

PLANTS AND TREES OF SYRIO-PALESTINE: CULTIVATION AND USES

by

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CHAPTER 1

GENERAL OVERVIEW

Modern Israel is an intensely interesting country, as one of the first impressions one receives on a tour to the region is the amount of the land that is being reclaimed from the arid, dry regions of the country and the restitution of forests and wooded areas. The idea of a study of the plants and trees of the land came after several visits to Israel and the realisation that the cultivation of the land and the production of fruit and vegetables for the markets are of extreme importance to the people. The Israelis are a hard-working nation and are researching so much of their geography, history and ecology. Israeli scientists are industrious in their efforts to produce larger, healthier and more abundant crops for food and medicine in particular, and other plants such as trees and plants used in perfumes, cosmetics and oils. The Bible is the collection of religious writings of Judaism and Christianity. It is a book containing laws that God gave to his people concerning the way they should live, and explains the need to follow a way of faith and trust. It can also be a source book for archaeological study, tracing the history of humankind and the relationship of people with God and the land. As such it is helpful in establishing the uses of many farming artefacts discovered in excavations and which are discussed in this dissertation.

The topic to be discussed, regarding the area and its plants and trees, was chosen as it is very pertinent in today's world, which is seeking to find alternative methods of farming, food crops, drugs and medicines, and is concerned about the 'greenhouse effect' on the environment. Particularly in Western countries organic fruit and vegetables are on the shelves of supermarkets and often cost a great deal more than the conventionally grown products which use chemical fertilisers and pesticides as these crops are grown in vast quantities. However, organic crops are considered far healthier than mass produced food plants, as they are naturally produced. Other foods that are commercially grown do not contain the vitamins and minerals our bodies need to prevent illness and disease. Supplements in the form of tablets such as Procydin are being recommended. Procydin is an antioxidant which is made from natural grape-seed extract and has an effect on the endothelium which assists arteries to expand and dilate and so reduce blood pressure. This dissertation studies the farming methods of Bible times, which would be accepted as organic, as only natural fertilisers were used.

By studying the cultivation of plants in the Bible and their uses one obtains a better understanding of what is meant in many passages in scripture and this makes the Bible texts more meaningful. To obtain an integrated description of the topic it was necessary to

study the geography of the region, which includes the climate and weather, topography, vegetation and soil types. It is interesting to note that by looking at the past, particularly in studying the Bible, one notices that many of today's farming methods and implements are similar to the ways of antiquity. Much of what is recorded in the Bible assists one in building a picture of the type of lifestyle of the farming community in antiquity and how it relates to the present day.

One of the problems of this dissertation was the use of the term "Syrio-Palestine". As mentioned below, the area has changed in size and name over the centuries. Scholars today have used the following terms when writing about this area: Israel, Ancient Near East, Palestine, Syria-Palestine, the Levant; the Holy Land, Bible lands. The latter two terms are used for popular handbooks and guides to the Bible. 'Syrio-Palestine' was used as most modern scholars prefer this term, as it reflects most accurately the region that was to be studied. This dissertation can have significance for anyone studying the Bible where background is needed, particularly with regard to farming, plants and their uses. Further to this dissertation, study can be conducted on medicinal plants, from antiquity to the present day, as space did not allow for in-depth treatment of this subject.

Another problem is that the time period that is covered by the dissertation has been exceedingly broad, as mention has been made of almost unbelievable dates in antiquity regarding plants (see 5.3). The history of a number of plants grown and used from antiquity to the the present day has been included. The history of settlements is also important in this study. The period covered therefore includes the earliest recorded times of humankind's activities in the Natufian culture ca. 10,500-8500 BCE, which is considered pre-agricultural, as the Natufians were still hunters and food gatherers (Mazar 1990: 36). The main discussion is on plants and trees grown during the time of the Bible, from the Neolithic Age (8500-4300 BCE) through the Bronze and Iron Ages to the Roman period up to the second century CE. Some mention is made of farming today, particularly where the activities have not changed much during the centuries.

In a topic such as this, where there are vast numbers of books and articles dealing with various plants of the region, it was necessary to discard many interesting plants and concentrate mainly on those which had the most impact on the society, such as the Seven Species mentioned in Deuteronomy 8:8. One of the most interesting sections is that dealing with medicinal plants but as mentioned above, further study should be conducted in this area.

Many articles and books written on various aspects of agriculture which include the history of the land and its effect on settlement patterns, in-depth research on implements, tools

and structures, types of plants, their uses and advice on how to grow them were consulted. The bibliography contains AA Swenson's books: *Flowers of the Bible and how to grow them*, *Herbs of the Bible and how to grow them* and *Plants of the Bible and how to grow them*. Some books also dealing with this topic are by N Hareuveni: *Nature in our Biblical heritage* and *Tree and shrub in our Biblical heritage* and O Borowski's books: *Agriculture in Iron Age Israel* and *Daily life in Biblical times*. Much research has been carried out on plants used in medicine and for food both in ancient and modern times such as *Healing herbs of the Bible* by RH Harrison and *Food at the time of the Bible* by MF Vamosh. However, this dissertation is written from the social aspect, with more emphasis on the people and their needs, their work on the land and the plants they grew and used. Their agricultural way of life includes their festivals, but also their struggles to cultivate the land and to preserve it.

By conducting a literature survey, it has been possible to provide a comprehensive view of the life of agriculturists in Syrio-Palestine, with their cultivation methods and use of plants. Books by expert scholars have been studied and a comprehensive document regarding the plants which have been of most use to people has been compiled. Similar methods of cultivation and farming used today are mentioned. Archaeological remains have assisted historians and archaeologists in investigating ancient methods of agriculture. This has meant that the pattern of settlement in relation to the environment can be established, for by identifying farming implements and structures it can be deduced what type of farming was undertaken and where it took place. By researching different plants an interesting phenomenon occurs, as some plants and trees are being studied in the attempt to make better use of them for food, while others are studied as possible cures for what are considered incurable diseases. Plants such as the *Sutherlandia frutescens* or cancer bush, have numerous medical uses including the benefits in treating AIDS and wasting in cancer; *Tabebuia impetiginosa* or pau d-arco, is used in the treatment of chronic venereal diseases and "as supportive treatment in cancer"; and other plants such as *Teucrium chamaedrys* or germander, and *Galium verum* or lady's bedstraw, still need more detailed pharmacological study (van Wyk & Wink 2004: 313, 316, 320 and 152).

The Bible and archaeology, as well as the growing of plants and their different varieties, have always been of great fascination to many people. There is renewed interest in plants, with documentaries on TV such as David Attenborough's *The Private Life of Plants*¹ giving the viewer an absorbing insight into their world. There is still so much more research that

¹ TV documentary series of six parts shown by BBC in 1995. Attenborough travelled with his team to all parts of the world, from jungles, deserts, swamps and mountains. Plant life is shown in action with the use of time-lapse photography and state-of-the-art techniques. The viewer is guided through the secret world of plants and how many struggle to survive.

needs to be undertaken regarding the trees and plants on this planet. Herbalife, one of a number of enormous enterprises, is continually researching the properties of plants and their usage for humankind, in providing good nutrition and healthy living. Some of their products are: *Nature's Raw Guarana Beverage* which uses *guarana* from the rainforests of the Amazon Basin and reduces fatigue and stress; *Rose-ox* containing extract of rosemary to strengthen the immune system and help prevent colds and influenza; *Niteworks*, a lemon powder mix that provides more nitric oxide during the night to support cardiovascular and circulatory health, and *Fibre and herb food supplement* which contains 'oat fibre plus mung bean, orange blossom, black sesame seed, hibiscus, chamomile, peppermint, fennel, parsley and papaya' (Herbalife 2008: 2-3).

Aloe products are increasingly coming under the spotlight, for they have had excellent results with health and skin products. According to the catalogue available, Alcare products make use of the gel from the *Aloe ferox* plant for medicinal and cosmetic care. This gel is used in a variety of ways, to help combat dry skin, insect bites, athletes' foot, blisters, and it has many other uses such as stimulating skin growth and healing burn wounds. Other products such as *Aloe Lean* and *Aloe Fibre Fat Magnets* are said to assist with dieting; *Aloe Joint Flex* is used with other ingredients to help with mobility of joints and reduce the pain associated with arthritis; and *Aloe Arthro Detox*, which detoxifies the system and is an immune and energy booster (Alcare 2007: 3-6).

Plants and trees throughout the ages have not only been used to feed and provide nourishment for people and animals, but use has been made of them for building, clothing, cosmetics and medicine. In fact, without plants, life would not exist. In modern times, it is becoming increasingly important to study plants scientifically to identify their potential to provide life-giving substances and healing properties. According to van Wyk and Wink (2004: 10-11) the Indians are considered the oldest users of herbs for medicine, although Chinese traditional medicine also made use of herbs from more than 5000 years ago. Most traditional medicines in Africa, America, Australia and Europe have used plants as cures. Medicinal use was made of leaves, stems, bark, roots, rhizomes, bulbs, tubers, wood, flowers, fruit, seeds, gum, resins, fatty oil, and essential oil to cure different ailments. For example, gum from the *Aloe vera* (*Aloe ferox* in South Africa) is mixed with water and made into a gel which is used in the pharmaceutical industry as well as for healing wounds; chamomile flowers (*Matricaria recutita*; *Matricaria flos*) are used to make a tea that has a calming effect or is used for gastritis, diarrhoea or travel sickness; the bark from the quinine tree (*Cinchona* species) has numerous uses such as an anti-malarial drug, a tonic to stimulate appetite or used in teas to cure flatulence (van Wyk & Wink 2004: 40-41, 200, 102).

The ancient people in Syrio-Palestine lived in a world where their Eastern way of life and thinking differs in many ways from our Western ways and thinking. For example, theirs was an ancient world, ours is modern. They lived in an agricultural world, ours is industrial. They made no separation between religion and their daily life, but in our world there is a separation between state and religion. According to Matthews and Benjamin (1993: Introduction xiv) the differences 'profoundly influence the way we live.' Living in an agricultural world in ancient times meant that human life was synchronised with nature and that every human challenge could be met by carefully studying the world of plants and animals.

Religion pervaded every activity of daily life in the world of the Bible and every season had its sacred festivals. It was not only the Israelites who celebrated the fertility of their wives, crops and animals, but all ancient peoples had their gods whom they worshipped. These people lived in fear lest they anger their gods, thus bringing disaster upon themselves. According to Grant (1984:63) it was the Canaanites who taught the Israelites how to farm in the region and who had three great annual seasonal festivals to celebrate various agricultural tasks. The Israelites then adapted these festivals to historical events: the Canaanites' Feast of Unleavened Bread which celebrated the end of the winter rains and the beginning of spring, was joined by the Israelites' celebration of Passover; the Festival of Weeks or Pentecost in summer was reinterpreted as a witness to God's covenant with the Jews; the Feast of Ingathering celebrated in autumn with the bringing in of the harvest was renamed the Feast of Booths or Tabernacles, or Succoth, to commemorate the wandering of the Israelites in the desert and God's provision for them (Rousseau & Arav 1995: 10; Grant 1984: 63).

Matthews and Benjamin (1993:37) maintain that the 'economics of farming involved environment, demography and technology. Environment was the land which villagers farmed. Demography was the villagers who farmed it. Technology included the tools and skills with which farmers worked.' Each of these aspects will be dealt with below. In this thesis the word 'environment' refers to the physical environment and particularly elements which relate to agriculture, such as climate, soil, vegetation and topography (Hopkins 1985: 32).

According to King and Stager (2001: 93) the people of Syrio-Palestine had a diet that 'consisted mainly of grains, vegetables, fruits and condiments' and the chief crops were wheat, barley, olives and grapes. They maintain that cereals ('among the earliest domesticated plants') were cultivated before the cultivation of fruit trees, as the grain could be eaten 'parched or raw, mostly in the form of bread or porridge.' Among the legumes grown were lentils, fava beans and chickpeas, while the vegetables consisted of

cucumbers, watermelon, onions, leeks and garlic. The main fruit trees were the olive and the grapevine, but date palms, pomegranate, fig and 'sycamore' trees were grown (King & Stager 2001: 94).

Syrio-Palestine has as its physical boundaries Mount Lebanon and Mount Hermon in the north; the Mediterranean Sea in the west; Transjordan in the east (this widely includes all the land east of the Jordan River) and the Syrian and Arabian deserts (east and south). The area is small in size being 410 km from north to south, 80 km from the Mediterranean Sea to the Jordan River, the inhabited land in Transjordan is about 40 km wide, making the total 20 000 sq km of fertile land (which includes the semi-arid regions in the Negeb and Transjordan) (Mazar 1990: 1). Mazar states that 'the evolution of human culture in Palestine was greatly affected by the country's geographic location, topography, climate, water, and other natural resources.' The geography of the land plays such an important part in the life of plants and humans and their interaction that Chapter Two below deals with this aspect. Chapter Three deals with the history and settlement patterns of the people in the land and Chapters Four, Five, and Six discuss cultivation and uses of plants.

Mazar maintains that the important role of history in the ancient Near East was determined by Palestine's geographic location as part of the Fertile Crescent, as it was a bridge between Egypt in the south and Syria and Mesopotamia in the north. Egypt and Syria had closest ties with Palestine but he also mentions Mesopotamia, Anatolia, Cyprus, the Aegean, and Arabia as being influential in its cultural history. He believes that Palestine should be part of 'the Levant' as it shares 'various common geographic and climatic factors' with Lebanon and the western half of Syria (the Orontes Valley and the region of Aleppo). Palestine, Lebanon and southern Syria (forming the southern part of the Levant) make 'a homogeneous unit' conforming to the land of Canaan as defined in the Bible (Mazar 1990: 1-3). (See Map 1 below).

CHAPTER 2

GEOGRAPHY OF SYRIO-PALESTINE

The location of Syrio-Palestine and its neighbouring countries in the Near East, as well as the various geographic regions of the land and the topographic features which hindered or advanced cultivation by the peoples who settled there, are discussed in the sections below (section 2.1, 2.2, 2.3 and 2.4). Two-thirds of the total geographical area is fit for human habitation and there is enough cultivable land, which is not very fertile or rich in natural resources (Grant: 1984: 9). The rest of the land comprises hostile terrain such as arid desert, steep mountains and gullies, infertile soil of the near-desert region, and rocky plateaus.

2.1 Political boundaries

The political boundaries of Syrio-Palestine have changed over the centuries as empires rose and fell. Today, the area is known as Israel, which is the main region under discussion. Lebanon lies to the north of Israel, Syria to the north-east, Jordan to the east and Egypt to the south-west. (See Map 2 below).

At the time of the United Kingdom under David and Solomon, the countries bordering Syrio-Palestine were Sidonia to the north-west, Philistia to the south-west, Arabia to the east and Egypt to the south. Hamath in the north was under Solomon's control, and the lands of Aram, Ammon, Moab and Edom, which had been conquered by David, were included in the United Kingdom (Bimson 1985: 42). (See Map 3 below).

Under the Romans, the land was divided into the provinces of Idumea, Judea, Samaria and Galilee on the western side of the Jordan River and the Decapolis, Perea and the Tetrarchy of Philip, consisting of Gaulanitis, Trachonitis, Auranitis, Batanaea, and Caesarea Baniyas (Philippi), on the eastern side. Its neighbours were Phoenicia in the north-west, Syria in the north, the Nabateans and Arabia in the east and Egypt in the south (Aharoni & Avi-Yonah 1977: 140). (See Map 4 below).

2.2 Geographical regions

When describing the major geographic features, most authors use a west to east direction, some dividing the land into four, five or even six regions. Gardner (1981: 39) and Zohary (1982a: 16-21) classify the land into four regions: the coastal plain, the hill country, the Jordan valley and the eastern plateau sloping towards the Arabian Desert, while Aharoni and Avi-Yonah (1977:14) identify the Negeb, the hill country, the Shephelah and the

wilderness. According to Bimson (1985:10), McNutt (1999:37) and Thompson (1986: 12-18) the land is divided into five different regions. Bimson and McNutt classify the area into the coastal plains, the central hills, the Jordan Rift Valley, the plateaus of Transjordan, and the desert, while Thompson's classification differs in that he separates the foothills and hill country into two regions, but treats Transjordan and the desert as one region. Matthews and Benjamin (1993:37-38) maintain that 'there are six clearly defined geographical and climatic zones': the coastal plain with the foothills (or Shephelah) separating them from the second zone, the Judean hills. The third and fourth zones are the Jordan valley and Transjordan. They classify the fifth zone as the hill country and the sixth as the Sinai Desert and the Negeb.

Mazar (1990: 3), also uses a west to east direction but divides the country into 'longitudinal strips' that vary in 'topography, breadth, and altitude' but he identifies seven regions: 'the coastal plain, the Shephelah foothills, the central mountain ridges, the Judean Desert (located east of the Judean Hills) the Rift Valley, the mountains or plateaus east of the Rift valley, and the eastern desert'. There is little disparity between the various classifications, but for the purpose of this study use has been made of Thompson's classification, which includes aspects of soil types and their importance to cultivation. (See Map 5 below).

2.2.1 Coastal plain and foothills. Along the relatively straight coast with few inlets or natural harbours, there is the narrow, flat sandy coast rising to chalk plains. Thompson (1986: 12-18) mentions three sub-sections to the plain region: the northern plain he calls the 'Plain of Acco' (Acre) which stretches from Mount Carmel to Rosh Haniqrah; the central plain, the Plain of Sharon, which was once covered with forest and swamp; and thirdly, the more cultivable southern plain, which Thompson calls 'the Philistine Plain.' The plain is fertile, except for the sand dunes (originating from the Nile delta) and which prevented the streams from flowing out to sea causing the land to become swampy and marshy in the rainy seasons.

The second region includes the lowlands or foothills cut by wadis or dry riverbeds and some intermittently flowing streams. The Shephelah, as it is known, is a narrow strip of land about 45 km long and 15 km wide consisting of 'wide valleys and round, rolling hills' (Hopkins 1985: 62). The eastern part of the region had the most fertile soil and was the main granary of biblical Israel (Zohary 1982a: 16).

2.2.2 Hill country. Thompson's third region is the 'hill country'. The land consists of limestone and, although much of it was not easily cultivated, it was the main area of Israelite settlement. Jerusalem and Samaria were two cities in the hill country. The Galilee region of the hill country is divided into Upper and Lower Galilee. Upper Galilee is mainly

mountainous, but to the east where it is more level, some agriculture takes place in the Butaha Valley, north-east of the Sea of Galilee. Lower Galilee has some level basins and gently sloping hills which allows settlement and more agriculture in the Plain of Gennesaret, to the north-west of the Sea of Galilee. The Valley of Jezreel forms a break between the mountains of Galilee to the north and the hill country of Samaria to the south. It is through the Jezreel Valley that important trade routes passed, although in the wet season the land became swampy. It is in the hill country of Samaria that wheat, fruit and olive trees were, and still are, grown.

Further south is the hill country of Judea with numerous wadis. It is on the western slopes of the hill country that adequate rain falls for the cultivation of crops, with irrigation farming and terraced fields. On the eastern side near the Dead Sea it is semi-desert and is called the Wilderness of Judea. Finally, in the southern region of the hill country below Beersheba, the land slopes towards the Negeb Desert which is an extremely inhospitable area (Thompson 1986: 15).

2.2.3 The Jordan Valley. The Jordan Valley is the fourth geographic region according to Thompson and forms part of the Syrio-African Rift Valley forming the lowest part of this area. The Jordan River starts in the north on the western slopes of Mount Hermon (2814 metres above sea level) and flows into Lake Huleh 71 metres above sea level. By the time it enters the 'mildly saline' Sea of Galilee it has fallen to 210 metres below sea level (Thompson 1986: 16). In ancient times the entire Jordan Valley was under water as it was the floor of an inland sea. A string of oases are situated along the valley at the fresh-water springs and brooks which occur from north of Jericho southward as far as En-Gedi and Zoar (Zohary 1982a: 21).

According to Matthews (1991: xxvi) the further south the Jordan flows the more saline it becomes, thus dividing the north, which is agriculturally richer and produces wheat, from the south, where more salt resistant barley is grown. The river twists and turns on its way down to the Dead Sea. Due to low rainfall, the river by this time is thick with brine, with very little plant life growing along its banks. The Dead Sea, into which the Jordan flows, is the lowest point in the earth's surface, about 390 metres below sea level.

Esse (1991: 4) maintains that the Jordan River valley has two 'morphological units' – the *ghor* which is the wider valley bottom flanked by the hills of Palestine and Transjordan; and the narrower *zor*, which is the actual river bed of the Jordan. Packer and Tenney (1980:201) state that the lower Jordan consists of three plains, the *ghor* (furthest from the river and continuing from the upper Jordan), the *qattara* or badlands, as the soil is salty from the ancient deposits of sediment left behind and which today is being reclaimed, and

the plain closest to the river, a few kilometres wide, known as the *zor*, extremely saline and covered by thickets of tamarisk and poplar.

2.2.4 Transjordan and the desert. The fifth region is the Transjordan plateau on the eastern side of the Jordan. The Gilead Mountains are situated between the Yarmuk and Jabbok rivers and then the land begins to slope gently to the south. In biblical times forests covered the hills and where rain falls on the higher plains agriculture is possible, although the mountains are barren (Thompson 1986: 18). Zohary (1982a: 21) notes that the rivers Yarmuk, Jabbok, Arnon and Zered crossing the Transjordan Plateau and flowing into the River Jordan, the Dead Sea and the Arabah Valley divide it into three natural blocs: Bashan north of the Yarmuk River; Gilead and Moab between the Yarmuk and Zered Brook; and Edom between Mount Seir and the Gulf of Elath. This area incorporates Bimson's fifth region, the desert, which includes 'the tableland of Bashan' (the Golan Heights of today), 'the level steppes of Ammon and Moab' and beyond the Edom mountains to the east and south of this area, the Syrian and Arabian deserts.

2.3 Factors affecting vegetation

There are a number of factors which have a marked effect on natural vegetation and cultivation of crops. The geology of the land plays an important role as different types of soil and height above sea level, water courses and rivers, valleys and mountains influence vegetation, cultivation and hence settlement patterns. Climate and weather patterns also determine the type of vegetation growth and play a crucial role in the cultivation of crops. The importance of the type of soil can be seen in its productivity. Sand dunes and desert areas are dry and infertile and very little grows except some plants adapted to these conditions. The hill areas are composed of slowly weathering limestone, which produces fertile soil. However, the Israelite farmers had to struggle to cultivate it, as they also had to contend with thorns and thistles, forest and shrub, rocks and harsh sun. Zohary (1982a: 22) points out that soil varieties 'are second in importance only to climate' and the land has extremely variegated soil, indicating nine dominant soil types.

2.3.1 Geology of the land: soil types. Soils play an important part in realising the agricultural potential of a region. Esse (1991: 5) maintains that the productivity of the land depends on properties such as 'texture, salinity, susceptibility to erosion, and location' of the soil. According to Bimson (1985:11) the major types of soils that are found in Syrio-Palestine are alluvium, Quaternary red sand, basalt, Eocene limestone, Senonian chert, Senonian chalk, Cenomanian limestone, Nubian sandstone, granite and dune sand. Zohary (1982a: 22) indicates nine dominant soil types: *terra rossa*, *rendzina*, sandy soils, alluvial soils, gray steppe soil, loess soil, *hammada*, reg and swamps and salines. Esse

identifies five main groups of soil: *terra rossa*, *rendzina*, alluvium, basalt and Lisan Marls. Soil types in the various regions in Syrio-Palestine are varied with one type predominant in a certain area. Frick (*in* Clements 1989: 77-78) identifies four basic soil types in the highlands: *terra rossa*, *Mediterranean brown forest*, *rendzina* and basaltic. (See Map 6 Bimson's classification below).

2.3.1.1 *Terra rossa*. The central mountain and hill area (which includes Upper and Lower Galilee, the mountains of Samaria, the Judean Hills and further south the Hebron Hills) consists of *terra rossa* soils. According to Esse (1991: 5) *terra rossa* soils are alkaline and consist of a high proportion of silt and clay. They are derived from the hard Cenomanian and Turonian limestone and dolomite of the parent material and are affected by erosion. These soils are fertile, low in lime, fairly shallow in depth, and particularly on the mountainsides, care has had to be taken to preserve the soil by terracing or building dams across the wadis or narrow valleys. Zohary (1982a: 22) points out that *terra rossa* soil, which is red to brown in colour, is the commonest soil type 'in the Mediterranean part of the country.' Frick (*in* Clements 1989: 78) describes the Mediterranean brown forest soil as being very similar to *terra rossa* soil as it has resulted from the 'breakdown of soft limestone', but however, contains more lime and the soils are more alkaline. Hopkins (1985: 128) points out that these soils are 'productive and fertile' covering 'smoother topography' and therefore of agricultural importance.

2.3.1.2 *Rendzina*. The *rendzina* soils are gray to grayish-white in colour and are formed on softer parent material than the *terra rossa* soils. *Rendzina* is formed on 'the soft limestones, chalks and marls' and is found in Mt Carmel, Samaria, the northern Judean mountains and also in Upper Galilee. *Rendzina* soil is 'rich in lime but poor in humus' so it is not very fertile. Esse (1991: 5-6) maintains that erosion has also affected this soil type and vegetation has suffered, but Hopkins (1985: 128) points out that *rendzina* soils are found where there is less danger of erosion and the land is suitable for agriculture. He points out that there is some clay in its composition but that the 'percentages of silt and sand which combine with the clay' indicate that it is loamy in texture. It has 'a low water-holding capacity' and this too, makes it 'less susceptible to erosion.'

Frick (*in* Clements 1989: 78) maintains that *rendzina* soils are 'more permeable and less susceptible to erosion', which confirms Hopkins' view. Zohary (1982b: 19) describes four varieties of *rendzina* soil with slightly different properties: light *rendzina* the most common variety derived from chalky rocks with a high lime content; the next most common variety which is derived from 'chalky-marly Cenomanian rocks' and supports most of the pine forests in the land; another marly variety, but supporting only small shrubs and maquis; and a dark coloured *rendzina* which contains more humus and less lime.

2.3.1.3 Alluvium. Alluvial soils occur in a number of areas of Syrio-Palestine. There are different groups of alluvium depending on the original soil group but they share similar properties such as heaviness and high moisture-holding capacity. Although these soils are fertile, there is the problem of water-logging and inadequate drainage thus causing crops to suffer. Zohary (1982a: 22) says they are found in 'plains and inter-mountain valleys' and are 'the most fertile soils in the country.'

The valleys of Jezreel and Beth-Shean, in the upper Jordan region, due to their alluvial soil which consists of rich red and black loam, and their abundant water sources, are particularly suited to agriculture. According to Esse (1991: 6) the parent material of the alluvium, in the western part of the Jezreel Valley, consisted of *terra rossa* and *rendzina* soils, while in the eastern part of the valley, the soils consisted of *terra rossa* and basalt. Alluvium from the Jezreel Valley is carried by the Kishon River to the Akko Plain. The whole coastal plain produces alluvium as it receives its soil from Mt Carmel and the western side of the Galilean mountains.

The area around Lake Huleh although comprising of some basaltic soil, is mainly alluvium. There is a problem with drainage, which originally caused swamps around the lake when the seasonal rains fell. These swamps are composed mostly of peat soil which is alkaline. From the Huleh Valley in the north of the Rift Valley a huge inland sea stretched as far as the Dead Sea. The Ghor Plain is found on both sides of the Jordan River and consists of alluvial soil. It runs for 105 kilometres continuing south to the Dead Sea and then beyond it, where it is called the Sebkha marsh (Bimson 1985: 19-20).

Alluvial soil is also found along the Sea of Galilee such as in the Plains of Gennesaret and Buteha at the northern end of the lake. At the southern end alluvium is found along the wadis and at the base of the Lower Galilee hills as far as the Beth Shean Valley. The parent material for the alluvium in the wadis is mainly basalt.

2.3.1.4 Basalt. Basaltic soils are found only in north-eastern Palestine in the area of eastern Lower Galilee, in the eastern part of Upper Galilee around Lake Huleh and large parts of the Golan Heights. These basaltic soils resulted from volcanic activity. The texture is heavy, they have a low soil profile and the soil tends to dry out quickly because it is low in organic matter. The lime content varies 'between 0 to 25 percent' and they 'are clayey in texture' (Hopkins 1985: 129). According to Esse (1991: 7) two kibbutzim close to each other have totally different agricultural yields, as one farms on basalt alluvium (resulting in a poor condition of the crops because of the heaviness of the soil and thus poor drainage) and the other on Lisan marls with some basalt (which produces crops in a better condition as it is lighter in texture and has better drainage).

Zohary (1982b: 19) points out that basaltic soils are alkaline and the soil layer is usually very shallow. Generally these soils are agriculturally poor, but 'when transported and accumulated in plains and valleys', become 'fine textured and agriculturally highly productive.'

2.3.1.5 Lisan Marl. This soil type is so called as it was formed at the bottom of the large Lisan Lake which dried up many thousands of years ago. It is light gray in colour and contains lime, gypsum and also calcium, which causes some salinity. It is easy to cultivate as it is crumbly. Lisan marls are found along the Jordan Valley from the Dead Sea to the south of the Sea of Galilee. At the Dead Sea the soil is extremely saline but in the northern part of the valley, although there is far less salt, the land is not very fertile. Today with fertilisers, cultivation is taking place (Esse 1991: 7).

2.3.1.6 Dune sand. Along the coastline and parts of the coastal plain there are sandy soils which have been carried by onshore winds. These soils are 'mainly of silica grains' and 'occur in a variety of forms, from calcareous sandstone and sandy clay to sandfields and dunes'. The soils are light and therefore easy to work agriculturally (Zohary 1982a: 22). There is a fairly high lime content and the soil is deficient in organic matter (Zohary 1982b: 20).

Mazar (1990: 3) states that further inland from the coastal plain, the low-lying hills consist of loess soil which is soft and sandy, although Zohary (1982a: 20) identifies this type of soil in semi-arid regions. The Plain of Sharon, north of the Yarkon River, is where the coastal plain narrows and two ridges divide the plain. These ridges consist of sandstone called *kurkar*, which according to Packer and Tenney (1980: 206) disintegrates slowly and hardens when it meets water. In the past the basins that were formed by the ridges were marshy areas trapping the alluvial soil washed down from the mountains. Further north the coastal plain narrows still further along the Carmel ridge, widens to become the valley of Acre and finally the mountain ridge, Rosh Haniqrah, becomes the border between Israel and Lebanon. According to Mazar the coastal plain in the north consists of light, sandy soil called *hamra* and there is plenty of water from the numerous rivers such as the Yarkon and the Kishon, making this one of the most fertile agricultural regions (1990: 3).

2.3.1.7 Desert soils. The desert areas are composed of sand and weathered rock. According to Zohary (1982a: 22), the loess soil is 'chiefly found in the northern Negev and southern Transjordan.' This soil has been transported by dust storms and 'deposited in plains and inter-mountain valleys', and being the most valuable of the desert soils, in certain places it has been cultivated where it can be irrigated. Also in the northern Negev and the western Judean desert a semi-desert type of soil which Zohary calls 'gray steppe

soil' is to be found. It is 'derived mainly from soft chalk where there is little rain' and it is 'uncultivable.'

Bimson (1985: 22) states that in the southern Negeb there is little soil and the ground consists mainly of 'desert debris (*hammada*)'. Zohary maintains that *hammada* is generally barren as it consists of coarse stones which conceal 'a gray or brownish, stone-mixed earth.' Sometimes it is salty or saltless and it may support a vegetation of low shrubs. According to Bimson, the soil that does exist is lacking in organic matter and liable to erosion.

Another type of desert soil is *reg* which is found in the desert plains and valleys. Zohary describes *regs* as 'vast, extreme desert flats, densely covered with angular rubble and pebbles.' The soil that lies beneath this covering is 'fine-grained, and often rich in salt and gypsum.' Due to its extreme dryness the soil is completely barren. The area of the Arabah, which is the southern extension of the Jordan Valley and part of the Great Rift as far as the Gulf of Aqabah, is mostly unsuitable for cultivation.

2.3.2 Topographic features. Mountains and valleys, rivers and lakes, deserts and the Great Rift Valley are all features which have shaped the settlement and cultivation of the land. Matthews (2007: 24-25) maintains that the physical terrain of the land has resulted in a 'great variation in settlement patterns – rural, urban, semi-nomadic, and seasonal.' The placement of cities and of settlements have been subject to the proximity of natural resources, natural defences and trade routes and where there are people in great numbers, the land also needed to be cultivated to produce food for them and their animals. Farming was of considerable importance in ancient Israel's economy and necessary for continuous survival. Matthews maintains that farming was a 'primary factor' in the economy and a 'link to survival in the rural settlements of the Central Highlands.' (See Map 5 below).

2.3.2.1 The Rift Valley. The major topographic feature in Syrio-Palestine is the deep rift which stretches from northern Syria through the valley of Lebanon, the Jordan valley, the Arabah and the Gulf of Elath stretching as far as the south-east coast of Africa. It is this rift which divides the area into the western part and the eastern part (Transjordan) (Aharoni & Avi-Yonah 1977: 14).

2.3.2.2 Mountains and valleys. A feature of this area is the great difference in altitude within relatively short distances, for example, where the Jordan River drops rapidly before entering the Sea of Galilee. Steep mountains cause this fall in altitude, an indication that this land was usually difficult to settle and cultivation was extremely hard. In the Upper Jordan Valley there are three mountain ranges which form a barrier; the Hermon Range

(the highest point is Mt Hermon over 2800 metres) to the north, the Naphtali Range to the west, and the Bashan Mountains (Golan Heights) to the east (Packer & Tenney 1980: 197). The high mountains have snow for much of the year and the run-off melting snow which flows into underground springs, together with the rainfall, provide water for the whole year. Other mountain ranges are the mountains of Samaria and Bethel in Lower Galilee, and the mountains in Transjordan: the Gilead, the Moab and the Edom ranges.

2.3.2.3 Lakes and rivers. There are three large bodies of water, the northernmost being Lake Huleh fed by the Jordan River flowing 120 kilometres southwards and on its way joined by two large rivers, its major tributary, the Yarmuk, and further south, the Jabbok, as well as a number of streams which carry water in the rainy season. Lake Huleh is a fresh water lake, which was swampy in ancient times when it became silted up by volcanic action and the erosion of the surrounding foothills. Today it has been reclaimed for agriculture (Bimson 1985: 19). A fertile region, the lake has been vastly reduced in size due to evaporation and its use for agriculture. From there the Jordan drops down into the Sea of Galilee, 21 kilometres long and a fresh water lake which is slightly saline but widely used for irrigation. Finally the Jordan, after meandering through the valley and thus almost doubling its length, empties itself into the Dead Sea (77 kilometres in length), the waters of which are saline and totally unsuitable for cultivation, containing chemicals such sodium, magnesium chloride, potassium chloride and sulphur, but useful in the making of fertilisers (Packer & Tenney 1980: 209).

2.3.2.4 Deserts. Numerous deserts such as the Negeb are another feature. The Negeb covers 11 650 sq kilometres, together with the deserts around it (Bimson 1985: 22). In the north-east is the Wilderness of Damascus, in the east, the Wilderness of Moab and in the south-east the Wilderness of Edom. The southern Negeb is divided into the Arabah in the south and in the south-west the Wilderness of Paran and the Wilderness of Zin. These desert areas have not been permanently settled but have for centuries been the home of wandering nomads, until Israel became a state in the twentieth century and begun to utilise as much land as possible. (See Map 7 below).

2.3.3 Climate and weather patterns. Climate and weather play an important role in shaping the land and its vegetation. Precipitation is vitally important, as are dew and snow, in a land as dry as Syrio-Palestine. There are large variations in temperatures between summer and winter and between day and night. The westerly winds from the Mediterranean Sea and the easterly winds from the desert have played their part in forming the landscape and the soils, as much weathering has occurred over the ages. The northern and western parts of the land tend to be wetter than the southern and eastern parts, but heavy rainfall in these drier areas can cause flash floods and the wadis quickly

fill up. The latitude and the height of the land have a bearing on the rainfall as it is on the mountains that most rain falls. As one travels further south the rainfall decreases, as it does from west to east. Much of the precipitation is lost due to evaporation because of the land's high temperatures and low humidity.

Bimson (1985:14-15) distinguishes between three climatic zones: Mediterranean, steppe, and desert and points out that each one has its own distinct vegetation. According to Esse (1991: 7) there are four climatic zones which 'converge in Palestine: the Mediterranean, Irano-Turanian, Saharo-Sindian and enclaves of Sudano-Deccanian' of which only the first two need to be considered. Zohary (1982b: 23) maintains that 'the country should be divided bioclimatically into three zones: a sub-humid zone (annual rainfall between 1000 – 400 millimetres); a semi-arid zone (annual rainfall between 400 – 200 millimetres); and an arid zone (annual rainfall 200 – 25 millimetres).' (See Map 8 below).

2.3.3.1 Mediterranean climate. Most of northern Palestine and along the coast as far south as Gaza, north into Lebanon, east into Syria and parts of Transjordan, the hill country of Judea and Samaria fall into the Mediterranean zone. Bimson (1985: 14) comments that this is the area characterised by hot dry summers and mild winters. The temperatures in mid-summer range between 23° C in the interior hills such as around Jerusalem, and 26° C along the coast. Rain rarely falls in the summer months from June to the beginning of October. Compared to summer, snow falls in winter on the mountains and high hills, the temperatures vary between the coast with an average of 12°C, to the interior hills where 7°C has been recorded in Jerusalem. Most rain falls in mid-winter between December and February but in the other winter months as well. The coast has about 35-40 centimetres of rain, while on Mount Carmel and the mountains of Judea, Galilee and Transjordan approximately 75 centimetres of rain falls. King and Stager (2001: 86) point out that 'there are Mediterranean zones east of the Jordan Valley, such as parts of Gilead, Ammon and Moab, that have as much rainfall as areas to the west of the Jordan.'

2.3.3.2 Steppe and desert. As far south as Beersheba and a large part of the Negeb, parts of the Jordan Valley up to the Sea of Galilee, and the southern and eastern part of the Transjordan plateau, the climate is steppe or Irano-Turanian and is a 'buffer between the Mediterranean zone and the Saharo-Sindian zone' (Esse 1991:9). Zohary (1982a: 27) calls this the Saharo-Arabian region. The temperatures are comparable to the Judean hills except for the area of the Jordan Valley where it has sub-tropical conditions and the summers are stiflingly hot. Jericho has daily temperatures above 38°C from June to September and these can even rise to between 43°C and 49°C, while the winter temperatures can be as mild as 18°C to 20°C in January. Only about 20–30 centimetres of rain falls in the steppe region. The desert zone includes the Negeb, the southern part of

the Jordan valley and the land south and east of the Transjordan steppe. Here the rainfall is less than 20 cm annually (Bimson 1991: 14).

2.3.3.3 Weather patterns. It is necessary to expand on the weather patterns in this region, as rainfall, dew and winds have a part to play in the agricultural life of settlements.

a) Rainfall. According to King and Stager (2001: 86) there are a number of Hebrew words for rain - rain in general is *mātār*, *yôreh* is the beginning of the rainy season and *malqôš* falls at the end part of the season. While most rain falls in winter, during mid-September to mid-October the moist sea air mingles with the hot, dry air rising from the earth's surface causing thunderstorms and intermittent rainfall. These rains are eagerly awaited as the temperatures drop, the skies become clearer, the summer drought is broken and the land is softened for ploughing. These are known as the 'former rains' or 'early rains' of autumn. The beginning of effective rainfall normally occurs in mid-October but good rains may only fall in January. It is the heavy winter rain which the farmer hopes will soak the ground and fill the cisterns. In March or April the last showers of the rainy season fall, thus giving the crops their last watering before the drought of summer. These rains are the later rains of spring, or as they are called in the Bible, 'the latter rains' and are vital for the growth of wheat and barley, as after this harvesting begins to take place (Thompson 1986:21).

b) Dew. Packer and Tenney (1980: 196) and King and Stager (2001: 87) mention that dew, which is 'the condensation of atmospheric moisture', falls on approximately 250 nights of the year but it evaporates quickly. Dew is of great importance in areas where there is little or no rain as it provides some moisture for the plants, particularly in summer. According to Bimson (1985: 14), dew makes dry-farming possible where there is no rain, the vine harvest is helped, and in times of drought the dry pasturelands are freshened.

c) Winds. Winds can be a blessing but also a curse in this dry land. Once the rain has stopped, hot winds blow in an easterly direction from the desert. These winds are known as *hamsin* or *sirocco* winds which are loaded with dust, causing irritation and unpleasantness. These winds scorch the vegetation making it dry and yellow. During the day the westerly winds off the Mediterranean Sea cool the hot air, and at night, as they carry moisture, they cause dew to fall (Packer & Tenney 1980: 196-197).

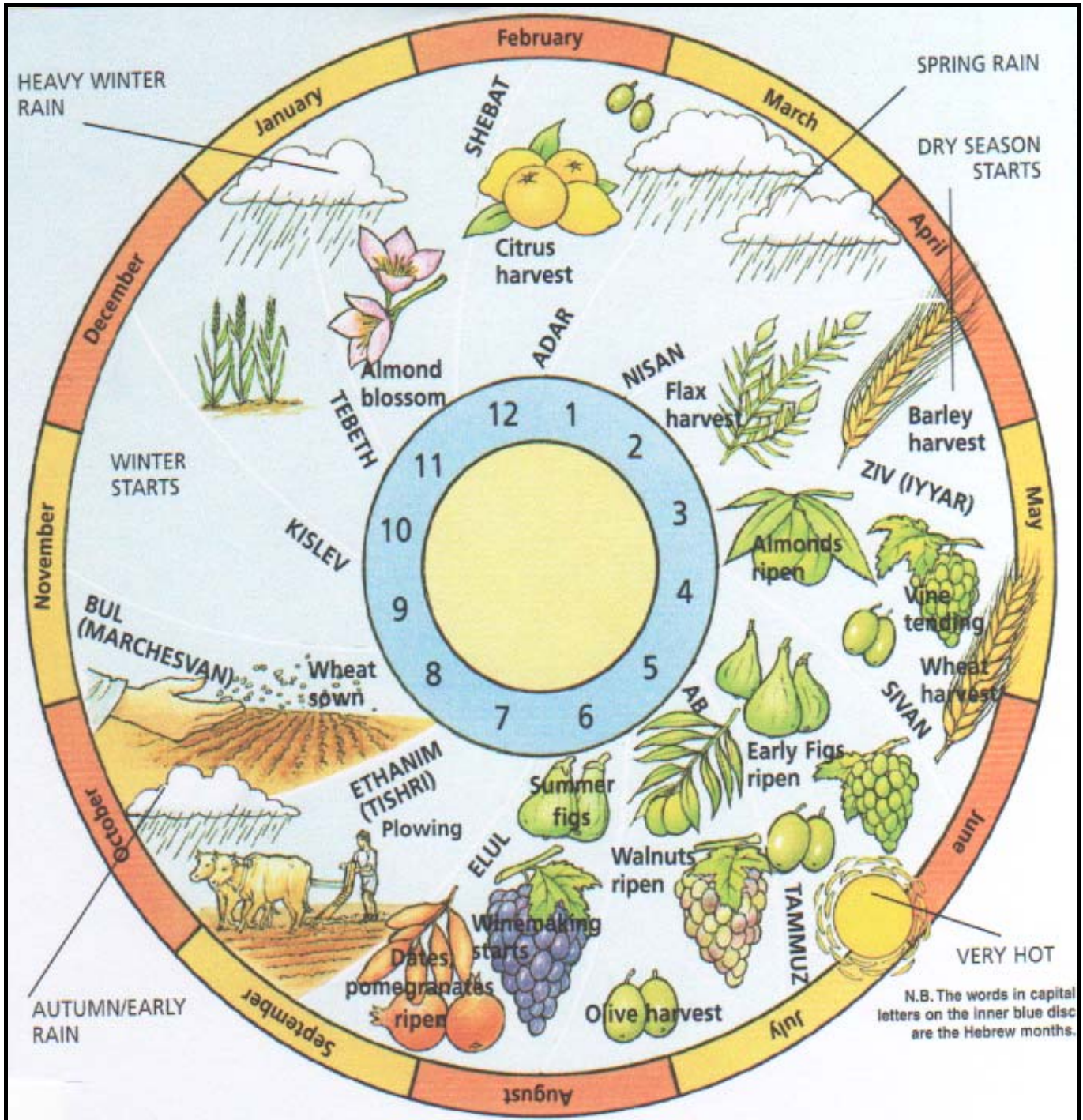
Hareuveni (1980: 35-36) says that between mid-April and mid-June there are a number of climate contrasts as 'scorching southern winds alternate with cold winds from the north and west', the southern winds bringing dryness and heat which is good for the olive, grape, date and pomegranate crops but can be devastating for the wheat and barley crops. The northern and north-western winds bring storms with thunder, lightning and rain. These winds are beneficial for the wheat if it is ripening at that time, but damage the olive, grape,

pomegranate, and date crops if the buds are beginning to open and pollination has not occurred.

2.3.3.4 Weather calendar. Looking at a farmer's monthly calendar, December and January with the heaviest rainfall, snow on the mountains and shorter days, mean that little will be growing that needs tending. According to Mackie (1991: 17-18) February has more sunshine and is the month when the almond trees begin to blossom and the late barley is sown. March is a windy month, has more sunshine and with April enjoys 'the latter rains'. These provide water for the barley and wheat crops. Apricot trees begin blooming and almond trees continue blossoming. April is also the month of the spring flowers such as red anemones, poppies and daisies but it is also when the *hamsin* winds blow for three days or more. These winds help to melt the snow and hasten the growth of plants, but as mentioned above can be a problem for some crops. In some areas such as the Jordan River valley, harvesting begins and peach, pomegranate and olive trees are in blossom. Rain begins to fall off in May, the flowers disappear, the grass withers and harvesting begins on the plains and low lands. Fruits such as green almonds, apricots and early plums are ready and the vines are in blossom.

Harvesting takes place in June on the higher ground. The surrounding areas are dry and barren except for fruit trees, vines and irrigated gardens for vegetables. During the summer months of July and August which are the hottest months of the year, grain is threshed and fruit such as grapes, figs, peaches, apples and pears ripen. September is also a hot month and pomegranates, quinces and bananas and figs are dried to be used in winter. Grapes are made into wine, syrup and raisins. October is a busy month for farmers as harvesting of fruit crops takes place. The fig and grape harvest is completed, olives are gathered and sugar cane and dates ripen. As 'the early rain' falls, the ground is ready for ploughing which carries on until November. This is when wheat and barley are sown. Finally, in December, the weather cools down, more rain falls and snow begins to fall on the mountains. Oranges, lemons and citrons ripen and vines are pruned. Pruning of the vines continues into January. The illustration below gives some idea of the seasons and corresponding crops.

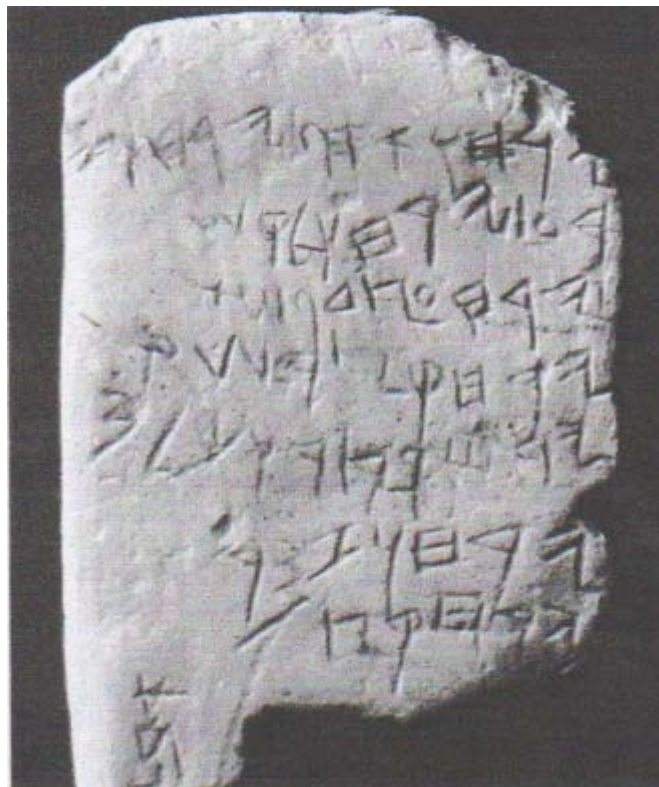
Diagram 1: Farming cycle



From Dowley 2002: *The world of the Bible*, p.12.

The Gezer calendar, a small limestone plaque which was discovered and dated from the tenth century BCE, (see 4.1 below), 'records a pattern of the agricultural year' from earlier times, and schedules and prioritises agricultural work (Matthews 1991: 50). It is 'based on a twelve month cycle beginning in the autumn' and enumerates eight periods, 'starting with the ingathering of autumn fruits' and beginning with the olive harvest (King & Stager 2001: 88). Matthews believes that this calendar was 'based on the division between the rainy winter months and the dry spring and summer'. Although this old calendar gives some indication of how farmers could organise their work, it seems to have been effective. It does indicate to some degree the crops that needed to be planted and harvested and in which months the work was to be undertaken. Most authors agree that the Israelites used a lunar calendar as opposed to the solar calendar when celebrating their festivals and organising their agricultural tasks (Borowski: 1979: 63).

The calendar discovered by McAllister at Gezer, measuring 11 centimetres and written in old Hebrew script



From Gower 1987: *The new manners and customs of Bible times*, p. 88.

2.4 Geographical distribution of vegetation

Contrasts in relief are very noticeable, with more than 1000 metres above sea-level near Hebron and 390 metres below sea-level at the Dead Sea (Bimson 1985: 17). This causes the flora of the land to be very varied. Deist (2000:137) maintains that there are 718 plant species endemic to the area. Many of these plants are annuals. According to Zohary

(1982b: 29) there are 'about 2400 species spread within 700 genera and 126 families'. It is conjectured that in prehistoric times the coastal plains and the hill country were overgrown with wood and shrubs, but were destroyed over time by 'natural disasters, human and animal activity'. It is believed that by the time of the Iron Age, when the Israelites entered the land, it was mainly on the higher mountains that they found woods consisting of 'high trees and a thick undergrowth of shrubs, herbs and grass' (Deist 2000: 137).

Esse describes two phyto-geographical regions which correspond with the climatic zones, namely the Mediterranean zone and the Irano-Turanian zone (1991:7). Zohary (1982b:31-34) notes that there are five geographical regions: 'Euro-Siberian region', 'Mediterranean region', 'the Irano-Turanian element', 'Saharo-Arabian element' and 'Sudano-Zambezi element.'

2.4.1 Mediterranean region. It is the largest vegetation zone in the land and contains evergreen plants and 'ephemeral herbaceous ones', numbering about 800 species (Zohary 1982b: 31, 55). In this zone the rainfall is above 350 millimetres per annum. There are a number of variations in vegetation cover. For example, the vegetation in the hill country consists of high maquis and forests of evergreen Palestinian or common oak (*Quercus calliprinos*) and terebinth (*Pistacia palaestina*) with associated flora, which grow on *terra rossa* soils. Where there is softer limestone and thus *rendzina* soils on Mt Carmel, Galilee, Samaria, Judea and Gilead, there are small forests of Aleppo pine (*Pinus halepensis*) (Esse 1991: 7).

In the valleys of the Sharon, Lower Galilee, Huleh and Dan, the Tabor oak (*Quercus ithaburensis*) grows together with the Atlantic terebinth (*Pistacia atlantica*). Along the coastal plain, on the western foothills from Judea to the border of Lebanon, the sand dunes of northern Sharon and on some of the eastern slopes of the Galilean and Samaritan mountains, there is some evergreen scrub forest which includes the carob tree (*Ceratonia siliqua*) and the mastic pistacia bush (*Pistacia lentiscus*). On the sandy areas of the coastal plain herbs and grass stabilise the soil. Plants such as 'marram grass (*Ammophila arenaria*), white broom (*Retama raetam*), Palestine knotweed (*Polygonum palaestinum*) and wormwood (*Artemisia*)' have adapted to the extreme conditions and live with many other plants. Water plants such as the reed (*Phragmites australis*), papyrus (*Cyperus papyrus*) and oleander (*Nerium oleander*) grow in swamps and along river banks on the coastal plain and in the Jordan valley, where remnants of Euphrates poplar (*Populus euphraticus*) and tamarisk (*Tamarix spp.*) still grow. (Zohary 1982a: 33-34).

Much of the vegetation in the Mediterranean region has been destroyed by settlers in the expansion of their farming and pasturage activities, as well as their need for timber for building and fuel. Where the forests have been destroyed, dwarf shrubbery (*bathah*) has overtaken the land and has become 'the most striking vegetal feature in the Mediterranean part of Israel.' Apart from the shrubs many annual flowers and grasses bloom in the rainy season. The predominant plant of the *bathah* is the thorny burnet (*Sarcopoterium spinosum*) (Zohary 1982a: 33).

2.4.2 Irano-Turanian element. The Irano-Turanian and Saharo-Arabian territories consist of steppe and desert vegetation which depends on the type of soil that is found there. The natural vegetation consists of 'widely scattered low bushes, dwarf-shrubs and herbs' and in spring, numerous tiny annuals. The soil is poor and cannot support agriculture, so herding and pastureland predominate (Zohary 1982a: 34).

The territory covers a large part of the northern and central Negeb, parts of the Judean desert and large parts of southern and eastern Transjordan. The annual rainfall in this region is from 150 to 300 millimetres and the temperature is more extreme than that of the Mediterranean region. In this region, according to Esse (1991:9) and Zohary (1982a:34), the main shrub is white wormwood (*Artemisia herba-alba*) and is characteristic of the western Judean desert and the northern and central Negeb. Among other types of dwarf-shrub vegetation growing on the gray calcareous or loessy soils are the black hammada (*Hammada scoparia*) and the santolina milfoil (*Achillea santolina*) which are also found in the valleys and plains of the northern Negeb.

2.4.3 Saharo-Arabian element. Here the climate consists of long dry summers, short winters and a low rainfall (25 – 150 millimetres). There are frequent rainless years when no annuals occur and only 'the drought-resistant or drought-evading dwarf-shrubs' grow (Zohary 1982b: 33). The soils consist of hammadas, regs, sands and rocks. Much of the land is plantless and where there is vegetation, it is found mainly in wadis where runoff moisture occurs.

This region is found in most of the Negeb, the southern part of the Arabah valley and the Judean desert. It therefore exists side by side with the Irano-Turanian element and both have vegetation that consists of dwarf-shrubs and grasses. In parts of the western Negeb, shrubs such as the sand wormwood (*Artemisia monosperma*) and white broom (*Retama raetum*) grow and grasses such as 'the triple-awned grass (*Stipagrostis scoparia*) and the turgid panic grass (*Panicum turgidum*)'. On the dry slopes of parts of the Judean Desert where the soil is salty and high in gypsum, succulent dwarf-shrubs such as the Dead Sea blite (*Suaeda asphaltica*), chenolea (*Chenolea*) and reaumuria (*Reaumuria*) grow. In the

dunes of the Arabah there are bushes and small trees like white saxaul (*Haloxylon persicum*), the white hammada (*Hammada salicornica*) and white broom. Other types of vegetation also grow in the valley of the Arabah and the lower Jordan Valley in the saline soils - plants such as shrubby blite (*Suaeda fruticosa*), saltwort (*Salsola*), and many species of tamarisk which grow in the flood plains north and south of the Dead Sea (Zohary 1982a: 34-35).

2.4.4 Sudano-Zambezi element. According to Zohary (1982b: 34) this element is 'scattered in favourable sites' within 'the local Saharo-Arabian territory' and therefore does not occupy its own territory. There are about 50 species, many which play 'almost no important part in the vegetation'. This poor vegetation is found in the southern part of the Rift Valley and in the southern Negeb. The soil consists mainly of gravel and much of the land is plantless. Examples of plants that grow in wadis and runnels are the jointed anabasis (*Anabasis articulate*) and shaggy sparrow-wort (*Passerina hirsuta*) and on the gravelly hills there are scattered bean caper bushes (*Zygophyllum dumosum*) (Zohary 1982a: 34-35). He calls this type of vegetation 'pseudo-savanna' as 'the vegetal landscape' looks like 'a kind of savanna'. Dwarf-shrubs and herbs grow here and examples of the thornbushes which grow in the vicinity of oases in the Rift Valley are Acacias (*Acacia raddiana* and *Acacia tortilis*), gray nightshade (*Solanum incanum*), Christ's thorn (*Ziziphus spina-christi*) and Apple of Sodom (*Caloptropis procera*) (Zohary 1982b: 49). (See Map 9 below).

2.4.5 Deforestation and deterioration of the land. The reason for the change in vegetation is not only due to climatic change, which has not been very marked over the centuries, but mostly to interference by man, as many forests were cut down to make way for settlements and agricultural lands. However, even a slight fluctuation in climate can have an effect by either impeding growth of Mediterranean type plants thus causing the spread of steppe vegetation in times of drought, or restoring and promoting growth of the Mediterranean vegetation when there are years of good rainfall, although the damage has already been done (Esse 1991:9).

Most of the changes in vegetation have been caused by deforestation and erosion. Esse (1991:9) maintains that 'large areas that are now barren could support climax vegetation' but due to erosion and the changes it brought in the composition of the soil in areas where there were once forests, there is little chance of regeneration. It is in the marginal areas between the Mediterranean and Irano-Turanian phyto-geographical regions that 'the fluctuations in climate and ground cover' have had the most impact.

Vegetational change has been widespread, much having been man-made due to the removal of forests and trees for building, fuel and in war the construction of siege-works, but also the spread of pastoralism where the land has been over-grazed by sheep and goats in particular. Hopkins (1985: 116) points out that 'goats and sheep act in tandem to gobble up newly sprouted seedlings and grass roots', thus preventing the growth of the natural forests and causing erosion. Stock should have been moved on to avoid loss of vegetation cover and erosion on exposed ground as the pasturage is of short duration and needs time to renew itself (Bimson 1985: 17).

The natural vegetation of the land was 'susceptible to forest fires' which occurred either deliberately, because they were planned, or accidentally. Fires were used to drive animals from the forests to make the game easier to shoot, to improve the grazing for their herds and to entice the game, 'to procure and maintain the yield of certain desirable plants' which respond to fire, and were started as acts of war (Hopkins 1985: 116-117). Fire did make certain kinds of vegetation more productive and so conserve the soil and protect it from erosion, unless following the fires there were torrential floods. When the land was cleared for agriculture and the timber removed, the soil was open to the elements and strong winds and rain scoured the earth and the slopes became bare of vegetation.

A dominant factor in this process of deforestation was the growth in size of settlements. With an increase in population in the villages and other settlements, there was a need for expansion in agricultural land and pasturage. According to Hopkins (1985: 140, 158-160) the size of the original settlements was small and in the Bronze Age were established near water sources, good soil, level ground such as in valleys, and sometimes near trade routes where the settlements needed to be defensible. In the Iron Age newly founded settlements did not always consider favourable environmental sites and appear to have had 'limited agricultural potential.'

CHAPTER 3

SETTLEMENTS

3.1 Settlement patterns from an historical perspective

The land has had a number of names during its history according to the group that occupied it at that time - Canaan, at the time of the Canaanites, Israel after the Israelites, and Palestine after the Philistines who lived in Philistia. Apart from these groups, the land was also home to the Amorites, Hittites, Jebusites, Horites and on the eastern side of the Jordan River, the Ammonites, Gibeonites, Moabites and Edomites (DeVries 1997: 133-134).

According to Mazar (1990: 35-36) the first agricultural communities in Syrio-Palestine lived in the Neolithic Period or New Stone Age. However, discoveries have been made that the first humans lived before the Neolithic era, along the Syrio-African Rift in sites such as the Jordan Valley lying south of the Sea of Galilee. They were hunters and gatherers (for example, the Natufians from wadi Natuf), who lived in communities throughout Syrio-Palestine ca. 10500- 8500 BCE. Evidence has been found that they lived in the caves on Mount Carmel and started to establish settlements near water sources, where wild grain grew and there were animals to hunt. The process of transition lasted thousands of years as humans gradually moved from food-gathering and hunting to food-producing (agriculture and pastoralism). This resulted in 'the eventual birth of the ancient Near Eastern civilizations.' Cauvin (2000:xv), in his introduction, maintains that the 'Neolithic Revolution' is among 'the great turning points in human history.' It is the time when the natural environment began to be manipulated by humankind, as people moved from being hunter-gatherers to becoming the first farmers and first herders over a period of thousands of years (12000–6300 BCE).

3.1.1 The Neolithic Age (8500-4300 BCE). This era is divided into Pre-Pottery Neolithic A (PPNA), Pre-Pottery Neolithic B (PPNB) and Pottery Neolithic (which is sometimes divided into PNA and PNB). In PPNA, discoveries of the seeds of cultured barley, einkorn (single-corn wheat), lentils and legumes were found to have been cultivated at Jericho. There is an indication of the emergence of agriculture here as, with the spring nearby, archaeologists believe there must have been irrigation canals. Implements such as flint adzes and hoes, stone celts and sickle blades used for farming have been found. Thus in PPNA agriculture and herding began (Mazar 1990: 42).

More settlement sites have been discovered in PPNB in the 'Mediterranean vegetational belt', the Jordan Valley, the Judean Desert, Transjordan and the Sinai Desert. While several of these areas are arid or semi-arid today, it may indicate that these areas benefited from a higher rainfall and that there were forests in the Neolithic Period. It was in this period that agriculture began to progress with the cultivation of cereals. Two-row barley (*Hordeum distichum*) and double-row emmer wheat (*Triticum dicoccum*) were harvested. *Triticum dicocoides* or the wild wheat with a soft spikelet, is the ancestor of the cultivated wheat with the hard spikelet, and is still found today in the Levant. Wild fruits were still gathered, but legumes were cultivated (Mazar 1009: 45). Cauvin (2000: 11) agrees that the people of the Neolithic domesticated 'not only the cereals, barley and wild rye and two species of wild wheat (emmer and wild einkorn), but also leguminous plants such as peas, lentils, beans, vetches and chickpeas.' Oats also became domesticated, as were goats and sheep, and later pigs and cattle. Wine and beer were developed during this period (McCarter 2008: 76).

The Pottery Neolithic period has not produced as many finds as the earlier periods except that there were major changes in settlement patterns. Their economy was based on agriculture and stock. It was in the Neolithic period that new technologies developed, such as the manufacture of pottery, irrigation and ways to manage water in times of drought. Discoveries made in these areas, indicate that there were differences between the northern settlements and those in the south which points to the emergence of two separate cultures, the objects of the more affluent settlements in the north, in Syria, differing from those in southern Palestine, around Jericho. In the Judean wilderness, Negeb, Sinai and the deserts of Transjordan few remains have been found, possibly due to the climate becoming drier, or more likely, hunters continued to survive in these areas as hunting installations called 'desert kites' have been found (Mazar 1990: 54-55).

3.1.2 Chalcolithic Period (ca. 4300-3300 BCE). The main culture in this period was called Ghassulian as key finds were discovered in the area to the north-east of the Dead Sea at Teleilat Ghassul. The best examples of clusters of Chalcolithic settlements have been found along wadis in the northern Negeb. Uninhabited in the Neolithic period, the settlements in the Chalcolithic along the banks of river courses seem to indicate that the settlers lived mainly in semi-arid areas such as the Jordan valley (but not Jericho), on the periphery of deserts, the Judean wilderness and the Golan Heights. This suggests that they were mainly herders but interestingly, on the Golan Heights it appears that olive trees were grown for the first time and indicates that some agriculture was developed, as olive oil became one of the major products of the country (Mazar 1990: 63). McCarter (2008: 76) points out that it was in the Chalcolithic period that donkeys were domesticated.

3.1.3 Bronze Age (ca.3300-2300 BCE). This period is divided into Early Bronze Age (ca. 3300-3050 BCE) with further sub-divisions, Middle Bronze Age (2300/2250-1550 BCE) which is also subdivided into different periods and finally Late Bronze Age (ca. 1550-1200 BCE). The Bronze Age was a period of importance in Syrio-Palestine as there were far-reaching changes occurring in the Near East which had repercussions on the settlements. Another feature was that settlements that had been occupied in the Chalcolithic Period appear to have been deserted and in Early Bronze Age 1 (EB I) many settlements were established in the fertile regions of the country, along the coastal plains, the northern plains, the central hill country, the Shephelah and the Jordan Valley. These settlements were established in areas of fertile ground, water supplies and close to important roads. The traditional base of the economy was goat herding and agriculture which became the main occupation, with horticulture in the mountain areas being introduced with Mediterranean crops such as grapes and figs, possibly for the first time in this region (Mazar 1990: 96).

The EB II – III period saw the rise of cities in Egypt and Mesopotamia. Although environmental conditions were different in Syrio-Palestine, there was a general movement of people from an agrarian economy to urban life and archaeologists are still studying this phenomenon. However, there were settlements in the Negeb and southern Sinai, both arid areas. According to Mazar (1990: 117) in this period ‘Palestine underwent one of the most intensive periods of settlement and urbanization in its ancient history.’ Some cities were abandoned at the end of EB II and other sites were established in EB III, indicating that there was a continuous flux in population at this time from rural to urban areas. It appears that at the end of EB III there was an abrupt ending to the urban culture of the Early Bronze Age in western Palestine. A non-urban culture lasting for about three hundred years replaced it and during this time Palestine was thinly populated by people living in villages and as pastoralists (Mazar 1990: 142, 151).

Discoveries of plant remains however, indicate that Mediterranean agriculture was well-developed. Plants such as cereals (barley and wheat) and legumes (peas, lentils, chickpeas) were grown around Arad in semi-arid surroundings. Other plants such as flax, olives, figs, grapes, pomegranates and dates were found in other sites but particularly in the hill country. Studies have shown that rainfall was heavier and the water table higher than it is today (Mazar 1990: 118).

During the Early Bronze/Middle Bronze Period (known as EB IV/MB I and lasting from about 2300/2250-2000 BCE) arid regions such as the central Negeb and Sinai were again inhabited. The settlements in this period differed from those in EB II, as the settlements in EB II throughout the Negeb and the Arabah were few in number and formed a line of

communication between southern Palestine and southern Sinai. In EB IV/MB I the settlements were larger and concentrated in the central Negeb and northern Sinai. Although the climate was drier than previous periods there was fertile land on which to establish settlements (Mazar 1990: 156-158). In Transjordan along the main north-south route there were 'agrarian sedentary settlements' which were closer to EB III than EB IV/MB I, indicating that this part of the land became a refuge for those who were escaping the destruction going on elsewhere in the country (Mazar 1990: 158). In western Palestine there were extreme changes in the way of life of the people of EB III to those of EBIV/MB I. In the earlier period there was an urban culture that was replaced by a society based on pastoralism and agriculture, thus indicating a complete cultural break (Mazar 1990: 170-171).

