Fruit Varieties Journal 51(1):28-31 1997

'Sampo' and 'Samdal', Elderberry Cultivars for Juice Concentrates

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Abstract

In 1989-95 two field experiments with eight Danish and three foreign cultivars of elderberry, *Sambucus nigra*, L. were carried out with the objective of comparison of yield, umbel weight and the contents of anthocyanin, soluble solids and titratable acid.

To obtain a high economic value per hectare and in order to keep the manual picking costs at a minimum, the fruit yield and umbel weight were used as the most important criteria for selection of cultivars with high contents of anthocyanin and soluble solids which are necessary for processing of high quality fruit concentrates.

Compared to 'Sampo' and 'Samdal' the yield, umbel weight and content of anthocyanin of 'Allesoe' and 'Korsor' were significantly lower, but the content of soluble solids were high in 'Korsor' and low in 'Allesoe'. By growing of 'Sampo' it is possible to obtain a high yield, medium size umbels, high content of anthocyanin and medium content of soluble solids. With respect to yield and content of anthocyanin the differences between 'Sampo' and 'Samdal' were not significant. Compared to 'Sampo' the cultivar 'Samdal' had a higher umbel weight but a lower content of soluble solids and titratable acids.

Introduction

The elderberry cultivars 'Allesoe' and 'Korsor' have been grown for several decades, but their growth habit, especially the height and spread of the bushes, are not satisfactory, and their content of anthocyanin is insufficient. In 1977 the results from a field experiment carried out in 1972-75 were published and a new cultivar was described and named 'Sambu' (1). In comparison with the old cultivars, 'Sambu' had a considerably higher content of anthocyanin and a much more attractive flavour, but about 20% lower yield.

In 1989 results from two field experiments with fourteen hybrids were published (3). Four of the hybrids were described and named 'Samidan,' 'Sampo,' 'Samdal,' and 'Samyl' respectively. Because of small bush size and growth habit 'Samidan' is recommended for growing in gardens only. Compared to 'Sambu' the yield of the four new cultivars were higher and the juice quality superior (3).

In 1989, another of the fourteen hybrids (No 369) was described and named 'Samocco.' Number 1565 was selected in Norway and named 'Finn Sam.' A new Danish cultivar 'Gentofte' was found in 1988 by a fruit grower.

Foreign cultivars such as 'Donau,' 'Haschberg' and 'Mammut' and the Danish cultivars 'Allesoe' and 'Korsor' never have been compared in a field experiment.

The objective of this project was to measure and compare the yield and quality attributes of Danish and foreign cultivars in order to recommend cultivars for commercial production of elderberries suitable for processing into fruit juice concentrates.

Materials and Methods

Field experiments

In the autumn of 1989 and 1990, two experiments each including six cultivars: 1) 'Allesoe,' 'Korsor,' 'Samdal,' 'Samocco,' 'Sampo,' 'Samyl' and 2) 'Donau,' 'Finn Sam,' 'Gentofte,' 'Haschberg,' 'Mammut,' 'Sampo,' were carried out. 'Sampo' was used as reference. Two year old bushes were planted on sandy loam soil in three replicates

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with each 2 bushes. The planting distance was 1.25 x 5 m with 4 m grass strips between the rows. Beginning, maximum, and end of flowering were registered.

NPK fertilizer amounting to 225 kg nitrogen, 20 kg phosphorus and 105 kg potassium per ha was applied each year. Weed control in the rows was carried out by use of Simazin and Kerb. The pruning method and pest control were described previously (2).

Harvesting and quality measurement

Fruits were harvested at optimum maturity defined as 90% black fruits in the bushes, and yield per bush were determined in 1991-95 and 1992-95 for experiment one and two respectively. Measurement of umbel weight and analyses for anthocyanin, soluble solids, and titratable acid were carried out as described by Kaack (2). The contents of anthocyanin and titratable acid were calculated as cyanidin-3-glucoside, mg/100g and as citric acid, g/kg respectively. The statistical analyses was a twoway analyses of variance (ANOVA) and a significance level P = 0.05%.

