

## Evaluation of characteristics of 18 sour cherry cultivars

*Vurdering af dyrkningsværdien af 18 sorter af surkirsebær*

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### Summary

The evaluation was based upon tree health, the yield over 8 years in the orchard and upon juice characteristics.

It is concluded that 'Stevnsbær' is the most valuable cultivar under Danish conditions. 'Fanal' and 'Nefris' are also valuable, but only if *Pseudomonas syringae* pv. *morsprunorum* can be controlled. 'Marasca Siva Uspravna', 'Crisane 2', 'Kelleriis 14', 'Schattenmorelle' and 'Vilholt' may be of interest as minor cultivars.

**Key words:** Sour cherry, cultivars, flowering, ripening, yield, fruit quality.

### Resumé

Vurdering af dyrkningsværdien er baseret på træernes sundhed, frugtudbytte de første 8 år i plantagen og på kvaliteten af saften.

Der konkluderes, at 'Stevnsbær' er den mest værdifulde sort. 'Fanal' og 'Nefris' er værdifulde sorter, hvis bakteriekræft kan bekæmpes. 'Marasca Siva Uspravna', 'Crisane 2', 'Kelleriis 14', 'Skyggemorel' og 'Vilholt' kan have interesse til særlige formål.

**Nøgleord:** Surkirsebær, sorter, blomstring, modning, udbytte, frugtkvalitet.

### Introduction

Cultivars of sour cherry are continuously collected for an evaluation of their commercial value under Danish conditions. The yield and the resistance to *Pseudomonas* and other diseases are considered to be the most important criteria. However, the quality of the fruits, expressed as intensity of colour, and content of sugars and acids is also regarded as very important criteria.

Cherries with coloured juice (morellos) are the main interest in Denmark. Therefore, different

clones of 'Stevnsbær' were used as reference cultivars.

### Material and methods

Maiden trees were planted during spring 1979 in a randomized 8-block, single tree experiment. The trees were grafted on *Prunus avium* 'F 12/1' and planted at a distance of 5.5 × 3.5 m. As the optimum ripening date is difficult or impossible to assess visually, the quality of the fruit was determined from samples of 100 fruits picked 2–3

times with 3–4 days intervals during the ripening season.

The trees were harvested mechanically with a Schaumann shaker. The yield records include shaken fruits only.

In the presentation of the results the cultivars are divided into 3 groups:

1. 'Fanal' types: Cultivars which visually did not differ in either tree morphology or in fruit appearance from 'Fanal'.
2. 'Stevnsbär' types: Cultivars with very small dark red fruits.
3. Other cultivars.

## Results

### *Tree growth*

The size of the trees was determined after 6 years in the orchard. At that age some of the cultivars had reached the maximal tree width equal to the planting distance of 3.5 meter.

The so-called 'Stevnsbär'-types had the most

vigorous growth. The shape of the trees varied only little, among varieties, except 'Kelleriis 14' which was more pyramidal than the others.

### *Tree health*

Cherry trees often have a short life, as they are sensitive to several serious diseases and frost damage.

Survival of trees in the trial is shown in Table 1. The reason for tree death may be bacterial cancer, trunk damage after mechanical harvest or wind breakage. As a group the trees in the 'Stevnsbär'-types had the shortest orchard life.

»Dead buds«. In 'Stevnsbär' a phenomenon of dead buds in the middle of the flowering shoots is very common (Fig. 1). This characteristic was judged over 3 seasons. The results are shown in Table 1. Only the 'Stevnsbär'-types showed this characteristic to any extend.

Leaf spots. The leaves of the 'Fanal'-types were every year more or less attacked by

**Table 1.** Tree size after 6 years in orchard, and tree health.

	Survived after 8 years in orchard, %	»Dead buds« 1: all dead 10: all alive average 4 years	Height m	Width m
<i>'Fanal'-types</i>				
'Nefris'	88	9.3	3.5	3.0
'Rexelle'	75	9.3	3.7	2.9
'Fanal'	100	9.1	3.7	3.0
<i>'Stevnsbär'-types</i>				
'Stevnsbär', cl 2198	88	7.2	4.1	3.4
'Stevnsbär', cl 26	75	7.3	4.0	3.4
'Stevnsbär', cl 30	63	7.1	3.7	3.4
'Brunbär Gästrikland'	75	4.6	4.2	3.5
'Marasca Siva Uspravna'	88	4.8	4.2	3.6
'Marasca Duguljasta'	100	6.7	4.1	3.2
<i>Other types</i>				
'Morel P2'	100	9.3	3.5	3.1
'Schattenmorelle'	100	9.5	3.5	3.1
'Crisane 2'	100	9.2	4.2	3.4
'Vilholt'	82	9.3	3.9	3.5
'Nabella'	100	9.7	3.5	3.2
'Kelleriis 14', cl 4562	100	9.8	3.3	2.3
'Schwäbischen Weinwechsel'	50	9.4	4.1	3.6
'Zahoracka'		8.1	3.4	3.1
'Timpurii de Cluj'		9.6	3.5	2.9



