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EFFECT OF PRE-TRANSPLANT CHILLING AND PLANTING DATE ON THE GROWTH AND FRUITING RESPONSE OF THE 'DOVER' STRAWBERRY[1]

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Abstract. **'Dover' strawberry (Fragaria ananassa, Duch.) plants were given either 0, 15, or 30 days of pre-transplant chilling at 2C and set in the fruiting field on or near October 1 and 15 and November 1 for two seasons. During the third season, plants were chilled either 0 or 15 days and set on October 22 and November 1 and 15. Chilling reduced January fruit yield, increased April fruit yield, and increased daughter plant production. Delaying the planting date generally reduced January yield. The highest April yields were from plants set on October 15, and seasonal yields were generally reduced if plants were set on November 1 or later. The most desirable planting date for highest early yields and lowest daughter plant production appeared to be October 1.**

The length of the chilling period given the strawberry plant before transplanting and the date of transplanting can influence the growth and fruiting response (1, 2, 4). Previous studies in Florida with four strawberry clones indicated that pre-transplant chilling reduced the January yield (1, 2). Delaying the planting date to November 1 or later reduced the January and seasonal yields. Chilling plants for 30 days prior to transplanting usually delayed fruit production until late in the harvest season. The purpose of this study was to evaluate the effects of plant chilling prior to transplanting and planting date on the subsequent growth and fruiting response of the 'Dover' strawberry.

Materials and Methods

The experiments were conducted during the winters of 1977-78, 1978-79, and 1979-80. The 'Dover' cultivar was placed in the fruiting field on October 3 and 17 and November 1, 1977, on October 2 and 16 and November 1, 1978, and on October 22, and November 1 and 15, 1979. The plants were grown in nurseries at the ARC-Dover, dug, and stored at 2C for either 0, 15, or 30 days prior to transplanting. The 30-day storage treatment was not used the last season.

Fertilizer, pesticide, and cultural practices standard to the area were used (3). Fruit were harvested twice weekly, counted, and weighed. Plants were evaluated for growth and daughter plant production several times each season. A randomized split-plot statistical design was used and data were analyzed according to Steel and Torrie (5). The data for each season were analyzed as a split-plot with the planting date as main plots and the amount of chilling as subplots. Mean separation was by Duncan's multiple range test. The daughter plant production data were not analyzed because of the large number of zeros in the data.

Results and Discussion

Delaying the planting date reduced the January marketable yields each season (Table 1). Yield differences were significant for 2 of the 3 seasons. The reduction in the January yield was most pronounced in those treatments in which plants received no chilling. The January yields for plants which were not chilled for the planting dates of October 1 and 15 and November 1, 1978 were 7.7, 3.5, and 1.9 MT/ha, respectively, in 1979 yields were 8.1, 7.4, and 2.7 MT/ha, respectively, and for the planting dates of October 15 and November 1 and 15, 1980 yields were 8.1, 4.8, and 1.3 MT/ha, respectively. Pre-transplant chilling reduced the January yields, and for those treatments in which plants received 30 days of chilling, January yields were negligible to none. April marketable yields increased with increased chilling and were highest with the October 15 planting date. If plants were set on November 1 or later seasonal marketable yields were reduced in 2 of the 3 seasons. Pre-transplant chilling affected seasonal fruit yields only during the 1980 season. Neither pre-transplant chilling nor planting date affected average seasonal fruit weight (data not presented).

Delaying the planting date resulted in smaller plants until about February or March when all plants were similar in size regardless of planting date (Table 2). During the first two seasons, plants receiving pre-transplant chilling were larger by March.

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Table 1. Main effects of planting date and number of days of plant chilling on marketable fruit yield of 'Dover' strawberry plants during 3 seasons.

