The Use of Wild Edible Fruits in Sustainable Fruit Production in Turkey

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Abstract: More recently wild edible fruits have been gained more importance particularly for sustainable agriculture and land protection not only in Turkey but also throughout the world. These kinds of fruits including rose hip, mountain ash, wild persimmon, wild grape, barberry, wild cherries, wild figs, European elderberry, wild raspberry, blackberry etc. has higher amount healthy promoting compounds compared to cultivated fruits. This wild fruit has also not been spraying by chemicals. Therefore, they can accept health fruits. The synthetic nutrition's are also not used for these kinds of fruits. This wild grown fruit has also protective effects against soil erosion. These wild fruits increased biodiversity where they abundant as well. In present study, wild edible fruits and their use in sustainable agriculture has been discussed

Introduction

Horticulture plants including fruits, vegetables and grapes are important to the well-being of people in every country of the world, providing essential ecological, economic and cultural services. They are main food resources for humans because they include several vitamines for example vitamin C, A, B6, thiamine, niacin, E, several minerals and dietary fiber (Quebedeaux and Bliss, 1988; Quebedeaux and Eisa, 1990; Wargovich, 2000). As well known, most of the vitamins are produced by horticultural plants. Their contribution as a group is estimated at 91% of vitamin C, 48% of vitamin A, 27% of vitamin B6, 17% of thiamine, and 15% of niacin in diet. Horticultural plants are also supply 16% of magnesium, 19% of iron, and 9% of the calories. They are also an important protein sources, particularly nuts including almond, hazelnut, pecan, pistachio, chestnut and walnut fruits. When compared proteins between fruits and the other plant crops, it is clear that proteins of fruits are of high quality as to their content of essential amino acids. Fruits, particularly nuts are well known for their high fatty acid content as well (Verma and Joshi, 2000). However there were wide genotypic effects on these parameters which mostly related to genetic derivation. Environmental and pre and post harvest conditions are also affecting its contents.

Fruits in the daily diet have been strongly associated with reduced risk for some forms of cancer, heart

disease, stroke, and other chronic diseases (Quebedeaux and Eisa, 1990; Tomas-Barberan and Robins, 1997; Prior and Cao, 2000; Southon, 2000; Wargovich, 2000). Some components of fruits are strong antioxidants and antioxidant capacity varies greatly among fruit species and genotypes (Prior and Cao, 2000).

There are some fruit growing countries such as China, Turkey etc. has great ecological diversity within the country. This ecological diversity has contributed not only to a high genetic diversity, but has also allowed the successful introduction and cultivation of a great number of fruit tree taxa.

On the other hand these countries have also a long history of fruit cultivation. Fruit culture has played an important role in Turkey's history. Over 85 fruit species including almost all the deciduous, most of the subtropical and some tropical fruits are grown. Deciduous fruits are spread all over the country. However, the subtropical and tropical fruits are grown mainly in the south where the winter is warm and the summer is hot. In the north of Turkey, tea, some citrus, loquat, persimmon and kiwi can be grown (Agaoglu et al. 1997; Ercisli, 2004). In rural areas, apricot, almond, walnut, chestnut, cornelian cherry, plum, hawthorn, rose hips etc. have been propagated to a large extent from seed, resulting in a wide range of variability (Ercisli, 2004).
In this review we are discussed about wild growing fruits and possible use of in sustainable fruit production in Turkey.

Classification of Fruits

Fruit species are mainly classified either climatic or fruit properties. According to climatic properties, fruit species can be classified into 3 main groups (Temperate fruits, subtropical fruits and tropical fruits). In fruit properties, the species can be classified as citrus fruits, pome fruits, stone fruits, nuts, berries, Mediterranean fruits etc. (Agaoglu et al., 1997).

Fruit species can also classified as cultivated or domesticated, semi domesticated and wild. In most part of Turkey, it is possible to see all 3 kinds of fruits.

The cultivated fruits mostly seen in commercial orchards, semi-domesticated are can be seen near cities, towns, villages. However the wild edible fruits are widely distributed far away from cultivated araes. Particularly rural areas of Turkey are very rich in terms of wild edible fruits. The most distinct characteristics of three groups are fruit sizes. The fruit size of three groups as follow; cultivated>semi-domesticated>wild. Sometimes wild term is as 'Black box' because in general wild plants are belongs to different species then cultivated ones.