Fig. 1. »Dead buds« in Stevnsbär. Photo K. B. Jørgensen.

Typisk eksempel på døde knopper i Stevnsbær. Foto K. B. Jørgensen.

*Pseudomonas*. All other cultivars did not show symptoms of any significance.

#### Season of flowering

The date of flowering varied about 5 days between years, but the order among cultivars was almost the same every year. The variation between most cultivars was only small. The flowering period does not seem to be any hindrance for cross pollination for most of the cultivars (Table 2).

#### Season of ripening

The date of optimal harvest depends upon which maturity criteria is found most important. It may be maximum fruit size, juice colour, soluble solids, or maximum acidity. As these characteristics do not develop parallel, a combination of maximum fruit size and maximum juice colour has been used for assessing the optimal harvest date (Table 2). The varieties covered a harvest period from 29 July to 20 August, with 'Vilholt' as the earliest and the 'Stevnsbär'-clones as the latest.

#### Fruit yield

Table 3 shows the annual and total yield from 1981–1986. The trees of the 'Fanal'-group fruited early, and gave a constant and high yield, 'Nefris' tended to give the highest yield.

Table 2. Date of flowering and harvest.

	Date of flowering 10% open average 4 years	Date of harvest average 5 years
<i>'Fanal'-types</i>		
'Nefris'	17 May	10 Aug.
'Rexelle'	17 May	9 Aug.
'Fanal'	16 May	10 Aug.
<i>'Stevnsbär'-types</i>		
'Stevnsbär', cl 2198	17 May	20 Aug.
'Stevnsbär', cl 26	16 May	20 Aug.
'Stevnsbär', cl 30	18 May	19 Aug.
'Brunbär Gästrikland'	15 May	18 Aug.
'Marasca Siva Uspravna'	16 May	13 Aug.
'Marasca Duguljasta'	14 May	10 Aug.
<i>Other types</i>		
'Morel P2'	17 May	12 Aug.
'Schattenmorelle'	19 May	14 Aug.
'Crisane 2'	16 May	8 Aug.
'Vilholt'	17 May	29 July
'Nabella'	19 May	11 Aug.
'Kelleriis 14', cl 4562	17 May	7 Aug.
'Schwäbischen Weinweichsel'	18 May	9 Aug.

The 'Stevnsbär'-clone 2198 gave a significantly higher yield than clone 30. The 2 'Marasca'-cultivars gave a lower yield than all the 'Stevnsbär'-clones.

'Zahoracka' and 'Timpurii de Cluj' gave only a very low yield, therefore, after a few years they were discarded from further observations.

#### Fruit quality

The quality of the fruit and juice was determined 4 years as intensity of colour of the juice, acidity, soluble solids, per cent stone in relation to weight of the fruit, and fresh fruit weight. The results are shown in Table 4.

*Colour of the fruit juice.* The 'Fanal'- and 'Stevnsbär'-groups of cultivars all had a very high intensity of colour, and except 'Brunbär Gästrikland', they did not differ significantly. The other cultivars had a medium to low intensity of colour, 'Crisane 2' being almost uncoloured.