In Middle Bronze Age IIA (MB II ca. 2000-1800/1750 BCE) under Canaanite culture, urban life revived and large fortified city-states were established particularly along the northern coastal plain and in the Sharon Valley, mainly on land that had never been occupied or had been abandoned for many centuries. These cities were situated near good water sources and where there were forests and marshes. In the northern and central Negeb and Transjordan the settlements were abandoned. In the preceding period the coastal plains had not had significant settlement and the desert areas had been inhabited, but another cultural break occurred with the establishment once more of powerful city-states along the northern coastal plain and along the northern valleys of Israel (Mazar 1990: 174, 178). Middle Bronze Age IIB-C (MB IIB-C ca. 1800/1750-1550 BCE) saw the foundation of fortified cities such as Hazor, a rise in population in other city-states such as Jericho, and rural settlements, particularly in the central hill country. However, by the end of the Middle Bronze Age, once more the cultural climate had changed as many city-states were destroyed by the Hyksos and Egyptians in Palestine, and by the Hittite raids on northern Syria. Only a few cities survived, such as Jericho, Hebron, Megiddo, Hazor and Jerusalem but the Canaanite civilization survived. In the northern and central Negeb and Transjordan settlements ceased to exist.

The Late Bronze Age (ca. 1550-1200BCE) continued under Canaanite culture but the Egyptians began to dominate the land. Once the Canaanites were defeated, the Egyptians ruled Palestine and southern Syria. The Egyptians economically exploited the Canaanites, taking products such as wood, oil, wheat and wine back to Egypt. Again the population declined as the cities deteriorated under Egyptian rule and there were fewer rural settlements than in the preceding period. Surveys have shown that many of the small Middle Bronze Age agricultural settlements in these regions disappeared in the Late

Bronze Age, as well as some important Canaanite cities such as Hazor (founded in MB II), which was totally destroyed but later re-occupied (Mazar 1990: 236, 290).

3.1.4 Iron Age (ca. 1200-587 BCE). The Iron Age is divided into Iron Age IA, IB, IC (1200-900 BCE) and IIA, IIB, IIC (900-587 BCE). It was a period of significant change as the material culture and ethnic makeup were replaced in Palestine when different people groups settled there. Western Palestine was inhabited by 'Israelites, Philistines and other related Sea Peoples, and the remnants of the indigenous Canaanite population' and in 'Transjordan there were Israelites, Edomites, Moabites, Ammonites, and Arameans' (Mazar 1990: 295).

In Iron Age I the Philistines and other Sea Peoples settled along the Mediterranean coastal plain and in the Shephelah, in cities such as Gaza, Ashkelon, Ashdod, Ekron and Gath. This region had been occupied by Canaanites, continuing to live there, but who had been under Egyptian overlordship. Now they were under Philistine rule (Mazar 1990: 308). The mountainous regions of Upper and Lower Galilee, the land of Benjamin, the hills of Samaria and Ephraim, northern Negeb, and parts of central and northern Transjordan in this period became an area of numerous small settlements. Many of the settlements were Israelite and attributed to the allotment of land to the twelve tribes. The settlers had to adjust to their new environment where water was so scarce. An indication of how the Israelites adapted to the environment is the evidence of cisterns, terraces and silos. Most of the areas were suitable for the growing of cereal crops, hence the silos and storage pits discovered here, and on the hillsides terraces were built to prevent soil erosion, as felling of trees affected the land (Mazar 1990: 334, 345).

During Iron Age IIA the land was united under David, an Israelite king, who was followed by his son, Solomon. According to Mazar (1990: 387) the socio-economic structure of Israelite society was changed due to the rise of the monarchy. There were the royal cities of Megiddo, Hazor and Gezer, but many small settlements were abandoned and others developed into towns. There is an indication from excavations that urbanisation was renewed. In the Negeb highlands which had been unoccupied for years, widespread settlement occurred during the time of the United Monarchy particularly where there were sources of water. The settlers had had to devise techniques to store water and to manage their agriculture in the riverbeds by diverting the runoff water into large open reservoirs (Mazar 1990: 390).

In Iron Age IIB the kingdom was divided into the kingdom of Israel in the north and the kingdom of Judah in the south. In Judah the settlement pattern was such that most of the population moved to live in the capital, Jerusalem, and the second largest city, Lachish.

Surrounding these cities were many 'small fortified towns, unfortified villages, and isolated farms and hamlets' (Mazar 1990: 417). Most of the population living in the countryside in country-towns consisted of farmers who cultivated the land and who built industrial installations such as oil presses and wineries to produce the oil and wine for consumption for themselves and the townspeople, and the surplus for trade.

Settlement in the Judean Desert was re-initiated with the establishment of the oasis town of En-Gedi. It was here that workshop installations have been discovered in houses indicating that an important product such as balsam perfume was prepared. In smaller villages along the Dead Sea 'sophisticated irrigation systems, based on diversion of winter floodwaters to the fields by dams and canals', have been found (Mazar 1990: 452).

3.1.5 Domination of the land from 721 BCE. The Assyrian conquests resulted in most of Palestine being under Assyrian rule in the eighth century. This consisted of the northern kingdom of Israel with the fall of Samaria in 721 BCE, while the kingdoms of Transjordan and the city-states of Philistia and Phoenicia became vassals of Assyria. The Assyrians 'caused a tremendous change in the political and demographic structure of the country' (Mazar 1990: 545). He notes that the Assyrians divided the kingdom of Israel into 'several administrative districts', with Megiddo and Samaria being two of the capitals. 'Large masses of people were deported, and in their place a new population was brought in' (Mazar 1990: 545). However, Judah continued to be independent and ruled by a monarch. The Assyrians were in turn defeated by the Babylonians, who finally defeated Judah in 586 BCE with the destruction of Jerusalem. The Babylonians deported most of the Israelite elite, leaving mainly the peasants behind to till the land. When the Persians under Cyrus defeated the Babylonians in 539 BCE, the Jewish exiles returned to Palestine to rebuild the temple and to cultivate the land. According to Mazar (1990: 548-549) there is not much known archaeologically about the Babylonian period in Syrio-Palestine but a new era began with the return of the exiles and Persian rule. During the following periods Syria and Palestine were ruled by the Greeks under Alexander the Great who defeated the Persians in 333 BCE. After his death Palestine fell to the Ptolemies of Egypt and then in 198 BCE Palestine came under the rule of the Seleucids whose capital was in Syria (Noth 1964:101-104). The Romans, being the most powerful empire of the time, took control of Judea, as they named the land. They gave the Hasmoneans (a Jewish priestly family) limited rule. However, after a number of insurrections, the Jews under Judah the Maccabee, revolted against the imposition of Greek culture and customs and took control of Jerusalem in 164 BCE. They ruled most of Palestine east and west of the Jordan River as an independent Jewish state. A power vacuum arose and the Romans exploited this by sending General Pompey to bring an end to the Hasmonean rule in 63 BCE. Herod the

Idumean was appointed King of Judea in 37 BCE. The Romans maintained control over the country by appointing Roman procurators. They put down two Jewish rebellions in 70 CE and 132 CE and their rule lasted until 313 CE.

In more modern times, Palestine has been ruled by the Byzantines who made a huge impact on Palestine architecturally with the many churches that were constructed throughout the country. With the conquest of the land from 634 – 640 CE by the Arabs, there followed a succession of dynasties: the Omayyads, the Abbasids and finally the Fatimids. During the time of the Omayyids, castles and fortresses were built and the Dome of the Rock mosque, but no sign of agricultural features. The next group to take control and rule the land were the Crusaders, who were also builders. They were followed by the Mameluke sultans who ruled from Cairo and Damascus and who did not take much interest in Palestine. The Turkish period lasted 400 years during which time some mosques and burial grounds were built by the Turks but they did not take much interest in the land either (Noth: 1964:112–116). In 1917 the land became a British Mandate at the time of the First World War and finally in 1948 it became the state of Israel. The country has made enormous strides in putting the neglect and devastation of the centuries to rights and much land has been reclaimed and used for farming.

3.2 Settlements: their relationship to the environment

The land of Canaan, which was the bridge between two great empires Egypt and Mesopotamia, was the south-western branch of the Fertile Crescent and was considered favourable for settlement, as there was fertile soil, water and a pleasant climate. This land was fought over for centuries by various nations due to its strategic importance.

According to Esse (1991: 12-13, 29) ancient settlements were established on the foothills following the line of the wadis, where there were springs. People also chose to settle on the edges of basins of waterlogged soil, on higher ground so as to benefit from the drainage, but use the soil to cultivate crops. Where the waters of the wadis deposited fertile alluvial soil such as on the Jordan plain, it appears that in the Early Bronze Age signs of occupation are evident, as there must have been a fairly constant supply of water. Man's ability to adapt and sometimes manipulate his environment determined the nature of his settlement and subsistence.

The Philistines settled along the coast in the southern part of the region, where there was a fertile plain and they were able to grow many crops. Further south along the coast and also further inland it becomes drier so, as in the Gaza and Besor brooks region, farming was only possible when there was enough rain.

In the Book of Deuteronomy 8: 7-9, Canaan is described as having springs, streams and pools of water, and crops such as wheat, barley, vines, fig trees, pomegranates, olive trees and honey (date palms). The land was therefore fertile, producing crops that would feed and sustain the people in the land, including the Israelites, as they settled in the rural areas. However, many of the areas where they settled were rocky and covered with thorns and thistles. They found low scrub of *bathah* around rocky outcrops, and nearer the steppe and desert regions the vegetation thinned and shrubs such as wormwood, broom, saltwort and some hardy grasses grew in these dry conditions (Bimson 1985: 17). The settlers tried to prevent the decay of the soil and vegetation by terracing where cultivation was possible. Thus they did a two-fold job – prevented the soil from washing away, and retained the water to irrigate their vineyards and orchards.

Matthews and Benjamin (1993: 1, 38) maintain that the first Israelite villages appeared on the hills and highlands of Judah, west of the River Jordan and north of Jerusalem. The physical environment of their settlement site determined the range of crops planted by each village, or the animals they herded. Each village had to adapt its farming techniques to the environmental conditions and the existing technology. The summers they found hot and dry, and the land became parched making farming difficult.

In the Upper Jordan region where the tribe of Dan settled, there were streams, swamps, small lakes and springs providing water for their crops for the whole year. The vegetation, consisting of the dense foliage of mosses, bushes and trees, was particularly luxurious around the springs of Dan and the Dan River. Cedar trees grew on the mountains. Settlers around Lake Huleh, which in the northern part consisted of swamps filled with semi-tropical plants, often contracted malaria as the drainage was poor and at certain seasons the land was flooded, making much of this area unsuitable (Packer & Tenney 1980: 199).

The northern coastal region enjoys good rain in winter and pleasant temperatures, thus conducive to habitation. The Plain of Sharon is the largest of the coastal plains and although swampy and shrub-filled, it was fertile and encouraged settlement, particularly for those wanting pasturelands. It is also a region of wild flowers such as the 'Rose of Sharon'. According to Mazar (1990: 7) in this southern region there was a fluctuation in permanent settlements but in the south and east, in the semi-arid Beersheba and Arad valleys, the environmental conditions were harsher still and only in 'selected periods' did habitation occur.

Galilee is divided into an upper and lower region with differences in altitude, climate and vegetation. Much of the landscape was shaped by volcanoes and earthquakes and consists of mountain ranges with steep cliffs, valleys, gorges and high plateaus. Upper

Galilee lies south and west of Lake Huleh. Few people settled here because of its rugged mountains, rocky ridges and sharp cliffs, the exceptions being fugitives and refugees who sought shelter amongst the mountains. Lower Galilee, being lower than the mountainous Upper Galilee, has fertile valleys running east-west between the mountain ridges. There are streams flowing into the Sea of Galilee providing water for irrigation and forming cultivable valleys. Villages such as Bethsaida, Capernaum and Magdala grew up in an area where the spring flowers grew in their profusion. According to Edwards (1988: 171) the valleys in Lower Galilee in Roman times were some of the most densely populated regions in the Empire.

The mountains of Samaria lie further south of Galilee and to the west of the Jordan River, with the Jezreel Valley as its northern border. Many people in antiquity settled in this valley as the ground produced good grain crops and pasturage, watered by the tributaries of the Jordan. The Beth-Shean Valley, to the west of the Jordan, was also heavily settled in antiquity as it was well adapted to human habitation and agriculture.

In the region of Samaria there are wide valleys such as the Dothan and Sanur, which apart from providing communication routes, also consist of cultivable land. The region of Shechem lies to the south of the Jezreel Valley but here the mountains become steeper and there are fewer valleys, such as the area around the Hebron Hills which lie still further south. The mountains receive about 60 centimetres of rain and in ancient times were covered with forests (Mazar 1990:4). Before settlements were built, it was necessary to fell the trees and build terraces on the slopes. Between the mountains and the deserts to the east and the hills to the south of Hebron, the land was suited to pasture and the cultivation of cereals.

There is an arid strip of land between the mountains and the Jordan River and then further south, the land becomes the Judean Desert. This hostile area, close to Jerusalem, was important to pastoral nomads passing through the land and the caves provided shelter for refugees and rebels. Settlements could only be established where there were oases providing water for humans, animals and plants. Jericho (the oldest continuously settled city in the world) was an oasis in the desert, several kilometres from the Lower Jordan River. Mazar (1990: 209) believes that although the Dead Sea area is bleak with high temperatures and little rainfall, people have settled there since antiquity. In the Judean wilderness and bordering the Dead Sea are two oases which provided food and fresh water since ancient times – En-Gedi and Ein Faschka.

The Negeb Desert is made up of several different sub-regions all having very little rain. In the central Negeb some places have a small amount of rain making pastoralism possible.

There were two important routes crossing the Negeb from north to south, one running through the Arabah, and the other the 'Gaza Road' which connected Gaza with the Red Sea via the oasis at Kadesh-Barnea (Mazar 1990: 7-8). The routes through the deserts needed to incorporate settlements where there was well-water. According to Bimson (1985: 22) 'the Negeb was a convenient vacuum for resettlement whenever population pressure forced out migrants from the Fertile Crescent.' The Nabateans were one Semitic people who were able to cultivate crops by means of wells or the collection of rainwater in the desert. They lived to the east of the Jordan River. Esse (1991: 12) points out that settlement sites were abandoned after a succession of dry years, as pasturage would suffer making the feeding of the flocks impossible. The pastoralists were then forced to expand into areas which were under cultivation.

According to Mazar (1990: 6) there are several sub-regions in Transjordan. In the north is Mount Hermon the highest point of the Anti-Lebanon mountains and south of these lie the Golan Heights, where the plateaus are divided by deep ravines. Its southern border is the deep gorge of the Yarmuk River. More rain falls on the higher hills such as the hills of Bashan (which rise towards the east), brought by the rain-bearing winds from the Mediterranean. Great oak trees grew there and dense foliage prevented the desert from encroaching. The rich well-watered soil produced plenty of grain and in the time of Herod the Great this area was made the Near East's granary (Packer & Tenney 1980: 210).

The Gilead plateau is fertile and fairly similar in landscape, vegetation and climate to the hill country of Samaria which is its western counterpart. However more rain falls here and there are many springs and shrub-covered hillsides. In ancient times people settled there, where there were evergreen trees used for making balm for medicinal purposes. Northern Gilead, split from southern Gilead by the Jabbok River, was covered with thick brushwood and oaks. The southern portion was more mountainous but people also settled there. Further south, the plateaus of Ammon and Moab are quite arid. Most of the natural vegetation of Ammon is grassland and is suited to pasturage although the well-watered areas from springs could be cultivated. A number of rivers cross these plateaus, such as the Arnon River, preventing movement of people from north to south, and Wadi Hesa, the natural border between Moab and Edom in antiquity. Moab was also a pastureland but some crops were cultivated on the plateau between the Arnon and Zered rivers. Further to the east lies the Syrian Desert. As the land is lower in the north and the plateau open and fertile, settlers, such as the Israelite tribes of Reuben and Gad, settled here. Towards the south the land rises towards the mountains of Edom. These stark red-coloured mountains are a marked change from the northern edge of the territory, the Moab plateau and the valley of the Zered. In the north there was abundant vegetation and the wood was sent to

make charcoal in the south for the copper smelters. In the south, because of its fertile soil, fairly good rainfall and vegetation, settlements arose.

Bimson (1985: 23) states that this land was 'densely settled and prosperous in biblical times.' The settlements that were on the fertile edge of the Transjordan were linked by the King's Highway, an important trade route to the south and the Gulf of Aqabah, but frequently interrupted by tributaries of the Jordan, which cut deep gorges. The other trade route was along the coast, linking Damascus with Egypt and was known as the 'Via Maris'. These routes and the routes that crossed east-west through Palestine joined settlements along the way and were important for trade from the Mediterranean Sea to the deserts of Arabia. According to Esse (1991:14) the location of trade routes influenced 'the location and nature of human settlement' and this was important culturally, for the settlers were able to trade their surplus products with travellers passing through the area. Trade routes aided in expanding the settlements and connecting the settlers of the hill country with the coastal regions. (See Map 10 below).

CHAPTER 4

AGRICULTURAL ACTIVITIES AND TOOLS

According to Botha (1999: 3) in the first century CE land was the main source of wealth and the 'whole economy of the Mediterranean world was dependent on agriculture.' Frick (*in* Clements 1989: 70) maintains that agriculture 'involves human intervention in the ecosystem process, seeking to maintain an artificial ecosystem.' This refers to the various operations connected with the cultivation of the soil, such as the sowing and harvesting of fruit, vegetables, grains and flowers. The raising of animals was important too, as this provided food and clothing for the people, assisted in the fertilisation and enrichment of the soil, and also provided fuel. The main occupation in ancient societies, consisting mainly of peasants, was the cultivation of the soil. One of the first occupations in the history of humankind was the tilling of the soil to prepare it for the seed that would be planted. Hopkins (1987: 179) points out that there are many 'variables' that affect agriculture, which include: 'crop types, length of growing season, water resources, kinds of implements, types of land use, and forms of economic organization.'

There was little difference from Middle Bronze Age to the first century CE regarding the methods of cultivation of the land in Syrio-Palestine. Even today some farming methods have hardly changed from those times (Gower 1987: 91-100). However, from artefacts discovered by archaeologists, farmers' implements of stone and flint began to change with the introduction of copper, which was dated to the third millennium BCE. During this time bronze replaced some of the tools that had stone and flint parts, but during Iron Age I up to the tenth century BCE bronze was gradually replaced by iron implements (Mazar 1990: 359). McNutt (1999: 163) notes that 'the major technological innovation during Iron Age II was the development and increased use of iron for tools and weapons.'

According to Matthews and Benjamin (1993:38) it was necessary for each village to adapt 'farming techniques to match the potential of its environmental conditions with existing technology.' For example, the villagers further north of Jerusalem lived on land that had poor soil and limestone outcroppings and they had to farm accordingly. Each Israelite tribe was given its own land to cultivate and live off in Canaan and Transjordan (Jos 13: 1–21: 41; Ezk 47: 13-20; Ezk 48: 1-6, 23-29). Land was so important to the Israelites that they were not permitted to sell it or relinquish permanent rights to it as it was to remain the family inheritance (Dt 19:14). McNutt (1999: 67) points out that there is evidence of subsistence strategies in the 'stone-lined or rock-cut silos, lime-plastered water cisterns' as

well as terracing in some places which indicate 'that agriculture was an important component of the economy.'

For the Hebrews, farming was an honourable occupation and agricultural development was encouraged by Mosaic Law (Dt. 26: 1-11). Village life was centred on a mixed economy of agriculture and herding, as well as mixed farming with the growing of different crops. As many villages were isolated, the people had to be self-sufficient, hence the need for farmers and herders, who could not survive without each other. Matthews and Benjamin (1993: 51) point out that 'villages which integrated farming and herding were economically dimorphic.' Deist (2000:147) states that crop failure was a possibility, so the farmers practised 'staggered sowing, which meant a longer sowing as well as a longer harvesting season.' With so many farming activities requiring labour, it is understandable that labour optimisation was paramount.

The shortage of water was the biggest obstacle that the inhabitants of Syrio-Palestine had to overcome, as the long summer months resulted in the smaller rivers drying up. The primary sources of water for the farmers were streams, springs, wells, cisterns and reservoirs. The farmers were forced to dig wells and cisterns where there were no natural sources of water. The amount of rain that falls on the land is an important factor to be considered by farmers. If the rain did not come in the right season when ploughing and sowing had to take place, the delay would mean that the crops would 'be unable to achieve complete maturation', but if the rains stopped too early, causing the second half of the season to be dry, the crops would 'be stunted and wither before maturation' (Hopkins 1985: 87).

The Canaanites worshipped fertility gods, whom they believed, would be kind to them and bless them with rain, thus ensuring that the soil was fertile, and they, their plants and animals would flourish. The Bible says that God told the Israelites to worship him and he would bless them and cause them to prosper (Deut 5: 33). Rain that falls heavily on the ground can often do considerable damage to the crops. The Bible (Ezk 34: 26) mentions that showers were a sign of God's blessing and much welcomed in the right season, but torrents of rain would cause heavy erosion of the soil. According to Hopkins (1985: 98) 'dew occurs where there is condensation of water vapour on objects which have cooled to the dew point of the air around them, usually by radiation during the night.' The dew that falls in the hot, dry summer on the vineyards, the olive and fig trees and all vegetation, refreshes the plants and is welcomed by the farmers, but as soon as the sun appears the moisture dissipates and so dew contributes little to the availability of water.

Mackie (1991: 33) notes that another important aspect in the farmers' lives was the wind direction. King and Stager (2001: 86) state that the prevailing winds in Palestine come from the west, 'the Mediterranean westerlies'. These are the winds that bring the rain, but before the rain comes, they bring relief on hot days and are a warning that rain will soon fall. In ancient times this meant that the drying raisins and figs had to be gathered in from the vineyards and housetops before the rain fell in torrents. Rainfall decreases as the wind moves the clouds eastwards. According to Mackie (1991: 33-35) the north wind disperses the clouds and forces the rain to fall on the Taurus and Lebanon Mountains. Rainfall decreases from the north (the more mountainous area) to the south, as the wind carries the rain southwards. Along the coast the north wind can also cause blight on plants with the impurities it carries along with it.

An east wind does not usually last long. It mainly blows at night when it is cool and dry, but if it continues to blow for several days at a time it causes distress in animals and plants because of its extreme dryness, and the fact that the night air is almost as warm as during the day. When it blows from the south-east it is extremely hot and oppressive as it carries particles of dust and scorches everything that grows. When the east wind blows in spring it can be useful as it causes the plants to grow more rapidly, for the ground is still moist. It can also be useful in autumn when the plants have stopped growing, as hot weather is needed to dry the fruits for winter.

Farmers were aware of a number of serious problems, one being the damage that locusts would do to their crops. They came in huge swarms and devoured everything green in their path. The Bible mentions locusts several times, in Joel 2:25; Proverbs 30:27; Judges 6:5; 7:12 as well as in a few other verses, an indication that they were dreaded by the farmers. There was also the problem of soil erosion, which they countered with retaining walls or terraces, and ploughing vertically so that the soil would not wash downwards taking the topsoil with it. Farmers also had to contend with the damage done to their crops by fungi and mildew (Rousseau & Arav 1995). The Israelites' enemies caused much damage to the crops when they attacked, and there were always thieves ready to steal from their land, apart from the forays by wild animals.

4.1 Agricultural activities

Farming can be divided into several activities consisting of the preparation of new ground and maintaining it. At first the fields had to be cleared of stones which had to be picked out by hand and heaped up around the borders of the field. Other stones were piled up to serve as a landmark (Gower 1987: 129). Activities, concerning the maintenance of the land which was already cultivated, were hoeing, weeding and fertilising. Crops beginning

to grow needed to be protected from the birds which would eat the new shoots, so it was the children's job to chase the birds away.

The Gezer calendar (as mentioned in 2.3.3.4 above) details the annual progression of work for the farmer once the ground had been prepared and cultivated:

It states:

'Two months (October/November) for (olive) harvest
Two months (December/January) for planting (grain)
Two months (February/March) for late planting
One month (April) for hoeing up flax
One month (May) for harvesting barley
One month (June) for (wheat) harvest and festivity
One month (August) for vine tending
One month (September) for summer fruit' (Deist 2000: 238).

It appears that Deist's interpretation of the calendar is at fault as the total months add up to eleven. All other interpretations give two months to the grape harvest, whereas Deist has only given one month, August, and has left out July entirely.

Gower (1987: 89) suggests the following:

'The two months are olive harvest (Sept./Oct.)
The two months are planting grain (Nov./Dec.)
The two months are late planting (Jan./Feb.)
The month is hoeing up flax (March)
The month is barley harvest (April)
The month is harvest and festivity (May)
The two months are vine tending (June/July)
The month is summer fruit (August)
(The planting in January and February was millet, peas, lentils, melons, and cucumbers).'

Although very similar to Deist's interpretation, Gower starts the calendar in September and so each agricultural activity is a month earlier. Deist starts the calendar in October, a month later. However, this is not a major difference as the seasons correspond.

Borowski (1979: 62) proposes another interpretation of the above calendar:

'two months of ingathering (olives)/two months
of sowing (cereals)/ two months of late sowing (legumes and vegetables)
a month of hoeing weeds (for hay)
a month of harvesting barley

a month of harvesting (wheat) and measuring (grain)

two months of grape harvesting

a month of ingathering summer-fruit.'

According to Matthews (1991: 51) planting of crops began after the rains in November and continued in the winter months until January. The first crops to be planted were barley and wheat, and from January to March, 'crops like sesame, millet, and lentils, and garden vegetables like cucumbers, garlic, onions, and leeks.'

The maps of Aharoni and Avi-Jonah (1977: 19) and Zohary (1982a: 37) indicate the cultivation of various crops. Along the coastal plain and the Shephelah some wheat and sycamore trees were grown, and barley in the south. On the slopes of the hill country fruit trees such as pomegranates, figs, olives, grapes and carobs were cultivated and some cereals. These, such as wheat, were also grown in the valleys. The Jordan Valley around Jericho was the main region for date palms and barley, but date palms also grew in the Arabah and along the coastal plain. On the high areas of Transjordan such as Bashan, wheat was mainly grown, with some barley growing in the drier areas and oak trees growing naturally. In the Negeb barley was grown. These were the crops grown in the various regions and depicted graphically on the maps. (See Map 11 below).

According to McNutt (1999: 71) 'types of crops differ according to ecological zones.' In the Mediterranean region, crops such as vines, cereals, olive and fruit trees, were grown and in the highlands of Judah, wheat, barley, grapes and olives. 'Palace granaries' found in Samaria, dated to Iron Age II, indicate that there must have been extensive grain fields in the region (McNutt 1999: 154). Zohary (1982a: 41) mentions that in En-Gedi and Jericho, a "precious balm tree" grew, but does not indicate whether it was cultivated. Packer and Tenney (1980: 201, 208) note that olive trees were grown in the Huleh Valley in Upper Galilee, and the Sharon Valley along the coast, although swampy, had good pasturage and some crops were grown. The valleys of Jezreel and Beth-Shean were both fertile regions where fruit trees, olives and grain were grown. The cultivation of different crops is discussed in Chapter 5 below, and the regions where they were grown is given in greater detail. Preparation of the ground would also have consisted of the building of terraces on the hillsides, and 'runoff farming' in the drier desert areas, two systems which enabled the farmers to use the land which had never before been cultivated (Borowski 1979: 28). Once the ground was cleared, it would be ready for ploughing, sowing the seeds and harvesting the crops. Activities also differed in the type of crops grown, as grain crops, vegetables and other seed sown crops were field crops requiring the ground to be ploughed and smoothed, while vines, fruit and nut trees would be planted in cultivated soil, in holes dug in the rocky ground.

Some of the most important farming activities will be dealt with below, but others, such as pruning, wine-making and tasks concerning specific crops will be discussed in Chapter 5. In this chapter, the tasks concern general farming and work dealing with the most important food crop for subsistence farmers, the cultivation of grain, are examined.

4.1.1 Preparation of new ground. Farmers needed to clear the ground of shrubs, trees and vegetation already growing there as well as clearing away the rocks and stones wherever possible. One quicker way of clearing the ground of trees and shrubs and which also had the result of the ash being a form of fertiliser, was by burning the vegetation. This had its downside as without plants to bind the soil, much of the topsoil was washed away when the rain fell heavily on the ground, resulting in soil erosion. Most of the land had to be cleared manually with tools for chopping and cutting the vegetation, and others for lifting the stones and tree stumps. This work, like all the farming activities, was labour intensive and families would need to assist one another. Much of the work on the land was done on hillsides, hence the need to build terraces to create level surfaces and prevent the soil, and water, from running away. The stones that were cleared from the hills and fields were piled up into heaps and the dew falling on them at night condensed and 'provided a natural drip irrigation system for plants in their vicinity', but they were also handy for terrace building (Deist 2000: 149). (See diagram 2 below).

According to Borowski (1979: 28-30) it appears that the early Phoenicians were the first people to build terraces and that the Israelites must have learnt from them thus 'creating agricultural land'. In the Late Bronze Age some terraces were built around Jerusalem. In the Iron Age, as the Canaanites occupied the fertile valleys, the Israelites settled on forested hillsides, many of which had not been cultivated previously or had been sparsely settled, 'such as the Judean hills, Mount Ephraim, and the Galilee.' The forest had to be cleared and then the terraces built by small groups of families. This occurred when the farmers learnt about 'topography, lithology, and water management', probably as a result of experiencing the harshness of their environment. 'Terrace-culture' had three results, namely: they 'affected the course of roads and paths', 'dictated the site of settlements and the direction of their expansion', and 'enabled the Israelites to maintain their presence in Canaan' so that later they could overpower the Canaanites. King and Stager (2001: 87), however, maintain that the narrow terraced slopes were better suited to trees and vines, and the broader plains and valleys to cereals.

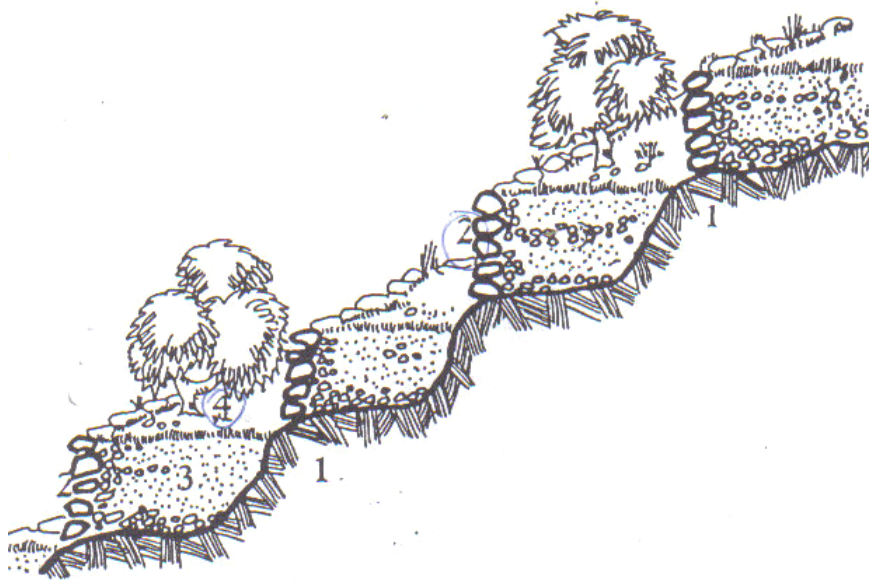
4.1.1.1 The building of terraces. A labour force was required to build the terraces on the hillsides, but it was also needed to maintain the terraces, particularly after the rainy season, which lasts about four months of the year. According to Hopkins (1979: 183-184, 175) terraces were 'costly and long-term investments' but were necessary for water conservation and were also used in the prevention of soil erosion. Matthews (1991: 50) refutes this by saying that there was little soil on the hillsides to lose due to deforestation and overgrazing, and so terraces were not designed to prevent soil erosion. He maintains that the soil, usually a 'mixture of different soil types', was 'brought from elsewhere.' The terraces were 'constructed all the way down the face of the hill to ensure natural filtration of the water and better distribution of moisture to all of the farming strips.' As rain falls only during about four months of the year, it was necessary to prevent water from running off the hillsides without the moisture soaking the soil and benefiting the crops.

Terrace building was not a simple task and needed 'engineering, geological, and hydrological knowledge' which developed with experience from primitive terraces to well-constructed ones. Edelstein and Gibson (1982: 52-54) maintain that varied techniques were needed in the building of terraces according to 'the nature of the area and the kind of stone and soil available.' They indicate the number of tasks that needed to be undertaken when creating a terrace and that there were different types of construction.

A wall had to be built first which meant that stones had to be collected. In the Iron Age terrace walls were built of 'large triangular stones to form a series of pillars' and smaller stones were used to fill the gaps between the large stones. Later, in the Roman and Byzantine periods, terrace walls consisted of rows of small stones at the bottom with rectangular stones fitted together and laid on top. Terrace styles, which as yet cannot be dated, were built only of small stones; or built with flat stones laid in 'herringbone fashion' and some walls were built with flat stones that were laid like bricks in 'staggered rows.'

Once the retaining terrace wall was constructed on the 'natural stepped limestone' (1), the stone retaining wall was built on the front edge of the horizontal surface of the limestone (2); the inside was carefully built up with 'a fill of gravel' immediately behind the wall which would allow the water to percolate from one terrace to the next. Different types of material were then used: a layer of gravel was put down first; then a layer of soil; next a layer of stones or gravel (3) and finally a layer of 'silt and organic matter' which gradually over time 'accumulated to make a thin layer of rich soil' (4). (See diagram below).

Diagram 2: How terraces were constructed



From Gershon Edelstein and Shimon Gibson *BAR* 1982 Volume 8(4) p. 46

Should the layer of soil covering the terrace be too thin, it was necessary to transport soil from surrounding slopes or from valley bottoms. It was in this soil that the plants could grow. In heavy rain, soil erosion would be minimised and it would soak into the porous bed of gravel and stones. The surplus water would flow over the limestone bedrock to the terrace below.

Hopkins (1985: 208-209) points out that terraces did conserve the soil but that farmers used what he terms 'soil mining' which was in direct contrast to terracing. He sees soil mining as 'the consumption of the stock of soil, nutrients, or humus.' As soil was washed down the slopes causing erosion, it filled and enriched the terrace beds. However, this was a short term policy as eventually the soil was depleted of nutrients and bare rock was exposed, resulting in falling yields of crops.

Matthews (1991: 50) states that sometimes channels were dug for rainwater to flow to the terraces and as they were built all the way down the hillside, there was 'natural filtration of the water and a better distribution of moisture to all the farming strips.' The farmers were therefore more concerned about the watering of their crops in the dry climate than the loss of soil, but efforts were made to channel the water to where it was needed.

To maintain his terraces the farmer had to regularly inspect them, particularly during the rainy season, then repair any damage and possibly also reinforce the walls. This amounted to high labour costs, but in the highlands of Israel, it is thought that labour must have been a cheap commodity and that the crops grown on the terraces fetched a good price in the markets. It appears that the community co-operated by working together in the tasks of building and maintaining the terraces (Hopkins 1985: 178). Probably all able-

bodied men and boys were used to provide the labour. Matthews (1991:49) points out that in the monarchic period, 50 percent of the hillsides were terraced, possibly due to the growth of the population in the villages and the need for more land to cultivate, although it is uncertain when many of the terraces were built.

The destruction of the high terraces in the Judean hills occurred during and after war when the Israelites' enemies 'destroyed the country's economy, its trees and agricultural installations' (Feliks 1981: 146). The terraces were destroyed by rolling rocks down the steep slope and smashing the walls. Once the terraces were demolished they were in need of repair but 'during the years of war and the exile that followed, these fell into neglect.' Where there were breaches, the rain water gushed down carrying the soil with it. After several years the terraces were almost completely destroyed, the soil had eroded away and the bare rocks were left exposed. Feliks maintains that the 'ancient terrace culture of the country was destroyed over the last fifteen centuries.' When the Israelites returned from exile in Babylon they realised that they did not have 'the necessary knowledge and experience of the dry, mountain culture' which was different from the one they had experienced under irrigation in Babylon (Feliks 1981: 168, 174). They set about rebuilding the terraces, repaired the agricultural installations, planted vineyards and fruit trees but were frustrated by their lack of success, as they frequently experienced drought, and suffered famine, pests infested the crops which were also sometimes stricken with disease, and forests of trees took over in the fruit plantations.

4.1.1.2 Runoff farming. According to Borowski (1979: 30-34) runoff or flood farming, appears to have begun in Iron Age II in the Negeb, as an 'offshoot of terracing in the hill country.' Farmers in the desert regions faced 'two constant problems': suitable soils to farm and enough water to do so. Farmers were able to solve these problems by developing 'water catchment systems' in which runoff water was directed down walls and into channels which led into cisterns. Cisterns were therefore of immense importance as they 'provided water for drinking, for watering animals and agricultural terraces, for growing crops and fruit trees.' By flooding the terraced fields, the runoff water, together with the rain falling on the land, caused new topsoil to be brought from the surrounding hills so that after each flood the soil was enriched. This occurred mainly in two periods of agricultural settlement: in Iron Age II –III and the Roman-Byzantine periods. Finds such as houses with storage pits, pottery, water channels, cisterns and terraces pertaining to these periods indicate that there were settlements in the Central Negeb even if for only a short time. A settlement 'located in the Buqei'ah, west of the northern tip of the Dead Sea' was uncovered when farm houses with fields attached, was excavated. These settlers cultivated field crops such as wheat and barley, as well as legumes and they may have

also grown fruit trees and cultivated grape vines. As remains of forts have been discovered, it appears that these settlements were established to defend the frontiers of the country and protect the trade routes. The settlers were most likely dependent on the produce they could grow and therefore it was essential for them to have a good watering system.

Springs were found in areas where there was porous limestone. Here the water collected and poured out of the ground. Springs provided water for the farmers through natural means in contrast to the necessity for wells to be dug to obtain water for the settlements and their flocks and herds. According to King and Stager (2001: 123) 'a well is an artificial shaft sunk into the ground to tap water into the water table' and wells were vitally important in ancient Israel. It is not certain how farmers knew where to sink the shafts to the water table to reach a good supply of water, although it was easier to sink a well in a wadi where there was a good chance of tapping an aquifer which was possibly between one and five metres below the surface. A circular hole had to be made that was about one and half to two metres wide and to prevent the collapse of the walls on the way downwards, the shaft was lined by 'chocking in rough fieldstones' (King & Stager 2001: 124). Some wells had low stone walls around the opening to stop sand and other contamination from blowing into them, or to prevent people or animals falling down them. Usually a stone slab covered the well opening (Packer & Tenney 1980: 265).

Women drawing water at a well



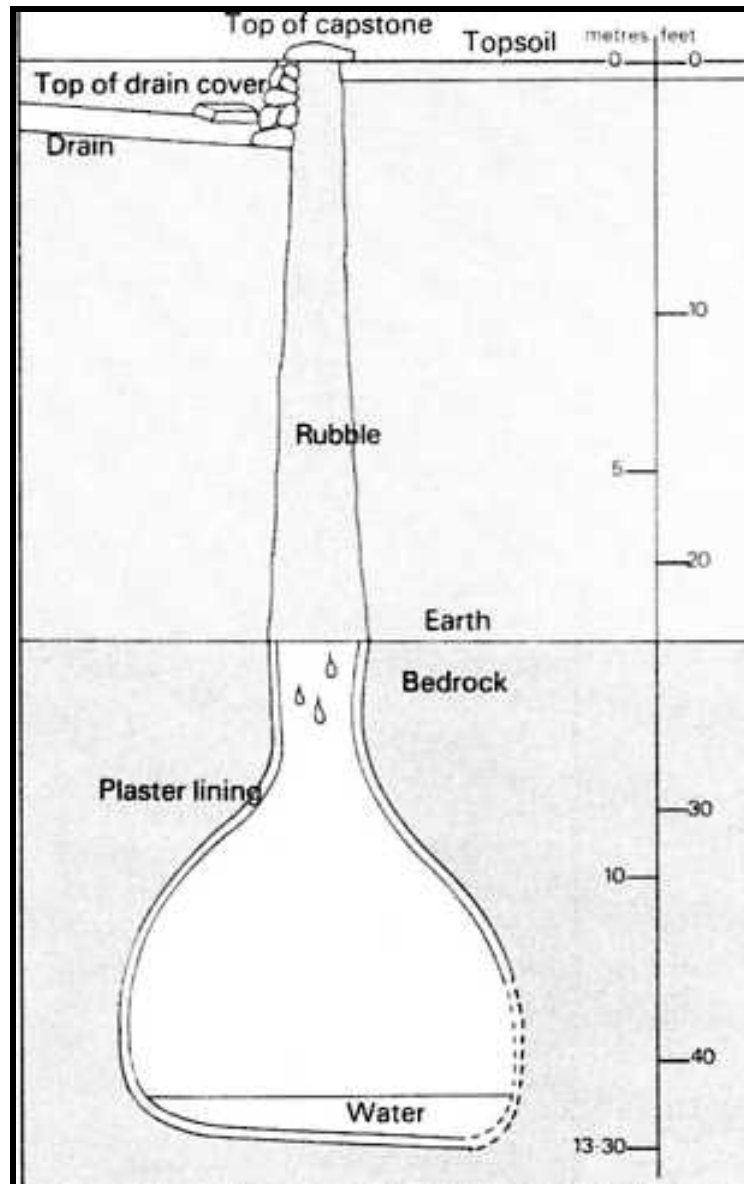
From Wight 1953: *Manners and customs of Bible lands*, p. 89.

Farmers also had to dig cisterns or artificial reservoirs for the water to collect and be retained. These cisterns were dug into the bedrock and then cemented thoroughly with a

type of lime plaster to prevent the water from seeping away or evaporating. Chiselling out a cistern from solid rock, such as in Cenomanian deposits, was the best way (for example, in the hill country of the Ai/Raddana area with its impermeable rocks), as this allowed better moisture retention than a clay-lined cistern (Matthews 1991: 45; King & Stager 2001: 126). However this was laborious and hard work, taking far more time to construct. Another laborious task was the annual cleaning of the cisterns from accumulated sediment, even when the cistern was covered against contamination.

According to Matthews (1991: 46) the Israelites developed a 'cistern system'. At the bottom of the cisterns rocks were placed in order to 'trap larger impurities', a hole was drilled into the side thus allowing water 'to travel into a series of adjoining cisterns' until the water ran into the cistern in the house. The water was filtered as it flowed from one cistern to the next. Rainwater from roofs was collected in these bell-shaped cisterns which provided the water necessary for those living in the hill country and drier areas. King and Stager (2001: 126) describe 'bottle-shaped' cisterns, with a stone covering the small opening at the top and the 'neck which was a narrow shaft through which vessels were lowered by rope into the cistern.' (See below). By Iron Age II it appears that most houses had their own cisterns, but there was also a public cistern within the city walls, such as in Jerusalem. Those living on the plains and coastal areas were able to use the water from springs and rivers but water was also stored in dams and pools.

Diagram 3: A “bottle-shaped” rock hewn cistern



Sectional drawing of a cistern, fed by an underground drain, using a bucket.
Rubble has since filled the neck of the cistern.

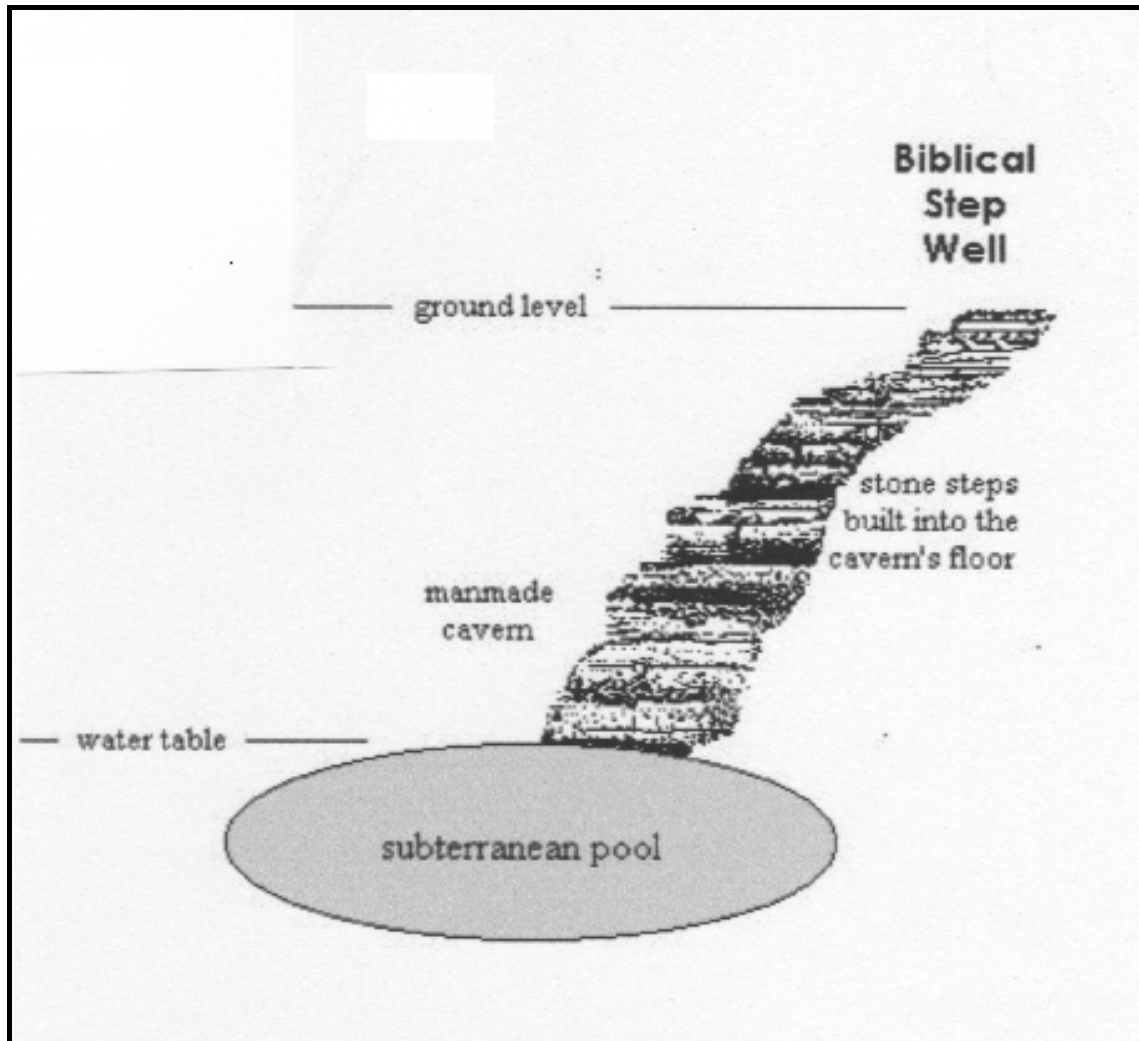
From:Thompson 1986: *Handbook of life in Bible times*, p. 115.

Cisterns dried up in times of drought, as did other water sources. Cisterns were also used for other purposes, such as imprisonment, as for example, the time when the prophet Jeremiah was let down into the mud at the bottom of the cistern. Sometimes cisterns were used for burials, but these were not ‘legitimate burial sites’ (King & Stager 2001: 127). It appears that cisterns were also used to store food such as surplus grain. Cisterns were usually built in the living area of the farm as a protection against theft and destruction by wild animals.

Underground reservoirs were extremely important for the inhabitants of towns and cities. For example, there was a cistern and an underground reservoir in Arad in the Iron Age

(King & Stager 2001: 127). At the bottom of the hill 'a circular, stone-lined cistern (once thought to be a well) was sunk' and 'collected runoff and rainwater'. From the cistern the water was carried to a 'feeder channel' cut through the wall of the citadel and from there the water flowed into a large underground reservoir with a capacity of 250 cubic metres of water.

Diagram 4: Steps to reach the water in a well



From: <http://www.fdungan.com/biblical.jpg>

Shewell-Cooper (1977a: 214, 217) states that the vegetable gardens 'were laid out in a chessboard arrangement' with channels in between. The farmer could let water flow into the next furrow or square, by unstopping 'the mud wall forming the channel'. Rivers or streams would be 'divided into many narrow irrigation canals' so that all the beds in the garden would get watered. This water needed to come from the 'living water' of the rivers to fill the channels.

4.1.1.4 Fertilising. According to Hopkins (1985: 191-193) there were a number of methods whereby the soil fertility was maintained and the soil protected. These were fallowing, crop rotation, fertilisation and terracing. Fallowing occurred when certain fields were allowed to rest as the crop yield had declined 'due to the exhaustion of soil nutrients' and those nutrients could be replenished, the 'natural pest cycle' of 'diseases and harmful insects which attacked certain crops, would be broken; and the fallow played a part in conserving "the soil moisture.' Jewish law declared that every seven years the land was to lie fallow, to assist in replenishing the nutrients and water or to delay their depletion.

That there was crop rotation is difficult to prove, but there were wet season and dry season crops and some plants such as legumes and grains require a significant amount of water, while chickpeas and sesame need very little moisture. It was also discovered that summer crops had to be sown first as they would be harvested before the winter rains, after which winter crops could be sown. The land then had to rest for five months until the next winter (Hopkins 1985: 198).

There were a number of ways in which the ground was fertilised. Manuring was one of them. Hopkins (1985: 204-206) maintains that there must have been some knowledge of the benefits of manuring, but that living in a dry climate would have discouraged 'the decomposition of manure for the restoration of soil fertility' which was essential before it was put on the fields. The 'dung heap' or compost heap would have consisted of the straw bedding and manure from the cattle stalls in a side room of the house, as well as household waste. Most of the animals were pastured away from the village houses but in the fields nearby, where the dung would be used to fertilise the soil. Hopkins (1985: 206) quotes White (1970: 124) when he explains about the importance of the straw bedding, which preserved 'the fertilizer value of animal excreta' by holding the dung together and absorbing the urine containing 'valuable nutrients'. However, in the dry climate of the country, the compost pile would have been fairly small and the labour needed to remove it to the fields would have deterred farmers, so it is unlikely that this form of fertilising can 'be counted on to play a vital role in maintaining soil fertility for field crops.'

Shewell-Cooper (1977a: 194, 213) states that when mulching or fertilising the soil, dung or humus was put into a shallow trench and possibly watered to prevent it from blowing away. Hopkins (1985: 206) suggests that the compost from the compost heap might have been used for the vegetable or 'kitchen gardens which were worked more intensively and supplied with greater quantities of water'.

Hopkins (1985: 207-208) points out that the 'less demanding method' to fertilise the soil was for the flocks and herds to 'be grazed on fallow fields, orchards, and harvested fields'.

At night the animals would be moved to alternate fields 'so that their excreta would be distributed evenly'. When the animals grazed on the fallow fields, they not only 'deposited manure but also served the purpose of eradicating weeds.' The dung that the animals dropped would not have been as effective in supplying nutrients to the soil as good rotted compost, as in the dry climate it would have thoroughly dried out, but it did require less labour. However, animal dung was used for fuel, which was also important for the peasants. However, some dung may have been put around the base of trees to fertilise them.

Farmers sometimes burned the stubble in the fields and this provided an ash fertiliser. The stubble was important in feeding the animals so this form of fertilisation did not 'play a central role in the agricultural systems.' According to Hopkins using wood ash would have provided nutrients such as phosphorus and potassium, but no nitrogen. Wight (1953: 173) makes an interesting statement, as he points out that on many of the hillsides there were small soft limestones scattered over the ground. With each rainstorm part of the lime in the stones dissolved and mixed with the soil thus liming and enhancing the soil. In the *Illumina Bible Dictionary* software (Beers, Petersen & Saba 2003: *Illumina*) the authors state that the Mishnah mentions 'the use of wood ashes, leaves, blood of slaughtered animals, and oil scum for fertiliser' so this indicates that the farmers were aware of the importance of fertilising their crops.

4.1.2 Ploughing and sowing. The preparatory activities of terrace-building and clearing the ground of stones completed, cultivation of the soil took place. This included digging up the soil, ploughing, harrowing and sowing it with different types of grain. Deist (2000: 148-149) maintains that the custom was 'first to dig up the virgin soil by hoe and then to plough it.' The land that had been cleared was divided into two parts: one part was planted while the other part lay fallow. The fallow land was used for the grazing of animals, and their droppings fertilised the soil, while the following year the land would be broken up and ploughed. The importance of ploughing was that it was preparation for the sowing of the seed, and these two activities are closely related. When ploughing did not take place as in the seventh year and the Jubilee in the Hebrew calendar, sowing did not take place either.

According to de Herrera (2006: 37) ploughing or digging have a number of benefits: the land is worked by opening it up to the sun and the rain and prepares it for cultivation; the land is levelled so that the sun will warm the land uniformly and the rainwater will not collect in holes but will flow over the land evenly; heavy soil is incorporated with light soil, seeds and fertiliser are integrated properly; large clumps of soil are broken up so that the soil 'can better sustain heat and moisture for greater productivity'; weeds are eradicated;

and where the soil has become hard from not being worked for some time, it changes its texture.

It was necessary for the ground to be softened by the rain before ploughing could take place. The plough would not enter the ground to make furrows if the soil was still hard and unyielding and rain was therefore needed, but ground that was too wet was also a problem. If rain fell at the right time, so that the plants had enough time to grow and mature, all was well, but with late rains, ploughing and sowing were delayed and the plants did not have enough time to develop and mature. Early rainfall could also be a problem, for should the farmer plough and sow, there may not be any rainfall for some time and the plants could wither and die. The Bible places importance on ploughing by describing different types of furrows that were made by the plough and their different parts. Borowski (1979: 80) describes the type of furrow that was made when ploughing on virgin soil and believes that a special plough must have been used. He mentions that the writers spoke of the deep part of the furrow as well as the high part of it.

Ploughing was done in several ways: a man ploughed the field himself; a team of oxen was used to pull the plough connected to a yoke, two mules or two oxen could be used, or a single mule or ox could be yoked to the plough. It was forbidden in the Mosaic Law to plough with a mule and an ox, possibly because of the unequal pull and the suffering of the weaker animal (Dt 22: 10). (See picture below).

Man ploughing with oxen



From Heaton 1956: *Everyday life in Old Testament times*, p.99.

Hopkins (1985: 209) points out that the furrows that were made along the contours of a slope helped to conserve the soil, as the water would be trapped in the furrows and the soil would not be washed down the slope in channels. He also describes the type of plough that had been adapted for soil conservation, which he calls the 'scratch' plough or 'ard'. (See section 4.2.1.1 below). This plough just opened up the soil, limiting exposure of

the lower layers and leaving 'the field covered with small lumps of soil' that are more resistant to erosion. Ward (1987: 103) maintains that the farmer ploughed his land twice, once to prepare the soil by breaking it up and loosening it, the second time the field was ploughed was when he ploughed crosswise, turning the soil over to cover the seeds. Other writers such as Feliks and Hopkins believe that there were four ploughings. Ploughing was sometimes done as a team effort with each farmer supplying his own plough and oxen so that all the village fields would be ploughed at the same time.

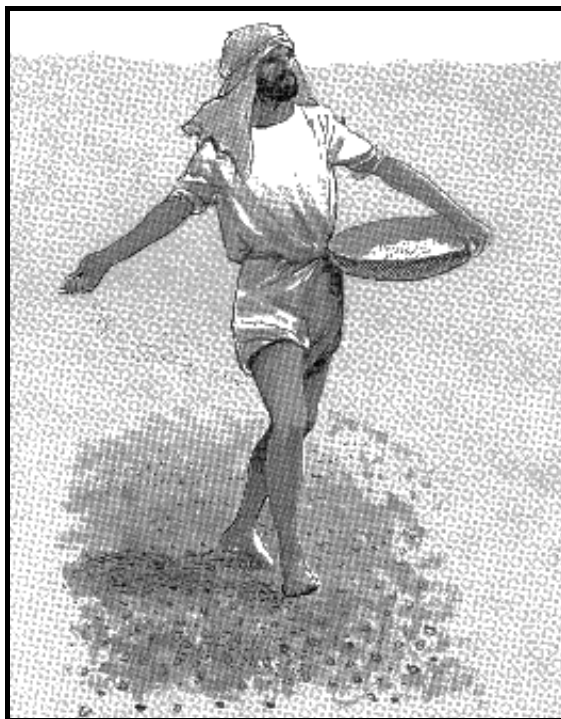
Furrows had to be straight and parallel to the previous one, so the farmer had to concentrate so that he did not deviate from the line. Much of the ground was difficult to plough as the ploughman had to contend with clumps of grass and stones. This meant that he physically had to manipulate the plough over these patches. He could not afford to be distracted either and so lose the straight furrow that was necessary.

According to Feliks (1981: 91-92, 195) 'the peasant ploughed more than four times before he sowed, and each ploughing was done in a special way in order to serve a specific purpose.' Ploughing at first is known as 'opening furrows' which are done in wide furrows (*yefatah*, the opening of the ground) and must be carried out before sowing can begin. This is done in summer after reaping, when the ground is dry. The farmer does this 'to open the stubble ground so as to allow the winter rains to soak into it' but the furrows are fairly wide apart which differs from other ploughing. The next time ploughing takes place is after the first rain and is known as 'rain furrows' (*rev'ia* furrows) and 'is a "coarse" form of ploughing' where there is a 'fallow space' left between one furrow and the next, and there are small mounds of earth 'which halt and store up the rain water and prevent erosion of the soil.' These mounds or ridges of earth, together with the furrows and strip of fallow land, prevent the soil from being washed away in torrential rainfalls as the 'rain brings the mounds back into the furrows' now filled with water, and the ground begins to level out. The "last ploughing before the sowing is the harrowing" where the ground is smoothed (*yesaded*) by ploughing 'small furrows' or narrow furrows, so that the field is 'ready for sowing.' The final ploughing occurs when the seeds are ploughed into the ground. The above is confirmed by Hopkins (1985: 214-215) but he points out that the ploughing 'method was not uniform throughout' and 'local circumstances and differences among farmers' would account for variable ploughing and planting.

Gower (1987: 94) suggests that there was an 'alternative method of sowing and ploughing.' First the ground would be ploughed and then the seed would be sown. The field would be ploughed again 'at right angles' to the ground which had first been ploughed, or the field could be harrowed 'by pulling a large bush behind a team of oxen.'

According to the Gezer calendar (see 4.1 above) it seems that there were four months of sowing. During the first two months (November/December) cereals were planted such as barley and wheat and in the late sowing months (January/February), the farmer planted legumes and vegetables (Boroswki 1979: 79, 84). Sowing was accomplished by several ways: 'broadcasting', when the farmer would sow the seed from an open basket or leather bag, replenishing the seed from a sack tied on the back of a donkey. Some farmers would sow seed by taking handfuls from a sack tied over the shoulder, and scattering it in the furrows which had been marked according to the distance he could throw the seeds. However, this meant that the sowing was uneven and some seed was wasted. (See below).

A farmer scattering his seed



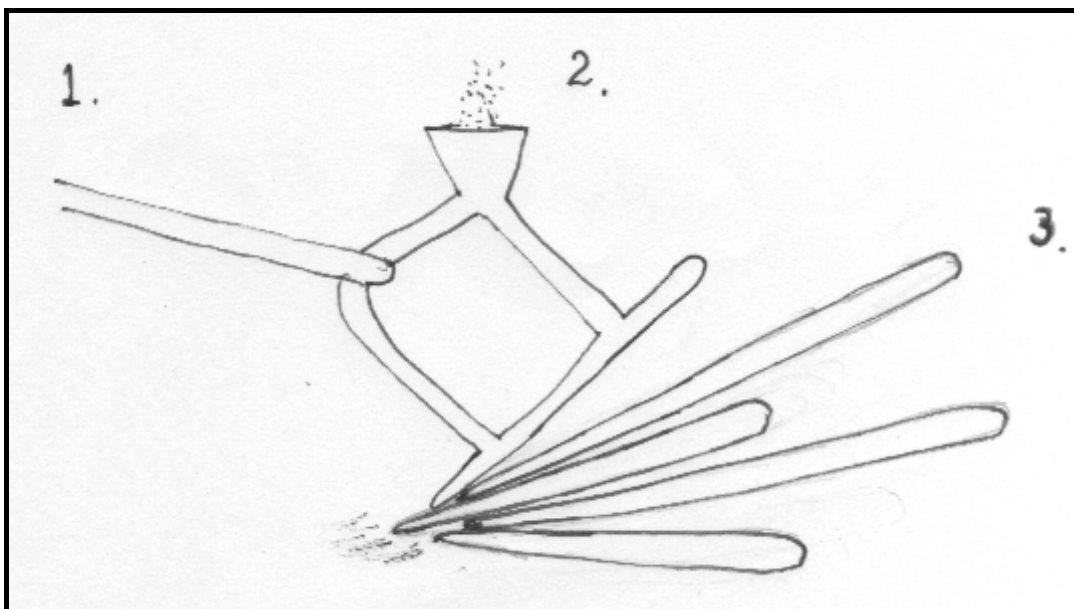
From Beers 2003: *Journey through the Bible*, p. 253.

Ward (1987: 104) notes that the seed sown came from a supply of the previous year's crop. If the farmer were wise, he would reserve 'only the seeds from the fattest, largest, most vigorous plants' for sowing. The yield for the farmer would be 'very modest by modern standards' as he 'could expect his wheat seed to yield fivefold (or five bushels of grain for every bushel of seed sown)'.

Gower (1987: 90) maintains that about thirty pounds (13.61 kilograms) was needed to sow a half acre but the Assyrians and Babylonians developed a 'primitive seed drill' which was 'fixed on to the plough' and this was more economical than sowing by hand. There is little or no evidence that the Israelites in biblical times ever used the idea. Using a seed drill

was the other method of sowing seeds. Borowski (1979: 86) describes how this implement was used. There were possibly three people in the team: one directed the plough and pushed 'the handle down to facilitate soil penetration'; the second person directed the animals; the third person held the seed-bag on his shoulder and dropped the seeds into the drill. The drill consisted of a funnel into which the seeds were dropped, 'a pipe attached to the bottom of the funnel through which the seeds fell' behind the plough point. 'The drill was made of leather and wood' and there is little archaeological evidence of it, but it is still used in the Near East today. (Below is a diagram from a slide presentation: 1 is the person directing the oxen, 2 is the person who dropped the seeds into the funnel and 3 is the person directing the plough).

Diagram 5: Babylonian scratch plough with seed drill



Adapted from: <http://www.hort.purdue.edu/newcrop/history/lecture09/lec09w.ppt#336,26,Slide> 26

Hopkins (1985:215-216) points out that 'staggered sowing' was practised in the Highlands. This helped to spread the risk when the new crops started to grow and there was no rain, or the crops were sprouting and a severe frost would kill off the plants. The variability of the rainfall meant that farmers had to choose a time when ploughing and sowing would be the most propitious. Hopkins mentions that the period of extended ploughing and planting over four months, as indicated on the Gezer calendar, is 'not the most efficient crop production strategy', but it does fit 'well in security-conscious subsistence agriculture.' For example, not only was there staggered sowing but also varied times of sowing as in different parts of the region, such as in the area of Galilee, wheat seed was sown when the winter rains began to fall, and harvested between May and June, but the farmers in the

Jordan valley sowed earlier and harvested their wheat in early May (Packer & Tenney 1980: 271).

Staggered sowing had a number of advantages such as draft animals were more readily available to work over a period of time and fewer were needed so that farmers did not need to borrow or rent animals. Labour, another important commodity also benefited, as an individual family could manage the ploughing and sowing and later, harvesting would be easier as it would then be 'carried out sequentially' (Hopkins 1985: 216). Farmers faced the risk of crop failure when the rainy season was delayed as the 'window' period for ploughing and sowing was reduced. They would face 'animal power' and labour problems as they had limited access to available animals and there was insufficient help as everyone would have to be involved. At the end of the season, when harvesting took place, there would again be a need to allocate the labour force to the various duties.

Once the seed had been sown, it was ploughed into the ground so that it would not blow away, or ants, other pests, or birds could steal it. Another method was to trample the seed into the ground by foot or the tread of animals. Farmers might also use a branch to rake the earth and make it smooth.

4.1.3 Harvesting. Hopkins (1985: 224) points out that the timing of the harvesting of the crops was important but 'not as decisive' as for ploughing and sowing. However, 'for a maximum yield grain must be harvested at a particular moment.' Cereals had to be harvested before they were too ripe as too many seeds would be lost. Harvest time 'marks a peak in the annual curve' for the requirement of labour, as it demands a 'high degree of attention' and 'necessary intensity' when the most propitious time for harvesting is desired, but staggered sowing would spread the labour as would 'environmental circumstances (such as variegated land)' (Hopkins 1985: 226).

Harvesting of the various crops took place at different times of the year and usually by a number of people working together as a team, for the work was labour intensive. It is probable that there was reciprocal labour exchange where the teams would help each other to complete the harvesting. Flax was the first crop to be harvested and this was done in March and April. According to Borowski (1979: 92) harvesting of grain was done in summer when the temperature was very high. Hopkins (1985: 225) states that harvesting 'is a complex task' involving (1) reaping and picking of the harvest; (2) 'collecting the harvested stalks; (3) transporting the harvest to the threshing floor; (4) drying the harvest; (5) threshing ...'; '(6) winnowing and sieving to separate the grain from the chaff and to clean the grain; (7) measuring and storing.' Three of the main activities during the harvest, reaping, threshing and winnowing, have been treated separately below.

When staggered sowing was undertaken, the crops ripened at variable times and as Hopkins (1985: 224) points out, it facilitated 'a timely harvest since it spread the maturation of the crops across a temporal window' but 'some late-planted crops' would 'catch up due to the warmth of early summer.' The Gezer calendar indicates the fifth season as being 'a month of harvesting barley' and the sixth season as 'a month of harvesting (wheat) and measuring.' Barley ripens earlier than wheat and is therefore the next crop ready for harvesting in April to May. At the beginning of the barley harvest the festival of Pesach was celebrated. Wheat was harvested from early May to June depending on the region. In the Shephelah and the Jordan Valley where the climate is warmer harvesting took place earlier than in the Judean hill country and the Galilee where the climate is cooler. At the completion of the wheat harvest the festival of Shavuot (Pentecost) was celebrated.

de Herrera (2006: 53-54) says that 'the dangers of harvesting are similar to those of sowing' as 'heavy rains and other harmful occurrences' can damage the crops. 'Preventative procedures' must be 'undertaken quickly and properly.' Agriculturists generally believe that 'harvesting should be done earlier than later' particularly concerning wheat, and 'barley must be harvested more quickly than wheat as it ripens earlier and the grain is naturally less covered, causing it to dry quickly and fall off its spike.'