Wild Fruit Diversity in Turkey

The biodiversity of the wild fruits in Turkey is an important bio-gene pool that is essential to human life, biological and agricultural development in the future. Areas of wild fruits in Turkey are mainly concentrated in Mediteranean, Black Sea, Middle, East, North East and South Anatolia regions (Ercisli, 2004).

Turkey holds a great richness of wild fruits with regard to variety and biological diversity. With their wide variety of form the wild fruits create unbelievable displays in the region's unique landscape. Since the availability of land for cultivation in some region (North East Anatolia, Black Sea Region) is limited due to the steepness of the land, wild fruits dominates fruit production and collecting wild fruits in these areas has been more important than fruit growing. The rich diversity of fruit species in the country can be explaining of its unique location. As well known Turkey is junction of different gene centers of crop origin and domestication. The main families in Turkey including fruits are; Juglandaceae, Berberidaceae, Saxifragaceae, Rosaceae, Rhamnaceae, Elaeagnaceae, Grossulariaceae, Anarcadidaceae, Cornaceae, Coryllaceae, Ericaceae, Caprifoliaceae, Moraceae etc. (Ercisli, 2004). To exploitation of the bioresources of the wild fruits in Turkey, more recently several projects were started. In order to conserve the resources of the semi-wild and wild fruits some institutes belongs to Ministry of Agriculture in Turkey set up some collections from them.

Nutritive Value of Wild Fruits

Having lower water content and nutritionally richer than cultivated fruits the wild fruits are indispensable foods not only for wild animals but also for local people. The wild fruits collected are consumed fresh or in dried forms or alternatively some of them are used for making syrup and pestils (dried fruit pulp). It can be concluded that the wild edibles eaten by the local peoples are a good source of nutrients, and considering their low cost and easy availability, need to be popularized and recommended for commercial exploitation. Considerable interest

has been generated by recent studies on the chemical composition of some wild fruits in most parts of the world. Some of these wild fruits have higher nutritional values compared with levels found in cultivated fruits (Eromosele, 1991; Netzel et al., 2007; Wang and Lewers, 2007). Wild fruits which are pesticide residue free are important food sources for rural populations. Nutritious wild fruits have the potential to be promoted for wider use, domestication and commercialization. As has been evidenced by studies in many parts of world, wild fruits provide an important component of the diet, particularly for children (Falconer, 1990). Wild fruits contribute greatly to diet quality rather than quantity. Another important characteristic of some wild fruits are their storage capacity.

Secondary Metabolite Production

Plant secondary metabolites are a generic term used for more than 30,000 different substances which are exclusively produced by plants. The plants form secondary metabolites e.g. for protection against pests, as colouring, scent, or attractants and as the plant's own hormones. It used to be believed that secondary metabolites were irrelevant for the human diet. The importance of these substances has only recently been discovered by scientists. Secondary metabolites carry out a number of protective functions in the human body. Plant secondary metabolites can boost the immune system, protect the body from free radicals, kill pathogenic germs and much more (Agrawal, 1999; van Baarlen et al., 2007). Among seconder metabolites anthocyanins which is very abundan particularrly wild and semi-domesticated colorful berries and small fruits such as wild strawberry, wild raspberry, wild blackberry, sea buckthorn, bilberry, wild bluberry, black and red mulberry, barberry, cornelian cherry etc. has anticancerogen, antioxidant, antithrombotic, antiinflammation effects. Caratenoids has anticancerogen, antioxidant and antiinflammation effects. Flavonoids has anticancerogen, antimicrobial, antioxidant, antithrombotic, strength immune system. Glucosinalats has antimicrobial, antioxidant, anticancerogen and also reduce cholesterol levels. These seconder metabolites are also the most importan raw materials for medicines. The studies have shown that these compounds prevent harmful UV radiation penetrating through leaves. The wild plants are more tolerant than cultivated plant to damaging effect of UV radiation and water stress because in these negative conditions they accumulate more seconder metabolites (Davies, 2004).

