HDC Contract SF/22

Effect of Planting Date and Density on the Growth and Cropping of the New Everbearing Strawberry Variety, Calypso

FINAL REPORT

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October 1993

Project Number:	SF/22
Project Title:	Effect of Planting Date and Density on the Growth and Cropping of the New Everbearing Strawberry Variety, Calypso
Project Leader:	Dr. D.R. Taylor
Location of Project:	HRI East Malling West Malling Kent ME19 6BJ
Project Coordinator:	Mr. H. Darby
Date Project Commenced:	October 1991
Date Project Completed:	October 1993
Key Words:	Strawberry, Calypso, Planting Date, Planting Density

CONTENTS

RELEVANCE TO GROWERS AND PRACTICAL APPLICATION

Application

A comparison was made between an autumn and spring planting of the new everbearing strawberry Calypso, in combination with three different planting densities. Yields were recorded for two years.

An autumn planting produced higher yields, especially in the first cropping year, while yield per plant increased with decreasing plant density in both years. However, yield per cropped area increased with increasing plant density and it is suggested that the optimum planting distance for Calypso is between 30 and 45 cm within the row. Yields overall tended to be higher and fruit size was maintained well in the second year. There was no effect of planting date on the cropping period of Calypso in either year.

The results suggest there are potential yield benefits to be gained by growing Calypso at relatively high plant densities, although in practice the choice of planting distance will depend upon a number of economic and management considerations by growers. Factors to be taken into account include the cost of planting material, costs involved with de-runnering operations and potential increased risk of disease due to density of foliage.

Summary

Calypso is a new everbearing strawberry from HRI East Malling and this project was set up to determine the effects of both planting date and density on the cropping performance of the variety, such that practical advice could be given to growers so as to achieve optimum results.

The trial was planted at HRI East Malling using small, module grown plants derived from NSA foundation stock. There were two planting dates, 3 October 1991 and 24 April 1992, with three between-plant spacing of 30, 45 and 60 cm, planted in double rows 40 cm apart on raised beds. Bed centres were 1.9 m apart, giving plant densities of 35088, 23392 and 17544 plants/ha. The trial was cropped for two years.

Results from the first cropping year showed that the autumn planted treatments produced larger, more productive plants compared to the spring planting, and that this effect was most apparent at the wider plant spacings (Figure 1). Although Calypso at the wider spacing gave the highest yields on a per plant basis, this did not fully compensate for the decreased density of planting and the highest yields per hectare were produced by the most closely planted treatments (Figure 2).

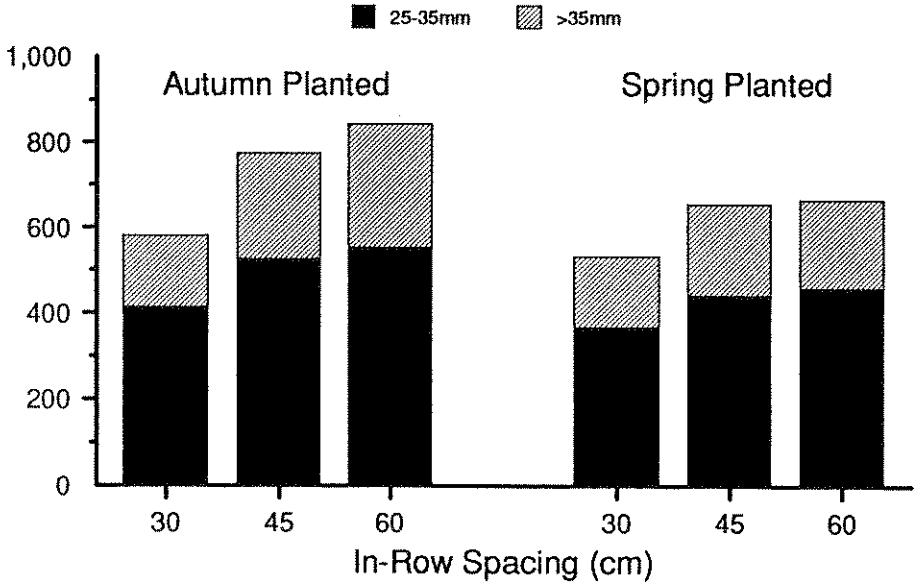

Figure 1 - Calypso Class I Yields per plant 1992 (g/plant)