**Table 3.** Fruit yield 1981–1986, kg per tree.

	1981	1982	1983	1984	1985	1986	1981–86 total
<i>'Fanal'-types</i>							
'Nefris'	4.7	10.9	21	36	33	39	145
'Rexelle'	3.5	8.7	23	29	31	35	130
'Fanal'	3.0	8.1	19	30	32	35	127
<i>'Stevnsbär'-types</i>							
'Stevnsbär', cl 2198	2.2	7.3	18	28	32	29	117
'Stevnsbär', cl 26	2.6	7.2	17	29	32	22	110
'Stevnsbär', cl 30	0.8	2.9	17	22	23	26	92
'Brunbär Gästrikland'	0.5	1.6	3	27	15	16	63
'Marasca Siva Uspravna'	0.7	3.1	8	27	22	26	87
'Marasca Duguljasta'	0.8	2.5	9	14	17	18	61
<i>Other types</i>							
'Morel P2'	3.4	16.3	14	22	28	24	108
'Schattenmorelle'	4.1	15.4	10	29	32	28	119
'Crisane 2'	2.6	9.5	6	24	25	31	98
'Vilholt'	0.8	7.9	8	35	21	29	102
'Nabella'	2.3	3.7	9	26	16	24	81
'Kelleriis 14', cl 4562	2.0	4.3	7	18	21	20	72
'Schwäbischen Weinweichsel'	0.4	1.8	8	25	32	33	100
'Zahoracka'	0.8	0.5	–	–	–		
'Timpurii de Cluj'	0	0	6				
LSD	0.8	2.5	3	5	3	4	14

**Acidity.** In the 'Fanal'-group 'Nefris' had the highest acidity and 'Rexelle' the lowest acidity. In the 'Stevnsbär'-group there was hardly any significant difference in acidity. 'Vilholt' had the lowest acidity of all cultivars tested.

**Soluble solids.** All cultivars in the 'Stevnsbär'-group had a high content of soluble solids, 'Morel P2', 'Schattenmorelle' and 'Kelleriis 14' the lowest.

**Stone per cent.** There was a close relationship between fruit size and stone percentage, therefore the small fruited 'Stevnsbär'-types generally had a high stone per cent. 'Vilholt' had the smallest stone in relation to fruit size.

**Fruit size.** The most pronounced difference in fruit size is between the small fruited 'Stevnsbär' on one side and all other cultivars with larger fruits of 4.5–5.0 g, on the other side. 'Crisane 2' was outstanding in having very big fruits.

## Description of the cultivars

### A: 'Fanal'-types

The 'Fanal'-types are characterized by fruits of medium size, with high colour and high acid content in the juice. The trees are very fertile, but very sensitive to *Pseudomonas*.

It has not been possible to demonstrate any significant difference in tree morphology including date of flowering and fruit ripening, tree size, leaf shape and size and fruit size. Between 'Fanal', 'Nefris' and 'Rexelle' the only pronounced difference between the cultivars is the lower acidity in 'Rexelle' than in 'Nefris'. Therefore, it has been suggested earlier (46), that the 3 cultivars should be regarded as clones of one cultivar.

'Fanal'. In most countries in Western Europe the name 'Heimanns Konservenweichel' is used. However, according to the official description

**Table 4.** Fruit quality. Average of 4 years.

	Colour <sup>1)</sup>	Acidity <sup>2)</sup>	Solids <sup>3)</sup>	Stone % <sup>4)</sup>	g/fruit
<i>'Fanal'-types</i>					
'Nefris'	208	2.19	15.6	6.7	4.8
'Rexelle'	194	1.75	16.0	6.4	4.5
'Fanal'	223	1.95	15.9	6.1	4.8
<i>'Stevnsbär'-types</i>					
'Stevnsbär', cl 2198	227	2.02	17.8	7.4	3.3
'Stevnsbär', cl 26	229	2.17	17.6	7.5	3.2
'Stevnsbär', cl 30	209	2.18	17.1	8.1	3.0
'Brunbär Gästrikland'	169	2.18	17.4	7.1	3.9
'Marasca Siva Uspravna'	192	2.30	17.8	7.8	2.8
'Marasca Duguljasta'	208	2.09	17.2	6.8	3.5
<i>Other types</i>					
'Morel P2'	96	1.59	13.9	6.1	4.7
'Schattenmorelle'	85	1.79	14.2	6.0	4.5
'Crisane 2'	49	1.59	15.4	6.0	5.7
'Vilholt'	89	1.43	15.6	5.1	4.8
'Nabella'	80	2.02	15.0	5.7	4.9
'Kelleriis 14', cl 4562	120	1.57	14.5	6.2	4.8
'Schwäbischen Weinweichsel'	117	1.78	16.1	5.9	4.5
LSD	32	0.20	1.8	0.9	0.6

<sup>1)</sup> mg malvidinchloride per 100 g

<sup>2)</sup> per cent titratable citric acid

<sup>3)</sup> refractometer values

<sup>4)</sup> stone weight in per cent of fruit weight

(15) the proper name should be 'Fanal'. The cultivar was selected in Germany about 1940 as 'Hermann 23'.