Results

Flowering, yield and harvest time

No difference in flowering time was found. All the cultivars flowered from the first to the fourth week of June (data not shown) and were harvested in September as shown in Table 1 and 2.

Table 1. Average yield and harvest week in September of 6 elderberry cultivars in experiment one, in 1990-95.

	Samples (number)	Yield (ton/ha)	Harvest week in September
Sampo	40	10.9	1
Samdal	40	10.8	1
Samyl	39	8.9	1
Allesoe	40	8.9	3
Samocco	40	8.3	2
Korsor	40	5.5	2
LSD (5%)		0.6	

Table 2. Average yield and harvest week of 5 elderberry cultivars in experiment two, in 1991-95.

Cultivar	Samples (number)	Yield (ton/ha)	Harvest week in September
Finn Sam	8	14.4	2
Sampo	16	10.4	1
Gentofte	13	9.2	2
Mammut	11	8.0	1
Donau	16	4.1	1
LSD (5%)		1.3	

The cultivar 'Haschberg' did not grow properly. The bushes were very small and it was impossible to find a reliable yield. Table 1 and 2 shows the average yield of the other cultivars in experiment one and two respectively. Average of experiments and years for umbel weight and the contents of anthocyanin, soluble solids, and titratable acid are shown in Table 3.

Discussion

In order to improve cross pollination and thereby fruit set it is common practice to grow two or three cultivars in the elderberry orchard. Because the 11 cultivars flowered from the first to the fourth week of June, they all can be used for cross pollination. As shown in Table 1 the cultivars were harvested in the first three weeks of September. These differences can be used in order to expand or space the harvest period.

Yield is the important characteristic because a high yield means a high economic value per hectare. A high umbel weight is important because the manual picking work decreases with increasing umbel weight. In experiment one (Table 1) 'Sampo' and 'Samdal' had the highest yield of 10.9 and 10.8 ton/ha, followed by 'Samyl' and 'Allesoe' with 8.9 ton/ha, 'Samocco' with 8.3 ton/ha and the lowest yield of 5.5 ton/ha by 'Korsor.' In experiment 2 (Table 2) the yield decreased significantly through 'Finn Sam,' 'Sampo,' 'Gentofte,' 'Mammut' to 'Donau.' With respect to umbel weight, as shown in Table 3, the cultivars could be divided

Table 3. Average of experiments and years for umbel weight and contents of anthocyanin (cyanidin-3-glucoside), soluble solids and titratable acid (citric acid) of 11 elderberry cultivars.

Cultivar	Umbel (gram)	Anthocyanin (mg/100 g)	Soluble solids (g/100 g)	Titratable acid (g/kg)
Finn Sam	129	518	9.4	10.8
Gentofte	88	611	10.3	8.9
Samdal	88	936	9.4	9.1
Samocco	81	596	9.0	9.2
Allesoe	72	531	9.0	9.1
Sampo	72	877	10.1	10.5
Samyl	70	846	9.0	10.2
Mammut	70	1028	10.7	12.6
Korsor	51	711	10.4	8.0
Donau	46	770	12.0	7.2
Haschberg		529	8.7	9.5
LSD (5%)	5	51	0.2	0.4

into four groups with 129, 81-88, 70-72 and 46-50 g/umbel respectively.

For processing of elderberry fruit juice concentrates a very high content of anthocyanin and soluble solids are requested (2). The reason is that a higher content of anthocyanin means that a lower amount of concentrate is sufficient to obtain a satisfactory product colour, among other things such as homemade wine packages. With a higher content of soluble solids a higher yield of concentrate is obtained. According to Table 3 it was possible to divide the cultivars in three groups with 846-1028, 611-770 and 518-596, mg/100g of anthocyanin. Table 3 shows that the group of cultivars with the highest content of anthocyanin include 'Mammut,' 'Samdal,' 'Sampo' and 'Samyl.' The significant highest content of soluble solids was found in 'Donau' 12.0 g/100g followed by a group of cultivars including 'Mammut,' 'Korsor,' 'Gentofte, and 'Sampo' that was similar with 10.1-10.7 g/100g.