Due to the high temperatures in summer, it was probable that harvesting of cereals took place during 'the cooler morning hours' as the work was 'back-breaking' (Hopkins 1985: 225). The whole family would be involved in these activities and often outside labourers were hired to help. For a small area to be harvested no tools were necessary and the farmer would pull out the whole plant with its roots (Borowski 1979: 93). This meant that the whole plant 'protected the grain from spilling'. When a large area had to be harvested a more complex operation was undertaken with more people involved. The reaping of the wheat consisted of several grain stalks being held in one hand and a sickle used, with a sweeping movement, to cut the ears of corn near to the top. The remainder of the plant was left as fodder for the grazing animals. The stalks were gathered into bundles and tied up into sheaves and left to dry in the sun, loaded onto the backs of donkeys, or put into a cart and carried away to dry on the roof of the house or threshing floor. When fields of grain were harvested, the corners were left so that the poor would find something to eat. These were the gleaners who could walk behind the reapers and gather up any grain that had been left behind. We read in the Bible that sometimes, as the grain was very dry, enemies set fire to it (Gower 1987: 96; Thompson 1986: 130). Feliks (1981: 35) mentions that the enemies of the Israelites would drive their herds of cattle and sheep to graze on the grain fields thus destroying them, or they would plunder the crops after they had been reaped.

When it came to harvesting grapes, the vines were cut with pruning hooks and the grapes carried in baskets to the wine-press. Grapes were picked from July to September and were usually harvested by the farmers or large landowners who rented their vineyards to tenants who would harvest the crop and take a share for themselves. Farmers guarded their crops of grapes and vegetables from thieves, birds and animals, by living in small shelters, or watchtowers, where they lived and slept during the harvest period (Thompson 1986: 135).

Olives were harvested between mid-September and late October and 'the olive harvest was the last major event of the agricultural year' (Thompson 1986: 135). Olives were picked by hand and the higher branches would be shaken or beaten so that the olives would fall to the ground onto mats to be picked up and put into baskets. These were taken to the olive presses.

4.1.4 Weeding. Borowski (1979:60) points out that the third word in line three of the Gezer calendar reads: 'a month of hoeing weeds', which were probably used as hay for animal fodder. Weeding of gardens is undertaken in February and the weeding of 'winter-sown crops' takes place in March in present day Palestine.

Weeding took place on the terraces among the vines and fruit trees. This was done using a hoe to 'cut back on the weeds that would steal moisture needed by the fruit to ripen' (Matthews 1991: 57). According to Packer and Tenney (1980: 266) digging the soil around the vines and clearing it of weeds was done 'once or twice during the growing season.' Hopkins (1985: 193) points out that 'ploughing could be labour-saving as it destroys the weeds and reduces the need for weeding' which was also labour intensive.

Weeding amongst the grain crops consisted of controlling the thistles, thorns, nettles and brambles, but it is known that weeds such as darnel grew together with wheat. Darnel was not destroyed while growing with the wheat but only later, when sifting of the grain took place. The ground between the rows of growing grain had to be kept free from weeds and the soil had to be kept loose so it was necessary to cultivate with hoes (Thompson 1986: 130). The weeds were then used for animal fodder, burnt or thrown away.

4.1.5 Threshing, winnowing and sieving. Threshing was another activity that sometimes required communal co-operation particularly when the threshing floor was shared by the villagers. It is possible that there were a number of threshing floors, positioned to assist in the winnowing, but close to the grain-producing fields to reduce the distance for the grain to be transported as the 'sheaves of harvested stalks were especially bulky and difficult to manage', but threshing floors at some distance from the village were liable to be raided (Hopkins 1985: 226). The dried grain was taken to the threshing floor, which consisted of a

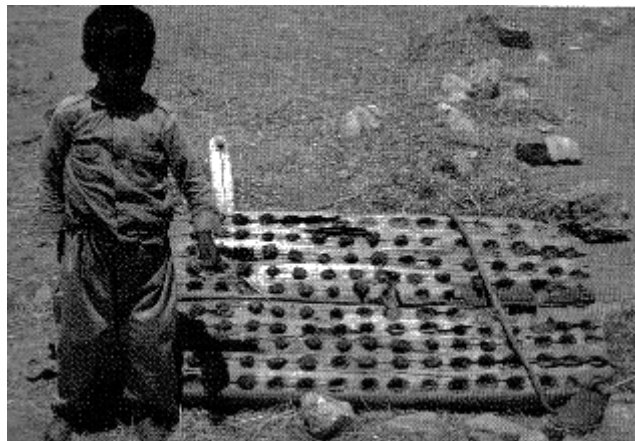
flat compact surface either of earth or smoothed rock. It was when this work was done and the grain collected that the farmer needed to sleep nearby to protect his harvest from thieves. The sheaves were spread out on the threshing floor until the straw lay about 30 centimetres deep.

There were several methods of threshing, such as the simple way of beating small quantities of grain, 'and more delicate crops such as dill and cummin', with a long flexible stick cut from a tree and called a flail (Thompson 1986: 130). He points out that Isaiah 28:27 mentions that different crops need different treatment: 'caraway is beaten out with a rod', 'not threshed with a sledge'; cummin is beaten with a stick, not having 'a cartwheel' rolled over it. The more usual method of threshing grain was using two oxen yoked together with 'the yoke attached to a vertical pole set in the middle of the threshing floor' (Gower 1987: 97). A boy would drive them round and round the floor and their hoofs threshed the grain. They were not muzzled so that they could feed while they worked.

A much quicker method was the use of a threshing sledge which was invented during the fourth millennium. The oxen pulled the sledge behind them 'over grain about fifty centimetres in depth' while the farmer stood on the sledge 'to give it extra weight' (Gower 1987: 97; Thompson 1986: 130). The grain fell through the straw onto the surface of the floor and the straw was cut up. This chopped up straw was mixed with some grain and made excellent fodder for the animals and the grain was gathered and cleaned by winnowing (http://en.wikipedia.org/wiki/Threshing-board#Threshing_with_the_threshing-board).

(See picture below).

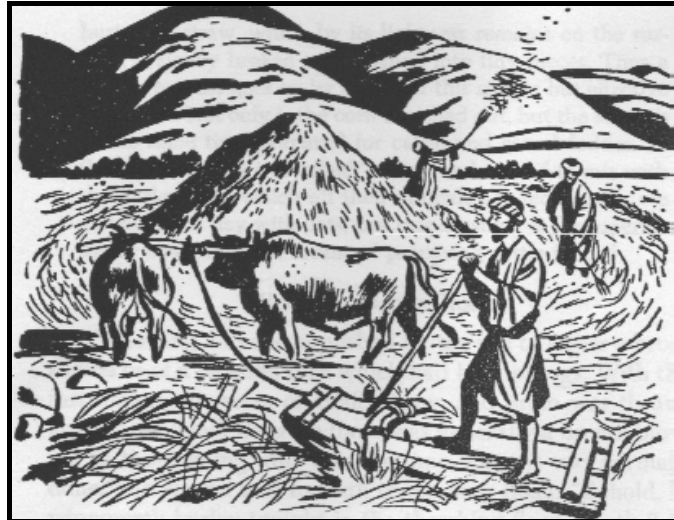
Threshing sledge with basalt teeth in a wooden frame, still in use today



From King & Stager 2001: *Life in Biblical Israel*, p. 89.

After threshing, the grain had to be separated from the chaff which was known as winnowing. The winnower put his fork, or winnowing fan as it was also called, into a pile of grain and straw and tossed it to the winds so that the chaff would blow furthest away, the

straw was blown to the side in a heap, and the grain would fall to the ground as it was heavier. Winnowing was done in the evening when the breeze was strongest. If there was no wind, small quantities could be winnowed by using a piece of matting and wafting it. The chaff which was left was used to burn in the fires in the home, while the straw was used as fodder. The next step was to shovel up the husk and straw with a wooden shovel and toss it into the air so the grain could be collected in a heap (Borowski 1979: 100).



Threshing and winnowing

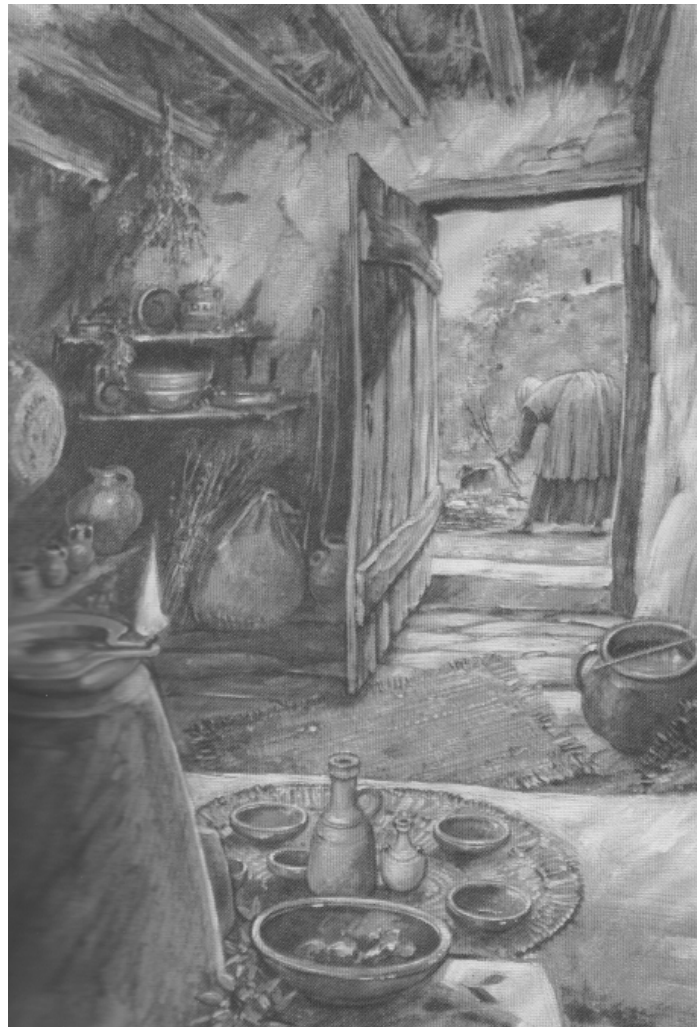
From Wight 1953: *Manners and customs of Bible lands*, p. 182

The final process was to remove the last of the unwanted material and so sifting was necessary. There were two kinds of sieves, one with large holes and one with small holes. The mixture was shaken, usually by the women, until the chaff began to appear on top with most of the other rubbish such as stones, and the grain fell to the ground. Finally the darnel weed grains had to be removed from the wheat grains. It was easier now to separate the grains, as darnel seeds become black when ripe, whereas those of wheat become yellow. Darnel grains 'are bitter and cause dizziness and sickness if eaten' so it was important to remove them (Gower 1987: 100).

Borowski (1979: 101-102) mentions that after the winnowing and sieving was completed the farmer was left with several products: larger parts of straw to be used for kindling; smaller pieces of straw that had been cut up and used as a binder in the making of mud bricks; chaff which consisted of the 'smallest and lightest' of the threshed material; and the 'clean grain' which was stored for 'daily use until the grain of the next harvest was available.' Heaton (1956: 102) states that some of the straw was 'mixed with dung and made into flat sun-dried cakes for fuel.'

4.1.6 Storage. The produce now had to be stored against 'spoilage and wastage by humidity and dampness or by pests and rodents' for future use (Borowski 1979: 107). Foodstuffs were either stored above or below ground, either in bulk and for public usage, or by individuals and in smaller quantities. Once the wheat was harvested and stored it was time to celebrate as the hard work was over and there was food for months to come. The Israelites celebrated this event with the Festival of Weeks (Shavuot), which was also known as Pentecost, 'a Greek word meaning fiftieth' (Brickner & Robinson 2008: 22, 30). It appears that cisterns were also used to store food such as surplus grain. Cisterns were usually built in the living area of the farm as a protection against theft and destruction by wild animals. Deist (2000: 190) points out that subsistence farmers had to make their own storage facilities such as 'silos for grain, jars for wine and oil, and rockhewn cisterns for water' but that methods and tools did not differ between them and large landholders except in 'the size of things'. (See below how the housewife of Bible times stored her foodstuffs).

The inside of a home showing various jars, dishes and pots for storage of foods



From Gower 1987: *The new manners and customs of Bible times*, p. 35.

4.2 Agricultural tools

Farmers required different tools for various activities and over the years these were modified, and made from different materials. Early tools have been discovered that were made with wood and flint for the blades which date from the early Neolithic period and were still used even when metal tools were developed. During the Bronze Age and Iron Ages, metal workers learnt to use copper, bronze and iron for the blades and sharp-edged tools. Farmers needed to see that their tools were in good repair and ready for use, for they had to be prepared and ready for action. For example, goads needed to be sharpened and yokes checked to see that they fitted smoothly on the necks of the animals. Methods and tools for growing and harvesting crops by peasants in the Near East are virtually the same as those that have been handed down over the centuries as can be seen from some of the photographs.

4.2.1 Farmers' tools. Deist (2000: 189-190) lists 'the tools and equipment to assist' farmers in their labour: 'chisels for stone dressing, ploughs, harrows, ropes, hoes, sickles, shovels, forks, brooms, threshing beaters, pruning knives, stretchers that fitted the backs of donkeys, bridles and bits for steering donkeys, mules (and horses), wagons, yokes, goads and oil and wine presses.' Should any tool need to be repaired, then 'some specialist in the area', such as a farmer with the expertise, would be required to assist.

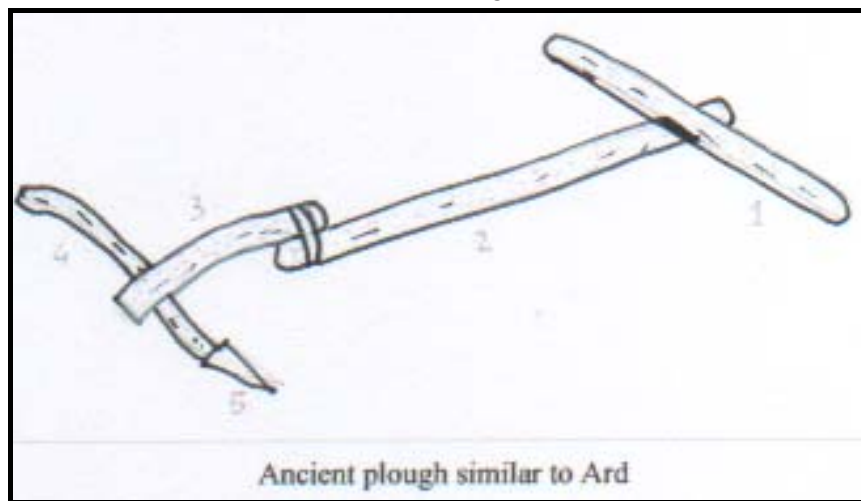
The ground could only be ploughed once the rains had come and softened the soil. Farmers also used mattocks, broad-bladed pickaxes and hoes to break up the clods of earth in areas where the plough could not reach, as on a rocky hillside or where the ground was hard (Gower 1987: 95).

4.2.1.1 Ploughs and yokes. The Hebrew word for plough is *maḥārēšâ* or *maḥārešet* (Borowski 1979: 81). From earliest times ploughs were made of a pole from a hard wood tree such as oak. They were light to carry but very primitive. They consisted of a forked stick with a pointed end and handles to control the implement. The farmer was able to plough with one hand and use his goad in the other hand to control his animal with his lightweight plough. The tips of the 'scratch' plough, or ard, 'could scratch the surface of the ground to a depth of only 70-100 millimetres' (Gower 1987:93). Hopkins (1985: 222) points out that the function of the scratch plough was to break up the soil from below and then 'cut a furrow through the soil without turning it over' and thus maintaining 'soil fertility' by guarding 'against the depletion of organic matter in the soil', 'water conservation' and guarding against soil erosion by not 'exposing the deeper layers.' (See diagram below). Later ploughs penetrated 12 centimetres of soil and turned the soil over (Packer and Tenney 1980: 268). According to Borowski (1979: 82) plough points were 'elongated, 20 to

30 centimetres long, with a pointed tip for soil penetration.’ With the development of metals, plough tips were made of copper, bronze, and then iron.

Both Isaiah 2:4 and Micah 4: 3 say that one day in the future when the Lord rules in Zion people will beat their swords into ploughshares and their spears into pruning hooks as there will be no more war. (See 4.2.2.1 below). However before this happens, Joel 3: 9-11 is told to proclaim to the nations that their soldiers must prepare for war, by beating their ploughshares into swords and their pruning hooks into spears, so that they can fight against the Lord’s armies.

The scratch plough or ard



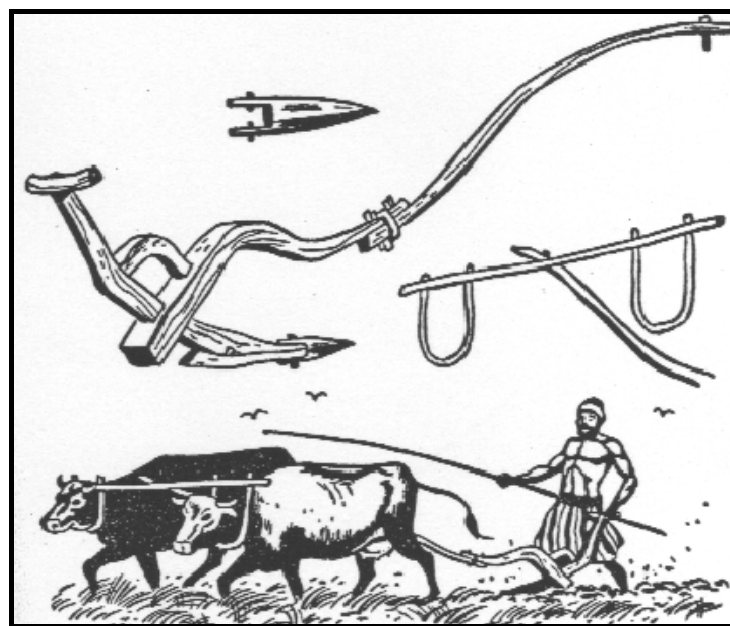
From: [http://en.wikimedia.org/wiki/Ard_\(plough\)](http://en.wikimedia.org/wiki/Ard_(plough))

Feliks (1981: 130) mentions that the yoke was ‘made up of a bar (*motah*) or bars (*mototh*), the bands (*mosseroth*) and ropes (*avoth* or *avototh*)’ and names two types of yokes that were used: ‘one for a single animal and the other for a pair of oxen.’ However, there were several types of plough, such as the single handed plough so the farmer was able to leave one hand free to steer his ox or mule. The bent parts of the plough were formed by the natural curve of the wood and held together later by the use of iron bands. One upright shaft was fastened to this with a crosspiece which served as a handle (Wight 1953:171). These ploughs are still in use today by farmers in the Near East (Borowski 1979:81). (See illustration below). Luke 9: 62 quotes Jesus as saying that no one must look back when putting their hand to the plough because they will not be fit for service in the kingdom of God, indicating that a farmer who looks away from the plough will not make straight furrows which are very necessary for effective cultivation of crops.

Another type of plough consisted of two T-fashion jointed wooden beams. The handle for the ploughman consisted of the ‘horizontal stroke of the T’ and the end was spiked so as to break up the ground (Gower 1987:91). The ‘vertical section of the T was attached to the

yoke' which was a simple rough beam or crossbar tied by rope across the necks of a pair of animals and 'held in place by two vertical sticks that came down each side of the neck and tied beneath.' Leather straps, called traces, were connected to the yoke and the plough and in this way the animal pulled the plough along. Deist (2000: 191) describes the yoke as being a 'strong wooden pole of approximately 150 centimetres by 10 centimetres put over the napes of two animals.' Two sets of 'vertically installed pegs fitted the yoke over each animal's nape' to prevent them from throwing off the yoke. Two 'forelocks' of about 40 centimetres long, were fitted to 'the lower ends of these pegs' which were 'then tied around the animal's neck.'

Primitive ploughing



From Wight 1953: *Manners and customs of Bible lands*, p.171.

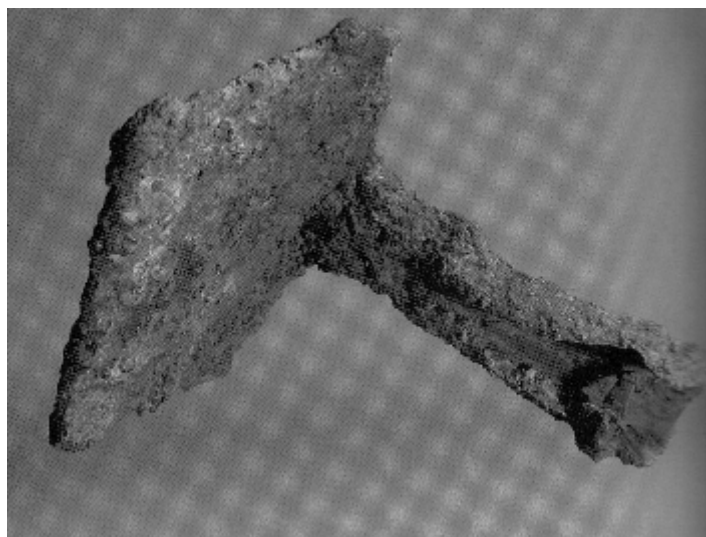
In 1 Kings 12: 4 the elders of Israel said the yoke they lived under in Solomon's reign was heavy and so they asked his son Rehoboam to lighten it. Here they are referring to the burden of taxation and forced labour and indicate that they are as yoked cattle. Jeremiah 27:2 put on a complete yoke as a symbol to show what would happen to the Judaeans when the Babylonians captured them, as they would be forced to go with their conquerors to work for them in Babylon. A number of verses speak of 'yoke' in the Bible, Isaiah several times mentions it (Is 9:4; 14:25; 58:6, 9), indicating that a yoke was a burden for people to bear.

4.2.1.2 Harrows. The harrow was a most useful farming implement known as 'a *charitz*' in Hebrew as 'it represents an instrument with teeth' (Packer & Tenney 1980: 268, 275). The early harrow might have been a log or plank of wood weighted with stones mounted on the

underside and pulled by an ox. Sometimes the farmer rode on it to give it more weight. Later harrows were like sleds which had metal blades on the underside and were pulled along the ground to break up the clods of earth after ploughing.

4.2.1.3 Hoes and mattocks. Should the ground need to be broken up further for cultivation, hoes or mattocks were used to break up the hard clumps of earth. The mattock was a hand tool like a hoe and was known as '*ma'der*' in Hebrew, meaning an instrument used to dig in the ground (Packer and Tenney 1980: 275). Feliks (1981: 47) mentions that there is a difficulty in the Hebrew words for various agricultural tools as '*maḥareshato* (or *maḥaresheth*)' is sometimes called a mattock, but is also called a ploughshare - other Hebrew words for plough being '*maḥarashto* and *itto*'. The blade of the mattock was set at right angles to the shaft and could be sharpened for use as a weapon. In the Iron Age the head of the mattock, the pickaxe and the hoe, was made of iron while the handle was made of wood. Apparently the head of the mattock could be sharpened with a file and used as a weapon, as could the axe and the goad. Hence the quote in 1 Samuel 13: 20-21 where it is mentioned that the Israelites had to have their ploughshares, mattocks, axes, sickles, forks sharpened and their goads re-pointed by the Philistines. When the soldiers went into battle against the Philistines only Saul and Jonathan had a sword and a spear, indicating that the others had to make use of their farming equipment to be used as weapons (1 Sm 13: 22). In Roman times, the 'mattock had two prongs behind the heavy blade' (Gower 1987: 94, Thompson 1986: 128).

A mattock from 1st Century CE



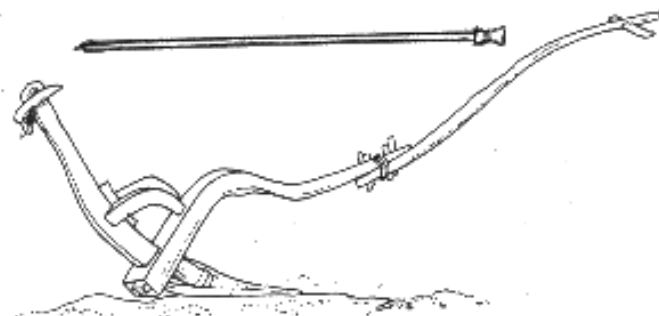
From Gower 1987: *The new manners and customs of Bible times*, p. 94.

The hoe may have been broader and lighter than the mattock and was 'used to clear hillsides or work the soil in the terraces' where it was difficult to plough (Thompson 1986: 128). Gower (1987: 94) also points out that later, farmers used 'a combined pick and hoe, which had a rounded hoe blade and a pick projecting behind it'. Hoes were also used to scrape the top surface of the soil to kill the weed seedlings as they started to germinate. Doing this would prevent competition for water and food with the crops sown by the farmer (Shewell-Cooper 1977a: 187).

4.2.1.4 Goads. Borowski (1979: 83) says there are a number of Hebrew words for goad – '*malmēd*, *dârbân* and **dârbônâ*' according to where they are written in the Bible. The ploughman used a goad which was a wooden rod about 213 to 240 cm long and pointed at one end. Goads were used to prod the animals forward or move slow-moving animals along. Later a goad was made with an iron tip and was 'heavy enough to be used as an effective weapon' (Gower 1987: 94). King and Stager (2001: 92) and Borowski (1979: 84) mention a 'shovel-like implement' (called a *ḥarḥûr*), the plough cleaner, at one end of the goad and a metal spur on the other, such as the one found at Hazor and dating from the eighth century BCE. Feliks (1981: 48) states that the word for the 'flat iron piece' at one end of the ox-goad in Rabbinic literature is '*ḥarḥur*' or the '*maḥaresheth*' (mattock) but the 'goad proper' was called '*darvan*' meaning 'nail'. Deist (2000: 192) suggests that the goad was to 'quickly clean the ploughshare in the process of ploughing and to break up the larger clods on newly ploughed land.'

The book of Ecclesiastes 12: 11 says: 'the words of the wise are like goads, their collected sayings like firmly embedded nails – given by one Shepherd'. Here the goad is pointing the listener to keep strictly to the wisdom of God and to live a life of obedience, not wandering off in another direction. In the New Testament, Paul explains his conversion to King Agrippa. He tells the king that he met Jesus on the road to Damascus and Jesus asked him why 'Saul' was persecuting him. Jesus said it was hard for him 'to kick against the goads' meaning that Saul/Paul by persecuting the church was actually hurting him.

A goad and a plough still used by Arab farmers today



From Feliks 1981: *Nature and man in the Bible*, p. 47.

4.2.1.5 Sickles. There were two terms for a sickle in Hebrew, a *'hermēš'*, which appears to be an older term used in religious law (Dt 16:9; 23: 25), or *'maggâl'* (Borowski 1979: 94, 95). Sickles were hand-held and were the principal tool for harvesting. They are still used today in some parts of the world and resemble those of ancient times. Sickles are crescent-shaped, although modern ones are larger (Thompson 1986: 129). The curved blade was made of flint at first, then of bronze and later, in the tenth century BCE, of iron (Packer and Tenney 1980: 268). However, flint bladed sickles were used in all periods, particularly for the harvesting of grass and cereals. The flint was embedded in the jawbone or bone of an animal, or in a curved piece of wood. The sickle that was used to reap the grain had 'a short wooden handle turned toward the point' such as was used in Egypt. Some primitive sickles have been discovered that have clay and wooden handles with flint blades, while later, metal was used to form 'small, curved blades' which replaced the flint (Packer and Tenney 1980: 276). (The top sickle is bronze, the lower one is carved out of bone).

Ancient sickles



From Beers 2003: *Journey through the Bible*, p.95.

Borowski (1979:96) describes a sickle that was found at Hazor and dating from the Iron Age. It had a wooden handle that was 'attached with nails or rivets to the metal shaft' and there was little change in form or basic structure for centuries. According to Deist (2000: 192) 'the early sickle was a hook-shaped metal knife used for cutting grain, grass and even thin branches of trees and shrubs', but this seems to be at variance with most authors, who agree that the early blades were made of flint.

Several times the sickle is mentioned in the Bible, regarding the time of harvest. Deist (2000: 192) says that the reaper waved his sickle to cut the grain and 'the action of waving the sickle grew into an image of waging war with the sword'. He mentions that in Jeremiah 50: 16 he says that the sower and the reaper, 'with his sickle at harvest', must cut off

Babylon, indicating warfare between the nations. The swinging of the sickle in Joel 3: 13-14 is 'a metaphor for judgment' as he says that the harvest is ripe and the day of the Lord is near. The book of Revelation 14: 14-19 mentions that God is going to send his angels with sickles to reap as the time is ripe for the harvest, meaning that God is ready for the judgment.

4.2.1.6 Threshing sledges and threshing floors. The Hebrew word for threshing floor is *goren*, for the stick *šebeṭ*, for the threshing sledge *môrâg*, and for threshing wheel, *'ôpan 'ăgâlâ* (Borowski 1979: 96-99). Feliks (1981: 93) mentions that apart from the flexible stick for threshing delicate and fragile seeds there were four other methods of threshing: 'treading by horses (*parashim*), a toothed threshing sledge (*ḥarutz*), a cartwheel (*ofan 'agalah*) and a roller sledge (*gilgal 'agalah*).' The grain that had been collected was transported to the threshing floor by a wagon or cart, animals, or people with large baskets. Here it needed to be threshed and winnowed. The threshing floors had to be hard and flat and were usually made in high windy places. Sometimes there was only one threshing floor in a village and threshing was organised so that each farmer had his turn. Threshing floors had to be maintained each year by rolling them and making them hard. Sometimes the threshing floor was located near the city gate (King & Stager 2001: 89). Matthews (1991: 54) notes that the threshing floor was also used 'as a site for the distribution of grain to the villagers.' Later it 'became associated with the well-being of the community and the administration of the law.'

Village threshing floor



From Heaton 1956: *Everyday life in Old Testament times*, p. 101.

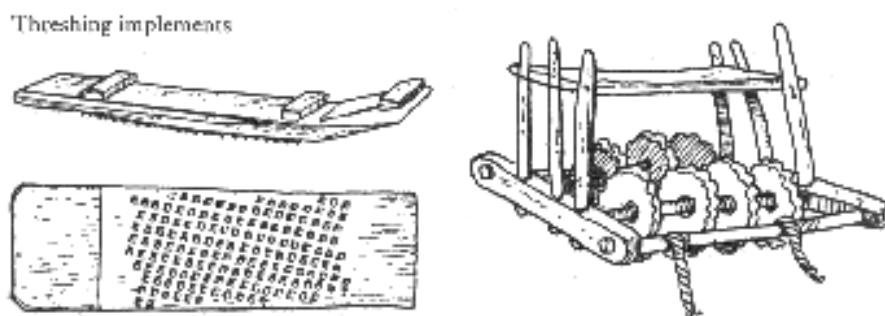
According to Borowski (1979: 97-99) there were several methods of threshing: a) using a flail or stick when there was a small amount of grain; when the threshing floor could not be

used for security purposes, or the crop had small seeds which could be damaged by using heavy equipment; b) by animals which would tread over the crop; c) using a threshing sledge which was the most common way; d) threshing with a wheel-thresher.

The threshing sledge consisted of a wooden plank, or two or three wooden boards about 90 centimetres wide and two to three metres long with the front part up-turned to prevent it from sticking into the surface when animals pulled it. There were many holes, 2.5 to 5 centimetres in diameter, on the underside and to these holes pieces of basalt, flint studs or iron projecting from the plank, were attached by pitch. These acted as teeth and tore the grain loose. The farmer stood on the plank while the ox or donkey pulled the board across the grain (Packer & Tenney 1980: 269-270). Borowski (1979: 99) mentions that 'threshing-sledges with stones and iron teeth' are still used today, side by side with modern threshers, in the Near East. (See 4.1.5 above).

During the Iron Age a more sophisticated threshing machine was invented and is what Borowski calls 'a wheel-thresher'. It was also made of 'a square wooden frame holding two or more wooden rollers', or wheels, on which there were 'three or four iron rings, notched like saw-teeth' (Packer & Tenney 1980: 268-269). The grain was beaten out by the rollers and by the oxen's feet as they pulled the machine over the sheaves piled on the floor. The driver sometimes sat on the crosspiece fastened to the frame. The straw was shredded as the threshing machine was moved over the sheaves and used for fodder.

Different types of threshing sledges

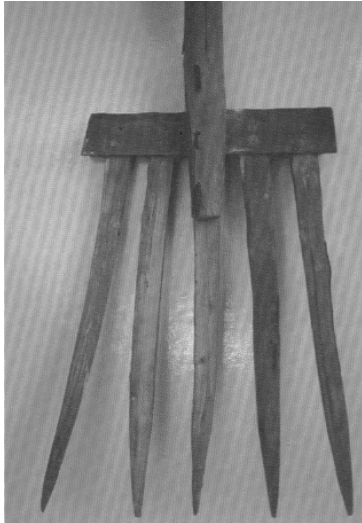


From Feliks 1981: *Nature and man in the Bible*, p. 93.

The threshing floor in the Bible 'was a basis for a simile picturing hard times' such as in Amos 2: 13 where God says he will press down his people as a cart presses down when it is full of sheaves (Deist 2000: 192). Isaiah 21:10 pictures the people as crushed on the threshing floor after their defeat by the Babylonians. The threshing sledge was also an

'image of victory in war' due to the way it operated as in Isaiah 41: 15 the Lord says he will make his people a new threshing sledge with sharpened teeth so that the mountains will be threshed and crushed and the hills become like chaff against the Persians, indicating that 'they will conquer the whole world' (Deist 2000: 193). Another image in Proverbs 20: 26 speaks of defeat for those who are against the king for 'a wise king winnows out the wicked; he drives the threshing wheel over them', so the king will maintain his power by crushing his enemies. Deist (2000: 193) points out that in Amos 1:3 'the iron-tipped sledge symbolizes excessive violence' that was carried out on the Israelites by Damascus when they attacked Gilead, and for this the Lord will punish them severely.

4.2.1.7 Winnowing fans and sieves. When there was a heap of grain and chaff in the centre of the floor the farmers winnowed it. A 'five-pronged' wooden fork was used called a winnowing fan together with a spade called a winnowing shovel (Gower 1987: 98). The fork was called a *mizreh* and the shovel a *raḥat* in Hebrew (Borowski 1979: 100). The fork was used to lift the grain and straw into the air and when too little remained for the fork to pick up, the shovel was used. A semi-oval fan-shaped frame about 90 centimetres in diameter which had a surface of woven hair or palm leaves was also used (Packer and Tenney 1980: 276).



A winnowing fork used in Bible times for winnowing grain

From Gower 1987: *The new manners and customs of Bible times*, p. 98.

Sifting was necessary to remove any unwanted material. The sieve was 'a round wooden frame' which had a 'mesh bottom made of woven leather thongs or sheep or goat gut' (Ward 1987: 107). Matthews (1991: 55) describes the sieves as 'small wicker screens for separating the grain from the chaff', trapping the tiny stones or bits of pottery and allowing the grain to fall to the ground. There were two kinds of sieves, the *kěbârâ* and the *nâpâ*

mentioned in the Old Testament (Borowski 1979: 100). The first sieve has large holes and when shaken sideways in a circular direction the heavy objects such as small stones move to the side and the grain falls through the middle. The other sieve has small holes and it is shaken up and down. The grain now remains in the sieve and the small particles fall through the holes. According to Deist (2000: 152) when sieving the grain the coarse meshed sieve was used first 'to hold back the pebbles, pieces of thorn bush or other waste' and afterwards the fine sieve was used to 'let through the kernels' but hold back 'thorns, tiny pebbles and coarse sand kernels'. Among the grain kernels collected, there was still dirt and small sand grains which got into the flour and the bread that was made from it.

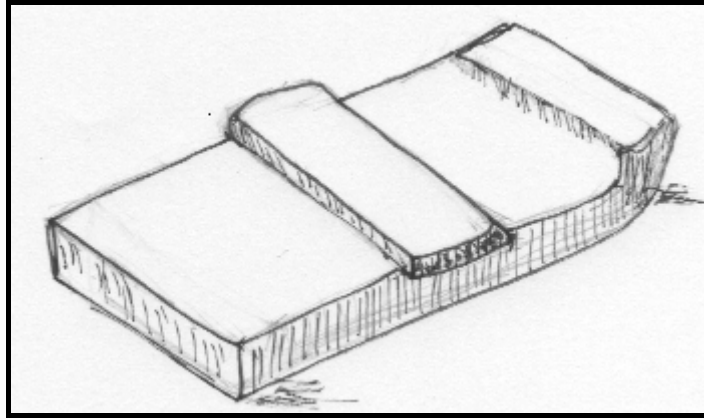
Sieving grain



From Heaton 1956: *Everyday life in Old Testament times*, p. 102.

4.2.1.8 Mills. Once the grain was collected, it was ready for grinding into flour. According to King and Stager (2001: 95) 'the handmill or saddle-quern consists of two stone slabs.' (See below). The larger rectangular stone (which is slightly concave) is at the bottom while the upper, smaller stone is at the top. This is the grinding stone which 'fits into the hand of the miller and is sometimes known as the "rider"'. The grain was spread on the large flat stone that was fixed in position and the grinder rubbed or crushed the grain with a round upper stone which was often made of basalt. Heaton (1956: 82) mentions that the saddle quern or a pestle and mortar were used to grind grain until the 'simple mill with the upper and lower stones came into general use in the fourth century' BCE.

A saddle quern and muller



Adapted from Heaton 1956: *Everyday life in Old Testament times*, p. 81

Packer and Tenney (1980: 278) describe this 'rotary mill' as consisting of two circular stone slabs about 50 centimetres across. These mill-stones were secured by a pivot. Grain was poured through the pivot hole in the upper stone and as the wheel turned it forced out the ground flour between the two stones. More grain was added to reach the required amount needed. Sometimes two women sat on either side of the mill and would grind the grain by turning the mill with a wooden handle attached to the outer surface of the upper stone.

Two women using a 'rotary mill'

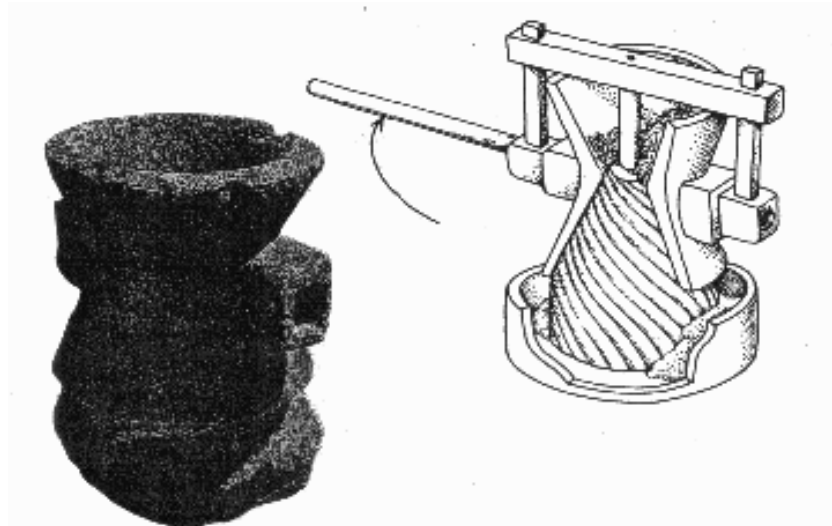


From Gower 1987: *The new manners and customs of Bible times*, p. 43.

Thompson (1991: 150) mentions that most likely the poor people even in New Testament times ground their own flour but that by then 'commercial mills and even bakeries were in existence.' Archaeological finds from Old Testament times point to the existence of public bakeries, such as the discovery of two-storey buildings in 'Middle Bronze Age Jericho' that indicate that the amount of grinding grain in large jars there is far more than a 'normal household' would require. When a family daily ground grain for its own consumption it was often done by pulverising the grain in a stone mortar with another stone that was rounded.

(The pictures below show two types of mills. The first picture shows a mill made of two stones, an upper and a lower stone. The upper stone was rubbed or rolled over the grain in the hollow of the lower stone. A wooden handle was inserted into a socket in the upper stone and was used to turn it. The second picture shows a hollowed out mortar with a basalt stone).

This mill was used for grinding large quantities of grain into flour



From Ward 1987: *Jesus and his times*, p. 107.

This is the kind of mill that was used in the home



From Beers 2003: *Journey through the Bible*, p. 140.

Grinding, milling and millstones have various images in the Bible. In Jeremiah 25: 10 the grinding of the millstones that will be stopped when God is angry with his people, is a sign that there will be 'doom and gloom' and no longer will there be mirth and gladness (Deist 2000: 194). There are two processes involved in grinding: the crushing of the grain by pounding it with the upper stone and then grinding the broken kernels by rubbing the upper stone over the lower one. An example of 'a metaphor for oppression' is found in Isaiah 3:15 where the Lord asks: 'What do you mean by crushing my people and grinding the faces of the poor?' (Deist 2000: 194).

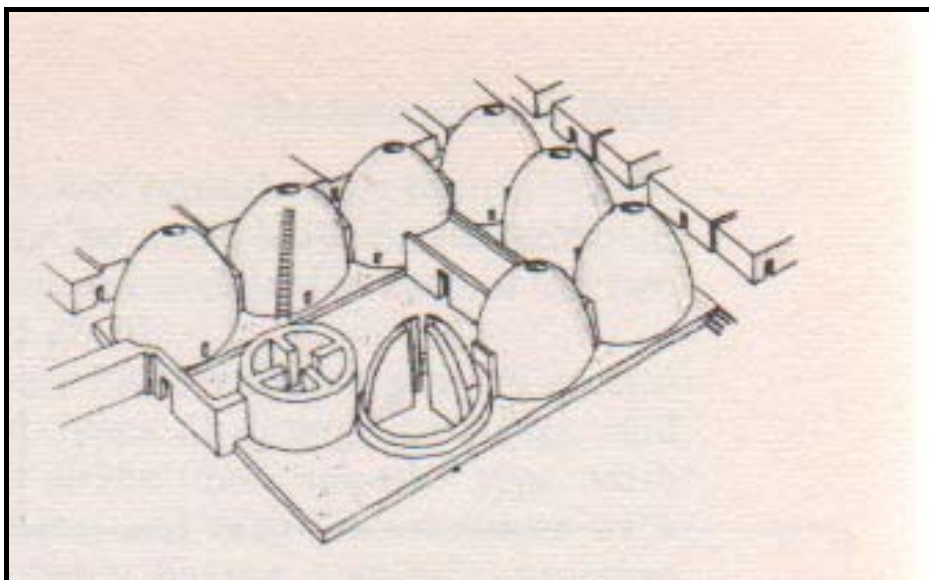
4.2.1.9 Storage facilities. Large quantities of grain were stored in bulk, in cisterns or dry pits, a room attached to the house, or a barn, while smaller quantities were stored in earthenware jars. According to Borowski (1979: 105) there were two main storage facilities, either 'subterranean or above-ground' which could be further subdivided. Subterranean facilities include grain pits which were 'small stone-lined or plastered' pits and used for 'storage of grain in bulk'; silos, which were large pits 'where grain was stored in bulk'; cellars, which were 'subterranean' rooms 'used for storage of foodstuffs, mostly in containers.' Above-ground facilities included granaries 'where grain was stored mostly in bulk; store-houses', which were buildings 'where grain and other foodstuffs were stored in jars'; store-rooms, which were rooms attached to large structures 'where foodstuffs and grain were stored in jars'; and storage rooms, which were storage facilities 'attached to the exterior or interior' of dwellings.

Borowski states that excavators have used 'terms such as grain-pits, silos, granaries', and so on, to describe the same type of structure, hence there is confusion about storage facilities. Some villages had public storage consisting of pits in the ground up to 7.6 metres in diameter and nearly as deep, as well as grain silos (Gower 1987: 101; Packer and Tenney 1980: 270). Vamosh (2007a: 79) believes that storage pits discovered in the Jordan Valley 'pre-date by thousands of years' the city of Jericho considered to be the first city in the world. At Arad 'stone-lined storage pits' containing burnt grain and dating to 2900-2700 BCE, the Canaanite period. Similar pits have been found at Dan, Hazor and Lachish. King and Stager (2001: 91) mention the 'large subterranean silo' estimated to be able to contain '346 metric tons of wheat' that was found at Megiddo and believed to have been used during Assyrian rule, but Vamosh mentions it was built in the period of the Israelite kings, at the time of King Jeroboam of Israel. This storage pit may have been built for government storage as its capacity was so large. Thirty-four silos at Tell Beit Mirsim were estimated to contain one metric ton each and were also considered to be government storage pits, as the potential capacity was thirty-four metric tons of grain. In

the Persian period 'large, brick-lined pits of up to two meters in diameter and two meters deep' were built to contain wheat at Tell el-Hesi. Grain pits were built in close proximity to dwelling areas and indicates that grain was used daily. Archaeologists have been unable to identify more structures as cellars, as they have 'found difficulty in excavating them properly and finding the relationship between the cellar and the building to which it belongs' (Borowski 1979: 111). At Tell Jemmeh and dating to the Assyrian period of the seventh century BCE, a cellar of several storerooms has been excavated. It appears that the cellar forms part of a residence and consisted of basement storerooms where large storage jars were housed.

Granaries were above ground storage facilities and were used mostly in Egypt. At Beth-Yerah in Syrio-Palestine a large building dating to Early Bronze Age III was excavated and appears to be the foundation of a large granary. (See diagram below). At Gezer a 'partially subterranean granary dated to MB IIA was discovered' with 'a substantial stone foundation holding a mud-brick superstructure', and another granary, 'dated to the Philistine period (mid-twelfth century)', has been uncovered (Borowski 1979: 113-114). Storehouses have been found that are dated to the monarchic period and consist of 'long and narrow rooms with thick walls and deep foundations' which were necessary to insulate against moisture and help the grain from going mouldy.

Reconstruction of granary at Beth-Yerah



From: Mazar 1990: *Archaeology of the land of the Bible*, p. 129.

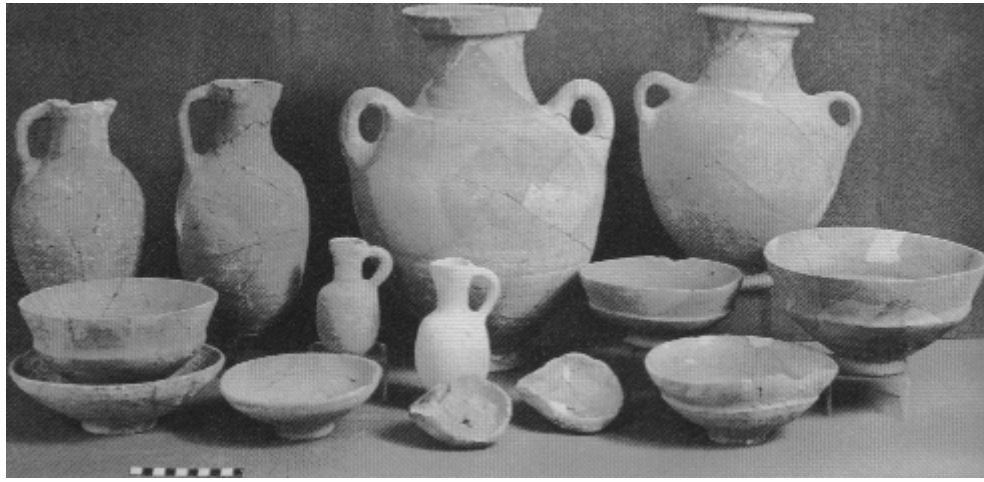
King and Stager (2001:91) also mention the 'tripartite buildings dating to Iron II' that have been thought to be 'storehouses, stables, bazaars, or barracks'. Borowski (1979: 116) points out that these buildings, found at Beersheba, Tell Qasileh, Tell Abu Hawan and

other sites, were unique to Palestine and could be labelled 'pillared store-houses'. The three structures at Beersheba, located near the city gate, appear to have 'served as storage facilities for various foodstuffs' such as 'flour, oil, wine, etc.' The foodstuffs were stored in jars and other vessels which were stacked one on top of the other. The size of the buildings and their location indicate that these were public structures. Thompson (1986: 155) mentions that there were large storehouses of two kinds: one had long parallel rooms with thick walls and a floor raised above the foundations such as at Beth-Shemesh; the other was built in such a way that animals carrying the grain could walk right into the store. On each side of the walkway were storerooms and the grain was loaded directly into them. As stone troughs have been found, it has been suggested that while the loads were being removed, the animals were fed and watered. Storehouses such as these have been found at Hazor, Beersheba and Megiddo.

Store-rooms are similar to store-houses but they are smaller in size and attached to other larger structures (Borowski 1979: 118). A number of store-rooms dated to Iron Age I have been discovered at Beth-Shean, while other store-rooms have been found at Dothan, Tell Dan and Samaria, the latter being attached to a storehouse. Storage rooms are identified 'as part of a dwelling unit' and in the 'Iron Age the most common dwelling structure' was the 'four-room house' where certain rooms were used for storage of agricultural products. In these rooms the foodstuffs were stored in jars and available for daily use.

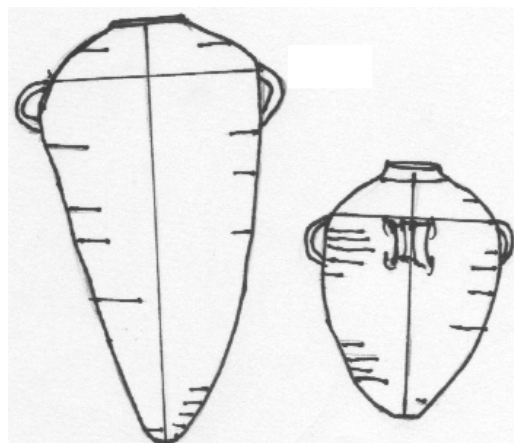
Private storage facilities sometimes consisted of bins which were built in the most secluded part of the house, under the women's living quarters. The grain that was stored needed to be protected from pests so the walls were thick with only one circular hole about 38 centimetres in diameter and therefore easy to seal at the top (Packer and Tenney 1980: 266). The insides of the walls were plastered and smoothed, thus not affording the insects and pests a place to hide. Some of the grain 'was "parched" to be eaten as journey provisions or pressed into cakes' (Matthews 1991: 56). According to Vamosh (2007a: 80) archaeologists believe that nearly 40 percent of the produce stored may have been destroyed either by mildew or eaten by rodents, but that the people needed to store grain as it 'could have made the difference between starvation and survival.'

(Below is a photograph of an assortment of jugs and pots that were used for storage, and at mealtimes).



From Gower 1987: *The new manners and customs of Bible times*, p.44.

Grape juice was stored in skin bottles, pitchers and barrels and left there to ferment into wine (Packer and Tenney 1980: 270). Vamosh (2007a: 81) maintains that 'the pottery jar was a great advancement in the storage of foodstuffs' as it was easily transportable and could be covered. She mentions 'the collared-rim storage jar' which was used to store liquids, olive oil, wine and water. Large earthenware storage jars, with 'a capacity of 250-1800 litres' called *pithoi* by archaeologists, were also used to keep wine, oil and grain in homes or shops. Dried foods such as grain, various types of dried vegetables and fruit were stored in jars of various sizes and were usually kept in the home where it was protected from thieves. According to Vamosh, the larger storage jars were a sign of a settled population, because these were not transportable and were inconvenient to carry. She notes that milk was also stored 'in specially crafted containers' for future use, but mostly it was kept in skins. Wine was usually stored in large tar-lined jars and 'sealed with a cork made of straw and mud', in the courtyard of the house. Other jars stored 'sauces, vinegar, oil, and honey.'



Earthenware storage jars called pithoi

Adapted from King and Stager 2001: *Life in Biblical Israel*, p.144.

4.2.2 General tools. A number of tools that were used by those living in Syrio-Palestine were used by carpenters, builders, householders as well as farmers, as in the early years in the small villages, the latter had to do most of the tasks themselves. Apart from the farming tools essential for his work, the farmer also needed tools such as axes, adzes, saws and hammers. Wight (1953: 208) points out that some Palestinian carpenters today use very similar tools to those that were used in Bible times.

(See below for collection of ancient carpenter's tools).



Four wooden mallets used as hammers and an adze with a bronze blade bound to a wooden handle with leather thongs

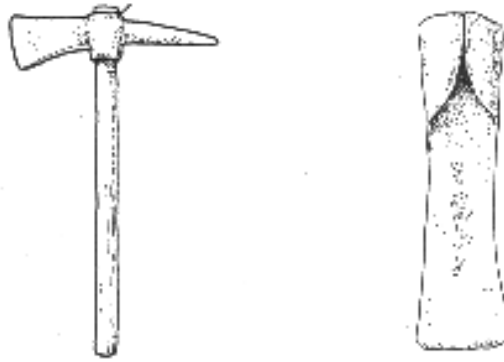
From Beers 2003: *Journey through the Bible*, p.211.

4.2.2.1 Axes and pickaxes. Packer and Tenney (1980: 272, 276) describe the most common type of axe which originally had a stone or flint head, but later was made of bronze, copper and iron. The Hebrew word for this axe was '*garzen*', meaning 'to be cut' or 'sever'. The blade was fastened to a wooden handle with leather straps. Axe blades were sometimes short or long. Later the axe heads were set into a wooden handle 'parallel or at right angle to the handle'. Carpenters and some other trades used axes in their work and axes could also be used as weapons of war.

Deist (2000: 191) mentions that the 'pickaxe was a sturdy instrument used both as a hoe and an axe' as it could cut 'the roots of trees on new land' and break the virgin soil of clumps and rough places. The prophet Isaiah 2: 4 states that the people will one day beat their swords into pickaxes (not ploughshares) indicating that they are ready to break new ground and to start again (Deist 2000: 191). (See 4.2.1.1 above). He mentions that Joel 3: 10 speaks of the time that will come when the farmers beat their pickaxes (ploughshares)

into swords as they are in danger from their enemies. According to Aviam (2004: 252), 'the farming pick was the most common tool' in ancient agriculture and discoveries have been made of picks of different sizes and shapes, either with pointed blades or horizontal and vertical blades. The main farming tool of the Jews was the *qardom* which was used for hoeing, but the term was used for all types of picks.

A pickaxe (*qardom*) and the tip of an ox-goad found in Ugarit

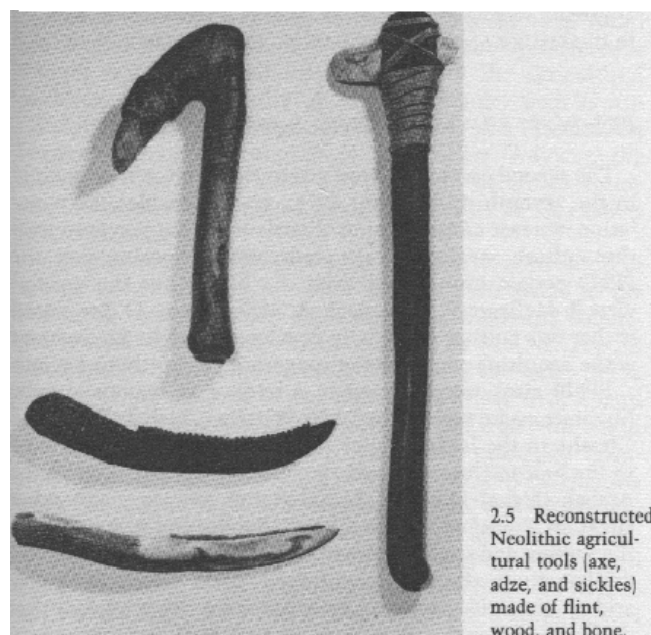


From Feliks 1981: *Nature and man in the Bible*, p. 48.

4.2.2.2 Adzes. This tool was used to smooth and shape wood. The carpenter would chip off pieces of wood leaving a fairly smooth surface. The blade was curved and attached by straps to the wooden handle at right angles. The blades, like the axe blades, were made of stone, copper, bronze or iron (Packer & Tenney 1980: 273).

(See photograph below of tools from the Neolithic period)

Ancient tools



From Mazar 1990: *Archaeology of the land of the Bible*, p. 43

4.2.2.3 Saws. The Egyptians made their saws of bronze with the teeth of the blade pointing towards the handle, thus cutting on the pulling stroke (unlike today where the teeth point away from the handle and cut on the pushing stroke). The blade was attached to the wooden handle by leather thongs while some blades were inserted into the handle (Packer & Tenney 1980: 273-274).

4.2.2.4 Hammers. According to Packer and Tenney (1980: 272, 274) there are a number of Hebrew words for hammer – ‘*halmuth*’, ‘*makkubhah*’ and ‘*makkebhet*’. These ancient hammers looked very much like the hammers of today. The earliest hammers were made of a heavy stone with a hole drilled in it for the wooden handle. Another type of hammer was the ‘maul’ which is thought to have been a heavy wooden hammer or mallet used by carpenters. In Jeremiah 23: 29 the Lord says that his word is like fire, and a hammer that breaks a rock in pieces, indicating that those who do not keep God’s word will be punished. He is speaking about the prophets who were lying to the people and turning them away from following God and allowing them to continue in their evil ways. Jeremiah 50: 23 says the Lord calls Babylon a hammer, a play on words here, as the Babylonians had been mighty conquerors, but now ‘the hammer of the whole world’ will be broken and shattered when God causes them to be defeated by their enemies.

CHAPTER 5

CULTIVATION OF SPECIFIC PLANTS

According to Crossan and Reed (2001: 20-21) peasants were primarily interested 'in working the land' as they had to pay taxes to the tax collector, tribute, and the Temple tax, and had 'to survive on what was left.' Their goal was to be self-sufficient and they did this by 'poly-cropping' – 'scattering their plots and diversifying their crops.' Diversification assisted them, in that if a single crop failed they would not suffer famine, and it would also assist them with labour demands, as the farming tasks would be spread over the seasons. Growing one's own food meant that they were self-reliant rather than relying on others. Unfortunately, it appears that 'polycropping waned as monocropping increased' which led to the peasants being forced to sell their land and become tenants when the crop failed or drought destroyed it (Crossan and Reed 2001: 69-70).

Dar (*in* Wilkins, Harvey and Dobson 1995: 326) mentions that the Bible and the Talmud identify about five hundred types of vegetation, consisting of 'one hundred and fifty types of cultured growth' which includes 'three kinds of grains, about twenty kinds of legumes, twenty-four kinds of vegetables, sixteen types of spices, ten healing grasses and perfumes as well as eighteen types of industrial crops' and 'twenty-five fruit trees.' Berlinger (1969: 72) mentions that 'the sages of Israel classified trees according to where they grew: oaks in mountainous areas; date palms in valleys; reeds along streams and river banks; and sycomores in the lowlands of the Judean Hills (Shephelah) where the climate is sub-tropical and ground water is near the surface'. Apparently even today the largest concentration of sycamore trees is still found in that area.

At the time of Jesus, the peasants had little land and had to eke out an existence. Rousseau and Arav (1995: 10) point out that 'Galilee was a special case': as most of the people were Jews who were 'small freeholders and small flock owners'; the region was prosperous as 'the climate and soil allowed for diverse farming; families could be self-sufficient.' Crossan and Reed (2001: 33-34) note, for example, that Nazareth in the first century CE was 'a small Jewish settlement' with a few hundred people and an adequate water supply. Its south-facing slopes were 'ideal for viticulture'; 'the ravines in the slope and the rockier ground' were suitable for olive trees, while the steep terraced slopes were suitable for fig and pomegranate trees; 'wheat, barley and millet' could grow in the fields on the slopes; vegetables and legumes could be grown in the 'alluvial soil spreading south of the village.' Archaeologists have discovered that there was space between the houses

for enclosures for livestock, 'gardens and orchards or communally shared agricultural facilities', thus ensuring self-sufficiency for the villagers (Crossan and Reed 2001: 324).

5.1 Grains

Cereal grains such as varieties of wheat and barley were essential crops for the people, wheat being the staple of their diet. Wheat and barley appear to have been first cultivated at about the same time in the eighth millennium BCE (Braun *in* Wilkins, Harvey and Dobson 1995: 25). Thompson (1986: 129) states that wheat was more popular than barley and was grown on 'the well-drained lower areas'; that barley could be grown in the same area but on poorer soil, and was usually grown in drier areas such as in the south-east near the Arabah. Archaeologists have discovered grinding stones and threshing floors 'from Mt Hermon in the north to the Negev in the south' thus giving a more detailed picture of the cultivation of grains in the land (Dar *in* Wilkins, Harvey and Dobson 1995: 329). The climate and soil conditions of 'the Tigris and Euphrates Rivers in the east, the Nile River in Egypt, and the Jordan valley of Palestine' were rich areas for the cultivation of grain (Packer & Tenney 1980: 247).

5.1.1 Wheat. The Hebrew word for wheat is 'hittah' (*hittâ*) and it is a member of the Grass family (Zohary 1982a: 74). It was one of the Seven Species with which the land had been blessed. According to Packer and Tenney (1980: 267) the Plain of Esdraelon (Jezreel) 'was the bread basket of Palestine.' The best wheat was grown in Galilee, but every available valley in the western Jordan hill country produced grain. Much grain was also grown in Transjordan on the plateau. Braun (*in* Wilkins, Harvey and Dobson 1995: 26) believes that the Judean hills were less favourable for the growing of wheat and 'outside certain favoured areas wheat was scantier and riskier' to grow than barley. Thompson (1986: 133) says that in the Roman period, when the new roads opened up trade, when the Roman Empire needed food, and water supplies were improved, huge wheat fields were developed 'in northern Palestine, lower Galilee, Bashan east of the Jordan', and 'in Lebanon.' He maintains that 'the area east of Galilee, the Hauran of southern Syria (including ancient Bashan) became one of the great granaries of the Empire.' Mackie (1991: 49) notes that today 'the chief grain fields are the Syrian plain between Lebanon and Anti-Lebanon, the Hauran east of Galilee, the plains of Esdraelon and Sharon, and the plateau around Jerusalem, Bethlehem and Hebron'. This indicates that wheat is still grown in areas where it was grown in ancient times.

Around the border of the field inferior grains of a lower quality, such as fitches, spelt and emmer, were grown as they were hardier and could grow in poor soil. These grains were mixed with wheat or barley to make coarse bread. Wheat on the other hand required more

water and less saline soil than barley (King & Stager 2001: 94). Zohary (1982a: 74) notes that the fields of wheat were not irrigated and were dependent on the scanty rainfall, which in some years did not fall and caused a famine in the land.

King and Stager (2001: 94) mention that there were several species of wheat that were cultivated: 'einkorn (*Triticum monococcum*), emmer (*Triticum dicoccum* or biblical *kussemet*), bread wheat (*Triticum aestivum*), and hard wheat (*Triticum durum*).' In Iron Age II a hybrid of emmer, bread wheat, was grown, while hard wheat was the principal wheat of the Mediterranean basin. Zohary (1982a: 74) states that the two species of wheat which were cultivated abundantly in biblical times were durum wheat (hard wheat) and emmer, and that the former is still, as in ancient times, 'the dominant field crop' as 'its grains are free (not hulled), hard, rich in gluten and supply excellent flour'. This grain is 'sown before or after the early rains and harvested in June or July'. (See 4.1.2 and 4.1.3 above). Zohary (1982a: 75) mentions that emmer wheat was also widely grown, but was very inferior to durum wheat, particularly 'with respect to its hulled grains' as these could not be threshed freely. Emmer is not called *ḥittâ* but has its own name, '*kussemeth* (or *kussemoth* or *kusmim*)'. Renfrew (1973: 66) mentions that the two wild forms of wheat, which he calls *Triticum boeoticum* and *Triticum dicoccoides* (emmer), grew on the basaltic and hard limestone regions around the Sea of Galilee and on the 'east-facing slopes of Mount Hermon'.

Zohary (1982a: 75) describes wheat as being an annual plant with erect ears of spikelets at the end of each stem. These spikelets have 'three to seven flowers, of which only a few produce grains.' These are the fruit of the wheat. They contain a 'single seed' which contains a tiny embryo and 'a large body of endosperm' which stores starch and proteins. The bran consists of the outer layer of the seeds. Zohary explains that farmers needed tough ears of wheat which would not be brittle and break off but last until they could be harvested. He believes that it was about 8000 years ago that wheat was domesticated and that it occurred in 'Jarmo in Iraq and probably in the Land of Israel as well.'

5.1.2 Barley. Barley was the second grain crop of importance and one of the Seven Species with which the land was blessed. Like wheat there are 'winter- and spring-sown varieties' (Renfrew 1973: 80). Packer and Tenney (1980: 247) note that the Hebrew word for barley is '*se'orah*', meaning 'hairy or bristling thing' because there is a rough, prickly covering to the ears, but Peelman (1975: 8) mentions that the 'long hair' of the barley refers to 'the distinctive appearance of the barley stalk.' It 'belongs to the genus *Hordeum*, which was cultivated in Palestine, Egypt and adjacent regions.' Zohary (1982a: 76) points out that there are 18 species of the genus *Hordeum*, but only two are cultivated – *Hordeum distichum* (two-rowed) and *Hordeum hexastichum* (six-rowed) barley, both

thought to be 'varieties of the common barley (*Hordeum vulgare*)'. In the first species 'only one flower of each spikelet is fertile, or grain-producing, while in the six-rowed, all three spikelets develop into grains.'

Barley was salt resistant and could grow in marginal regions, growing 'best in the dry areas of southern Samaria and Judea' (Rousseau & Arav 1995), and in the 'semi-arid margins of the mountains and sections of the northern Negev' (Zohary 1982a:76). Shewell-Cooper (1977a: 163) says that barley grew in the Jordan Valley, in Moab, and in and around Lebanon. Braun (*in* Wilkins, Harvey and Dobson 1995: 25-26) states that barley grows extremely well on 'well-drained, fertile soil' but that it also grows 'on the thin limestone soil' of the Judean hills as well as many other parts. It does not require so much rain when it is germinating, 'it takes a shorter time to mature' which means it is less likely to suffer from disease, and hotter or colder temperatures do not affect it so much, so that it can be grown from sea level up to almost 1524 metres. Renfrew (1973: 81) mentions that 'moderate rainfall' and 'deep loam soils suit barley best.' He believes that barley grows vigorously on soils which have a high nitrogen content and are 'remarkably tolerant in saline and alkaline conditions', but however, it is 'more sensitive to soil acidity.' As barley is 'tolerant of alkalinity', there are many acres of barley growing on chalk or limestone fields.