Harvest period	Planting date[z]				Plant chilling (days)		
	October 1	October 15	November 1	November 15	0	15	30
	MT/ha						
	1978						
January	3.4a[y]	1.9b	0.9c	—	4.4a	1.6b	0.2c
April	13.9ab	17.0a	11.6c	—	5.0c	14.5b	23.0a
Season	27.2a	25.3a	24.1a	—	24.4a	25.8a	26.3a
	1979						
January	3.0a	2.6a	2.3a	—	6.1a	1.8b	0.0c
April	12.3c	19.6a	15.5b	—	7.6c	16.2b	23.6a
Season	32.3a	33.8a	26.3b	—	32.1a	33.6a	26.7b
	1980						
January	—	7.1a	4.4b	1.2c	4.7a	3.7b	—
April	—	2.6a	2.0b	1.9b	1.8b	2.4a	—
Season	—	29.8a	24.4b	20.0a	23.5b	25.8a	—

[z]Approximate dates.
[y]Mean separation in rows for either planting date or plant chilling by Duncan's multiple range test, 5% level.

Table 2. Main effects of plant chilling at 2C prior to transplanting and planting date on relative size of 'Dover' transplant in fruiting field during three seasons.[z]

Observation date	Planting date[y]				Chilling (days)		
	October 1	October 15	November 1	November 15	0	15	30
	Plant size						
December 5, 1977	8.5a[x]	6.9b	6.7b	—	7.7a	7.4a	7.0a
January 2, 1978	9.2a	8.3b	7.7b	—	8.4a	8.3a	8.5a
March 3, 1978	9.6a	8.9a	8.9a	—	8.6b	9.1ab	9.8a
April 5, 1978	9.2a	8.6a	8.6a	—	7.5c	8.8b	10.0a
November 29, 1978	9.3a	8.9a	7.2b	—	8.4b	8.9a	8.0b
December 29, 1978	9.2a	8.6b	7.0c	—	7.9b	9.4a	8.0b
January 19, 1979	9.6a	9.5a	9.2a	—	8.8b	9.7a	8.8b
February 23, 1979	9.9a	9.7a	8.0b	—	8.3b	9.9a	9.5a
November 20, 1979	—	8.1a	7.0b	7.0b	7.7a	7.0b	—
December 17, 1979	—	8.0a	7.0b	6.0c	7.0a	7.1a	—
January 18, 1980	—	7.0a	6.1b	5.0c	6.0a	6.1a	—
February 20, 1980	—	8.5a	8.8a	8.5a	8.3a	8.8a	—
April 2, 1980	—	8.0a	7.5a	7.0a	7.0b	8.0a	—

[z]Plant size rated visually on a scale of 1 to 10 with 10 being the largest. Plant size is relative only within a rating date.
[y]Approximate dates.
[x]Mean separation in rows for planting date or plant chilling by Duncan's multiple range test, 5% level.

Daughter plant production increased with increased length of the pre-transplant chilling period during the 1978-79 season (Table 3). Even those plants not receiving pre-transplant chilling produced a large number of daughter plants when set on October 1 but not when set later. For chilled plants, date of transplanting had some effect on when daughter plants were produced and a slight affect on total daughter plant production.

'Dover' transplants should not be chilled prior to transplanting since chilling reduced January fruit yields and increased yields later in the season. January yields are preferable because strawberry fruit prices generally decline as

Table 3. Effects of planting date and plant chilling on daughter plant production in the fruiting field during 1978-79 season.

Planting date	Chilling (days)	Number of daughter plants/14 plant plot[z]				Total
		November 29	December 29	January 19	February 23	
October 1	0	14.6	4.0	0.0	0.0	18.6
	15	12.8	6.0	5.0	0.4	24.2
	30	34.6	23.0	23.0	2.4	83.0
October 15	0	0.8	4.0	0.0	0.0	1.2
	15	3.8	8.0	5.0	0.8	17.6
	30	37.6	24.0	25.0	3.0	89.6
November 1	0	0.0	6.0	1.0	0.2	1.8
	15	0.8	8.0	14.0	1.0	16.6
	30	0.2	25.0	23.0	2.0	50.2

[z]Daughter plants removed after each evaluation.

the harvest season progresses (6). Quite often, some fruit ripening in April are not harvested because of low prices or no available market. Plants set on October 1 produced a greater January fruit yield, but daughter plant production was also greater than those plants set at a later date. Daughter plant production in the fruiting field increases labor costs since growers detach them from the mother plant and destroy them. Another problem some growers encountered when transplanting the 'Dover' cultivar in early October is that plants became excessively large and fruited poorly. This is believed to result from placing vigorously growing transplants directly from the nursery into a highly fertilized fruiting field. Only slight transplant 'shock' occurs, and plants remain vegetative longer. Growers who anticipate this problem should delay transplanting until October 15. This problem may also occur with other strawberry cultivars.

