

ORGANIC FRUIT PRODUCTION IN DENMARK

Growers Experiences in Denmark

Hanne Lindhard¹, Maren Korsgaard² and Holger Daugaard¹

¹Department of Horticulture, Kirstinebjergvej 10, DK 5792 Aarslev, Denmark.

²Demonstration project for organic fruit and berry production, Industrivej 31 C, 4230 Skælskør, Denmark.

Abstract:

Organic agriculture covers app. 6% of the Danish agricultural land. There are app. 200 fruit- and berry growers, totally they grow app. 350 ha, which are 5 percent of the total Danish area grown with fruit and berries. Converting to organic agriculture are national subsidised. At the moment the yearly subsidy is 291 GBP to 49 GBP pr. ha depending on the type of farm.

Pear and especially apple production are huge challenges to the Danish growers, as the humid climate favours apple scab and other diseases. It has not been a profitable production up till now. To control scab infections some growers use sulphur. In Denmark it has been forbidden to use copper since 1995. Organic strawberry production is profitable in Denmark. The main variety is 'Honeoye', which is quite resistant to diseases.

If total conversion of the Danish fruit and berry productions happened in 1998 the apple yield would have decreased with 86 percent. Black currant and pear yield would be reduced with more than 50 percent. Strawberries would keep the highest yield compared to conventional production.

There are many ongoing organic trails in apples, some in black currants and a few in prunus and strawberries.

Production:

Organic agriculture covers app. 6% of the Danish agricultural land. It consists of 3.800 farmers with at total acreage of 170.000 ha.

Among these are app. 200 fruit- and berry growers, totally they grow app. 350 ha, which are 5 percent of the total Danish area grown with fruit and berries. Most of the organic farms are very small scale, having just a few trees and shrubs for local marketing. Only about 10 farmers have their main income from the fruit production, but all of them have as well earnings from other productions or jobs out of the farm.

An example of a common combination is poultry production combined with fruit production. In 1999 the yields were very low, only 200 t organic fruit were produced in Denmark. To cover the market an amount of 3000 tonnes of organic fruit were imported, mainly from Germany.

Table 1. The organic fruit and berry area in Denmark. 2000.

Crop	Total Area	Fully converted area	3. year of conversion	2. year of conversion	1. year of conversion
Strawberry	48,3 ha	34,5 ha	2,0 ha	11,8 ha	44 ha
Black currant	80,9 ha	66,5 ha	9,8 ha	4,6 ha	
Other berries	43 ha	12,4 ha	6,7 ha	23,9 ha	
Apples	72,2 ha	45,5 ha	13,4 ha	13,3 ha	

Other tree-crops.	63,2 ha	56,5 ha	5,6 ha	1,1 ha	
	351,6 ha	215,4 ha	37,5 ha	54,7	44 ha

Conversion:

Before 1998 it was possible in Denmark to sell the third harvest after conversion as organic certified crop. Since 1998 the conversion period for perennials is 36 month, and we can only start conversion between the 1. of September and 1. of January. The consequence it that the conversion has become more expensive. This change does not seem to scare the fruit growers, as there are still new fruit areas in conversion.

Converting to organic agriculture are national subsidised. At the moment the yearly subsidy is 291 GBP to 49 GBP pr. ha depending on the type of farm. To a fruit grower that level is almost as good as nothing.

Table 2: National subsidy to organic plant production in Denmark

Year of conversion	First	Second	Third	Fourth	Fifth	Sixth
All farms	86£ / ha	86£ / ha	49£ /ha	49£ / ha	49£ / ha	49£ / ha
Farms with 50% grain.	291 £/ ha	291 £ /ha	189 £/ ha	131 £ / ha	131 £ / ha	49 £ / ha

Experiences from practice:

Apples and pears:

Pears and especially apples are huge challenges to the Danish growers, as the humid climate favours apple scab and other diseases. It has not been a profitable production up till now.