As in an earlier trial (42) the trees were very productive. However, the trees were susceptible to *Pseudomonas*, as reported elsewhere (33, 39, 49, 51). The trees flower 2–3 days, and the fruits ripen 4–5 days earlier than 'Schattenmorelle'.

The fruit is of high quality, having a high colour intensity and high acidity in the juice.

Although the cultivar has many very good characteristics it can not be recommended for planting in Denmark owing to its large susceptibility to *Pseudomonas* as long as this disease can not be controlled. References: 3, 9, 10, 11, 15, 18, 19, 21, 24, 26, 27, 28, 29, 38, 39, 41, 42, 43, 44, 45, 46, 49, 51.

'Nefris'. A Polish cultivar found as a seedling in 1938 and described to be very similar to 'Fanal'. The same authors (31) report, that it has been withdrawn from planting, because of its susceptibility to *Pseudomonas*. Its characteristics have also, in this study, been very similar to 'Fanal'. References: 4, 7, 31, 39, 41.

'Rexelle'. Synonym: Beutelspacher Rexelle (3) seedling from 'Schattenmorelle', sown in 1936, protected in München in 1961 (34).

It has been reported lately from Norway (39) and West-Germany (18) that 'Rexelle' is very similar in all characteristics to 'Fanal'. The same has been found in this trial, including the sensitivity to *Pseudomonas*. References: 1, 16, 18, 23, 29, 30, 33, 34, 37, 39, 46, 49, 50, 51.

## **B: 'Stevnsbär'-types**

This group comprises cultivars characterized by small fruits with very high colour intensity and a very high content of acids.

'*Stevnsbär*'. Clones of wild *Prunus cerasus* have been grown for centuries under different local names in Denmark. The cultivar was official named and described in 1976 (40). The tree is fairly vigorous and medium productive. It is self fertile and not very sensitive to *Pseudomonas*. The fruit is small, about 3 g, and its very dark red juice has a very high content of acids and sugars. The fruits have a low fruit retention force, and are therefore very suitable for mechanical harvest. However, the trunk of the trees is sensitive to damage from the shaker.

The clones tested in this experiment were very similar. The only significant difference was a higher yield of clone No. 2198 compared to clone No. 30. In an earlier study of 'Stevnsbär'-clones the most productive clone was named 'Stevnsbär' cl. Viki (45) which unfortunately was not included in this experiment.

'Stevnsbär' must still be considered as the best cultivar under Danish conditions for production of cherries for liquors, wine, juice, yoghurt etc. References: 2, 11, 14, 35, 40, 43, 45, 47.

'*Marasca Duguljasta*'. Origin: Yugoslavia. In most characteristics the fruit is very similar to 'Stevnsbär'. In accordance with Yugoslavian observations it flowers very early and the fruit ripens in the same season as 'Fanal'. In Yugoslavia it has been as productive as 'Fanal'. However, under our conditions the yield was only about the half of that of 'Fanal'. References: 36.

'*Marasca Siva Uspravna*'. Origin: Yugoslavia. This cultivar is also, in fruit quality, very similar to 'Stevnsbär', however the fruits tend to be somewhat smaller, but the acidity was the highest measured in this trial. The fruit ripens about a week earlier than 'Stevnsbär'. The yield was a little lower than the best 'Stevnsbär'-clones.

'*Brunbär Gästrikland*'. Origin: Sweden. In Swedish and Norwegian observations its quality was much like 'Stevnsbär'. This trial also proved the same, although, the fruits were bigger and the colour intensity lower. The yield was very low. References: 19, 38.

## **C. Other types**

'*Crisane 2*'. Origin: Romania. The tree is very vigorous, erect and productive, especially in the later years. It is self sterile (7). The fruits ripen about the same time as 'Fanal'. The fruit is very large, and the juice has a very light colour and a low acidity. The cultivar may be of interest for products needing only little colour. References: 7, 13.

'*Kelleris 14*'. Origin: Denmark, 1945. In accordance with several observations in other countries the tree has been weak in growth. The tree is healthy and frost hardy. The yield per tree has been low, but, as in Germany (5), it was high in relation to tree size. There is contradictory statements about ripening season. In this trial it was harvested 5 days earlier than 'Schattenmorelle', in other trials up to 4 days later. The fruit is very similar to 'Schattenmorelle', except that the juice is more coloured. The cultivar deserves further interest. References: 5, 6, 16, 25, 29, 32, 33, 37, 39, 50, 51.