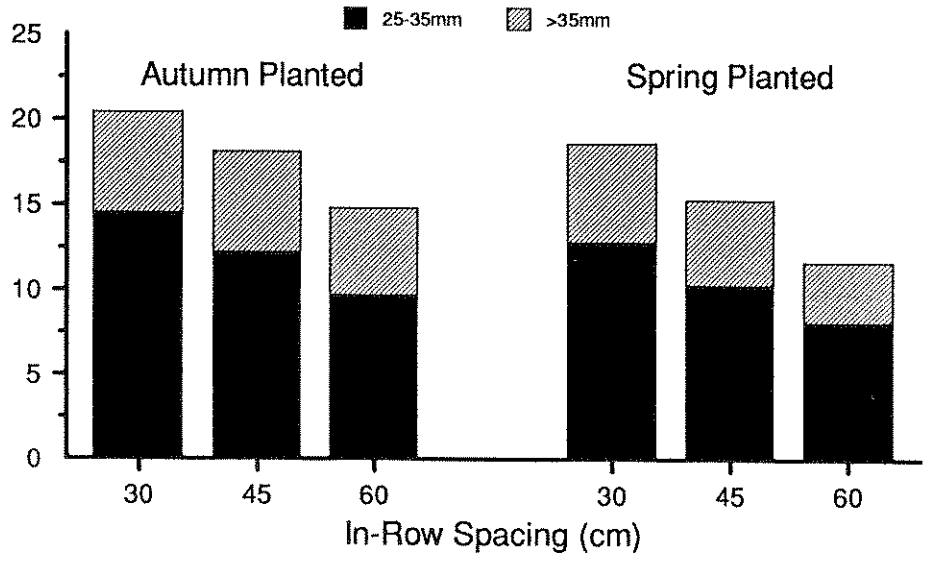

Figure 2 - Calypso Class I Yields per area 1992 (t/ha)

In the second year, although the autumn planted treatments tended to produce higher yields compared to spring planting (Figure 3), this effect was less apparent than in the first year. The effects of plant spacing were essentially the same as in the first year, again with the highest yields per area produced by the highest density of planting (Figure 4). Overall, yields tended to be higher than in 1992 and fruit size was maintained well, the proportion of class I fruit over 35 mm being actually higher in the second year.

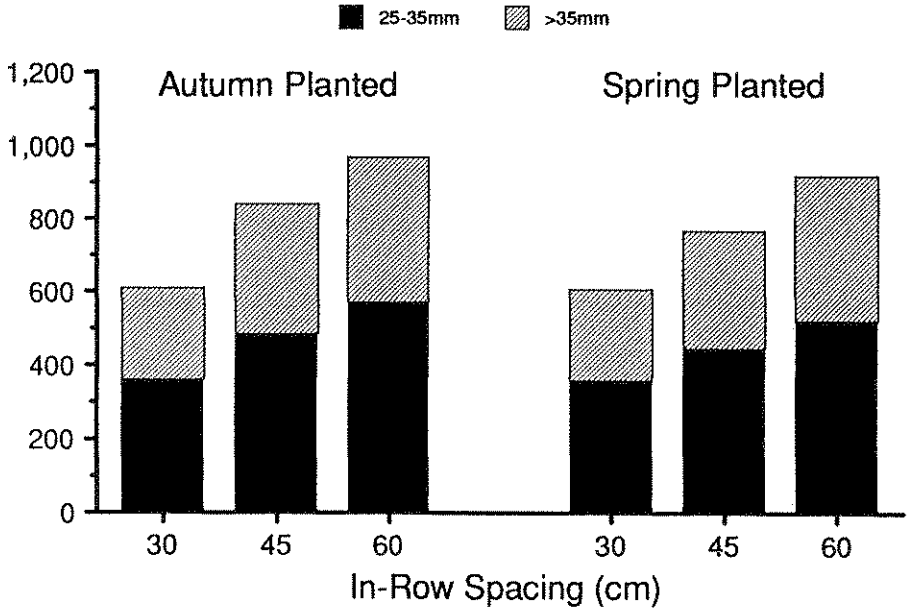

Figure 3 - Calypso Class I Yields 1993 per plant (g/plant)