Compared to 'Sampo' and 'Samdal' the yield, umbel weight and content of anthocyanin of 'Allesoe,' and 'Korsor' were significantly lower, but the content of soluble solids were high in 'Korsor' and low in 'Allesoe.' By growing of 'Sampo' it is possible to obtain a high yield, medium size umbels, high content of anthocyanine and medium content of soluble solids. With respect to yield and content of anthocyanin the differences between 'Sampo' and 'Samdal' were not significant. Compared to 'Sampo' the cultivar 'Samdal' had a higher umbel weight but a lower content of soluble solids.

The yield and umbel weight of 'Finn Sam' was very high but the content of anthocyanin was low and the content of soluble solids medium. 'Mammut' had a very high content of anthocyanin and soluble solids, but the yield and umbel weight were medium. The cultivar 'Samocco' had a medium umbel weight, but the yield and contents of anthocyanin and soluble solids were low. In comparison with 'Sampo' and 'Samdal' the cultivar 'Gentofte' had a lower yield and content of anthocyanin, but the umbel weights were equal and the content of soluble solids was higher in 'Gentofte. 'Haschberg' had very low levels of anthocyanin and soluble solids and the yield was very low. With respect to titratable acid the content was highest in 'Mammut' followed by three groups 1) 'Finn Sam,' 'Sampo' and 'Samyl' with 10.2-10.8 g/kg; 2) 'Gentofte,' 'Allesoe,' 'Samdal,' 'Samocco, and 'Haschberg' with 9.1-9.5 g/kg, and 3) 'Korsor' and 'Donau' with 7.2-8.0 g/kg respectively.

Conclusion

Because of high yield, medium umbel weight and high contents of anthocyanin and soluble solids, medium to high content of titratable acid the cultivars 'Sampo' and 'Samdal' are recommended for commercial production and industrial processing of elderberry concentrates.

References

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Fruit Varieties Journal 51(1):31-35 1997

Incidence of *Xylella fastidiosa* Wells et al. on Plum and Peach in Alabama[1]

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Abstract

Alabama cooperative extension personnel in 22 of the 67 counties responded to a request for peach and plum twig/leaf samples to be tested for *X. fastidiosa,* the causal organism of phony peach and plum leaf scald. Enzyme-linked immunosorbant assay results indicated that 14% of peach and 12%, of plum samples were positive. The highest incidence of the pathogen was in Mobile County with 44% of the samples testing positive. Additionally, two plum variety trials were sampled at Shorter in Macon County and Thorsby in Chilton County. All of the cultivars at Shorter and 37.5% of the cultivars at Thorsby had assay results significantly higher than uninfected seedlings. Trees in the Shorter and Thorsby trials were also rated visually, with 'AU-Producer' having the lowest average rating of 0.4 on a 0-5 scale.

Xylella fastidiosa Wells et al., the causal organism of phony peach on peach and plum leaf scald (PLS) on plum, can be a devastating disease in both crops. This bacterium infects the xylem tissue of the host plant resulting in stunted growth and reduced fruit size in peach. On plum it causes leaf margin necrosis and death of entire branches, and can eventually kill the entire tree.

The organism is spread from one host to another by leafhoppers (*Homalodisca coagulata* (Say)) and *Oncometopia nigricans* (Walker) (8). Further, the organism is known to be transmitted by budding and grafting (1, 2, 3, 5).

This study was undertaken to determine the relative incidence of *X. fastidiosa* on plum and peach in Alabama.

Materials and Methods

Requests were made to Cooperative Extension offices in 67 counties of Alabama for plum and peach twig/leaf samples in May 1994. Each office was supplied with plastic bags to collect the samples, forms to identify the samples, and U.S. Postal Next-Day mailers to return the samples.

Collectors were asked to collect samples randomly without regard to symptom expression from mature trees. Samples came from both commercial orchards and private residences. Eight of the plum samples were from feral trees. Samples returned consisted of 1-2 year old twigs with leaves and petioles intact or just leaves and petioles.

Returned samples were stored at 5C until processed. Material from each

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