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Ripening of elderberry (*Sambucus nigra* L.)

Modning af hyld (Sambucus nigra *L.*)

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Summary

Results are shown from analyses of fruits of four elderberry varieties ('Samdal', 'Samidan', 'Sampo', 'Samyl') picked at four dates.

During ripening the content of anthocyanin and soluble solids increases and the content of titratable acid decreases.

The importance of these changes are discussed in relation to processing of home wine sets, pure elderberry juice and mixed juices.

Key words: Elderberry, *Sambucus nigra* L., anthocyanin, soluble solids, titratable acid, ripening, processing.

Resumé

Der er vist resultater fra analyser af hyldebær af fire sorter ('Samdal', 'Samidan', 'Sampo' og 'Samyl') plukket på fire tidspunkter.

Under modning øges indholdet af anthocyanin og opløseligt tørstof, medens indholdet af titrerbar syre aftager.

Betydningen af disse ændringer er diskuteret i relation til fremstilling af vinsæt, hyldebærsaft og blandet saft.

Nøgleord: Hyld, *Sambucus nigra* L., anthocyanin, opløseligt tørstof, titrerbar syre, forarbejdning.

Introduction

The area grown with elderberry is increasing mainly due to the fact that this crop is easy to manage.

As elderberry juice is used as a colorant in mixed juices and home wine sets the content of anthocyanin is a very important quality attribute. The aim has been to determine the changes of important quality characteristics during fruit ripening.

Materials and methods

Results from a field experiment described earlier (5) are subject to further evaluation.

Analyses were carried out as described by *Kaack* (4).

The content of anthocyanin and titratable acid was calculated as cyanidin-3-glucoside and citric acid respectively. Soluble solids content was determined by refractometry

