ECONOMICS OF ORGANIC FRUIT PRODUCTION

MAFF Project no. OF0151

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By

Chris Firth and Margi Lennartsson

Henry Doubleday Research Association

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Buyers/marketers of organic fruit

Aspalls Cyder, Suffolk
Broughton Pasture Organic Wines
Crone's Suffolk
Congelow Produce, Kent
Flavourburst Ltd. Somerset
Meridan Jams Clwyd
Orchardworld, Essex
Organix Brands, Dorset
Organic Connections, Cambridgeshire
Organic Marketing Company, Hereford
Rachel Dairy, Aberystwyth
Seddlescombe Vineyards, Sussex
Yeo Valley, Bristol

Growers of organic fruit

Aspalls, Suffolk
R Crone, Suffolk
G Cherry, Suffolk
P Bowers, Lincolnshire
N Evans, Suffolk
L. Findlay, Aberystwyth
P Hall, Kent
I Mason, Shrewsbury
D Morton, Norfolk
I Pardoe, Hereford
P Pitman, Wiltshire
M Rogers, Devon
T Seldon, Hereford
I Tolhurst, Berkshire
M. Wilson, E. Sussex
P Ward, Kent

EXECUTIVE SUMMARY

In June 1998 HDRA began a one year study into the Economics of Organic Fruit Production. The study aims to provide information on:

- the size of the organic fruit market and potential for future growth
- returns and costs of growing organic top and soft fruit

Methodology

Information for this study has been obtained through contact and visits to marketing organisations, fruit processors and growers. For information on the market major buyers of organic fruit have been contacted to ascertain quantities bought and market trends. In consultation with the ADAS Fruit Team and the Welsh Institute of Rural Studies, data collection forms were devised to enable full costing techniques (all costs allocated to different cost centres) to arrive at net margins and costs of producing organic fruit per hectare (acre), and per kg (lb). In determining the financial returns, average yields over a number of years (5-10) have been used rather than those related to a specific year and where necessary costs were related to those yields.

Presently there are a very small number of specialised organic fruit growers, therefore the sample was small: dessert apples (5), culinary apples (3) pear growers (3), strawberry growers (5). It was not possible to find any commercial data from growers of other organic fruit. Case study data from these growers of apples, pears and strawberries were used to provide 'best possible estimates' for the physical and financial performance of these organic fruit enterprises.

Results

The Organic Fruit Market

Organic fruit, at an 18% share, is the second largest sector of the organic food market in terms of retail value. The market has grown by 18% per annum for much of this decade, however, according to respondents to the HDRA study, the organic fruit market has on average increased of 95% in 1998. This is in line with the recent rapid growth of the rest of the organic market. The market is expected to continued to grow at 70% per annum over the next 5 years. This growth is from all market outlets ranging from multiples, wholesale, direct marketing and processing. On other hand, at 2,800 tonnes, UK production is extremely small and only growing by approximately 11% per annum in terms of area of fruit grown. Approximately 90% of the organic fruit consumed in the UK market is imported. In the UK the market is very buoyant with a large number of buyers chasing limited supplies, thus driving up prices which are generally 50-100% higher than conventional ones. Buyers have a definite preference for UK supplies.

Production economics for organic fruit

Summary of results[1]

	Dessert Apples	Pears	Strawberries
Yields (t/ha)	10	8.6	8
Class 1 & II (%)	68	75	80
Processing (%)	32	25	20
Average gross prices (p/kg.)	89	110	305
Gross Returns (£/ha)	8803	9510	24400
Total costs (£/ha)	6948	6854	16166
Total costs (p/kg.)	70	80	201
Net Margin (£/ha)	1855	2655	8334
Net margin (p/kg.)	19	31	104

[1] The figures presented here can be regarded as 'best possible estimates'. They are based on case study data provided by the various growers, however, it is important that they are treated with caution, as the sample was small.

The general conclusions are that despite low (lower than conventional) and sometimes variable yields most organic fruit growers are currently able to generate economic returns. Profitability is related to current high prices (premiums of 60-100% over conventional) for fruit and ability to sell the whole crop to various outlets. Although individual costs differ the overall costs of production are similar between conventional and organic fruit. The profitability of organic fruit appears to be similar or greater than average conventional production. Break-even budgets indicate that even if prices fell by approximately 20% then organic fruit production could still be profitable. Price premiums of approximately 40% are still required to enable organic fruit production to be profitable at current yields.

Conversion to organic top fruit production

So the question remains, if it is possible to generate economic returns from organic production, why are more fruit growers not converting? The conversion process, taking 3 years for top fruit, is an obstacle as are the high costs of establishing fruit with returns not being generated for some years, especially for top fruit. There are two options for conversion to top fruit; converting an existing orchard or establishing a new one.

1. <u>Converting an existing orchard</u>

This may seem in the short-term to be the simplest, cheapest option but in practice conventional orchards often do not lend themselves to organic management. Evidence collected shows that total yields may fall by as much as 50% and gradeout [1] (quantity of yield in Class I) will decrease from 85% (conventional average) to 50% during the conversion period. Yields and grade-out will vary greatly between varieties. In a case study of a grower, income fell by £5850/hectare during the three year conversion period. However, following conversion, the grower's income level rose to above pre-

[1] The UK top fruit industry uses gradeout to denote the % marketable yield in Class I, rather than the % failing to reach this level.

conversion levels. Additional costs of conversion may involve the purchase of appropriate mowing and cultivation equipment. The total costs of conversion are £6,000/ha, spread over 3 years. Some growers have experienced less dramatic reductions in yields and others have developed their own processing facilities to juice the out-grades, thus ensuring a market for the whole of their crop during conversion.

2. Establishing a new orchard

This method of conversion is in many ways more preferable, enabling the establishment of an orchard more suitable for organic production. The costs of establishment depend very much on the growing system, and according to the results of this study vary from £3,700-£13,500/ha, break-even will be achieved approximately 5-6 years after planting. The cost of establishing a new orchard is approximately twice the cost of converting an existing orchard, however, the new orchard will in the long term offer higher returns. The advantage in converting an existing orchard lies in obtaining organic fruit quicker and maybe the only option for a grower wishing to convert all their orchards at once.

Conversion to strawberry production

In order to minimise pests and diseases, soft fruit such as strawberries must be grown in a rotation with other crops. This will require an organic farm 5 times larger than the strawberry area. Strawberries fit well into a rotation with arable crops and livestock but are also grown on vegetable farms. Conversion to such systems takes two years and usually involves growing fertility building crops (Grass/clover leys) for the first two years. The conversion period may involve a reduction in income, although it can be offset if the farm has livestock to graze the leys or set aside can be claimed on it (if eligible for arable area payments). The establishment of soft fruit also involves a capital cost, usually between £5,500-£9,500/hectare.

Organic aid

This is available to growers converting at a rate of £450/hectare spread over 5 years. When establishing a new orchard this represents approximately 2-3% of total costs during the first 5 years, and 8% of the costs of converting an established orchard. This rate is unlikely to offer a great incentive to growers wishing to convert to top fruit production. This compares unfavourably with many other European countries which pay higher rates for land undergoing conversion of fruit trees relative to cereals and grassland. Most other European countries also pay continued maintenance payments to organic growers.

Comparison with other European Union (EU) Countries

Overall the information obtained confirms that organic fruit growing can be profitable and in many cases is more profitable than conventional production. Commonly EU countries have intensive systems of production with resulting high yields and also higher costs of production. Prices received for organic fruit in EU countries tend to be some 30-50% lower compared with the UK.

Recommendations

The number of UK organic fruit growers is currently small. Current price premiums offer potential economically profitable returns, however, conventional growers are reluctant to convert. In order to give growers confidence to take up the challenge of organic fruit production they need encouragement from government and industry in terms of continued aid to assist conversion, more money for research to improve the quantity and quality of economic data available, to improve production techniques and finally money to disseminate this information to growers. This report suggests that continued economic monitoring of converting and existing organic fruit farms should be undertaken. Fruit buyers should also encourage UK growers by offering them market incentives. Unless the UK organic fruit growers receive this encouragement, the majority of organic fruit may continue to be imported.

1 INTRODUCTION

2 Background

Of all the organic food sectors in the UK, fruit is one of the least developed. Despite strong consumer demand and high prices for organic fruit, there are, at present, only a handful of commercial apple and pear growers. Most soft fruit growers also operate on a tiny scale.

Realising that consumer demand and prices for organic fruit are rapidly increasing, organic growers are keen to meet the challenges of production. Following a meeting at the Soil Association's Cirencester Conference on Organic Agriculture in January 1997, an Organic Fruit Focus Group (OFFG) was set up as a producer initiative to develop the production and market for UK derived organic fruit. The aim of the group is to define and develop the key areas of research and development for organic fruit and to work strategically to encourage the sector. At its first meeting at Ryton Organic Gardens in February 1997, it was concluded that lack of knowledge on the technical problems and potential solutions and uncertainty of the economics of organic fruit production were the main barriers dissuading growers from investing in or converting to organic production.

Funding was sought from the Ministry of Agriculture, Food, and Fisheries (MAFF) for a study into the economics of organic fruit production and this was finally received for a one year study beginning in July 1998. A project running alongside this one: 'Organic Fruit Production; A Review of Current Practice and Knowledge', was completed in March 1999 (Bevan, 1999)

2.1 Aims and Objectives

The overall aim of the study is to provide information on the size of the market, potential for future growth and the economic performance of organic fruit production. In detail this involved:

i) Examining the present size of the organic fruit market, differentiating between the various market outlets, and identifying the potential future growth of the market.

ii) Through contact with growers and processors obtain prices and costs of production.

iii) To provide economic analysis on the major top (apples and pears) and soft fruit (raspberries, strawberries and blackcurrants) which in detail will provide:

a) Gross Margins for the above crops.

b) Fixed costs and estimated whole farm performance for organic fruit growers.

c) Costs of establishing/ converting to organic fruit production.

d) Breakeven-budgets to indicate what yields and prices are necessary to make fruit production economic.

e) Estimations of economic size (in terms of area of cropping) of holding for above crops.

iv) To interpret and evaluate the data and make recommendations to potential advisers and policy makers.

3 METHODOLOGY

3.1 Management of the project

The project was led and undertaken by HDRA in consultation with a Steering group set up by the UK Organic Fruit Focus Group. The project was carried out with advice from the Welsh Institute of Rural Studies (WIRS), Aberystwyth. A wide range of people and organisations associated with both conventional and organic fruit production were also consulted as part of the study.

3.2 Organic fruit market

Information on the fruit market has been gained from three sources: published statistics, contact with buyers and processors of organic fruit, and from farmers experiences of selling in different markets.

Twenty organisations involved in buying, marketing and processing of organic fruit were contacted, either through visits, by telephone or writing to obtain information on:

- types, quantities and source of organic fruit bought and prices paid.
- current and predicted growth rate of the organisation's market in organic fruit.

3.3 Production economics

3.3.1 Data collection

After consultation with the ADAS Wye Fruit Team it was decided to make use of adapted data collection forms from an ADAS Study into the 'Economics of the English Cox Apple Crop 1995/96'(Hardy, 1996). These collected data from growers on:

- cropping areas
- yields: 1997 and average for last 5 years and likely range
- sales: outlets and prices obtained
- marketing costs: transport, commission, packaging
- variable costs: materials, tree management, picking, grading and storage
- overhead costs: labour, machinery, rent and administration etc.
- system and age of orchard/plants/bushes
- costs of establishment of orchards/bushes/plants

3.3.2 Farm Business Standards

In order to calculate total costs of production and net returns all data has been collected and processed according to national Farm Business Survey Standards (FBS). This is the system used by MAFF to collect Farm Incomes Data in England and Wales. The data is collected by a number of Universities from about 2800 holdings each year. (MAFF, 1998)

Under FBS standards, in addition to the normal income and expenditure, all farms are treated as tenanted thus a rent figure is included for owner-occupied land, machinery and orchard depreciation are calculated, interest payments are excluded and a value is placed on unpaid manual labour of the farmer and family.

3.3.3 Enterprise costing

In order to analyse enterprise performance the data has firstly been analysed in gross margin form (including establishment and fruiting costs) and secondly has been analysed on a pence per kg or lb basis, a full cost accounting technique, which has been developed for analysing the conventional fruit industry (Knight & Tustain, 1995). This enables easier construction of break-even budgets for further analysis. For top fruit; costs have been grouped according to the following headings: materials, tree management, orchard depreciation and other variables, overheads, harvesting, storage, grading and packing and marketing. These are norms in the conventional fruit industry and enable easier comparison with these systems. For soft fruit, (strawberries) costs have been grouped according to those being related to price, yield and area, (ADAS, 1999)

3.3.4 'Best possible estimate budgets'

Since the number of organic fruit growers is small it is not possible to present averages. The case study data which has been collected has enabled the construction of what are called here 'best possible estimate budgets'(Lampkin & Measures, 1994). These do not represent one particular grower's data, but demonstrate what is possible. The figures are based on costing up of actual physical activities such as the number of sprays, times, the costs of each spray etc.

3.4 Sample of growers

3.4.1 Size of the UK organic fruit industry

Before discussing the size of sample it is helpful to indicate the size in terms of area and number of the UK organic fruit growers. The areas of organic and 'in-conversion' top and soft fruit in UK (Table 1) are compared with the areas of conventional top and soft fruit. This indicates that the areas of organic fruit production in the UK are very small (1.03 %) in comparison to the conventional sector. The total of organic land as a percentage of all agricultural land is 1.7 % (Lampkin, 1999, Personal Communication) The estimated tonnage of different organic fruit produced in the UK and their farm gate value are shown in Table 2.

Table 1: Areas of organic fruit in the UK 1998 (hectares)

	Organic	In-conversion	Total	* Conventional	Organic % of total area
TOP FRUIT					
Apples- dessert	192	67	259	8,252	2.3
Apples - culinary	99	26	125	5,384	1.8
Pears	16	21	37	2,739	0.6
Plums	7	1	8	1,498	0.5
Cherries	8	0	8	592	1.4
Total Top Fruit	322	115	437	22,547	1.4
SOFT FRUIT					
Strawberries	1	3	4	4,494	0.02
Raspberries	4	4	8	2,669	0.15
Blackberries	3	0	3	n/a	
Rhubarb	3	0	3	n/a	
Mixed and other	7	0	7	3234	0.2
Total soft fruit	18	7	25	9,502	0.2
TOTAL FRUIT	340	122	462	32,993	1.03

Source: Soil Association, 1998 Conventional: MAFF, 1997*

Table 2: Estimated tonnage and farmgate value of domestic fruit harvested in 1997

Crop	Tonnage	£/t	Value £m
Dessert apples	1,000	990	0.99
Cider/processing apples	1,200	170	0.20
Plums	88	1,000	0.09
Pears	300	990	0.30
Cherries	26	2,000	0.05
Strawberries	44	2,000	0.09
Raspberries	26	2,250	0.06
Rubarb	100	700	0.07
Other fruit	55	1,500	0.08
Total			1.93

Source: Soil Association, 1998

Table 3: Numbers of registered organic fruit growers in England and Wales

	Top fruit	Soft fruit
Registered organic growers[1]	115	129
Full-time commercial growers[2]	10	5

Source: [1] Soil Association, 1997 (This includes Organic Farmers and Growers)
[2] Author's estimate.

