

Chilling Requirement of Strawberry cv. 'Sonata' and 'Figaro'

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Abstract

'Sonata' and 'Figaro' are two new Junebearers from the breeding programme of Fresh Forward, The Netherlands. Runner plantlets of both cultivars were transplanted in trays outdoors on 15 July 2006. On 23 November 2006, after receiving 436 chill units in the field, the trayplants were put into cold storage at -1.5°C. After receiving additional chilling up to respectively 1093, 1254, 1414, 1575 and 1735 chill units, the plants were transferred to a heated greenhouse for spring production.

Petiole and inflorescences lengths were greatest with the highest chilling amount for both varieties. For cv. 'Sonata' the percentage of misshaped fruit decreased with longer chilling duration. However, a chill requirement of 1575 chill units was considered optimum in relation to yield and vegetative development for Sonata.

According to this preliminary trial it appeared that cv. 'Figaro' had a much lower chilling optimum. The length of petioles and inflorescences were saturated with 1575 chill units, which is much more chilling than needed for maximum fruit production. The highest total yield was achieved with 1093 chill units. Fruit quality in the main season was superior with with the 1254 and 1414 chill unit treatments. Figaro plants subjected to an excessive amount of chilling were more vigorous and the fruit production was decreased and delayed. With low chill, Figaro was characterized by a reblooming period which resulted in a second harvest period from early June to early July.

INTRODUCTION

The shortday strawberry plants *Fragaria x ananassa* Duch. 'Sonata' and 'Figaro' are two new Junebearers from the breeding programme of Fresh Forward, The Netherlands. Both cultivars are crosses from cv. 'Elsanta'. Prior to forcing in the spring in the greenhouse, it is essential for the dormancy to be broken by adequate chilling exposure. Insufficient chilling may lead to a lack of vegetative development, poor anther and pollen quality, fruit malformation, lower fruit weight and yield (Kronenberg et al., 1976). The objective of this study was to investigate the effect of chilling on the cropping of the cv. 'Sonata' and 'Figaro'.

MATERIALS AND METHODS

Strawberry runners of cv. 'Sonata' and 'Figaro' were transplanted in 300 cc trays on 15 July 2006. The accumulated chilling was calculated as chill units (Lieten, 2006). On 23 November 2006, after receiving 436 chill units in the field, the trayplants were put into cold storage at -1.5°C. After a cold storage period of 4 to 8 weeks the total accumulated chilling was respectively 1093, 1254, 1414, 1575 and 1735 chill units. The different groups were arranged at random in 3 replications of 24 plants in the greenhouse. With 4 plants per container (6 liter peat volume) the plants were established at a density of 11 plants per m².

The forcing started in the first week of February. Sonata was harvested from 31 March until 25 May, Figaro was harvested from 31 March until 6 July. Total yield, percentage of class 1 (marketable) and class 2 (misshaped, rotten) fruit was determined. From 10 plants of each

replication the length of the first and the longest inflorescences and the longest petioles were measured respectively on 15 and 20 March. All data were analysed by ANOVA. Least significant differences were determined at $P < 0.05$ to compare means.

RESULTS AND DISCUSSION

Petiole and inflorescence length increased significantly with duration of chilling for both cultivars. The 1093 and 1254 chill units treatment showed significantly shorter petioles and inflorescences which resulted in smaller fruits. Analysis of variance indicated significant differences for misshaped fruits among the chilling treatments. The percentage of Class 2 fruit was minimized with more chilling; increased chill from 1093 units to 1735 units decreased the class 2 fruit for Figaro from 13.4% to 8.7 % and from 9.3 to 5.3 % for Sonata. Compared to the cv. Elsanta, Sonata seems to have a higher chilling requirement of about 1575 chill units to achieve the best yield and fruit quality during forcing culture (Table 1). Sonata was characterized by a concentrated harvest period regardless the chilling history of the plants (Figure 1).

It appeared that the chilling optimum of Figaro was not the same for vegetative development and fruit production (Table 2). If plants were subjected to an excessive amount of chilling, above 1414 chill units, length of petioles and inflorescences were saturated, plants were producing runners and fruit production was decreased and delayed. With low chill, Figaro was characterized by a reblooming period which resulted in a second harvest period from early June to early July (Figure 2). The highest total yield for cv. Figaro was achieved with 1093 chill units. However, with the 1254 and 1414 chill unit treatments a significant higher class I percentage and a lower percentage of misshaped fruits were produced in the main production period (no data shown).