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RESPONSE OF TOMATOES TO FERTILIZER RATES AND WITHIN ROW PLANT SPACING IN TWO AND FOUR ROW PRODUCTION SYSTEMS[1]

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Abstract. **Response of 'Walter' tomato** (Lycopersicon esculentum **Mill.) to two types of row arrangements between lateral irrigation furrows, two fertilizer rates and three within-row plant spacings was evaluated for 2 seasons on Myakka fine sandy soil. Yield per ha was influenced by plant density only. Closer within-row spacing reduced fruit number but had no effect on fruit size, except in the fall with the two-row system when fruit size was best at 76 cm spacing. Production system with 4 rows between lateral furrows (4860 m row/ha) had a higher per ha yield than a system with 2 rows between lateral furrows (3650 m row/ha). In the spring, higher fertilizer application (44.6 kg of 18-0-25 + 2 and 11.5 kg of superphosphate per 100 m row) did not result in higher yield or larger fruit size than the lower fertilizer rate (29.7 kg 18-0-25 + 2 and 11.5 kg superphosphate per 100 m row). In the fall, fruit size was larger wiwthin the lower fertilizer rate.**

In west central Florida, staked fresh market tomatoes are produced with various plant bed arrangements, fertilizer quantities, and in-row plant spacings. For example, in the single bed system, one bed, 91.5 cm (3 ft) wide and 23 cm (9 inches) high is formed between 2 lateral irrigation ditches which are 3.81 m (12.5 ft) apart. In the double bed system, plant beds with 1.98 m (6.5 ft) centers, between 2 irrigation furrows 5.64 m apart, are formed. On some farms, 4 beds, with 1.98 m centers, are made between irrigation furrows 9.91 m apart. The different plant bed arrangements result in various net linear row-meter (m) per hectare (ha). In the single, double and 4-bed arrangements above, there are 2625, 3546 and 4036 linear row m/ha, respectively.

Fertilizer application also varies from 145 to 390 kg of N/ha. Phosphorus (20% P_2O_5), containing fritted micronutrients, is applied at a rate of 123 kg/ha. Potassium is applied at a rate of 1.4 to 2 times that of N (4, 5, 6). Presently, fertilizers are recommended on an area (ha or acre), rather than on a 100 linear m-row (100 linear ft) basis. In view of the many different plant bed arrangements, fertilizer recommendations based on area are rather confusing. Plant density/ha varies with the number of linear m of bed/ha and with the in-row spacing. Seedlings are set at 51 cm (20 inches), 71 cm (28 inches), 76 cm (30 inches), or 81 cm (32 inches) apart in the bed, depending upon the individual grower. Thus, plant population per ha in the single bed production system may vary from 3240 at 81 cm in-row spacing, to 5,140 plants/ha, at 51 cm in-row spacing.

Growers are divided as to the advantages or disadvantages of the various plant bed arrangements and in-row plant spacings. Many have the opinion that fewer linear m of plant bed per ha and increased in-row spacing of plants is more economical. This arrangement requires less input of labor and materials, while fruit size and per plant yield is higher with increased in-row plant spacing.

Previous research indicated no yield or fruit size increase with fertilizer rates exceeding 300 kg N/ha (270 lb./A) (2, 3, 7). Plant bed arrangements on yield and fruit size have not been investigated to date.

This report presents the results of a study conducted to evaluate the effects of plant bed arrangements, fertilizer rates and in-row spacings on yield, fruit number and fruit size of fresh market tomatoes with seepage irrigation.

Materials and Methods

Experimental design was split plot with 4 replications. Main plots were 2 fertilizer rates, low and high, and sub plots were 3 in-row plant spacings. Treatments were randomized and replicated 4 times. Soil was Myakka fine sand (1) with the spodic layer at 71 cm below the surface.

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