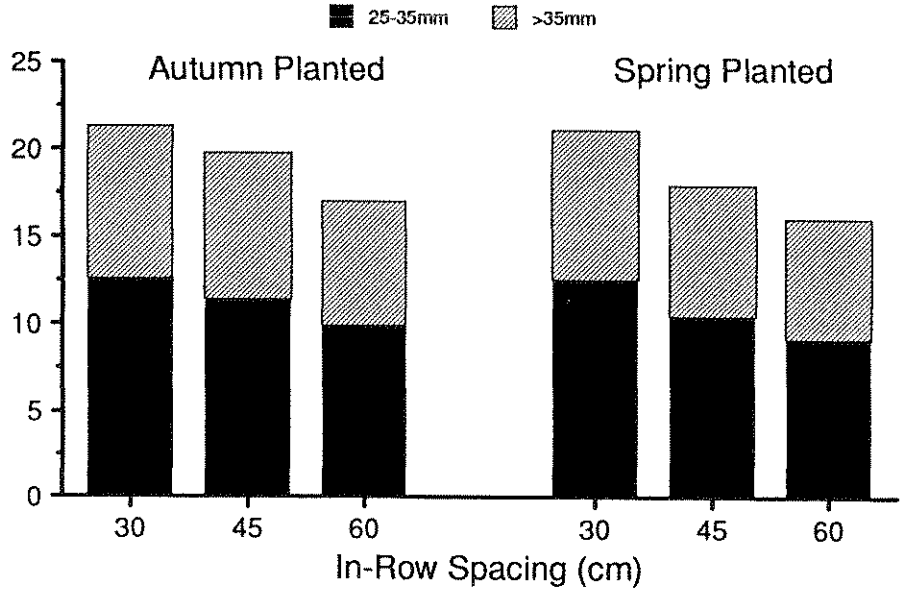

Figure 4 - Calypso Class I Yields per area 1993 (t/ha)

There was no effect in either year of planting date on the cropping period of Calypso.

The results obtained from this trial suggest that the optimum planting distance for Calypso lies between 30 and 45 cm within the row and that autumn planting tends to give better yields, although this may well depend in practice on the type of planting material used and the actual date of planting.

Action Points for Growers

- Autumn plant Calypso for optimum yields, unless large, well established module plants are available for spring planting.
- Plant Calypso at a distance of between 30 and 45 cm within the row.
- Calypso plantings can be maintained for two cropping years very successfully.

EXPERIMENTAL SECTION

Introduction

The new everbearing strawberry variety Calypso was raised by Dr. David Simpson at HRI East Malling, from a cross of Rapella x Selva made in 1985 and first released to the industry in limited quantities in 1991/92. Calypso has a similar season to Rapella, but produces fruit of superior quality; runner production is also better. In trials funded by the HDC, both at HRI Efford and on growers' farms, results had indicated that the cropping season of Calypso could be advanced if it is spring planted compared to an autumn planting. Plants of Calypso also tend to be more compact than Rapella, suggesting that they could be planted at a higher density.

This trial was designed to look in more detail at the effects of both planting date and density on the cropping performance of Calypso.

Materials and Methods

The trial was carried out at Horticulture Research International, East Malling. The soil type was well drained, fine sandy loam passing into clay loam, previously cropped with cereals.

Prior to planting the experimental site was ploughed, cultivated and spaded, with the following fertilisers being applied after soil analysis: muriate of potash (150 kg ha^{-1}), Kieserite (150 kg ha^{-1}), and triple superphosphate (100 kg ha^{-1}). Raised beds were then formed and chloropicrin injected at 200 l ha^{-1}, the beds being covered with black polythene.

Planting material for the trial was obtained from NSA Foundation stock, with runners being rooted into 6.5 cm modules (Plantpak FP6, 0.19 l). There were two planting dates, 3 October 1991 and 24 April 1992, in double, staggered rows, 40 cm apart, with between plant spacings of 30, 45 or 60 cm. Bed centres were 1.9 m apart. The experiment was thus a 2 x 3 factorial with 2 planting dates and 3 plant spacing; a latin square design was used with 6 replications, each plot having 20 plants.

Sub-polythene trickle irrigation was used to supply water as required, this being determined with the aid of several 15 and 30 cm-long tensiometers, situated at various points within the trial. In the maiden year, plants were de-flowered by hand until the end of May, while in 1993 the trial was mowed off on 21 May. The plants were de-runnered on three occasions during the season in both years.