The number of registered growers relative to an estimate of the number of more specialised full-time organic fruit growers is shown in Table 3 The more specialised includes top fruit growers with at least 12 hectares (30 acres) of fruit trees and soft fruit growers with 1 acre or more of one crop. It demonstrates that the number of full-time specialised organic fruit growers is extremely small.

3.4.2 Size of sample in this study

The sample of growers for this study includes:

- dessert apple growers (5) includes 1 grower in conversion.
- culinary apple growers (3)
- pear growers (3)
- strawberry growers (4)

More growers have been visited than this and have provided general physical information on yields, establishment, conversion, methods of production and technical problems, but have been unable to provide their financial data. The technical information has been reported to MAFF in project OF0150 (Bevan, 1999).

Although the sample is small it does represent quite a large proportion of the specialised full-time organic fruit growers. Because of the small sample size the figures must be treated with caution. However, they do provide a starting point in the economic analysis of organic fruit growing and give good indications of what is happening.

4 RESULTS

4.1 The Fruit Market

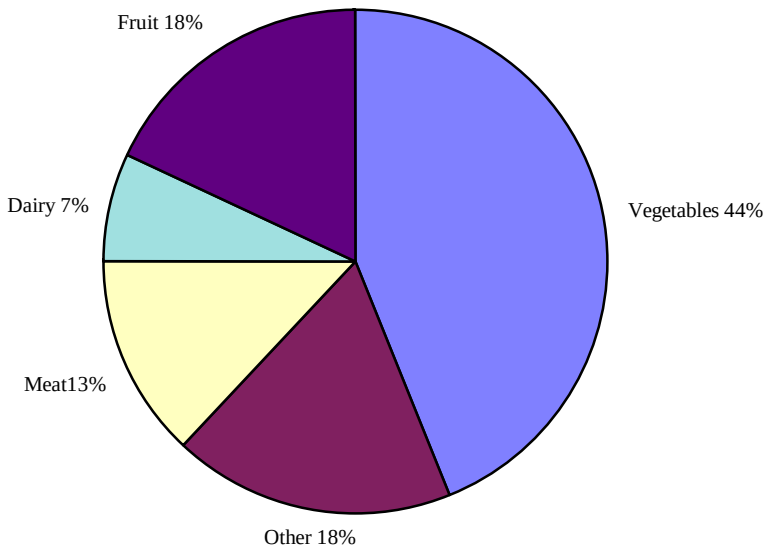
4.1.1 Market trends

Despite the fact that relatively little organic fruit is grown in the UK, fresh fruit is the second largest sector of the organic market, accounting for 18% of the Retail Value of sales of organic food in 1996 (Figure1), the largest being vegetables (Mintel, 1997). The market for organic fruit rose by 71% (18% per annum) from 1992 to 1996 and was predicted to continue to increase by 40%, to £50 million, over the 5 years from 1997 to 2001 (Mintel 1997; Figure 2). More recent market research predicts a more rapid rise in the organic food market by 95% from 1999 to 2001 (Soil Association, 1998). A report this year charts a compound annual growth rate (CAGR) in the market for organic food at 30% between 1995-1999 (Datamonitor, 1999).

Contact with a total of 20 buyers, marketers and processors of fruit during 1998 as part of this study indicate that the market for organic fruit is growing even faster than this with sales of organic fruit growing by an average of 95% alone in 1998, and projected average increases of 70% per annum for the next 5 years.

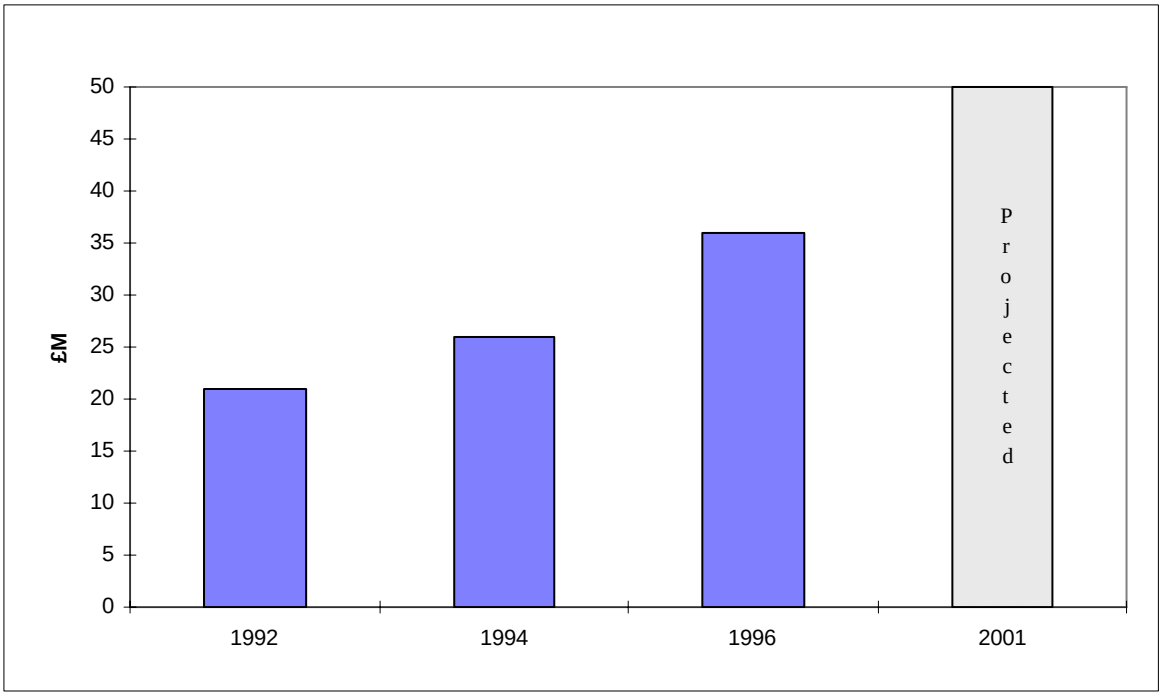
The rapid expansion of the organic fruit market has been following a similar trend to that of the whole organic market. A number of factors has led to this unprecedented growth. Fears about pesticides, the BSE crisis and more recently the debate over Genetically Modified foods has led to consumers having less faith in food from more intensive farming systems and in turn buying organic food.

Figure1:Retail Sales of Organic Foods, by type 1996



Source: Mintel, 1997

Figure 2: Retail Sales of Organic Fruit 1992-1996 (£M)



Source: Mintel, 1997

With escalating demand and restricted supplies prices for organic fruit have been high with consumers paying 50-100% premiums over conventional fruit. Prices for imported organic fruit are often lower than UK grown. There is some concern that high prices in the UK could reduce demand for produce, slowing down the growth in future sales. (Datamonitor, 1999). Compared with the rapid rate of increase in demand for organic fruit, the UK organically grown fruit supply, in terms of area of fruit grown, grew at the rate of 11 % per annum from 1993-1997 (Table 18), this compares unfavourably with the average for all UK organic agriculture at 19 % (unpublished data- Foster and Lampkin, 1999b).

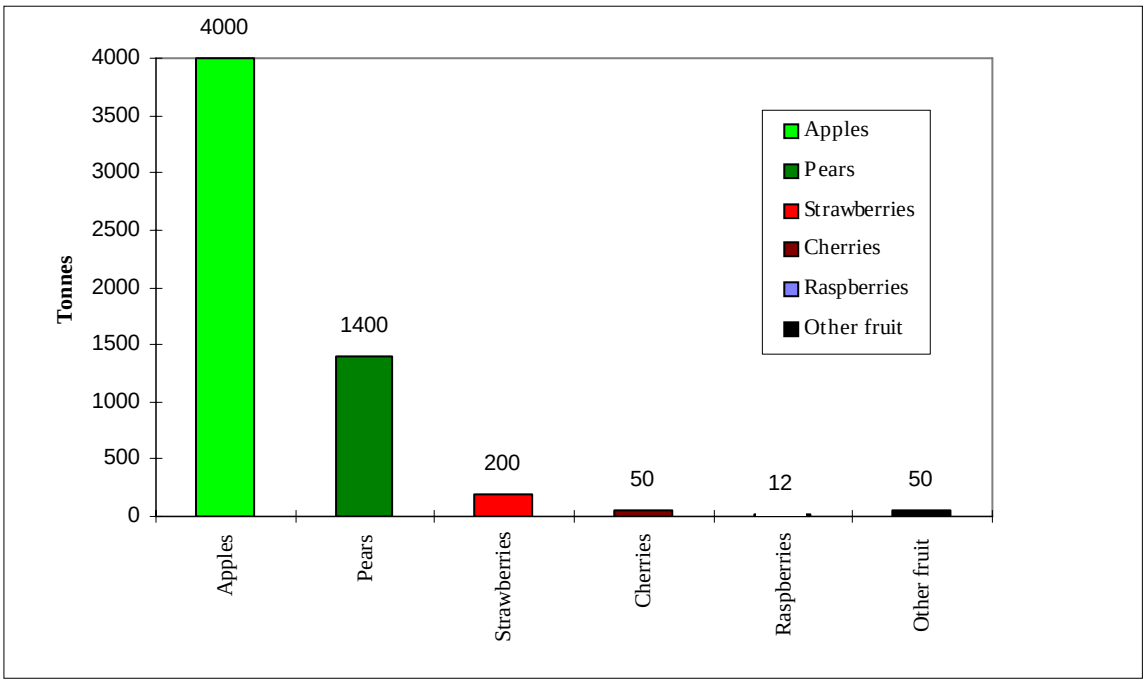
Organic fruit produced in the UK in 1997 was estimated to have a farmgate value of £M1.93 (Soil Association, 1998) This represents approximately 10% of the total organic fruit consumed in the UK with 90% being imported. However, there are a large number of tropical fruits, such as banana and citrus fruits, which can not be grown in the UK and it is estimated that only 30% of fruit consumed in the UK (conventional and organic) can be grown in this country.(Vaughan, 1998).

4.1.2 Results of the HDRA fruit industry buyers study

66% of fruit buyers (wholesalers, packers, co-operatives and processors) in the HDRA study stated they bought UK organic fruit, although for most of the time it was very difficult to source, on average, they did obtain 35% of their fruit from UK sources. UK fruit was generally only available during the harvesting months e.g. August to December for apples. However, in line with organic principles of reducing ‘food miles’ (the distance food travels) almost all buyers stated a preference for UK grown produce. In some cases buyers have developed special relationships with growers to encourage them to grow organic fruit, for example by guaranteeing a market and price.

A wide range of produce (Figure 3) was bought including apples (dessert and culinary), pears, plums, cherries, strawberries, raspberries, rhubarb and other berried fruit. The majority of this product is being imported from a wide range of countries including: Holland, Spain, Italy, France, USA, Argentina, Brazil, Turkey, Poland, Serbia and Germany. Many of these countries have a larger land area under organic production than the UK and are experiencing a more rapid rate of conversion to organic production (Datamonitor, 1999). Some of these countries are gearing up to export increased volumes of organic fruit to the UK. This is is likely to have a downward pressure on UK prices.

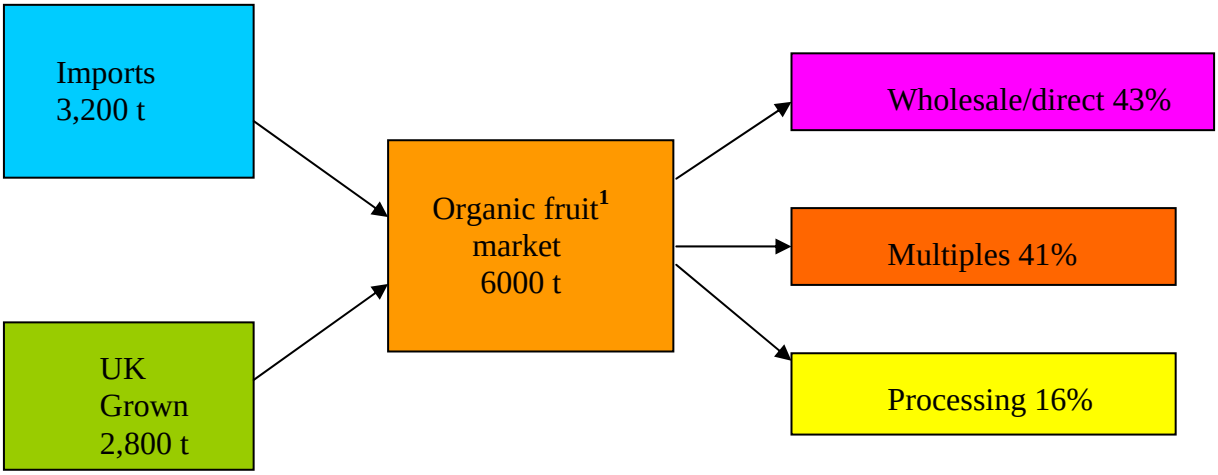
Figure 3: Volume of major types of traded organic fruit marketed in the UK[1] 1998



[1] This does not include farmers making direct sales.

4.1.3 Market outlets

Figure 4: Sources (tonnes) and market outlets(%) for organic fruit



1 This does not include fruits which can not be grown in the UK, the direct sales includes box schemes)

- **Multiples** are experiencing a rapidly increasing demand for organic fruit; one multiple stated their sales of fruit had doubled in the past year. Although 41% of the organic fruit is currently sold through multiples (Figure 4), this is set to increase as the UK supermarkets begin to dominate sales of organic food (Datamonitor, 1999) The multiples are strongly competing with each other to sell organic produce. In order to meet demand they are having to import fruit from as far away as Argentina. Multiples have expressed a wish to replicate every line with an organic alternative (Jupe, 1998). For top fruit they buy the fruit as a combined EEC Class I and II. They are aware of the difficulties in achieving a high standard of skin finish and size from organic produce, and accept that organic fruit may not look as attractive as conventionally grown produce. Top fruit is usually sold pre-packed in bags and sold on the basis of being organic rather than looking good. In some instances they are prepared to sell 'transitional' or 'in-conversion' produce, although this has been discouraged by the Soil Association due to the confusion that it causes to consumers. Multiples express difficulties in sourcing UK fruit and have to cope with often small and variable quantities. Growers on the other hand state they have difficulties producing fruit to meet multiple standards. Details of some of the prices paid are found in the section covering individual crops.

- **Wholesale / direct sales/box schemes** are also experiencing a rapid increase in sales volumes with one of the largest box scheme operators expecting their volume of organic fruit to increase by 10 fold over the next 5 years. These markets are less demanding in terms of cosmetic appearance of the fruit, although the fruit must still pass the EEC classifications and the trading standards officers are now regular visitors to organic co-operatives, companies and packers. Fruit is now commonly being included in what had been solely 'vegetable boxes'. Box scheme operators are

often prepared to buy 'in-conversion' fruit which commonly sells for prices 30% less than organic ones.

- **Farmers markets** are where the produce is sold directly to the public by the farmer/grower and offer small and medium growers an alternative flexible marketing outlet. They are springing up in many areas of the UK being inspired by the success of these retail outlets in the US. The first US-style farmers market started in September 1997 in Bath and has spread to at least 27 other towns and cities in 1998 with a greater number expected to start in 1999. Some advantages of using these markets are good prices (cutting out the middleman), relatively low overheads, and social interaction and feedback from customers. The disadvantages are time needed to man the stall, need for personal selling skills and difficulties with the perishability of soft fruit (Festing, 1998). One of the organic growers in the HDRA study was able to sell a few tonnes of apples and some juice through such a market, it provided a good outlet for apples not obtaining the cosmetic finish and size requirements of the multiples.