Peelman (1975: 8) notes that barley was sown in October and November and harvested in spring before the Passover and according to King and Stager (2001: 94) barley was harvested in late April or early May, two weeks before the wheat. However Thompson (1986: 130) maintains that it was in mid-April or early May that the barley was cut and that about a month later the wheat was harvested. Zohary (1982a: 76) confirms that barley was harvested a month before wheat and states that at the Passover feast barley was used for 'the *omer* offerings ... while the first grains of wheat were offered at the Feast of Pentecost' (fifty days later). Shewell-Cooper (1977b: 163) suggests that the sowing of barley took place in winter to be harvested in spring, and when all sign of winter was over, the spring sowing took place and was harvested in summer.

5.1.3 Millet. Millet was another type of grain grown in Palestine, Egypt and other parts of the ancient world and consisted of two varieties: *Panicum miliaceum* (a cultivated grass) and *Sorghum vulgare*. It is thought that millet was 'a staple item in the Israelite diet' (Packer & Tenney 1980: 247). According to Zohary (1982a: 77) millet is only once mentioned in the Bible, when Ezekiel 4: 9 is told to make bread with wheat, barley, beans, lentils, millet and spelt (an inferior grain). Millet requires irrigation as it is a summer crop. Although cultivated early, with 'relics' of it being found in Mesopotamia and dating to about

3000 BCE, no traces of ancient millet have been found in Israel and no historical records, yet it does grow there. Zohary notes that millet is a summer crop and does need irrigation.

5.2 Vines

It appears that grapes were cultivated from as early as the Early Bronze Age, as grape presses have been found in the bedrock dated from the third millennium BCE in the Near East (Vamosh 2007a: 31; King & Stager 2001: 98). Renfrew (1973: 127) points out that pips of cultivated grapes have been found in 'Hama in Syria' as well as in Egypt 'in the fourth millennium BCE.' Grape pips have been found at Lachish and Jericho and dated to the Early Bronze Age but it is difficult to distinguish between wild pips and those from cultivated grapes. Borowski (1979: 155) says that the earliest remains of the cultivated grape were also found at Arad from the same period, and, at Aphek a site on the Via Maris, dry grapes dating to the Late Bronze Age were found. According to King and Stager (2001: 98) 'wine culture was well developed in the period of the Neo-Assyrian empire' in the first millennium, and by the ninth century BCE 'wine was popular but expensive'. Vines appear to have been cultivated in Syria, 'along the borderlands between Turkey in the north and Syria and Iraq in the south.' Many winepresses have been discovered by archaeologists indicating that in Syrio-Palestine vines were cultivated in many parts of the land.

King and Stager (2001: 93, 98) mention that the Hebrew word for grapes is *'ānābîm* and Zohary (1982a: 54) and Borowski (1979: 155) state that the botanical name for the vine is *Vitis vinifera*. Grapes were another of the Seven Species that were a blessing to the Israelites in Canaan, and the first fruit to be mentioned. Grapes did not require a hot, dry climate but grew best where there was more rainfall. Packer and Tenney (1980: 254) state that Palestine was called 'the land of the grapes' as the climate and soil conditions were well suited for growing grapes. Wight (1953: 188) maintains that vineyards were grown in southern Palestine 'especially in the vicinity of Hebron', and in the north 'in Syria and the foothills of the Lebanon Mountains.' Rousseau and Arav (1995: 328) note that 'viticulture was an essential part of Palestine's agrarian economy' in first century CE. The most popular grape variety grown was the 'soreq' which was a special dark red grape which grew in the 'Soreq Valley in the foothills south-west of Jerusalem' (King & Stager 2001: 98). Packer and Tenney (1980: 266) state that the 'hill country of Judah' had a 'perfect climate' for the growing of grapes. Renfrew (1973: 130) points out that vines need at least a temperature of 16°-17°C in the summer and that the plants are 'extremely sensitive' to their water requirements as they need moisture but 'not in excessive amounts at the wrong time.' The grapes need heat to assist in their ripening, but dry summer winds can ruin them. Vines 'prefer soils which are heavy and tend to retain moisture, but the best grapes

come from vineyards with a high proportion of stones or gravel in the soil' (Renfrew 1973: 130). Goor (1966a: 52) cites Josephus who mentions the viticulture in Galilee, which was mainly conducted in the area of Gennesareth, on the shores of Lake Tiberias. After the fall of the Temple and the expulsion of many of the Jews, vineyards were abandoned and destroyed but some were still functioning until the Arabs took over in the seventh century CE. They were most common in Judea but there were fewer in Galilee. Abel in Galilee produced grapes of special merit.

Borowski (1979: 157) mentions that vines were either planted in a vineyard, where most vines were grown, near a dwelling (Ps 128: 3) or in a mixed grove with other fruit trees (Can 6: 11) particularly fig trees, which he believes were grown so that the vines could be trained up them. (Gower 1987: 105) points out that most families had a vine plant growing on a trellis beside the house. An economical way for some villages was to have a communal vineyard, but individual farmers also tended their own vineyards. Some owners hired tenants to care for their vines. Vineyards were built on a hillside where the terraces had already been built, where the drainage was good and there was plenty of sunshine on the south side of the hills. Around the plot a wall was constructed, consisting of the rocks dug out of the ground by the farmer when he was preparing the plot, and a ditch was dug. All thorns and thistles had to be cleared away. On top of the wall a fence of thorns was placed to prevent animals from damaging the crop and thieves entering the vineyard.

Feliks (1981: 78) describes the 'Song of the Vineyard' in Isaiah 5:1-2; 4-6 which speaks of the various actions that were needed in preparing the ground and tending the vines, such as digging up the wild bushes and clearing away stones. Packer and Tenney (1980: 266) explain that on the prepared ground choice vine slips or cuttings were planted in a vineyard in rows about 2.4 metres to 3 metres apart to give the branches space to grow. Where the vineyard was on flat ground it was possible to plough between the spaces. Most vines were supported by trellises of forked sticks, or trained to climb trees, to prevent bruising and rot, but some varieties were left to run on the ground. Frankel (1999: 35) cites Pliny who described five methods of growing vines: '1. allowing it to trail on the ground; 2. growing as a small bush that supports itself; 3. being trained on vertical posts; 4. on simple horizontal "yokes" clearly in rows; and 5. trained to grow overhead "on four bars in a rectangle".' A further method advocated by others was the training of vines on trees. Apparently the ancient farmers used a number of these methods, as can be seen above. Although vines were usually grown from cuttings, sometimes they were 'propagated by layering', a method where the cuttings would first be placed in watermelons or pumpkins from which the cutting would receive water and which Goor (1966a: 54) says took place in the post-biblical era.

According to Zohary (1982a: 55) 'the plant simultaneously produces sterile and fertile branches', the latter growing extremely fast but are 'too weak to support themselves and their heavy load of grapes', so trellises are needed to support them. Little care was needed once the vines were planted and established, except for fertilising and weeding. Goor (1966a: 55) notes that the Mishnah enumerates a number of tasks when cultivating vines: 'thinning branches, making basins for irrigation, shortening canes, shaping vines and topping them for regeneration.' Other tasks were: wrapping the vines against sun or cold, 'dusting, smoking, coating against plant diseases and insect pests.' He also mentions that watering of the vines was not customary and only sometimes the farmers irrigated their vineyards. Goor (1966a: 58, 59) mentions that during the time of the Arab conquest (636-1098 CE) it was noted that bitumen from the Dead Sea was used by the inhabitants of Zoar to increase the yield of their vines. This practice was continued into the time of the Mamelukes (1250-1517) as the stems of the vines and fig trees were painted with the bitumen. The vines suffered from the grape bud-moth which destroyed the buds, but the bitumen prevented this from happening.

Wight (1953: 192) explains that the lime in the stones scattered on the ground dissolved in a rainstorm and mixed with the soil thus helping the growth of the grapes. Bees are responsible for pollination by gathering the pollen and the nectar from the flowers which are minute and greenish in colour but change colour as they mature. When they open they 'shed their hood-like cover' and the fruit continues to grow into clusters of berries (Zohary 1982a: 55). He notes that each berry has two seeds and the flesh and juice inside the grape berry is colourless, the colour of wine coming from the skin.

Where there was a large vineyard, a winepress was hewn out of the rock nearby and a permanent watchtower was built, usually consisting of two storeys. Feliks (1981: 74) mentions that near the winepress and watchtower, water cisterns were hewn out of rock and here the water collected, which was used to supply 'auxiliary watering' to the vines when there was no rain. Gower (1987: 105) notes that where the owner could not afford a tower, a tent was pitched or a temporary shelter was built during the harvest. Booths made of four strong poles were fixed into the ground and a covering was lashed to them. This acted as a temporary shelter. (See below). Shewell-Cooper (1977a: 80) confirms the farmers' need for a permanent watchtower or temporary shelter which he says is indicated in Isaiah 1: 8. Beers (2003: 146) states that day and night the watchtower was occupied by a man who watched for 'any sign of approaching thieves.' Borowski (1979: 161) says that the Song of Songs 8: 11-12 indicates that the watchman was a paid guard.

A temporary shelter or booth for the watchman



From Heaton 1956: *Everyday life in Old Testament times*, p. 104.

According to Mackie (1991: 58) there were a number of dangers that faced the farmers as they tended their vines. Locusts were a problem as they ate every bit of greenery. The east wind withered the grapes with dry heat, while the south-west wind brought moist warmth and mist from the sea which affected the vines and the grapes. Sometimes they had to face wild animals such as lions and bears. There was also the worry that robbers would steal their produce and passing travellers would help themselves to grapes.

Pruning was done during the late winter with a pruning hook or knife, once the vines were established. This was to get rid of old, weak, broken, non-productive or diseased branches so that the plant would produce new growth and the best possible grapes. For three years the farmers did not harvest the grapes so that the vines would bear well thereafter. In March came the first pruning with the clusters being removed. When clusters formed again the pruners cut off the twigs bearing no fruit (Packer & Tenney 1980: 266-267). Thompson (1986: 135) mentions that the farmer used a pruning knife to cut off the shoots of the vine when the blossom had gone and the flowers had become ripening grapes. It was important that the vine's energy was channelled into producing good fruit, rather than wood. The pruned branches were used for fuel. A pruning hook had 'a small, sharp, curved blade' and like the other tools, the blade was adapted during the Iron Age and could be beaten into a spear should the need arise (Thompson 1986: 135). Beers (2003: 146) mentions that vines were 'peacetime plants' because they yielded their best crops in times of peace when the farmer could care for them and prune them, whereas when the men went to war, the vines were untended and the vines grew shabby, the grapes being eaten by birds and thieves. Borowski (1979: 157, 164) says that 'planting vineyards was a sign of stability and permanent settlement.' However, during the Jubilee year and the Sabbatical year, it was forbidden to prune the vines or to eat the grapes from an unpruned vine (Lv 25:4-5).

Once or twice during the growing season the farmer dug around the vines to clear the ground of weeds (Packer & Tenney 1980: 266-267). The weeks after the grain harvest in mid-June to mid-August were the time for tending the vineyards (Thompson 1986: 135). When the grapes are small and acidic and still unready for harvest, they are called *boser* in Hebrew, and are what the prophets Ezekiel 18:2 and Jeremiah 31:29-30 called 'sour grapes'. (Vamosh 2007a: 31). From June or July to September the harvesting of grapes took place. Borowski (1979: 164) says that the grape clusters were cut off with a sharp knife, 'probably the same one used for pruning.' Grapes could only be harvested when the vines were four years old or more and the fourth year's harvest was given to God. The farmer was allowed to consume his grapes from the fifth year. According to Leviticus 19: 10 and Deuteronomy 24: 21 harvesting could only be done once and if there was any fruit left it was for the poor, just as it was for the grain harvest. According to Goor (1966a: 57) the 'vine-growers knew from which vines to pick the grapes for the various uses – wine, fresh grapes, raisins and so forth.' Creeping vines produced better and sweeter wines.

Goor (1966a: 54) mentions that there were late ripening grapes which came from Galilee, and early ripening grapes came from the Jordan Valley, En-Gedi (which the Mishnah said produced grapes 'four or five times a year'). The Mishnah also noted the regions where the 'best wine-making grapes were grown: Kerutim and Hatoulim' in Judea produced the best grapes for wine, and the second best grapes were grown in the mountains of Samaria and Lower Galilee at 'Beit-Rima and Beit-Lavan.'

Grape harvest time was hard work but, it was a time of festivity with singing, dancing and much celebration. Sometimes the whole village joined in to help as the work had to be completed quickly (Gower 1987: 106). As the grapes were harvested by the women, they were put in baskets and those to be used for wine-making were carried to the wine-press. According to King and Stager (2001: 100) a winepress was cut out of the bedrock where there was a fairly flat surface to make it easier to tread the grapes. The winepress was usually situated within the vineyard, but sometimes there was a winepress in the town. The winepress consisted 'of a pair of square or circular vats' which were 'arranged at different levels and connected by a channel'. The higher and larger vat where the men trod on the grapes and which King and Stager call the 'treading platform', was called a '*gat*' in Hebrew, and the juice flowed into the deeper vat called a '*yeqeb*'. Borowski (1979: 165) confirms King and Stager's observation and suggests that there were three types of winepresses: '1. a press hewn in the rock within or next to the vineyard; 2. a press built of stones and mortar within the confines of a city; 3. a portable stone press.' (See 6.1.2 below).

5.3 Olive trees

Westenholz (1998: 38) states that Syrio-Palestine might be the 'birthplace of the cultivated olive' as 'charred pieces of olive wood found in excavations have been dated to 42,980 BCE.' She also notes that the 'protohistoric people who lived on Mount Carmel already knew of the olive and enjoyed its fruits (ca. 10000 BCE).' Renfrew (1973: 132) mentions that olive stones from the third millennium BCE were found at Lachish in Palestine and Tell Sukas in Syria. King and Stager (2001: 96) say that 'on the sea floor at Maritime Atlit south of Haifa', there is evidence that in the 'mid-sixth millennium' it was the site of 'wild olive processing' that was probably destroyed 'by a worldwide flood.' Goor (1966b: 223) cites De Candolle who believed that 'East and West of Syria and Palestine' from India to Portugal and in a number of other regions as well, the wild olive originated. In the region under discussion, the wild olive grew abundantly in the 'woodlands of the Carmel hills, in Samaria, Lower Galilee and Gilead.' He says that the cultivated olive evolved in the eastern Mediterranean region which includes Israel. Archaeologists have tried to trace the evolution of the olive by the dating of its pits and close to Jericho at Teleilat el-Ghassul fossilised stones of cultivated olives have been found dating from the Chalcolithic period. Krymow (2002: 97) mentions that olive remains dating from Early Bronze Age were found in the Cave of Treasure in Naḥal Mishmar north of the Dead Sea. Also from the Early Bronze Age at Arad, remains of cultivated olives have been found (Westenholz 1998: 38). Zohary (1982a: 56) notes that there were 'rich groves of olive trees' growing on the poor rocky soil on the 'mountain slopes of Galilee, Samaria and Judea, crowned by the Mount of Olives in Jerusalem.' The Garden of Gethsemane close by was a place where there were many olive presses (Westenholz 1998: 38).

Aviam (2004: 51-52) notes that according to Jewish literary sources such as Josephus, the Talmud, Midrash, and a third, later source, Teshuvot Hageonim of 1864, 'Galilee was important as one of the major olive oil production centres in Israel, during Second Temple, Mishnaic and Talmudic periods.' Apparently Gischala, in Upper Galilee, was mentioned as 'a place where vast quantities of olive oil were produced and marketed' but that the 'entire Upper Galilee (apart from Mt. Meron) was a major olive-growing and oil-producing region.' Nearby Teqo'a was also specifically mentioned by Teshuvot Hageonim. Aviam has tried to trace the development of the olive-oil industry in the Galilee and notes that no oil presses have been found from the Bronze Age so far, and only in Iron Age II two sites have been identified with certainty. He suggests that Galilee in the Iron Age and during the 'Israelite kingdom' was not so important as an olive growing area, when comparing it with the 'finds from Judaea, Samaria and Philistia.' According to Aviam (2004: 90) the Jews were concerned about dietary laws during the Second Temple period, so they tried to buy all

their food products from fellow Jews. This meant that olive oil that was produced by Jews, who first purified themselves by immersion in the *mikveh* before beginning to work, was acceptable so the Galileans sent their oil to the Temple.

Aviam (2004: 56-57) believes that the finds suggest that the mass production of olive oil only gained importance in the Hasmonaean period and that earlier production was only for domestic use. He suggests that the growing of grapes and the production of wine was of greater importance at this time than the production of olive oil. However, he believes that the Hasmonaean settlers Jews in the region, among them Judaeans with the knowledge of the growing of olive trees and the production of olive oil. Galilee was seen to have ideal conditions for olive cultivation with its *terra rossa* soil, Mediterranean climate, and abundant water. The Hasmonaean, Aviam suggests, subsidised the planting of huge groves of olive trees and the erecting of mass-producing oil presses and so established the olive oil industry. He also notes that during the period under the Herods and in Middle and Late Roman periods oil production grew, as evidenced by the increase in olive oil presses. By the Byzantine period, according to Aviam, 'the olive oil industry reached its peak' and that every village had at least one press for its own needs, but many had more than one press indicating that oil was exported to other countries. It was during the Persian period at the beginning of the seventh century CE that the industry began to collapse and by mid-century when the Muslims captured the land, the olive presses were abandoned, but rebuilt during the Mameluke period. With the collapse of the industry in Galilee, Cyprus took over the olive oil trade and its production.

King and Stager (2001: 93, 95) mention that the Hebrew word for olives is *zê'îm*. The botanical name is *Olea europaea* (Harrison 1966: 25). Zohary (1982a: 56) notes that olives were another of the Seven Species of the land and in biblical days grew prolifically both on mountainsides and along the Coastal Plain. Goor (1966b: 224) says that for the Israelites, the olive tree was 'the focus of their husbandry' and cites De Candolle: 'the fruit of the olive and its oil are inseparably bound up with the Hebrew people'. Goor believes that the many biblical passages, referring to olives and oil used in peace and in war, on secular and holy days, indicate the importance of the olive in the lives of the people.

King and Stager (2001: 95) note that olive trees grew in the shallow rocky soil and required little water, thus not competing 'with cereals for fertile, arable soil.' Renfrew (1973: 134) says that olive trees thrive best on 'calcareous, schistose sandy or even rocky soils' that are well-drained. They grew better in the warmer south of the country as they could not withstand the severe cold of parts of the north and require 'an average annual temperature of fifteen degrees centigrade.' Olive trees are said to flourish even on bare rocks, need little water and can withstand drought (Krymow 2002: 96). Matthews (1991: 58) maintains

that the olive tree was 'well suited to the hot dry summers and cool damp winters of Israel and the rest of the Mediterranean basin.' Swenson (1995: 140) maintains that olive trees can withstand drought of up to five or six months as long as they get good winter rain. These trees were long-lived and considered to provide one of the essential foods of the land. It is believed that Ekron in Philistia was probably the principal 'producer of olive oil in the ancient Near East' during Iron Age II (King & Stager 2001: 96).



Olive tree showing fruit and flowers

From Swenson 1995: *Plants of the Bible and how to grow them*, p. 139.

The olive tree was an extremely important plant and touched nearly every phase of life. One tree could 'provide a whole family with fats', as it was used on the bread. Like the vine, an olive tree could be grown beside the family home, and later olive groves were planted beside the vineyards and grain fields, but higher up on the hillsides in western Palestine, as they could grow in shallow soil and could withstand long droughts (Gower 1987: 113; Thompson 1986: 135). According to Frankel (1999: 36) olive trees need a warmer climate than vines. An adult tree can withstand temperatures of -11°C but a young tree will die at -7°C . The trees need 'between 600 to 2400 hours a year below 7°C in order to give fruit.' Olive trees did not need as much care as other crops as once planted and established, they required only an occasional loosening of the soil with a hoe. The tree is a very slow grower, taking about ten years to reach fruit-bearing maturity. It lives to a very old age, bearing fruit even when the trunk is hollow (Zohary 1982a: 56). Goor (1966b: 229) mentions that the best conditions for olive growing were in Upper Galilee and the hills of

Samaria and Judea and that the olives with the highest oil content came from Tekoa in Galilee, but the Shephelah was also said to produce excellent olives. Even if the trunk is cut down or decays, shoots grow up around it, and Krymow (2002: 96) says this is what happened when the Roman conqueror of Jerusalem, Titus, cut down all the olive trees in 70 CE to build fortresses.

Gower (1987: 113) states that cultivated olive trees were grown by inserting a graft from a cultivated tree into a wild olive which was then cut down to the ground. It took about fifteen years to grow to maturity producing plentiful olives, but olives can be picked after its seventh year. Olive trees bear fruit for centuries. The roots go down deeply into the ground and often throw up new shoots. These shoots were then grafted into stocks. Mackie (1991: 60) mentions that 'even the planted slip of a fruitful olive is improved by being cut down and grafted' and Harrison (1966: 26) says that to make olives profitable a 'graft stem' needs to be grafted into wild stock. Renfrew (1973: 134) points out that olive trees need to be spaced 10 metres apart from each other as they have 'an extensive root system.' When fully grown an olive tree is about five to eight metres high with a trunk about one metre wide, gnarled bark and dull green leaves which take on a silvery sheen in the sunlight. Creamy-white blossoms with deeper yellow centres appear on the tree in spring and the petals falling to the ground seem like snowflakes (Gower 1987: 113; Wight 1953: 197). This occurs once the tree is about five or six years old. Berlinger (1969: 15) mentions that if the olive fly or other destructive insects attack the fruit, it falls off the tree. Goor (1966b: 234) mentions that at first olive trees were grown close together, but after a few years they were thinned out and other trees such as fruit trees, or even grain, were planted among them.

Olive trees blossom in May, ripen slowly and the fruit is ready for harvesting by the women and boys in autumn, September to October, usually after the first rains. According to Vamosh (2007a: 37) farmers were concerned about the ripening fruit during 'the Omer, the fifty-day period between Passover and Pentecost' as hot dry winds from the desert could ruin them. Sometimes the fruit is picked by hand by moving along the length of the branches, the trees are beaten with sticks or long poles, or the branches are shaken. The olives fall onto a large cloth spread under the tree and the fruit is gathered into baskets (Matthews 1991: 58; Gower 1987: 113). Olives that did not fall to the ground but remained on the tree were left for the poor to gather. One of the problems concerning the method of beating the branches with sticks to obtain the olives was that the tender young shoots were destroyed so that the following year there would be a bad crop. This meant that there were alternate good and bad years for the crop (Gower 1987: 113) but King and Stager (2001: 96) point out that olive trees only bear fruit every other year.

One tree could produce about twenty gallons of oil and so it was important to care for the trees. According to the Babylonian Talmud some of the inhabitants could tell the differences between the soils by the taste and smell of the earth: some soil was good for olive trees, another good for vines and a third good for figs (Goor 1966b: 234). Olive trees are prone to decay and to prevent this happening, the trunks were painted with red paint and the hollow filled with stones. He cites the Mishnah as saying that the trees were treated with a mixture of 'oil and dung to keep noxious insects away'; some kind of protection, like leaves, was wrapped around the trunk, against the cold or the rays of the sun; they were topped 'so as to renew the growth' and basins were made around the trunk for watering.

5.4 Fruit, vegetables and nuts

Remains of various fruit trees such as 'olives, vines, dates, figs, walnuts, almonds, pomegranates, peaches and a few carob trees, oaks and doum palms have been found' and 'pistachio, apples and pears' were also popular according to Dar (*in* Wilkins, Harvey and Dobson 1995: 331). He points out that there were 'twenty-five types of fruit trees ... known in Roman Palestine', the prime fruits being 'the olive and its oil, the vine and its wine, the dates and the fig'. Borowski (1979: 154) mentions that fruit trees were an 'important element of the agricultural economy and the Israelites were commanded to plant fruit trees for their own use' (Lv 19: 23). According to Borowski, fruit trees were mostly grown in 'mixed orchards' as Jeremiah 29: 5, 28 and Amos 9: 14 describe. Grapes and olives have been discussed above, so the following sections deal with the other fruits.

5.4.1 Date Palms. According to Vamosh (2007a 41-42) the cultivated date, known as *Phoenix dactylifera*, 'may be connected to the coastal region of northern Canaan known as Phoenicia', but the source may be debatable – either 'northeast Africa, Asia, Iraq or India.' Apparently, 'dates were first extensively cultivated in the low-lying region of southern Mesopotamia ... between the Tigris and the Euphrates.' Dates grew particularly well in Palestine, especially in the Jordan Valley north of the Dead Sea and Jericho was known as the 'city of palm trees' (Thompson 1986: 137). Vamosh (2007a: 42) confirms this as she mentions that 'during the Chalcolithic period (4300-350 BCE)' people living at 'Telilat el-Ghassul in the southeastern Jordan Valley', ate dates. Also dates must have grown near the Dead Sea, for people living 'around 3500 BCE left date pits in the cave known as the Cave of the Treasure at Naḥal Mishmar'. King and Stager (2001: 103) mention that there is evidence that date palms grew densely in the 'Jordan Valley, the Arabah, and parts of the Coastal Plain.' Westenholz (1998: 47) says that date palms grew around Lachish in the

Iron Age as depicted on the 'bas-reliefs from Nineveh describing the Assyrian siege' in 701 BCE. The Romans and the Greeks esteemed Judean dates for medicinal purposes – Herodotus and Hippocrates in the fifth and fourth centuries BCE, and the physician Galen in the first century CE (Westenholz 1998: 47) She mentions that after the Crusaders, 'the agrarian economy of the land collapsed and palm orchards were left untended and neglected.' Krymow (2002: 159) mentions that date palms grew over vast parts of Syrio-Palestine but that 'war and drought decimated the trees'.

The Hebrew word for the date palm is *tāmār* (King and Stager 2001: 94). Zohary (1982a: 60) notes that although not actually mentioned, dates are considered to be one of the Seven Species of the Land, as the verse in Deuteronomy 8: 8 refers to 'honey', and dates were made into a type of honey. According to Berlinger (1969: 28) there were several varieties of dates; the softer juicier variety with a high sugar content and usually growing where there is irrigation and cultivation; and the drier variety, known as 'the bread of the desert' growing in semi-arid regions and having a high starch content. Vamosh (2007a: 42) points out that the Egyptians took dates from Canaan after their defeat of the Canaanites in the sixteenth century BCE and Pharaoh Thutmose III may have introduced some different species into his own country. 3400 years later the Egyptian workers who came to 'excavate Tel Megiddo brought dates with them ... as part of their food supply', dates which had not previously been grown in Palestine, but the pits took root, started to grow, and can still be seen today. The dates from Palestine were highly sought after in the fourth century BCE and were exported, as they were 'easy to preserve'. In excavations at Masada, date pits have been discovered in the storehouses, confirming Josephus's statement that Herod stored dates there in the first century CE. (See also 6.1.4.1).

According to an article in the *Biblical Archaeology Review* 2006, number 32 volume 4, a 2000 year old date seed found during excavations at Herod's Palace at Masada, has been germinated in the Arabah Desert, and is known to be the 'oldest seed ever to be successfully germinated.' The article states that 'at one time the Jordan River valley and the shore of the Dead Sea were covered in thick forests of date palms.' The Romans minted coins with the date palm on the back as they 'closely identified the date palm tree with the region.' Apparently, the cultivation of date palms was 'abandoned after the Roman conquest' and the species that is growing now 'has long been considered extinct' (STRATA 2006: 12)².

Date palms grew around oases, their source of water. Berlinger (1969: 97) and Packer and Tenney (1980: 248) say that the trees grow to a height of 18 to 24 metres. Berlinger notes

²STRATA in *BAR* includes several short articles on different topics. This is a section that is included in every copy of the periodical. There is no named author for this section.

that date palms are evergreen, have no branches, but the crown of the tree is made up of pinnate or compound leaves which are almost two metres in length. As the tree grows higher, the old leaves break off the trunk and leave behind some protruding stumps which are used for climbing. Packer and Tenney (1980: 248) state that the date palm lives for over 200 years, having the peak of its fruit-bearing between its 'thirtieth and eightieth years'. Dates ripen at the end of summer.

Swenson (1995: 145) mentions that 'palms are unique among trees.' They differ in that the trunk does not have 'a hard central core of wood' but it does have 'a soft spongy heart area surrounded and protected by a hard casing of strong fibres'. This is the 'conductive system' of the tree so that water and minerals can reach 'the leaves and growing areas'. Most palms 'have only a single point of growth activity, the terminal bud', which if it is cut off causes the tree to die. The tree trunks do not have a 'cambium layer' which causes the tree to grow wider, so the palm remains 'graceful and slender'.

According to Renfrew (1973: 152) there are separate male and female trees and it is necessary to have 'one male tree to the acre (or one to 50-100 females)'. Zohary (1982a: 61) notes that 'the date palm is a dioecious species' and that 'the flowers of both male and female trees grow in dense numerous clusters covered by a woody swathe which splits into boat shaped valves at blossom time.' He says the palms were usually pollinated by the wind but that even in ancient times the farmer knew to take pollen from the male flower cluster and deposit it on the female cluster. Swenson (1995: 145) agrees saying that the Egyptians and Babylonians 'cross-pollinated their date palms.' He also says that date palms are 'propagated by offsets and suckers' and begin 'to bear fruit about five years after planting'. Zohary (1982a: 61) maintains that if date palms are propagated by seed about half the trees would be male and as one male tree can supply enough pollen to fertilise 25-50 female trees, not many male trees are needed. Date palms 'reach full bearing by 15 years' and continue 'to bear fruit for about 80 years' (Swenson 1995: 145). Each tree yields about '45 kilograms of fruit'. The fruit is borne in clusters on branches, 'about 40 strands, with 25-35 dates per strand'. According to Zohary (1982a: 61) the tree flowers in spring and the fruit ripens at the end of summer.

Zohary (1982a: 60) also says that date palms these days are cultivated in the 'Jordan and Aravah Valleys, the Dead Sea area and the Coastal Plain, mainly in the El Arish and Gaza districts.' These are hot plains and valleys and date palms have adapted themselves to the physical and climatic conditions.

5.4.2 Fig trees. The botanical name for a fig tree is *Ficus carica* (Zohary 1982a). King and Stager (2001: 94) believe that the 'fig tree (*tě'ēnâ*)' is the 'most valued fruit' after the grape.

The Hebrew word means 'to spread out', possibly because it is a beautiful shade tree with large leaves and 'wide spreading branches' (Packer and Tenney 1980: 254). Vamosh (2007a: 44) says that the Hebrew word for 'unripe fig' is '*paga*'. Figs have 'their botanical origins in the Arabian Peninsula' but figs were also growing in Syrio-Palestine. Krymow (2002: 80) mentions that dried figs dating from 5000 BCE, the Neolithic Age, were found when archaeologists excavated 'Gezer on the western slopes of the Judean mountains' and that 'figs have been cultivated since the Early Bronze Age, around 3000 BCE'. Westenholz (1998: 30) says that fig fragments were found from the 'Neolithic, Chalcolithic and Bronze Age levels at Jericho' and that figs were cultivated by the Canaanites before the Israelites settled there. Krymow (2002: 79) notes that Egyptian documents mention figs in 2700 BCE as food and medicine, and in the third century BCE, figs, together with 'olives, nuts, honey, and pomegranates were imported into Egypt.' Figs were another product among the Seven Species of the land the Israelites were entering and were a symbol of prosperity and peace (Zohary 1982a; 58). Goor (1965: 125) notes that in the biblical period 'vine and fig are paired in the Bible', probably because they were planted side by side and the vine sometimes climbed up the fig tree. Krymow (2002: 79) says that figs are 'a sign of fruitfulness and one of the blessings of the Promised Land'. She also says that remains of figs from the Iron Age were found at 'Beth-Shemesh near Jerusalem', and at Masada, from the first century CE. The Roman historian and naturalist, Pliny, mentions 'a tiny fig that was imported from Syria', which in 'Roman times' also included Palestine, but this could have referred to the sycomore fig (Krymow 2002: 79).

According to a report in <http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/5038116.stm> archaeologists several years ago found 9 small, ancient figs at a house in an early Neolithic village called Gilgal I in the Jordan Valley and believe that these figs may indicate one of the earliest forms of agriculture, as they date the carbonised fruits at between 11,200 and 11,400 years old. The team believe that the 'figs pre-date cultivation of other domesticated staples such as wheat, barley and legumes' which are considered to be the first known foods cultivated by humans. The researchers believe that 'the figs are a variety that could only have been grown with human intervention' as they seem to be 'an early domestic crop rather than a wild breed'. They believe that the figs are of the 'self-pollinating, or parthenocarpic variety, like the kind we eat today.' Parthenocarpic figs cannot reproduce on their own as they do not produce seeds and there are only two ways they occur – 'by chance genetic mutation' in nature, or by 'removing a shoot and replanting it.' Professor Bar-Yosef, one of the researchers, maintains that early humans must have recognised that fruit from parthenocarpic mutation does not produce new trees and fig tree cultivation was practised, whereby they planted new shoots and another form of

agriculture began. The figs discovered at Gilgal I were also found with wild barley, wild oats and acorns, which Bar-Yosef says indicates that Neolithic people were not only hunters and gatherers, but had also begun to cultivate food crops. Kislev (2006: 1372), head of the research team, believes that the 'fig trees could have been the first domesticated plant of the Neolithic revolution', preceding the domestication of cereals by about a thousand years. However, this is refuted by Lev-Yadun and others (2006: 1683), who believe that 'the finds do not necessarily indicate cultivation, nor horticulture predating grain crops', because 'parthenocarpic fig trees naturally produce both seeded and seedless fruits and are capable of spontaneous reproduction' and that the figs did not necessarily come from 'trees propagated by cuttings'. There is an ongoing debate on this topic and presumably research is still being undertaken.

Fig trees are 'a member of the mulberry family' according to Vamosh (2007a: 44). They were cultivated from early times and were considered almost as important as grapes. Fig trees were grown in the arid areas of the hill country of Palestine in particular, and often in a vineyard (Matthews 1991: 59). Beers (2003: 310) states that fig trees can live as long as 400 years and are often grown in the corners of the vineyards. Vamosh (2007a: 44) notes that on the Mount of Olives there are two villages which have taken their names from figs, 'Bethphage, or *Beit Pagi* (House of unripe or green Figs) and Bethany - *Beit Te'elah*, the House of the Fig' thus indicating that there must have been fig groves growing in the area. Goor (1965: 125) notes that the principal cultivation regions in biblical times were in the Galilee at Sepphoris, Sakhnin and Gush Halav, in the region of Jerusalem, in Judea in the plain of Lod, Yavne and Bnei Brak and in the Jordan valley and in the south. Goor (1965: 124) mentions that wild or cultivated fig trees still grow along the Jordan River and around the Dead Sea. Berlinger (1969: 40) mentions that wild fig trees are found today growing at the mouths of caves and deserted village sites indicating the popularity of the fruit in the past.

In another article on the Internet, an explanation is given as to how wild figs were pollinated and produced fruit. The fruit wasp crawls inside the opening (the eye) of the fruit, which is a green globe, called the synconium. Here there are a cluster of hundreds of flowers which if pollinated by the wasp 'produce drupelets, tiny bubbles of fruit material' inside of which are seeds. The synconium is not the real fruit, as the tiny little seeds inside are the fruit. Early wild fig trees were either 'hermaphrodite' producing pollen but not seeds to generate the new tree, or 'female', producing no pollen, but producing figs. If one female should be pollinated, 'a seed that can make a new tree' is produced. It is the length of the flower which indicates whether the fig is hermaphrodite or female

(http://archaeology.about.com/od/domestications/a/fig_trees.htm). However, Asaph Goor, quoted in an article on the Internet, mentions that fig trees are either male or female, and thus the fig tree is called 'a dioecious species' (like the date palm) where only the female fig trees 'set seeds and produce edible fruit'. Male trees are called 'caprifigs' and there are several varieties, but there are hundreds of varieties of female fig trees

(<http://waynesword.palomar.edu/ww0501.htm>). Zohary (1982a: 58) confirms this and notes that there are two sexual forms of figs – male or wild figs called caprifigs and female or cultivated figs. He says that 'wild figs have many female flowers and fewer male ones, while the "female" fig tree has female flowers only.'

Fig trees are called 'symbiotic' as they can only 'survive to reproduce' if they are assisted in pollination by the fig wasp or by some other means, to help in germinating the seed. The fig wasp would not survive without the fig tree which provides it with food and shelter. Female fig wasps enter the synconium and inject their eggs into the flowers. The short hermaphrodite flowers are suitable for the eggs to be injected, but the longer female flowers are not suitable for the eggs to be placed. The baby fig wasps in the hermaphrodite flowers feed on the developing synconium where they stay until adulthood. Still inside the synconium, the male wasps fertilise the female wasps which then gnaw their way out, having their bodies dusted with pollen. They 'find another synconium, enter it, inject their eggs, dust the pollen off their bodies and die.' The eggs are not successfully injected into a female fig, so the fig wasp only spreads its pollen. If the synconium of the female fig is never pollinated, 'the fruit does not form at all, and the synconiums dry up and drop off the tree.' This means that 'to bear fruit and produce seeds for the next generation of trees, a fig tree flower must be both exposed to pollen and be left unpierced by a mother wasp.' However, at some time, 'a mutation of the fig tree occurred that does not require pollination to bear fruit' and these are called parthenocarpic figs. Edible fruit is produced without pollination by the fig wasp. Parthenocarpic figs can also be produced by human intervention – by cutting a shoot and planting it and this is how fig-bearing trees are propagated today (http://archaeology.about.com/od/domestications/a/fig_trees.htm).

According to Feliks (1982: 242) fig trees are easy to cultivate as all that is needed is to 'insert a fig shoot into the moist ground, anywhere, even in rocky terrain.' These shoots take root fairly quickly, and after a few years the trees begin to bear fruit. Goor (1965: 129) notes that rooting was accelerated if the cuttings were inserted into wild bulbs. Vamosh (2007a: 44) mentions that 'in the wild, the fig tree remains a small bush' but when it is cultivated and near water, it can grow from 5 to 12 metres. Figs were valued for their fruit as well as their shade. They were not only grown inside fences but were also planted outside gardens, making it easy for passers-by to pick the ripe fruit. Shewell-Cooper

(1977a: 55-56) notes that it is extremely important to fertilise and mulch around fig trees by giving them manure or compost, particularly young trees, so that they will continue producing good fruit for many years. Moldenke and Moldenke (1952: 105) note that the fig tree is variable in its 'habit of growth' as it can grow like a tree or grow into a long, straggling, branching shrub almost like a vine.

Renfrew (1973: 135-136) mentions that fig trees need about 86 to 122 centimetres of rainfall per annum, but rainfall in August and September spoils the fruit. The trees will grow on stony ground near water or where the land is well-watered. They thrive 'best on well-drained hill slopes with a thin soil cover.' The trees have a 'spreading root system and small leaf area' thus making it an ideal plant to grow in semi-arid conditions as it can 'draw water or moisture from a wide area without losing too much evaporation from the leaves.'

Feliks (1981: 242) points out that the fig tree needs careful tending and guarding as the trees produce fruit for an extended period, 'from early until late summer'. Sometimes no fruit appeared when the leaves came out, so the tree would remain barren for the season, but usually fruit could be found on the trees for about ten months of the year. Berlinger (1969: 97) mentions that ripe figs also spoil easily and need to be picked at dawn when the air is cool and the fruit is still covered with dew. They must also be picked before they rot, or the birds and wasps blemish them. Figs should be picked when they are completely mature – usually when they sag, droop, or change colour

(http://www.forestwonderer.com/tree_id122.html). Vamosh (2007a: 44) mentions that the ancient farmer would pierce each young fig, like the fruit wasp does, as this allowed the fig to be fertilised. To protect the fig against insect infestation, the farmer would then cover the fig with oil. Goor (1965: 130) cites the Mishnah which gave instructions regarding the ripening of figs: 'certain early varieties were smeared with oil to hasten ripening' after they had first pierced them. The object of piercing and oiling the fruit was to allow the oil to seep into the fruit.

According to King and Stager (2001: 104) several crops of figs were produced each year. The first figs to appear in June were particularly sweet, then there were the summer figs of August and September, and at the end of November the winter figs were the last of the year. Mackie (1991:61) and Wight (1953: 200) confirm this as they maintain that there are 'three fig seasons': 'early figs', 'ordinary summer figs', and 'winter figs'. However, Westenholz (1998: 30) maintains that there are two crops of figs a year, the first crop of figs ripen in June and are called the '*bakkūrôt*', (the winter crop) and the second crop ripens in August and September and is the summer crop or '*kayitz*'. Wight (1953: 200) says that the first figs are large and juicy and are considered a 'delicacy because they are

the first of the season'; the summer figs were used for food in August and September, and for winter use, dried on the housetops. The last crop, the winter figs were smaller in quantity than the early figs but still large and fleshy, though less flavoursome than the summer fruits. Berlinger (1969: 97) points out that if there is a severe drought or a locust plague, the first trees to be attacked are the vine and the fig tree, and in a drought year the fig tree will not blossom. There are no festivals for the harvesting of the figs, unlike the grape harvest, as there is no specific harvest time for figs.

The fig tree, like the vine, was a symbol of peace and prosperity in the days of Solomon (I Ki 5: 5) and the prophets used it as a symbol of the prosperous time the people will enjoy when they are restored to their land (Mi 4:4; Ze 3: 10) (Borowski 1979: 170).

5.4.3 Pomegranate trees. The botanical name is *Punica granatum* (Zohary 1982a: 62). Moldenke and Moldenke (1952: 190) mention that the Hebrew word for pomegranate is '*rimmôn*' which means 'a bell'. The trees 'grew wild in western Asia and northern Africa' and were 'cultivated in Palestine' (Packer and Tenney 1980: 255). Goor (1967: 215) notes that pomegranates were 'cultivated in Israel more than 5000 years ago.' Walker (1957: 166) says that pomegranate trees 'grow wild in Persia and Syria' and Harrison (1966: 27) says that pomegranate trees were 'indigenous to Persia'. Vamosh (2007a: 45) states that in the ruins of 'biblical Gezer' dating from the Bronze Age (3300-3050 BCE) rinds of pomegranates have been found, possibly indicating that these trees were grown in the area. However, Westenholz (1998: 36) mentions that it was from the Neolithic Age that the pomegranate rinds were found at Gezer. Renfrew (1973: 153) notes that pomegranate remains were found in 'Middle Bronze Age levels' at Jericho. Goor (1967: 224) notes that in the Crusader period, twelfth century CE, pomegranates were growing in the region of Shechem and also Jebel.

According to Berlinger (1969: 38) pomegranates were one of the Seven Species with which the land of Canaan had been blessed. Goor (1967: 218) says that unlike olives, grapes and figs, pomegranates were not an essential food in the diet but the pomegranate tree was valued for its shade, colour of the flowers and fruit, and it symbolised 'sanctity, fertility and abundance.' Numbers 13:23 mentions that the spies sent into the land brought back with them a bunch of grapes from the Valley of Eshcol as well as pomegranates and figs, indicating that pomegranates were growing in the land of Canaan. Vamosh (2007a: 46) points out that on an Egyptian papyrus of the thirteenth century BCE the Pharaoh of Egypt was holding a reception, in which beans, figs and apples, together with pomegranates from Syria where they grew, were on the menu. Borowski (1979: 173) points out that although pomegranates were grown in Egypt, the Egyptians preferred the fruit from Syrio-Palestine.

According to Krymow (2002: 83) plant remains of pomegranates together with walnuts, lentils, wheat, onion and garlic were found in 'the Cave of the Treasure in Naḥal Mishmar near the Dead Sea' and dating from the Chalcolithic period (See 5.4.1 above). She confirms what Renfrew and Vamosh have to say concerning the fact that pomegranate rinds were also found around Jericho, dating from 1650 BCE, and at the ruins of Gezer. She mentions that pomegranate remains were found at 'other sites near the Dead Sea, in the Eighteenth Dynasty tomb of Kha at Deir el-Medina, and in caves near En-Gedi.' The first recorded use of pomegranates as food and medicine was in Twelfth Dynasty Egypt (2052-1778 BCE). Goor (1967: 215) says that pomegranates still grow 'in the north of Syria, in Gilead and on Mount Carmel.'

Goor (1967: 221) notes that pomegranates were propagated by cuttings. Zohary (1982a: 62) mentions that there are two species of pomegranate, the common species which is widely cultivated, and which Goor (1967: 220) says are known as Badan pomegranates. Zohary explains that there is also a 'dwarf shrub with small flowers and fruits.' Berlinger (1969: 38) describes the pomegranate as being a small tree or a tall shrub which grows to a height of three to four metres and begins to bear leaves in spring. The 'oblong lanceolated leaves' start off being reddish in colour, but by late spring they are a fiery crimson. The effect is enhanced by the crimson buds, which open and bright red petals appear in late spring and the fruit appears at the end of summer. The red flower is most attractive and has yellow stamens. When the weather has warmed up, the leaves change to deep green, the petals drop off, and the 'bell-shaped calyx widens at the base' and begins to look like 'a reddish-green jug'. The tree has a 'straight stem, reddish bark and plenty of spreading branches'

<http://www.geocities.com/Athens/Parthenon/3664/pomegranate.html>).

According to Swenson (1995: 148-9) when the rainy season comes these trees begin to bud. Pomegranates are like figs and olives as they enjoy a Mediterranean climate and prefer full sunshine and well-drained soil. In the growing season when the fruit is forming they need extra water to 'provide the sweetest taste'. The fruit, which ripens at the end of summer, is the size of an orange or an apple. Krymow (2002: 83) says they are 'traditionally eaten at Rosh Hashanah, the Jewish New Year.' Renfrew (1973:152) describes the pomegranate fruit as being 'up to 9 centimetres across' and having 'a thick, leathery skin and a persistent crown-like calyx.' Inside the fruit are numbers of cells which each contain 'several seeds embedded in the juicy pink flesh'. Krymow (2002: 83) notes the Jewish tradition that says that 'a perfect pomegranate contains 613 seeds, one for each of the commandments.' Berlinger (1969:38) notes that the red juice of the seed pulps are supposed to reflect 'the love-intoxicating' crimson colour of the spring flowers. King

and Stager (2001: 104) describe the fruit as being symmetrical and having a beautiful scarlet colour. Inside there are small seeds which are surrounded by a juicy pulp.

Goor (1967: 222) mentions that Jewish sources such as the Mishnah and the Talmud wrote that pomegranates suffered from attacks by pests, and a number of diseases, the commonest being 'splitting' when the fruit cracks open. Apparently not all types were affected. The pomegranate butterfly is a pest that lays its eggs in the fruit, the caterpillar burrows into the fruit and feeds on it, thus spoiling the fruit and causing it to rot. Goor (1967: 228) notes that in modern Israel plant diseases are 'root-rot due to excess of water round the crown of the trees'; the fruit can be spoiled by 'blossom-end rot'; and splitting can occur.

5.4.4 Sycamore trees. This was a tree that was very similar to the fig tree and was often called the 'fig-mulberry' because 'its heart-shaped leaves resemble a mulberry' and it is very closely related to it (Beers 2003: 302; Shewell-Cooper 1977b: 156). Its botanical name is *Ficus sycomorus* (Zohary 1982a: 68). Vamosh (2007a: 45) states that 'the sycamore fig' is a relative of the domesticated fig and that it is unconnected to 'the sycamore'- the 'American plane tree and the English maple'. Hence in this dissertation the spelling used is 'sycamore' except where quotations are included. King and Stager (2001: 105) state that the Hebrew word for the sycamore tree is 'šiqmā' Vamosh (2007a: 45) suggests that 'shikma' comes from the same Hebrew word as 'rehabilitate', as the 'sycamore' can renew itself, even if only a small piece of the trunk remains. Packer and Tenney (1980: 255) maintain that in biblical times sycomores 'grew in Egypt, along the coast of Palestine, and in the Jordan valley', but Berlinger (1969: 72) maintains that 'the tree originated in tropical East Africa and reached the East Mediterranean shores long before the Israelites invaded Canaan.' Shewell-Cooper (1977b:156) said that sycamore trees were 'commonly found on the plains of Jericho'. Hareuveni (1984: 83) says that 'the sycamore usually does not grow in mountainous areas; it grows with the olive in the plain.' Zohary (1982a: 68) says that sycamore trees were not 'introduced into Israel' but from the 'Natufian period have mainly been vegetatively planted and propagated from the native stands'.

Feliks (1981:30, 56-57) states that along the coastal plain sycomores also grew wild, but they must have been grown in orchards at the time of King David when there was an overseer to look after them (1 Chr 27:28), so they must have been greatly valued and carefully tended. Borowski (1979: 184) believes the sycomores must have been grown for 'timber rather than food'. Feliks (1981: 56-57) mentions that the sycamore was an indigenous tree, and, as 'a tropical tree' it grew in the warm regions of the country, widespread in the coastal lowland. In the time of King Solomon the sycamore 'grew in

great abundance in the Shephelah' but during his reign 'cedar wood began to supplant the sycamore'. Apparently it did not grow in mountainous areas, so the sycamore did not grow in Upper Galilee, but did grow in Lower Galilee (Feliks 1981: 59). Sycamore trees grew best where there was no frost which destroyed the tree, so they grew where the climate was mild, such as in the Shephelah.

Moldenke and Moldenke (1952: 107) mention that the sycamore tree is evergreen with 'heart-shaped, fragrant leaves' smaller than the ordinary fig leaves. They grow to about ten metres in height and have many strong, wide-spreading branches growing fairly close to the ground. The trees bear fruit several times a year in clusters, but the fruit is inferior to that of the domesticated fig (King & Stager 2001: 105). It is small, about the size of a gooseberry, and yellow in colour with black spots. The fruit is very sweet and grows in clusters directly on the trunk and branches of the tree (Thompson 1986: 137; Packer and Tenney 1980: 255). Zohary (1982a: 68) calls this phenomenon 'cauliflory' as the flowers and fruits grow on the stem.

To stimulate growth, young trees were pruned severely and the trees were cut back every seven years. If a man rented a field with a sycamore tree in it, the Mishnah allowed him to cut the branches only in the first year of a seven-year lease (Gower 1987: 119). Feliks (1981: 58-59) maintains that the tree has a number of 'good traits': it grows quickly, has long straight beams, has the ability to 'regenerate after lopping', and 'its fruit is edible and nutritional.' Hareuveni (1984: 84) notes that sometimes one 'finds offshoots around a sycamore, especially around the stump of what was a "virgin" sycamore.' These offshoots were not used to cultivate new trees, which was done by 'planting cuttings taken from young branches'. The ability to regenerate after being chopped down occurs when the tree restores itself and grows new branches. The tree will grow deeper roots if the sand is blown away and the roots lie uncovered and if the whole tree is covered by sand it will survive. The branches of the tree will grow roots deep into the sand and the new growth of the tree will grow out of the sand, so that a new tree is visible. This is what gives the sycamore its name in Hebrew which he says is '*shikma*' which means 'rejuvenation', and confirmation of Vamosh's observation.

It seems that shepherds were allowed to graze their sheep beneath the trees, possibly as a way of fertilising them while the shepherd treated, or dressed, the figs. This they did by climbing the tree to make an incision in the fruit to hasten the ripening process. By doing so the production of ethylene gas, responsible for ripening the fruit, increases (King & Stager 2001: 105). Vamosh (2007a: 45) says that by piercing the fruit while it was still unripe, assisted in fertilisation and produced better fruit. Thompson (1986: 137) states that when Amos tended the sycamore fig trees he had to cut off the top of each fig 'to make

sure the ripening fruit was clean and free from insects' and Gower (1987: 119) mentions that the fruit needed to be 'pierced and wiped with oil if it was to become ripe and juicy'. There seem to be a number of suggestions as to how sycomore figs were tended, but like the fig, the fruit needed intervention such as pollination by the wasp or by human hand, where 'gashing' the fruit occurred. Depicted on ancient tombs and on ancient bas-reliefs gashed sycomore figs have been found indicating how the early farmers gashed or pierced the fruit to help it become large, sweet and fleshy

(<http://waynesword.palomar.edu/ww0501.htm>).

Zohary (1982a: 68) explains that pollination of the sycomore fruit is quite complicated. Like the fig, the sycomore has syconia which 'consist of a globular receptacle'. Inside they are lined with succulent hairs 'among which the minute male and female flowers are inserted.' There is a narrow opening at the top of the fig called the *ostium* and this is 'encircled with tiny scales'. Certain wasps enter for pollination of the fruit. The lower part of the fig contains the many female flowers, far more numerous than the male flowers, which are found in the upper part of the fruit near the *ostium*. The wasp therefore assists in pollination which is essential for the ripening of the fruit. Seeds are not produced as the 'ovaries are converted into galls which make the fruit inedible to man.' Galls are excrescences formed on the plant by the wasps. Zohary (1982a: 69) maintains that the ancient Hebrews used a special knife and made an incision in the fig before it ripened 'to prevent the setting of this kind of fruit.' He mentions that nowadays 'a parthenocarpic variety' of fig is cultivated which does not need the wasp to ripen the seedless figs.

5.4.5 Nut trees. The main nuts mentioned in the Bible were almonds and pistachios, but walnuts were also grown in biblical times. They were grown mainly for their nutritious value.

5.4.5.1 Walnut trees. The Hebrew word for walnut is *egoz* and its scientific name is *Juglans regia*. According to Berlinger (1969: 62) these trees originally came from 'the cold, rainy regions of southern Asia' but have been 'cultivated in the Levant for thousands of years.' Swenson (1995: 186) says that walnut trees are 'a native of Persia', but that botanists believe that the *regia* species were also grown in Lebanon thousands of years ago. In ancient times walnut trees grew 'along water courses or near wells' as they needed a good supply of water and the irrigation methods had not developed sufficiently to provide cultivation at a 'distance from the water source.' At the time of Jesus 'walnut trees grew on the Galilee shore line' (Walker 1957: 144). Swenson mentions that today walnut trees grow near springs in Samaria, on Mount Carmel, and in the Galilee, but that they need irrigation in summer if they are not close to water. The trees give good shade and have a

pleasant scent. Vamosh (2007a: 49) says that walnut trees were 'planted at low points in the valleys so they could get a good dose of frost in the winter, which they needed to develop properly.' Although walnut remains have been 'found in archaeological deposits in Europe', there are no remains from Iron Age levels in Syrio-Palestine.

Shewell-Cooper (1977b:159) believes that Solomon had a 'big garden of walnuts' or even a 'wood of walnuts' (Can 6:11). Swenson (1995: 184) confirms this, as he says 'I went down to the grove of nut trees' is believed by authorities today to mean that these were walnut trees. He also says that at the time of Solomon, walnut trees were growing in many parts of the world, believing that as walnuts are easily transportable they were used as articles of trade and were taken by traders and travellers to many distant lands.

According to Zohary (1982a: 64) who quotes Josephus Flavius, 'the valley of Genesareth' had an 'abundance of walnut trees, among other plants', thus refuting the thinking that the walnut tree grew in an imaginary garden. He mentions that today in eastern Jerusalem there is 'a place called the Valley of Walnuts'. Packer and Tenney (1980: 255) point out that walnut trees are cultivated in the region of Galilee and along the slopes of Mount Lebanon and Mount Hermon.

Walnut trees are deciduous trees, losing their leaves in winter, but in February they start to bloom again. Berlinger (1969: 62) says that walnut trees are usually the last trees in 'a mixed orchard' to grow new foliage. According to Zohary (1982a: 64) who describes the 'Persian walnut' (although there are about 40 species), the tree is stately' and grows to a height of about six to eight metres, while around its crown it is 20 metres. Berlinger notes that two to five pairs of oblong leaflets give off a strong fragrance, like 'strong aniseed', when crushed between the palms of the hand. At the 'base of branches of previous years' the male flowers grow in long catkins late in March, while at the 'tip of new shoots' the female flowers grow in clusters of three or four. Zohary says that these buds are small and green and pollinated by the wind. At the end of summer, in August, the fruits ripen. The husk, or outer covering, cracks while still on the tree and the nuts fall to the ground. The 'edible kernel', or nut fruit, is enclosed in a hard wooden shell. The nut contains about sixty percent fat.

5.4.5.2 Almond trees. These trees are the first to flower before the end of winter in January. The Hebrew word for almond tree was *luz* and is still used today by 'Arabs and Kurdish Jews', but more commonly the Hebrew word for almond tree or branch, and the almond fruit is '*shāqēd*' meaning 'to hasten' or 'the awakening one', which may refer to the fact that almond blossoms are the first to appear at the end of winter (Thompson 1986: 137). The scientific name is *Amygdalus communis* (Packer & Tenney 1980: 254; Zohary

1982a: 66). Zohary states that flowering almond trees may once have grown in the Sinai, but not today, but they do grow on the hills of the Negeb.

Almond trees have also been found growing in 'the northern regions of Mount Lebanon and Hebron, east of the Jordan, and in Egypt', and have also been found growing wild on Mount Carmel to the height of almost five metres (Packer & Tenney 1980: 473). Berlinger (1969: 52) says that wild almonds grow in hilly and maquis areas of the country, 'in semi-arid areas or on the fringes of the Judean wilderness' where other fruit trees, apart from the olive, do not grow. He mentions that almond trees thrive 'under difficult conditions'. According to Zohary (1982a: 66-67) there are 'two wild bitter-seeded and one cultivated sweet-seeded species in Israel' and he believes that the bitter strain is used 'as stocks for the grafting of sweet-seeded varieties'. Because Israel has these 'wild species of almonds very close in habit to the cultivated tree', Zohary suggests that Israel might have been 'one of the original countries in which the almond was domesticated'.

Berlinger (1969: 52) describes almond trees, particularly the wild almond trees, as having a strong root system, as the roots grow through the rocks and split them by the force of their growth. They do not grow very tall and in winter look very lifeless. In late winter, at the end of January or the beginning of February, the pinkish-white blossoms of the almond trees appear, heralding spring. Renfrew (1973: 157) mentions that almonds are tolerant of most climates, but are 'susceptible to early spring frosts'; they grow well in areas with 40 to 100 centimetres of rainfall; and they do best when cultivated in 'deep, well-drained, rich soils but not 'in alkaline conditions'.

Zohary (1982a: 66) notes that the trees flower for about a month, the leaves coming out later than the flowers. Cultivated almond trees grow to about six metres in height. The flowers 'each have a bell-shaped calyx and a spreading corolla, 15-20 stamens, and a pistil'. The fruit starts to ripen about ten weeks from the time the flowers appear. Berlinger (1969: 52) describes the fruit as having 'a heavy, leather-like covering' which wrinkles as it gets older. According to Zohary this is the 'pericarp' which splits into two, releasing the seed encased in a hard shell which falls to the ground. The actual fruit of the nut, the kernel, which contains about fifty percent fat, is covered by a thin brown skin.

5.4.5.3 Pistachio trees. Packer and Tenney (1980: 255) mention that the Hebrew word for pistachio is *botnim* which Zohary (1982a: 65) confirms. He says that the place Betonim mentioned in Joshua 13: 26, was 'in the district of the tribe of Gad in southern Transjordan, an area suited to the pistachio' and he believes Betonim 'probably derived from botnim.' He notes that 'the pistachio tree has long been cultivated in Israel', and in fact, a pistachio nut from the late Neolithic stratum has been found in Greece. This suggests that pistachio

trees were growing in the regions around the Mediterranean Sea. The scientific name for the tree is *Pistacia vera* which is said to be 'a small tree native to mountainous regions of Iran, Turkmenistan and western Afghanistan' <http://en.wikipedia.org/wiki/Pistachio>. Borowski (1979: 189) seems to disagree with the above statements as he mentions that *Pistacia atlantica* would be the more correct botanical name, as he says that *Pistacia vera* were not cultivated in Syrio-Palestine during biblical times. He notes that remains of *Pistacia atlantica* were found in Early Bronze Lachish, and Iron Age remains of *Pistacia atlantica* and *Pistacia palaestina* were found at Beersheba and Arad. According to <http://en.wikipedia.org/wiki/Pistachio>, '*Pistacia vera* is often confused with other species in the genus *Pistacia* that are also known as pistachio.' These species can be distinguished from *Pistacia vera* by 'their geographic distributions (in the wild) and their nuts.' Their nuts are much smaller, 'have a strong flavor of turpentine, and have a shell that is not hard.' Zohary (1982a: 65) suggests that as pistachio trees are a 'steppe tree', they were probably introduced into Palestine from Syria or even Persia when other cultivated plants were brought into the land. Pistachio trees grow in parts of Palestine and Syria today (Moldenke and Moldenke 1952: 180).

Walker (1957: 146) notes that pistachio trees are small, growing to a height of six to nine metres. There are many branches of light brown while the bark of the tree is red-brown. According to Zohary (1982a: 65) the leaves are made up of 'two or three pairs of large, ovate leaflets with minute unisexual flowers, male and female on different trees.' According to Walker (1957: 146), when the leaves are 'bruised' they smell like the fruit. Loose clusters of flowers grow from the branches and when the flowers wither, the nuts form. The oval nuts hanging in clusters, resemble almonds, but are smaller in size. They have a double shell, the outer one being thin, dry and red, and the inner kernel being a pale green colour with an 'agreeable, oily, sweet taste.'

5.4.6 Vegetables and herbs. Borowski (1979: 207) says that there are two reasons why 'this branch of agriculture was not well-developed': 'the hilly terrain and the scarcity of available water to irrigate the garden plots.' However, it seems that vegetables such as cucumbers, melons, leeks, onions and garlic would have been grown in their fields and vegetable gardens. Ward (1987: 104) says that the farmer ploughed his field once a year but it was the women who had to tend the vegetable garden and produce the food for the table in this way. The women were in charge of sowing the seed to the harvesting of the crops. The vegetables that were grown required a good supply of water so the women had to carry the water from the cistern or well to their vegetable gardens which were not always near houses but rather near the water source. Borowski (1979: 208) mentions that as most of the gardens were outside the settlement, 'they required protection from people

and animals' but not all the plants eaten were cultivated, as some plants were picked in the wild, such as bulbs. Borowski notes that there is a difficulty in studying horticulture in the Iron Age (and other periods too), which is due to the fact that there are very few vegetable remains. It was only when they were dried and preserved that it is possible to study their history in more depth.

The subsistence farmer's plot did not only have vegetables, but most probably also had some fruit and nut trees like pomegranates, almonds, pistachios, figs, and date palms which required less care. According to Numbers 11:5 'cucumbers, melons, leeks, onions and garlic' were the vegetables the Hebrews pined for once they were in the wilderness, as they were the vegetables they had grown in Egypt and enjoyed. It is possible that once they were settled in the land and prepared the ground, they grew these vegetables from the seeds they had brought with them. The Hebrew word for cucumber is '*kishshu'ah*', and refers to 'either of two species' which are grown in Egypt and Palestine today (Packer & Tenney 1980: 248). Apparently the owner of a cucumber field often erected a rough booth where he sheltered while he protected 'his crop of ripening vegetables from thieves and marauding animals (Is 1: 8)' (Peelman 1975: 16). Leeks, onions, garlic and cucumber were grown for flavouring in stews as were herbs such as cumin, dill and mint.

According to Shewell-Cooper (1982b: 106, 112) garlic bulbs need to be planted about a half a centimetre deep and 1.5 centimetres apart in rows. The botanical name for garlic is *Allium sativum* and the Hebrew word is '*shum*'. The garlic plant is related to the shallot, as well as to onions, leeks and chives. Moldenke and Moldenke (1952: 32) note that there are 67 varieties of garlic and onions 'recorded in the Holy Land region' and although there is some difference of opinion regarding the botanical name for garlic, they favour *Allium sativum*. The botanical name for leeks is *Allium porrum* and the Hebrew word is '*hatzir*' referring to its green colour. There is a wild variety that grows in the region. Moldenke and Moldenke (1952: 34-35) and others, question whether in the different places in the Bible where '*hatzir*' is mentioned, the writer is describing leeks, and they think that fenugreek could be the plant mentioned in some places. However, Moldenke and Moldenke tend to favour the leek, as it is extremely popular as a food and is used abundantly in cooking. They note that leeks are a food of the poor. Shewell-Cooper (1982b: 106, 112) notes that another member of the family is the onion, known as *Allium cepa*, and in Hebrew '*betzâlîm*' (Moldenke and Moldenke 1952: 33). They say that onions have been cultivated from 'time immemorial' in Egypt as Borowski (1979: 211) confirms, by saying that Egypt was a country known for its onions. Walker (1957: 56) notes that onions growing in a dry climate grow larger than in a temperate climate and Moldenke and Moldenke cite the comments

by Hasselquist, that the onions in Egypt were sweeter and softer than in the northern countries.

Other crops grown in Syrio-Palestine were mallow, sorrel and artichokes, as a source of green leaves (Gower 1987: 103). Beans, lentils and chickpeas were also grown as they were good sources of protein (Thompson 1986: 137). The bean plant grew about a metre high and had white pea-shaped flowers which bloomed in late spring. In summer, these became the big, thick pods in which large, coarse beans grew (Packer & Tenney 1980: 248). Zohary (1982a: 84) gives the botanical name for broad beans as *Vicia faba* and the Hebrew term '*po'*'. He mentions that beans were widely grown in biblical times and remains have been found in 'the Neolithic levels in Jericho.' Moldenke and Moldenke (1952: 101) refer to the broad beans as being *Faba vulgaris*. They note that the plant is very hardy and erect and is a 'simple-stemmed plant', and that the beans are either brown or black in colour. They also remark that the flowers have a sweet perfume that scents the air when grown in fields. Other food plants with pods are lentils and chickpeas.

The Hebrew word for lentils is '*adhashim*' and the Latin name for the plant is '*lens*' (Peelman 1975: 22). Shewell-Cooper (1977a: 89) notes that geologists and historians believe that lentils date back to 'at least the Bronze Age.' Zohary (1982a: 82) believes that lentils may have 'originated and been domesticated in the Near East' as carbonised seeds have been found 'dating back six or seven millennia'. The lentil has 'five or six pairs of oblong leaves on each stem and white, violet-striped flowers'. They are grown in all areas of Palestine. Zohary (1982a: 82) mentions that 'the lentil grows in various soils as a winter crop from sea-level to 1200 metres'. However, it needs 'a mild winter and sufficient rain.' According to Shewell-Cooper (1977b: 87) lentil plants grow to about 20 centimetres and are a 'near relation to the broad bean and the tufted vetch.' The plants are pulled out rather than being cut, when the pods are fully ripe. They are taken to a threshing floor and beaten so the little lentil seeds fall out and split in two. According to Moldenke and Moldenke (1952: 128) the lentils are the size of small peas, 'but are flattened and lens-shaped, convex on both surfaces.' Heaton (1956: 85) believes the settlers enjoyed 'strong flavours' in cooking as they used the spices, 'coriander and black cummin' instead of pepper, to make their stews of lentils and beans tastier.