To prevent apple scab the more resistant varieties are planted the most popular grown apple varieties are 'Discovery', 'Aroma', 'Ingrid Marie', 'Filippa', 'Holsteiner Cox', 'Elstar' and 'Belle De Boskoop'. A few growers have started planting some of the new scab resistant varieties like 'Vanda', 'Retina', 'Gerlinde', 'Prima' and 'Redfree'. 'Conference' is the most common grown pear, but also 'Grev Moltke', 'Herrepære', 'Doyenne de Comice' are grown.

To control scab infections some growers use sulphur. In Denmark it has been forbidden to use copper since 1995. In 1998 and 1999 we had severe scab infections, which reduced the yield. Sulphur alone were not able to control scab infections. When growers use sulphur to try to control apple scab, red spider mites can become a problem. In 2000 we have higher yields, due to the warm and dry month of May.

Apple sawfly can be a severe pest, especially in the variety 'Discovery'. As Quassia is not allowed in Denmark we have no way of controlling it. In trails Quassia has shown varying effect.

Yields have varied between 5-8 t/ha marketable fruit. The main part of the orchards consists of 1000-1500 trees/ha. Commonly used rootstocks are M9, M26 and MM106.

Cherries and plums

The production of sweet cherries is small, but growing. Apparently it gives good results. Problems with pests are small, but the disease monilia can be a problem. Many varieties are planted.

The production of sour cherries is down to one orchard. Monilia and leaf spot causes big problems. The variety grown is 'Stevnsbær', which is a Danish variety for juice production.

Black currant:

Black currant has been a difficult crop to grow profitable. Yields vary between 1- 5 t/ha. Powdery mildew, Tortrix moths, black currant gall mites and weeds are the main problems reducing the crop. The most common variety is still 'Ben Lomond', which gives an excellent juice-quality, but is too susceptible to mildew. The more resistant Swedish variety 'Titania' is planted now. To control mildew some growers use cow-urine in early spring and later on sulphur. Methods to control gal mites and tortrixes are needed.

Strawberries:

Organic strawberry production is profitable in Denmark. The main variety is 'Honeoye', which is quite resistant to diseases. The yield varies between 8-12 t/ha. Other varieties commonly grown are 'Polka', 'Korona', 'Dania', 'Symphony' and 'Pandora'. Weed control is efficiently done mechanically by harrows and some hand hoeing. Disease control is mainly done by choosing resistant varieties. Some growers use the antagonist *Trichoderma* distributed by bumblebees to control botrytis.

Other Berries

Elderberry is grown to some extent both for harvesting of flowers and for berries. It is quite easy to grow organically, but the market is limited. The main varieties are 'Samdal', 'Sampo' and 'Samyl', which all are Danish varieties.

Red currant is also grown to some extent. It is quite easy to grow, but like elderberries the market is limited. Main variety is 'Rondom'.

Raspberries are practically not grown organically in Denmark; there are only very few and small growers. The problem with the raspberry beetle is big and not solved. The only way to avoid it is to grow autumn-varieties like 'Autumn bliss', but consumers like raspberries in the summer.

Black berries are grown at a very small scale, mainly due to the great demand of labour and difficult marketing.

Blueberries and Cranberries are not grown organically in Denmark. Although we do have good climatic conditions we have only a few suitable soils.

Economics

In a political report the consequences of a 100 percent conversion of the Danish agriculture to organic production were assessed. The results for the most important fruit and berry crops are shown in table 3. If conversion happened in 1998 with the present varieties, the apple yield would decrease with 86 percent as an average of 6 varieties. Black currant and pear yield would be reduced with more than 50 percent. Very little is known concerning sour cherries. Strawberries would keep the highest yield compared to conventional production.

Table 3: Conventional yield (1994-96), organic yield (Tons/ha) and the decrease (percent).