- **Processing** as with the other markets, is a rapidly expanding market, with buyers being very keen to source UK produce, but presently mainly having to import the fruit. 90% of organic strawberries are presently going for processing. Outlets for other types of fruit include fruit juice, cider, vinegar, yoghurts and other dairy products, jam, baby food, and wines. Many processors require soft fruits to be IQF (individually quick frozen) and delivered in minimum of ½ tonne quantities, this necessitates growers being close to freezing plants.

4.2 Dessert Apples

4.2.1 Yields

Yields from conventional top fruit in the UK are highly variable from year to year, mainly due to the weather. There is anecdotal evidence that yields from organic apples are even more variable mainly due to the added factor of pest and disease damage. Yields also vary with the planting system used; more densely planted orchards (more trees per hectare or acre) would be expected to yield higher. Yields will also vary over the life of the tree. Commonly it takes 3-5 years for a tree to begin to bear fruit, perhaps with 30% of full crop by year 3 and full crop from year 6. When a tree begins yielding and how long it bears fruit will depend on the rootstock used. More intensive orchards would expect fruit from the second year and trees would last 15 years. Less intensive trees would begin to yield later and last for 25-30 years. Finally yields from trees will vary greatly between varieties; for example Cox will yield much lower than Discovery.

Organic orchards studied had single row systems with 740-1230 trees per hectare (300-500/acre) with one more intensive grower having 3952 trees per hectare. Many of the established organic growers have a high percentage (as high as 55%) of the variety Cox, which does not generally perform well in organic systems. This helpss to explain why overall average yields are perhaps on the low side. In the study of organic growers (Table 4), yield data was firstly collected from one year (1997) and then growers were asked to supply average yields from the last 5-10 years.

Table 4: Total yields of organic dessert apples t/ha

	Tonnes per hectare (acre)	Range of yields
Average yields (1997)	10.8 (4)	9-15
Average yields (5-10 years)	12 (4.8)	10-15
Average for intensive orchards	20 (8)	17-25
Discovery (average 5-10 yrs)	15	10-25
Cox (average 5-10 yrs)	10	1-20
Red Falstaff (average 5-10 yrs)	12	10-25

Marketable yields (that is the percentage of the yield which reaches Class I and II) will be lower than the figures above. Organic growers would normally expect to get 60-75% in this combined quality class.

4.2.2 Prices

Prices paid vary with quality, variety and market outlet. The highest prices can be obtained from selling to multiples. However, gradeout will usually be higher and marketing costs (grading, packaging and transport) will also be greater. Prices below were collected in 1997 and 1998.

- Multiples: for combined class I and II, prices paid varied between 121-143p/kg (55-65p/lb)

- Wholesale: for Class II apples prices varied between 77-99p/kg (35-45p/lb)
- Processing: 22p/kg (10p/lb)

Overall returns which can be expected from organic production are shown in **Table 5**.

4.2.3 Costs of production, gross and net margins

Assumptions made in deriving the returns and costs are given following the table.

Table 5: Returns and costs of organic dessert apple production

	£ per hectare	£ per acre	p/kg	p/lb.	% total costs
Yields (tonnes)	10	4	-	-	-
Class I &II (%)	68	-	-	-	-
Processing (%)	31	-	-		-
GROSS RETURNS	**8803**	**3564**	**89**	**41**	**-**
COSTS					
Commission	457	185	4.6	2	7
Transport	652	264	6.6	3	9
Packaging	724	293	7.3	3.3	10
Grade and pack (labour)	583	236	5.9	2.7	8
Others	109	44	1.1	0.5	2
Total marketing costs	**2524**	**1022**	**25.5**	**11.6**	**36**
Fertiliser	124	50	1.2	0.6	2
Sprays	247	100	2.5	1	4
Others	12	5	0.1	-	-
Total materials	**383**	**155**	**3.9**	**1.8**	**6**
Pruning costs	494	200	5	2.3	7
Total tree management	**494**	**200**	**5**	**2.3**	**7**
Picking	326	132	3.3	1.5	5
Bin hire/depreciation	119	48	1.2	0.5	2
Harvesting transport	86	35	0.9	0.4	1
Total harvesting costs	**531**	**215**	**5.4**	**2.4**	**8**
Levies	62	25	0.6	0.3	1
Orchard depreciation	237	95	2.4	1.1	3
Storage	247	100	2.5	1.1	4
Total Variable costs	**4476**	**1812**	**45**	**21**	**64**
GROSS MARGIN	**4327**	**1752**	**44**	**20**	**-**
Other labour	845	342	8.5	3.8	12
Power and machinery	420	170	4.3	1.9	6
Insurance	363	147	3.7	1.7	5
Rent	146	59	1.5	0.7	2
Property repairs	185	75	1.9	0.8	3
Prof. and advisory fees	161	65	1.6	0.7	2
Others	351	142	3.5	1.6	5
Total overhead costs	**2470**	**1000**	**25**	**11**	**36**
TOTAL COSTS	**6948**	**2813**	**70**	**32**	**100**
NET MARGIN	**1855**	**751**	**19**	**9**	

Notes to Table 5

Figures used	All based on 'best possible estimates' (refer to 3.3.4)
Yields	These are based on a conservative average of what can be expected from the whole life of an UK orchard, and takes account of the fact that presently many orchards contain a high percentage of the variety Cox which yields lower than others. Yields from intensive orchards will be higher than this.
Returns	Assumes a yield of 10 tonnes per hectare, 68% is sold in Class I&II, of which 43% sold to multiples 143p/kg (65p/lb) and 25% to wholesale market 84p/kg(38p/lb), with the remainder being sold for processing 22p/kg (10p/lb)
Marketing costs	
Commission	7.5% on sales to multiples
Transport	Supplying the multiples via packhouses can be more expensive than 6.6p/kg (3p/lb) due to present low volumes of UK organic apples being sold, which involves transporting small quantities, these costs are normally passed onto the grower.
Packaging	6p/lb for multiples, 3p/lb for wholesale markets
Grade and pack	This may be done on farm or at a packhouse for multiple sale, here assumed cost of 4.5p/lb for multiple sales and 3p/lb for wholesale sales
Other	Other marketing costs include promotion.
Total marketing costs	'On-costs' for produce going to multiples can be as high as 40p/kg (18p/lb). Costs of supplying the multiples is at least 11p/kg (5p/lb) higher than supplying wholesale markets. Presently the net returns from wholesale markets can be greater than those gained from selling to multiples due to these additional marketing costs.
Materials	
Fertiliser	Includes compost and manure at 25 tonnes per hectare.
Sprays	Includes Sulphur, Seaweed, Calcium, soft soap, BT, and Derris. Normally orchards are sprayed a toatl of 12-16 times per season.
Tree management	Pruning includes summer and winter pruning. This cost varies with the number of and size of trees, usually between £445-865/ha
Harvesting	Bin hire £3.81 per bin, 320 kgs per bin
Other costs	Levies- organic certification (Lampkin, 1999)
Orchard depreciation	Cost of establishment divided by the life of the orchard, in this example the orchard is assumed to last for 25 years.
Storage	This is based on storing the crop for 2 months at £1 per bin per week.
Overhead costs	
Other labour	This includes the farmer and partners manual labour
Rent	An imputed rent of £146 per hectare
Net Margin	this equates to Management and Investment Income in FBS terms, being the return to the grower and includes their manual labour.

Varieties grown in organic orchards, divided according grower's preferences, include:

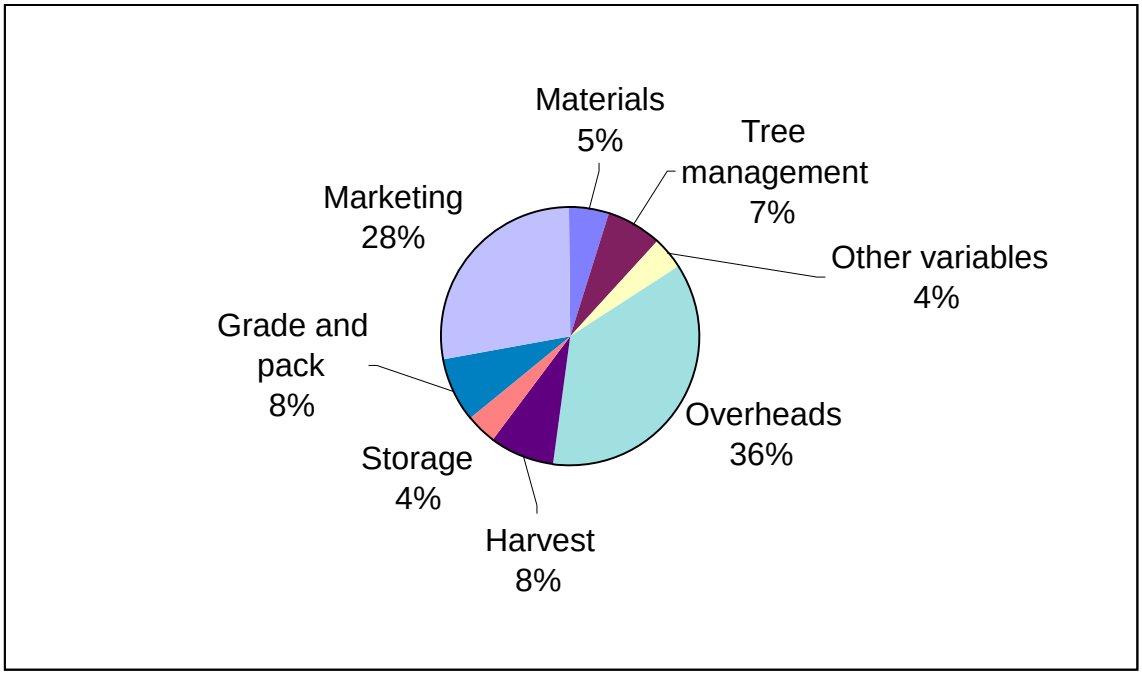
Those which growers stated performed well: Red Falstaff, Worcester, Russett, Spartan, Discovery, Fiesta, George Cave, Laxton Fortune, Kent, Saturn, Kidds Orange.

Others: Cox, Laxton Superb, Worcester Permaine, Egremont Russett, Jonagold, Idared, Katy, Sunset, Golden Delicious.

The relative importance of the different costs is illustrated in Figure 5, which shows the percentage of 8 main cost centres in relation to the total costs.

Total production costs of the crop (materials, tree management, variable costs and overhead costs) account for 52% of the total costs, with overhead costs making up over two thirds of the production costs. Harvesting, storage, grading, packing and marketing account for the remaining 48% of the costs, these are all unit related to the yield.

Figure 5: Breakdown of costs of organic dessert apple production into 8 cost centres, expressed as a percentage of total costs



4.2.4 Results from 1997/98 harvest, profitability

Data was obtained from organic growers in Kent, Suffolk and Herefordshire. From the farms monitored, total costs of production varied from 53p/kg (24p/lb) to 84p/kg (38p/lb). Main costs of production, including overhead costs between the farms were very similar. The main differences in costs were due to the use of different market outlets used, higher costs being incurred where growers sold to multiples and if the grower processed apples themselves. Net Margins ranged from 13p/kg (6p/lb) to 28p/kg (13p/lb) with an average of 19p/kg (8.75p/lb). The late frosts of 1997 season do not appear to have affected the organic growers in the sample so severely as conventional top fruit growers in that year.

Profitability of organic apple production is very much related to selling the whole crop to a variety of currently high priced markets. Growers need to aim to obtain 60-80% of their fruit in Class I and II. Growers with greater than 50% gradeout at present prices will obtain negative net margins. Costs of growing top fruit are high and it is important to see that routine activities such as pruning, picking, grading etc. are performed cost

efficiently, most likely with skilled labour. Overhead costs should also be carefully monitored.

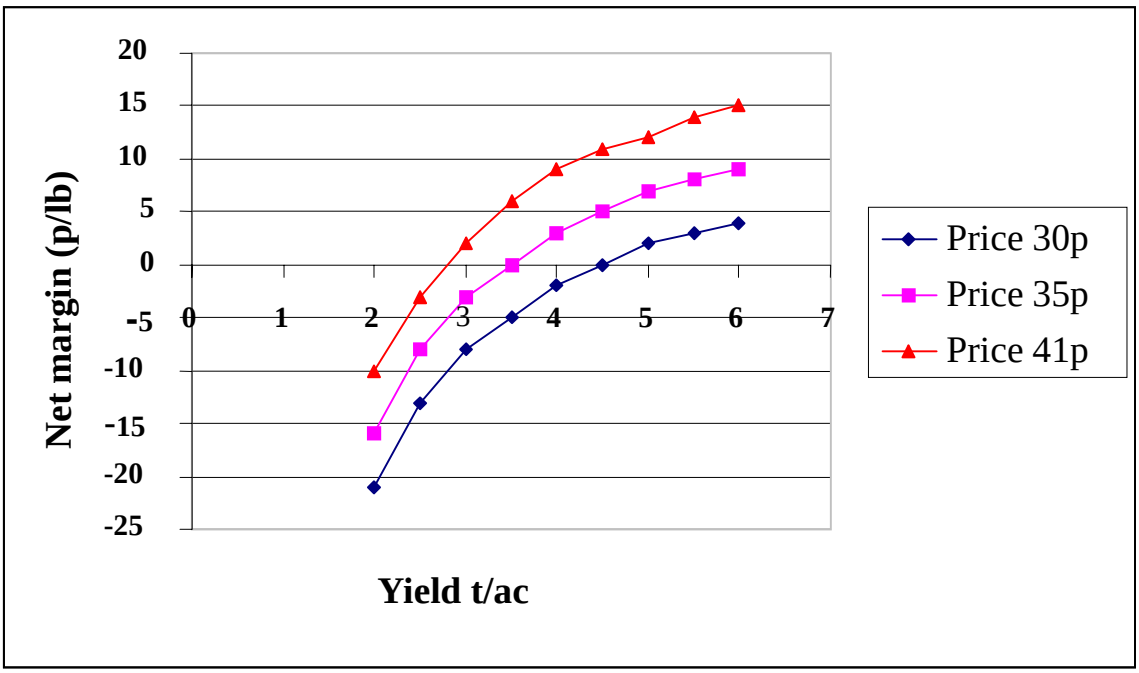
Are intensive systems of production (more trees per hectare) more profitable than extensive systems? One extensive grower with 741 trees per hectare was able obtain results at the top end of the growers group, although there is insufficient evidence from this study to make firm judgements on this issue. However, results from conventional apple production have shown there is a surprisingly low correlation between yield and the breakeven cost per kg or lb., although as expected the unit costs on the tree do reduce at higher yields. The largest yields can be obtained at the higher tree densities but extra costs, particularly orchard establishment, largely counteract the apparent advantages (Knight, 1995).

4.2.5 Breakeven price

Current average prices are 89p/kg. A breakeven price (Table 5) of 70p/kg (32p/lb) is required by growers in order to cover costs. At current prices this can be obtained with a yield of 6.8t/ha (2.75t/ac) In order for growers to generate a return on their investment they should aim to obtain another 15-20% on top of this. At 15% this would equate to a total of 81p kg (37p/lb). Present day prices would only have to decline by 10% in order for this level to be reached.