According to Zohary (1982a: 83) the botanical name for chickpeas is *Cicer arietinum* while the modern Hebrew name is '*himtza*'. They are a widely cultivated pulse. Although not originating in Syrio-Palestine, deposits have been found from Early Bronze Age in Jericho and in other areas of the Near East. The chickpea is an annual which grows to a height of 30 to 35 centimetres. It has 'an erect heavily-branched stem and pinnate leaves with five to eight pairs of ovate to oblong, acutely dentate leaflets.' The stem and the leaves are

covered with little hairs and the 'flowers are usually solitary and borne on a long stalk' and are 'self-pollinating'. The pods, 'which are swollen, oblong and often 1-2.5 centimetres long' have 'one or two angular seeds, 0.5 centimetres in diameter.' Chickpeas are 'spring pulses' and harvested in about mid-summer.

5.5 Flax

Zohary (1982a: 78) explains that the Hebrew word for flax is '*pishtah*' but that it has three meanings: the flax fibres for spinning, the linen produced by the flax, and the plant itself. King and Stager (2001: 147) confirm this by saying that in the Bible flax is called '*pištā/pēšet* (plural *pistīm*)' which 'refers to the flax plant, its fibres, and the linen that it produced.' Zohary (1982a: 78) says that the flax plant is only one of 'about 200 species of the genus *Linum*'. He mentions that flax must have been 'intensively cultivated' as 'the word is mentioned several times in the Bible'. Cultivation of flax dates to 5000 BCE and probably originated in Syrio-Palestine and other Middle Eastern countries. Wild flax (*Linum bienne*) still grows in its natural state there. Renfrew (1973: 120) maintains that 'the earliest finds of flax (*Linum usitatissimum*)' were found in 'south-west Iran and on the Middle Tigris in Iraq' although later it was found elsewhere in the Near East. King and Stager (2001: 148-149) call flax a 'wetland plant' as it grew 'extensively along the Nile.' They say that it was domesticated at least by the PPNB (Neolithic) period as in the Naḥal Hēmar Cave in the Judean Desert 'fabrics from fine linen yarn' were found dating from 7300-6300 BCE. In the Cave of the Treasure in Naḥal Mishmar above the Dead Sea linen fragments consisting of 'thirty-seven linen samples' in yellow, red, green and black, from the Chalcolithic period were found. Looms were also found causing speculation that flax may have been grown at En-Gedi as there was a plentiful water supply. Studies of Deir 'Alla in the Jordan Valley, on the east side of the river, indicate that 'flax was grown there as early as early Iron Age I' on irrigated fields and by the seventh century BCE flax became an important crop. Botha (2000: 9) agrees that flax was cultivated along the Jordan Valley, and mentions that it was also cultivated around the Sea of Galilee particularly around Arbel where quality flax was grown.

According to Zohary (1982a: 78) flax 'is an annual herb' that when cultivated grows to about 50 centimetres or more in height and branches towards the top of its erect stem. The leaves are long and narrow and the pretty pale blue flowers consist of 'five sepals, five petals, five stamens and an ovary with a long style.' The fruit is 'a round capsule (globose)' and it contains numerous oil producing seeds. Rousseau and Arav (1995: 314) say that the flax grown in Palestine was of such good quality that the linen produced was as good as the quality produced in Egypt. The centre of production was Arbel in Galilee. 'Flax was the most important fibre of Palestine', as it was difficult to grow cotton because the climate

was too dry. Little mention is made of flax cultivation in Israelite times but it appears that it must have been grown in the Jordan Valley as Rahab stored flax on the roof of her house in Jericho (Rousseau & Arav 1995: 314).

According to Renfrew (1973: 124) flax plants grow rapidly and need plenty of moisture during the early stages of its development. Although it can be cultivated in drier climates, it needs from 45 to 75 centimetres of rain. It grows best in 'fertile, deep, well-drained loams, especially silt loams, clay loams and silty clays.' If the rainfall is insufficient, it does not grow well in light soils. It has a shallow root system and so the plants need the water which is supplied to the top 60 centimetres of soil. The fields should to be weeded as flax does 'best where there are no weeds'. In an article on the Internet, it mentions that flax takes about a hundred days to grow from 'seed to mature plant' and that flax fibres 'are among the longest and strongest of all natural fibres'

(<http://www.reshafim.org.il/ad/egypt/timelines/topics/flax.htm>).

Berlinger (1969: 78) points out that 'flax is a winter plant and reaches maximum growth towards the end of the rainy season.' Thompson (1986: 137) and Rousseau and Arav (1995: 315) note that flax was harvested a month before barley, by cutting the yellowish stalks at ground level and laying them out to dry, as indicated by the Gezer calendar, in the tenth century BCE, where 'hoeing up of flax' is mentioned. Packer and Tenney (1980: 259) note that flax was harvested by the women who pulled out the plant by its roots and gathered it in bundles. de Herrera (2006: 73) mentions that flax should not be harvested when it is still green as 'neither the flax nor the seed is ripe', but it should be harvested when it is yellow and ripe and the seeds are plump. He says that harvested flax should be made into bundles which should be protected from moisture, as this will rot the grain and will result in short fibres. If the flax got wet it was to be dried. Flax seed had to be shaken out otherwise it would spoil by becoming heated and damaged. If flax gets wet, it is thought that the fibres strengthen due to the pectin that is in them. This acts like a glue, but they do dry quickly and are better at resisting decay than most other natural fibres

(<http://www.reshafim.org.il/ad/egypt/timelines/topics/flax.htm>). Seeds are collected from the plants that are left standing, so they can be used for the next year's sowing, other of the seeds are prepared for the making of linseed oil used in medicines.

King and Stager (2001: 149) mention that the first step in processing flax was to obtain the fibre from the stalks which were 'soaked to soften and separate' the fibres. Peelman (1975: 12) and Berlinger (1969: 78) say that the stalks were immersed in water for two to three weeks so that the fibres could separate and the non-fibrous parts decay. The separating and peeling of the threads from the stalk was a process called 'retting'. The

'fibres were stripped out from the woody parts of the stalk', opened to dry and bleach in the sun on rooftops or in the fields. The dried flax was then combed by being passed through the 'teeth of an iron comb, called a hackle'. The flax was spun into thread which was then woven into linen. The best linen was made from the finer threads.

CHAPTER 6

USES OF PLANTS

Weiss and Kislev (2004: 32-34), archaeologists involved in archaeobotany, maintain that weeds, seeds and grains can teach us about life in ancient times and they have discovered some that were 'grown 2,500 years ago'. They excavated part of the city of Ashkelon and found that the conflagration caused by the Babylonian destruction in 604 BCE, had frozen the city 'in time and preserved a wealth of materials, including carbonized seeds and fruits.' The grid in which they worked contained four buildings: the Warehouse consisting of long, narrow rooms; the Shops Building, one of which was a wine shop with artefacts connected to the trade, such as juglets and an ostrakon with reference to wine; the Counting House with scale weights, artefacts connected to scales and an ostrakon which was a receipt for grain; and the Administrative centre.

They removed '138 botanical samples' from 'the streets and rooms of Grid 50' and in these samples they 'identified nearly 20,000 plant remains, including nearly 7,000 cereal grains, more than 9,000 fruit seeds and nearly 2,000 weed seeds.' The rest were legumes such as 'peas, beans, lentils and wild plants' preserved by being charred in the fire. From this collection they learnt a great deal, such as that 'the Philistines ate: wheat, barley, almonds, figs, grapes, olives, pomegranates, chickpeas, and lentils' which were the most important foods (Weiss and Kislev 2004: 35). They found that this diet 'was similar to that consumed at other contemporaneous sites throughout the Levant.'

Weiss, together with other archaeologists in their excavation of an 'ancient site known as Ohalo II, on the southwest shore of the Sea of Galilee', has found evidence that people living 'at least 10,000 years before the development of agriculture, ... collected wild grains, pounded them into flour, and perhaps baked bread.' A 'grinding stone with traces of barley and other grains' was discovered, and 'what appears to be a makeshift oven and grape residue.' Ohalo II 'has been called a Stone Age Pompeii' because of the quality and quantity of the remains found. Possibly the yeast on the grape skins may have been used in the fermentation necessary for bread-making, but it is thought that the people may 'have made dough, wine, or other fermented beverages.' It seems that gruel must have been made, as indicated by the grains discovered at the site. Apart from grain and grapes, archaeologists have been able to uncover the 'remains of hundreds of species of fruits, plants and animals' (Weiss & Kislev 2004: 37).

6.1 Food crops and other uses

Most of the crops grown were sources of food and sustenance for villagers in ancient times. A typical meal would have consisted of bread onto which olive oil, lentils, beans or vegetables made into a stew, were placed. Olives, cheese and fruit could also have been part of the meal that a family shared. Sometimes the people ate portions of bread that were dipped into the stew and eaten using their fingers. Wine was the main form of beverage, although goats' milk might also have been available. Eating for the rich was a sumptuous affair and 'the dishes were expensive fine wares and the food was exotic' (Crossan & Reed 2001: 96, 105). Dar (*in* Wilkins, Harvey and Dobson 1995: 326) states that it is possible to 'reconstruct the diet in Palestine during the Romano-Byzantine period' because of written records, as well as archaeological excavations, that have uncovered food remains which have been investigated. 'Pottery, from the excavations of the kitchens and storehouses of the buildings of the period', has been of great assistance, as well as the uncovering of 'ancient production installations which were used to boost agricultural production.' The Mishnah records 'the weekly and daily diet of a woman who was living alone in Roman Palestine' which consisted of 'wheat, legumes, olive oil and dried figs' (Dar *in* Wilkins, Harvey & Dobson 1995: 327-328).

6.1.1 Grain. Grain was an important crop for ancient peoples who used it for food, for export and for sacrificial offerings. Together with wine, grain was considered a symbol of 'plenty and prosperity' (Packer & Tenney 1980: 247). In the excavations at Ashkelon (mentioned above), archaeologists have been able to establish where the grain was grown in the fields, and they discovered a large amount of wheat, of a variety of species, in the Counting House. Weiss and Kislev (2004: 37) suggest that 'the concentration of large amounts of wheat and grains and well-known weeds in the same pile' could indicate that 'the pile represents a load of wheat from a single field.' They maintain that 'some of the species do not grow in the Philistine plain, but in the Shephelah, the Sharon Plain, and the Samarian and Judean hills', indicating that 'ancient Ashkelon imported much of its food from some distance' as the fields around the city would not have been able to supply all the inhabitants, who therefore had to rely on 'regular, long-distance trade in crop plants, such as cereals.' They also suggest that as there was 'a brisk trade in comestibles among cities on the coast, especially between the Philistines and the Phoenicians', the wheat discovered could have been transported by ship to the city market (Weiss & Kislev 2004: 37).

Vamosh (2007a: 23) notes that the ancient people learnt of the versatility of grain and that it could not be easily digested when it was eaten in its raw form. Grain can be boiled in water so that it becomes gruel and if one bakes it, it becomes bread. The people

discovered, too, that if grain became wet it must not be thrown away, as it ferments and the stored carbohydrates are converted to sugar. Beer was produced when the 'moist sprouted grain' was baked, then ground, and water added with some yeast.

6.1.1.1 Wheat. The word for bread in Hebrew is *lehem* but it can also mean food in general. Wight (1953: 44) says that as bread was the principal food of the people, and still is today, they took a religious attitude towards it, as they had been 'brought up to think of bread as having a mystic sacred meaning' and that 'everything about bread from the sowing of the seed to the baking of the loaves was done in the name of God.' He points out the Eastern custom concerning the attitude towards the sacredness of bread, for it must be broken not cut, as by cutting bread it was thought of as cutting life itself. Peelman (1975: 8) says that bread was always held in the right hand when used to scoop up food and that as smaller pieces were broken off to do this and not cut with a knife, 'the term, "to break bread", means to share a meal together.'

Heaton (1956: 82) explains that the grain was ground into flour and the coarse flour which resulted, 'was mixed with salt and water and made into dough' which was known as 'unleavened bread'. This was the quickest bread to make. However, usually the women added some 'fermented dough kept from the previous days' baking' and this 'was then left to rise'. Wight (1953: 46) and Vamosh (2007a: 29) describe several kinds of breads that were made (either of wheat or barley): small loaves, rather like bread rolls but flatter; larger loaves called *kikar*, which were round in shape and fairly flat (rather like today's pita), very flat loaves that were almost as thin as paper and were used to dip into the food; 'cake' baked in the fire, which was not sweetened and has a different connotation to the word we use today; and the 'wafer' which was like the cake, but thinner. Beers (2003: 62) states that there were two varieties of unleavened bread, which without yeast, did not rise and was much flatter than bread with yeast: 'one kind was crispy and very flat, like a cracker'; the other type was 'thick and heavy' rather like 'date or nut bread'.

According to Wight (1953: 46-47; Beers 2003: 141) there were a number of methods by which bread was baked. The simplest way to bake bread was to lay the dough on heated flat stones; or use a clay pitcher as an oven, where the fire was made at the bottom and the dough placed on the coals; thin dough was sometimes placed on the outside of the hot pitcher and baked there; fuel was placed inside a large earthenware jar called a *tannur*, which, when hot enough, thin cakes were placed on the outside to cook; or a hole was dug in the ground, the oven heated; and, when the dough was rolled out thinly, it was struck against the oven's sides where it baked instantly. These types of baking were used individually by families, but when bread was also baked for the general population, the

village baker supplied the bread, although families could make use of the public ovens. Apparently professional bakers were known in the Roman period (Vamosh 2007a: 27).

Raw grain was also eaten, although in several places in the Bible, such as in Leviticus 23: 14 and Deuteronomy 23: 25 the people were told to first bring an offering to God before they could eat the green ears which they did by rubbing them in the palms of their hands (Wight 1953: 43-44). Wight points out that even today the Arabs pick the ears of grain, rub them in their hands and eat them. 'Parched grain' was another use, when unripe kernels were roasted in a pan and eaten with or without bread. Heaton (1956: 83) points out that 'sometimes the dough was mixed with olive oil or cooked in it and sometimes wafers were made with honey.' He suggests that the cakes that were taken by King Jeroboam's wife to the prophet Ahijah (1 Ki 14: 3), 'may possibly have been cakes sprinkled with aromatic seeds' as artefacts have been excavated which had 'perforated bottoms' which could 'have been used as sprinklers for such fancy baking.'

Dar (*in* Wilkins, Harvey and Dobson 1995: 329-330) points out that apart from flour for bread, 'various porridges ... were prepared from the grain' and this 'depended on the way the seeds were broken and the type of processing.' The 'quality of the bread depended on the sifting of the flour' so that 'pure bread' was a 'lighter bread' and 'was considered better quality' than 'black bread' which was the lowest quality, but there were various grades in between. King and Stager (2001: 94) point out that the flour that was produced from grinding wheat or barley was called '*qemah*' or ordinary flour for everyday use, but there was also 'more costly fine flour made from the inner kernels of wheat' called '*sōlet*' which was 'used for sacrifices and special occasions' but could also be interpreted as 'semolina or grits' which were the coarse bits left over after the sifting of the wheat. Twelve loaves of bread were kept on the golden table in the Temple but outside the Holy of Holies, and were known as the 'Bread of the Presence' or 'the Showbread' (Lv 24:5; Ex 25:30) (Vamosh 2007a: 25). Each Sabbath, new bread was brought and the old bread, as fresh as the first day it was displayed, was eaten by the priests as it was considered holy.

Part of the ground floor of the house was reserved for the preparation and storage of food. Here the grain was ground daily into flour which would be used in baking and cooking. Grinding the grain into flour was an essential task in the daily life of a household and was the work of the women of the household, slaves or servants (King & Stager 2001: 94). Dar (*in* Wilkins, Harvey and Dobson 1995: 330) states that yeast had to be added to the flour as 'because of the climate flour could not be kept for a long time' which meant that those who ground the flour had to rise early, for if there were 'six or seven persons' in the household, grinding would take 'three to four hours every morning'. The bran, or outer coat of the wheat seeds, was used to feed the animals (Zohary 1982a: 74).

Renfrew (1973: 67) points out that it is believed that emmer wheat was used in preparing beer in Ancient Egypt, as residues inside beer jars indicate this, as well as 'dried and exhausted grains left from mashing'. When examined these were found to be 'starch grains of emmer, wheat, yeast cells, moulds and bacteria.'

6.1.1.2 Barley. According to Braun (*in* Wilkins, Harvey & Dobson 1995: 27), as there are not 'the necessary gluten-forming proteins to make a well-risen loaf' in barley, barley bread was considered the food of 'rural poverty' and was mostly used to feed the animals. Barley was made an acceptable food for humans 'in the form of roasted grain, bannocks, kneaded barley-cakes', 'barley porridge', 'barley gruel', 'barley beer' and 'barley-meal', which could be made into a drink or mixed with 'the meal of other grains and of pulses'. Like wheat, raw barley grain was roasted in a pan and eaten, and appears to have been 'a common article of diet in Old Testament times' as recorded in 1 Samuel 17:17; 25:18 and 2 Samuel 17:28, and it is still eaten in the Near East. Packer and Tenney (1980: 247) suggest that 'barley was used in ceremonial offerings, baked into cakes, and fed to horses and camels', and in the New Testament 'Jesus used barley loaves to feed the five thousand people (John 6:9)'. However, Peelman (1975: 8) mentions that barley was widely used for feeding donkeys and cattle too, and at a later stage rabbis called barley 'animal food'. Shewell-Cooper (1977a: 162) notes that 1 Kings 4: 28 mentions that Solomon fed his horses on barley. Barley bread was made like bread that was made from wheat, by grinding the grain into flour. Water was added to this and sometimes it was 'flavoured with salt, olive oil, honey, herbs or spices'. It was also shaped into flat loaves and broken into pieces to scoop up the stew from the pot.

According to King and Stager (2001: 102-103) beer was made from barley, and also from wheat, and is considered one of the 'oldest beverages in the region, dating to the fourth millennium or earlier.' It is known that beer 'was the common drink in Mesopotamia and Egypt' and Mesopotamian sources mention and describe the brewing process. In those days beer 'was drunk through a reed or tube with a sieve on the end to keep it free of straw and chaff.' They mention that beer was not a popular beverage in Israel, and there is not even a Hebrew word for beer. The beer filters that were found in the city of Emar in Syria in the Middle Euphrates, were made of 'a copper alloy' and were dated to 1300-1150 BCE. These filters were 'attached to the ends of drinking straws to filter out the grain and other solid ingredients in the beer.' It seems from texts that there was a 'ritual function for beer' as together with perfumes and bread, beer was consecrated to the god 'Dagan and his consort, Ninkur.' Apparently beer was also used medicinally, but the reason for its curative properties is not given (STRATA 2008: 76). Vamosh (2007a: 35) notes that as early as the fourth century BCE a chemist in Alexandria wrote down the recipe for beer.

Homan (2004: 84) suggests that scholars have argued that the motivation for the domestication of cereals came about due to a 'thirst for beer' rather than 'a hunger for bread' 'ca. 9500-8000 BCE'. He mentions that beer was part of the staple diet and as such was 'rich in carbohydrates, vitamins and proteins.' The alcohol in beer 'killed many detrimental micro-organisms' so it was safer to drink than water. Homan points out that wine and viticulture have been focussed upon, but that the importance of beer in the Near East has been neglected, particularly in Syrio-Palestine and the 'Hebrew Bible'. Homan notes that beer played an important role in 'religious observance in the ancient Near East'. Beer was poured out to the gods as a libation and offered to them 'to quench their thirsts' and Homan suggests that 'Yahweh can be said to have been a heavy beer drinker' as 'about 16 litres of beer '(šēkār in Hebrew) were presented to him weekly (Nm 28: 7-10).'

Homan (2004: 85) points out that the alcohol content of beer in ancient times was between two and three percent. He says that all classes of society in Egypt and Mesopotamia drank beer. This is possibly because it was easier to grow cereals than it was to grow grapes, so wine had to be imported. According to Homan, 'beer was considered a primary food' and 'wages and bride-prices' were often paid in beer in Egypt and Mesopotamia. Beer also had cosmetic as well as medicinal properties: it was 'prescribed for constipation, stomach ailments, coughs, swollen eyes and was even used in enemas.'

The difference between beer and wine was that wine could be stored, but beer did not improve with age, so it was not traded, unlike wine, of which many jars with sealed inscriptions have been found. Beer was only stored for a few weeks, to complete the brewing process. Homan (2004: 86) confirms King and Stager's statement that straws were used when drinking beer, 'to filter out barley husks and stalks', and reduced the number of insects entering the mouth. Apparently, by using straws the alcohol in the beer affected the drinker more rapidly, most of the straws being made of reeds, but there were also metal ones. Strainer tips, at the bottom of the straws, made of 'bone and/or metal' have been found from 'Middle Bronze Age, Late Bronze Age and Iron Age' in Israel at places such as Geshar, Megiddo, Gezer Kabri, in Syria at Alalakh and Emar, and in Egypt in Tel Amarna. Other artefacts to do with beer are the 'beer bottles' or 'beer jars' that have been found in Egypt and at 'several sites in Palestine.'

According to Homan (2004: 86, 88) making bread and making beer are similar and so many pottery forms were used to bake the barley cakes that were used in brewing beer. 'Bread moulds and flowerpots' were associated with beer brewing. Flowerpots were so named because they had 'perforated bases' and were used to bake bread but also strain beer. Later beer bottles were made and the bread moulds were modified and changed (Homan 2004: 88). He mentions that 'fermentation stoppers' were used in Syrio-Palestine

and have been found from the Iron Age. They were made of clay with a small hole which was stopped with cloth to allow the gases to escape during fermentation. Hundreds of these stoppers have been discovered and at first they were identified as loom weights, but now the scholars realise that they were used to allow beer and wine to ferment.

Philistine vessels have been discovered that are identified as beer jugs which contain 'filtered spouts with a handle at a ninety degree angle' which suggest that they were made for 'personal drinking rather than serving' (Homan 2004: 91). He points out that the beer jugs have several forms and have been found throughout Israel from the Iron Age. Homan (2004: 92) suggests that 'if the beer jug did indeed hold alcoholic beverages made from fermented cereal malt', then a great deal of beer was drunk in ancient Israel. However, many scholars believe that the strainer jugs were used for wine and not beer, as there was an 'immense wine industry', and that they were used to 'consume the beverage rather than to store it'. However, Homan believes that the beer jug was used by both beer and wine drinkers, or even a mixture of the two. He suggests that even though there is much evidence regarding the wine industry in ancient Israel, barley was easily stored and so beer could have been produced all year round.

Homan (2004: 91) experimented with making beer the ancient way. He malted barley by damping the grains which after three days began to germinate. He ground the germinating grain and made small cakes of bread which he baked. The result was that some of the sugars were caramelised by the heat and a sweet taste was created. Then he put the 'baked malted barley cakes into an open vat of water', just as Ecclesiastes 11: 1-2 notes, 'throw their bread upon the face of the water'. This forms 'wort', a sweet liquid which was then 'fermented by airborne yeast' after about two days. On the surface of the liquid a thin layer of bubbles began to form and 'three days later the fermentation was complete'. The beer was ready to drink, but 'dates, grapes, raisins, honey and cinnamon' could be added.

6.1.2 Grapes. Some of the grapes that were picked in September and October were eaten fresh, or pressed and drunk as fresh grape juice. Some of the grape juice was boiled down to make a thick syrup called *dibs* that was an ingredient for sweetening cakes (King & Stager 2001: 101). Gower (1987: 108-109) and Wight (1953: 194) believe that this could have been the 'honey' of the Bible as it 'flowed' in the land and would most likely be related to the grape. It seems that this 'honey' was sometimes spread on bread or sometimes diluted with water to make a drink. Grape honey was added to yoghurt to sweeten it. Goor (1966a: 60) mentions how grape-honey was made; 'the grape-juice which is expressed from the grapes, immediately after the grapes are trodden' is cooked. It is very sweet like 'real honey' and then it is cooked again 'until it becomes as thick as honey'. It is much cheaper than honey made by bees. However, it seems that dates were also

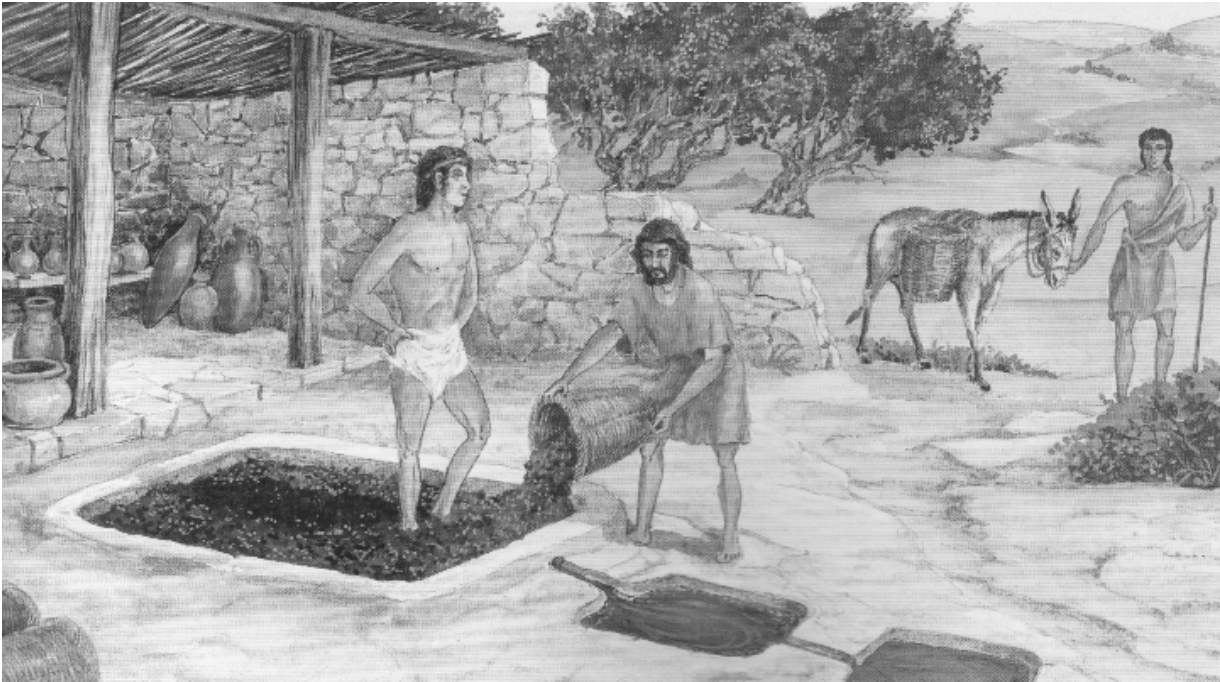
made into honey and it is possible that it is their 'honey' that was included with the Seven Species of blessing.

Other grapes were dried so as to provide raisins, a staple food. In a corner of the vineyard the grapes were scattered over mats, or were dried in bunches, turned daily and sprinkled with olive oil to keep the skin moist (King & Stager 2001:107; Wight 1953: 193). Raisins were stored for the winter and formed an important part of the diet when other fruit was not available. Raisin cakes were also made, and as they were 'rich in iron, minerals, and sugar', they were 'highly nutritious' (Rousseau & Arav 1995: 329). Krymow (2002: 164) notes that grape leaves were used in cooking in stews, soups and stir-fry dishes. Grape leaves were wrapped around meat or rice and cooked. The grapevine symbolised fertility to the early people and they also depicted the vine on their coins. The 'first coined money of Jewish princes' used either 'a single leaf, a branch or a cluster of grapes' (Krymow 2002: 164). Goor (1966a: 51) mentions that once the vine had been uprooted, or broken, or pruned, it was only useful as fuel. However, he notes that the grape-vine was an important symbol for the Jews who had a golden vine festooning the entrance to the Temple as well as its canes which were 'held up on trellises' so that anyone who wanted to bring an offering of a bunch of grapes or a leaf would hang it on the vine.

The people in ancient times seem to have drunk wine rather than water, due to the number of winepresses that have been discovered in the land today (Dar *in* Wilkins, Harvey & Dobson 1995: 331-332). For example, on the Carmel mountains the 'medium-sized village' of Horvat Sumaqa 'possessed five large winepresses'. Apparently the people mixed the strong wine with water, and wine was 'one of the basic food elements in the ancient diet.' It was considered one of the staples of life for the Israelites (Matthews 1991: 58; Wight 1953: 193).

Aviam (2004: 175) notes that 'the vintage begins at the end of the summer, when it is still the dry season' and believes that as almost all the winepresses were found outside the village, in places without a roof, this serves as 'evidence that grape treading was carried out before the rains began.' Most of the juice was made into wine. The first stage of processing the grapes was the treading of the grapes. Grapes were taken to the winepress and trodden by the bare feet of several men, amidst great laughter, jollity and sometimes music, in the larger and upper treading vat. The juice or must flowed through a channel into the lower vat which was carved in the bedrock or in a plaster lined vat. This cistern was smaller and deeper and where possible had a hole at the bottom through which the juice could flow into collecting vessels such as wine jars. (See below).

Treading grapes at a winepress



From Vamosh 2007b: *Daily life at the time of Jesus*, p.69.

Vamosh (2007a: 32) states that the human foot exerted less pressure and therefore did not break the pip, or inner part of the grape, which contains 'the oil, seeds and tannin'. Frankel (1999: 41) notes that the grape skins and stalks were pushed into the centre of the treading floor and formed 'a hard block' so that the must could flow freely and the skins could be further processed by treading, pressing, or other methods. He mentions that the channel is blocked by sprigs of great burnet which act like a sieve to prevent the grapes and twigs from flowing with the must into the lower vat. When there is enough must, the burnet is removed and the juice begins to flow, but the workers use their hands to prevent the skins from flowing into the collecting vat. Frankel (1999: 146) mentions that stone rollers were used to crush grapes, instead of treading, in pre-industrial times and these have been found in the Hebron district, western Lower Galilee and Mount Carmel. There were two different types of rollers: simple rollers and slotted rollers which had slots to insert levers which were then 'used to roll the rollers.'

According to Frankel (1999: 42) the second stage in the processing of wine is usually pressing the grapes. He maintains that in ancient times 'grapes were certainly always first trodden and then pressed.' Pressing made it possible 'to extract additional must from the grape skins and stalks.' He discusses the various ways of pressing to obtain the must according to classical and Talmudic literature. The first must and the finest, stated Pliny and Columella, was the juice that flowed even before the grapes were trodden and Columella called it '*mustum lixivium*'. The must of the second pressing is when the grapes

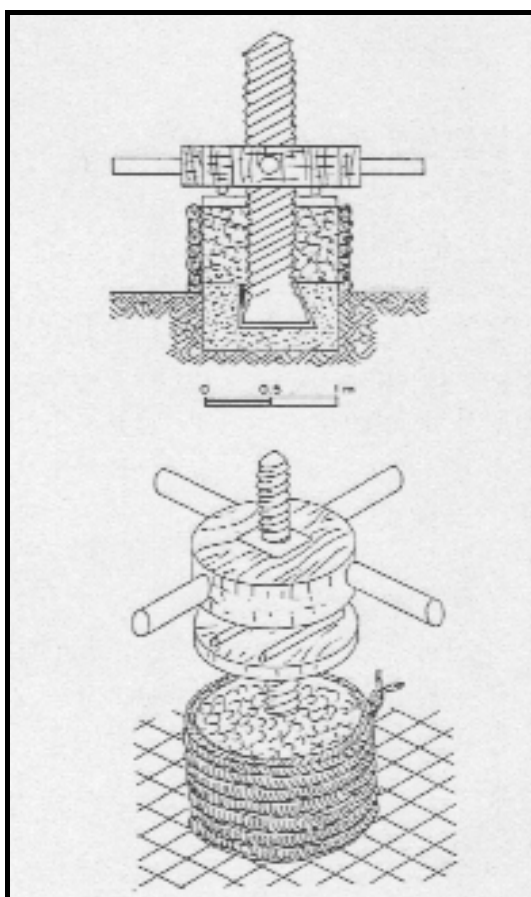
have been trodden and the skins and stalks are 'placed under the press so that whatever remains in them may be pressed out into the same vat.' Apparently when the juice has stopped flowing people 'trim around the edges of the mass and press again'. This second pressing produces must which is kept separate because it has a different taste and Columella called it '*mustum tortivum*' or 'pressed must'. A poor type of wine was produced by adding water to the pressed grape skins and pressing again and this was called '*lora*' in Latin. It was this wine known as *tmd* in Hebrew that was given to the workers. A fourth type of wine was 'lees-wine' which was made 'by pressing the dregs of wine itself.' There were several varieties: 'after-wine of the straining bag', 'after-wine of the kernels', and 'ordinary after-wine'. Lees-wine was considered wine regarding tithes, but after-wine was not considered wine in this case. Finally there was the 'boiled-down must' made by boiling the fresh must of which again there were a number of varieties: '*sapa*, was boiled down to one-third of its original volume'; '*defrutum* was boiled down to one half' (although Columella said it was boiled down to one-third) and was quite a thick consistency; and '*caroenum/carenum* which was boiled down to two-thirds of its original volume'. 'Boiled-down must was very sweet and used to enrich musts of other wines.' The Talmud mentioned 'cooked wine' and Frankel believes it was the boiled-down must that was meant.

Aviam (2004: 170, 177) mentions that most winepresses 'were cut in hard limestone, on the edges of the soft rock area, or in the "nari" (a harder layer that covers the chalk)' and gives examples of areas where winepresses have been found, such as "'Winepress Hill" near Ma'a lot, where five or six winepresses were cut, side by side, on one small hill.' He explains that the limestone hill lies on 'a geological fault line' which has on its eastern side hard limestone and 'on its western side chalk and rendsina soil.' This, he says, is due to the fact that 'the ancient farmers of Galilee preferred to grow their grapes in rendsina soil' and 'to grow their vines on the high mountains' such as in Upper Galilee especially in the area of the Meron Mountains. He notes that the farmers preferred to grow their olives in *terra rossa* soil and not on the high mountains where the olives were inferior. Aviam (2004: 171) also distinguishes between: the 'simple type' of winepress with a threshing floor which was often a natural sloping rock, usually very shallow, and a collecting vat into which the liquid ran, probably constructed in the Iron Age I period; and a 'composite type' of winepress in which the threshing floor was better constructed, hewn out of the rock, had 'one or more settling vats through which the liquid reached the collecting vat' which was sometimes 'paved with a simple white mosaic.' Aviam suggests that the composite type of winepress, and possibly a few of the simple type, were constructed in the Roman period, but mainly in the Byzantine period. The making of wine declined during the Arab conquest

in the seventh century CE as the drinking of wine and alcoholic beverages was prohibited in Islam. Possibly in the Mameluke period (fourteenth to fifteenth centuries CE) many ancient sites were resettled and the winepresses used to make grape honey.

Frankel (1999: 26) mentions that when studying wine and oil production, 'the installations used to produce these two substances are very similar and it is therefore often difficult to distinguish between them.' His research has drawn on: archaeological discoveries; wall paintings and other pictorial depictions; pre-industrial installations used until recently; and written sources such as 'Hebrew and Aramaic biblical and Talmudic texts' and classical Latin and Greek texts. Frankel confirms the research of Aviam, in that he also maintains that winepresses were normally in the vineyard outside the village. According to written sources he says that it was here that the first fermentation took place in the vat.

According to King and Stager (2001:101) in the sixth century BCE the Greeks invented the grape beam-press. The grape beam-press consisted of a beam which was secured to a wall, with the other end weighted with stones. The baskets of grapes were placed under the weighted end. This press worked in a similar way to an olive press except that as grapes were soft skinned, less pressure needed to be exerted. Frankel (1999: 140) notes that the 'single fixed-screw press was the main wine press in Israel and surrounding countries.' (See below). The purpose of this press 'was to squeeze out the must left in the grape skins and stalks after treading.' He mentions that during pressing the material to be pressed, either olive mash or grape skins, had to be placed in a suitable container, 'usually a flat round frail with a round opening on top and made of thick thread' such as plaited and loosely woven date palm fibres. The frails were packed by hand and then placed one on top of the other before being pressed by the screw press.



Fixed screw type press

From Frankel 1999: *Wine and oil production in antiquity in Israel and other Mediterranean countries*, p. 140.

According to Frankel (1999: 43) 'to become wine, must goes first through a short and very turbulent fermentation at a temperature of 15°-20° and lasts for three to nine days'. In the second stage of fermentation it needs to ferment in a cool place. In ancient times the juice, or must, that was extracted was then 'left to settle overnight, with the fermentation beginning about six to twelve hours after pressing' (Rousseau & Arav 1995: 329). Renfrew (1973: 131) notes that sweet wines may contain up to 18 percent sugar, whereas dry wines may have less than 2 percent. Alcohol may be added to sweet wine and the fermentation process is then stopped, but in dry wines, fermentation continues until most of the sugar is used up. Vamosh (2007a: 32) notes that to make wine, grapes and yeast are needed – the yeast, from the broken skins of the grapes, begins to convert the sugar of the grape juice into alcohol. Renfrew (1973: 131) mentions that the wine yeast is called *saccharomyces ellipsoideus* and is 'naturally present in the "bloom" on the grape skin.' The sediment in the juice was left to settle before the juice was poured into bags made of animal skins or into clay jars (Peelman 1975: 18). Vamosh says that the next day the new wine was collected in earthen jars which were placed in cellars, caves or cisterns, which were cool, and here the fermentation would continue. During fermentation carbon dioxide

is formed and drives the oxygen, which is detrimental to the wine, to the surface. This makes the wine 'boil and bubble'. Borowski (1979: 167) mentions that the mouths of the jars were sealed with clay and a small hole was left to allow the gases to escape. Care had to be taken by the ancient wine-makers, for if the grape juice was exposed to the air for too long while the carbon dioxide escaped, it became contaminated by a fungus and the alcohol that was formed turned into vinegar. To prevent this happening, according to Pliny, the Roman historian and naturalist, 'resin from the terebinth tree was added to the wine'.

King and Stager (2001: 100) state that wine was stored in vats or deeper rock tanks. Where wine was made in bulk, such as at Ashkelon, where 'a large, centrally located ashlar building, or winery' was discovered, there were 'press rooms' which alternated with 'storerooms' in the complex. For about six weeks the grape juice in the collecting vessels or vats was left to stand and ferment. The lees or sludge from the juice formed at the bottom of the vessel. Wine was then carefully poured into smaller jars making sure that the sediment was not disturbed. The jars were sealed with clay, but in the handle there was a small hole to allow the gases released during the remaining fermentation to escape. When the process had been completed a blob of wet clay sealed up the hole and the owner's name or seal was put on the clay. Sometimes wine was put into wineskins (goatskin bottles) but these had to be new so that the expanding gases did not burst the skin, which happened when new wine was put in old wineskins (Gower 1987: 109 - 110). The rich kept their wine in amphorae which were narrow wine jars with pointed ends that were buried in the earth to help keep the wine cool.

Wine was stored in large jars and a smaller jug was used for dipping from the store jar (King & Stager 2001: 102). Pitchers and carafes were used to pour wine into drinking cup-bowls. The wine needed to be strained to prevent the dregs and foreign matter entering the cup and being swallowed. Wine or liquid was poured from large bowls to drinking bowls. Several types of strainers have been discovered such as the 'strainer that was built into the spout of the jugs' - known as 'strainer jugs'. These were 'actually composite carafes, serving as decanter and strainer' and were used to pour the wine from large bowls to the drinking bowls. They were used in the seventeenth century BCE in Phrygia and according to King and Stager, indicate that the Philistines drank wine and not beer. Egyptian and Canaanite wine sets have been discovered consisting of a bronze bowl, juglet and strainer. In Jordan at Tell es-Sa'idiyeh and in a Persian period tomb at Tell el-Far'ah, a strainer, a ladle and a bowl were uncovered.

Goor (1966a: 48) notes that wine was drunk as freely on weekdays as on feast days; it was 'mixed with water as a purifier' and was often drunk instead of water. King and Stager

(2001: 101-102,109) confirm this noting that wine was not only made for pleasure but also for necessity as the water was not safe for drinking unless it came from a fresh spring. Wine was also drunk when there was a limited milk supply. They point out that wine was 'served as the commonly consumed beverage in ancient Israel'. It was not only the main 'table beverage', but it was also used in sacrifice as 'a libation' or drink offering, as mentioned in Exodus 29:40; 44 when God told Moses to consecrate the Tent of Meeting, and Aaron and his sons as priests. Wine was also a medium, like vinegar, for 'pickling olives, vegetables and carobs'; red wine was used for dyeing clothes; 'a concoction of water and wine, or water and vinegar' was used for house-cleaning and floor-scrubbing.

Wine was also used as medicine. Vamosh (2007a: 33) says that as 'a component in medical treatment', wine was 'part of the poultice applied' to the injured man in the story of the Good Samaritan (Lk 10: 34). Wine was used as a disinfectant to clean wounds before smearing with the healing olive oil. Paul also told Timothy that a little wine was good for his stomach's sake and his frequent illnesses (1 Tm 5:23), so its benefits must have been recognised. In the fifth century BCE, Hippocrates studied the effects of wine on the body and noted 'that red wine and boiled wine' were good for the digestion, white wine was good for the bladder, but that sweet wine led to the swelling of the stomach. Pliny 'recommended applying wine to scorpion, spider, and bee stings' and another Roman, Gallus, noted that 'applications of wine prevented gangrene' when he treated wounded gladiators. Goor (1966a: 48) notes that wine was an effective 'remedy for intestinal complaints and other ailments.' Vamosh (2007a: 33) points out that although wine has 'beneficial medicinal effects', there are a number of views, such as the 'Jewish sages' and several places in the Bible (Eph 5: 18 and 1 Pt 4:3), where too much wine causes intoxication and debauchery. Later Jewish sages did note 'the benefits of wine in small quantities, and that it was harmful in large amounts' (Vamosh 2007a: 34).

Wine was 'traded in large quantities, either as import or export' such as the wines imported from the Greek islands and Italy, or as in the case of Solomon (2 Chr: 2:10), exported as payment to the King of Tyre, together with wheat, barley and olive oil. The economy of first century CE eastern Mediterranean was such that open markets were created which encouraged producers and traders and this resulted in olives and grapes being grown extensively 'in Palestine, Syria, southern Anatolia, Greece, and Italy 'as 'wine and olive oil industries were major sources of wealth'. Discoveries of thousands of jar handles with imprints from 'Rhodes, the Greek islands, and Italy provide evidence that foreign wines were imported' (Rousseau & Arav 1995: 330). It seems that in the first century CE Pliny listed 80 different types of wine, while Strabo listed 130 (Vamosh 2007a: 33).

Shards that have been discovered mention shipments of wine and the places they came from, and a clay jar found at Hazor, from the Iron Age during the period of the Israelite kingdom, is 'marked as *smadar* wine – young wine' (Vamosh 2007a: 33). King and Stager (2001: 101-102) note the different names for wine, such as 'dark wine' (*kāḥôl*) from Judah, juice which was unfermented (*asîs*), newly fermented wine (*tîrôš*), red wine (*hemer* - Aramaic) and there was also grappa, a brandy, that was distilled grape juice. Brandy was made in the Bronze Age and is thought to have had an alcoholic content of 20 to 60 percent. Sweetened wine was also made by 'adding raisins, honey or some other fruit juice as a sweetening agent' (Vamosh 2007a: 35). Cheap wine was produced before fermentation was completed for the Roman soldiers and to this was added myrrh or gall to relieve pain (Gower 1987: 111). Vamosh (2007a: 32) says that vinegar was made from 'flat wine' which was 'probably produced by pouring water over mashed grapes' to which could be added 'dried figs, salt and honey'. Vinegar was more diluted than wine and was used when going on a journey as 'a little would go a long way' (although not very tasty). King and Stager (2001: 106) note that 'a diluted form of vinegar resembling sour wine was sometimes drunk by the poor and by soldiers.' Rousseau and Arav (1995: 330) point out that to make wine 'more intoxicating' it was mixed with spices. Vamosh (2007a: 35) mentions that some ancient wine-makers added 'crushed iris to the wine and another recipe suggests cardamom and saffron'.

According to Zohary (1982a: 54) the vine 'was regarded as a national emblem'. It has been depicted on 'mosaic floors, murals, and portals of synagogues, on pottery, furniture, tombs and coins' and even when the Jews went into exile they chiselled vines 'on tombstones in foreign lands.' Borowski (1979: 156) notes that in the Bible the prophets speak of the vine as 'a symbol for the people of Israel, their destruction and restoration (Jr 2:21; 6:9; Ezk 15:6; 17:6-8; Hs 10:1; 14:8 and others).' The vine and the fig were also symbols of peace and prosperity (I Ki 4: 25; Mi 4:4) (Borowski 1979: 157).

6.1.3 Olives. Westenholz (1998: 39) mentions that 'the olive tree provided oil from its fruit and roots, leaves and branches, bark and wood.' Some olives were dried, some preserved by pickling in salt water and later eaten, but most olives were pressed for their oil 'which was used as a substitute for scarcer animal fats' such as 'butter and cooking fat' (Packer & Tenney 1980: 271; Gower 1987: 116). Goor (1966b: 228) notes that olives that were to be eaten were either prepared by 'salting, pickling, drying, dipping in boiling brine, or cooking'. Olives that were to be pickled came mainly from irrigated orchards. According to Gower (1987: 114) many olives were eaten with barley bread for breakfast by the peasants. The olive fruit was served fresh to eat, but Vamosh (2007a: 39) suggests that only the ripest

fruit could have been dried to lose the bitter taste and then 'nominally processed by pickling only in salt'.

Olive oil was used on bread, for cooking, as an ingredient in medicines, perfumes, oils and ointments, for light and for anointing. Olive oil was the main fuel used for lamps and it was used as an ingredient in soap. Beers (2003: 151) says that most women did not have money for beauty care, and as they rarely bathed, 'olive oil was rubbed liberally into the skin as a perfume and deodorant'. The fragrant oil was also used as a 'skin moisturiser' to make it shine and be supple. Olive oil was also good for the hair as it made the hair shine. Goor (1966b: 228) notes that the oil helped in the 'weaving of wool, for greasing the fleece or for smoothing the fingers of the weaver.' It was also used to soften sandals and shoes. According to Goor (1966b: 229) the juice of the olive was used to polish brass, to prepare leather and to protect grain from pests.

Another use of olive oil was that leather shields were treated with it, which acted like shoe polish to preserve the leather from cracking and drying out. It was used to protect hair and skin from the wind and sun, and 'shepherds used it to heal the bruised heads of their animals' (Krymow 2002: 97). 'Writing ink and soaps were also prepared in great part from the oil' (Westenholz 1998: 40; Goor 1966b: 228) although Frankel (1999: 44) states that it seems that soap was made from animal fat and it is unclear when olive oil was used in soap-making. Goor (1966b: 228) notes that oil was used on metal to protect it from rusting. According to Vamosh (2007a: 38) little of the tree was wasted and the lees, resulting from the crushing and pressing of the olives, was used as a fertiliser for the olive trees, 'poured over grain to protect it from insects and mice', was a component of plaster, kept insects away and prevented the soil from becoming muddy.

Anointing with oil was another use, but this was for those who were consecrated into God's service such as the prophets, priests and kings (Gower 1987: 116). The prophet and priest were anointed when they took over their duties, and they would anoint the king when he was appointed. Oil was also used in religious ceremonies and was put in the seven-branched candelabrum for light in the Temple. King and Stager (2001: 97-98) note that an olive press was discovered at Tel Dan which must have 'provided oil for lighting the lamps and for votive offerings in the temple'. Peelman (1975: 28) describes the preparation of the oil to be used in the Temple. It was high quality oil which was 'allowed to drip slowly from bruised olives' not pressed ones. It took eight days to prepare the special oil which was used in the lamps of the Temple (Ex 27: 20), 'to prepare cakes offered on the altar' and the anointing oil. Westenholz (1998: 40) points out that olive oil 'played a role in sacrifices' as it was used in the 'obligatory daily meal offerings' (Ex 29: 40; Nm 28: 5). It was also used for 'individual meal offerings' as grain or flour was mixed with oil and

sometimes frankincense had been added to the oil. There were five kinds of offerings that were made by individuals in which the oil was either added and mixed with the ingredients or was poured over the mixture (Lv 2: 1-10; 14-16)

Oil was also used for healing, as in the story of the Good Samaritan and the man set upon by brigands, as wine and then oil was poured into his wounds (Lk 10: 34). Also in the New Testament, James 5: 14, tells the disciples to take oil with them when they visit the sick so they can anoint the sick people, thus consecrating them or giving them into God's care (Gower 1987: 117). According to the 'Babylonian Talmud, Tractate Aboda Zara, 25a' the olive stones were used to lessen toothache (Westenholz 1998: 39). She also mentions that 'medicinal ointments were made by boiling aromatic substances in olive oil which was used as an unguent' and 'rubbed over the body as a remedy against chills and to heal wounds and sores. It was also used as an ointment to strengthen 'the skin, muscles and hair' and it was used as 'a salve to soothe sore throats' (Westenholz 1998: 40).

Dar (*in* Wilkins, Harvey and Dobson 1995: 331) states that 'there was no ancient settlement in Palestine that did not have its olive press to produce oil' and where there were olive groves there were 'six or seven olive presses in every town and village' in the area. This confirms the view of Aviam (2004: 57, 174) who notes that 'almost all the oil presses surveyed in the Galilee are located inside ancient villages' whereas "most of the winepresses are scattered in the surrounding fields.' Like grapes, olives were crushed and pressed for the oil that was present in the fruit, but 'ripe juicy grapes cannot be packed and transported home for squeezing or they will lose their juice, especially the "first" juice, which is considered the best.' It was naturally sensible to treat the grapes and prepare the juice near the vineyard and then send it to the village in jars, but the olives were harder and more resistant and were packed and sent to the press installations in the village (Aviam 2004: 175). However, exceptions have been found to both winepresses, found in several villages, and olive presses, found near the olive groves. King and Stager (2001: 96) mention that olive presses were usually cut out of the rock close to the olive groves, but this is not in accordance with Aviam's research. Vamosh (2007a: 49) says that 'in preparation for the pressing, olives were heated to express the oil more readily from the fruit'. This was a task that was done in the owner's home. Both King and Stager and Vamosh, it seems, are concentrating on the individual needs of a family, but Aviam is concerned with the mass production of oil.

Aviam (2004: 175) notes that 'olive picking starts after the first rains' unlike the grape treading which was carried out before the rains. He mentions that sometimes it is 'impossible to work outdoors for many days' giving that as a reason why 'most of the olive presses were located inside the village'. He believes that as the 'oil-press installation

included a large wooden beam, ropes and wooden parts that cannot be left in wet conditions', and as 'olive oil was a more valuable product than wine, it needed to be kept under secure conditions' so presses were often found inside houses or even inside a cave such as the Roman press found at Yodefahat.

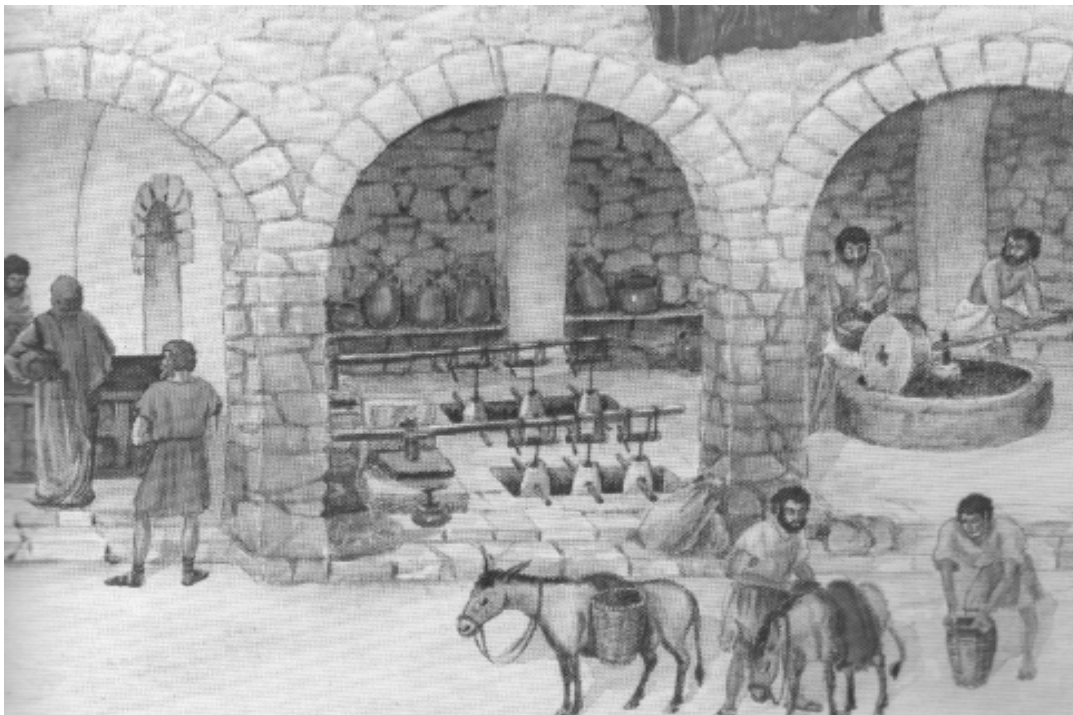
According to Vamosh (2007a: 38) scholars believe that at first the oil to be produced was obtained by treading the olives by foot wearing a special type of shoe to do this, rather like treading the grapes. Frankel (1999: 51) notes that most installations discovered today in Israel consist of a sloping upper surface where treading, crushing and pressing was carried out and then, connected by a channel, a second part, which was the lower collecting vat into which the oil flowed. However, he believes that most of these simple installations were wineries for treading grapes, but in the Chalcolithic period must have been used for treading and crushing olives. Gower (1987: 115) notes that an early method to obtain oil was to put the pulp into cloth bags that were trodden by foot and the oil came out through the cloth. However, the olive fruit was hard and little oil was produced in this way. The oil was collected into jars and left to stand until the sediment had settled. The pure oil was drawn off and stored in a cool place. According to Frankel (1999: 68) there were 'three simple methods of crushing olives: treading, pounding with a pestle and mortar; or using a stone roller'. Thompson (1986: 152) says that the best and probably the cleanest oil that was obtained resulted from beating or pounding the olives in 'a stone or rock-cut mortar with a pestle'. One such press has been found at Gibeon. The oil that was crushed collected in a basin and was separated from the pulp by pressing it out.

Frankel (1999: 46-47) notes that there were two different processes in extracting fine quality olive oil: 'the first by pounding with a mortar and pestle' confirming Thompson's view, 'the second by the addition of hot water'. Frankel says that there were four main factors that affected the quality of the oil: '1. the quality of the trees and olive groves; 2. at what stage of ripeness the olives were picked; 3. the treatment of the olives between picking and processing; 4. the extraction process itself.' The olives that were picked early produced 'a smaller yield of oil of sharper taste and greener colour' that he calls 'virgin oil', 'green oil' 'or summer oil' and this oil was expensive. Frankel quotes the Mishnah which divides olives into 'three categories according to how long they wait before pressing': 'the best quality are those taken directly from the tree to the press; the second quality are those stored on the roof and from there taken to the press; and the third are those stored indoors and then dried on the roof and taken to the press.' Frankel (1999: 61, 138) says that the simple lever was the earliest means of exerting pressure first by humans and then by weights. Gradually the oil presses were developed and improved, and from Iron Age II wine presses and oil presses could almost always be clearly distinguished. The winery had

a treading floor and a fairly large collecting vat, but no olive-crushing device, and the olive press had an olive crushing device which from the Hellenistic period onwards was a round rotary olive crusher, a fairly small collecting vat and no treading floor. Frankel (1999: 27) mentions that 'in the Iron Age olives were crushed by rollers or in mortars'.

According to King and Stager (2001: 96) the rotary olive crusher consisted of a large stone, 'the crushing stone, or *memel*, which was rolled over the olives spread on a flat rock-cut cylindrical stone shaped like a saucer with a hole in the centre, or on the floor of a rectangular crushing basin'. Through the hole in the centre of the wheel a wooden beam was fixed with weights, which was rotated around the crusher by a donkey or a labourer. (See illustration below). The olives were then crushed and thereafter the pulp was pressed to extract the oil which was collected in a cistern. Virgin oil is the result of the first crushing. Vamosh (2007a: 38) notes that olives were 'often heated to express them more readily from the fruit' and this was carried out in the owner's home before the olives were taken to the press. Vamosh notes that 'the best and most nutritious' way to produce olive oil today is using the cold-press method.

Olive oil production



From Vamosh 2007b: *Daily life at the time of Jesus*, p.39.

In this type of olive production centre the olives were first poured into the round crushing mill (to the middle right of the illustration). The round upper stone attached to the beam was pushed around either by animal or human power. The olives were then scooped up, put into round baskets and placed one on top of the other over a press-bed or round basin built into the floor. Pressure on this column was exerted by a screw. This method has been used since the first century before Jesus, to this day.

An earlier method to press the olives was to use a beam inserted into a recess in the wall, which hung over the basin (centre of illustration). Weights were hung on the beam and lowered into niches in the floor. The fulcrum of the beam was the column of flat baskets. This method went out of style by the time of Jesus.

Frankel (1999: 47-48) notes that 'the method used to extract the oil was the main factor affecting quality.' 'The finest oil was that produced without exerting pressure.' He maintains that after crushing, the olive pulp was left for a while 'to allow the oil to flow from the pressure of its own weight' and this was known as the 'first oil' to be used in the Temple. The second method of producing choice oil was when hot water was added to the crushed olives, or the olives were boiled in water. This resulted in the oil floating to the surface and then skimmed off. The Arabs called it 'water oil'. There was a third quality of oil according to the 'ancient sources' and the Mishnah wrote of three grades of oil depending on the way the olives were processed. Thus there were nine grades of oil in total. At each pressing, the oil became more inferior. Frankel sums up the differences in the quality of the oil by saying that 'there were six main types of oil: virgin oil, first oil, oils of the first, second and third pressing, and lees oil' and he ignores 'the quality of the olive groves' and 'the treatment of the olives between picking and pressing.'

King & Stager (2001: 97) describe two grades of oil (as opposed to the nine grades that Frankel mentions above): the virgin oil, extracted by 'cracking and crushing'; and the second-grade oil obtained by 'pressing the pulp with a beam-press'. This pulp was placed in woven baskets with holes in the bottom, covered with a stone and placed on the pressing surface. Pressure was 'exerted on the olives by means of a long beam weighted with stones and secured in a wall niche'. This stone-weighted lever weighed about 270 kilograms (Vamosh 2007b: 49). According to King and Stager (2001: 97) the oil flowed out of the holes in the baskets and into a groove. Below the baskets were 'cylindrical vats' which collected the oil. This is the type of olive press that was used in Iron Age II. The finer oil gradually rose to the top and was skimmed off to be used in lamps and the rest was further refined and used as a base for cosmetics, medicine and in cooking.

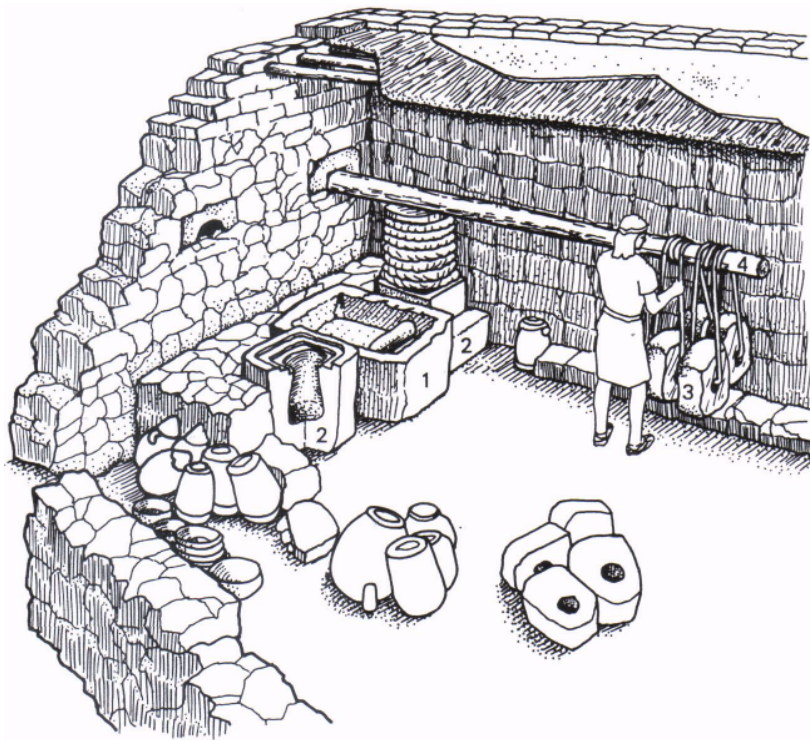


Diagram of Iron Age II olive press found at Tel Miqne (Ekron). (1) the crushing basin; (2) the presses; (3) the stone weights; (4) the wooden beam.

From King and Stager 2001: *Life in Biblical Israel*, p.97.

Finally, the pressed skins and leftover parts of the olive fruit formed olive cakes, which were the 'final product of the olive producing process'. Olive cakes were used for fuel to heat the ovens, as were the olive pits which still contained some oil. Olive wood also had its uses. (See 6.2.3 below). According to Frankel (1999: 45-46) the oil lees was 'the black fluid left after the oil was separated.' He mentions that there were a number of uses of the lees: 'to treat trees'; to pour around olive trees as manure mixed with human urine; 'to kill noxious weeds'; 'to smear on vines to keep out insects'; 'to make an infertile olive (tree) bear fruit by wrapping straw around the tree and soaking it with diluted lees', and this could be done for fig trees too. Other uses were: 'to protect grain from insects and mice' by covering the grain with a mixture of chaff over which lees was poured; 'dried figs were kept in jars coated in lees, as was oil'; 'myrtle twigs and berries, and fig branches with leaves and fruit were preserved in lees'; 'soaking firewood in lees improved it'; 'furniture was smeared with boiled-down lees to keep moths from the clothes kept in it'; 'to prevent decay of the wood and to polish it'; 'it was used as grease for belts, shoes and hides'; 'lees were sprinkled on cattle food and given them to drink in order to improve their health'; 'sheep were smeared with an ointment of lees, boiled lupins and dregs of wine to treat for scab'; 'plaster was made of chopped straw, chalky or red earth and lees'; and, 'threshing floors

were prepared by adding lees to earth and then tamping it down.’ This was done so that the lees would keep the insects away and prevent the earth from becoming muddy.

Olive oil brought economic prosperity to the region as the surplus oil was sold to countries such as Egypt, Phoenicia and sometimes Greece (King & Stager 2001: 96). One of King Solomon’s sources of wealth was olive oil, as for example in 1 Kings 5:11 and 2 Chronicles 2:10 it is stated that Solomon gave Hiram, among other things, twenty thousand baths of oil (about seven and a half gallons) a year in return for the labour of his men (Wight 1953: 199). Goor (1966b: 231) notes that it was said that ‘Egypt imports cedar wood from Phoenicia and wheat, wine and oil from Syria and the land of Israel.’ This indicates that olive oil was one of the ‘major articles of trade employed in the barter system used in ancient times’ (Swenson 1995: 141). King David thought so highly of his olive groves that he set overseers to care for them, as well as the sycamore trees (Goor 1966b: 232).

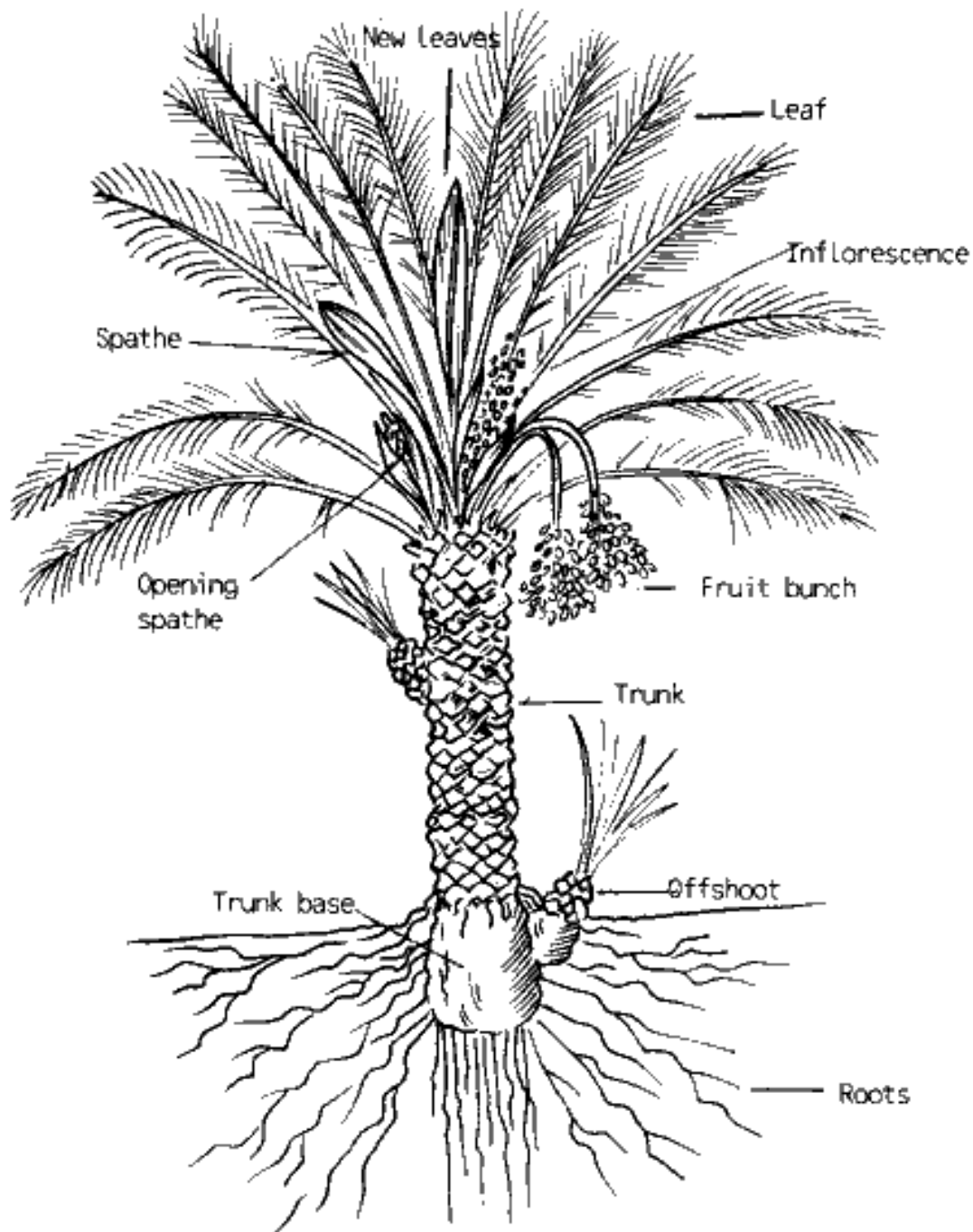
The olive tree was considered the emblem of peace and prosperity and a symbol of blessing, fruitfulness and happiness (<http://www.newadvent.org/cathen/12149a.htm>).