Literature cited

- Kronenberg, H.G., Wassenaar L.M. and van de Lindeloof C.P.J. 1976. Effect of temperature on dormancy in strawberry. *Scientia Hort.*, 4:361-366.
- Lieten, P. 2006. Chilling Unit Model for Greenhouse Production of Strawberry cv. 'Elsanta'. *Acta.Hort.* 708:381-387.

Tables

Table 1. Effect of chilling on performance of cv 'Sonata' in greenhouse culture.

Chill Units	Length (cm)			Total yield		% Class 1	% Class 2
	1 st Inflor.	Inflor.	Petiole	Kg/m ²	Gram/plant	Gram/plant	Gram/plant
1093	9.40 a	13.23 a	12.22 a	6.012	559 a	508 a	51 a
1254	9.10 a	14.89 a	14.58 b	6.465	589 a	546 b	43 a
1414	10.38 b	17.55 b	20.11 b	6.717	607 a	561 b	65 a
1575	10.79 b	18.89 b	23.20 c	7.425	677 b	632 c	45 a
1735	10.57 b	19.37 b	23.92 c	6.906	662 b	647 c	15 b

Values in the same column with different letters are significantly different at $P < 0.05$.

Table 2. Effect of chilling on performance of cv 'Figaro' in greenhouse culture.

Chill Units	Length (cm)			Total yield		% Class 1	% Class 2
	1 st Inflor.	Inflor.	Petiole	Kg/m ²	Gram/plant	Gram/plant	Gram/plant
1093	14.00 a	15.78 a	16.60 a	8.237	748 a	646 a	102 a
1254	14.23 a	16.76 a	17.38 a	7.190	653 b	566 b	88 ab
1414	17.55 b	22.44 b	23.48 b	7.158	646 b	571 b	75 ab
1575	18.57 b	22.30 b	27.16 c	6.528	595 c	505 c	90 ab
1735	18.87 b	24.58 b	27.70 c	5.647	515 c	468 c	47 b

Values in the same column with different letters are significantly different at P<0.05.