Variations in yield and price are obviously likely to have an effect on the net margin. Figure 6 demonstrates what would happen if prices or yields rose or fell from 10 tonnes/ha (4t/ac) and a current average price of 89p/kg (41p/lb). At current prices breakeven point would be reached at 6.8t/ha (2.75t/ac), if prices were to fall to an average of 77p/kg (35p/lb), a grower would need to achieve a yield of 8.6t/ha (3.5 t/ac) in order to breakeven, and 11t/ha (4.5t/ac) if prices fell to 66p/kg (30p/lb).

Figure 6: Sensitivity analysis showing variation in organic apple net margin with variations in yield t/acre and average price received for apples



4.2.6 Establishment costs

The costs of establishing an new orchard are approximately £5 per tree planted, this includes the cost of tree, stakes and the labour in planting. Depending on density of planting this would vary from £3700-£13,500/ha (£1500-£5500/ac) Detailed costs of establishment of a recent orchard supplied by a grower converting to organic production are shown in Appendices 8.2 It takes approximately 5 years for grower to recoup their original investment, a detailed cashflow for the first 10 years of an intensive orchard are shown in Appendices 8.1

4.2.7 Optimum size of orchard

The HDRA study contained farms ranging from 2 to 39 hectares (5-97 acres) of apple orchards. The main factor determining the minimum size of orchard area belonging to any farm is the quantity of equipment required to run the farm. This is likely to include two tractors, with spraying and mowing equipment, a grader, building to grade in and may include a cold store, although cold storage space is commonly hired. Total investment is in the order of £30,000 –50,000. In order to efficiently use this equipment an area of 15-20 hectares (37-50 acres) of orchard is considered optimum (Personal Communication, ADAS Fruit Team 1998). This was borne out in the data collected from top fruit farms. The farms over 12 hectares (30 acres) did have reduced overhead costs, compared with those with orchard areas below this.

4.3 Culinary apples

4.3.1 Yields

Yields of organic culinary apples, as per apples in 4.2.1, will vary each year according to weather, pests and diseases, age of trees and density of planting system. Growers monitored had 400-575 trees/ha (160-235trees/ac). Varieties grown include: Bramley, Howgate Wonder, Dabinett, Browns, Reinette Obay and Northwood.

Table 6: Total yields of culinary apples t/ha

	Tonnes per hectare (acre)	Range of yields (t/ha)
Average yields (1997)	15 (6)	10-15
Average yields (5-10 years)	15 (6)	10-25

Almost all the produce which is harvested will be marketed.

4.3.2 Prices

Prices paid will vary with quality, variety and market outlet. None of the growers in the sample sold to multiples, although they are keen to source cooking apples. The growers in the sample sold their apples via wholesale markets, and also for juice and cider. It is not economic to grow culinary apples solely to sell to others to process and market, therefore some growers are also involved in on-farm processing into juice or cider.

- Wholesale: Class I and II price received was 88p/kg (40p/lb)
- Processing: Price received for apples for juicing 22p/kg (10p/lb) for cider 11p/kg (5p/lb) £110-£220 per tonne.

4.3.3 Returns and costs of production, gross and net margins

Assumptions made in deriving returns and costs are given following this table

Table 7: Returns and costs of organic culinary apple production

	£ per hectare	£ per acre	p/kg	p/lb.	% total costs
Yields (tonnes)	15	6	-	-	-
Processing (%)	100	-	-		-
GROSS RETURNS	**15398**	**6234**	**103**	**47**	**-**
COSTS					
Transport	450	182	2	1	6
Promotion	50	20	0.4	0.2	0.1
Total marketing costs	**500**	**202**	**3**	**2**	**7**
Fertiliser	77	31	0.4	0.2	1
Sprays	72	29	0.2	0.2	1
Others	22	9	0.1	0.1	0.3
Total materials	**170**	**69**	**1.1**	**0.5**	**2.6**
Pruning costs	445	180	3	1.4	6
Total tree management	**445**	**180**	**3**	**1.4**	**6**
Mechanical harvest	101	41	0.6	0.3	2
Bin hire/depreciation	178	72	1	0.5	3
Harvesting transport	75	30	0.4	0.2	1
Total harvesting costs	**353**	**143**	**2**	**1**	**5**
Levies	67	27	0.4	0.2	1
Orchard depreciation	99	40	0.6	0.3	1
Processing variables	1183	479	1.3	0.6	18
Total Variable costs	**2816**	**1140**	**19**	**9**	**38**
GROSS MARGIN	**12582**	**5094**	**84**	**38**	**-**
Other labour	1633	661	11	5	22
Power and machinery	993	402	6.6	3	14
Insurance	225	91	1.5	0.7	3
Rent	146	59	1.5	0.4	2
Property repairs	225	91	1.5	0.7	3
Prof. and advisory fees	324	131	2.2	1	4
Others	67	27	0.4	0.2	1
Processing overheads	897	363	6	2.7	12
Total overhead costs	**4508**	**1825**	**30**	**14**	**61**
TOTAL COSTS	**7324**	**2965**	**48**	**22**	**100**
NET MARGIN	**8077**	**3270**	**55**	**25**	

Notes to Table 7

Figures used	All based on 'best possible estimates' (refer to 3.3.4)
Yields	These are based on a average of what can be expected from the whole life of an UK culinary orchard.
Returns	Assumes a yield of 15 tonnes per hectare, All produce for on farm processing and bottling one tonne of apples yielding 675 litres of juice, 60% apple juice sold at £2 litre, 33% cider sold for £1 litre, 7 % sold to others for processing at £110/t
Marketing costs	Includes a small amount of advertising.
Materials	
Fertiliser	Includes pelleted chicken manure.
Sprays	Includes, seaweed and a small amount of soft soap. Culinary apples do not require so much spraying, since cosmetic appearance is less important if only selling for processing.
Tree management	Pruning includes summer and winter pruning. £0.87/tree
Harvesting	Most harvesting is done by machine, shaking the tree and picking up apples mechanically. The cost here is for labour in assisting harvesting.
	Bin hire £3.81 per bin, 320 kgs per bin
Other costs	Levies- organic certification (Lampkin & Measures, 1999)
Orchard depreciation	Cost of establishment divided by the life of the orchard, in this example the orchard is assumed to last for 25 years.
Processing variables	Includes bottles, tops, labels, printing and processing labour.
Overhead costs	
Other labour	This includes the farmer and partners manual labour
Rent	An imputed rent of £146 per hectare
Processing overheads	Includes processing machinery repairs, electricity, depreciation on equipment and barn. Total processing costs in this example are £0.22/litre. One growers has paid a processor to juice and bottle their apples at a cost of £0.97/litre which includes transport to the processor.
Net Margin	This equates to Management and Investment income in FBS terms, being the return to the grower and includes their manual labour.

4.3.4 Results from the 1997/8 harvest

Three growers were monitored as part of this study. All the growers were quite different. One grew Bramleys mainly for sale on the wholesale market and was able to achieve a net margin of £650/ha. The second processed all apples on farm into apple juice or cider and achieved a negative net margin -£550/ha due to low yields (5t/ha) since the orchard is still not in full production, and the third practised very low management input resulting in low yields (5t/ha) and negative net margins of -£723/ha.

It is not profitable to grow and sell culinary apples solely for processing at £110-220/t. This would result in negative net margins of -£1980. Often it is cheaper for juice and cider makers to import apple juice from Europe than it is to grow the apples and some owners of culinary apple orchards have abandoned them for this reason. However, the illustration in Table 7 shows that it is profitable to grow, process and bottle the juice or cider on farm.

4.3.5 Breakeven prices

Due to the varied nature of culinary apple production this has not been completed.

4.3.6 Establishment costs

The costs are similar to dessert apple production (4.2.6). Culinary apple trees are likely to be at a lower planting density which will reduce the cost.

4.3.7 Optimum size of orchard

See comments on dessert apple orchard(4.2.7). If the grower is also processing the apples on farm then these costs have to be borne in mind.

4.4 Pears

4.4.1 Yields

Yields of organic pears (Table 8), as per apples in 4.2.1, will vary each year according to weather, pests and diseases, age of trees and density of planting system. Pears will normally begin yielding fruit five years after planting out and be in full cropping by year 8-10, cropping may last 15-30 years.

Growers monitored had pear orchards containing between 740 and 1000 trees/hectare (300-400 tree/acre). The most common variety grown was Conference, with one grower also growing Comice.

Table 8: Total yields of organic pears in t/ha

	Yields t/ha (t/acre)	Range of yields (t/ha)
Average yields (1997)	10 (4)	8.5-11.5
Average yields (5-10 years)	8.5 (3.5)	0-20
Conference (average 5-10 yrs)	15 (6)	10-25
Comice (average 5-10 yrs)	10 (4)	1.25-20

Marketable yields for a combined Class I and II is usually between 70 and 80%, with the remainder going for processing.

4.4.2 Prices

As with apples, pear prices will vary with quality, variety and market outlet. Prices collected for 1997 and 1998 sales were:

- Multiples: combination Class I and II prices varied 121-143p/kg (55-65p/lb)
- Wholesale: for Class II pears prices averaged 110p/kg (50p/lb)
- Processing: For babyfood 77p/kg (35p/lb), for juicing 22p/kg (10p/lb)

Overall returns and costs of production which can be expected from organic pear production are shown in Table 9.

4.4.3 Returns, costs, gross and net margins from organic pear production

Table 9: Returns and costs of organic pear production

	£ per hectare	£ per acre	p/kg	p/lb.	% total costs
Yields (tonnes)	8.6	3.5	8600 kgs	7700 lbs.	-
Class I &II (%)	75	-	-	-	-
Processing (%)	25	-	-		-
GROSS RETURNS	**9510**	**3850**	**110**	**50**	**-**
COSTS					
Commission	482	195	4.6	3	7
Transport	571	231	6.6	3	8
Packaging	667	270	7.3	3.5	10
Grade and pack (labour)	571	231	5.9	3	8
Others	96	39	1.1	0.5	1
Total marketing costs	**2384**	**966**	**28**	**12.5**	**35**
Fertiliser	124	50	1.2	0.6	2
Sprays	247	100	2.5	1	4
Others	12	5	0.1	-	0.1
Total materials	**383**	**155**	**3.9**	**1.8**	**6**
Pruning costs	618	250	7	3.2	9
Total tree management	**618**	**250**	**7**	**3.2**	**9**
Picking	287	116	3.3	1.5	4
Bin hire/depreciation	104	42	1.2	0.5	1
Harvesting transport	109	44	0.9	0.6	2
Total harvesting costs	**500**	**201**	**5.8**	**2.6**	**7**
Levies	86	35	0.6	0.2	1
Orchard depreciation	198	80	2.4	1.1	3
Storage	217	88	2.5	1.1	3
Total Variable costs	**4384**	**1775**	**51**	**23**	**64**
GROSS MARGIN	**5126**	**2075**	**60**	**27**	**-**
Other labour	845	342	8.5	4	12
Power and machinery	420	170	4.3	2	6
Insurance	363	147	3.7	2	5
Rent	146	59	1.5	0.7	2
Property repairs	185	75	1.9	0.8	3
Prof. and advisory fees	161	65	1.6	0.7	2
Others	351	142	3.5	1.8	5
Total overhead costs	**2470**	**1000**	**29**	**13**	**36**
TOTAL COSTS	**6854**	**2775**	**80**	**36**	**100**
NET MARGIN	**2655**	**1075**	**31**	**14**	

Notes to Table 9

Figures	All based on 'best possible estimates' (refer to 3.3.4)
Returns	Assumes a yield of 8.6t/ha (3.5t/ac) of which 75% obtains combined Class I and II, (of this 50% is sold to multiple sales 143p/kg (54p/lb) and 25% to wholesale 110p/kg (50p/lb)). The remaining 25% goes for processing 44p/kg (10p/lb)
Other assumptions	see notes following apple production.(Table 5)

The costs of producing pears are very similar to producing apples. As for apples approximately 50% of the costs are incurred from harvest onwards and these costs are related to the yield of the crop.

4.4.4 Results from 1997/98 harvest, profitability

From the farms monitored total costs of production varied from 46-73p/kg (21-33p/lb). The main difference in costs were due to market outlet used, the higher costs being for produce sold to multiples. Net Margins varied from 29-40p/kg (13-18p/lb) with an average of 34p/kg (15.5p/lb). On the whole organic pears are considered easier to grow than apples.

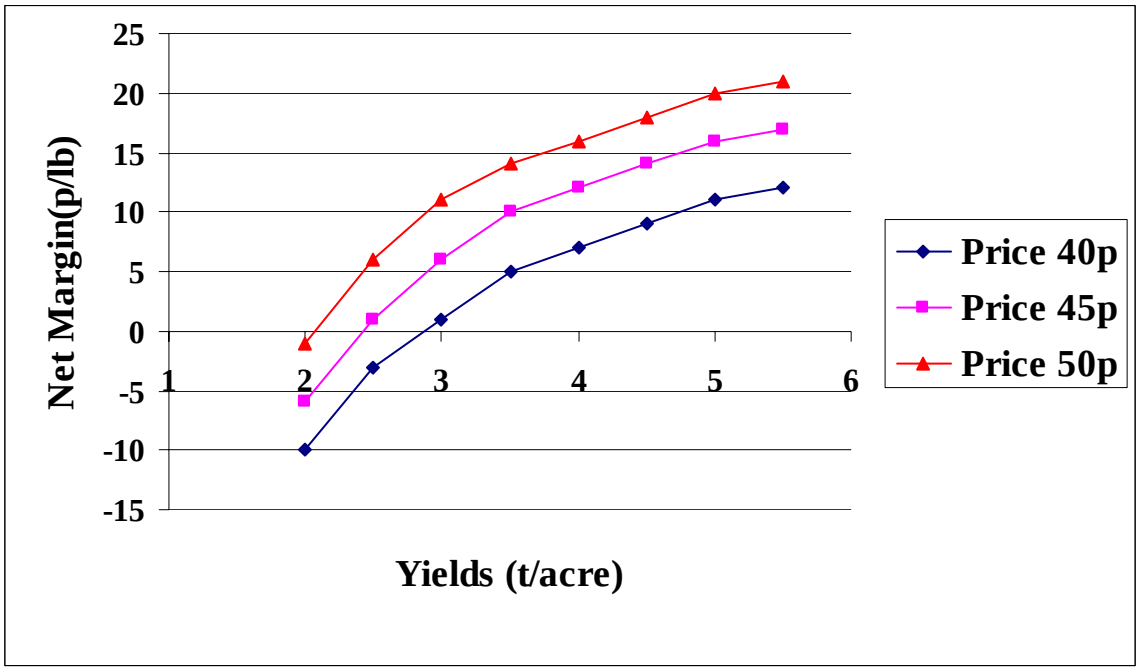
Profitability is related to obtaining good prices for the whole of the crop. Growers should aim to obtain 50-80% of their crop in Class I and II to generate positive net margins, if gradeout from these Classes exceeds 55% (45% in Class I and II), at present prices, growers will obtain negative net margins.

4.4.5 Breakeven price

Current average prices are 110p/kg (50p/lb). A breakeven price (Table 9) of 80p/kg (36p/lb) is required for growers to cover all costs, including their own manual labour. At present prices this can be obtained with a yield of 4.6t/ha (2t/ac). In order to generate a return on their investment growers should aim to obtain 15-20% on top of this. This equates to 92p/kg (41p/lb) Present day average prices would have to drop by 18% from 110p/kg (50p/lb) to fall to this level, assuming the yield stays the same.