6.1.4 Fruit, vegetables and nuts. According to King and Stager (2001: 93) ‘the Israelite diet consisted mainly of grains, vegetables, fruits and condiments’, the chief crops in biblical times being ‘wheat, barley, olives, and grapes’. They state that cereals were the first cultivated crops, but that later fruit trees were cultivated.

6.1.4.1 Dates. The dates that were grown in the Jordan valley were of exceptional quality and were greatly admired (Dar *in* Wilkins, Harvey & Dobson 1995: 331) and, as Vamosh (2007a: 42) mentions, were exported for their quality. She mentions that the ‘Babylonian Talmud Tractate *Ketuboth* reported’ that ‘dates and date honey’ were a ‘tasty sweet;’; ‘they warm and satisfy, act as a laxative, and strengthen the body without spoiling it’. This must have pleased Cleopatra who was given Herod the Great’s date plantations by Mark Anthony. The Israelites ate the fruit but also made a sweet syrup from the dates called *dibs* (like the grape). Vamosh (2007a: 41) notes that dates were boiled in water, strained through a cloth, then cooked until the liquid had reduced and it formed a syrupy substance which is the date honey referred to by the Mishnah. This syrup is then fermented into date palm wine, mentioned in the Talmud, and it was a common drink in Egypt and Mesopotamia (Packer & Tenney 1980: 271; King & Stager 2001: 104). Heaton (1956: 87) believes that the Israelites drank date wine and Westenholz (1998: 44) notes that the ‘sweet sap’ yielded by the date palm was used to make ‘a fermented wine’. Dates are a high-energy source of food, with a high sugar content. They were a basic food for the ancient peoples. They were eaten fresh as well as dried, as pressed small cakes. Renfrew

(1973: 152) notes that dates are rich in vitamins A, B1, B2 and nicotinic acid. According to Vamosh (2007a: 35) dates have double the amount of sugar than grapes and when dates are trodden on they can express sufficient amount of juice to make into wine. Apparently, wild yeasts on the date skins can contribute to fermentation.

Diagram 5: Parts of a date palm one year old



From: <http://www.fao.org/docrep/t0681E/t0681e02.html>

Peelman (1975: 30) notes that the Arabs living in the Middle East say that the date palm has '360 uses;' and Moldenke and Moldenke (1952: 170) note that 'the Arabs have a

saying that the palm tree has as many uses as there are days in the year' and mention that it is 'almost literally true.' King and Stager (2001: 104) mention that the date palm was very important and point out that nearly every part of the palm was used by the people in their daily life. The trunk was used 'for timber, the leaves for roofing and basket weaving, the fruit for sweets and the seeds for animal fodder'. Peelman (1975: 30) confirms that the wood was used to make doors and support beams and says that the trunk of the tree was hollowed out and made into a boat. Packer and Tenney (1980: 260) say that 'the shoots that sprouted around the bottom of the trunk were used for ropes, sandals, and baskets' and Peelman (1975: 30) says that the fibres were made into 'thread, rope, rigging for boats, and fish nets'. The 'heart of the date palm' is said to adorn 'the capitals for columns and pilasters' in Iron Age royal buildings at 'Hazor, Megiddo, Jerusalem, Samaria, Dan, and Ramat Raḥel'. Westenholz (1998: 44) notes that 'from the tree's trunk a tasty juice could be made' and that fences and rafts were made from the wood and that huts and buildings were also made with it. She mentions that the date stones were used as fuel. As dates stored well, Josephus noted that they were among the commodities stored up at Masada and this was confirmed by the finding of date pits in Herod's huge storehouses on the fortified plateau (Vamosh (2007a: 40).

The date palm, 'a favourite symbol of fertility', was a popular motif that has been found on 'Phoenician ivories, cult stands, amulets, scarabs, cylinder seals, wall paintings, and pottery'. One of the 'four species' to be brought to the Feast of Tabernacles, is an unopened, sword-shaped palm leaf called '*lulav*' in Hebrew (Berlinger 1969: 97). The other three species are fruit from a goodly tree (citron, Hebrew *etrog*), leafy branches and poplar (Lv.23:40). Brickner (2006: 55) says that 'leafy branches' is taken to mean 'myrtle branches', and for 'poplar', willow is used.

Vamosh (2007a: 43) mentions a number of ways that dates were eaten: 'date gruel', although frequently eaten was not 'respectable for the Sabbath'; dates mixed with walnuts, should 'unexpected guests arrive'; 'treats' such as dates mixed with 'honey, walnuts, almonds, cinnamon, and even black pepper and cardamom'; date pits were food for the livestock and were also used for fuel. Date palms also had other uses such as the huge leaves were woven into mats and the fibres provided 'thread and rigging for boats'. Little mention is made of the medicinal use of dates except that it was used as a laxative. Moldenke and Moldenke (1952: 170) mention that the small leaves are used as dusters and the 'date seeds' are used for 'stringing as beads'. They note that when the spathe is pierced 'a syrupy liquid exudes' which is used to make a liquor, and also the 'honey' considered to be one of the 'Seven Species' in the Bible.

Krymow (2002:160) mentions that even today in Arab countries every part of the palm tree is used: the leaves woven into mats, baskets, dishes and brooms; for thatching and building fences; the fibres are made into rigging for boats and thread; rope is made from the 'web-like portions of the tree's crown'; the 'inside of the very top of the trunk is edible; the heart of the palm is used in salads'; the sap is distilled and used in aperitifs and liqueurs; the kernels are ground up, soaked in water and fed to animals (and are more nutritious than barley, according to Moldenke and Moldenke 1952: 170); the seeds provide oil for soap; the fruit 'produces starch, sugar and wax'; the dates are also made into wine and added to sweeten beer; the wine is drunk but also used to 'wash the body to prepare it for mummification'.

Vamosh (2007a: 43) points out that the coins minted by the Romans in 70 CE, with '*Iudaea Capta*' on them were to commemorate the quelling of the Jewish revolt as palms were a symbol of victory or triumph.



From Vamosh 2007b: *Daily life at the time of Jesus*, p. 18.

She notes that date palms were also a symbol of life, one reason being that as palms grow very tall and close to water, travellers could see them from afar and know that their and their animals' thirst would be quenched; as 'a spiritual symbol of life, palms adorned the First Temple (1 Ki 6:29)'. Krymow (2002: 159) notes that palm branches were carried in ceremonial processions and were used to make the roofs of the booths during the Feast of Tabernacles.

6.1.4.2 Figs. Figs could be eaten immediately when fresh and ripe, but some were dried and pressed into cakes that were stored for future consumption for their high sugar content which make them especially nutritious, so therefore they were also useful for travellers or warriors (Matthews 1991: 59; King & Stager 2001: 104). Borowski (1979: 171) mentions three ways in which to 'prepare dried figs: individual figs, dried on strings, and mashed into cakes.' Goor (1965: 131) mentions that figs were often dried 'under trees or on special drying grounds' and that olive oil was put on the drying figs 'to enrich and preserve them from mould or rot.' According to Renfrew (1973: 136) 'dried figs contain over 50 % sugar' and when they are dried, the 'syrup which fills the interior of the syconium evaporates and condenses'. The sugar crystallises on the surface and 'acts as a preservative'. Figs were apparently easy to dry and store, so they were 'an attractive fruit' to grow. Most references to figs mention that dried figs were threaded on long strings and were easily transportable in that way. Shewell-Cooper (1977b: 54) mentions that dried figs, and the modern 'Syrup of Figs', are 'an answer to constipation'.

Figs could also be used for medicinal purposes, such as a poultice to cure boils (2 Kings 20: 7). According to Vamosh (2007a: 44; 68) 'research has shown that fig sap is an effective element in treating skin cancer'. Krymow (2002: 80) notes that the Egyptians used figs medicinally, as a purgative and for a number of stomach diseases. Externally it was used for stiffness and back pains. 'The Assyrians used figs in a poultice or plaster'. Another remedy was to boil figs in milk or barley water and take the medicine for coughs and colds. She confirms what Vamosh says that figs are used as a folk remedy for cancer, but also 'for skin conditions such as warts and corns and for healing wounds.'

Vamosh (2007a: 44, 68) points out that fig sap, and balsam sap, were used by ancient farmers to curdle milk to make cheese. However, the sap could not be used from fruit of trees less than three years old. In their fourth year they were to be a thanksgiving offering to God, as instructed in Leviticus 19:23, 'but use of the sap from the leaves and branches would be permitted', according to 'the sages'. Goor (1965: 132) notes that according to the Mishnah it was the sap of leaves and branches that was permissible, but the sap of unripe figs was forbidden. According to Zohary (1982a: 58) 'the latex in all parts of the tree is a skin irritant and may cause a kind of dermatitis.' Dar (*in* Wilkins, Harvey and Dobson 1995: 332) says that wine was made from figs and apparently they also produced 'honey'. Goor (1965: 131) notes that unripened late figs were boiled and then eaten, but unripened early figs were not cooked. He mentions that fig beer was made from dried figs.

Fig trees, with the crown often measuring eight metres in diameter, were also useful for shade with their dense foliage and broad leaves (King & Stager 2001: 104). Goor (1965: 126) notes that the shade of the vine and the fig were symbols of 'peace, happiness,

security, wealth and plenty.’ Peelman (1975: 10) mentions that the large rough leaves of the fig tree are used to ‘make baskets, dishes and umbrellas’ in the Middle East countries and the export fruit is wrapped in fig leaves. Goor (1965: 128, 132) notes that the wood was used as fuel and cites the Mishnah which said it was permissible to burn ‘sound fig-wood’ for sacrifices as it gives plenty of embers, does not make smoke and quickly burns to ashes. He also mentions that figs were ‘an article of trade and a source of income for the inhabitants.’

6.1.4.3 Pomegranates. According to Vamosh (2007a: 45) the pomegranate is one of ‘the most beautiful of all fruit in the Land of Israel’. Even today the pomegranate is crafted in silver and used ‘as an adornment to modern Torah scrolls’ as a remembrance of the ancient Temple. Pomegranates, because of their shape and their symbol of fertility, became the adornment of the Temple capitals and decoration on the priestly garments. Thompson (1986: 137) notes that the shape of the pomegranate fruit was so attractive to the people that it was carved into Solomon’s Temple decorations, and Packer and Tenney (1980: 472) describe the pomegranates in blue, purple and scarlet that decorated the hem of the robe of the high priest. Moldenke and Moldenke (1952: 190) note that the fruit with its ‘erect calyx-lobes’ was used as ‘inspiration for Solomon’s crown ... and all crowns thereafter’. Coins were minted by the Hasmoneans in the mid-second and first centuries BCE on which a single pomegranate appeared and later, in 67 CE, the rebels against Roman rule minted coins with three pomegranates on them (Vamosh 2007a: 45-46). Borowski (1979: 173) says that the pomegranate was also a model in daily life for the decoration of ‘ritual clay vessels’ used in the Iron Age.

Moldenke and Moldenke (1952: 19) mention that the pulp of the fruit has been used since the days of Solomon to make cool drinks and sherberts, and is also eaten raw. Pomegranate seeds are made into grenadine, and it is used as a flavouring. It may have been made in ancient times. The fruit is rich in potassium and also contains some Vitamin C. The ‘first sherbet known was made of snow mixed with pomegranate juice’, according to Peelman (1975: 32). Packer and Tenney (1980: 255) confirm this noting that in the book of the Song of Solomon 8:2 pomegranates are mentioned as wine, but that the juice was also drunk as a cooling beverage. Heaton (1956: 87) mentions that apart from wine made from grapes and dates, ‘the men of Israel also drank pomegranate wine’. According to Westenholz (1998: 36) pomegranate wine was the ‘drink of lovers’ and an ‘intoxicating wine’ was made from the juice. Wight (1953: 54) states that spices were added to the juice of the fruit. Renfrew (1973: 152) says that the juice was ‘used in cooldrinks, conserves, and syrups’. Borowski (1979: 173) notes that ‘the seeds can be eaten fresh’ or ‘dried and stored’ and the juice in the seeds can be squeezed out and ‘drunk fresh, fermented for

wine, or used for syrup.’ Moldenke and Moldenke (1952: 191) note that the soft seeds can be eaten, ‘sprinkled with sugar’, or dried and used as ‘a confectionery’.

There were two kinds of pomegranates - one, the sour juice variety which could be used instead of lemon juice, and the sweet kind which was sought after as a fruit. The fruit has a ‘hard protective rind which contains tannin’ which is used today as an astringent and in the tanning of leather (Berlinger 1969: 38; Packer & Tenney 1980: 255). Moldenke and Moldenke (1952: 191) note that red dye is made from the unripened fruit which is also used in medicine and the tanning of red leather, and the flowers also yield a red dye. Goor (1967: 221) says that the dry husks were used by the children in their games, or ‘as the bowls of scales’. Westenholz (1998: 36) mentions that as there were few trees in Mesopotamia, pomegranate wood was used, and ‘the throne of Adad in Mari’ was made of pomegranate wood. Goor (1967: 219) says that the shade of the pomegranate tree was also an important use.

Vamosh (2007a: 46) lists a number of uses of the pomegranate: ‘in ancient Egypt, a juice was made’ which was considered ‘an aphrodisiac’; wine was made; they were eaten fresh; they were pickled; the rind was used to cure ‘intestinal worms’; the flowers used to make red dye; the ‘yellow inner rind’ was used to stain leather; the branch was ‘used as a skewer for the lamb that was roasted in Jerusalem on Passover’ because it did not burn quickly due to the moisture in it; and, as pomegranates were harvested at the end of summer, they were ‘considered suitable to be brought to the Temple as an offering on the Feast of Tabernacles’, which celebrates the last harvest of the year and according to Goor (1967: 220) pomegranates were hung up in the booths to decorate them. Westenholz (1998: 36) mentions that the peel of the pomegranate was used to make yellow dye. Zohary (1982a: 62) notes that the bark and the rind were once used as an ingredient in the making of ink.

The medicinal use of pomegranates is mentioned here and not in 6.5 below. Krymow (2002: 83) cites Pliny who noted that there were three kinds of pomegranates that grew in Carthage: ‘white, red, and a larger more astringent kind’ which was mainly used in medicine. Pomegranate stem and root bark were mainly used to expel tapeworms (which Vamosh confirms); pomegranates were used for skin problems; and the dried fruit rind or the fruit pulp was a remedy for diarrhoea (van Wyk & Wink 2004: 263). Krymow (2002: 83) notes that an infusion of pomegranate flowers was made into a mouthwash and used to treat sore throats and gingivitis. The fruit contains an oestrogen hormone and anti-tumour agents. Krymow also mentions that the rinds were burned and used to ‘disinfect and fumigate houses and other buildings’. The rind also had ‘powerful anthelmintic properties’ according to Harrison (1966: 27) and this may just be ‘incidental to the astringent nature of

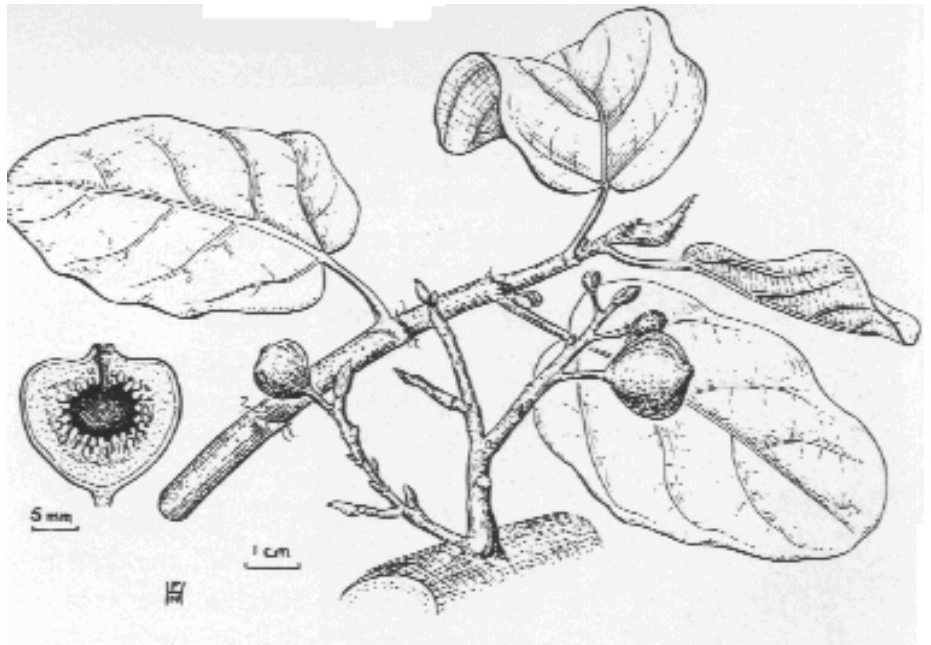
the tannic acid which is found there'. He says that the pomegranate tree and its fruit were regarded in 'Palestinian folklore' as having the power to ward off attacks of demons causing sickness and disease and the tree was thought to be sacred. However, it was for the therapeutic value of its flowers and fruit that the pomegranate was most esteemed. He notes that the blossoms were made into an infusion to treat flatulence in infants, and the fruit was pulped to extract juice which was not only used as a cooldrink but also 'in times of sickness to combat pyrexia'. Goor (1967: 218) notes that the flesh and the peel were used against respiratory ailments and stomach troubles, and the flowers were 'steeped in wine'. This infusion was used to treat dyspepsia. Peelman (1975: 32) says that apothecaries used the fiery red blossoms (known as 'balausts') to make an astringent medication for the treatment of dysentery which was 'an intestinal ailment common in lands with poor sanitation'. Borowski (1979: 173) notes that the 'hard rind was used by the Egyptians to guard against respiratory ailments, stomach trouble and intestinal worms.'

Peelman (1975: 32) mentions that in 'Christian symbolism the pomegranate is a symbol of the power of the Lord burst from the tomb, just as the seeds of the ripe fruit burst out when the skin is broken'. Packer and Tenney (1980: 255) note the fruit has so many seeds that it is a symbol of fertility, which is confirmed by other scholars.

6.1.4.4 Sycomore figs. The fruit was edible and nutritional and was used as food by the poor. In its green unripe state it had to be pierced and wiped with oil for it to become ripe and juicy 'in a matter of days' (Feliks 1981: 59). He maintains that if the figs were not treated, they fell off the tree in 'an unripe state'. However, according to Berlinger (1969: 72), 'in its natural state the fruit does not ripen until it has been pierced and stung by a certain kind of wasp'. Once this has happened and the wasp has laid its eggs inside the fruit, the larvae which begin to grow, make the fruit inedible. Another method was to prick and pierce the fruit with a special sharp knife which would cause the fruit to ripen. This was called 'dressing' the sycomore tree. Dressing was practised up to the time of the Byzantine farmers and until the seventh century CE when the Arabs invaded the country. Feliks (1981: 60) cites Galil who has concluded that while "'dressing" of sycamore fruit' continued in Egypt and Africa, it became 'extinct in Israel'. Apparently 'a parthenocarpic, seedless species of sycamore' was developed 'whose fruit no longer required the treatment' of 'dressing'. This has resulted in a species that 'yields fruit that is not particularly suitable for food' and that in 'Eretz Yisrael' sycomore culture is not important. Hareuveni (1984: 91) explains that 'the embryonic sycomore fruit develops on many trees only at the end of summer, ripening in autumn', unlike figs, which ripen throughout the summer. He confirms that the fruit needed piercing, and for the sycomores growing in the Jericho Valley, this occurred when the shepherds came down with their flocks from Judea and Samaria. This

meant that the shepherds could graze their flocks in the valley while they tended the sycomores. Shewell-Cooper (1977a: 156) mentions that a very hard resin exudes from the trunk and branches of the sycomore, and this resin is used to make varnish 'known as assandarac.'

Leaves and fruit of the sycomore tree



From Beers 2003: *Journey through the Bible*, p. 303.

6.1.4.5 Nuts. The fruit of trees such as walnuts, almonds, and pistachios was used for eating and in cooking. Sometimes the wood of the tree had other uses.

a) Walnuts. The green fruits (the nuts) of the walnut tree are delicious and make a tasty confection of 'royal repast'. Ripe walnuts are tasty to eat and from these nuts an excellent oil is extracted (Berlinger 1969: 62). The nut is encased in a 'heavy green rind' which, if steeped in boiling water, makes a 'good, rich, brown dye'

(<http://www.geocities.com/Athens/Parthenon/3664/index.html>). Zohary (1982a: 64) mentions that walnuts were not only eaten as nuts, but they were used for 'oil, tannin and timber, and wood for the altar fire in the Temple'. Vamosh (2007a: 49) notes that the walnut oil was used for lighting and cooking

b) Almonds. Before the fruit of the wild almond is ripe and is still green, it is edible, but later when the fruit is completely ripe, the fruit is bitter, as it has a high amygdalin content, making the fruit 'totally unpalatable' (Berlinger 1969: 52). However, the fruit of cultivated almonds is sweet and the nuts would have been included in the diet of ancient peoples. Almonds 'are eaten raw or roasted, or are ground for food' (Zohary 1982a: 67). Packer and

Tenney (1980: 473) state that there are two types of almonds: the bitter almond used for its oil and the sweet almond used in desserts.

Vamosh (2007a: 49) mentions that the 'sages around the time of Jesus' spoke of the many uses of almonds: 'a delicious almond paste, a relish, oil', and an excellent ingredient in cooking. She says that bitter almonds could be made sweet by boiling them in water and the husks of the nut were used as fuel.

Berlinger (1969: 52) says that the 'blossoming almond is the symbol of national rejuvenation'. This is possibly because in Numbers 17: 8, we read that when the leaders of the tribes of Israel and Aaron gave their staffs to Moses, who placed them in the Tent of Meeting, there Aaron's rod budded, blossomed and produced almonds. In Genesis 43:11 we are told that Jacob sent his sons to Egypt with a gift of almonds and pistachios, together with honey, herbs and spices, as a gift to the ruler but he did not know that it was Joseph who had risen to power in the land. This indicates that nuts were considered a worthy gift to someone considered influential. According to Walker (1957: 12) the almond was the design on the Maccabees shield. Swenson (1995: 159) says that almond blossoms 'were used as models by the craftsmen-artists', in the wilderness, for ornamenting the golden candlesticks in the tabernacle (Ex.25: 33). Borowski (1979: 189) notes that Iron Age deposits of almonds were found at Beth-Shemesh and says that during this period 'almond wood was used in construction at Tell el-Fûl' as the beams in the second storey of 'Fortress III' were made of almond wood and not cypress or pine.

c) Pistachios. Pistachio nuts are not mentioned in the Bible apart from the verse indicated above. However, pistachios were made into a confection or eaten fresh and used as an accompaniment to meals. Shewell-Cooper (1977a: 153) mentions that the 'people in the East like this nut young and fresh and will not eat it dry.' Moldenke and Moldenke (1952: 180) say that the pistachio kernels are eaten raw, or fried with pepper and salt. They confirm that the kernels 'form a popular dessert' and that they are used as flavouring in cooking and confectionery.

6.1.4.6 Carobs. A tree that was useful to man and beast was the 'carob or locust tree' (Beers 2003: 290). Borowski (1969: 187) and Zohary (1982a: 63) note its botanical name is *Ceratonia siliqua*. According to Walker (1957: 120) carobs are native to the eastern Mediterranean region. Zohary (1982a: 63) maintains that it is 'native to Israel' and 'common in the Coastal Plain and the adjacent foothills, and on the eastern slopes of Galilee and Samaria'. He is surprised the Old Testament does not mention it and that the New Testament only gives a vague hint of it. However, he adds that carobs are mentioned in the Talmud and the Mishnah. Zohary and Moldenke and Moldenke (1952: 72) say the

carob is an evergreen tree, growing to the height of about 15 metres and has pods 16 centimetres long which are very bitter when green, but as they ripen they become darker and a honey-like tasty sweet syrup forms inside. Vamosh (2007a: 47) notes that carobs ripen in the middle of summer. Moldenke and Moldenke (1952: 72) mention that the pods contain a pulp that is used to make candies. According to Vamosh carob trees have roots that get entangled with other trees, so they need to be planted quite a distance from each other. She believes that 'a mountain farm might contain a grove of olives and grapes and a field of wheat or barley, interspersed with carob trees.'

Zohary (1982a: 63) notes that there are flat beans inside the pod that are very nutritious. In Jesus' time the pods were used as food for the pigs and cattle and poor people also ate them because they were cheap (Walker 1957: 120). A mature tree can produce 400 kilograms of husks. Today, the syrup extracted from the beans as a gum is used in the food, textile, and cosmetic industries. Vamosh (2007a: 35, 47) believes that carob fruit could be made into an alcoholic beverage, as over-ripe carobs at the end of summer have a yeasty odour. Once picked the 'pod can be stored and was available year-round in large quantities' and therefore were part of the diet of poor people.

Scholars believe that Syrio-Palestine was probably the region where the carob tree originated and then made its way to Anatolia, 'Greece, Italy, Egypt, and North Africa' (Vamosh 2007a: 47). She notes that carobs are considered to be 'highly nutritional', containing various vitamins. From the gum made of ground carob seed which contains 'the sugar compound known as arabinose', fibre is provided which is 'essential to healthy digestion, by absorbing water and adding bulk to the large intestine'. She also mentions that because carobs were nutritional and easily digested, carob was made into porridge, 'considered a healthy food for the elderly.' Other uses that Vamosh mentions are that the 'leaves contain a high quantity of tannin' and were used in the tanning industry; the green pods produced a golden colour, and 'locust bean gum was also made into a glue'. As the seeds in the pod were 'so similar to each other', they were 'used as a standard weight, the "*gerah*" in Hebrew.' Moldenke and Moldenke (1952: 73) note that as the carob seeds were used as standards of weight, 'they are the source of the term "carat"', which Vamosh says comes from the Greek word *keration*.

6.1.4.7 Vegetables and herbs. Packer and Tenney (1980: 247-248) say that the Hebrews always 'included vegetables in their diet'. They maintain that 'the vegetables were boiled, eaten raw, or mixed with other foods'. The most widely used vegetables were beans and lentils and other vegetables such as leeks, garlic or onions were added to them to make a tasty stew. Dar (*in* Wilkins, Harvey and Dobson 1995: 330-331) points out that 'actual archaeological discoveries of vegetables have been few, and only garlic and onions' have

been found in caves from the time of the Bar Kochba rebellion (132-135 CE), but that the Talmud refers to 'vegetables which were grown and consumed in Roman-Byzantine Palestine'. He maintains that the 'inhabitants of Palestine during ancient times ate lettuce, spinach beets (mangold), kale, radishes, turnips, carrots, artichokes, black cala, leek, onion, garlic, cucumber, melon, watermelon and squash' and apart from these cultivated plants, they also 'ate wild plants' and 'many herbs from the *labiatae* family' such as 'various kinds of marjoram and mint.'

Krymow (2002: 25) mentions that alliums – garlic, leeks and onions, were not only used to add zest to meals, but were, and still are, considered herbs with healing powers and of medicinal use. In their medical papyrus, the Egyptians had more than 'two hundred prescriptions for garlic', said to cure problems such as 'headaches, physical weakness and throat infections.' Moldenke and Moldenke (1952: 32) mention that in medicine garlic was used as 'a digestive stimulant, diuretic and antispasmodic'. Swenson (2003: 54) notes that garlic was considered beneficial for certain ailments – bites, worms, respiratory and heart conditions. The Greeks and Romans considered garlic a symbol of strength and courage and the 'Hebrews believed that garlic increases virility' according to the Talmud. Garlic is still popular today in the Middle East, and with the Jewish people (Swenson 1995: 88). The Talmud gives instructions about the food to be eaten with garlic and as there were more than 60 types of onions and garlic existing in Syrio-Palestine, garlic cloves must have been eaten regularly. According to Vamosh (2007a: 53) the Roman writers and the Mishnah mention that as the Jews ate so much garlic, they were known as 'eaters of garlic'. Borowski (1979: 211) notes that remains of garlic were found in the Cave of the Pool and the caves at Naḥal Mishmar, but there were no remains from the Iron Age. According to Shewell-Cooper (1977a: 106) garlic is cultivated in Israel today and there are varieties of wild garlic growing there too.

In biblical times the white bulb of the leek, together with 'rice, crushed almonds and honey were made into a porridge' (Krymow 2002: 30). She notes that 'leeks and scallions were rubbed with olive oil and grilled.' Leeks were also used in medicine. Swenson (1995: 86) says that although there is disagreement as to which type of leek grew in Syrio-Palestine, it appears that it is the same species that we grow today. Today in the Middle East leeks are added to stew soup and meat dishes, but are also chopped up and eaten in salads. Walker (1957: 56) maintains that onions were a universal food in biblical times but only once are they mentioned in the Bible. Krymow (2002: 32) says that the Egyptians regarded onions as so sacred that the priests were forbidden to eat them. The onion represented the universe to the ancient Egyptians, who also considered it a cure-all. The Israelites made onions such a part of their diet 'that an onion board, bread dough covered with

sautéed onions and poppy seeds and baked, was traditionally served' at the feast 'after the circumcision of a male infant' (Krymow 2002: 33). It was 'bulbs of garlic' and bulb scales of onions that 'were found in the Cave of Treasure in Naḥāl Mishmar near the Dead Sea' which were believed to have been from the 'late Chalcolithic period or Early Bronze Age'. Swenson (1995: 82) says that onions were a staple food in antiquity and were not as 'harsh or bitter' in taste as modern ones, as the onions grown in Egypt, and other parts of the eastern Mediterranean, were 'sweet and mild'. Swenson (1995: 74) notes that in the Mediterranean area and Egypt onions were part of the diet of the poor people especially, and had been eaten 'for centuries before Christ'. Vamosh (2007a: 53) notes that spring onions were indigenous to Syrio-Palestine and when the Crusaders in the Middle Ages found them, they were growing near Ashkelon. They called the plant *escallion* and the name we use today for a spring onion is scallion, which comes from this word.

Swenson (2003: 47) mentions that there is confusion amongst scholars regarding the cucumber, which is thought to be *Cucumis melo* (the muskmelon) or *Citrullus lanatus*, the watermelon. Others believe that the cucumber we have today is *Cucumis sativa* and it is that which grew in Syrio-Palestine in biblical times, as cucumbers are widely grown and eaten throughout the Middle East. According to Peelman (1975: 16) the gourd family consists of the 'melon, cucumber, squash, bottle gourd and pumpkin', all 'herbaceous, tendril-bearing vines'. He believes that the melon was actually the watermelon and grew in the region, as did the cucumber. Swenson (2003: 47) says that cucumbers have been growing in Syrio-Palestine for more than 3000 years. He mentions that they were one food which could be pickled easily with another herb, dill. Cucumbers were known to the Greeks and Romans too as food to be eaten at meals but they were not nutritious as 95 percent of the fruit is composed of water. Vamosh (2007a: 52) says that the cucumber of biblical days was more like our zucchini.

Different kinds of legumes, such as 'lentils, broad beans, chickpeas, peas and lupins', have been found when clay jars in houses have been uncovered. Walker (1957: 34) mentions that beans are widely cultivated in Syria and Egypt today. She says the beans are given to horses and the stalks to camels, but they are a staple food for the people. In antiquity beans were one of the ingredients that was crushed and added to other foods to make wholesome bread.

Sharon and Gilboa (2008: 13) state that large pithoi, of the 'wavy band' and 'collared rim' types, from early Iron Age were discovered at Tel Dor. They believe that these were 'bulky containers' as both types of pithoi contained lentils and that 'pulses have always been an indispensable part of the Mediterranean cuisine'. This is due to the climate which was favourable for these plants which were also easily stored for lengthy periods, like grain.

Pulses are 'richer in protein' than grains and are 'important in low-meat diet[s]'. They maintain that in the archaeological sites of the Bronze and Iron Ages in modern Israel, 'broad-beans, fava beans, lentils, peas and chick-peas have all been found' as has '*lathyrus*' which is a legume thought to be poisonous and 'no longer grown for food.'

Packer and Tenney (1980: 248) state that the Israelites made bread by adding beans to their grain of wheat and barley, lentils, millet and fitches, as indicated in Ezekiel 4:9. Beans were also eaten by the poor people. Shewell-Cooper (1977a: 94) points out that beans were grown as vegetables, but then were dried and used in the winter, or ground and mixed with the flour from the wheat. According to Zohary (1982a: 84) beans were ground and mixed with millet to 'make porridge and purées or a kind of coarse bread'. They were often cooked and eaten whole.

Packer and Tenney (1980: 473) point out that lentils were combined with other ingredients to make bread and they were boiled to make a stew, together with oil and garlic. According to Vamosh (2007a: 54) lentils 'seem to have been the second most important component of diet after grain' for the Jews. This can be deduced from the list of foods to be given to an estranged wife by her husband of which over a kilogram of lentils, considered essential, had to be included. Lentils grow in seed pods and can be eaten fresh, but if they are dried they can be stored or taken on journeys. Red lentils were particularly common. The protein content of lentils is very high, thus a meal made from lentils is nourishing and satisfying, particularly if they are combined with grain. At the time of Jesus a stew was made with lentils and onions were added. Apparently sweets were also made from lentils which were toasted, ground, rolled in honey and fried.

Chickpeas were also a type of legume and were part of a farmer's diet. They grew plentifully and so were food for the poor as well as for animals. Other legumes that were grown were beans, which were 'a type of large, flat, tan-coloured lentil' that had to be ground. The actual type of bean is uncertain as sometimes it was translated as 'horse bean, broad bean, or fava bean' (Vamosh 2007a: 55).

Herbs and spices such as anise, cinnamon, fragrant cane, wormwood or gall, mint and sage grew wild or were grown in Syrio-Palestine (Vamosh 2007a: 74). They were not only used in food dishes, but were also used as perfumes, and 'an indication of wealth'. They were added to the incense burnt in the Temple and they acted as preservatives. Spices and herbs were also used in the healing process, such as cumin, which was thought to stem the flow of blood and some herbs and spices were used in the burial of the dead.

Bay leaves were used as a spice and in ancient times as well as today, this tree grows 'in the hills of Judea and Samaria', over 50 kilometres from the excavation at Ashkelon,

where a bay laurel was found in the Counting House (Weiss & Kislew 2004: 35). Heaton (1956: 85) believes the settlers enjoyed 'strong flavours' as they used the spices, 'coriander and black cummin' instead of pepper, to make their stews of lentils and beans tastier. Cumin adds flavour to bland food and was used particularly during times of fasting when there was drought, famine or plague (Krymow 2002: 172). According to King and Stager (2001: 107) coriander (*gad*) was another herb that was native to Israel, which has a strong aroma and was used in food. It was used as a bitter herb at Passover and its leaves were also used for 'flavouring soups and wines'. Coriander seeds were used to 'season food and vegetables'. Shewell-Cooper (1977a: 98) says that coriander grows naturally in the Jordan Valley and in many other parts of the land. A number of other herbs and spices such as cinnamon, cassia, saffron, cloves, and fennel, were used to season food and also sometimes preserve it, but they were not necessarily grown in Syrio-Palestine.

According to Vamosh (2007a: 83) the people at the time of Jesus had various ways to preserve their food apart from spices and herbs. Olives, onions and other vegetables were pickled, as was fish; olives and fish were salted; and placing food such as 'watermelon, squash, cabbage, and chard' into boiled water with spices would conserve the food for a few days. She notes that the pickling of vegetables used a number of 'special vessels' and that modern day pickling follows the same method: 'sealing the vegetables in a vessel with water, salt, and vinegar.'

Gardens, as we know them today, were not at all common in biblical times and it was only the rich who could afford to have gardens laid out and tended. Hirschfeld and Vamosh (2005: 21-25) describe Ramat Hanadiv, as 'a large country estate occupied during the Herodian period (30 BCE to 70 CE)' by 'a wealthy member of the Herodian elite'. It consists of two sites, Horvet 'Eleq and a smaller site Horvet 'Aqav. When the site at Horvet 'Eleq was excavated, it was found that a garden had been constructed that was watered from the spring nearby by channelling the water flow. Apparently 'exotic plants were cultivated' and 'a garden like this' was known 'as a *paradisos*'. Royal palaces also had gardens as described in the Song of Songs 5:1, where there were many festivities. In later times, the Garden of Gethsemane was a public garden where the inhabitants could go.

Shewell-Cooper (1977a: 20) says that gardens mentioned in the Bible were associated with rich people which is confirmation of the above research. The 'market gardens' of Egypt had furrows between the rows of crops of leeks, melons and cucumbers and it is probable that the Israelites copied the Egyptians in this way. The watering of these gardens was important and Shewell-Cooper notes that in Numbers 24: 6-7 buckets were used to lift water from the river, a system that is still used in some parts of the world.

6.2 Woods and their uses

Rousseau and Arav (1995: 339) maintain that wood, as well as stone and clay, 'was one of the most important materials in Palestine.' They believe that the Palestine of the first century CE was very different from Israel today, as there was plenty of wood in antiquity, but that the Romans, and later the Ottoman Turks razed the forests for their own use. However, wood was widely used in 'buildings, for implements and furnishings, and for a variety of household objects.' Wooden furniture consisted of tables, chairs, stools, benches, chests and beds but many of these items would have been used only by the rich, as the poor did not sleep in beds, although they may have sat around a low wooden table for meals. Other items made of wood were 'carts, wagons, wheels, bowls and other utensils, some tools, and tool handles.' Jesus was known to be a carpenter or *tekton* and was thus a 'construction craftsman' who was able to work with wood as well as brick and stone (Rousseau & Arav 1995: 340). Matthews (1991: 48) mentions that the roof of the house was of great importance to the family. A 'mixture of reeds, branches, and palm leaves' was used as thatching and then covered with earth or bricks. The family used the roof as extra sleeping quarters and was a place where mud bricks, flax stalks and some food crops could dry out. Thompson (1986: 189) mentions that in Syrio-Palestine there was 'a tradition of furniture-making' from patriarchal times as farmers needed carts and wagons which the woodworker would have supplied. He notes that the kinds of woods that were used were indigenous, such as acacia, oak, ash, sycamore in the foothills, 'olive everywhere', some cypress and cedar in the north, but 'few of these trees yielded long timbers' so plentiful supplies of 'cypress, cedar and almug wood' had to be imported from 'Lebanon and Ophir'.

A boat from the first century CE was found in the mud of the Sea of Galilee at Ginnosar and a number of species of local wood was identified: Aleppo pine (*Pinus Halepensis*) a common tree in the land; Jujube or Christ's thorn (*Ziziphus Spina-Christi*) which is found in Galilee and the Jordan Valley; and *Quercus Libani* or *Quercus Ithaburensis*, the latter 'was common in the forests of the Dan Valley, Hula Plain, Upper Jordan Valley, Central Galilee, Samaria, and Gilead' (Rousseau & Arav 1995: 340).

6.2.1 Oak trees. Swenson (1995: 170) notes that 'botanists and biblical scholars' identify four types of oaks that must have grown in biblical times. These are the *Quercus ilex*, *Quercus macrolepis*, *Quercus coccifera*, and *Quercus lusitanica* and are the most likely species, although other oaks have been brought to the land. He mentions that their 'tight grain and dense wood' were valued in 'construction and furniture building'. Swenson says that although oaks were reliable for building, they were not as popular as cedar. Oak wood was also used in boat construction, as was the case with the 'Galilee boat', although this

was identified as *Quercus libani* or *Quercus ithaburensis*. Rousseau and Arav (1995: 340) mention that oak 'gave a high-density durable wood' and the trees grew all over Galilee and other parts of Palestine. According to Shewell-Cooper (1977b: 149) the area east of the Jordan River was 'celebrated for its great oaks.' Peelman (1975:26) seems to confirm this, as he says in ancient times the hills in Bashan were covered with forests of oak trees. Zohary (1982a: 108) notes that the common evergreen oak and the Tabor oak (*Quercus ithaburensis*) do not form forests today but that forests of Tabor oaks did grow along the 'Coastal Plain (north of the Yarkon River), the Lower Galilee, the Dan Valley, the Hulah Plain and the Golan Heights' and this is confirmed by King and Stager (2001: 108). They mention that 'along the central Coastal Plain' mainly the 'evergreen or Kermes oak' grew as well as some Tabor oak.

According to Zohary (1982a: 108-109) the Tabor oak grows to a height of 25 metres and has a crown of 20 metres in circumference. These trees can attain an age of between 300 and 500 years. Tabor oaks require winters that are warmer and do not grow on mountains above 500 metres, preferring to grow in 'lower altitudes, plains, and valleys.' The tree can grow in 'sandy and basaltic soils, chalky *rendzina*, *terra rossa* and even deep alluvial ground.' The common oak is considered to be a shrub, but it does occasionally grow tall with its trunk circumference reaching between one and three metres. Both 'species have vertical roots that spread several metres deep, and horizontal roots that spread several metres near or below the surface.'

King and Stager (2001: 108) mention that oak wood was used for tools and weapons. Oak trees were also used in the making of 'furniture, tools, agricultural implements, carts and boats' (Rousseau & Arav 1995: 339). Peelman (1975:26) mentions that 'boat oars, buildings, and carvings were made from the wood of the oak tree'. Oak trees growing in a clump were objects of worship, as people brought idols there, believing that it was sacred to a god or to some spirits, or they may even have worshipped it because of its 'great strength' or 'longevity'. Zohary (1982a: 108) confirms this saying that oak trees 'were associated with worship, offerings and other ritual and religious customs' and were 'burial sites for the honoured dead'.

Oaks also had another use, as 'tiny scale-like insects' infested young oak trees. People versed in the art of producing dyes used the insects to make scarlet dye which is sometimes mentioned in the Bible. For example, in Genesis 38: 28, 30 the midwife tied a scarlet thread to the wrist of Zerah, one of Tamar's twins when the Israelites were living in Egypt. In the wilderness Moses told the people that the Lord had instructed him to collect, among other colours, scarlet yarn from the people and then to make the curtain of the tabernacle of with it, as well as blue and purple yarn (Ex 25: 4; 26:1).

According to Peelman (1975: 26) the acorns of the oak tree were used to provide food for the pigs and poor people also ate acorns during times of famine. Acorns were also used to make 'a strong black dye which was valuable commercially'. Tannin was obtained from the bark of the tree and this was used to treat the animal hides to make leather. It was also used in the preparation of dye and in medicine.

6.2.2 Sycamore trees. According to Feliks (1981: 30, 58) 'in the rocky regions of the country' there were woods with trees that were felled for building material, and firewood was foraged. Among these trees was the sycamore which 'was the principal tree for building' as it was suitable for the 'construction of roofs in houses'. The timber was light, porous, long-lasting and strong and provided straight logs for building 'every few years', when it was suitably tended and lopped.

Feliks (1981: 58) mentions that the sycamore tree 'has great vitality and properties for renewal' after lopping, which Hareuveni (1984: 89) confirms by noting that the 'speedy regeneration of the sycamore' was helpful to the Israelites in their building needs. They would cut down a 'virgin' tree which after a few years would grow a 'good-sized trunk'. From the stump that had been left, many new branches would grow. The Israelites used these for the building and the tree would grow more branches from the cut tree and this was considered agricultural work 'and forbidden during the sabbatical year' by the rabbis. The Israelites 'used the sycamore limbs only after the tree had a chance to grow for a minimum of six years,' allowing the tree to regenerate until it reached the size of the earlier cuttings. He points out that when comparing the wood of cedar and sycomores, the cedar is tall and strong, but the sycamore never reaches the height that cedars do and cedars were considered far more prestigious to use. He says therefore, that Solomon chose cedar wood for his palace and the temple because he wanted to show off to the other nations. However, according to Moldenke and Moldenke (1952: 108) David valued sycamore trees so highly that he appointed an overseer over them, as he did for the olives (1 Chr 27: 28).

Hareuveni (1984: 89) describes the wood as long-lasting and easy to work, so the Egyptians used the wood to make their coffins. In the Iron Age, the rich people of Syrio-Palestine imported cedars and junipers from Lebanon for their buildings and furniture, but the poor made use of the sycomores which they planted for their timber and their fruit. Straight logs were required for rafters in homes, but in palaces and large buildings longer and stronger beams were required and thus Lebanese cedar was used and not the porous sycamore wood (Feliks 1981: 30, 58). Berlinger (1969: 72) notes that by sawing off unnecessary growths from the twisted and gnarled trunk it made the tree more 'robust and erect' and it was possible to obtain straight beams which were 'a cheap source of building material and used by the common people'.

The wood was used to make doors and latticed windows (Wight 1953: 25). It was also used 'for temples and auditoriums' (<http://www.geocities.com/angiewf/sycomore.html>). The tree also provided shade in the hot climate (Moldenke and Moldenke 1952: 107).

6.2.3 Olive wood. The wood of the olive tree is 'close-grained and has a yellow tint' (Wight 1953: 200). It was used for woodcarvings and inserts for cabinet work but the wood was not useful for building as the branches were twisted and not straight enough for beams. Goor (1966b: 226) refutes this by saying that olive wood was especially used for rafters in building. It was used for statues and for panelling (King & Stager 2001: 98). Wight (1953: 200) states that King Solomon had the inner and outer doors of the sanctuary and the cherubim of the Temple made of olive wood as described in 1 Kings 6: 23, 31, 33. Zohary (1982a: 56) notes that olive wood is 'richly grained' but because of the 'trunk's hollowness', it was unsuited for making furniture. Swenson (1995: 137-138) confirms that olive wood was popular with the 'craftsmen of Biblical days'. Gower (1987: 39) mentions that the houses of the wealthy had cedar doors and bars to bolt the door. Westenholz (1998: 39) says that olive wood was used 'in religious ceremonies and in the production of religious furniture' as well as being made into toys and used for tools in the building of houses.

Haureveni (1984: 83-84) says that the offshoots growing from the roots and the trunk of the olive tree were sometimes cut out of the trunk with the 'thickened growth at the point of attachment'. This was smoothed and made into a shepherd's staff which he could then use as a weapon or as a tool to direct his flock. He would throw the staff ahead of the sheep and goats and it always landed on its head which was the heaviest part. Westenholz (1998: 39) mentions that 'the leaves were collected either green or dried', the green leaves to feed livestock and the dried leaves to be used as fuel. Goor (1966b: 226) notes that the dried leaves were used as a kind of paper for writing. Vamosh (2007a: 38) notes that from the inner branches of the olive tree baskets were woven. Westenholz (1998: 39) confirms this and says that the branches were 'a popular material with basket-makers and as thatch for the booths of the Feast of Tabernacles' (Neh 8: 15). Goor (1966b: 226) notes that olive branches were woven into garlands for young girls as the branches are straight and easy to plait. Shewell-Cooper (1977a: 59) points out that an olive orchard provides excellent shade, which would have been most welcome for the workers in the heat of the day.

Goor (1966b: 226) mentions that the felling of olive trees was banned unless they were very old, or decayed. Olive wood was prohibited from being used as fuel on the Temple altar according to the Mishnah, but it was permitted to use old, dried olive wood for ordinary firewood. Old olive trees were allowed to be cut off at ground level, but the roots were not to be touched so that the tree could continue to produce suckers and could regenerate itself.

6.2.4 Acacia trees. Acacia trees grew in the desert areas (Rousseau & Arav 1995: 340). It is thought that when the Bible speaks of *shittah* or *shittim* wood, it is actually acacia wood that was used (Swenson 1995: 156). He says that botanically there is no shittah tree, but there are four species of acacia growing in Syrio-Palestine. The Bible mentions the town of Shittim (Nm 25:1), and in several other places, and Swenson (1995: 157) suggests that *shittah* or acacia trees must have been growing there, as often this is how a place is described. He says that it seems that it is the *shittah* tree that grows *shittim* wood.

Swenson (1995: 156) says that it appears that the acacia was the only tree of any great size growing in the desert as they can survive in arid and barren land, even managing to flourish in it, because they are drought-resistant. They grow mostly along wadis as they do need some water during the year, and when there are flash floods the water rushes down these dry riverbeds providing moisture for the trees. Acacia trees grow in abundance from the Dead Sea area southwards. The two species that are to be found in the Sinai are *Acacia seyal* and *Acacia tortilis*. Zohary (1982a: 116) mentions that there are four species of acacia which are native to the region but that the common acacia, *Acacia raddiana* would have been the most suitable to use for building.

The tree grows to about 6 metres in height but are more often wind-blown and shrubby, having strong white thorns growing in pairs on the branches. The leaves are fine, feathery and bi-compound, the flowers are yellow and borne in small groups, and the fruit is 'a slightly curved pod' (Swenson 1995: 156). He also says that although these trees grow rapidly, their lifespan is about twenty to thirty years. Zohary (1982a: 116) notes that the main flowering season is in spring and there is another season in summer.

According to Swenson (1995: 156) the wood, like oak above, was used to make furniture. It is hard and was an ideal wood to use for building the Tabernacle poles (Ex 25: 5). It was also used to make the Ark and its poles, and the table and its poles (Ex 25: 10, 13, 23, 28). The altar of incense also had to be made of acacia wood (Ex 37: 25). Apparently the ancient Egyptians used this hard wood to clamp shut their mummy coffins made of sycamore wood. Today the 'fine-grained wood' is used in cabinet-making (Swenson 1995: 157).

Moldenke and Moldenke (1952: 24) note that the Arabs collect the leaves and flowers for food for their cattle and Swenson (1995: 157) confirms this, saying that the acacia tree provided food for the herds and wood for fires for the herdsman. It was also used to obtain brownish gum, known as gum arabic, for trade, by tapping its bark, thus increasing its value to the people (Swenson 1995: 157). However, Moldenke and Moldenke (1952: 25) mention that it is uncertain whether 'the ancient Hebrews were acquainted with this

substance and its uses.’ Swenson mentions another use of acacia wood, which was not as important but was still a useful product, and that was excellent charcoal. This was obtained by burning the wood, which as it was hard and densely grained, produced charcoal that was of value.

6.2.5 Cedar Wood. This wood was imported from Lebanon (*Cedrus libani*) where the trees grew on the western slopes of the mountains (Shewell-Cooper 1977b: 134). Walker (1957: 50) says that cedars (*Juniperus oxycedrus*) were native to Syria as well as the plains of Galilee and Gilead. Swenson (1995: 161) said that at one time ‘the mountains of Lebanon and other parts of Palestine were covered’ with cedar trees. He describes the trees as being about 30 metres high and over two metres in diameter. Zohary (1982a: 105) says that cedars can reach ‘an age of two or three thousand years.’ Unfortunately, cedar trees were cut down and the forests burned by the armies that attacked the land, so the forests have been depleted. Moldenke and Moldenke (1952: 68) cite Smith as saying that the valley of the Kedisha River in the Lebanon range was where cedars still grow but Zohary (1982a: 104) says that there are still some small forests of cedars in Lebanon and the Cilician Taurus. King and Stager (2001: 111) note that there are remnants of cedar trees at sites such as ‘Tel Aphek, Tel Gerisa, Jerusalem, and Lachish’ as well as at some sites in the Negeb.

Cedar wood is known to be a very firm wood. It is also ‘an aromatic wood with a definite scent and taste’. It is a good tree to use as insects do not attack it, so it is free from woodworm, it is not affected by dry rot or wet rot, as it can withstand the forces of nature (Shewell-Cooper 1977b: 134). Zohary (1982a: 104) mentions that ‘the Egyptians imported cedar wood for buildings, ships, thrones, altars, etc.’ for ‘its superior quality, fragrance and durability’. Shewell-Cooper (1977a: 135) notes that the Egyptians also used cedar wood for the coffins for their mummies. It was cedar wood that was used in the building of Solomon’s temple in Jerusalem. We read that Solomon sent a request to Hiram, King of Tyre, for the cedar wood for the temple (2 Ch 2: 3, 8-9). According to King and Stager (2001: 111) there appears to have been a timber trade in Iron Age II between ‘Phoenicia (Lebanon) and Israel’ which indicates Israel had a measure of ‘administrative sophistication’ at that time. Shewell-Cooper (1977a: 135) mentions that more cedars were cut down in the time of Ezra, when Cyrus, the Persian king, gave permission for the temple to be rebuilt.

Cedar was ‘in great demand in the days of the Bible’ because the trees produced much timber, the wood was aromatic and was enduring in quality as it was resistant to decay and rot (Swenson 1995: 161). He mentions that chariots were made of cedar wood and quotes the Song of Solomon 3: 9 where Solomon made himself a chariot of the wood of

Lebanon. Berlinger (1969: 54) notes that oil and resin from the tree was used for embalming the dead. King and Stager (2001: 110) say that the resin and oil were used in perfume. Moldenke and Moldenke (1952: 69) suggest that the masts of ships in Tyre could have been made of cedar.

In scripture the cedar was extolled, as in the Song of Solomon 5: 15 it says: 'his appearance is like Lebanon choice as its cedars'. In Amos 2:9 the cedar is used symbolically to emphasise their majesty, as the Amorite the Lord destroyed is mentioned as being 'as tall as the cedars and strong as the oak'.

6.3 Clothing and other uses of flax

According to Berlinger (1969: 78), 'in ancient times woven cloth was usually named after the raw materials used, the system followed in making the cloth and the colour which was chosen for the cloth itself.' Rousseau and Arav (1995: 314-315) believe that the 'loom weights, spindle whorls, dye vats, and other artefacts of textile production found in Palestine' were used in wool processing and not in the making of linen. Matthews (1991: 117) points out that wool garments were difficult to wash, and as they were often drenched with perspiration and 'soiled with food and dirt on the sleeves', this resulted in skin infections and 'bacterially based diseases' were transmitted. Linen was easier to wash and keep clean, and by being a lighter material did not cause so much sweating. Although the rich dressed more often in linen clothing, some items of clothing were made of 'linen, gauze or silk', such as 'sashes, mantles, and girdles to tie "undergarments' (Matthews 1991: 120). King and Stager (2001: 147) point out the 'biblical law code in Leviticus 19:19 and Deuteronomy 22: 9-11' prohibited the mixing of two fibres, such as wool and linen, as well as prohibiting ploughing with an ox and a donkey.

Berlinger (1969: 78) says that 'the art of weaving linen was a common practice in ancient Israel.' Spinning and weaving were women's work and were done at home while caring for the children (King & Stager 2001: 152). They mention that flax was the easiest fibre to spin but first the stems of the flax plant had to be treated. Spinning entailed 'pulling out the fibres lengthwise, and twisting' which resulted in 'making the threads continuous for weaving. When weaving cloth, spun thread was used, but when mats or baskets were made, unspun fibres were woven.

Peelman (1975: 12) describes the method of spinning the flax by the 'spinsters'. A spinster would use a distaff and spindle. She 'gathered the mass of fibre on a distaff or between her left arm and her body' and 'using her fingers she twisted tufts of fibre into a thread which was wound onto a spindle'. King and Stager (2001: 152) describe the art of spinning: the distaff, which is a large stick holding the unspun flax on its cleft end and from

this unspun fibre, thread is drawn. The spindle is held in the hand and is the rotating rod onto which the fibres are 'twisted to form thread and are then wound.' Sometimes the spindle is weighted using 'spindle whorls' which have been discovered in many parts of the land. For example, in the Jezreel Valley, at 'Ein el-Jarba, Neolithic spindle whorls have been excavated, and it was known that in Jericho thread was spun at that time (King & Stager 2001: 153). Peelman maintains that it was 'the women of the family' who did the weaving, but later 'guilds were organised in cities and the weaving and dyeing was done by craftsmen.'

Weaving is the 'interlacing of a series of spun threads or yarns'. The vertical threads are called the warp, and the horizontal threads are called the woof or weft. They 'cross at right angles to form a textile.' First the warp threads are stretched over a loom and then the weft threads are passed over and under them with a shuttle. Many looms have been found in excavations. The weaver uses a 'heddle rod' or weaver's beam which are 'parallel wires in a loom used to separate and guide the warp threads and raise and lower them in weaving' (King & Stager 2001: 153).

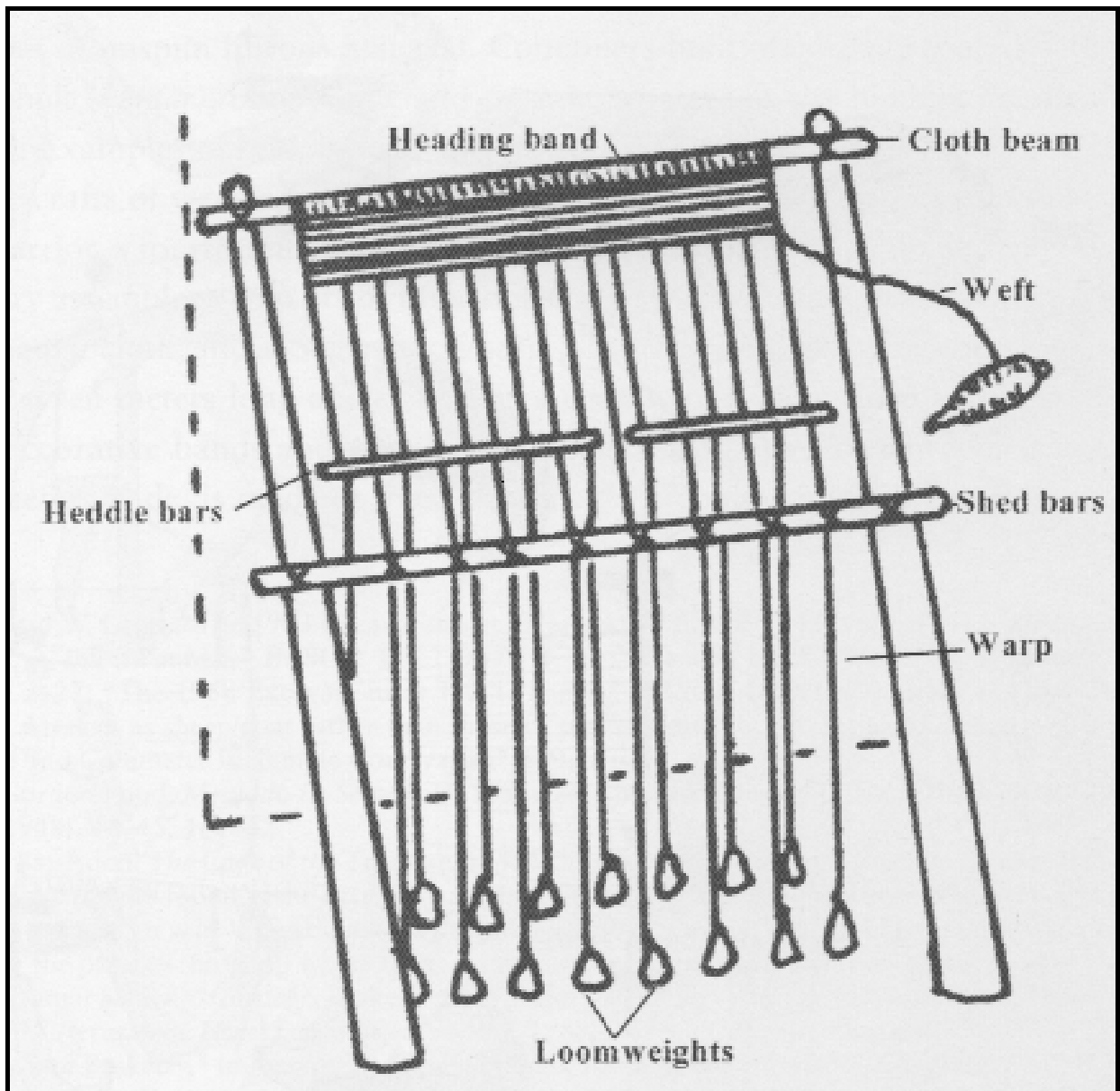
According to Botha (2000:10) the linen was bleached before being woven. This was done by putting the yarn in bowls and fulling it by cleaning the cloth to get rid of the oil, dirt and other impurities and then thickening it. There are two processes in fulling: scouring (cleaning) and milling (thickening). Then the cloth needs to be stretched. Fulling was a time-consuming process in which 'clay was mixed with soda or alkalines gained from the ashes of certain plants', or from human and animal urine. Pliny the Elder, noted that the wealthy seemed to wear bleached linen clothes, fibre having been wet, rubbed with natron, spread on a stone and beaten with a wooden club. After that it was rinsed and left to bleach in the hot sun. Apparently the Romans used 'sulphuric fumes' to bleach the linen, possibly having learnt it from the Egyptians (<http://nefertiti.iwebland.com/trades/dyeing.htm>).

Usually the thread was spun in its natural colour which was yellowish or different shades of brown, but sometimes it was 'dyed before being woven into linen' (Peelman 1975: 12). Linen was not usually dyed except that some threads were coloured 'blue for decorative purposes.' Botha (2000: 11) notes that most people could not afford to buy dyed or bleached material which was more costly than the natural colour. Dyes were of different colours and shades and he notes that 'green and red were used fairly often' but that other colours were 'yellow, blue and dark red.' The original colour of the thread would result in different shades of the same dye, as for example, 'blue dye would give green' or various shades of it if used on yellowish thread, 'red dyes would give orange or dark red' or other shades of it. Plant dyes were used most often, Botha noting that green dye was made from 'unripe dates, yellow and red from pomegranates', and crimson was made from a beetle

living in the bark of oak trees. To make blue dyes the 'indigo plant and the whortleberry' were used. According to Peelman (1975: 12) 'madder from the roots of *rubia tinctorium*, a perennial vine that grows in the Near East', made 'a cheap red dye', and purple was made from molluscs, the *murex*. Botha (2000: 11) mentions that 'purple and blue were highly desirable colours.' Berlinger (1969: 78) says that light blue (*tchelet*) and purple (*argamon*) were woollen weaves usually, but that it may be that 'dyed linen weaves were given the same name.' King and Stager (2001: 159) mention that colours were a 'mark of a person's status', so 'dyeing was a major industry'. They note that the simplest method was to just put the cloth in a dye bath and immerse it. According to Botha the dye was prepared and then the yarn was soaked in the mixtures. Thereafter 'large round stones were used to properly beat the dyes into the material', but the colours were not waterproof and did not last.

King and Stager (2001: 153) describe two kinds of looms, 'the horizontal and the vertical' mentioning that the 'horizontal ground loom was more prevalent'. Vamosh (2007b: 52) describes the most common loom used as being the standing loom 'with the warp stretched between an upper and a lower beam, or with loom weights stretching the warp'. King and Stager (2001: 154) describe the vertical loom as being a wooden frame with two vertical beams and a horizontal beam. The warp is stretched from the horizontal beam by loom weights. Loom weights have been excavated and from their position on the ground it seems that vertical looms were sometimes situated close to walls. One of the sites excavated was at Timnah (Tel Batash), and other Iron Age sites were also excavated where many loom weights have been discovered in the houses, indicating that weaving must have been an important home craft and that there must have been many weavers. Weaving was started at the top of the garment. It is thought that the undergarment worn was made of linen, but it seems that 'pure linen garments' were the prerogative of the rich, as they were costly.

Diagram 6: Sketch showing parts of a warp-weighted loom



From King and Stager 2001: *Life in Biblical Israel*, p. 155.

Peelman (1975: 12) notes that linen was not only used to make clothing, but also 'burial shrouds, swaddling, wrapping, curtains and canopies.' King and Stager (2001: 157) note that in the 'Cave of the Warrior, a fourth-millennium burial site in the Judean Desert, in the Jericho area,' a shroud or 'wrapping sheet' woven from linen yarn and a 'sash' made of linen threads were found. They question whether the 'irrigated flax grown around Jericho may be the source from which these beautiful textiles were woven.' Wight (1953: 28) comments that the flax that was woven into linen was used to make the turbans that the people wore to protect themselves against the sun, apart from other garments, such as the inner tunic.

Flax was grown in Palestine for the production of 'fine linen' with which the priests' garments were made (Rousseau and Arav 1995: 314). King and Stager (2001: 150) note that there were 'several kinds and qualities of linen' – the finest worn 'by royalty and religious personnel' (Gn 41: 42; Es 8: 15; Rv 19: 8) and used in the Tabernacle (Ex 25: 4-9; 35: 25). Berlinger (1969: 78) says that the vestment of Aaron, the High Priest, was made of 'fine, thin, multiple, interwoven flax cord' (Ex 28: 3-8). Shewell-Cooper (1977b:171) also believes that there were several types of linen, as in Ezekiel 9:2 and Daniel 10:5 coarse linen is mentioned, and in Exodus 26: 1 finer linen is mentioned. Linen was the most costly and special fabric, wool was the most common. Linen clothing was lighter than that made of wool and Berlinger believes that the wearer of a linen garment, such as the High Priest, would 'suffer less from perspiration', 'keep greater body cleanliness' and therefore be 'more in keeping with the sanctity of the Temple area' (Ezk 44: 18). The sacred linen garments, the vestments of the high priest such as the ephod, the tunic and the turban, were probably made of ordinary linen which had to be pure white (Lv 16: 23, 32) (King & Stager 2001: 150). They also note that the priests wore linen clothes 'including linen underwear'. It was usually 'the wealthy and the elite' who wore linen clothes as they were very expensive.

There appears to have been a textile manufacturing industry at Kintullet 'Ajrud, in the northern Sinai, where there was a fortress and caravanserai, as excavations have uncovered textile remains. There were pieces of linen fabric and woollen fabric, 'flax fibres, spun yarn and twisted thread' and contrary to the law against mixing fabrics of linen and wool, some remains show a mix of wool and linen, where woollen threads dyed red and linen threads of light blue were woven together. This is an indication that Kintullet 'Ajrud was a cultic place as weaving was sometimes done at cultic places (2 Ki 23:7) (King & Stager 2001: 151).

Wight (1953: 28) mentions that strands of flax were twisted and made into wicks and placed in the shallow cup of the olive oil lamp. When the oil began to be used up it gave off a most unpleasant smell, which indicated that it was time to replenish the oil. When the wick was well worn, the housewife knew that it was time to put in a new wick. According to King and Stager (2001: 150) it was the broken fibres that were used to make wicks. Flax was also woven into rope and made into measuring lines. They also note that linen was used to wrap scrolls, as the scrolls in Cave I at Qumran 'contained a large number of linen fragments, some used to encase the scrolls' (King & Stager 2001: 152).