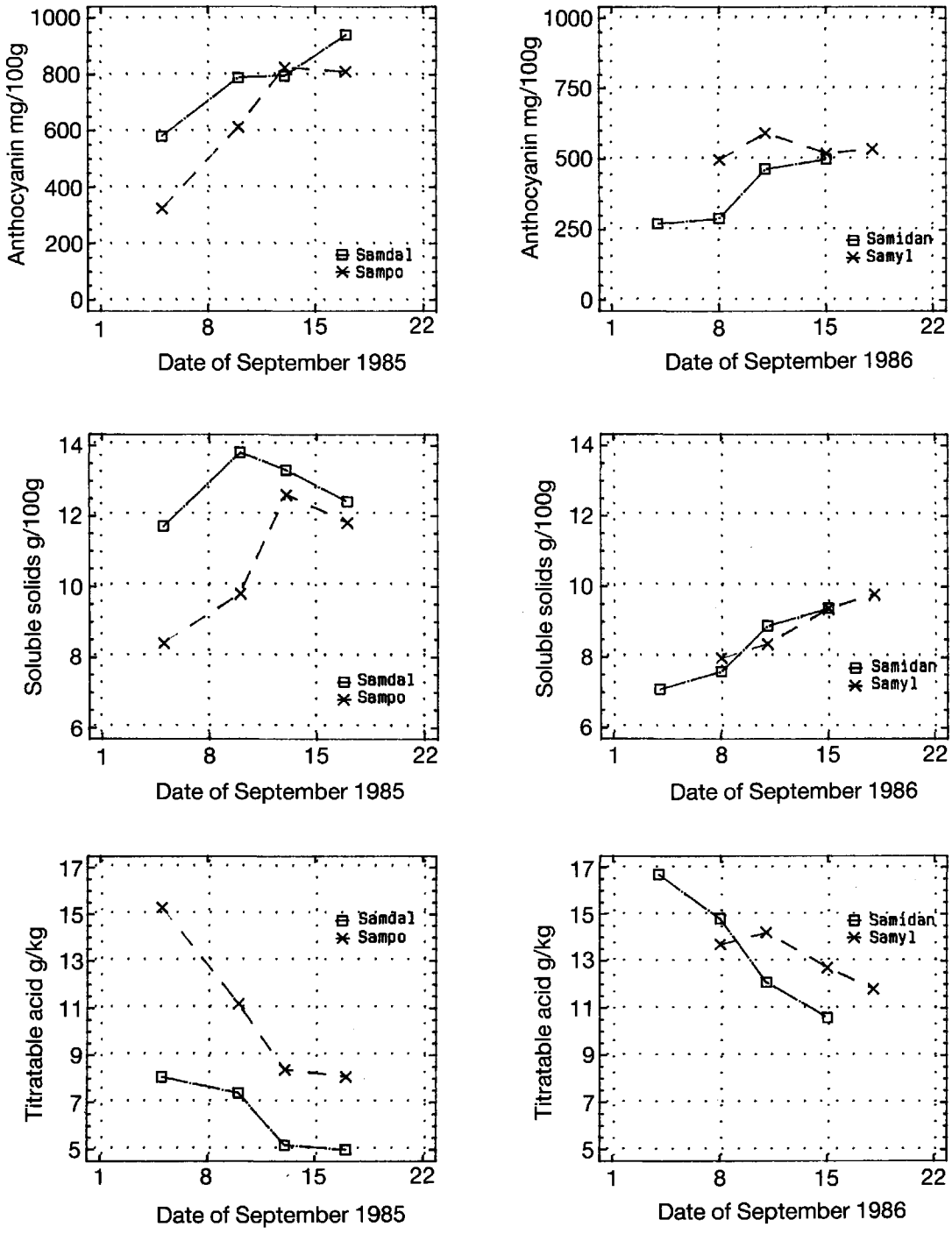

Fig. 1. Content of anthocyanin, soluble solids and titratable acid in elderberry picked on four dates.
Indhold af anthocyanin, opløseligt tørstof og titrerbar syre i hyldebær høstet på fire tidspunkter.

Results

Results from analyses of elderberry from four varieties picked on four dates are shown in Fig. 1. Regression analyses by use of equation (1), where y is the quality characteristics and x the harvest days, was carried out. The results are shown in Table 1.

$$y = ax^b \qquad 1)$$

If $o < b < 1$, $Y \rightarrow \infty$ and if $b < 0$, $y \rightarrow o$.

Discussion

Fig. 1 shows that the content of soluble solids increases during ripening, while the content of titratable acid decreases. This is quite normal for stone fruits (3).

The accumulation of anthocyanin increases as shown in Fig. 1 and as found earlier for elderberry, cherries and grapes (1,2,4,6,7).

In fruits of 'Samyl' the content of anthocyanin did not change significantly. Complete development of the anthocyanin content was obtainable while the changes in soluble solids and titratable acid continued. The content of soluble solids in fruits of 'Samdal' did not change significantly according to the mathematical model. A reason was probably fruit dropping due to the over-ripening of some fruits. The curvature for the contents of anthocyanin, soluble solids and titratable acid in 'Sampo' also indicate overripening on the last picking date.

Use of elderberry juice as a colorant in home wine sets requires a high content of anthocyanin, while soluble solids and acid may be supplied by addition of sucrose and citric acid.

Addition of sugar only is allowed during processing of elderberry juice or mixed juices. For processing of pure elderberry juice, harvest may be carried out at a certain level of titratable acid (10 g/kg). During processing mixed juices the acid can be supplied from other fruit juices. A high content of anthocyanin is reqired for all the above mentioned applications of elderberries. For this reason the picking should be carried out after proper ripening and anthocyanin development.

Table 1. Results from statistical analyses by regression ($y=ax^b$) of the results presented in Fig. 1 (y=quality characteristics, x=days, a=intercept, b=slope (after linearization), r=correlation coefficient).
Resultater fra statistisk analyse ved regression ($y=ax^b$) på data vist i Fig. 1, (y=kvalitetsegenskab, x=dage, a=skæringspunkt, b=hældningskoefficient (efter linearisering) r=korrelationskoefficient).

Variety *Sort*	Variable *Variabel*	log(a)	b	r
'Samidan'	anthocyanin	4.1	0.72	0.91
'Samyl'	–	6.2	0.04	0.16 NS
'Samdal'	–	6.4	0.17	0.98
'Sampo'	–	4.6	0.72	0.91
'Samidan'	soluble solids	1.3	0.31	0.96
'Samyl'	–	1.3	0.33	0.99
'Samdal'	–	2.5	0.04	0.60 NS
'Sampo'	–	1.6	0.31	0.92
'Samidan'	titratable acid	3.8	−0.49	−0.97
'Samyl'	–	3.2	−0.25	−0.85
'Samdal'	–	2.1	−0.18	−0.85
'Sampo'	–	3.6	−0.52	−0.97

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