Variations in yield and price are obviously likely to have an effect on the net margin. Some of the likely results of these variations are modelled in Figure 7 below.

Figure 7: Sensitivity analysis showing variation in organic pear net margins with variations in yield per acre and average price received for pears.



This shows that as the average price a grower receives for their pears decreases to 99p/kg (45p/lb) the yield required to achieve breakeven will be 5.9 t/ha (2.4t/ac) and if it fell to 88p/kg (40p/lb) a yield of 7t/ha (2.8t/ac) would be required.

4.4.6 Establishment costs

The costs of establishing a pear orchard are very similar to those of an apple orchard at approximately £5 per tree. Total costs will vary according to planting density, varying from £3700-11,500/ ha (£1500-£4700 /ac). Pears normally reach full production by year 7 and it takes approximately this time to breakeven. See appendices 8.3 for full details of a cashflow for establishing a pear orchard.

4.4.7 Optimum size of orchard

See section on apples 4.2.7

4.5 Strawberries

4.5.1 Yields

As with top fruit, yields from strawberries vary with the weather (yields being reduced by sharp late frosts and wet weather prior to and at harvesting), variety, planting density, and age of plant. In organic systems most of strawberries are grown outdoors at rates of 25,000 to 35,000 plants per hectare (10,000-14,000 per acre). Plants or runners are kept in the ground for 3 or in some cases 4 years, with an initial maiden year which yields 30-50% of full potential. Average yields (Table 10) from 3 years cropping (including the maiden year) have been collected from organic strawberry growers as part of this project.

Table 10: Total yields of organic strawberries (t/ha)

	Yields t/ha (t/acre)	Range of yields t/ha
Average yields (1996-98)	6.8 (2.75)	4 -9
Average yields (last 5-10 years)	8 (3.3)	5-9
Processing strawberries	10.5 (4.25)	9-12

Varieties grown include: Pegasus, Honeoye, Florence, Sophie, Emily and for processing Tonto and Melody.

4.5.2 Prices

Prices vary with quality, market outlet, time of the year and the weather (people buy more strawberries when the sun is shining). As with other fruit the highest prices can be obtained from multiples outlets, via packers. However, gradeout and marketing costs (grading, packaging and transport) will be higher. Prices collected in 1998 indicate:

- Multiples: Class 1 £3.5-4.80 per kg (£1.60-2.20/lb)
- Wholesale: Class 1 £2.20-£3.60 per kg (£1-1.64p/lb)
- Processing: £1-£1.90/kg (0.45-0.86p/lb)

Overall returns which can be expected from organic production are shown in Table 11

4.5.3 Output, costs of production, gross and net margins

Table 11: Output, costs, gross and net margins for organic strawberry production

OUTPUT	£ per hectare	£ per acre	p/kg	p/lb.	% total costs
Yields (tonnes)	8	3.24	8000 kgs/ha	7125 lbs/acre	-
Class I (%)	70	-	-	-	-
Processing (%)	30	-	-		-
GROSS RETURNS	**24,400**	**9879**	**3.05**	**1.39**	**-**
COSTS					-
Variable costs (price)					-
Commission	1952	790	24	11	12
Variable cost (yield)					-
Handling/transport	552	223	7	3	3
Picking and packing	5400	2186	68	31	33
Packing materials	2584	1046	32	15	16
Cold store and freezing	80	32	1	0.5	0.5
Variable (price + yield)	**10568**	**4279**	**132**	**60**	**-**
Variable costs (area)					-
Plants	1167	472	15	7	7
Planting	175	71	2	1	1
Polythene	382	155	5	2	2
Polythene laying	74	30	1	0.4	0.5
Bed raising	111	45	1	0.6	1
T-tape	214	87	3	1	1
Straw	87	35	1	0.5	0.5
Cutting back plants	263	107	3	1	2
Irrigation	861	349	11	5	5
Manure	33	13	0.4	0.2	0.25
Fleece	83	500	15	7	0.5
Others	63	15	0.8	0.4	0.4
Variable costs (area)	**4716**	**1909**	**59**	**27**	**29**
Total variable costs	**15284**	**6188**	**191**	**87**	**94**
GROSS MARGIN	**9116**	**3691**	**114**	**52**	**-**
Power and machinery	343	139	4	2	2
Rent	146	59	2	1	1
Other overheads	293	119	4	2	2
Total fixed cost	782	317	10	4	5
TOTAL COSTS	**16166**	**6504**	**201**	**91**	**100**
NET MARGIN	**8334**	**3374**	**104**	**47**	**-**

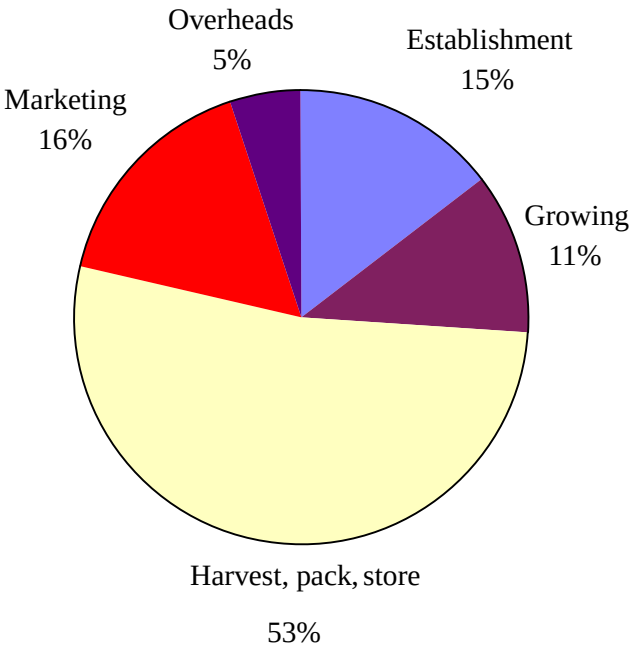
Notes to Table 11

Figures	All based on 'best possible estimates' (refer to 3.3.4)
Yields/Prices	It is assumed that 70% of the strawberries are sold as Class I (of this 50% to multiples at £4/kg and 20% to the wholesale markets at £3/kg) and 30% for processing at £1.50/kg
Costs	All costs are averages over the 3 years the strawberry plants are in the ground, the full costs in cashflow form are shown in Appendices 8.4
Costs related to yield	
Commission	8% of all sales
Handling/transport	£69 per tonne
Picking and packing	£675 per tonne
Packing materials	£323 per tonne
Cold Store and freezing costs	£10 per tonne
Costs related to area	
Plants	£100 per thousand
Planting	£15 per thousand [1]
Polythene mulch	Through which strawberries are planted: £1146 per hectare
Polythene laying	Contractors rate of £222 per hectare [1]
Bed raising	Contractors rate £333 [1]
T-tape irrigation lines	2 per bed: £646 per hectare [1]
Straw	Laid between the rows to suppress weeds £87 per hectare [1]
Cutting back plants	Following harvest with a strimmer £395 per hectare
Water	For irrigation per thousand litres: £0.68, assumes using mains water
Manure	25tonnes per hectare, £5 per tonne
Fleece	Floating crop cover used to advance the crop: £2470 per hectare
Others:	Plough and cultivate contractors rates: £99/ha, spread manure £90/ha.
Fixed costs	Machinery and general overheads: based on figures collected from organic farms and are averages for cropping and horticultural farms. (Fowler, 1998)

[1] *(Source: ADAS, 1999)* it was decided to use conventional costings for these items since many of these operations are not currently practised by many organic farmers, but are likely to be used by more specialised growers who will convert to organic farming in the future, e.g. organic farmers often lay plastic manually and do not use irrigation

Figure 8 shows the costs grouped according to establishment costs, annual growing costs, harvesting (including packing and storage) and marketing costs (commission and transport). By far the largest element of costs in strawberry production are in harvesting and packing the fruit, efficient picking rates are important. A good rate is 8-12kg per person per hour (Lovelidge,1999b).

Figure 8: Breakdown of costs of organic strawberry growing into five cost centres, expressed as a percentage of total costs.



4.5.4 Results from 1996-98 harvest

The organic strawberry growers monitored were from Norfolk, Lincolnshire, Wales, Cornwall and Devon. One of the farmers grew strawberries solely for processing. From the actual data collected from past 3 years accounts yields have averaged 6.8 t/ha (2.75t/ac) not including those for processing. These years included two very wet summers (1997 and 1998) which depressed yields from normal averages of 8t/ha. Average gross receipts were £20,200/ha (ranging from £15,500-24,000/ha). Total costs averaged £9,500 per hectare (ranging from £8,500-11,000/ha). The variation was mainly explained by differences in picking costs. Costs varied between 65 and 88p/kg requiring from 7 to 14 casual pickers (picking 3-4 hrs per day) per hectare for an 8 week period of work. The lowest picking costs were incurred for strawberries grown for processing. Net margins averaged 116p/kg (ranging from 53-187p). The highest returns were obtained from a grower selling 80% of their produce to a packer. The lowest returns per kg and per hectare (£5,600/ha) were obtained from a grower selling all produce for processing, however, these were still very good returns in comparison with arable and vegetable crops in the rotation on that farm.

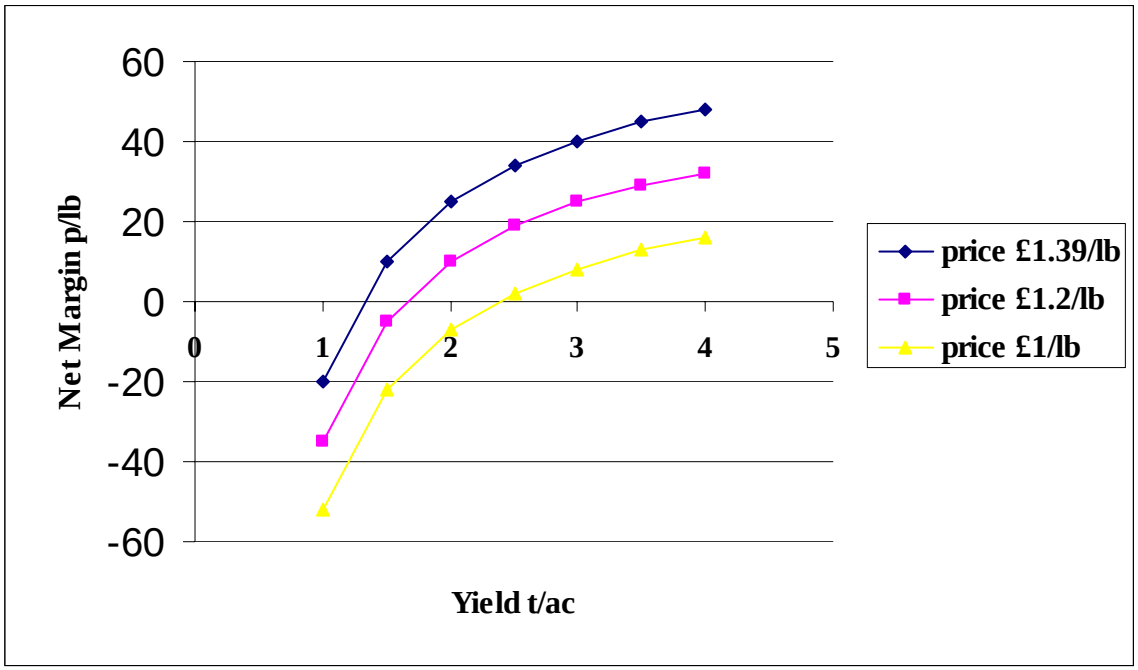
Profitability is related to the ability to sell the whole crop at good prices. It is possible to sell an average of 80% of the crop in Class I. All farms showed that organic strawberry growing was profitable and there is considerable scope for yields and prices to fall before this profit is eroded (Figure 9). Overall profitability of strawberries will need to be assessed in the context of all the crops in the rotation, which may include fertility building grass clover leys. Organic strawberries are grown in rotation with arable crops and grassland for livestock, as well as on vegetable farms.

4.5.5 Breakeven price

Current average prices (Table 11) are 305p/kg (130p/lb). A breakeven price of 201p/kg (91p/lb) is required by strawberry growers in order to cover costs if mainly selling for the fresh market, and if solely for processing £1/kg(45p/lb). At present prices this can be obtained with a yield of 3.2t/ha (1.29t/ac). In order for growers to generate a return on their investment, they should aim to obtain another 15-20% on top of this. At 15% this would equate to 230p/kg (104p/lb) for the fresh market.

Variations in yield and price will have an effect on net margins. These are modelled in Figure 9, which examines the effects of 3 different price levels on net margins.

Figure 9: Sensitivity analysis showing variation in organic strawberry net margins with variations in yield per acre and average price for strawberries



Yields of 8 t/ha (3.24t/ac),and current prices of 305p/kg (139p/lb), give a net margin of 104p/kg (47p/lb). In order for net margins to fall to breakeven point, assuming yields remain at 8t/ha (3.24t/ac), prices would have to fall by 35% to 201p/kg (91p/lb). Yields at present day prices would have to fall by 60% to 3.2t/ha (1.3t/ac) in order to fall to breakeven point. Price premiums above conventional prices are not required to enable organic production to break-even. (Table 17)

4.5.6 Establishment costs

The cost will vary between £5,000 and £9,500 per hectare (£2,000-3,850/ac) depending on the planting density and on whether plastic mulches, crop covers and irrigation are used. These costs are detailed in Appendix 8.4.

4.5.7 Optimum size of strawberry holding

This very much depends on the market outlet being supplied and the labour availability. Smaller scale market garden type growers supplying direct sales (box schemes, farmers markets, etc) tend to grow 0.1-0.2 ha (¼-½ acre) of strawberries. Since strawberries are a relatively high value product it is often not economic to add them to a standard value box of say £5. Strawberry picking often clashes with peak labour demands for weeding and planting on such holdings.

More specialised growers would have between 0.4 and 0.8 ha (1-2 acres). The larger volumes from such units would enable them to supply larger box schemes, co-operatives and wholesale markets on a regular basis or to supply packers and processors. The latter require fruit in minimum ½ tonne lots. The total area devoted to strawberries on one farm is also limited by the constraints of the rotation; strawberries can not be grown on more than 20% of the land. Holdings larger than one hectare (2.5 acres) are likely to suffer from reduced marketable yields simply because it is unlikely that all the crop will be harvested (Raffle, 1999).

4.6 Conversion to organic fruit production

4.6.1 Conversion to organic top fruit

The conversion to organic fruit poses a number of problems. For all perennial crops such as top fruit, the conversion period is 3 years (36 months) from the last use of prohibited inputs, which is longer than for other crops.. Conversion to crops, such as arable and vegetable crops, are usually made with a specific break from conventional to organic crops using a grass clover fertility building period. Whereas established orchards usually continue to be cropped through the 'in-conversion period' with potential significant marketable yield reductions and difficulties in marketing the non-organic produce during this period.

Previous studies on the economics of conversion to organic farming have noted that the process of conversion to organic production involves changes in attitudes as well as changes and innovations in the enterprise mix, marketing strategies and production practices (Lampkin & Padel, 1994).

This study collected data from one grower who had completed conversion of an existing orchard, another who was in the middle of conversion and a final grower who was establishing a new orchard. This is a limited amount of data in the UK to draw any firm conclusions from and what is presented here are some of the findings based on this study.