Packer and Tenney (1980: 259) point out that today 'linseed oil is extracted from flax seeds', but they are uncertain whether in 'Bible times' this was done. Zohary (1982a: 78) says that in biblical times flax was grown exclusively for fibre to make linen but that today it

is grown for its seeds as well. King and Stager (2001: 149) say that flax was grown in 'Neolithic Jericho for oil and probably also for linen'. They say that flax was cultivated for its fibre to be made into 'linen yarn and fabric' and its seeds were 'the raw material for linseed oil'. In fact, according to King and Stager (2001: 149) 'flax was the leading source of oil before the olive was domesticated'. According to van Wyk and Wink (2004: 193) the ripe dried seeds are used whole or crushed as a laxative to treat chronic constipation. They are a treatment for 'irritable colon, spasmodic colitis and diverticulitis'; 'the mucilage', or sticky substance, is 'beneficial for gastritis and enteritis'; and for local inflammations the seeds or seed flour can be used externally. Linseeds are taken to lower cholesterol and triglyceride. de Herrera (2006: 74) maintains that flax is used medicinally as it is 'hot and humid, and relieves a cough if boiled in water and eaten with honey' but it does cause flatulence. Flax can be 'spread on abscesses and lumps' to reduce the swelling. Clothes made from linen that have become worn can be used as bandages to dress wounds and he says that linen 'when cut into pieces, cleaned, and bleached white' can be 'used to make paper as well.'

Beers (2003: 123) mentions that flax and reeds were used as rulers by the carpenters of Hiram, the King of Tyre, when they were sent to build King David's palace. Renfrew (1973: 124) says that the Romans made porridge using flax. 'They pounded the seed in a mortar and mixed it with barley grains, coriander seed and salt.' Another use of the flax plant was that the oil found in the roots was squeezed out and added to cattle feed

(<http://www.geocities.com/Athens/Parthenon/3664/flax.html>). The Egyptians made boat sails and mummy wrappings from flax woven into linen (Peelman 1975: 12).

As little flax was grown in Palestine, not much was exported and it appears that 'international buyers had to find additional supplies of linen in Tyre, Byblos and Beirut' (Rousseau & Arav 1995: 314). However, King and Stager (2001: 150) mention that 'linen production was a prominent industry in ancient Palestine' as in I Chronicles 4: 21, the 'linen workers in Beth Ashbea' are mentioned, which King and Stager say refers to the 'families of the linen factory'.

6.4 Perfumes, ointments and cosmetics

According to Rousseau and Arav (1995: 216) in ancient Mesopotamia and Egypt 'the use of ointments, cosmetics, and perfumes is attested in religious rituals, magic, and medicine as well as in the secular domain.' They note that 'the art of making cosmetics, ointments, and perfumes became elaborate and developed into a thriving international trade.' Various countries produced the products required for the industry, as for example, Arabia produced frankincense from gum storax as well as myrrh, cassia, cinnamon and laudanum. They

mention that Pliny 'deplored the abuse of perfume' which he maintained was an expensive luxury, lost its scent quickly, and was only used by women to attract others.

Rousseau and Arav (1995: 218) note that 'a number of spices and aromatic plants were used in the preparation of ointments' and perfumes, and they include the following: '*Aloe* (Hebrew *ohalim* or *ohaloth*)' which came 'from India and Malaya'; '*Balsam* (Hebrew *bassam*)' was a resin which came 'from the opobalsamum tree growing near Mecca', and in the 'Second Temple time large balsam plantations around Jericho and En-gedi'; '*Cassia* (Hebrew *gidida* or *gesioth*)' which 'was also known as cinnamon-cassia' and came from China; '*Cinnamon* (Hebrew *ginnemon*)' which came from Ceylon; '*Galbanum* (Hebrew *helbenah*)' also used in medicines; '*Henna* (Hebrew *kofer*)' which grew in Palestine and is still used to dye hair and nails, but was also used as a medicine; '*Frankincense* (Hebrew *lebonah*)' from the trees 'grown in India, Arabia, and Somalia'; '*Kalamos* (Hebrew *kaneh*)' an aromatic cane which grew in 'India and also in the northern Jordan Valley between Lake Huleh and the Sea of Galilee'; '*Myrrh* (Hebrew *mor*)' which is 'the sap of a small tree growing in Arabia and Africa', and 'sold either in liquid or solidified form'; '*Nard* (Hebrew *nerd*)' was an expensive perfume 'extracted from two types of plants: *nadala*, from the Himalayas and Nepal, imported through India and Persia, and *spike*', hence the word 'spikenard'. Beers (2003: 313) says that cheaper varieties of nard came from other countries and describes it as 'a fragrant ointment made from the shaggy roots and lower stems' of the plant, and 'used to anoint royalty' and as such could be symbolic in the story of Mary and her alabaster jar mentioned below (Mk 14: 3). The valuable oil extracted from the roots is strongly aromatic and is used in making perfume (Moldenke and Moldenke 1952: 148).

6.4.1 Perfumes, oils and ointments. King and Stager (2001: 280) mention that perfume was used 'in religious ritual, burial preparation, personal grooming, healing, and a variety of other circumstances.' Oil was used as a blender to produce the perfume – olive oil in Syrio-Palestine, and sesame oil in Mesopotamia. They note that both men and women wore perfume, rich and poor. Perfume was used to mask unpleasant smells, and scented oils also protected the skin from the ravages of wind, heat and sun. Perfumes were expensive as only natural materials were used and 'the process of extracting the product from the plant' took a long time and then only small amounts of perfume were produced. They mention that because the perfume was so expensive only small containers were used, such as 'juglets and pyxides'. Many of the ingredients for the perfumes were imported so this added to the expense, although 'henna, saffron, balm and laudanum, were indigenous to Palestine'. Matthews (1991: 122) mentions that there were various types of perfume which were used to 'mask household odours' as well as being used in

shrines and temples as incense offerings. He says that 'spikenard, taken from the root of gingergrass' from Arabia, myrrh, and 'saffron extracted from crocus, and turmeric' were among the scents.

Henna is mentioned only once in the Bible and that is in the Song of Solomon 1:14 where he says that 'My lover is to me a cluster of henna blossoms from the vineyards of En Gedi'. The whitish blossoms are fragrant and were 'offered in bouquets in Indian temples'. According to Moldenke and Moldenke (1952: 125) large bouquets of the blossoms are taken to the baths of girls in the East and they 'consider a nosegay of henna one of the most elegant gifts that can be received from a friend.' Berlinger (1969: 60) describes how Arab women place bunches of flowers in their bath water 'because of its strong, pleasant odour which they believe is attractive to their menfolk'. The fragrant essential oil called *mehendi* is distilled from the blossoms and used as a perfume (Zohary 1982a: 190).

King and Stager (2001: 280) say that 'aromatic oil from sweet cane was used in the holy anointing oil and in perfume'. Rousseau and Arav (1995: 217) mention that 'oils were the vehicles through which scents were obtained and kept' and there were a number of plants and spices used in this production such as the oils from 'unripe olives (*omphacium*), the seeds of grapes harvested in mid-summer, sweet almonds, cypress and alanos, light petroleum, reeds, balsam, lupine, narcissus' and other plants. Beers (2003: 159) mentions that 'perfumes included frankincense and myrrh from Arabia and Africa, stacte and saffron from Palestine, and aloes and nard from India'. King and Stager (2001: 281) mention that great skill was needed to mix the holy anointing oil which was made up of myrrh, cinnamon, sweet cane and cassia (Ex 30: 23-25). The holy incense consisted of a blend of 'stacte, onycha, galbanum and frankincense.' The perfumer had to blend the ingredients for the perfumed ointments and various procedures were undertaken so that the odourless 'fats and oils absorbed the fragrance, or essence, pressed from fresh flowers.'

The Bible mentions the practice of anointing for kings (1 Sm 10:1; 16:13), prophets (1 Ki 19: 16), priests (Ex 30:30), the Tabernacle (Ex 30: 26-29), the heads and feet of honoured guests (Lk 7: 46), the dead were anointed before burial (Mk 14: 8; 16: 1), and anointing was a sign of rejoicing (Is 61:3). The Talmud writes of oil made from olives picked early and to be used cosmetically, men anointed their heads and beards with oil (Ps 133:2; 141:5) and according to the book of Esther 2:12, young girls received six months of beauty treatment 'with oil enriched with myrrh' before going in to the king (Frankel 1999: 44). He also notes that olives 'not yet a third ripe' were used by women to rub into their skin to remove the hair and rejuvenate the skin. Mention is also made of ointments 'used as cosmetics to alleviate the dryness of the skin or after bathing' (2 Sm 12: 20), or 'to prepare oneself before an amorous encounter' (Es 2: 12) (Rousseau & Arav 1995: 217). Vamosh

(2007a: 59) says that before the wedding, a couple 'were anointed with aromatic oils and dressed in their finest clothes'. We also learn from the Bible that the perfume and ointment containers and jars were tightly sealed so that the scent did not escape from the opening, as in the story of Mary having to break the neck of the alabaster jar in order to anoint Jesus with the expensive perfume (Mk 14: 3).

Rousseau and Arav (1995: 218) point out that 'sacral ointment contained only four species' which were 'mixed in specified proportions with olive oil: myrrh, cinnamon, kalomos and cassia' and were to be blended by a perfumer (Ex 30: 23-25). 'Sacral incense' also had to be blended by a perfumer (Ex 30: 34) and was made by mixing in equal parts of the resins 'stacte, onycha, galbanum, and frankincense', with salt. It would have been both expensive and rare and only a small quantity, 'not more than a pinch, would be used in each censer' as 'incense is vaporised not burnt' (Lloyd Davies & Lloyd Davies 1991: 44). Beers (2003: 207) states that in the Bible, frankincense is 'almost always associated with worship' (Lv 2:1-16; Ex 30: 34-38) and in the Song of Songs is mentioned as a 'perfume of love' (Can 3: 6; 4: 6, 14). Myrrh, however, was associated with suffering, such as the offering of myrrh and vinegar to Jesus on the cross (Mk 15: 23) and Beers points out that 'the process of obtaining myrrh suggests suffering, for the skin or bark of the plant is pierced or cut so that the plant will "bleed" a white gum which turns red on contact with the air.'

Millard (1990: 19) notes that 'cheap perfume and oils were kept in small pottery flasks' and were in daily use, while expensive perfume and oils were kept in costly 'alabaster boxes' which kept ointments best, according to 'Pliny the Elder, writing later in the first century'. Ointments were used to such an extent that an international production in 'delicate containers' grew up and many 'flasks, vials, and small jars' made of glass or alabaster, which preserved the scent of the perfume and the ointments, have been discovered in archaeological digs and are now on display in museums (Rousseau & Arav 1995: 217). Beers (2003: 312) mentions that 'alabaster is a soft marble common in the area of Alabastron in Egypt, from which the word may come'. It is 'formed by water dripping in limestone caves to form stalactites and stalagmites'. He describes alabaster as being 'very fine-grained and pure white or translucent when no impurities are present', but that when 'iron oxide and other impurities' are present 'beautiful combinations of yellow, pale and dark brown, and red' are produced.

There is little written about the perfume and ointment industry in Syrio-Palestine, but there is some mention in the writings of Josephus and the Gospel writers. Containers for perfume and ointment have been discovered, thus indicating that these products were imported into the land. Gums and perfumes came from 'India, the Himalayas, and Persia', also Syrio-Palestine and Asia Minor, and transported to the Canopus district of Alexandria

in Egypt, the centre of the international trade (Rousseau & Arav 1995: 217). The Egyptians were 'great users of cosmetics, ointments and perfumes' as they, and other peoples of the Near East, made ointment. According to Harrison (1966: 53) the 'ancient Near Eastern peoples' recognised the 'fumigant and deodorant properties' of aromatic substances. He notes that 'a number of sweet-smelling perfumes were used for the clothing as well as for the body'. He also points out that 'the women of upper classes' in the Near East, like the Egyptians, 'were in the habit of swallowing aromatic pellets of sweet-scented oils' to cause their breath to be fragrant or to combat halitosis. Aromatic herbs were sprinkled on beds and couches, which Harrison believes was to 'incite venery.' Harrison (1966: 52) notes that the Israelites did not use 'complicated methods of manufacture' in producing ointments and perfumes, using mainly 'fragrant woods, herbs or aromatic resins' and then it was perfumers who were allotted that task. He says that 'expensive aromatic substances were imported' into the land and were available to wealthy households who probably detailed a servant to become a perfumer. However, some aromatic substances were used in everyday life and not only by the wealthy.

6.4.2 Balm. Zohary (1982a: 198) notes that balm was used as an ingredient to make perfume – 'the resin was squeezed into an oil or paste'. According to Vamosh (2007b: 76) the sap at the factory was made into 'an unguent, *opus balsamum*, the most expensive form of the product.' The branches of the tree were made into another product, by cooking them in water in big baths. The juices which resulted from this were mixed with olive oil and the product was called 'aromatic oil'. Krymow (2002: 38) says that balm was used in the 'making of the holy oil used in the temple' according to 'Rashi, the famous biblical and Talmudic commentator of the eleventh century' CE who wrote of 'resin' as one of the ingredients (Ex 30:34).

6.4.3 Myrrh. Concerning myrrh, probably the most well-known Scripture is that connected with the birth of Jesus, when the wise men from the East brought gifts of gold, frankincense and myrrh. According to Dugmore (2007c: 92) the wise men chose these gifts as they were the most costly and 'revered commodities at the time.' Myrrh was also used by Nicodemus in preparing Christ's body for burial, as the Egyptians had been doing for centuries. Myrrh was 'burnt as holy incense at funerals and cremations throughout the ages'. According to King and Stager (2001: 348) 'the fragrance of myrrh' is referred to in the Bible 'as a symbol of luxury and beauty' as it was used to 'perfume royal garments'. Zohary (1982a: 200) quotes an Old Testament verse from Psalm 45: 8, where the psalmist says 'Your robes are all fragrant with myrrh and aloes and cassia'.

Krymow (2002: 87) mentions that myrrh (*mor* in Hebrew) was an ingredient in the incense that was to be burned before the Lord in the Tabernacle (Ex 30: 23) and later in the Temple in Jerusalem. Myrrh was also used as a cosmetic. According to Swenson (2003: 35) myrrh is 'actually a pale yellow liquid or resinous sap which hardens to form crystals.' It is used in perfume, in making soap, and as an ingredient for incense. (Swenson 2003: 35). There was a great demand for myrrh in 'ancient perfumeries'. In the ruins of En-Gedi, myrrh oil was found in pottery used for the production of perfume (Krymow 2002: 93). Myrrh was used to 'perfume clothes, fumigate houses and sweeten the breath'. In the Song of Solomon (1: 13) he says: 'My lover is to me a sachet of myrrh resting between my breasts.' According to Krymow (2002: 93) it was a custom of an Egyptian woman to place the aromatic myrrh gum in a small flask on a chain that hung around her neck and rested on her breast, so it appears that in Solomon's time this custom was copied in Syrio-Palestine. The shrubs were so important that it was necessary for guards to protect them and keep them safe (Walker 1957: 26).

6.4.4 Aloes. Moldenke and Moldenke (1952: 47) say that regarding the types of aloes mentioned in the Old Testament, it is the Eaglewood or *Aquillaria agallocha*, that corresponds with Psalm 45: 8 which reads: 'All your robes are fragrant with myrrh and aloes and cassia' and Proverbs 7: 17: 'I have perfumed my bed with myrrh, aloes and cinnamon'. This leads one to assume that as aloes are mentioned with other 'perfumes, scents, and spices', that they might yield a resinous gum to make a kind of incense (Swenson 1995: 99). According to Krymow (2002: 145), the aloe tree exuded a fragrant oil and resin when it was decayed or diseased, and it was this resin that was collected for 'burning as incense, for deodorizing and for use as a perfume'. The Eaglewood was not native to Syrio-Palestine but as the Bible mentions aloes there is discussion as to what plant the writers meant. Egyptian women used aloes as perfume and the Greeks knew about it as a healing herb as well as a perfume.

6.4.5 Cosmetics. Heaton (1956: 91) believes that 'the ancient East' knew a lot about hair oils. 'Ointments, salves, oils and creams of every description' were a necessary 'part of everyday life' as they were needed by the workers 'as sunburn lotions and as a protection against flies and vermin' such as fleas, although it seems they tolerated lice. Beers (2003: 151) explains that 'ointment was combed through the hair to repel swarms of insects' and used particularly by women, as long hair was considered 'a symbol of womanhood'. Heaton (1956:91) notes that archaeologists have discovered 'palettes for mixing cosmetics (such as the black antimony and olive oil)' and suggests that not only Queen Jezebel 'painted her eyes' (2 Kings 9:30) but that other women in the Old Testament used make-up (Jr 4: 30; Ezk 23: 40). Harrison (1966: 51) mentions that 'toilet articles' have been

discovered by archaeologists, one of which was a container holding 'a complete beauty outfit, consisting of henna dye, rouge, pastes, eye-paints and an assortment of toilet instruments including tweezers.' He says that ointments were not only necessary to protect the exposed parts of the skin, but were also used to enhance 'personal beauty'. By applying oils and ointments the skin remained supple and prevented it from becoming cracked or broken. It was thus able to resist infection from germs entering the body through fissures.

Beers (2003: 151) notes that women in Jezebel's day, painted their faces with bright colours 'and drew heavy black lines around their eyes', as well as using coloured paints, lipstick and rouge, but these came from copper or iron ore and were mixed with water. As mentioned above, olive oil was a perfume and moisturiser. Women in Egypt and Assyria coloured their eyelashes and the edges of their eyes with a black powder to which vinegar or oil was added. Kohl was like mascara, and has been found in special jars which were discovered at archaeological sites. Matthews (1991:122) describes eye paint used by women to enlarge their eyes, which was a common practice, as being made of 'crushed galena mixed with gum and water'. The mixture which was applied to cheeks, lips, finger and toe nails, and hair, were 'red dyes made from iron oxide (red ochre) or crushed leaves of the henna plant'. A mixture of crushed plant matter or clays produced other colours. According to King and Stager (2001: 281) Egyptian and Babylonian women wore eye make-up to 'emphasize their eyes, to protect them from the bright sun, to relieve eye ailments, and to protect the eyes from insects'. They say that 'eye paint was worn in ancient Israel as well' as one of Job's daughters did (Job 42: 14). Some Jewish women copied this habit of using eye paint but it was frowned upon (Beers 2003: 159).

As mentioned above, henna was used in cosmetics. Zohary (1982a:190) notes that it is mainly the henna leaves that are used, as they are dried and crushed into a powder and then mixed with water to make a paste. This is applied to the body - mainly the hair and nails, but it is also used to dye cloth and clothes. The Ancient Egyptians 'were among the first to use henna as a cosmetic, and they wrapped their mummies in henna-colored clothes'. Moldenke and Moldenke (1952: 125) mention that young girls put the paste which is a 'bright-yellow, orange, or red' colour on both finger nails and toe nails, finger tips, palms of the hands and soles of the feet., but men also used it to colour their beards and the manes and tails of their horses. They say that this custom was 'frowned upon by the Jewish leaders as something pagan'. The law required that any Israelite man who wanted to marry a woman who was taken as a prisoner, had to make sure that her head was shaved, her nails cut and her hands and the soles of her feet were scrubbed first and she

was not allowed to wear her own clothes (Dt 21: 11-12) possibly to rid herself of the pagan use of henna.

6.5 Medicine

Wiseman (*in* Palmer 1986: 14) mentions that there are some medical texts that can be dated from ca. 2100 BCE. Harrison (1966: 11) confirms that from archaeological excavations of clay tablets it has been discovered that the Babylonians were advanced in 'prescriptions, formularies and pharmacopoeias' but that it is difficult to be able to identify many of the items in the prescriptions. Wiseman states that later a group of therapeutic texts with prescriptions were made for the Assyrian king's library in the seventh century BCE which included the names of plants, some of which can be identified. Details of the 'contents of an apothecary's stock' in the fourteenth century BCE was included. The 'stock consisted mainly of seeds and dried substances and special oils, but no ready made-up prescriptions' were included. Pills, potions and poultices were made using plant ingredients together with 'oils, milk and beer'. According to Harrison (1966: 11) 'the commonest drug in the herbals of Assyria' was a substance that 'was prepared by soaking pine-wood in water' and the resulting solution was used to treat a wide range of ailments. It was applied externally to muscles and ligaments as 'a type of embrocation', and if taken internally, it had 'therapeutic value for kidney or hepatic dysfunction'. According to Harrison (1966: 12) many of the herbal remedies of the Babylonians were accompanied with magical incantations but that the remedies on their own were expected to have satisfactory results. The Assyrian herbalist had a huge list of drugs which functioned either as 'cathartics, carminatives, ecboics, soporifics, emmenagogues, expectorants and general stimulants.' Apparently the Egyptian pharmaceutical writings include many plants which cannot be identified today. Egyptian apothecaries used drugs in the form of 'pills and suppositories' and used poultices in the treatment of wounds but magic also played a part in treatment of the patient.

Harrison (1966: 13) says that the 'Hebrews appear to have employed herbs and vegetable substances' with 'therapeutic and culinary purposes' and did not rely on magic. He notes that scholars have tried to classify the materials used into 'culinary or hygienic usage on one hand, or of religious and ritual association on the other' but that some substances used for therapeutic purposes can be further classified.

According to Botha (2000: 4) in the first century CE the peasants, or 'subsistence farmers', were undernourished and ate an unhealthy diet. He quotes Galen, the Roman physician and philosopher of Greek origin in the second century CE, who maintained that due to famine and the fact that most food was taken to be stored in the cities, the peasants had to

rely on 'shoots and suckers of trees and bushes, and bulbs and roots of unwholesome plants and cooked grass' apart from some leguminous plants called pulses. It is no wonder that the peasants were infested with parasites such as lice, as well as intestinal parasites such as the encysted larva of tapeworms and tapeworms.

Krymow (2002: 16) mentions that the Israelites knew the medical practices of the Egyptians and took this knowledge with them, but the Israelite priests taught the people to look to God for health and healing and to obey his laws concerning right living. If the people chose to anger God he would afflict them with all sorts of diseases (Dt 28: 22). The priests were the 'health officials' as there were no physicians at this time, so the people used home remedies to treat themselves, making use of herbs in their 'powders, ointments and salves'. 'Good hygiene' found in the Mosaic Law would result in healthy bodies. Laws such as Sabbath rest, diet and preparation of foods, unclean animals, purification and cleanliness were to ensure health for the individual.

Wiseman (*in* Palmer 1986: 36) mentions that baths and bath places have been excavated in large houses and that it was known that the 'Hebrews ... poured water over their bodies and washed themselves and their clothes'. The soap they used was made of 'lye, a fossil carbonate of soda dissolved with oil or sesame oil, or an alkali of salt-wort or similar plant.' They then anointed their bodies with perfumed oils. He mentions that the Egyptians and Babylonians also washed and cleansed themselves, used oils on their bodies and herbal remedies. Wiseman (*in* Palmer 1986: 38) notes that the Egyptians had a list of more than five hundred remedies, mostly made from plants. Both the Egyptians and the Hebrews used perfumers to prepare some of these remedies.

Thompson (1986: 274) maintains that 'the role of the apothecary – the ancient equivalent of a pharmacist – was more important than that of the doctor.' It was the apothecary who prepared all the oils, ointments, and potions for the sick, the spices for embalming the dead, fragrant incense and sacred anointing oils for the temple, and the cosmetics used for everyday care. Unfortunately one of the problems they faced in the hot climate was that insects were attracted to the perfume and the flies got stuck in the ointment, giving it a bad smell. Thompson points out that Syrio-Palestine must have been very smelly – 'odours of disease and unclean bodies, smoke, drainage, cooking, refuse and animal droppings.' Pleasant perfumes were needed to overcome the bad smells, such as resins, gums and balsam which were mixed with spices.

Wiseman (*in* Palmer 1986: 21) notes that the Egyptians used meat or grease for a wound and then 'mouldy barley bread' to cover the suppurating wound which was then bandaged, and he sees this as a possible 'elementary antibiotic'. The Babylonians used 'oil, honey,

and stringent herbs, especially cedar-resin' as common dressings for wounds. Wiseman (*in* Palmer 1986: 29) also notes that amongst the most common ailments for the Hebrews, Egyptians and Babylonians, were headaches. Laudanum, natron, pine-seeds, fruit, burnt fish bones and goose fat were the usual remedies.

Krymow mentions that the Talmud was written in the Hellenistic period and in it 'about seventy herbs and other plants' with 'medicinal properties, some for cures, others for prevention', are identified. Amongst the plants listed are: 'olives, dates, pomegranates, garlic, hyssop, cumin and other plants used mainly for food'. There are other writings telling about the use of plant remedies such as *The Book of Jubilees* which was written in the first century BCE. Also in the first century CE, Josephus 'investigated medicinal roots and the properties of stones', helped by texts from the Essenes, a Jewish sect. (See below).

The Old Testament has little to say about plants and their healing power, mentioning only balm, oil and figs. Jeremiah 8:22 cries out: 'Is there no balm in Gilead? Is there no physician here?'; Isaiah 1: 6 mentions that wounds, bruises and open sores are 'not cleansed or bandaged or soothed with oil'; and in Isaiah 38:21 he tells Hezekiah's servants to 'prepare a poultice of figs, and apply it' to the king's boil. This appears to have been a known remedy as Wiseman (*in* Palmer 1986: 33) explains that there are 'two veterinary texts from Ugarit in the thirteenth century BCE' which prescribed the use of figs to draw an abscess, as did Pliny in the first century CE who recommended this treatment. According to Zohary (1982a: 183) there were herbal remedies in biblical times but they are not included in the Bible because God was the ultimate healer (Ps 41: 3). The most often prescribed remedy was prayer, as any other method would be considered idolatry by the Mosaic Law. Other instances of healing in the Bible were miracles performed by the prophets, and in the New Testament, by Jesus, some needing faith as a condition of healing (Mt 9: 22) such as the woman who suffered from haemorrhage, and in James 5:15-16 he says that if anyone is sick, 'the prayer offered in faith will make the sick person well.'

Matthews (1991:20) mentions that in Old Testament times (what he calls the 'Patriarchal Period'), 'periods of famine' and a carbohydrate-rich diet 'would have caused some health problems for the people'. He speculates that 'by eating figs and dates and using cooking oil made from dates and olives' this could have offset the 'poor and unbalanced diet'. He says that in the Inter-Testamental and New Testament period, it is most likely that the medical knowledge of Jewish physicians was of Egyptian origin, but they might have had 'the same training as Luke'. The general knowledge obtained from the Egyptians included herbal medicines and their use in relieving ailments such as 'indigestion, constipation, and

sleeplessness' (Matthews 1991: 236). However, it seems that these cures were often 'accompanied with sacrifices, prayers and incantations' for the help of God. This happens with the Bedouin who although using herbal medication, also seek guidance and help from the Koran.

In Greek and Roman times there was an emphasis on herbs which were readily available and formed the basis for certain cures. According to Kee (1986: 34) by the end of the first century BCE there were records of species of plants, and animals, an interest in surgery, experimentation with drugs by Heraclides (in the third century BCE), pharmacology and external surgery. Apparently there is evidence that Hellenistic medicine impacted on 'Jewish thinking in the early second century BCE' (Kee 1986: 21). He points out that in the first century CE Josephus wrote that there was a link between the Essene community, with their medical skills, and those of Hellenistic medical practices. The Roman naturalist, Pliny, also in the first century CE, 'believed in the inherent powers of plants and herbs to enable the body to recover from disorders' (Kee 1986: 21).

Rousseau and Arav (1995: 199) mention that there were 'three kinds of healings in first century CE Palestine – those performed by physicians, those done by non-physician healers, and those associated with miracle workers'. In Mesopotamia and Egypt 'various customs and rituals, including incantations and the use of herbs and other ingredients' were practised. In the first century CE the writings of Romans such as 'Celsus, Pliny the Elder, and Josephus ... and some excerpts from the Dead Sea Scrolls', mention medicine and healing, although very little attention is given to diseases and remedies (Rousseau & Arav 1995: 200-201). Kee (1986: 41) states that Dioscorides in the first century CE, wrote a medical encyclopaedia known as the '*Greek Herbal*' consisting of five books. These describe the medical value of 'herbs, oils, ointments, trees, animals, fish, reptiles, insects, human effluences and excreta, cereals, roots, juices, saps, vines, wines, cooking oil and vinegar.' These books also describe the appearance of each of the above, 'its place of origin, instructions about proper harvesting and preparation of each for medicinal purposes.' Warnings are also given on the 'dire results of false identification and overdoses'.

6.5.1 Ancient times. Rousseau and Arav (1995: 321-322) have compiled a list of ten plants which grew in Palestine in the first century CE and were known for 'their medicinal properties': 'Colocynth or bitter apple (*Citrullus Colocynthus*), a plant of the gourd family', the pulp of the fruit mixed with water and drunk 'as a purgative'; 'Chamomile (*Matricaria Chamomilla*)' the leaves of which are boiled in water and the decoction 'drunk to relieve sore throats and colds', but other uses are for menstruation or 'pain in the kidneys and urinary tract'; 'Onion (*Allium Cepa*)' the leaves and bulb are used ; 'Fenugreek (*Trigonalla*

Foenum Graecum)' is a leguminous plant. The seeds are 'ground to a powder and mixed with water for the treatment of stomach ache and diabetes'; 'Mandragora or Mandrake (*Mandraga Officinalis*)' 'known as a "love plant" in the Bible; 'Ginger (*Zingiber Officinalis*)' the rhizome of which is 'used in cooking and traditional medicine' as it 'has a hot, spicy taste'. It is 'crushed into powder' and 'drunk with tea as a remedy for colds, sore throats, liver problems, hoarseness and intestinal gas'; 'Cumin (*Cuminum Cyminum*)', the seeds and fruit of which are used as they 'are aromatic and carminative (they eliminate gases)'. Apart from flavouring in food, the seeds are used as various remedies such as stimulating milk in nursing mothers, curing stomach ache, and eliminating gases in the digestive system; 'Lemon (*Citrus Limonum*)' 'added to tea as a medication for colds, sore throats, nausea, dizziness, stomach ache and diarrhea'; 'Sage (*Salvia Triloba*) is an aromatic herb'. The leaves are boiled in water and the decoction is 'drunk as a remedy for stomach ache and gases, diarrhea, and indigestion'. It is also used to 'ease menstrual pains and is considered a menstrual regulator'; 'Jujube tree (*Zizyphus Spina Christi Lotus*) or Christ's thorn' which is a spiny bush or tree with edible fruit called jujube. If it is 'eaten in large quantities, its fruit is said to cure diarrhea'.

Aromatic spices were used in preparing a body for burial and it appears that they were also brought to the tomb to disguise the smell of the decaying body during first few days of the mourning rituals for the dead (Vamosh 2007b: 72-73). She mentions that physicians in the first century CE had special assistants whose task it was 'to anoint patients with a prescribed oil specific to the illness'; the 'gum of the terebinth tree was used for toothache and halitosis' and the herb cumin was applied to wounds as it contains 'infection-preventative substances' (Vamosh 2007b: 71).

To treat wounds and bruises olive leaves were used by ancient surgeons as plasters and liniments (Krymow 2002: 97). Vines were also used. The juice was used for laxative purposes. The wine was used as an anaesthetic and mixed with other ingredients it was also used as a laxative. Wine was also used to 'stimulate the appetite, kill worms, ease pain and cure coughs' (Krymow 2002: 164). She mentions that wine was also 'a folk remedy for rheumatism', and the sap of young branches was used as a remedy for skin diseases. Krymow notes that: the leaves were used as an astringent and were used for diarrhoea; the juice of unripe fruit was also an astringent and was used for throat infections; raisins were taken with figs as a laxative; raisins were also said to be 'pain relieving and anti-inflammatory', as well as 'ease arthritic pain, gout and migraines.'

6.5.1.1 Balm. Zohary (1982a: 198) points out that the Arabs were using balm resin 'long before it was recorded in the Bible'. He calls the plant the 'balm (balsam) tree of Judea', so the terms are used interchangeably here according to the different scholars. Zohary

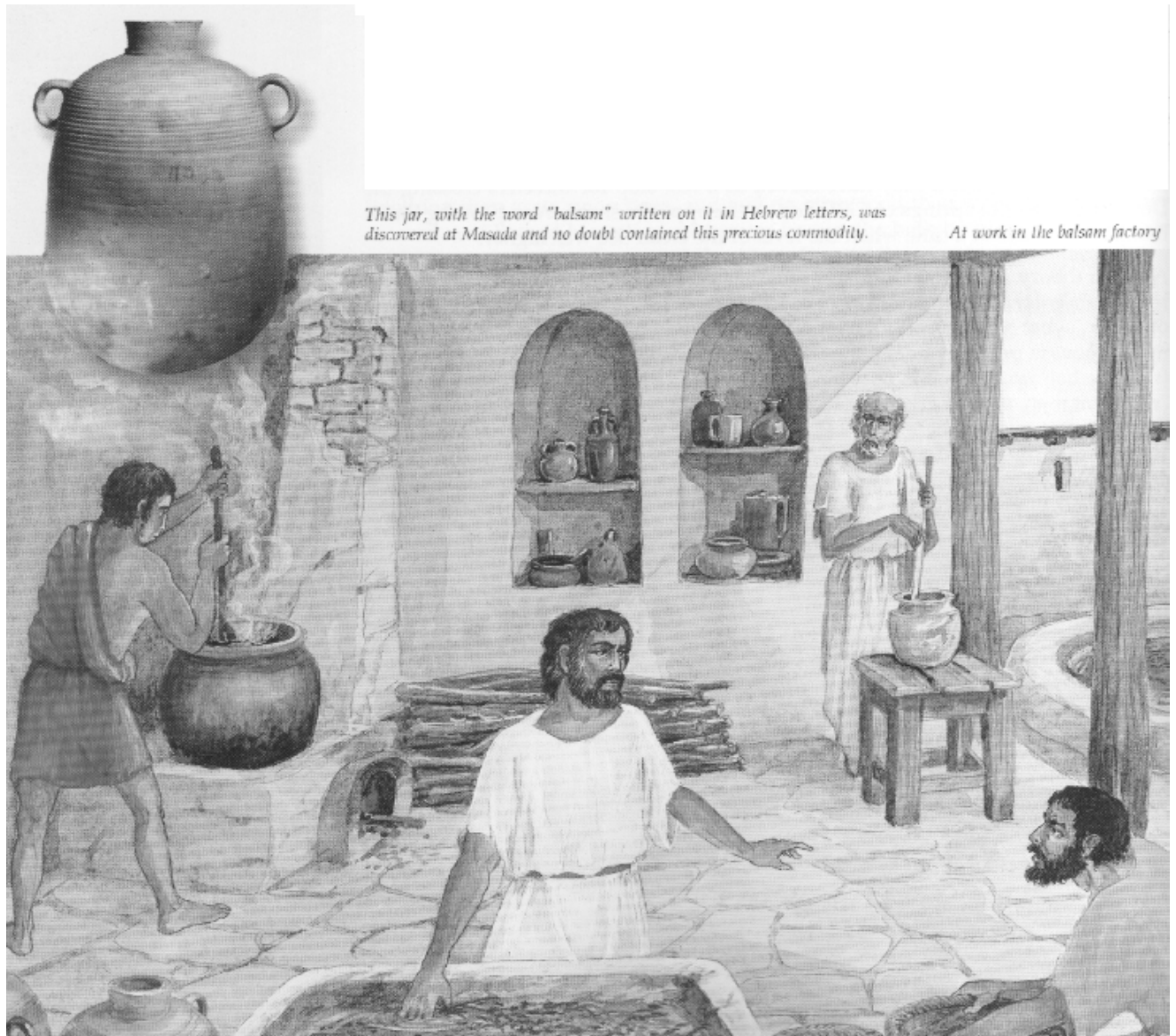
maintains that the trade in balm resin was 'a very profitable commerce' and controlled exclusively by the Arabs. They did not pass on their knowledge about its origin or manufacture, as they were very secretive about it. Harrison (1966: 17) notes that various ancient versions used the terms 'balm' and 'balsam', indicating that the term meant 'some sort of resin or gum'. He also points out that balm was traded and that the Egyptians imported it from Gilead, as did the people of Tyre.

Moldenke and Moldenke (1952: 55) note that the balsam is a small tree with fruits that are 'pounded and boiled to extract the oil' which is used in medicines and for healing. The fruit is also used to make an intoxicating drink when it is fermented. They note that the gum is yellow, fragrant, resinous, sticky and very agreeable, according to the botanist Hasselquist. He mentioned that 'three grains' of resin would 'strengthen a weak stomach' and that its second use was to heal wounds. However, Moldenke and Moldenke (1952: 84) note that there are two kinds of balm or balsam tree and specify the above as '*Balanites aegyptiaca*', although Zohary (1982a: 199) does not concur.

According to Vamosh (2007b: 76) the 'most famous pharmaceutical and cosmetic of the ancient Holy Land was balsam.' She mentions that it was used in the Old Testament (Gn 37: 25; Jr 8:22, 51:8) and that Josephus calls balsam "an ointment of all the most precious" (*Antiquities* 14: 4,1)', noting that 'it was produced near Jericho'. She says that the 'production of this expensive plant into medicine and cosmetics was kept such a secret, that the plant, which has been identified with *commiphora opobalsamum* of ancient records, has become extinct'. According to Zohary (1982a: 199) the name is recognised as *commiphora gileadensis*, although balsam trees never grew in Gilead. He notes that '*opobalsamum* was later given as an epithet to *Commiphora*'. Walker (1957: 26) mentions that balm grew prolifically in Judea. Like Vamosh, Zohary refers to Josephus but also to Pliny, Tacitus and Dioscorides, who praised the 'balsam tree of Judea'. Vamosh (2007b: 76) says that in *Wars of the Jews* (1:6:6) Josephus mentions that when the branches of balsam trees were cut with sharp stones, sap exuded 'like tears'. He also said that the Jews unsuccessfully tried to 'destroy Judea's near-monopoly of balm groves'. It was at this time that the plant was introduced into Egypt (Zohary 1982a: 198).

Vamosh (2007b: 76) mentions that archaeologists have discovered a structure at Qumran which is thought to be a furnace that heated the water to process the balsam plant, and they also found a jar believed to have contained this expensive product at Masada with the word 'balsam' written on it in Hebrew. Zohary (1982a: 198) notes that at the ancient site of En-Gedi 'tools, vessels and furnaces of ancient workshops for production of the balm commercially' have been discovered. It was at En-Gedi and Jericho that balsam trees were cultivated and it is conjectured that the Queen of Sheba brought the trees in seedling

form as a gift to King Solomon. However, it is more likely that a species of balsam grew wild at En-Gedi, as the tropical conditions may have been conducive for its growth. It could also have been found in the 'Aravah Valley, the Dead Sea and nearby portions of the Jordan Valley'. Zohary believes that the peasants of Jericho and En-Gedi used the native stocks and bred 'superior varieties' from which the Israelite balm 'derived its reputation'. (See illustration below showing men at work in a balsam factory).



From Vamosh 2007b: *Daily life in the time of Jesus*, p.76.

Harrison (1966: 17) says that the "balsam of Jericho" was found in abundance throughout north Africa and Palestine' and was even found growing in western India. He does note, however, that 'there appears to have been some distinction made between "balm" and "balsam of Jericho"' in the writings of the ancient Greeks. The balm that was taken to Egypt by Jacob's sons for the ruler of Egypt appears to have no healing value and Harrison says that it 'must have been indigenous to Palestine' and could not have been

'the balm of Gilead' which 'is native to Arabia'. Another variety of resinous gum must be meant which was used medicinally in various preparations and had 'aromatic and astringent qualities'. It was 'chewed to sweeten the breath and massage the gums'.

Zohary (1982a: 198) says that balsam has three uses: 'as an ingredient of the holy oil, as a healing agent for wounds and an antidote to snake bites, and as an ingredient of perfume.' Dioscorides noted that balm was useful for the treatment of 'scorpion and dog bites' (Swenson 2003: 76). It was also supposed to help with heart disorders and used for uplifting moods. Harrison (1966: 17) states that balm was used 'as a counter-irritant for diminishing local pain', and was 'acclaimed as an antiseptic and astringent for cuts and wounds.'

The balm tree grows in hot deserts or semi-deserts, according to Zohary (1982a: 199). It is a shrub or small tree which loses its leaves in the dry period and has small clusters of white flowers which produce fruit in which there is 'a fragrant yellow seed' from which oil of a therapeutic value is extracted. There are about 100 species of the plant and some produce resin or gum. 'The resinous, fragrant balm exudes spontaneously or is obtained artificially'. Incisions are made in the stems and branches and the gum accumulates in clumps. Initially they are bright green but later they solidify and fall to the ground where they are collected.

Packer and Tenney (1980: 250) mention that this bushy evergreen plant was very fragrant because of the gum, which was 'used as incense and dissolved in water as an ointment.' The oil was 'obtained from the bark, leaves and berries' to be used as medicine, which is referred to in Jeremiah 8:22, 51:8. They maintain that Jeremiah refers to it as 'a symbol of spiritual healing.' Krymow (2002: 38) notes that 'balm was an emblem of Palestine' and agrees with Packer and Tenney that it was a symbol of spiritual healing. She notes that the Romans carried balm branches when they returned to Rome after having defeated the Jews, as a symbol of their victory.

6.5.1.2 Bay laurel. The botanical name for the bay tree is *Laurus nobilis* (van Wyk and Wink 2004: 188). This evergreen tree is also known as the sweet bay, the bay-laurel, or the laurel (Moldenke & Moldenke 1952: 123). They mention that in Psalm 37: 35, the psalmist speaks of having 'seen the wicked in great power, and spreading himself like a green bay tree', which is sometimes translated as 'cedar of Lebanon' by some translators. Apparently the bay tree grows in 'thickets and woods from the coast to the middle mountain zones', growing to a height of about 8 metres but Moldenke and Moldenke mention that it is not common in the land, even though it is said that it was 'abundant on Mount Carmel and around Hebron.' Walker (1957: 96) however, says that bay trees grow

'on the wooded hills of northern Palestine, and in the glens near Galilee and on Mount Carmel.' Zohary (1982a: 120) calls the tree the 'laurel' or 'sweet bay' and confirms that Walker is correct in saying that it grows 'on stony ground' on Mount Carmel and in the Galilee.

The leaves are glossy, oblong and tough, while the flowers are small, creamy-white, borne in clumps and the fruit is a one-seeded black berry, about the size of a small grape. The male and female flowers are usually borne on separate trees (van Wyk and Wink 2004: 188). Moldenke and Moldenke (1952: 123) believe that it was the evergreen leaves with their 'pleasant spicy fragrance' that caused King David to select the bay tree as 'the symbol of prosperity', while the Greeks and the Romans adorned the heads of those honoured and distinguished in some field like war, academia, or politics. The leaves are still used as a condiment to flavour meats and stews and are used in the treatment of diabetes (Krymow 2002: 210). They also yield a fragrant oil called 'oil of bay', while the fruit, roots, bark and leaves are also used in medicine (Moldenke & Moldenke 1952: 123).

Weiss and Kislev (2004: 35) believe that they have found evidence that the bay laurel was used as a medicinal plant. It was often mentioned 'in ancient medical literature' as it was noted in antiquity that 'a massage of bay laurel oil' was used 'to alleviate joint pain and neuralgia and as a balm for healing wounds'. Boiled berries and leaves were used to prevent diarrhea', while 'a tincture of bay laurel berries was said to enhance sexual potency.' They note also that there is written evidence that 'laurel fruits were used by the Assyrians as an eye treatment, to make bandages and for the treatment of urinary-tract infections.'

Van Wyk and Wink (2004: 188) seem to confirm this as they mention that the fruit is rarely used but there are a number of uses of the leaves and the essential oil from the leaves - for 'gastrointestinal complaints' - such as 'indigestion, dyspepsia and flatulence'. Although used for bladder and kidney ailments these have not been 'well documented'. The essential oil is used: in aromatherapy, has 'insecticidal effects', and is used to rub on rheumatic joints, sprained limbs or bruised skin.

6.5.1.3 Cumin (Cummin). According to Moldenke and Moldenke (1952: 89) cumin is 'a common annual plant of the carrot family' and thought to be a native to Egypt, and the eastern Mediterranean, particularly Syria, where it is said to grow wild. It is a small plant growing to a height of about 30 centimetres and Walker (1957: 66) says that it has always been cultivated, even from earliest times in Israel. The plant has a number of branches with fine leaves and dainty pink or white flowers growing in umbels. The most important part of the plant is its fruit or seed which is contained in narrow, ridged pods about 5

millimetres long. Walker notes that the seeds have medicinal properties known by 'the ancients in antiquity'. Cumin is used as a spice in stews and it is crushed and added to the bread flour as it was in antiquity. Harrison (1966: 30-31) says that writers in antiquity frequently referred to cumin as 'a condiment for use with different varieties of food' but it was also used by herbalists 'as a carminative' and it was used 'in poultices as a discutient.'

Walker (1957: 66) says that there is a village near Acre called 'Kammon' which takes its name from the Hebrew word for this flower which grows there and gives the area a 'sharp smell'. The fruit is round and fragile and when harvesting cumin, the stalks are beaten with a rod to 'preserve the small tender seeds' as quoted in Isaiah 28: 27. Zohary (1982a: 88) mentions that the seeds or 'grains' are used 'in folk-medicine as an anti-spasmodic, and its oil is an ingredient of perfume'. Krymow (2002: 172) mentions that the oil was also used in liqueurs. King and Stager (2001: 106) note that there are two kinds of cumin, white cumin (*kammōn*) which is beaten with a rod and black cumin (*qesah*) which is beaten with a stick. This is because both kinds have delicate seeds. King and Stager confirm Zohary's view of the medicinal use of cumin seeds which they say are 'taken as medicine to ease colic, flatulence, stomach disorders, and diarrhea.' Zohary (1982a: 91) mentions that 'black cummin is the only one of fourteen species that has been cultivated since ancient times.' It is an annual herb which grows to about 30 centimetres. It has many leaves with branches ending in lilac flowers consisting of 'five sepals, five petals, many stamens and an ovary of a few carpels'. The ovary turns into a 'hairy capsule' containing masses of black seeds, once it has been pollinated.

According to Krymow (2002: 171-172) cumin was extremely important for the Hebrews because they 'used it to stem bleeding following circumcision'. She points out that as the seeds had to be carefully harvested and they are so small, 'the Greeks referred to mean and stingy persons as "cumin splitters".' The Egyptians made great use of cumin, and 'medical texts from the Eighteenth Dynasty' call it '*tepnēn*'. Amongst its uses they mention 'stomach ailments, head illness, skin ailments and abscesses.' 'Nine medical recipes' for cumin are given in the Ebers papyrus, 'including one for intestinal parasites'. Another use is 'an unguent to ease headaches' made of 'cumin, myrrh, lotus flowers, juniper berries, moringa tree oil and two unidentified ingredients.' '*The Abyssinian Herbal* recommends cumin for eye poultices and insect stings.'

Krymow (2002: 172) notes that cumin 'contains pain-relieving compounds' as well as having 'anti-inflammatory properties'. It is thought that cumin 'supports and stimulates the immune system' and may even 'help poor circulation'. 'In aromatherapy the essential oil is said to increase the appetite.' In Palestine it has been used to 'treat cattle with ulcers from insect bites and worms deposited on the skin by flies.'

6.5.1.4 Aloes. Although the aloe is barely mentioned in the Bible, Zohary (1982a: 204) mentions that it was used medicinally in ancient Egypt and other places, where it was also used as an ingredient for embalming the dead. He maintains that aloes still grow in 'some Arab countries and also in Israel' and here he refers to *Aloe vera* which he includes with *Aloe succotrina*. In agreement with Zohary, both Shewell-Cooper (1977b: 91) and Moldenke and Moldenke (1952: 35) and others, maintain that where aloes are mentioned in the Bible they are referring to two different plants. All refer to the aloe in the Old Testament as being the *Aquilaria agallocha* (or Eaglewood) from which a costly perfume is extracted, but some translators have different opinions. In the New Testament a different plant is mentioned, the *Aloe succotrina*, which came from the island of Socotra at the south end of the Red Sea, and was a plant which was used as a drug in preparing bodies for burial. It was Nicodemus who brought aromatic spices to embalm the body of Jesus. The juice extracted from the fleshy leaves of the plant was known to be a purgative. It has an unpleasant smell and a bitter taste.

Moldenke and Moldenke (1952: 35) note that the aloe drug and myrrh, were imported into Palestine. It was very expensive, so it can be assumed that Nicodemus was a wealthy man as he brought about fifty kilograms of these two substances to use for the embalming (Jn 19: 39). Moldenke and Moldenke (1952: 47) believe that the aloe and myrrh were mixed and then wrapped between the burying clothes for embalming. According to Krymow (2002: 146) it has been said that Nicodemus had such respect for Jesus that is the reason why he brought so much aloe and myrrh to embalm him. Other writers believe that the aromatic juice used in embalming had such a bitter smell that Nicodemus had to use fifty kilograms of myrrh to neutralise it. Harrison (1966: 17) notes that because of the climate, it was necessary to use deodorants and disinfectants when preparing a body for burial. It seems that the 'Jews appear to have sprinkled aloes and myrrh freely between linen strips' to be used for the body.

There is much debate as to the correct plant as there are a number of opinions as to whether the aloe was a tree or a succulent plant (Swenson 1995: 99). However, Moldenke and Moldenke (1952: 47) put it quite clearly – they regard the aloes used for embalming as *Aloe succotrina*, and those used for perfume as *Aquilaria agallocha*, but they also debate whether the sandalwood (*Santalum album*) might have been the plant mentioned in the Old Testament. Harrison (1966: 15) confirms that the Eaglewood was the aloe mentioned in the Old Testament and says that the tree grew to a great height and had a trunk of dark fragrant wood. He notes that when the trunk was decayed or diseased the wood was 'permeated with fragrant oil and resin'. He says that the wood was 'valuable for burning as incense, for deodorising, and for the manufacture of perfumes.' It was 'used ceremonially

as a substitute for incense' and it was said to have medicinal value as a 'tonic or stomachic' if taken internally (Harrison 1966: 16). Swenson (1995: 99) mentions that the Egyptians were noted for their expertise in embalming and that they also knew the plant *Aloe succotrina* so it is most likely this species of aloe that was used by Nicodemus. Harrison says that *Aloe succotrina* was 'well-known in antiquity as a drug.'

Krymow (2002: 146-147) says that Egyptian records of 550 BCE mention the use of aloe for skin infections. Later in the first century CE Dioscorides wrote about the beneficial effects of aloe juice, noting that it was used for treating wounds, constipation, sleeplessness and preventing the falling out of hair. He did mention the bitter taste of the aloes before he described 'at great length the medicinal value of the juice.' Swenson (2003: 9-10) notes that more than 2000 years ago the Greeks used the aloe as a healing plant and that it is conjectured that Alexander the Great used the herb 'to heal wounds for his troops'.

6.5.1.5 Mandrakes. These are commonly called 'love apples' or 'devil's apples', but the official name is *Mandragora officinarum* (Moldenke & Moldenke 1952: 137; Krymow 2002: 218). Moldenke and Moldenke (1952: 137) say that the Arabs call the mandrake "'devil's apple" because of its supposed power to excite voluptuousness.' They say that Josephus mentioned the superstitious awe of the Jews and the Greeks and the method by which they should pull up the plant by using a dog, and the Romans considered it so valuable that there was a special ceremony when the root was collected. Walker (1957: 124) says that mandrakes grow in abundance throughout Syria and southern Europe. Zohary (1982a: 189) mentions that mandrakes are still common in Greece and that the ancient Greeks valued it for its aphrodisiac properties, being the people to call mandrakes 'love apples', when they soaked the plant in wine. They believed that the concoction would help a barren woman conceive, just as the Bedouins believe today. He says that the Arabs called the plant 'the devil's candle' because they believed it shone in the dark. According to Shewell-Cooper (1977b: 114) mandrakes grow in Israel today, particularly on the lower slopes of Mount Hermon.

Mandrakes are related to the *Solanaceae* or potato family (Berlinger 1969: 48). He describes the plant as having large wrinkled green leaves which lie flat on the ground, but, having large taproots growing deep into the soil, up to a distance of more than sixty centimetres, so it is extremely difficult to uproot. The bluish 'bell-like flowers appear in winter' in the centre of the rosette of leaves. In spring the leaves wither and where the flowers were, 'plum-size berries ripen'. The ripe fruit is yellow in colour and has 'a fresh sweet odour' but 'an insipid, sickish taste.' According to Berlinger (1969: 48) if someone eats too much of the fruit they become 'temporarily insane' as the fruit is slightly

poisonous. Zohary (1982a: 189) says that the fruits are edible but are thought to be 'narcotic and purgative'. Harrison (1966: 12) agrees with Zohary and mentions that mandrakes were valued in Mesopotamia 'as a stomachic, emetic and purgative.'

Experiments on mandrakes have shown that they contain both sedatives and aphrodisiacs, the sedatives in larger quantity, so the aphrodisiac effect may not be so great. Walker ([1957: 124) notes that the berries are 'shaped like a tomato, and soft and pulpy when cut open'. She mentions that the smell is 'peculiar' but is still considered a 'delicacy'.

Mandrakes are considered a symbol of fertility as in the story of Leah and Rachel, who could not fall pregnant (Gn 30: 14-16). Lloyd and Lloyd (1991: 12) say that mandrakes have no 'pharmacological effect' and that Leah's use of it 'as an aphrodisiac to stimulate Jacob', was psychological. According to Moldenke and Moldenke (1952: 137) the 'efficacy' of the plant 'lay more in the superstitious notions regarding it than in its actual properties' which they believe rose from the resemblance of the taproots to the lower part of the human body. Berlinger (1969: 48) says that the taproots often resemble 'the lower portion of the human body with legs apart' and suggests that perhaps this is why 'ancient peoples believed that this herbaceous perennial could cure barrenness in females.' Harrison (1966: 36) mentions that people in the east believed in the magical property of mandrakes and carved the root to a 'vaguely human form', then sold it as a charm so that the wearer would be protected from harm or have sexual vigour. He also notes that there was a superstition that whoever pulled up the root of a mandrake would be stricken with a severe illness or sudden death.

Hippocrates in the fifth century BCE mentioned mandrakes as did Dioscorides in the first century CE, when he included mandrakes in 'his list of poisonous herbs' (Harrison 1966: 36). Dioscorides believed there were two varieties, a male kind which flourished in spring and was white in colour, and a female variety which matured in autumn and was black in colour. Writers, such as Serapion who lived in the second century CE, and Isidore who was a prolific writer in the sixth century CE, believed that mandrakes would 'reduce sensibility to pain during surgical operations if taken as a potion or infusion' and Dioscorides is said to have 'used mandrake wine as an anaesthetic when he was an army surgeon' in Emperor Nero's service (Harrison 1966: 37).

6.5.1.6 Myrrh. Zohary (1982a: 200) notes that the botanical name for myrrh is *Commiphora abyssinica* but again there are a number of species of this plant growing in different parts of the world. Van Wyk and Wink (2004: 111) say that the myrrh of the Bible originates from Ethiopia and Somalia, is called *Commiphora guidotti* and is 'referred to as

scented myrrh.’ Walker (1957: 136) calls the plant *Commiphora myrrha* and says that in ‘Bible days the tree grew along the coast of the Red Sea and in the southern part of Arabia.’ Krymow (2002: 93) agrees with Zohary that myrrh is known as *Commiphora abyssinica* and believes that Solomon probably grew some trees in his garden. She says that myrrh trees ‘still grow in rocky areas, especially in the limestone hills of the Middle East and many parts of North Africa.’ There is a variety of myrrh with ‘hairy green leaves and showy pink or red flowers’ that ‘still grows in Gilead’.

Zohary (1982a: 200) describes the myrrh plant as being a thorny branched shrub or small tree, which grows on rocky ground. The tiny leaves are made up of pairs of leaflets with a pointed tip and a larger leaf at the end. The flowers are small and reddish in colour. The stems and branches are fragrant and exude drops of oily resin spontaneously, but when cultivated, incisions are made so that the resin flows more heavily. This oil-like substance dries into light or dark brown globules quite quickly when it falls off the tree. According to van Wyk and Wink (2004: 111) by damaging the stems of the myrrh plant an ‘inferior product’ results.

Although myrrh was mainly used as an ingredient in perfume, it was also used as a medicine. Harrison (1966: 45) says that people in the Orient from early times esteemed myrrh as ‘a domestic perfume and an aromatic deodorant.’ He mentions that the ‘Hebrews prized myrrh as one of the ingredients of the holy incense’ and together with cassia, aloes and cinnamon was esteemed as a perfume. Later they used myrrh with other spices when preparing a body for burial. Myrrh has a strong aroma and a bitter taste, ‘myrrh’ being the Hebrew word for bitterness (Kramer 2006: 141).

Krymow (2002: 93) notes that myrrh was considered a ‘panacea’ for almost all human ailments from eye infections to haemorrhoids. It was used as a type of anaesthetic, and a treatment for wounds, inflammations, ulcers and stomach problems in the Greek and Roman worlds. Krymow wonders if the Wise Men brought myrrh to Mary and Jesus (Mt 2:11) as it was given to both the mother and the baby for post-natal care. Another reason for using myrrh was that it was used as a mouthwash for sores in the mouth and throat. Harrison (1966: 11) says that myrrh ‘was generally dissolved in beer when prescribed for ingestion in cases of dyspnoea.’ He says that it was used ‘internally in suppositories, enemas and catheters’ and it was also used for female diseases.

Swenson (2003: 35) notes that in ancient texts it was written that myrrh was believed to be a cure for cancer and leprosy. The Egyptians used myrrh to fumigate their homes as it burns slowly and is said to kill certain insects such as mosquitoes. They also used it in embalming, in their temple rituals and as ‘an astringent and detergent’ (Harrison (1966:

45). Kramer (2006: 141) says that as the ancient world recognised the healing power of myrrh, today research confirms 'its antiseptic, anti-inflammatory, fever-reducing and analgesic actions.' However, Packer and Tenney (1980: 253) say that the myrrh used today does not come from the same genus as that of biblical times.

6.5.1.7 Some other herbs. As mentioned above there are numerous herbs and spices that were used in the past, that had medicinal properties. All of these plants are also used medicinally today. Harrison (1966: 11) says that galbanum was used externally to treat chilblains and cleanse the aural canal if there was a discharge and internally it was used as a remedy for dyspepsia. It was also used in its solid state to fill teeth with holes. He also mentions that the poppy was used as a narcotic and that opium was made from *Papaver somniferum*.

a) Henna. According to Zohary (1982a: 190) henna (*Lawsonia inermis*) is a tree-like shrub which grows to about 4 metres. It is still found in 'Jericho and other villages in the Jordan Valley, and on the Coastal Plain', but it has entirely disappeared from En-Gedi. '*Lawsonia inermis* is a member of the Willow-herb family, and is the only species in the genus.' It grows naturally from 'tropical northeast Africa to Arabia, Persia, and northwest India', but its place of origin is not known. Moldenke and Moldenke (1952: 124) suggest that it is 'a native of northern India' and is 'now growing wild in Nubia, Egypt, Arabia, Syria, Lebanon, and Palestine.' Van Wyk and Wink (2004: 190) say that henna originates in India, the Middle East and the Mediterranean, but now it is cultivated mainly in Egypt and India.

Rousseau and Arav (1995: 218) note that the ancient Egyptians used henna as a medicine and it is possible that it was used for skin diseases. Van Wyk and Wink (2004: 190) note that henna has astringent and antimicrobial properties and they mention that the leaf 'is used medicinally mainly to treat wounds, sores and skin infections'. They say that it is used as a gargle for sore throats and that it can be 'taken internally in case of diarrhoea, dysentery, stomach ulcers and tapeworms.' They mention that it is 'also considered to be anti-epileptic' and 'helpful in inducing abortion.' Krymow (2002: 216) says that 'henna plasters help bacterial and fungal infections'. Walker (1957: 46) notes that henna is 'an effective check to excessive perspiration.'

b) Hyssop. It is called by various names by some authors. For example, van Wyk and Wink (2004: 177) call biblical hyssop, *Origanum syriacum*, Shewell-Cooper (1977c: 109) calls it *Hyssopus officinalis*, Krymow (2002: 62) says it is called either *Origanum maru* or *Majorana syriaca* by modern botanists. The Hebrew word is *ezov*, and the Palestinians call it *za'tar*. Zohary (1982a: 96) says that hyssop was not always called *ezov* as there is some error 'which lies in the fact that the well-known European hyssop (*Hyssopus*) does not grow in Israel or the Sinai.' He therefore calls the Syrian hyssop, *Origanum syriacum*,

which confirms van Wyk and Wink's terminology. Zohary agrees that the Bible writers used the word *ezov*, and that the Arabs call it *za'tar*. Moldenke and Moldenke (1952: 160) mention that of all terms applying to plants in the Bible, hyssop is the most 'puzzling and controversial' and no definite conclusion has been reached. They are of the opinion that *Origanum maru* fits the biblical descriptions best. What confuses the issue is that in 1 Ki 4: 33, hyssop is described as growing out of the wall. This may have been another plant and not the shrub hyssop. Swenson (2003: 28) mentions that there are about six species growing in Syrio-Palestine, with the most common, *Origanum vulgare* growing only in the north, and a related species, *Origanum maru*, growing in the central hills. Another species, probably *Origanum syriacum*, grows in the southern desert (Zohary 1982a: 96).

The Syrian hyssop grows in the Middle East and throughout the Mediterranean area. It has many stems and is a sturdy plant growing on stony ground to a height of about 70 centimetres. It has grey-green leaves and white flowers growing in clumps at the end of the stems. Krymow (2002: 63) points out that in spring the 'hyssop displays the tiny flowers and thick, fuzzy leaves' which when held together form a bunch that 'will hold water and make an excellent sprinkler', as for example, in John 19:29 we read of the centurion who held a sponge of hyssop full of vinegar to Jesus' lips. The Israelites were told to use hyssop to sprinkle the blood of a lamb on the lintels of their doors when they were in Egypt so that the angel of death would pass over their home (Ex 12: 22).

In biblical times it seems that hyssop was also connected to spiritual cleansing with the sprinkling of blood on the altar and the priests (Lv 14: 6-7; Ps 51: 7; Heb 9:19). Krymow (2002: 63) suggests that as hyssop 'was considered a sign of purification' it 'might also have been used to sprinkle the people on Calvary to protect them from defilement on the eve of the Sabbath, since they were in the field of execution.' Here is pure conjecture, as there does not seem to be a scriptural passage to indicate this. According to Berlinger (1969: 56) in ancient times hyssop was used to 'cleans a man after an attack of leprosy or to cleanse and purify his house after an attack of rot.' Swenson (2003: 28) mentions that its camphor-like smell could be the reason for its use as a cleaner as it was used to improve the smell in sick rooms and cooking areas.

As a medicine, Pliny wrote that 'the pulverized leaves were used as a dusting powder for skin eruptions and swelling' (Krymow 2002: 63). She mentions that it was used as a stimulant to the brain and hyssop tea is given to children in Lebanon who have 'colds or colic'. She believes that hyssop helps 'inflammation, degenerative arthritis and the aging process' (Krymow 2002: 64). Swenson (2003: 28) believes that hyssop has a strong medicinal smell and is possibly why it was thought to have a curative effect. According to van Wyk and Wink (2004: 177) the flowers, leaves and stems are used either fresh or

dried and an essential oil is made by steam distillation. As a traditional medicine they believe that hyssop was used 'to treat respiratory ailments (coughs, bronchial inflammation and nasal congestion).' They also mention that the 'oil is a gentle stimulant of circulation and is also used in eyewashes and as a gargle'. The essential oil can be used as a chest rub to 'treat congestion and coughs' or 'weak infusions of the herb can be taken.' According to Harrison (1966: 45) Pliny described an ancient belief regarding hyssop that was 'rooted in magic and superstition', stating that the wild hyssop 'was efficacious in the prevention and cure of bites and stings from venomous animals, reptiles and the like.'

c) Wild gourd is also known as colocynth and it 'grows in the southern part of the Coastal Plain and the Jordan Valley' (Zohary 1982a: 185). Moldenke and Moldenke (1952: 78) note that there are a number of different opinions regarding the interpretation of different Bible references – most mention 'gall' (Dt 29:18; Jr 9:15; Am 6: 12) others mention 'wild gourd' (2 Ki 4: 39-40). They believe that the plant is the *Citrullus colocynthis* and this is confirmed by Zohary (1982a: 185), King and Stager (2001: 81), Rousseau and Arav (1995: 321) and Krymow (2002: 210). According to King and Stager (2001: 82) wild gourds 'grow in the desert by the Dead Sea' and are probably what was known as 'apples of Sodom' or 'bitter apples' because they are bitter tasting. Moldenke and Moldenke (1952: 78) say that they cover 'the dry sandy regions around the Mediterranean, Red and Dead Seas, the plains of En Gedi, Beersheba, Jericho, Jaffa, Sidon and elsewhere' and note that they are a prolific producer of fruit.

Colocynth is a wild vine, the fruit of which is a deadly poison, but its seeds can be eaten and Zohary (1982a: 185) says that they can be ground up to make a kind of rough bread which the Bedouin eat in times of famine. The Bible records the story of Elisha and the prophets who were poisoned by eating stew into which 'wild vine' had been added (2 Ki 4: 39-40). The wild gourd is 'a perennial hot-desert herb' which has a thick root holding much water (Zohary 1982a: 185). There is a short stem with long trailing shoots which bear the leaves. The flowers are yellow and the fruit is round, yellow when ripe and the size of an apple. The rind is hard and smooth and inside there is 'spongy pulp and white or brown seeds.' It is used medicinally, especially for stomach pains but only a little should be used because large doses can be fatal as the 'pulp is a drastic hydragogue cathartic'. Moldenke & Moldenke (1952: 78) confirm the use of wild gourd as a purgative and note that 'the powdered gourds' are a 'powerful medicinal drug' but are also used to keep moths out of woollen clothing.

6.5.2 Modern traditional healing. Some modern herbal treatments have been discussed above (6.5.1). Rousseau and Arav (1995: 319-320) mention that 'some customs of the

Bedouin still living in the Middle East and in North Africa may go as far back as the second millennium BCE' and some of the 'traditional healers of Jesus' time perhaps used some of the healing techniques still practised among today's Bedouins.' Apparently, from studies of healing practices of the Bedouin in North Africa by J. Rousseau and 'a monograph on the healing practices of the Bedouin in the Negev' by 'Aref Abu Rabia of Beer-Sheba', they found that 'Bedouins prefer traditional healers to physicians' who are only called when traditional healing does not succeed. They have a number of basic beliefs which are similar to those of early Judaism such as that God is the supreme power and sin is related to illness. It is therefore necessary to keep the commandments and dietary rules, as well as have 'good relationships with neighbours' to maintain a healthy life. The Bedouin have a strong belief in the 'evil eye' which is seen to be a spell, cast by a devil or a person, who by looking at someone causes them harm. To prevent this from happening, there are a number of ways to ward off the evil eye, such as reciting the Koran and wearing amulets.

