R. THURLOW: Have you tried rooting *E.* 'Limelight', and how successful were you?

J. BEESLEY: We had good results when rooting cuttings taken from some bought in plants in October, but were unsuccessful with cuttings taken from another source.

B. LOCKWOOD: Do you wound cuttings?

J. BEESLEY: Yes.

P. WOOD: Have you tried rooting cuttings taken in January or February? We tried this and had results similar to October cuttings, but the advantage is they occupy the bench space for a shorter time.

J. BEESLEY: No, we haven't tried that late.

B. HUMPHREY: The Clonal Selection Committee would welcome additional clones of *E.p.* 'Maculata' for testing if anyone has a good one.

PROPAGATION IN DENMARK OF SOUR CHERRIES BY CUTTINGS

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There is, in Denmark, a long tradition for the growing of sour cherries and this has expanded rapidly in the last few years.

Sour cherry is now, after apple, the most grown tree fruit in Denmark. Sour cherries requires relatively little regular care and are often grown by farmers. The rapid expansion is in part due to a high demand for juice by the processing industry and in part, to the development of machine harvesting.

Sour cherries belong to the species, *Prunus cerasus L.*, and all cultivars which are grown in Denmark are self fertile. By far, the most planted cultivar is 'Stevnsbaer' which has been grown in Denmark for at least 200 years. It is preferred by the processing industry because the fruit is strongly coloured and has a high content of sugar and of acid.

The well-known Danish rose breeder, D.T. Poulsen, has bred two cultivars 'Kelleriis 14' and 'Kelleriis 16'. These are little grown in Denmark but 'Kelleriis 16' is quite frequently planted in Germany.

As machine harvesting requires relatively more space, the normal planting distance is 5×3 metres, which gives about 670 trees per ha.

The rootstocks are either seedlings of *Prunus avium* or the *P. avium* clone, F 12/1. As the trees are machine harvested there is, however, little need to control the size of the tree through the rootstock.

There seems to be a big difference in the yield of different trees and, in the last couple of years, a selection programme has been carried out, and there are now several high yielding clones available. At the same time some growers have selected their own high yielding clones.

Some 10 to 12 years ago a few trees which were propagated by cuttings were planted in an orchard alongside a row of trees which were grafted on the rootstock, F 12/1. The growth and yield of these own-rooted trees has been very satisfying and inspired the experiments about which I am now going to report.

EXPERIMENTS AT HORNUM

At the Institute of Landscaping Plants at Hornum there has for several years been work with the propagation of sour cherries by cuttings.

The initial experiments were designed to investigate the rooting potential of 'Stevnsbaer'. They were also designed to investigate the need for a rooting hormone treatment.

The cuttings were harvested from stock plants grown in 10 litre containers in a glasshouse. The cuttings were terminal cuttings about 10 cm long.

Some of the cuttings were treated with different concentrations of IBA by the concentrated dip method.

The cuttings were rooted in 3.8 cm stonewool blocks in which the temperature, by bottom heat, was kept at a minimum of 21°C. The cuttings were kept moist by a misting system controlled by an electronic leaf.

After two weeks the cuttings were assessed weekly for root development. A cutting was recorded as having rooted when at least one root had penetrated the bottom or sides of the stonewool block.

One experiment was started in April and another in May. In the experiments several concentrations of IBA were used but in Table 1, only the results for 1000 ppm IBA is given as this concentration was superior to both lower and higher concentrations.

As shown in Table 1 the rooting was accelerated by the IBA treatment. After two weeks there were more rooted cuttings among the IBA-treated than among the untreated control. After 3 weeks, however, the difference was small, and after 4

Table 1. 'Stevnsbaer' sour cherry. Percent of cuttings rooted after 2, 3, and 4 weeks. Mean of two experiments.

	Weeks		
	2	3	4
Control	40.0	95.0	98.4
1000 ppm IBA	66.7	100.0	100.0

weeks there was little difference. From Table 1 it can be concluded that a hormone treatment is unnecessary and that glasshouse grown cuttings will root in 4 weeks.

To assess the growing-on of the cuttings, 30 cuttings were placed in 1 litre stonewool blocks and grown in a glasshouse all summer. In October the height of these plants was about 150 cm.

It is well known that cuttings harvested from stock plants forced in a glasshouse root faster and better than cuttings harvested from stock plants grown in the open. Table 2 shows the percent rooting of cuttings harvested from fruit bearing trees.

The cuttings of 'Kelleriis 14' and 'Kelleriis 16' were inserted in the stonewool blocks June 28 while the 'Stevnsbaer' clone 24 (a clone selected for its high yield) was inserted in the stonewool blocks July 26. The rooting procedure was as mentioned earlier. The number of rooted cuttings were recorded August 30 and the results are seen in Table 2. It must be noted that 'Kelleriis 14' and 'Kelleriis 16' are much slower rooters than 'Stevnsbaer'.