4.6.2 Alternatives approaches in converting to organic top fruit production.

There are two alternatives;

1. Conversion of an existing orchard
2. Planting a new orchard

4.6.3 Converting an existing orchard

Converting an existing orchard may seem in the short-term to be the simplest, cheapest and quickest option of obtaining organic fruit. Evidence collected would confirm that it is cheaper to convert an existing orchard than establish a new one. However, there are many inherent problems to be aware of:

- a grower may select the poorest orchard in terms of pest and disease occurrence, with weak or poorly maintained trees;
- often the existing varieties are susceptible to damage by scab and/or mildew;
- the planting system may not be suitable for effective mulching or weed control;
- the age of the tree may be detrimental to cropping potential;
- too much vigour in fully productive (mid life) plantations may lead to greater susceptibility from pest and disease damage,

- tree canopy management may not be conducive for effective permitted spray penetration.

Old Conference pear and Discovery apple orchards are exceptions to these points. They are by no means ideal but have proven to be a profitable and successful alternative to replanting. (Kennedy, 1999) Discovery can, however, be susceptible to sawfly damage. Extensive orchards on fairly traditional rooting stocks do appear easier to convert than intensive ones. One technique adopted by a converting grower was to 'rehead' (graft new stock) onto his old rootstock, thus giving his orchard a new lease of life. Other growers have used the conversion period to prune and reshape their trees especially where they have taken over neglected orchards.

Evidence collected shows that during conversion yields will fall (as much as 50%) and levels of grade-out (fruit which achieves class I standard- see footnote on page 3) will decrease from the conventional norm of 80-90 % to as low as 50% especially in the first two years of conversion. This is exacerbated by having to sell at low Class II prices in the conventional market, during the conversion years. Fruit may be sold as 'inconversion' 12 months after the last prohibited input use and some wholesalers and box scheme operators do buy 'in conversion' fruit and pay a price midway between conventional and organic. Some multiple buyers have also been paying growers a 10-20% premium, over conventional prices, during conversion in order to encourage organic production and selling this under a 'inconversion' brand. Due to the confusion that so called 'inconversion' or 'transitional produce' causes in the eyes of supermarket consumers, certifying bodies have been discouraging multiples from selling fruit in this manner. This has led to marketing problems for growers (Lovelidge, 1999a).

Yields and gradeouts during conversion will vary greatly for a number of reasons:

- between varieties grown, e.g. Discovery is likely to yield better than Cox,
- according to whether specific management strategies such as planting grass clover leys in the alleyways
- adopting specific organic pest and disease measures, e.g. timely spray treatment.

A case study was conducted of one grower who has converted a 10 hectare (25 acre) apple orchard (containing 38% Cox, 23% Discovery and other mixed varieties) on a fairly extensive system (300 trees per acre). Average apple yields fell by a total of 50% from pre-conversion levels until the first organic year (**Table 12**). Gradeout (Class I %) was 85% prior to conversion, this decreased to 70% in year 1 and 20% in year 2 with the remainder in class II and processing categories. This led to a reduction in income of £426 (£172/ac) in the first year, compared with pre-conversion levels, £3662/ha (£1483/ac) in the second year, and a further £1731/ha (£701/ac) in the third year. This averages just over £2000/ha/year over 3 years. Having completed conversion the grower does now make a higher net margin/ha from organic production than from his pre-conversion levels.

Other costs of conversion may include purchase of appropriate mowing and cultivation equipment to control weeds. In **Table 12** the total costs of conversion have been estimated at £6,319/ha over the three period of conversion (£2,000 per annum). These costs have been calculated to be recouped through higher returns, from organic production, 8 years after conversion. Of course if a conventional grower is not making a

positive net margin from his orchards, which is currently quite common (Renwick,1998), this fall in the income will not be so great. Others have reported a cost of converting existing orchards as high as £4,500/ha per year for three years (Anon, 1998).

Table 12: Case study of conversion to organic apple production

	Year 0 Pre-conversion	Year 1	Year 2	Year 3[4]	Organic
Yields (t/ha)	25	20	17	15	12
Class 1 (%)	85	70	20	-	-
Class 2	-	10	45	-	-
Combination class 1 & 2	-		-	60	68
Process (%)	15	20	35	40	32
Total returns (£/ha)[2]	11,791	9432	4357	7370	9183
Total costs (£/ha)	9653	7722	5881	5775	6247
Net margins (£/ha)	**2138**	**1712**	**-1524**	**1595**	**2936**
Reduction in income[1] from year 0 (£/ha)		426	-3662	-1731	
Total cost of conversion (£/ha)[3]				6319	
Additional income after conversion (£/ha)					789

Notes to Table 12

1 The reduced level of income compared with the pre-conversion year

2 Includes organic aid at a total of £250/hectare from year 1, spread over 5 years. Organic aid has now been increased to £450/ha.

3 This is the cumulative reduction in income over the conversion period, plus cost of additional cultivation equipment and finance charges.

4 The grower sold his produce as ‘inconversion’ in year 3

This case study should only be taken as one example of what can happen during conversion, it should be noted that the grower in question had a large area of the variety Cox, which is known not to perform well through conversion and subsequently in organic systems. Other growers have experienced less dramatic reductions in yields, and some growers have been able to maintain financial returns through developing their own facilities to process the outgrades, or to use environmental features such as ponds for fishing in order to generate additional income during this period (Lovelidge, 1998). In Continental Europe there is evidence that yields during conversion from more intensive orchards can drop more dramatically than this case study, especially in the second year of conversion (Bevan, 1999). It appears, however, from evidence collected to date, that if sufficient planning and management strategies are employed, and suitable markets found for ‘inconversion fruit’ during conversion that losses can be minimised. The exact management strategies to be undertaken are not well established and could be the subject for a future study.

4.6.4 Establishing a new orchard

The second alternative is in many ways more preferable, enabling the establishment of an orchard more suitable for organic production. Such an orchard can be converted during the years before they yield fruit so there would be no greater loss over the conversion period that with a conventional orchard. Some growers in the UK have established orchards under conventional production for the first two years, in order to use conventional methods of weed pest and disease control, then converted the orchard which begins fruiting at the end of the three year conversion period (Hall, 1997).

The costs of establishment depend very much on the growing system and the number of trees per acre. The normal cost is approximately £5 per tree which includes tree, stake, and labour in planting. If a mulch and irrigation are used, the cost will increase. Total costs vary between £3,700-£13,500 per hectare depending on tree density (500-2,325 trees/hectare)

Following planting, when fruiting begins very much depends on the rootstock chosen. Generally 30% cropping is obtained during the 3rd year with full cropping from the 6th. Break-even will not usually be achieved until the fifth year for apples and later for pears. (see Appendix 8.1 for a typical cash flow for establishing apples).

Comparison of 'payback' (re-coupment of original investment) from either method of conversion indicates that financial payback on investment will be achieved in much the same period, that is 5-7 years. Establishment of a new orchard is, however, much more expensive (by approximately three times) than the cost of converting an existing orchard but would in the longer term offer greater returns and is usually the option recommended to many thinking of converting to organic top fruit production. The advantage of converting an existing orchard lies in obtaining organic fruit quicker, and it maybe the only option for a grower wishing to convert all their orchards at once. Ideally more evidence should be collected in this area in order to further assess the alternatives to conversion.

4.6.5 Organic Aid

This is available in the UK to growers converting to organic top fruit production at a rate of £450/ha (new rate April 1999) spread over 5 years, plus lump sums per farm of £300 in year 1, £200 in year 2 and £100 in year 3. Land in permanent crops is eligible for the same rate for conversion as land eligible for Arable Area Payment Scheme. For those converting an existing orchard (Table 12), this would represent approximately 8% of the conversion costs. When establishing a new orchard the organic aid represents 2-3% of total expenditure over the first 5 years (Appendix 8.1). Bearing in mind the costs of establishing and converting an orchard, this is relatively small and is unlikely to have a major influence on a growers decision to convert.

In 1997 UK rates of payment for conversion to organic fruit production compared unfavourably with those which are available in other European Union (EU) Countries (Table 13). However, in April 1999 the UK rate of payment nearly doubled from the rates shown in this table, to a little below the average for other EU converting fruit farmers. The average payment made in the first two years for converting fruit farmers in the EU is 562 ECU/ha/year (£365) as against £360 for UK fruit growers. Some countries such as Belgium have a higher rate for top fruit as against soft fruit. The largest differences in conversion payments between UK and other EU countries is that

other EU countries most commonly have a tiered payment system, with less being paid to cereal and grassland farmers and higher rates to vegetable and fruit farmers. This recognises the higher cost involved in converting to these more intensive systems of land use. A recent MAFF review of the Organic Aid Scheme stated that 'the case for a separate rate of aid for horticultural crops was not strong', small comfort for those contemplating conversion (Anon,1998).

Table 13: Typical 1997 payment rates for land in first two years of conversion (ECU/ha/year)

	Cereals	Grassland	Vegetables	Fruit
Austria	326	217	434	723
Belgium	180	299	299	569
Germany	140	140	140	662
Denmark	140	87	140	140
Spain	121	90	241	287
Finland	389	549	566	1022
France	151	106	151	711
Great Britain[1]	101	101	101	101
Greece	182	304	304	1035
Ireland	337	398	398	398
Italy	185	309	309	1050
Luxembourg	173	173	173	173
Holland	226	136	543	837
Portugal	217	n/a	362	579
Sweden	145	214	145	145
EU average	**202**	**219**	**287**	**562**

(Source: Adapted from Lampkin, 1999b)

[1] 20% of values shown land is in less favoured areas in England/Wales or rough grazing in Scotland/N.Ireland . The standard organic aid rate for GB in 1997 was a total of 215 ECU/ha for the first two years conversion payments.

Many EU countries also have continuing or maintenance payments which are made to farmers for ongoing organic management of their land (

Table 14). The average payment for fruit trees is 496 ECU/ha/year (£322/ha), in comparison the UK makes no payment. France is the only other EU country not to make ongoing maintenance payments to its organic farmers.

Table 14: Typical 1997 payment rates for fully (continuing) organic land (ECU/ha/year)

	Cereals	Grassland	Vegetables	Fruit
Austria	326	217	434	723
Belgium	111	173	296	740
Germany	112	112	112	560
Denmark	114	60	114	114
Spain	72	54	145	172
Finland	237	339	414	869
France	0	0	0	0
Great Britain	0	0	0	0
Greece	182	304	304	1035
Ireland	246	246	276	276
Italy	185	309	309	1041
Luxembourg	148	148	148	148
Holland	136	136	136	136
Portugal	181	n/a	301	483
Sweden	145	n/a	145	145
EU average	**169**	**193**	**241**	**496**

(Source: Lampkin et al, 1999b)

4.6.6 Conversion to organic strawberry production

In order to minimise pest and disease incidence all crops must be grown in a rotation. At present a 3-4 year break between strawberry crops is recommended This will require an area 5 times larger than the strawberries. Strawberries fit well into a rotation with arable crops and livestock but are also grown on vegetable farms. Conversion to such systems takes two years and usually involves growing fertility building crops (grass/clover leys) for the first two years. The conversion period may involve a reduction in income, although it can be offset if the farm has livestock to graze the leys or set aside can be claimed on it (if eligible for Arable Area Payments). Organic aid will

be available to farmers converting to organic soft fruit production as per 4.6.5, however, if the land is not eligible for Arable Area Payments the rate is only £350/ha over 5 years.

4.7 Comparison with conventional fruit production

Comparisons are made here for the general purposes of comparing conventional and organic systems only and should not be taken as stating a case that one system is financially better than the other. The figures for conventional apple production are more statistically reliable since they are taken from a much larger sample (57 growers in the case of the figures for dessert apples) as against 5 growers for the organic sample. These comparisons have been made in consultation with representatives from the conventional fruit industry.

4.7.1 Dessert Apple production

Table 15: Comparison of output, costs and margins in organic and conventional dessert apple production

	Organic	Conventional
Marketable yields (t/ha)	10	16
Class I (%)		85
Class II and processing		15
Class I and II (%)	68	
Processing (%)	32	
Gross Prices p/kg (p/lb.)		
Class I p/kg (p/lb.)		68 (31)
Class I and II p/kg (p/lb.)	121 (55)	
Processing p/kg (p/lb.)	22 (10)	8.8 (4)
Gross Returns (£/ha)	**8803**	**7605**
Marketing costs (£/ha)	2524	2856
Materials (£/ha)	383	630
Tree management (£/ha)	494	896
Harvesting (£/ha)	531	890
Storage (£/ha)	247	400
Other variables (£/ha)	299	156
Overheads (£/ha)	2470	1534
Total costs (£/ha)	6948	7360
Total costs p/kg (p/lb.)	**70 (32)**	**50 (22.5)**
Net Margin (£/ha)	**1855**	**245**
Net Margin p/kg (p/lb.)	**19 (9)**	**1.65 (0.75)**

*(Source: Organic Table 5,*Conventional MAFF,1997 and Hardy,1996)*

Notes to Table 15

Yield figures for conventional production	From 10 year averages (MAFF, 1997)
Returns and costs	Obtained from a study into the Economics of the English Cox Apple Crop 1995/96 (Hardy, 1996)
Comparisons	
Yields	On average organic yields are 50-80% of conventional ones, with a lower gradeout % (see footnote page 3) under organic production. The conventional Cox apple crop will not achieve such a high gradeout rate, these are more likely to be closer to organic levels.
Prices	Organic prices are commonly 80-90% higher than conventional ones. Organic production has the advantage of a good market and price for outgrades which go for processing into juice, babyfood and other outlets.
Gross Returns	Despite lower yields, higher prices for organic crops enables organic growers to obtain similar or higher than average conventional gross returns per hectare.
Costs	
Marketing costs	This includes grading and packing. This will be higher where more produce is sold through multiple outlets. Organic growers also use wholesale and direct marketing methods.
Materials	These are considerably less under organic production. Although a lot of sprays are used under organic production, they contain materials such as sulphur and seaweed sprays which are less expensive than conventional chemicals.
Tree management	This is mainly pruning and thinning and is related to number of trees per hectare. Many organic growers have a lower tree density and organic growers have less hand thinning since they will have smaller crops. Organic growers will have more labour in weeding and mowing the grass sward, this is included as an overhead cost in this comparison.
Harvesting, storage	These are related to the yield and are therefore less under organic production. Currently most organic growers do not store for long periods.
Variables	Include organic certification which explains why this is higher for organic production.
Overheads	Organic growers do have extra costs of fuel and machinery since they are spending more time spraying the trees and mowing the sward and there are extra labour costs involved in these operations.
Total costs	Total costs of conventional and organic top fruit growing are quite similar, organic growers make some savings by having lower material costs but have to spend more on machinery and labour.
Margins	These are highly variable in conventional production with many growers presently losing money. It is possible with present prices and careful management to make healthy profits from organic production.