Crop	Conventional yield	Organic yield	Average decrease
Apples*	20	2.8	86 %
Pears**	11	4.8	56 %
Sour cherries	6	-	>27 %
Black currants	4,3	1.9	56 %
Strawberry	9,6	5.5	43 %

*Variation for 6 varieties 'Discovery', 'Elstar', 'Rød Ingrid',

'Jonagold', Mutsu, and 'Pigeon'.

** Variation for 'Conference' and 'Clara Frijs'

As the yield is decreasing the growers need a higher sales price to get the same profit as a conventional grower does. In table 4 the necessary price for an even profit is calculated. Strawberry is the crop where an even profit is within the reach. Some growers already have a better profit than the conventional. To get an even price for the easiest grown pear the grower needs more than double price. For black currants, most apple varieties and sour cherries the grower needs 4-7 times the conventional price to have an even profit. The Danish pear 'Clara Frijs' can not be recommended for organic production as the yield is very low and thereby the price has to be to high.

Table 4: Conventional and organic prices (GBP/kg) for 1994-96 and the necessary price for organic productions to keep the same profit as conventional growers.

Crop	Average price conventional	Average price organic	Necessary price Organic
Apples 'Elstar'	0.37	0.87	2.20 (5.94)
Apples 'Pigeon'	0.80	1.91	4.77 (5.96)
Apples 'Aroma'	0.38	0.91	1.71 (4.50)
Pears 'Clara Frijs'	0.52	0.82	8.76 (16.84)
Pears 'Conference'	0.36	0.57	0.84 (2.33)
Sour cherries	0.46	1.09	3.36 (7.30)
Black currants	0.28	1.04	1.13 (4.04)
Strawberries	1.47	1.79	2.04 (1.39)

Structure of Organic fruitproduction in Denmark

Growers organisation

Some of the fruit growers are organised together with organic vegetable growers in the association of organic fruit- and vegetable growers in "Økologiens Hus". This way they together with the other organic farmers have a political influence in the Danish society. The marketing of organic fruit is mainly a task of every farmer. Only a few of them are associated in marketing-companies.

Advisory service

There is no organic advisory service in fruit growing, but a 3-years "demonstration"-programme was started in 1999. The aim of this project is to inform about organic fruit growing methods and thereby to develop and increase the production. 110 fruit growers take parts in experience-groups, receive newsletters or participate in field visits all arranged by the demonstration project.

Research

Research in organic fruit production mainly takes part at Danish Institute of Agricultural Sciences, Department of Horticulture. Also at the research station 'Fejø forsøgsplantage' organic trails are based. "Grass-root-research" is a research programme especial for practical research located in the orchards and performed by the grower. 13 projects dealing with organic fruit have taken place in this programme.

Ongoing organic research in Denmark:

The Danish policy has been to band more and more pesticides and promote organic production. As fruit and berries are high value crops were many pesticides are used conventionally to secures production security it is also crops were we see the highest crop

reduction when production is converted to a less input production system. To be able to help and advise the growers to a profitable system much research is needed.

Since 1987 there have been organic trials carried out in Denmark. The research has mainly been in apples and black currants, but also few trials in pears, plums, sour cherries and hips.

Ongoing research:

Apples:

Evaluate scab resistant varieties.

The effect of cover crops on growth, yield and fruit quality.

Effect of leaf shredding on apple scab infections.

Present races of *Venturia inaequalis*.

Development of sustainable organic production systems for apples.

Mechanical weed cleaning in apples and effect on rootstocks.

Seaweed as fertiliser in apples.

Chicken under apples, pears and hazel.

The effect of use of sulphur in high dense planting.

Varieties for industry

Varieties for cider production.

Planting system for 7 scab resistant varieties

Effect of cover crops in tree row on yield and predators.

Prunus:

Super spindle in sweet cherries.

Testing of plum varieties.

Black currants.

Variety testing.

Effect of cover crops

Effect of sulphur

Production on leg.

Strawberries.

Variety testing.