Fruit was picked twice weekly and sorted into four grades: Class I > 35 mm; Class I 25-35 mm; Class II < 25 mm and slightly misshapen; unmarketable. Plant growth during the first year was assessed at the start of cropping by measurements of heights and spreads, and these data were used to calculate plant volume.

Results

1993 Picking commenced on 19 July and finished on 4 October, the yield and grade-out results being given in Table 1.

There was a significant effect of plant spacing on yield, this being most notable when comparing the 30 and 45 cm treatments. Thus, total class I yields showed a 38% and 26% increase at 45 cm compared to 30 cm spacing for the autumn and spring plantings respectively, while the increases were 15% and 20% for the 60 cm compared to the 45 cm treatments. A similar trend was apparent with total yield per plant and the large (35 mm +) class I fruit. However, the proportion of the total class I fruit made up of large berries was very consistent, averaging 41-43% irrespective of plant spacing.

TABLE 1 Crop Yield 1993 (g/plant)

	Autumn Planted			Spring Planted			SED
	30cm	45cm	60cm	30cm	45cm	60cm	
Class I 35mm+	251	356	400	247	322	398	18.4
Class I 25-35mm	362	489	572	361	447	522	17.5
Total Class I	613	845	972	608	769	920	26.3
Class II	152	199	213	150	174	212	10.3
Unmarketable	134	187	229	119	165	204	11.6
Total Yield	899	1231	1414	877	1109	1336	34.2

SED = standard error of difference (20 d.f.)

There was little effect of planting date on yield, although yields from the autumn planting treatments tended to be higher than the spring planting. However, this increase was only significant for the total class I yield at the 45 cm spacing. Generally the yields obtained in 1993 were higher than those in the first cropping year, particularly with the spring planted treatments.

Neither planting date or density had any effect on the proportion of the total yield consisting of class I fruit, this being approximately 70% for all treatments. The relatively high proportion of class II and unmarketable fruit in 1993 was due mainly to (1) splitting of the berries, especially later in the season, caused by them lying in rainwater trapped on the polythene mulch, and (2) small, tertiary and quaternary berries, with no 'truss pruning' having been carried out.

Table 2 gives the estimated yields on a per hectare basis according to the respective plant densities. There was a significant trend for increasing yield with increasing plant density, i.e. 30 cm > 45 cm > 60 cm, and this was apparent for large class I, total class I and total yields. Again autumn planted treatments tended to give higher yields compared to spring planting, but this was only significant in the case of the total class I yield from the 45 cm spacing.

There was no effect of planting date on the cropping period of Calypso, the average 10% and 50% pick dates being 11 August and 27 August respectively.

TABLE 2 Crop Yield 1993 (t/ha equivalent)

	Autumn Planted			Spring Planted			SED
	30cm	45cm	60cm	30cm	45cm	60cm	
Class I 35mm+	8.8	8.3	7.0	8.7	7.5	7.0	0.47
Total Class I	21.5	19.8	17.1	21.3	18.0	16.1	0.72
Total Yield	31.5	28.8	24.8	30.8	25.9	23.4	0.92

SED = standard error of difference (20 d.f.)

Planting densities (plants/ha): 30cm - 35088
45cm - 23392
60cm - 17544

1992 and 1993

Tables 3 and 4 give the accumulated yields for the two years of the trial, on a per plant and estimated yield per hectare basis respectively. The results show again the significant effects of plant spacing on yield, with plants at a wider spacing producing higher yields per plant (Table 3), but again this did not compensate for the decreased density of planting when yields per hectare were calculated (Table 4).

Planting date had a significant effect over the two years combined, with yields from an autumn planting being significantly higher compared to spring planting for large class I, total class I and total yields at all plant spacings, with the exception of large and total class I at 30 cm (Table 3).

TABLE 3 Accumulated Crop Yield 1992 + 1993 (g/plant)

	Autumn Planted			Spring Planted			SED
	30cm	45cm	60cm	30cm	45cm	60cm	
Class I 35mm+	420	607	691	413	537	606	20.9
Class I 25-35mm	776	1013	1123	727	887	979	34.7
Total Class I	1196	1620	1815	1140	1425	1585	46.8
Class II	328	400	424	300	340	393	18.2
Unmarketable	277	377	438	242	315	373	14.4
Total Yield	1800	2397	2676	1682	2080	2352	59.7

SED = standard error of difference (20 d.f.)