4.7.2 Dessert pear production

Table 16: Comparison of output, costs and margins in organic and conventional dessert pear production

	Organic	*Conventional
Marketable yields (t/ha)	8.6	11
Class I (%)		85
Class II and processing (%)		15
Class I and II (%)	75	
Processing (%)	25	
Gross Prices p/kg (p/lb.)		
Class I p/kg (p/lb.)		55 (25)
Class I and II p/kg (p/lb.)	121 (55)	
Processing p/kg (p/lb.)	22 (10)	8.8 (4)
Gross Returns (£/ha)	**9510**	**6049**
Total costs (£/ha)	6854	5837
Total costs p/kg (p/lb.)	**80 (36)**	**51 (23)**
Net Margin (£/ha)	**2655**	**212**
Net Margin p/kg (p/lb.)	**31 (14)**	**4 (1.7)**

(Source: Organic Table 9, Conventional: Wye College)

Notes to Table 16

Comparison	* Less detailed information was available for comparison with conventional pear growing. Overhead costs for conventional pear growing were assumed to be the same as conventional apple growing. Many of the comments on apples also refer to pears. Some of the differences are highlighted below.
Prices	Organic pears are commonly sold with price premiums of 100% over conventional prices.
Yields	Organic yields are on average 70-80% of conventional ones. It is possible to achieve gradeout (Class I and II) of 70-80% from organic pears. High prices and higher percentages making Class I and II enable organic growers to make good returns.
Net margins	These are higher than for apples, many due to higher percentages making Class I and II grades. The costs of growing organic pears and apples are similar. Overall it is considered generally easier to grow organic pears than apples due to lower pest and disease incidence.

4.7.3 Strawberries

Table 17: Comparison of output, costs and gross margins of organic and conventional outdoor strawberry production (average 3 years).

	Organic	Conventional
Marketable yields (t/ha)	8	8.6
Class I (%)		90
Class II and processing		0
Class I and II (%)	80	-
Processing (%)	20	-
Gross Prices p/kg (p/lb.)		
Class I p/kg (p/lb.)		264 (120)
Class I and II p/kg (p/lb.)	440 (200)	-
Processing p/kg (p/lb.)	150 (68)	-
Gross Returns (ha)	**24,400**	**22,000**
Marketing costs (ha)	2504	2335
Picking and packing (ha)	8064	8784
Establishment costs (ha)	2156	2603
Growing costs (ha)	1294	2231
Total variable costs (£/ha)	**15,284**	**15,953**
Gross Margin (ha)	**9,116**	**6,049**
Gross Margin p/kg (p/lb.)	**114 (52)**	**73 (33)**

(Source: Organic: Table 10, Conventional: ADAS, 1999)

Notes to Table 17

Marketing costs	include commission, and transport
Picking and packing	includes: labour and materials and cold storage
Establishment	includes; plants, planting out, bed raising, polythene mulch and its laying, and T-tape for irrigation.
Growing costs	include: Fungicides, insecticides and herbicides (conventional growing only) fertilisers, biological control, straw, floating polythene or fleece as a crop cover, and water for irrigation.
Fixed costs	Insufficient information was available on fixed costs of conventional strawberry growers to enable comparison to net margin level, however, the gross margin does include all labour costs which are the highest costs of strawberry growing.
Yields	Outdoor organic strawberries are likely to have marketable yields only slightly less than their conventional counterparts. One of the factors for the relatively high organic yields is a viable processing market for organic outgrades which does not exist in the conventional market, meaning there is less wastage in organic systems. A key to good yields in any strawberry production system is having good quality planting runners. A considerable portion of conventional strawberries are now grown indoors under glass or polytunnels. This is not commonly practised in organic systems due to disease problems.
Prices	Organic strawberries sell for approximately 60-70% higher than conventional ones. Strawberries for processing are in much demand, according to processors contacted as part of this study, who require 200 tonnes/annum, equivalent to 25 hectares (62 acres). Presently these are being imported.
Costs	Costs of establishment, picking, packing and marketing can be very similar between organic and conventional. The largest difference in costs is in growing where the organic costs are considerably cheaper because artificial chemicals and fertilisers are not used.
Gross Margins	There is potential to generate good returns from organic production which match or are better than conventional returns. This is largely due to the higher prices paid for the whole crop of strawberries.

4.8 Organic Fruit Production in other countries

Some statistical and economic data on organic fruit production has been collected from other countries. Much of the detailed data from Switzerland, Germany and Holland is not in English and it has not been within the scope of this study to translate it, therefore what is presented here is only a summary. Statistical data collected from European countries (EU) (Table 18) show that the area of organic fruit in the UK is small (approximately 0.3% of EU total) relative to many other European Countries. The statistics also charts the growth in the area of organic fruit, which has risen by an average of 12% per annum in the UK from 1993-1997, as against the EU average of 20% per annum in the same period.

Table 18: Certified perennial and fruit crop areas in the EU 1993-1997 (ha)

	1993	1994	1995	1996	1997
Austria	nd	nd	nd	631[1,2]	631[1,2]
Belgium	10	142	155	202	51
Germany	nd	nd	3697[4]	3019[4]	4288[4]
Denmark	nd	189	253	284	351
Spain	5662	2498[5]	10646	20235	36604
Finland	135	199	256	299	415
France	8027	nd	8532	9332	10437
Great Britain	206	229	285	333	302
Greece	539	664	1986	4270	8523
Ireland	nd	nd	nd	nd	nd
Italy	nd	nd	nd	60483	nd
Luxembourg	0	0	1	1	3
Netherlands	nd	nd	174	210	265
Portugal	nd	5582	7734	6177	7109
Sweden	nd	nd	nd	160	220

(Source: Foster, 1999b-unpublished data)

nd = no data
1 Austria: Policy supported land area only
2 Austria: Vines only
3 Belgium: Flanders not included in 1993
4 Germany: AGÖL land area only
5 Spain: Andalucía and Comunidad Valenciana not included in 1994

Breakdown of the area devoted to individual fruit crops (Table 19) shows that in terms of the crops in this study; apples pears, strawberries. Italy produces the most organic apples and pears followed by Greece, Germany, the UK, Denmark and the Netherlands in descending order.

Table 19: Individual perennial and fruit crop areas in 1997 harvest year in EU countries (ha)

	Vines	Olives	Citrus	Apples/ pears	Stone fruit[3]	Soft fruit[4]	Other	Process	Total
Austria	631	nd	nd	nd	nd	nd	nd	nd	631
Belgium	nd	nd	nd	nd	nd	nd	nd	nd	51
Germany	1578	0	0	393	nd	127	1463	460	4228
Denmark	0	0	0	165	nd	186	nd	nd	351
Spain	3121	23553	1465	2218[1]			6249	nd	36554
Finland	0	0	0	13	nd	401	nd	nd	415
France	5804	195	nd	nd	nd	nd	4438	nd	10437
UK	13	0	0	223	11	11	44	nd	302
Greece	1122	5854	795	554	nd	nd	185	nd	8253
Ireland	nd	nd	nd	nd	nd	nd	nd	nd	nd
Italy[2]	9368	29223	7907	1184	1855	108	10838	nd	60483
Luxembourg	1	0	0	2	nd	nd	nd	nd	3
Netherlands	0	0	0	150	nd	nd	115	nd	265
Portugal	594	5024	nd	nd	nd	nd	1491	nd	7109
Sweden	0	0	0	nd	nd	nd	nd	nd	220

(Source: Foster, 1999, Personal Communication)

[1] figure represents total for apples, pears, peaches, apricots and stone fruit
[2] 1996 figures used for Italy as data for 1997 not available
[3] Stoned fruit includes; plums, peaches and apricots.
[4] Soft fruit includes berried fruit
nd no data available

4.8.1 Organic Top Fruit

Table 20: Comparison of financial organic dessert apple data from different European Countries

	England	Denmark	Netherlands	Switzerland	Hungary
Yield (t/ha)	10	8	20	30	10
Class I and II %	68	60	75	69	nd
Processing %	32	40	25	-	nd
Class I and II Prices (p/kg)	121	85	66	69	nd
Processing prices (p/kg)	22	20	15	14	nd
Gross margin (ha)	4327	nd	7450	7477	nd
Net Margin (ha)	1855	293	4500	nd	nd

Source: Denmark-Anon, 1996, Netherlands-Groot, 1996, Switzeralnd-Schmid 1999, Hungray-Balazs, 1997

Denmark

In a Study of Organic Fruit Growing 'Frugtaval 8' (Anon, 1996) It was noted that organic apple growing was less profitable than conventional apple growing with net margins of £293/ha as against £1,493 for conventional. Organic apple yields at 8t/ha only one third of conventional apple yields. Prices and yields are similar to England, however, costs of production are higher resulting in lower net margins in Denmark. There is a rapidly expanding market for organic fruit with increasing prices, although often consumers expect the organic products to be, as a minimum, the same quality as similar conventional products and this makes large demands on the producers. Difficulties of growing apples acceptable to the supermarkets were noted, other outlets such as farm shops were easier to sell in. As with English apple growing, material costs (chemicals and fertilisers) were 25% of conventional ones and machinery costs were double. Establishing an orchard costs approximately £5,000 per hectare and it takes 5 years to recoup this investment.

Netherlands

Intensive methods of production are used with planting densities of 2400 trees per hectare with most growers using irrigation. It is estimated that yields of 20t/ha are required in order for growers to breakeven and allow income for investment (Bevan, 1999). However, there are few organic growers who consistently achieve this. This indicates that costs of production are much higher than in the UK and the prices received are lower, almost half that of UK. An economic study on the Dutch fruit industry has been completed which contain some organic fruit orchards in the sample of growers. This shows that despite much lower yields (50% less) from organic orchards, higher prices and lower costs of production enabled higher average net margins to be

achieved from organic apple and pear orchards than conventional ones, although the sample of organic orchards was small (Groot,1996).

Switzerland

As part of the MAFF project (OF0150) 'Organic Fruit Production; a Review of Current Practice and Knowledge' (Bevan, 1999) a tour of some European countries was undertaken with visits to research Institutes and commercial farms in the Netherlands and Switzerland. The report noted Switzerland had intensive high yielding systems with average yields of 30 tonnes per hectare. Irrigation is used in most orchards and trees are trained along wires and in some orchards woven plastic is used to control weeds. The Forschungsinstitut fur Biologischen, Landbau (FiBL) an organic research centre has conducted a considerable amount of economic research and monitoring on behalf of organic fruit growers and also made a comparison with Integrated Pest Management (IPM) schemes (Schmid, 1999). The results indicate that organic top fruit can be more profitable than fruit grown under IPM regimes.

Most of the fruit produced in Switzerland is sold wholesale and many of the small 'health-food' type shops also stock a range of organic produce. Surveys have shown that consumers are prepared to pay 20% more for organic fruit than conventional.

Hungary

Yields of 10 tonnes per hectare were noted in 1993. Costs of production were 40% lower than conventional ones. Organic fruit was sold profitably on a stable market, which could not be said for non-organic fruit (Balazs, 1997).

Germany

Research and information is available in German but was not translated in time for the writing of this report.

4.8.2 Organic Soft Fruit

Table 21 compares data on organic strawberry growing from other countries with those obtain from England

Table 21: Comparison of organic strawberry data from different countries 1998

	England	Denmark	USA
Yield (t/ha)	8	n/a	31
Prices: Class I	4.40	2.38	na
Prices: Processing (p/kg)	1.50	1.43	na
Cost of picking (p/kg)	55-88	52-57	na
* Net margin (ha)	9,116	n/a	3777

*labour and machinery costs are deducted, but not other overheads.

Denmark

In 1998 there were 25.5 hectares of organic strawberries grown in Denmark which represented 3.3% of the total strawberry growing area in the country. The organic strawberries were sold via PYO systems, farm gate sales, markets and smaller quantities to multiples and a small share for processing.

Most strawberries are grown with 25,000-30,000 plants per hectare in single rows on the flat. Plastic mulches are not common and weeding is by mechanical inter-row hoes and by hand. Full accounting data is not available. It was noted that yields can be reduced by up to 30% by the disease Botrytis (grey mould). Labour costs were £10.10 /hour for skilled labour and £6.10/hour for under 16 year olds. The average picking piece rates were 52-57p/kg. Organic strawberries sell for £1.33-£1.62/kg in PYO systems (15% higher than Danish conventional prices) and retail Class I sold for an average in 1998 of £2.38/kg (20-30% above Danish conventional prices) (Neilsen, 1998). In comparison with England, intensity of production (number of plants per hectare) is similar, prices for strawberries are almost half of that obtained in England and labour costs are much double those in England.

USA

A study of conversion to organic strawberry production systems was conducted in California and comparisons were made with conventional growing systems (Gliessman, 1994).

Plant populations of 48,000 plants per hectare were used. Over a period of 3 years, yields of organic strawberries were 68% of conventional (32% lower), although the yield difference between the two systems narrowed over the three year period from 39% lower in year 1 to 28% lower in year 3. The transition to organic strawberries involved changes in management and was a learning process for farmers. Price premiums of 50% were received for organic strawberries. Total costs of growing organic strawberries was lower, but the organic system required more tractor hours for mechanical weeding and labour costs were 11% higher.

Overall the organic strawberries yielded a higher financial return which was 40% higher than conventional systems in terms of net margins per hectare. In comparison with England the systems of production are very intensive and in a different climatic region therefore comparisons are perhaps less possible.

Conclusion on comparison with other countries

Overall the information obtained from other countries confirms some of the findings of this study that organic fruit growing can be profitable and in many cases can be more profitable than conventional systems. More intensive systems in terms of tree or plant population tend to be more prevalent in other countries and these result in higher yields but also in higher production costs. Prices received for organic produce tend to be higher in the UK, with Class I strawberry prices being 80% higher in the UK than in Denmark and dessert apple prices being 42% higher. It is easy to understand why European countries are keen to export their organic produce to the UK and this could lead to an erosion of our present premiums.

5 Constraints to increasing the organic fruit industry

The UK organic fruit industry is extremely small and needs nurturing in order that it can expand to meet the market demand. A SWOT (strengths, weaknesses, opportunities and threats) analysis is used here to identify some factors which need to be considered to enable the industry to grow.

Table 22: SWOT analysis of the organic top fruit industry

Strengths	**Weaknesses**
1. Genuine demand for fruit from all market outlets; multiples, direct marketing and processing 2. Markets have strong preference for UK fruit 3. Proven economic viability with current returns offering profits to enable reinvestment in new orchards.	1. Difficult conversion period, with likely fall in income, difficult to sell 'in conversion fruit' 2. Lack of technical advice and information on current 'best practice' and lack of experience among UK growers. 3. Lack of technical knowledge of many aspects of organic top fruit production. 4. Many apple varieties not suitable for organic production. 5. Limited products available to combat pest and diseases. Inability to use many products licensed in Europe. 6. High establishment costs of new orchards.
Opportunities	**Threats**
1. The market is wide open. Consumers really do want to buy organic fruit which they can trust. Sectors of the market such as processing has great potential to grow. 2. Research can help to develop better varieties and more improved production practices e.g. improved ways to control pests and diseases. 3. Conventional top fruit growers have been struggling to make a profit for a number of years with insufficient returns to enable reinvestment in new orchards. Organic production may offer some growers a new opportunity. 4. Retailers/processors to give contracts or guaranteed prices in order to give confidence to growers to convert.	1. Lower priced imports of organic top fruit. Many countries in Europe and the Southern Hemisphere are rapidly expanding their organic production. This is likely to lead to lower prices. 2. Research in top fruit is more advanced in other countries (e.g. Germany, Netherlands, Denmark and Switzerland).