'*Morel P2*'. Origin: Holland, about 1960. Selection of 'Schattenmorelle'. It is very similar to 'Schattenmorelle', and it does not seem to have any qualities better than a good clone of this cultivar. References: 32, 49.

'*Nabella*'. Origin: Germany, 1954. Self pollinated seedling of 'Schattenmorelle'. The tree and the fruit are much alike its parent cultivar, however the juice may have a somewhat higher content of acids. As the tree has not been as fertile as 'Schattenmorelle', the cultivar does not seem to be of further interest. References: 6, 9, 10, 39.

'Schattenmorelle'. An ancient cultivar, described in countless publications as the most internationally grown morello type cherry. Synonyms: 'Morello', 'English Morello' (USA, England), 'Griotte du Nord' (France and Belgium), 'Dubbele Morelkers', 'Morel' (Belgium, Holland), 'Lutowka' (Poland). Several clones, mostly in Germany, have been selected.

The tree is of medium vigour and its productivity differs from medium to very high. It is very sensitive to *Monilia*. The fruit is rather big, and its content of colour, acids and sugars is medium. It ripens midseason, 1 week earlier than 'Stevnsbär'. In this trial the yield was almost the same as for 'Stevnsbär'. It is a valuable cultivar, when high colour intensity and high content of acidity are not of major importance. References: 3, 5, 11, 13, 14, 16, 18, 19, 21, 24, 26, 28, 33, 34, 36, 38, 39, 40, 41, 42, 43, 44, 51.

'Schwäbischen Weinweichsel'. Origin: Germany. The tree is very vigorous and the yield has been reported to be regular and medium (16) as it was in this trial. The fruit size and the acidity of the juice is like 'Schattenmorelle', but it has a higher sugar content and higher colour intensity.

However, these qualitative characteristics are much lower than for 'Stevnsbär'. The cultivar seems to be too »intermediate« to find a place in the selection. References: 14, 16, 17, 20, 21, 33, 50.

'Timpurii de Cluj'. Origin: Romania? The tree is small and erect. In this trial the yield was extremely low, so observations were terminated after a few years. In Romanian studies it did not show any valuable characteristics either. References: 4, 8, 12, 13, 22.

'Vilholt'. Origin: Denmark. Probably a seedling of 'Ostheimer'. The tree is healthy, medium in vigour and productive. It differs from all other cultivars in this trial by its early ripening, more than 2 weeks earlier than 'Schattenmorelle'. Fruits are of the same size and have the same colour as 'Schattenmorelle', but the acid content is

very low, and the taste rather sweet. This cultivar does not seem to have any characteristics better than many others for processing purposes. However, its very early ripening may give it some possibilities for the fresh fruit market, private gardens and pick-your-own orchards in nordic countries.

'Zahoracka'. Origin: Czechoslovakia? Synonym: 'Demerova'. The cultivar was reported to be of very high quality in Czechoslovakia. However, under our conditions early fruit yield was very low, and no further observations were carried out. References: 48.

### Conclusion

The main object of this work was to evaluate sour cherry cultivars for their productivity and quality characteristics.

Most of the cultivars are considered superfluous in the Danish selection. 'Stevnsbär' must still be considered as the most important cultivar as it combines resistance to *Pseudomonas*, very high colour intensity, acidity and sugar content and good suitability to mechanical harvest. However, its orchard life and tree productivity should be improved.

'Fanal' and 'Nefris' are very valuable cultivars, with very high productivity and good fruit quality, if *Pseudomonas* can be controlled or in areas where it is of little importance.

'Marasca Siva Uspravna' deserves further observation as a cultivar prolonging the harvest season. Although the yield was lower than that of the 'Stevnsbär'-clones, the quality of the juice was very high.

'Crisane 2' was, mainly in the later years, a productive cultivar with large fruits. It may be of interest for products needing only little colour.

'Kelleris 14' gave a low yield per tree, however owing to the weak growth it may be possible to obtain a high yield per hectare, with higher planting density. The fruit is in many ways comparable to 'Schattenmorelle', i.e. larger fruits and a much lighter juice than 'Stevnsbär'.

'Schattenmorelle'. A good clone of 'Schatten-

morelle' may be of interest for prolonging of the 'Stevnsbær'-season, if a lighter juice can be accepted.

'Vilholt' may be of interest as an early cultivar for the fresh fruit market.

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