In contrast to the primary metabolites (carbohydrates, fats, proteins, vitamins and mineral nutrients) secondary metabolites do not have nutrient characteristics for human beings. They are usually found in very small amounts but have an effect on humans. The function or importance of these compounds to the organism is usually of an ecological nature as they are used as defenses against predators, parasites and diseases, for interspecies competition, and to facilitate the reproductive processes (coloring agents, attractive smells, etc). Wild fruits can synthesize and accumulates a variety of secondary metabolites. Some of the biologically active secondary metabolites substantiate the claim made in traditional system of medicine. Wild fruits appear to be a resource of many biologically active compounds. Their derivates are already in extensive use for the control of drug-resistant malaria. In vitro studies on some of the other active compounds identified in wild fruits will hopefully give new therapeutic and agricultural products of commercial importance

Threats on Wild Fruits in Turkey

As elsewhere in the world, the wild fruits in Turkey face an onslaught of threats from human activities, habitat destruction, over-grazing, over-harvesting and the increasing impact of global climate change. For rural communities the forests including numerous wild fruits also provide grazing for livestock and the under-storey of wood pastures is cut for hay to provide fodder during the winter months. A high proportion of the threatened taxa are critically endangered, that is, they face an extremely high risk of extinction in the wild. Many of these are narrow endemics, such as Crataegus tanacetifolia, whose fragmented populations are threatened by cutting and/or over-grazing. Others, relatives of domesticated fruit trees and shrubs such as Pyrus elaegnifolia is threatened by collection of saplings as rootstock for grafting.

Although an important source of income for rural communities, unsustainable rates of harvesting of these plants such as chestnuts continue to pose a huge threat to the country's unique fruit and nut forests. The threat is further compounded by unregulated logging, grazing, hay-making and, more recently, a number of the species that are endangered or vulnerable are wild relatives of domesticated fruit and nut varieties. This includes seed propagated semi-wild apricots (Armenica vulgaris), which is threatened by unsustainable harvesting and cutting. The wild apple species are still found in the fragmented fruit in Turkey and are threatened by habitat degradation, mainly from agricultural development and overgrazing. Therefore, there is necessity to come to

grips with conservation of invaluable bioresources, understanding of the relationships between eco-environment and humankind. During the initial stages of agricultural development, the wild fruit forest was seriously damaged through the reclamation of wasteland. In order to gain great benefits from the wild fruits, the peoples cut down ancient wild fruit trees/shrubs. Some herdsman also cut down wild fruit trees to enlarge their meadow area, leading to the disappearance of primary wild chestnut forest. According to previous investigations, there has been a reduction in the number of wild apple tree seedlings due to over-grazing and dung injuries, leading to a decrease in the activity of wild apple trees to reproduce. The human activities have accordingly caused environmental degradation and a reduction in species numbers and distribution area, which will inevitably lead to the endangerment and extinction of many rare species.

The Use of Wild Edible Fruits in Sustainable Fruit Production

Wild fruit species are very important source of adapted plant material especially when unfavorable climatic and soil conditions are present. These species are also more effective than non-native species in controlling soil erosion. Once established, since they are adapted to local dry conditions, their care is easier than non-native species. Deep spreading roots help combat soil erosion (Kaya, 1999). They also grows in a tremendous range of conditions from very dry, sterile, sandy woodlands to river bottoms to rocky hillsides and moist or very dry locations. It thrives on almost any type of soil. The wild fruit shrubs or threes tolerates drought and cold. It develops strong lateral roots and grows fast (Gungor et al., 2002) and is valued for their ability to reclaim degraded soils. It has also been used for wildlife habitat plantings. There is some indication that new markets for specialty native berries and fruits may be opening up.

Considerations for a Rural Development Strategy

As well known wild or indigenous fruit species has been played an important role in Anatolia's history. As mentioned before in the past Anatolia had the host a lot of civilization. All previous civilizations have been used fresh and dried fruits as well as extracts for medicinal and social purposes. However, at the beginning 19th century the commercial orchards established with monoculture fruit species and thus wild fruits are neglected. As well known wild fruits, particularly berries widely found in forests thus one strategy would be to enhance the recreational and tourism potential value of wild harvesting. This could be done in conjunction with innovative interpretive programs to impart to visitors some of the historical significance of native fruits and berries and their uses by local peoples living rural areas in Turkey. To be successful on this topic, harvesting areas remain in as natural because the tourists will be seek wild experience. Also, it is important that these areas should be not far away for walk and suggested distance from town, village or resorts should be maximum 40 km. These areas are also must be uncontaminated. Local festivals and celebrations, native recipes and cooking traditions, and local history can be helpful to success on this strategy. Near villages or towns each house can produce special products from these wild fruits and can be sell relatively higher prices because visitors may have remote this culture. The one of the most important things for seller is that they must imply that all products are fully nature. The villagers can also establish some small nurseries to multiply nature wild fruits and can sell them as planting material to tourists.

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