Table 23: SWOT analysis of the UK organic soft fruit (strawberries) industry

Strengths	**Weaknesses**
1. High value product. 2. Genuine demand from all sections of the market. 3. Proven economic viability from outdoor strawberries even with lower yields and prices.	1. High establishment costs, relative to non-fruit crops. 2. Lack of technical advice and information on current knowledge. 3. Lack of technical knowledge on many aspects of organic strawberry production. 4. Labour shortages for picking in some rural areas. 5. Supermarket acceptance of varieties suitable for organic production. 6. Need for land area five times strawberry area in order to have organic rotation. 7. Highly perishable product which needs immediate selling or cold storage. 8. Proximity to freezing plant if growing for processing. 9. Conventaionl specialist fruit growers do not have expertise in the wide range of crops required to be grown in organic systems.
Opportunities	**Threats**
1. Develop protected cropping for strawberries, this needs further research and development. 2. Organic strawberries can provide a viable opportunity for existing organic livestock and arable farmers. 3. Can provide a useful source of income for the small to medium sized organic farmer and grower who may face falling margins from existing enterprises in the near future as more farmers convert to organic production. 4. Organic PYO (Pick your own) Presently few exist in the UK. 5. Develop contracts with processors.	1. Lack of processing varieties. 2. Prices are likely to fall as supply increases. 3. Adverse weather can lead to fluctuating returns. 4. PYO more vulnerable to Botrytis as some of the crop is left to over ripen.

6 Recommendations

6.1 Policy makers

The following recommendations are made as part of this study:

- **Organic aid**

Although, this has recently been increased to £450/ha spread over 5 years with the addition of a payment of £600 per holding, this is small compensation for a grower converting to organic top fruit production, and represents approximately 8% of the total costs of converting an existing orchard and 2-3% of the costs of establishing a new one. Many other EU countries are paying 1000 ECU/ha/year (£650) during the first two years of conversion. In future it may be worth considering a tiered payment system, as is practised in most other EU counties, with larger payments to fruit growers and other intensive horticultural growers in order to take account of their higher costs of conversion.

- **Maintenance payments**

In the event that current premium prices decline to break-even point, consideration should be given to providing organic fruit growers with ongoing payments for continuing organic management of their fruit holdings. The UK is one of only two countries in the EU (with France) not to make these payments. Current price premiums in the UK of 50-100% , which currently make organic fruit production profitable, are unlikely to remain, and it is very possible that they will fall to European levels of 20-30% in the next few years.

6.2 Fruit buyers

- **Nurturing the industry**

In order to enhance the expansion of the organic fruit industry buyers of fruit, such as multiple buyers and processors etc. should consider striking deals with growers in the form of forward contracts and guaranteed prices and to buy 'inconversion' fruit at a premium in order give incentive and confidence to growers to convert to organic production. There are a number of firms engaging in this activity and it needs to be expanded.

6.3 Advisors and fruit growers

- **Economics of organic production**

This study has collected data from growers to demonstrate that organic apple, pear and strawberries growing can be profitable, with sufficient returns to cover all costs, to reward management time and provide funds for reinvestment in new orchards.

- **Conversion to organic top fruit production**

The evidence collected from this study does indicate some of the costs of converting an existing orchard and gives indications of the cost of establishing a new orchard. Evidence from Continental Europe would indicate that establishing a new orchard is the best route into organic top fruit production. Limited evidence in the UK (and New Zealand; Lampkin, 1999, personnal communication) would indicate that it is also possible to convert an existing orchard, assuming the grower picks the appropriate variety, density of planting, and age of orchard. This route is still likely to be chosen by many who do not have the funds to establish a new orchard.

7 Suggestions for future work on the economics of organic fruit production

7.1 Conversion

In order to enable advisors to make better recommendations to potential converters to organic top fruit production it is suggested that a some of the farms which have already been included in this study (3 converting dessert apple growers) should continue to be studied, and 7 other farms added to make a total of 10 farms (subject to growers registering for conversion). More case study data from these converting farms could be obtained, which would enable more reliable data to be collected on yields, financial output, costs and management strategies adopted during conversion. Comparison could be made between the conversion of existing orchards and the establishment of new ones. (No data was collected from new orchards as part of this study, apart from establishment costs)

7.2 On-going monitoring of existing organic fruit farms

The data in this study was collected from one or two years production (1997 and 1998) and growers were also asked to give averages from the past 5-10 years, which were based on farmers' records and memories. In order to collect more reliable data, a representative study of a number of organic fruit farms should be made each year to obtain actual sales and cost data. Once again a number of growers in this study have indicated their willingness to continue to be monitored. In addition to the type of information presented in this study further study would enable data to be collected on yields of different varieties, which has not be covered in depth in this study.

8 Appendices

8.1 Cashflow for establishing organic apples

YEARS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ESTABLISHMENT COSTS	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**
Site Preparation & Planting	1000	0	0	0	0	0	0	0	0	0
Trees	6045	0	0	0	0	0	0	0	0	0
Stakes	2300	0	0	0	0	0	0	0	0	0
Guards & ties	930	0	0	0	0	0	0	0	0	0
Drill and est. grass & clover sward	100	0	0	0	0	0	0	0	0	0
Wild flower headlands	170	0	170	0	170	0	170	0	0	0
Manure (inc. application)	500	0	0	0	0	0	0	0	0	0
Poly-mulch (inc. laying)	1400	0	0	0	0	0	0	0	0	0
Irrigation (inc.laying)	1000	0	0	0	0	0	0	0	0	0
TOTAL EST COSTS (£/ha)	**13445**	0	170	0	170	0	170	0	0	0
YIELDS (lbs per Tree)	0	3	6.6	12.6	14.4	16.2	16.2	18	18	18
Lbs per Ha	0	6975	15345	29295	33480	37665	37665	41850	41850	41850
Tonnes/hectare	0	3.17	6.98	13.32	15.22	17.12	17.12	19.02	19.02	19.02
Conv. 40% Class I (kgs)	0	1268	2792							
40% Class II (kgs)	0	1268	2792							
20% Juice (kgs)	0	634	1396							
Organic 68% Class I&II				7971	9108	10245	10245	11382	11382	11382
32% Juice I				938	1071	1205	1205	1339	1339	1339
Organic aid	225	135	50	20	20					
TOTAL RETURN (£/Ha)	**225**	**1070**	**2106**	**8928**	**10199**	**11450**	**11450**	**12721**	**12721**	**12721**
PRODUCTION COSTS										
Sprays*	200	350	400	450	500	500	500	500	500	500
Irrigation	30	30	50	60	60	60	60	60	60	60
Mowing*/ shredding/ hand weed	400	350	350	350	350	350	350	350	350	350
Pruning	70	120	250	466	466	466	466	466	466	466
Harvesting	0	150	350	600	700	760	760	830	830	830
Soil Association Certification	40	60	70	85	85	85	85	85	85	85
TOTAL PRODUCTION COSTS (£/ha)	**740**	**1060**	**1470**	**2011**	**2161**	**2221**	**2221**	**2291**	**2291**	**2291**
TOTAL COSTS	14185	1060	1640	2011	2331	2221	2391	2291	2291	2291
ANNUAL CASH FLOW:	-13960	10	636	6917	8038	9229	9229	10430	10430	10430
ACCUMULATED CASH FLOW:	**-13960**	**-13950**	**-13314**	**-6397**	**1642**	**10870**	**20099**	**30529**	**40958**	**51388**
Cash Flow wihout organic aid	-14185	-14310	-13894	-6997	852	10080	19139	29569	39998	50428

NOTES
Variety: (Saturn & E.Windsor with Discovery/Worcester Pollinators)M9
1 Ha @ 3.5m x 1.25m = 2325 trees/ha

Organic prices
Class I &11 £0.88 per kg (net of marketing costs)
Juice £0.22 per kg

The first 3 years of conversion, the produce is sold via conventional outlets (@44p/kg Class 1, 26p/lb Class II, 6.6p/lb Juice)
Yield is calculated as 60% of conventional.
% Class I and 11 is average for organic growers
Machinery purchase, depreciation, rent and other overheads are not included
Net marketing price/kg will vary over the 10 year period subject to supply & demand.
If Poly-mulch & irrigation are not used, this figure will remain due to the cost of mulching and/ or machinery purchase.
* Production costs include costs of materials and application (labour and machinery costs)

8.2 Establishment costs for organic apples

The following information was supplied by a grower establishing a new orchard 1998

Operation	Cost £/ha	Cost £/acre
Install land drainage, half chain spacing, shingle fill to 300 mm of ground level	1729	700
Sub soil to 500 mm in four directions with tracked machine	198	80
Spread 50 mm well rotted farmyard manure, approx. 370 tonnes/ha (150 t/ac)	741	300
Plough and cultivate	124	50
Lay Hy-Tex mulch and irrigation line using contractor in one pass	173	70
Hy-Tex mulch £0.25 per m^2, approx 5000m^2 /hectare (2000/ac)	1235	500
Drip line £0.29/linear metre, 2500 linear metres/ha (1000/ac), Ram 10 mm pressure compensated	716	290
Trees 1185/ha (480/ac) £2.60 each	3083	1,248
Stakes 1185 /ha £0.99 each	1173	475
Guards and ties 1185/ha £0.40 each	474	192
Labour, staking and planting 1185 trees/ha (480/ac) stringfellowed through Hy-Tex	830	336
Drill and establish clover/grass swards	371	150
Sub total	10,846	4,391
Reservoir and irrigation system £36,000 spread over 12ha (30 ac)	2,964	1,200
TOTAL	**13,810**	**5,591**

8.3 Cashflow for establishing organic pears

YEARS	1	2	3	4	5	6	7	8	9	10
ESTABLISHMENT COSTS	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**	**£/ha**
Site Preparation & Planting	1000	0	0	0	0	0	0	0	0	0
Trees	6045	0	0	0	0	0	0	0	0	0
Stakes	2300	0	0	0	0	0	0	0	0	0
Ties and guards	930	0	0	0	0	0	0	0	0	0
Drill & est. grass & clover sward	100	0	0	0	0	0	0	0	0	0
Wild flower headlands	170	0	170	0	170	0	170	0	170	0
Polymulch (incl. laying)	1400									
Manure (inc. application)	500	0	0	0	0	0	0	0	0	0
Irrigation (inc.laying)	1000	0	0	0	0	0	0	0	0	0
TOTAL EST. COSTS (£/HA)	**13445**	**0**	**170**	**0**	**170**	**0**	**170**	**0**	**170**	**0**
YIELDS (lbs per Tree)	0	2	4.6	8.8	10	11.34	11.34	12.6	12.6	12.6
Lbs per Ha	0	4650	10695	20460	23250	26366	26366	29295	29295	29295
Tonnes per hectare	0	2.1	4.7	9.3	10.57	11.98	11.98	13.32	13.32	13.32
Conv. 30% Class I (£)	0	277	620							
50% Class II (£)	0	231	517							
20% Juice (£)	0	18	41							
Organic 70% Class 1 & II (£)				5729	6511	7380	7380	8205	8205	8205
30% Process (£)				614	698	791	791	879	879	879
Organic aid	225	135	50	20	20					
TOTAL RETURN (£/ Ha)	**225**	**662**	**1229**	**6363**	**7229**	**7734**	**7734**	**8593**	**8593**	**8593**
PRODUCTION COSTS										
Sprays*	350	450	600	650	650	650	650	650	650	650
Irrigation	30	30	50	60	60	60	60	60	60	60
Mowing*/ shredding/ hand weed	400	350	350	350	350	350	350	350	350	350
Pruning	70	120	250	466	466	466	466	466	466	466
Harvesting, bins, transport to store	0	100	210	450	550	600	600	650	650	550
Soil Association Certification	40	60	70	85	85	85	85	85	85	85
TOTAL PRODUCTION COSTS (£/ha)	890	1110	1530	2061	2161	2211	2211	2261	2261	2161
TOTAL COSTS	14335	1110	1700	2061	2331	2211	2381	2261	2261	2161
ANNUAL CASH FLOW:	-14110	-448	-471	4302	4898	5523	5353	6332	6332	6432
ACCUMULATED CASH FLOW:	**-14110**	**-14558**	**-15030**	**-10728**	**-5830**	**-307**	**5046**	**11378**	**17710**	**24142**
Cash flow without organic aid	-14335	-14918	-15440	-11158	-6280	-757	4596	10928	17260	23692

NOTES

Variety: Conference Q.C.

Organic prices: Class I&II £0.88/kg (net of marketing costs)
Process £0.22/kg

1 Ha @ 3.5m x 1.25m = 2325 trees/ha

Yield is calculated as 60% of conventional. .
N.B. The first 3 years of conversion, the produce is sold via conventional outlets (@44p/kg Class 1, 22p/kg Class II, 4.4p/kg Juice)
Net market prices will vary over the 10 year period subject to supply & demand.
* production costs include materials and cost of application (machinery and labour) for futher details of material costs see sections on pears.
Machinery purchase, depreciation, rent and other overheads are not included

8.4 Cashflow for organic strawberries

STRAWBERRIES CASH FLOW Per Hectare

OUPTPUT			**Yr 1**	**Yr 2**	**Yr 3**	**Total**	**Average/year**	**Margins £/kg**
Price per tonne			3050	3050	3050			3.05 £/kg
Yield			4.00	10	10	**24**	8.00	8000 kgs
Total receipts			**12200**	**30500**	**30500**	**73200**	**24400**	3239 kgs/ac
COSTS								
Variable costs (price)								
Commission		8%	976	2440	2440	5856	1952	
Variable cost (yield)		**£/t**						
Handling/carriage per tonne		£69	276	690	690	1656	552	
Picking and packing per tonne		£675	2700	6750	6750	16200	5400	
Packing materials per tonne		£323	1292	3230	3230	7752	2584	
Cold store and freezing per tonne		£10	40	100	100	240	80	
Total variable costs (price + yields)			**5284**	**13210**	**13210**	**31704**	**10568**	
Variable costs (area)	**no/ha**	**£/ha**						
Plants (per thousand)	35,000	£100	3500			3500	1167	
Planting (per thousand)		£15	525			525	175	
Polythene		£1,146	1146			1146	382	
Polythene laying		£222	222			222	74	
Bed raising		£333	333			333	111	
T-tape (2 per bed)		£642	642	0	0	642	214	
Straw		£87	87	87	87	261	87	
Cutting back plants		£395	395	395		790	263	
Water per thousand litres		£0.68	1224	680	680	2584	861	
Plough and cultivate		£99	99			99	33	
Manure (25t/ha)		10/t	250			250	83	
Spread manure		£90	90			90	30	
Fleece		£2,470	1235	1235	1235	3705	1235	
Total variable costs (area)			**9748**	**2397**	**2002**	**14147**	**4716**	
TOTAL PAYMENTS			**15032**	**15607**	**15212**	**45851**	**15284**	
GROSS MARGIN			**-2832**	**14893**	**15288**	**27349**	**9116**	1.1 £/kg
NET CASH FLOW			**-2832**	**12061**	**27349**			
OTHER FIXED COSTS (Ha)								
Machinery			343	343	343	1029	343	
Rent			146	146	146	438	146	
General Overheads			293	293	293	879	293	
Total fixed costs			782	782	782	2346	782	
TOTAL COSTS of producing strawberries (Ha)			**15814**	**16389**	**15994**	**48197**	**16066**	2 £/kg
NET MARGIN (£/HA)			**-3614**	**14111**	**14506**	**25003**	**8334**	1.0 £/kg

Assumptions

Sales 80% fresh market (50% multiples at £4/kg, 30% wholesale at £3/kg), and 20% at 1.50/kg for prrocessing
There is a market for all picked fruit.
Labour £4 hr
FYM £10/t
Other fixed costs are based on figures collected from organic farms and are averages for cropping and horticultural farms (Fowler, 1998)
Rent £146/ha

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