Bedouin traditional healing is 'most concerned with sterility, menstrual problems, impotence, digestive problems, colds, sore throat, death and illness of young children, scorpion stings, and snake bites', ailments for which they have cures (Rousseau and Arav 1995: 321-323). For instance, modern Bedouin women after menstruation drink a high concentration of fenugreek and water, as well as recite verses from the Koran, to increase the probability of falling pregnant. Nursing mothers also drink fenugreek to stimulate lactation. Bedouins also believe that the jujube tree is 'a holy plant' and perform various rites to Allah. The women believe that if they want to fall pregnant they should go to the tree and read the Koran. The fruit of mandrakes are eaten by Bedouin women during menstruation, while reciting the Koran, as a remedy against sterility. Ginger is drunk 'as an aphrodisiac' in tea, by Bedouin men. The bulb and the leaves of onions are eaten as a cure for colds, the juice smeared on the mouth, nose and hands of children as protection against diseases, onions cooked in oil are made into a plaster and 'applied on wounds to disinfect them and to draw pus', and onion peels are put on 'scorpion stings and snake bites to draw out the poison.' These are a number of traditional cures that concern plants mentioned above, and that were grown in first century CE Palestine.

Rousseau and Arav (1995: 323-324) believe that traditional healing uses natural resources such as the use of plants which is 'in common with ancient medicine'. Concerning the healings of Jesus, the Gospels do not record that he made use of plants or natural products which are used in traditional healing, such as 'leaves, seeds, roots and fruits', or 'agricultural products like wine, vinegar, and olive oil'. Although they were available, he healed uniquely and unlike the physicians and magicians of his time.

Many of the plants mentioned above are still used as home remedies and it is probable that some people living in Israel and Arab countries today make use of them. Krymow (2002: 93) mentions that myrrh resin is still used as a mouthwash and for sore mouths and throats. Myrrh today is steam-distilled and as such 'stimulates the immune system, soothes skin conditions, eliminates parasites and alleviates infections and inflammation.' Olive oil is used to treat 'burns, colds, sore throats, dermatitis and rheumatism' (Krymow (2002:97). Other uses are: it softens the skin, prevents heart disease, and 'olive leaf tea is recommended for gout and fevers'.

Unripe dates are used by Arabs as 'an astringent for hemorrhoids' and 'the Lebanese say the sugar from the fruit helps hepatitis' (Krymow 2002: 160). Other medicinal uses are treatment for asthma, chest complaints, cough and fever. Dates are also said to help cancer in the stomach and uterus, and are used for abdominal tumours.

Aloes are very much in use today as Swenson (2003: 9-10) mentions that the gel of the plant, coming from its leaves which when cut ooze a substance, is recognised as having healing properties for burns and to 'help people look younger'. Some of the other uses of aloes today are for treating sunburn, frostbite and minor skin irritations; as a laxative when taken internally; 'treatment of digestive disorders, asthma and immune deficiency'. It is also said to have 'anti-cancer properties'; and it is used for soothing the skin and beautifying it (Krymow 2002: 147). The gel is also used as a health drink.

According to van Wyk and Wink (2004: 218) the dried leaves and the oil of olives are used in medication. The leaf is used in traditional medicine as an 'anti-hypertensive'; the oil used internally is a mild laxative and promotes the discharge of bile from the system; used externally the oil is used as an emollient and to relieve pain in inflamed or irritated mucous membranes. They also mention that the vine has various traditional medicinal uses (2004: 344). Grape seed is an important source of anti-oxidants which are used by the body to 'help resist diseases'. They also note that 'red grape leaves have been used in traditional medicine to treat diarrhoea, improve circulation and to help control bleeding.' Red wine in particular, as it has 'anti-arteriosclerotic ingredients', and if drunk in moderation, is said to help control cholesterol.

Hyssop is used today to 'flavour salads, soups and stuffings' (Swenson 2003: 29). Herbalists use the leaves and flowers for teas. The oil of hyssop is used in some perfumes and also helps to make some liquors like Benedictine and Chartreuse.

6.5.3 Some medicinal plants grown in South Africa. According to Kramer (2006: 6) 'nearly half the medicines we use today are herbal in origin, and a quarter contain plant extracts or active chemicals taken directly from plants.' Research is being undertaken and only a

few thousand plants have been studied. Scientists around the world are searching for species that could form the new medicines. South Africa has a rich variety of plants, a number of which have been used to cure various complaints. Many of the plants in the Near East grown from antiquity to today, do not grow in South Africa, although there are probably various equivalents. The following are just a few plants that are also found in Israel. Some plants which are not grown in Israel are included below as they have similar medicinal properties.

6.5.3.1 Bay tree. Like its counterpart in Israel, this Mediterranean tree grows in South Africa and is used in cooking as well as in medicine. According to Kramer (2006: 39) the 'oil of the bay tree has antiseptic, antifungal and stimulant properties', while it can also be used externally to rub on aches and pains, rheumatism, sprains and bruises. This confirms the uses that ancient physicians had for the oil. Advice is also given on the treatment of 'stomach disorders, colic, stomach bloating' and the preparation and dosage for 'mouth ulcers and inflammation of the mouth.'

6.5.3.2 Cumin. Cumin is grown from seed and enjoys warmth and sunshine, being harvested in summer. Cumin is one of the ingredients in curry and other spice mixes but is also used medicinally. The seeds are used, 'either whole or ground, in infusions' (Kramer 2006: 76). The essential oil made from the seeds is 'colourless or pale yellow' and has a 'musky smell and a bitter aromatic taste'.

As the essential oil contains flavonoids and anti-inflammatory properties, it is 'beneficial in treating minor circulatory disorders.' Cumin can be used internally and is effective in treating 'indigestion, flatulence and stomach infections'. Research has shown that cumin can be used as a food preservative, disinfectant and astringent as it combats various bacteria. Used externally, cumin is added to creams and ointments to treat painful joints. Research has also shown that cumin 'might be beneficial in the treatment of thrombosis and inflammation.' As in the past with folk medicine, cumin is sometimes used during breast-feeding to relieve tension in the breasts, to stimulate lactation and menstruation. Cumin is also said to have aphrodisiac properties, which is confirmed by the use of it by Bedouin men in the East.

6.5.3.3 Aloe. In South Africa the aloe that grows profusely in the south-eastern part of the country, is the *Aloe ferox*. The better known *Aloe vera* grows in the 'dry regions of north Africa and the Mediterranean basin' (Kramer 2006: 31). Van Wyk and Wink (2004: 40, 41) discuss both plants which have similar properties. Both use the different parts of the leaf, the outer covering and the inner pulp. From the substances that exude from the outer cut leaves, some is dried and forms a brown resin which is used as a laxative and a basis for

tonics, while the gel from the pulp is used in ointments for healing wounds, but also used as a tonic. This gel has 'antibiotic, anti-inflammatory and antiseptic effects' and as such is used in the treatment of psoriasis and eczema (Kramer 2006: 31). It is also used to treat 'radiation burns' and because of 'its soothing, moisturising and healing effects' it is used to treat 'wounds, burns, acne, anal fissures and haemorrhoids.' It can also be used against sunburn and research has been done as to whether it can be used as a treatment for rheumatoid arthritis. Herbal practitioners warn that the main property of *Aloe ferox* is as a laxative and so should not be taken internally, but there is a tonic which aids digestion and stimulates the immune system. Van Wyk and Wink (2004: 40) maintain that 'fresh bitter sap is instilled directly against conjunctivitis and sinusitis.'

6.5.3.4 Myrrh. The botanical name is *Commiphora myrrha* and van Wyk and Wink (2004: 111) call it African myrrh as it grows in many dry parts of Africa such as Somalia and Ethiopia in north-east Africa, as well as in South Africa. Dugmore (2007c: 92) indicates that the South African myrrh is not the same species as grows in Arabia but is still, after 2000 years, used in traditional medicines in the Middle East and Africa. She maintains that there is a large market and the price is high because of its healing properties. According to her source, van Wyk, 'myrrh has excellent antiseptic, anti-inflammatory and antimicrobial qualities.' To treat throat infections and tonsillitis an infusion is made by 'pouring a cup of boiling water onto 1 or 2 teaspoons of powdered gum resin mixed with crushed myrrh leaves' which must then be 'drunk three times a day.' It is also an effective healing plant, and because 'it is naturally designed for wound healing' of trees, it is also used for healing human wounds. Dugmore explains that for medicinal use, the dried nuggets of gum resin 'are either crushed into powder or steam-distilled to create an essential oil' which can be applied to wounds. Other uses of myrrh by traditional healers are 'the treatment of mouth ulcers, sore teeth and gums'. A tincture is prepared for this purpose, made of 'powdered resin dissolved in alcohol.' Van Wyk and Wink (2004: 111) note that myrrh is used to treat the common cold (for 'the relief of nasal congestion and cough').

Not only is myrrh used in Africa and the Middle East, but also Chinese traditional medicine makes use of myrrh and frankincense, both aromatic herbs which are 'bitter and pungent' and are used to 'disperse congealed blood and are very effective for relieving pain'. Used together, these herbs 'enhance the therapeutic effect' (Dugmore 2007c: 92).

6.5.3.5 Wild olive. The botanical name for the South African species is *Olea Africana* which grows wild, while the cultivated *Olea Europaea* grows in Mediterranean countries and also in South Africa. According to Dugmore (2007b: 98) the only difference between the two wild species of olives, is that the wild European olive became domesticated, but the wild African olive remained wild. Apparently it is easy to recognise a wild from a

domesticated species of olive as the domesticated olive has fleshier fruit. Although the fruit of the wild olive is 'edible and rich in nutrients' it is not as tasty as commercial olives and is only eaten in times of famine.

The plant has many different medical uses throughout Africa and in 'Southern Africa it is regarded as one of the most important African traditional medicinal plants.' It is used primarily as an anti-inflammatory and van Wyk is quoted in the article as saying, 'its anti-inflammatory effects are scientifically documented', having 'significant anti-spasmodic, anti-oxidant and lipid-lowering activities.'

The scrapings of the root and bark in Zulu culture are 'used to treat urinary tract infections, bladder infections and headaches', while 'in the Xhosa culture the leaves are boiled in water to make a decoction which is used as a gargle to treat sore throats.' This 'same decoction is used throughout Africa as an eye lotion for humans and animals.' To reduce blood pressure 'a tincture or infusion of the leaves' is used in traditional medicine throughout Africa. One chemical substance in the leaf is 'oleuropein' which 'lowers blood pressure by increasing coronary flow' thus working in combination on different mechanisms of the body. The other chemical substance is 'oleacein which inhibits the ACE enzyme: one of the enzymes in the body associated with high blood pressure.'

6.5.3.6 Mustard tree. Dugmore (2007a: 103) notes that the botanical name for this shrub or small tree growing to a height of up to 5 metres is *Salvadora persica*. She says that as its name suggests, the tree originally came from Persia so it has a long history, but it is also 'a native of Africa' where it is found along the watercourses in the desert regions. The Damara tribe in Namibia call the tree 'khoris' and 'the place where it grows is called Khorixas meaning "place of the khoris".' It is a plant that thrives in the desert and possibly this gave the Damaras 'a sense of eternal hope' in their hot, dry land.

Walker (1957: 134) says that the mustard tree grows wild in many parts of the world, 'including Palestine, where it is also cultivated'. Van Wyk and Wink (2004: 70) note that in other parts of the world it is the ripe seeds that are used and that the black mustard (*Brassica nigra*) is a 'source of pungent mustard oil'.

Dugmore (2007a: 103) mentions that the tree grows from a tiny seed which is 'brown and a few millimetres in diameter'. It is a shrubby tree with many stems and 'bright green fleshy leaves and small pink berries', which are edible but tasteless. It is however, the roots that have important medicinal qualities and not the seed. Traditional African healers take the roots and make them into an infusion which is considered highly effective for stomach ailments. Walker (1957: 134) mentions that today mustard is 'used to make poultices or plasters for external application to the body as a cure for some illnesses.'

The tree is also called the 'toothbrush tree' for the roots are used as a toothbrush in rural areas where a western-style toothbrush is not available. According to studies 'the root extracts ... have powerful antibacterial and anti-plaque properties and are therefore essential for "oral hygiene".' The indigenous toothbrush from the root of the mustard tree is known as 'Miswak' in the 'Afro-Arab world' and 'Miswak' has become 'the brand name for a tooth-cleaning product', the main ingredient being the root of the mustard tree. According to van Wyk and Wink (2004: 282) the roots are sold as 'toothbrush sticks or chewing sticks on local markets' and herbal toothpaste is also manufactured.

Dugmore (2007a: 103) says that the mustard tree benefits 'the stomach and mouth' and inspires faith, but it is also 'a wound healer'. The Masai in Kenya pulverise the bark and use it as a plaster. The plaster burns, as does mustard. Dugmore suggests that this is 'what is known as a "counter-irritant", where the burn of the wound is countered by the burn of the mustard' and one thus forgets about the original pain.

CHAPTER 7

CONCLUSION

Syrio-Palestine is at the cross-roads of Europe, Asia Minor and Africa, and it is unique in that this narrow strip of land contains a wider range of plant species which 'existed in Biblical times' and 'grow there today' than Britain or Spain (Swenson 1995: 8). However, as explained above, in this dissertation the Seven Species of Deuteronomy were discussed together with some other interesting and useful plants. Swenson notes that 'scientists estimate' that this region was fertile, and lush vegetation grew there about 'fifteen thousand years ago', but 'times and events' have altered the land. Even so, he explains, 'plants have been tougher and more resilient', which is fortunate for man. This dissertation covered the period when the the land was mainly semi-arid and arid, thus contributing to the hardship of the settlers who sought to cultivate the ground and tame the wilderness. As discussed above, farming artefacts, buildings and irrigation systems, for example, reflect their way of life and their attempts to wrestle a living from the land.

Trees and plants need different climates and soil types for optimum growth. Syrio-Palestine consisted of a number of different areas classified according to amount of rainfall and the subsequent affect it had on soil types. Modern research into the climate and weather, the topography of the land and its ecology, have lead to a better understanding of the reason for certain plants to be found in this region. This has led to improved farming methods, resulting in effective cultivation of the soil and increased productivity as is evident in modern Israel. The ancient peoples of biblical times, however, did not have science to assist them and they had to make use of their senses. Many were influenced by the moon in their farming efforts and the Israelites followed the lunar calendar. Today one notes that the Jewish calendar is a lunisolar calendar which is used for predominantly religious purposes (http://en.wikipedia.org/wiki/Hebrew_calendar).

Agriculture had been practised in Syrio-Palestine long before the Israelites settled there. It took thousands of years for the cultivation of plants, many species of which have changed and been modified. Farming methods today have been changed and improved resulting in fewer labourers being needed and scientific procedures being followed. However, in numerous countries in the world today, especially in the developing countries, the same farming activities with very similar tools are carried out. A Google search on the Internet provides a plethora of pictures and notes on ancient farming implements and methods that are even used today. Mention was made of tools that improved from the Bronze Age, and particularly in the Iron Age, when the bronze and flint blades of sickles, pruning knives and

hoes, for example, were replaced by iron parts. Uncultivated land was claimed and worked, so that even in some desert areas such as in the central Negeb, farming settlements were founded. Modern Israel, with its irrigation systems and fertilisers, hard work and scientific approach, is reclaiming land that lay dormant for hundreds of years.

Even though Syrio-Palestine was conquered and overrun many times by different nations, the cultivation of crops continued. In some periods there was a decline due to war or disinterest in agriculture. According to Mazar (1990: 118) 'paleoenvironmental research' and the studies of plant and animal remains, has helped in reconstructing the pattern of agriculture and diet in the Early Bronze Age. However, this is true for the other periods as well, as scientists and archaeologists have studied the area and have built up a picture of the past. Mazar explains that 'the traditional Mediterranean agriculture was already well-developed' by about 3300 – 2300 BCE. Apparently the rainfall was heavier, as studies have shown, and the water table was therefore higher. This in turn had an effect on plants and life in the area. This confirms Swenson's findings above.

Plants that were growing in the different regions were wheat and barley, peas, lentils, chickpeas and flax. In some places olives, figs, grapes, pomegranates and dates were grown. In the hill country grape vines and olive trees became major crops at this time. Mazar (1990: 118) notes that 'agricultural specialization that was adapted to regional environmental conditions' took place in the Early Bronze Age. The introduction of the animal-drawn plough was another innovation which affected farming. This period thus saw the 'emergence of horticulture as a major occupation'. The result was that surplus products were traded and cities began to be established as more people settled in the area. Literary sources and archaeological discoveries have assisted in dating and identifying the buildings and objects excavated and our knowledge of life in ancient times has been increased.

Farming is said to have been built on 'twin pillars' – 'cultivating crops and caring for animals' (Thompson 1986: 132). This dimorphic economy benefited both agriculturists and herders. This became apparent from the need for labour to be diversified and the use of certain plants for animals, and the benefit animals had in fertilising the ground thus improving the quality and quantity of the crops. Matthews and Benjamin (1993: 24) note that both men and women in the villages were involved in herding and farming, as the women helped to 'manage the herds, clear new fields, construct terraces, harvest, thresh, and winnow the fields, orchards, and vineyards' apart from planting, hoeing, weeding, and caring for the garden and picking the crops. Men were primarily involved in the farming and herding activities but Matthews and Benjamin (1993: 25) point out that women had the important role of being responsible for the management of the 'subsistence economy of

the household which included a number of activities'. The mother organised the manufacture of 'soap, pottery, baskets, cloth, and tools'. She 'determined how much food was to be consumed and how much was to be stored as beer, parched grain, and dried vegetables' so that it was the mother who had complete control in her home, as she had to make sure that everyone was fed and that there was enough food for the next meals, as well as ration the use of oil for the lamps. The mother also had to bear children and bring them up, teaching them the correct way to dress, to clean themselves and to assist in the tasks in the home. The mother also explained why the family ate different foods at harvest festivals from those they ate everyday and she taught the children how to herd, garden, and cook, as well as many other skills.

Psalm 104: 15 mentions the three main crops grown in Syrio-Palestine: wine from grapes to make 'the heart of man' glad, oil from olives 'to make his face shine', and grain made into bread 'to strengthen his heart'. According to Frankel (1999: 38) the vine, olive and wheat 'are the three traditional staple products of Mediterranean dry farming'. Frankel points out that their products of wine, raisins, olive oil and grain 'could be stored indefinitely.' He notes too, that apart from being the basic foodstuffs in a human diet, they also 'played a crucial role in the economic history of the region' and throughout the ages 'were an integral part of the cultures, languages, religion, literature, art, customs and folklore' of many of the nations around the Mediterranean. However, he mentions that from analyses made by scholars, which is fairly limited, olive oil was 'a staple product of importance' for 'Iron Age Judaea and Israel and Late Bronze Age Ugarit', but probably excluded 'the poorest part of the population' (Frankel 1999: 45). McNutt (1999: 68) notes that from surveys and excavations of hill country villages in early Iron Age I, there is an indication that the people were isolated and had 'a very simple material culture.' There was a subsistence economy and according to McNutt (1999: 70) 'subsistence strategies ... varied from region to region – dry farming in the flat open areas, horticulture in the mountainous areas, animal husbandry in the desert fringe, and summer pasturage in other parts of the highlands.' This indicates that 'the dominant economic activities in Iron Age I were associated with agriculture.' McNutt (1999: 71) notes that 'types of crops differ according to ecological zones' so that 'in the coastal Mediterranean zone, vines, cereals, and olive and fruit trees' were grown; and in the highlands of Judah, 'wheat and barley, grapes and olives' and herding was carried out over the whole area.

From the above chapters on cultivation and uses of plants in Syrio-Palestine, it can be extrapolated that throughout the history of the region, farming was of great importance, and that even in the lean years of war, destruction and neglect of the land, some farmers continued to eke out an existence with the basic crops of grapes, olives and wheat. They

also grew other crops such as pulses and vegetables for their own use, as well as gathered roots, bulbs and leaves from the fields. Spices and herbs were either grown, such as coriander, mint and black cumin, or picked from the wild, such as rue, hyssop and cumin (Vamosh 2007a: 74-77). Botha (2000: 127) notes that the 'Palestinian peasants' did not only farm a single crop, but that they worked on a rotation system, following a two or three year cycle in which 'a third or a quarter of the fields were left fallow on a rotating system'. This meant that they 'grew a little wheat, owned a few olive trees, a few fig trees, and a few lovingly tended vines' and they also kept some livestock. He says that 'the peasant in antiquity should be considered a gardener rather than a farmer.' Vamosh (2007a: 23) notes that grain, particularly wheat, 'can be considered the perfect vegetable food source' as the kernels contain 'carbohydrates, proteins, fats, minerals, and vitamins', hence the need to grow healthy crops.

Agriculture was the predominant occupation in the ancient world so much so that Botha (1999: 3) states that in the Roman period, 'the whole economy of the Mediterranean world' depended on agriculture as land was 'the main source of wealth'. Borowski (2003: 14) notes that agricultural land was so precious, particularly in the hill country in the Iron Age, that villages were built on 'rocky outcrops or steep slopes' or even on hill tops for defence purposes, but that the farmer would not have sacrificed agricultural land, 'unlike present-day practices'. Villages were built near the fields where they worked and also close to country roads for communication to other towns and villages. He points out too, that in the premonarchic period, bartering was the way in which the small surpluses were used for other necessary items, as the farmers were mostly self-sufficient.

Botha (2000: 127) points out that due to the harsh climate and the poor soil, farmers had difficulty in supporting themselves and their families. One of the problems was that diseases such as various 'rusts' attacked the plants and destroyed them, thus causing famine. According to Haggai 2:17 the Lord in his anger struck all the works of their (the Israelites) hands 'with blight, mildew and hail', but even then the people did not turn to him (Botha 2000: 97). These diseases affected the farmers badly as any loss to their crops meant less food for the family.

According to Matthews and Benjamin (1993: 38-39), it was necessary for each village to adapt its 'farming techniques to match the potential of its environmental conditions with its existing technology.' Labour was extremely important and the farmers used a 'variety of techniques.' Some of these were: to have as many children as possible; pool their resources; manage their time; plant a variety of crops so that sowing and harvesting were spread out over the year; use staggered sowing by planting a single crop at different stages and harvesting it at different times so less labourers were required, as well as being

a kind of insurance that if some of the crops failed others might be saved. Matthews and Benjamin (1993: 40-41) point out that the crops, the Seven Species mentioned in Deuteronomy, assisted the farmers with 'crop mixing' and therefore with different times for sowing and harvesting. Other activities that needed co-operation and pooling of labour were: clearing the land; terracing the fields; planting crops, cultivating and harvesting. Borowski (2003: 26) points out that if the fields were not close to the village and required some distance to be travelled, the labourers preferred to stay overnight in the field, while some who lived closer would 'travel to and from the workplace in the dark'. These activities and the various crops mentioned above indicate the importance of family unity and communities working together and assisting one another.

Matthews and Benjamin note that the pillared houses, which they say appeared after 1250 BCE in Syrio-Palestine, have been excavated and indicate that the extended family lived together and that three basic needs were met: 'living and working space, space for livestock, and storage space for grain, animal fodder, and products such as wool'. Borowski (2003: 63) notes that 'not much can be done without nourishment' which meant that the majority of the Israelite family's time was occupied with 'tilling the land, herding, or a combination of the two', and preparation of food. Although there was a prohibition against eating certain meats, there was no prohibition against plants, so one can assume that plants and fruits could be freely eaten, except where they were toxic and caused illness, or even death. Plants that were sustaining and healthy, such as dates, olives, grapes, wheat and barley were discussed above.

The availability of water was probably the most important element when settling down and building a house. 'Without water, no human, animal, or plant can survive' (Borowski 2003: 4). Much of the land suffered from a shortage of water and as explained above, the farmers had to use a number of ways to store water, such as in cisterns, or to dig wells. Many of the rivers and brooks did not flow all year but were dry for much of it, needing the rain to fall so that the dry riverbeds would once more run with water and the channels be utilised to water the fields. Villages were established around perennial springs and oases in the desert were also supported by springs (Borowski 2003: 6). According to Borowski (2003: 122) one of the tasks that required attention was the cleaning of the cisterns, particularly the large communal ones used by the villagers. This was a task that required two men to climb into the cistern to remove the silt that accumulated and hand it to a third man who dumped it to be used as fertiliser on the gardens and trees near the houses. The roles are changed from time to time, as in the other farming tasks, so that the men did not get too exhausted.

Most of the year was occupied with the various physically demanding activities discussed above, but according to Botha (2000: 128), there were times when some tasks were 'reserved for quiet times', such as maintenance of equipment. Implements made of iron had to be carefully stored against bad weather. He notes that basketry-making as an industry was carried out in winter months, as well as making beehives, ropes, and wooden poles. There were a number of different tasks, even the collecting of dung, which it appears was assigned to the older women, who then made dung cakes to be used as fuel. Borowski (2003: 118-119) notes that the women tended the gardens next to their homes. There would be 'fig, pomegranate, apricot and carob trees' growing, and between them would be 'beds of cucumbers, leeks, garlic, and watermelons' so that they would have a varied diet while the crops lasted. Other necessary chores were to fetch the water from the well, tend the compost heap by adding kitchen scraps and digging them in, and collecting the 'greens and roots' to be used as a supplement to their daily diet.

Part of the annual farming cycle was harvest time and the Israelites enjoyed festivities and festivals with dancing, singing and merry-making. At the Feast of Passover, the barley harvest was celebrated, while fifty days later the Feast of Pentecost celebrated the bringing in of the wheat harvest. The Feast of Tabernacles celebrated the final harvest of the year with the bringing in of the fruits, such as olives, pomegranates and dates as well as wine from the grape harvest. The peoples of the ancient world celebrated and gave thanks to their gods for the harvest, while the Jews were meant to give thanks to Yahweh at their feasts, but were often disobedient and followed after the other nations' gods and worshipped their idols.

Matthews and Benjamin (1993: 162) mention that what 'gave birth to the state', as opposed to individual villages, was the agricultural crisis. 'The fragile nature of the environment made it impossible for some villages to compete' and it was therefore necessary for them to join 'more efficient villages'. The population grew with extended economic opportunities and growing markets in agricultural products, so more and more land was reclaimed. The power came increasingly under a small 'ruling elite', so that by '1000 BCE Hebrew villages in the hills had developed all the land available for farming and herding'. The villages needed 'a social system to protect their land and feed their children'. There was so much repetition, as the villages worked the same land, used the same natural resources, faced the same enemies; and produced almost the same products. This meant that if the economy of one village was destroyed for any reason such as drought and famine, the economies of the other villages were affected. However, the state covered a much broader region incorporating a number of different ecological zones, with villages

and cities, and it was therefore more able to insure itself 'against adverse changes in natural resources, weather and climate.'

The people living in the Ancient Near East found a use for nearly every plant in their region. Those who lived there made use of trees and plants from the forests on Mount Lebanon to the scrubby bushes of the desert areas. Botha (2000: 16) points out that Pliny in the first century CE noted that many of the perfumes originated from the 'natural smells of the forest and desert, which attracted humans' but that most of the substances used in the perfumes were not native to Syrio-Palestine and were imported via traders from among such countries as Arabia, India, Nepal, and certain regions in North Africa. He notes that 'a great many wild vegetables were consumed' and that it was these plants in their diets that protected the people from 'various vitamin deficiencies' (Botha 2000: 87). However, he does mention that many of the people at the time of Jesus, suffered from a variety of complaints such as 'malnutrition and undernourishment' (Botha 1999: 37). He says that the diet of the ancient peoples was 'mainly vegetarian' of which more than half 'the daily caloric intake' was made up of cereals, the rest consisting of 'legumes and fruit' (Botha 2000: 94).

Although food crops were the most important plants grown, as mentioned above, plants also had other uses, such as flax for clothing, herbs and spices for perfumes, cosmetics and medicines and wood, which was mostly used for tools, household appliances and furniture, especially the hard woods such as oak and olive. Some trees were used for rafters of houses. Although there was simple furniture in the home such as stools, benches, chests, maybe a table and beds, it appears from discoveries that the rich enjoyed far more luxury, as can be seen from excavated ornate wooden objects, such as a bed with inlaid ivory and decorated small tables. Botha (2000: 131) points out that timber was more plentiful in Syrio-Palestine than it is today, as there were far more trees. The landscape has changed and is different from the ancient past. Another indication of climate change, regarding temperature found in the 'carbon isotopes in buried wood' in the first century CE, is that it was cooler and more rain fell.

Both Wight (1953) and Mackie (1991) have studied life in the Near East and the Oriental manners and customs of the Arabs, and have found that this has brought the Bible to life. According to Wight (1953: 7-8) it is the Arabs living in the Near East 'who have become the conservators of the manners and customs of Bible times'. He describes three classes of Arabs: 'the Nomad or Bedouin Arab', 'the Peasant or Fellahin Arab', and 'the City or Belladin Arab'. The first group are the shepherds who live in tents and whose customs have changed little, and the second group are the farmers usually living in a one-room house and whose customs have practically not changed at all. It is the third group who live

in towns and cities and who have 'come into contact with western civilization' who have changed the most. Mackie (1991: 176) notes that there is a 'great array of surviving thoughts, habits and institutions that explain and confirm' similar details in the Bible. Wedding customs have not changed much, herding is carried on as before, and farming in many parts is carried on as it was hundreds and even thousands of years ago. Many of the people rely on traditional medicines and have many superstitions such as 'the evil eye' for which they use charms and incantations. Some plants such as the mandrake are held to be 'a charm against evil spirits' (Krymow 2002: 218). Rousseau and Arav (1995: 321) note that apart from animals, animal products and minerals, the 'Bedouins make medicinal plants the bulk of their pharmaceutical resources' wherever they live.

Although sections were devoted to plants used in perfumes, cosmetics and medicines, there are many more plants with these properties which were not discussed. In November 2008 in Cape Town, South Africa, a conference attended by delegates from many parts of the world, was held to discuss medicinal plants. What might be considered an historical treatise, has therefore feelers into the present and the future. Traditional or folk remedies are coming under the spotlight as scientific methods are used to discover their curative properties. This dissertation can be extended by further study of plants and the value they have for life on earth today.

Van Wyk and Wink (2004: 7) note that 'traditional cultures all over the world' make use of 'medicinal plants and plant-derived medicine' in modern society. People are seeking to find 'natural alternatives to synthetic chemicals'. Van Wyk and Wink believe that more than 50 percent of all drugs in clinical use in the world today consist of 'natural products and their derivatives.' They have included 'more than 320 plants and their relatives' in their book, but suggest that as the subject is so vast, one should consult their list of 'Further Reading'. Kramer (2006: 5) explains that '*Nature's medicines*' is devoted to mainly an A to Z of plants and an A to Z of more than 130 common illnesses. Although the section on plants gives guidelines on self-medication there is a warning that a medical herbalist should be consulted and that the dosage should not be exceeded. With a scientific approach today, there is far more information on the properties of plants, whereas the ancient people were forced to use plants by trial and error. The writings of many ancient Greek and Roman writers have played a part in laying a foundation for modern plant medicine, but as mentioned above, the Bible has almost nothing to say about healing plants, as those who suffered were meant to look to God for their health and welfare.

This dissertation has been a comprehensive literature survey and has not come to any scientific or empirical conclusions. The investigation was into the cultivation of the land a large amount of background information was given concerning the history and geography

of the region. The bulk of the dissertation concentrated on the plants grown and their uses and included a number of indigenous trees and plants such as acacias and oaks, and herbs such as balsam and mandrake. The treatise does not include any new knowledge as the information was obtained from books, periodicals and the Internet but was arranged in such a way that further study can be conducted from various angles. Some ideas for further study are a comprehensive study of all plants of the region; indepth study into farming implements and their development through the ages; or an evaluation of medicinal plants in Israel and South Africa. Traditional healing plants and their properties and uses could be further expounded. Bible texts, of which there are hundreds, could be investigated and discussed with regard to archaeology and the explanations that can enhance the meaning of the scriptures. This thesis is mainly a contribution to the importance of farming in Bible times and lands, and the plants and trees that provide the needs of the people of ancient times as well as our daily needs.

BIBLIOGRAPHY

Aharoni, Y & Avi-Yonah, M 1977. *The Macmillan Bible Atlas*. New York: Macmillan Publishing.

Alcare 2007. *Alcare catalogue: July 2007*. Albertinia: Alcare.

Alexander, P & Alexander, D 1999. *The Lion Handbook to the Bible*. Oxford: Lion Publishing.

Aviam, M 2004. *Jews, pagans and Christians in the Galilee: 25 years of archaeological excavations and surveys: Hellenistic to Byzantine periods*. Rochester, New York: University of Rochester Press.

Beers, RA et al 2003. *Illumina Gold*. Wheaton, Illinois: Tyndale House Publishers.

Beers, V G 2003. *Journey through the Bible*. London: Monarch Books.

Berlinger, M (ed) 1969. *Plants of the Bible in their natural surroundings*. Haifa: Department of Education and Culture.

Bimson, JJ et al 1985. *New Bible Atlas*. Leicester: Inter-Varsity Press.

Borowski, O 1979. *Agriculture in Iron Age Israel*. Ann Arbor, Michigan: University Microfilms International, University of Michigan Press.

Borowski, O 2003. *Daily life in Biblical times*. Atlanta: Society of Biblical Literature.

Botha, PJJ 2000. *Everyday life in the world of Jesus*. Pretoria: Biblia Publishers.

Botha, PJJ 1999. Homes and families in first century Galilee. *BAR 303-C Reader*. Pretoria; Unisa.

Brickner, D 2006. *Christ in the Feast of Tabernacles*. Chicago: Moody Publishers.

Brickner, D & Robinson, R 2008. *Christ in the Feast of Pentecost*. Chicago: Moody Publishers.

Craffert, PF (comp) 1993. *Discovering the First-Century Mediterranean World. Reader for BAR212-A*. Pretoria, Unisa.

Cauvin, J (tr T Watkins) 2000. *The birth of the gods and the origins of agriculture*. Cambridge: University Press.

Clements, RE (ed) 1989. *The world of Ancient Israel: sociological, anthropological, and political perspectives*. Cambridge: Cambridge University Press.

Darom, D [200-]. *Beautiful plants of the Bible*. Herzlia: Palphot.

de Herrera, GA 2006. *Ancient agriculture: roots and application of sustainable farming*. Layton, Utah: Ancient City Press.

Deist, FE 2000. *The material culture of the Bible: an introduction*. Sheffield: Sheffield Academic Press.

DeVries, LF 1997. *Cities of the Biblical World*. Peabody, Massachusetts: Hendrickson Publishers.

Dimbleby, GW 1967. *Plants and archaeology*. London: John Baker.

Dowley, T 2002a. *Life in Bible times*. Carlisle, Cumbria: Candle Books.

Dowley, T 2002b. *The world of the Bible*. Carlisle, Cumbria: Candle Books.

Dugmore, H 2007a. Seed of faith. *SACL* 129, 102-103.

Dugmore, H 2007b. The wild and wonderful olive. *SACL* 128, 98-99.

Dugmore, H 2007c. Worth its weight in myrrh. *SACL*.127, 92.

Edelstein, G & Gibson, S 1982. Ancient Jerusalem's rural food basket: the "new" archaeology looks for an urban center's agricultural base. *BAR* 8 (4), 46-54.

- Esse, DL 1991. *Subsistence, trade, and social change in Early Bronze Age Palestine*. Chicago: The Oriental Institute of the University of Chicago.
- Feliks, Y 1981. *Nature and man in the Bible: chapters in biblical ecology*. London: Soncino Press.
- Frankel, R 1999. *Wine and oil production in antiquity in Israel and other Mediterranean countries*. Sheffield: Sheffield Academic Press.
- Gardner, JL (ed) 1981. *Atlas of the Bible: an illustrated guide to the Holy Land*. New York: The Reader's Digest.
- Garrett, DA (ed) 2005. *NIV Archaeological Study Bible*. Grand Rapids, Michigan: Zondervan.
- Goor, A 1965. The history of the fig in the Holy Land from ancient times to the present day. *EB* 19 (2), 124-135.
- Goor, A 1966a. The history of the grape-vine in the Holy Land. *EB* 20 (1), 46-64.
- Goor, A 1966b. The place of the olive in the Holy Land and its history through the ages. *EB* 20 (3), 223-243.
- Goor, A 1967. The history of the pomegranate in the Holy Land. *EB* 21 (3), 215-230.
- Grant, W 1984. *The history of Ancient Israel*. London: Phoenix.
- Grmek, MD 1989. *Diseases in the Ancient Greek world*. Baltimore: Johns Hopkins University Press.
- Harpur, J (ed) 1987. *Great events of Bible times*. New York: Doubleday.
- Hareuveni, N 1980. *Nature in our Biblical heritage*. Kiryat Ono, Israel: Neot Kedumim.
- Hareuveni, N 1984. *Tree and shrub in our Biblical heritage*. Kiryat Ono, Israel: Neot Kedumim.

Harris, RL1995. *The world of the Bible*. London: Thames and Hudson.

Harrison, RH 1966. *Healing herbs of the Bible*. Leiden: EJ Brill.

Heaton, EW 1956. *Everyday life in Old Testament times*. London: Batsford.

Herbalife International of America. *Herbalife 2008*. Los Angeles: Herbalife.

Hirschfeld, Y & Vamosh, M F 2005. A country gentleman's estate: unearthing the splendours of Ramat Hanadiv. *BAR* 31 (2), 18-31.

Homan, MM 2004. Beer and its drinkers: an ancient Near Eastern love story. *NEA* 67 (2), 84-95.

Hopkins, DC 1985. *The Highlands of Canaan: agricultural life in the Early Iron Age*. Sheffield: Almond Press.

Hopkins, DC 1987. Life on the land: the subsistence struggles of Early Israel. *BA* 50 (Summer) 178-191.

Kee, HC 1986. *Medicine, miracle and magic in New Testament times*. Cambridge: Cambridge University Press.

King, PJ & Stager, LE 2001. *Life in Biblical Israel*. Louisville: Westminster John Knox Press.

Kislev, ME 2006. Early domesticated fig in the Jordan Valley. *Sc* 312 (5778) 1372-1374.

Kramer, P (ed) 2006. *Nature's medicines: a guide to herbal medicines and what they can do for you*. Claremont: Reader's Digest.

Krymow, V 2002. *Healing plants of the Bible*. Cincinnati, Ohio: St. Anthony Messenger Press.

Lev-Yadun, S et al 2006. Comment on "Early domesticated fig in the Jordan Valley". *Sc* 314 (5806) 1683.

Lloyd Davies, M & Lloyd Davies, TA 1991. *The Bible: medicine and myth*. Cambridge: Silent Books.

Mackie, GM 1991. *Bible manners and customs*. Westwood, New Jersey: Barbour.

Matthews, VH 2002. *A brief history of Ancient Israel*. Louisville: Westminster John Knox Press.

Matthews, VH 1991. *Manners and customs in the Bible*. Peabody, Massachusetts: Hendrickson Publishers.

Matthews, VH 2007. *Studying the Ancient Israelites: a guide to sources and methods*. Grand Rapids, Massachusetts: Baker Academic.

Matthews, VH & Benjamin DC 1993. *Social world of ancient Israel 1250-587 BCE*. Peabody: Massachusetts: Hendrickson Publishers.

Mazar, A 1990. *Archaeology of the land of the Bible: 10,000 – 586 BCE*. New York: Doubleday.

McCarter, SF 2008. A revolution – 12,000 years ago. *BAR* 34 (2) 76.

McNutt, PM 1999. *Reconstructing the society of Ancient Israel*. London: SPCK.

Millard, A 1990. *Discoveries from the time of Jesus*. Oxford: Lion Publishing.

Moldenke, HN & Moldenke, AL 1952. *Plants of the Bible*. Waltham, Massachusetts: Chronica Botanica.

Noth, M 1964. *The Old Testament world*. London: A & C Black.

Packer, JI & Tenney, MC 1980. *Illustrated manners and customs of the Bible*. Nashville: Thomas Nelson Publishers.

Palmer, B (ed) 1986. *Medicine and the Bible*. Exeter: The Paternoster Press.

Peelman, N 1975. *The plants of the Bible*. New York: Morehouse-Barlow.

Pfeiffer, CF 1965. *Ancient Israel: from patriarchal to Roman times*. Grand Rapids, Michigan: Baker House.

Renfrew, JM 1973. *Palaeoethnobotany: the prehistoric food plants of the Near East and Europe*. London: Methuen.

Rollefson, G 2008. A revolution – 12,000 years ago. *BAR* 34 (2), 76.

Rosner, F 1977. *Medicine in the Bible and the Talmud: selections from classical and Jewish sources*. New York: KTAV Publishing House.

Rousseau, JJ & Arav, R 1995. *Jesus and His world*. Minneapolis: Fortress Press.

RW Research 2005. *Rose book of Bible charts, maps and time lines*. Torrance, California: Rose Publishing.

Sharon, I & Gilboa, A 2008. Lentils at Tel Dor. *VoP* Issue #8. Jan/Feb, 12-13.

Shewell-Cooper, WE 1962. *Plants and fruits of the Bible*. London: Darton, Longman & Todd.

Shewell-Cooper, WE 1977a. *God planted a garden: horticulture in the Bible*. Evesham: Arthur James.

Shewell-Cooper, WE 1977b. *Plants, flowers and herbs of the Bible: the living legacy of the third day of creation*. New Canaan, Connecticut: Keats Publishing.

STRATA, 2006. A tree grows in the desert. *BAR* 32 (4), 12.

STRATA, 2008. What is it? *BAR* 34 (5), 22, 76.

Swenson, AA 2002. *Flowers of the Bible and how to grow them*. New York: Citadel Press.

Swenson, AA 2003. *Herbs of the Bible and how to grow them*. New York: Citadel Press.

- Swenson, AA 1995. *Plants of the Bible and how to grow them*. New York: Citadel Press.
- Thompson, JA 1986. *Handbook of life in Bible times*. Leicester: Inter-Varsity Press.
- Vamosh, MF 2007a. *Daily life at the time of Jesus*. Herzlia: Palphot.
- Vamosh, MF 2007b. *Food at the time of the Bible*. Herzlia: Palphot.
- Van Wyk, B-E & Wink, M 2004. *Medicinal plants of the world*. Pretoria: Briza.
- Walker, W 1957. *All the plants of the Bible*. New York: Harper Row.
- Ward, K 1987. *Jesus and His times*. New York: The Reader's Digest.
- Wear, A (ed) 1992. *Medicine in society: historical essays*. Cambridge: Cambridge University Press.
- Weiss, E & Kislev, ME 2004. Weeds and seeds: what archaeobotany can teach us. *BAR* 30 (6), 32-37.
- Westenholz, JG (ed) 1998. *Sacred bounty sacred land: the seven species of the land of Israel*. Jerusalem: Bible Lands Museum.
- Wight, FE 1953. *Manners and customs of Bible lands*. Chicago: Moody Press.
- Wilkins, J, Harvey, D & Dobson, M 1995. *Food in antiquity*. Exeter: University of Exeter Press.
- Zohary, M 1982a. *Plants of the Bible*. Cambridge: Cambridge University Press.
- Zohary, M 1982b. *Vegetation of Israel and adjacent areas*. Wiesbaden: Reichert.
- Zondervan 1998. *Zondervan Reference Software*. Grand Rapids: Michigan: Zondervan.

ABBREVIATIONS

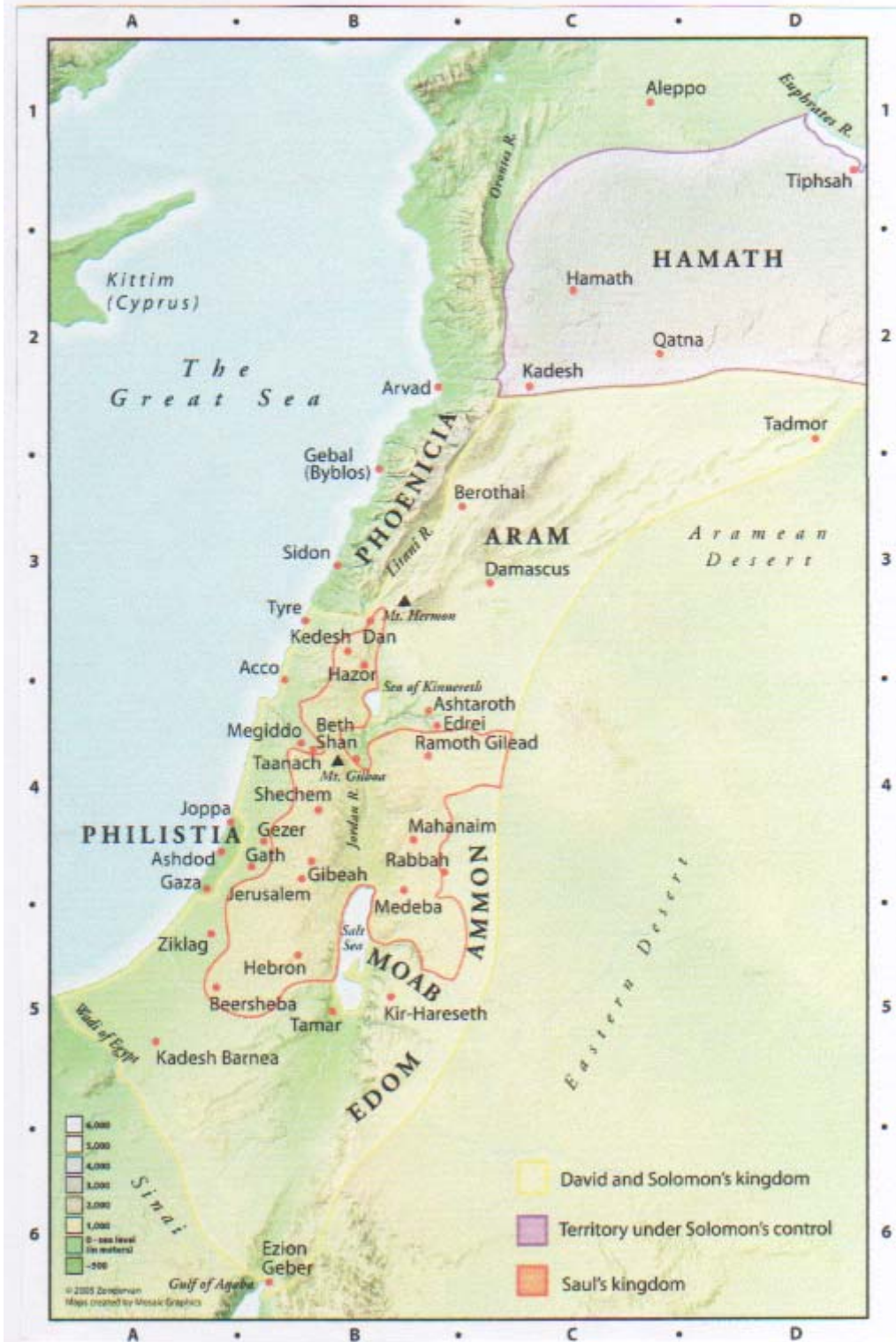
BA	Biblical Archaeologist
BAR	Biblical Archaeology Review
EB	Economic Botany
NEA	Near Eastern Archaeology
SACL	South African Country Life
Sc	Science
VoP	The Voyage of the Planet

Map 1: Map of Palestine



From Gower 1987: *The new manners and customs of Bible times*, map 2.
© The Moody Bible Institute of Chicago

Map 3: United Kingdom of David and Solomon



From *Archaeological Study Bible*, map 5

© 2005 Zondervan, map created by Mosaic Graphics

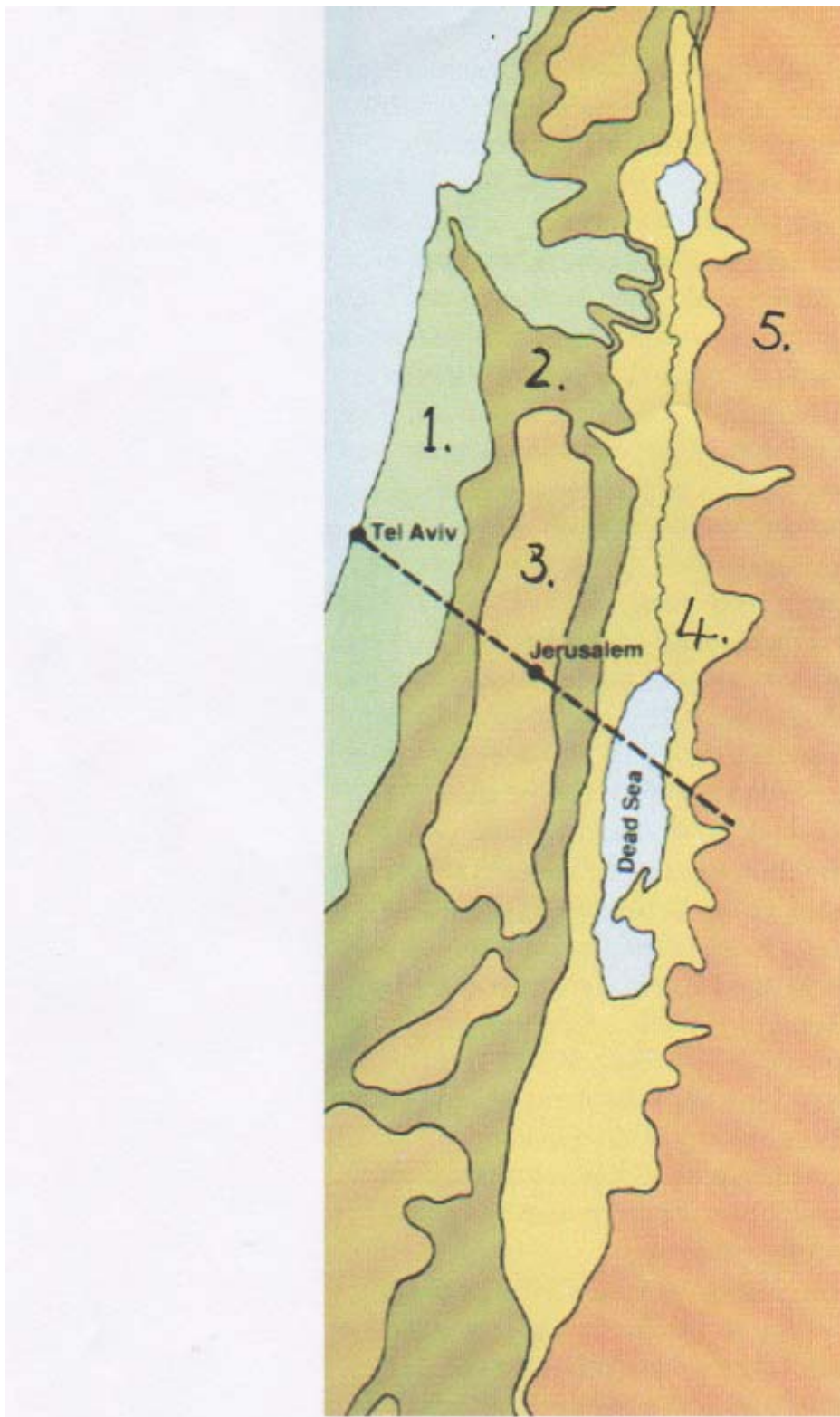
Map 4: At the time of the Romans



From Dowley 2002: *The world of the Bible* p.18.

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Map 5: Regions according to Thompson

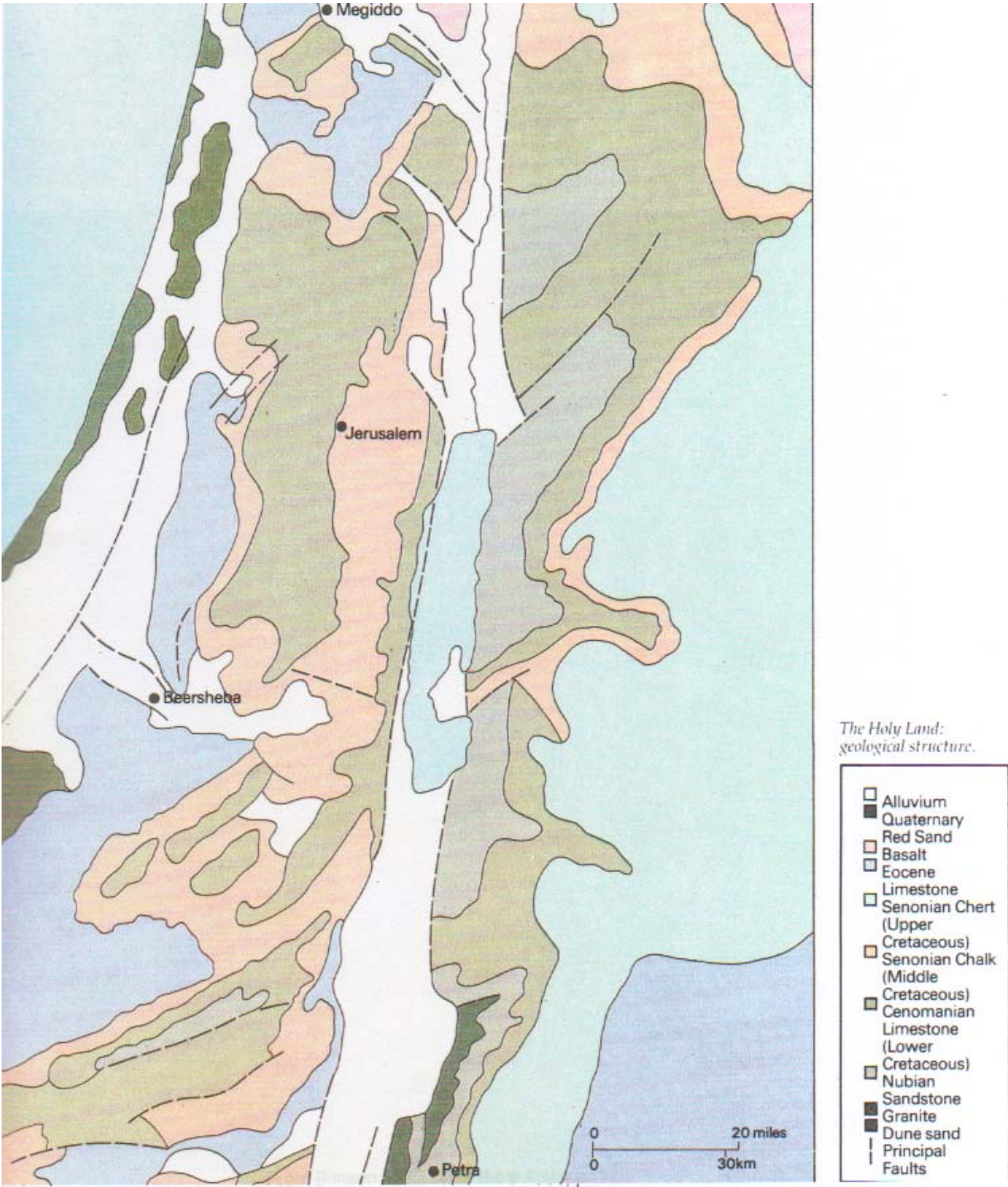


This shows in simplified form the five regions discussed in 2.2 above.
1. Coastal plain; 2. Foothills; 3. Hill country; 4. Jordan Valley; 5. Transjordan and desert

From Thompson 1986: Handbook of life in Bible times, p. 12.

© Inter-Varsity Press.

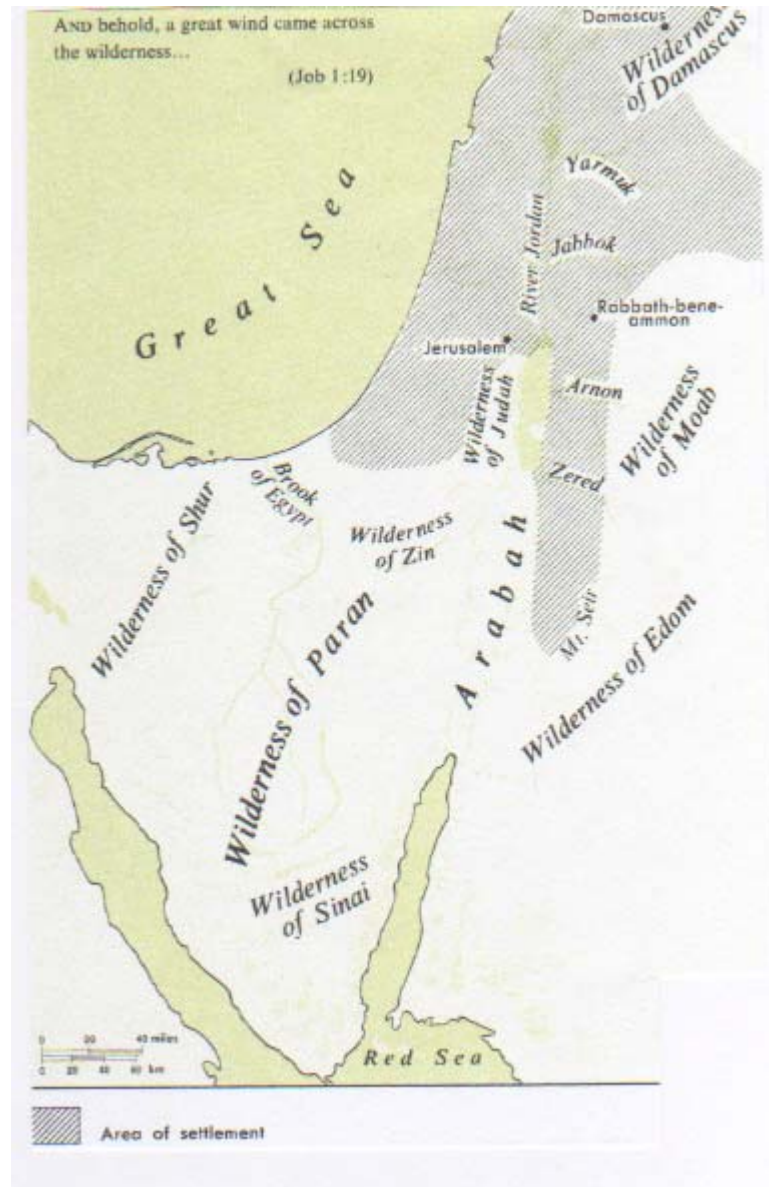
Map 6: Central and southern Syrio-Palestine geological structure



From Bimson a.o. 1985: *New Bible Atlas*, p. 11.

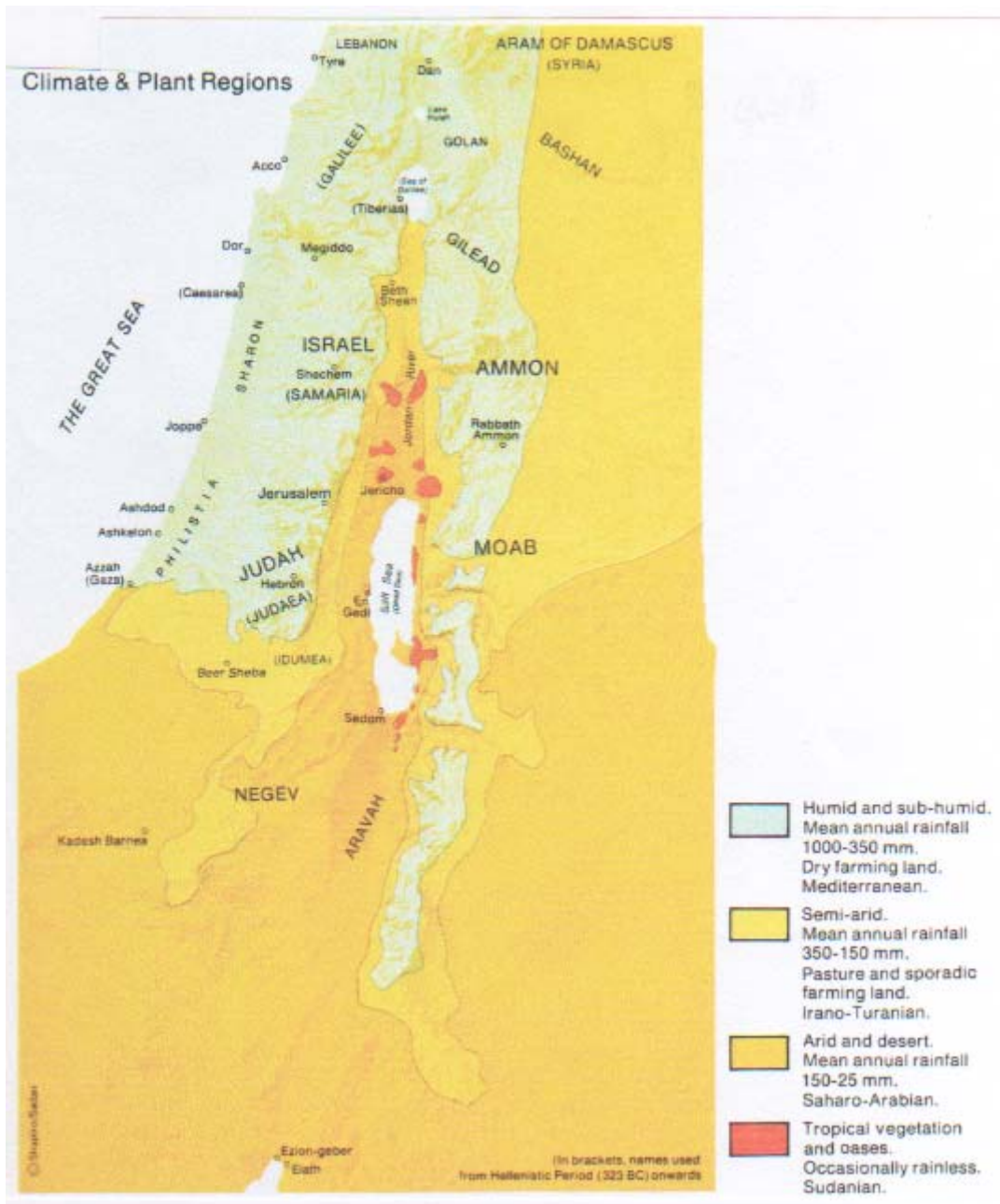
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Map 7: Deserts



From Aharoni and Avi-Yonah 1977: *The Macmillan Bible Atlas*, p. 14

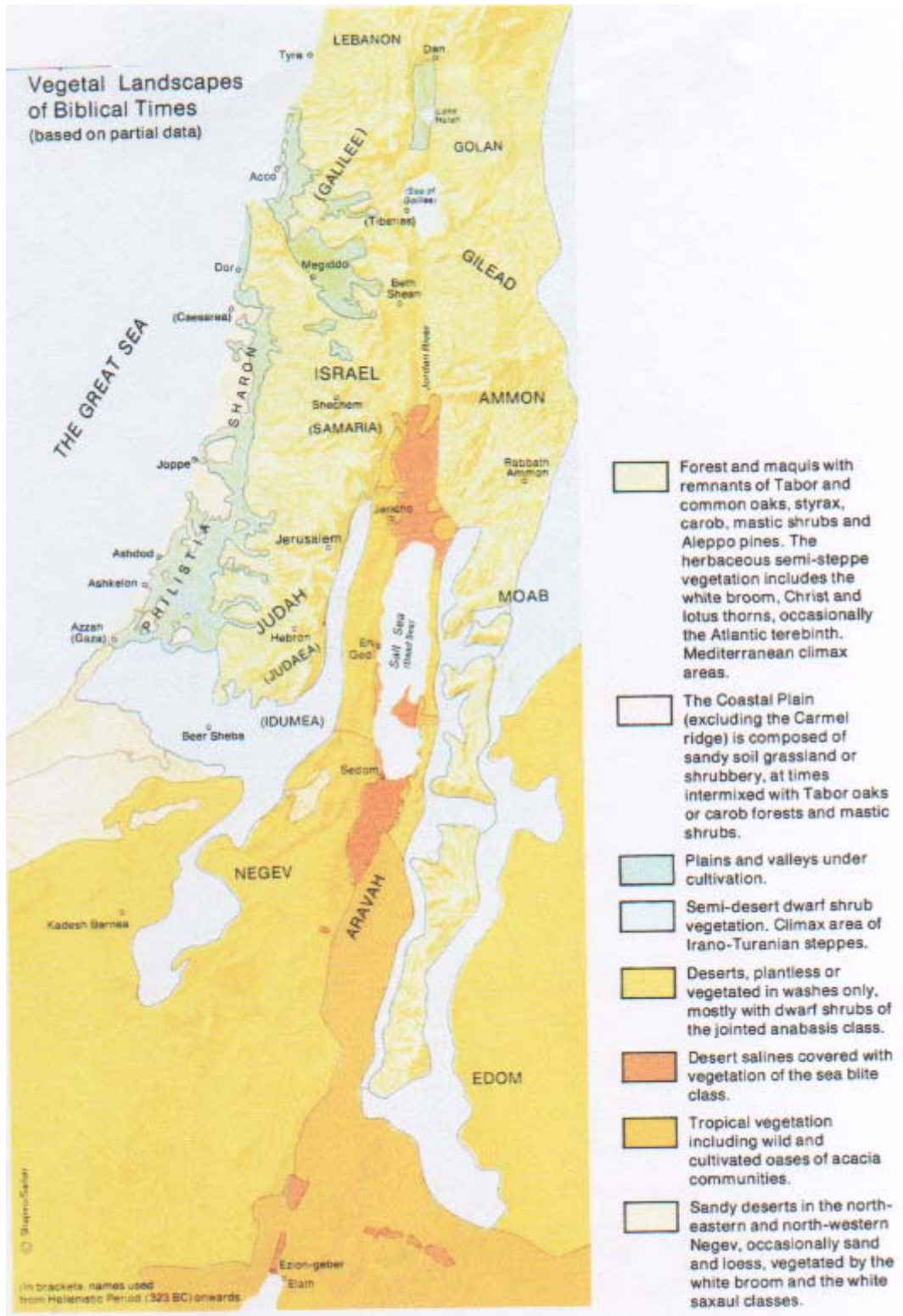
Map 8: Climate



From Zohary 1982a: *Plants of the Bible*, p. 27

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Map 9: Vegetation



From Zohary 1982a: Plants of the Bible, p. 29

© Shapiro/Sadan

Map 10: Trade routes



From Zohary 1982a: Plants of the Bible, p. 43

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Map 11: Cultivation of crops



From Zohary 1982a: Plants of the Bible, p. 37

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