TABLE 4 Accumulated Crop Yield 1992 + 1993 (t/ha equivalent)

	Autumn Planted			Spring Planted			SED
	30cm	45cm	60cm	30cm	45cm	60cm	
Class I 35mm+	14.7	14.2	12.1	14.5	12.6	10.6	0.59
Total Class I	42.0	37.9	31.8	40.0	33.3	27.8	1.12
Total Yield	63.2	56.1	46.9	59.0	48.7	41.2	1.45

SED = standard error of difference (20 d.f.)

Planting densities (plants/ha): 30cm - 35088
45cm - 23392
60cm - 17544

Conclusions

Plants from the autumn planting tended to produce higher yields, but this increase was only significant at the 45 cm spacing for class I fruit and contrasted to the more notable effects recorded in the first year of the trial.

Yield per plant increased with decreasing plant density, but when yields per hectare were calculated this did not compensate for the density effect, such that the highest density planting treatments produced the highest yields, as was the case in 1992.

Overall, yields tended to be higher than in 1992, this being most notable with the spring planted treatments. There were no treatment effects on fruit size, the proportion of class I fruit over 35 mm being very consistent and was significantly higher than in 1992 i.e. 41-43% in 1993 compared to 29-35% in 1992.

As in 1992, there was no effect on the cropping period of Calypso with the different planting dates and this contrasts with results obtained from other HDC funded work (Burgess, 1992).

Acknowledgements

The author gratefully thanks Malcolm Wickenden and Carol Crisp for their expert recording of the trial, and Gail Kingswell for the statistical analysis of the data.

References

BURGESS, C.M. (1992). Work at HRI Efford 1. Comparison of Autumn and Spring Plantings of Four Everbearing Varieties. *Horticultural Development Council Project News - Supplement*, No. 14, p 44.

Contract

Contract between HRI (hereinafter called the "Contractor") and the Horticultural Development Council (hereinafter called the "Council") for a research/development project.

PROPOSAL

1. TITLE OF PROJECT Contract No: SF/22

EFFECT OF PLANTING DATE AND DENSITY ON THE GROWTH AND CROPPING OF THE NEW EVERBEARING STRAWBERRY VARIETY, CALYPSO.

2. BACKGROUND AND COMMERCIAL OBJECTIVE

Initial trials have shown that the new everbearing strawberry variety from HRI East Malling, Calypso, represents a considerable improvement over the varieties currently being grown in the UK, i.e. Ostara and Rapella, and could well be of great importance to the industry if its initial promise is fulfilled.

As yet there is little information regarding the optimum cultural conditions for Calypso and how these may differ from the varieties presently grown. Currently, some growers are spring planting and others autumn planting everbearers, but there has been little critical work to compare these two options and the effect on subsequent cropping. Also, initial observations suggest that the plant habit of Calypso is less dense than Rapella and consequently could possibly be grown as closer spacing than those currently used for this variety.

3. POTENTIAL FINANCIAL BENEFIT TO THE INDUSTRY

Calypso holds great promise for the UK industry, but there is a need to obtain information regarding the management requirements of the variety, so that cultural recommendations can be given to growers prior to its release in 1992/93 and the full potential of the variety be realised.

4. SCIENTIFIC/TECHNICAL TARGET OF THE WORK

To determine the effect of planting date and planting density on the growth and cropping of Calypso, so as to give information of direct use to growers on the best combination of planting date/density for this variety.

5. CLOSELY RELATED WORK

This project will complement the HDC funded work ongoing at HRI Efford in which the effect of planting date on the performance of Calypso and other new everbearing varieties is being evaluated, the first results of which are expected at the end of the 1991 season.

6. DESCRIPTION OF THE WORK

Early October and mid-late April planting dates will be compared, being grown as double rows on black polythene mulched raised beds with sub-polythene irrigation. At both planting dates, three between-plant spacing treatments will be used - 30, 45 and 60 cm, with the rows being 40 cm apart. The planting material will be obtained from NSA Foundation stock, being propagated from runners rooted into 7 cm modules.

Records will be taken of yield, fruit quality and vegetative growth.

7. COMMENCEMENT DATE AND DURATION

Start date 1 October 1991. It is intended that the trial will be cropped for two years.

8. STAFF RESPONSIBILITIES

Project Leader: Dr. D. R. Taylor
Other staff: One HSO and one SO, together with members of farm staff and casual workers.

9. LOCATION

HRI East Malling