Table 2. Three cultivars of sour cherries. Percent rooted; recorded August 30.

'Kelleriis 14', inserted June 28	60.0%
'Kelleriis 16', inserted June 28	73.0
'Stevnsbaer' (clone 24), inserted July 26	70.8

After recording, the cuttings were potted in 10 cm pots and overwintered in a frost-free glasshouse. In the spring the plants were repotted in 1 litre pots and grown on an outdoor container bed during the summer. Table 3 records the height of the plants at the end of the growing season.

Table 3. Sour cherries. Rooted mid-summer 1978. Mean height, fall 1979.

'Kelleriis 14'	72 cm
'Kelleriis 16'	89
'Stevnsbaer' (clone 24)	134

The most commonly used method in Denmark for propagating easily rooted cuttings is a 1 metre wide tunnel covered with milk-white polythene. The tunnel is equipped with a mist line which is normally operated 2 to 3 times a day, either automatically or, more often, manually. This method was in-

vestigated for rooting 'Stevnsbaer' cuttings.

In early July cuttings were harvested from mother stock grown in the open on a container bed. The cuttings were not treated with rooting hormones. For the first 6 weeks the mist line was operated daily.

It was obvious that the cuttings rooted more slowly than in the glasshouse. However, when the cuttings were lifted in November, 95 percent had rooted. This is quite satisfying and the method can be said to be quite suited for 'Stevnsbaer' sour cherry.

From these experiments the conclusion can be drawn that 'Stevnsbaer' cherry is easily rooted and that several methods are available for propagating it by cuttings.

COMMERCIAL PROPAGATION

The nursery industry has, so far, shown very little interest in propagating 'Stevnsbaer' sour cherry by cuttings and, in fact, hardly propagates it at all.

The cherry growers themselves have, however, shown a keen interest, and we have had many inquiries from growers who wanted advice.

That the growers shows such keen interest may, in part, be due to the fact that many of them are farmers, and have no traditional feelings concerning the merits of rootstocks. Also, the rapid expansion in the area planted with 'Stevnsbaer' has created a heavy demand for trees, and this has encouraged the growers to do their own propagation.

Most growers have been experimenting with one or two thousand cuttings but only one grower has propagated on a really commercial scale. Because of lack of equipment and experience some growers have experienced failures of one kind or the other.

Also the weather conditions have been most unfavourable and, in the spring of 1981, caused heavy losses among cuttings which had been propagated in polythene covered low tunnels and had been overwintered in the tunnels. 'Stevnsbaer' is an earlier leafer and, as the temperature on April 22 very quickly dropped from a plus temperature to minus 7°C, many cuttings were killed.

The above mentioned grower, who works on a commercial scale, was hard hit by this frost. With cuttings propagated in 1979 the same grower had a much more satisfying result and he has in 1981 sold two-year-old trees to several other growers.

For instance, one grower in the fall of 1981 planted 6000

trees, that is enough for about 10 ha. These trees are now well established.

A glasshouse grower rooted cuttings in 9 cm pots in August 1980. The cuttings were overwintered in a glasshouse and, in the spring, repotted into 16 cm pots. The plants were, during the summer of 1981, grown on a container bed in the open and overwintered on this container bed. In the spring of 1982 the plants were planted. About 75 per cent of the original cuttings were planted. I think the grower would have done even better if he had started rooting the cuttings a month earlier, that is about July 1.

To sum up, experimental as well as commercial experience shows that the 'Stevnsbaer' sour cherry can be propagated by cuttings. It is also known that 'own-rooted' trees can yield well. The propagation methods may need some adjustments so that they are more suited to the growers' equipment and experience. We are at present working on these problems at Hornum.

ESTABLISHMENT IN CONTAINERS OF WOODY ORNAMENTALS PROPAGATED FROM DORMANT LEAFLESS CUTTINGS

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Abstract. Data are presented on the rooting of February-taken, dormant, leafless cuttings in heated bins and on their subsequent establishment in containers.

Both rooting in the bin and survival at the end of the season were highly correlated with the degree-weeks of temperature which the cuttings had experienced in the bins.

The survival of *Acer saccharinum* cuttings markedly decreased with increase in the number of degree-weeks. This response was not as marked for *Laburnum* × *vossii* and *Platanus* × *acerifolia*, suggesting that *Acer* cuttings rapidly become depleted of their carbohydrate reserves.

Survival of *A. saccharinum* cuttings in containers was markedly increased by placing them under mist enclosed by polyethylene in a netting tunnel.

Difficult-to-root species such as *Acer platanoides* 'Drummondii' and *Prunus* 'Shirofugen' responded poorly even when mist was used to assist cutting survival.

REVIEW OF LITERATURE

The propagation of woody ornamentals from dormant, leafless (hardwood) cuttings is a traditional technique for easily rooting genera in cold frames or the open ground (see Sheat,