Figures

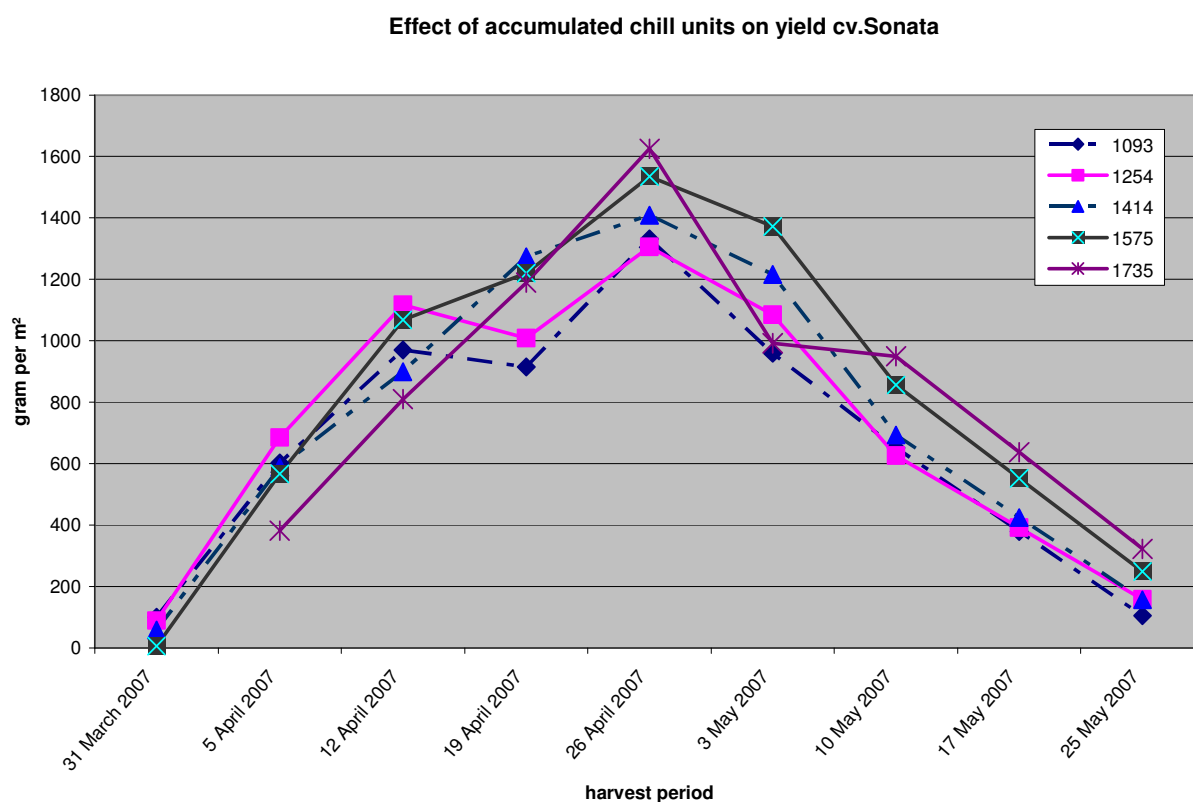


Figure 1. Effect of chilling on yield of cv. Sonata in greenhouse spring production

Effect of accumulated chill units on yield cv. Figaro

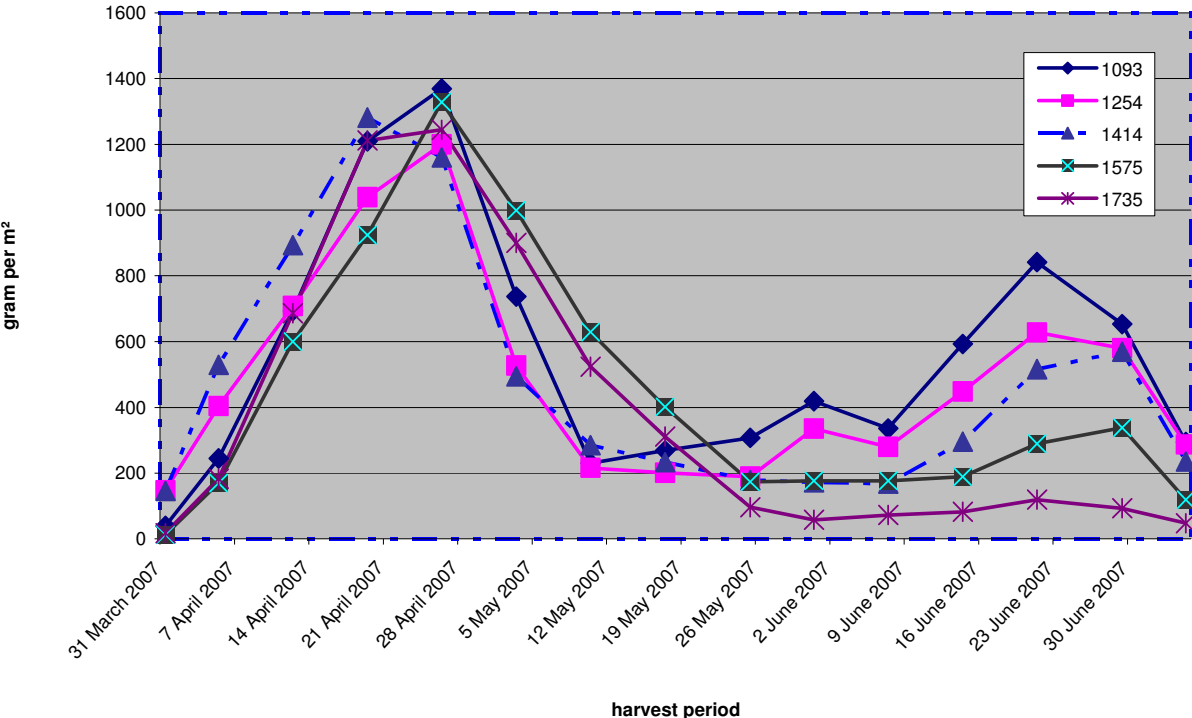


Figure 2. Effect of chilling on yield of cv. Figaro in greenhouse spring production