and cytokinins all stimulate callus formation and enhance wound healing if placed in contact with meristematic tissue. Auxins, however, consistently inhibited bud growth. This inhibition might be advantageous where both wound healing and suppression of sprouting is desired but in other cases it would be undesirable.

The only field test to date was a complete failure; however, the favorable responses obtained in greenhouse experiments with several growth regulators over a fairly broad range of concn without phytotoxicity suggests they can ultimately be adapted to field use.

Literature Cited

1. Ali, S. A., D. C. Nelson and T. P. Freeman. 1975. Suberization and periderm development in Norchief and Red pontiac potatoes. *Amer. Potato J.* 52:201-209.
2. Artschwager, E. 1927. Wound periderm formation in the potato as affected by temperature and humidity. *J. Agr. Res.* 35:995-1000.
3. Bentley, J. A. 1958. The naturally-occurring auxins and inhibitors. *Ann. Rev. Plant Physiol.* 9:47-80.
4. Bloch, R. 1941. Wound healing in higher plants. *Bot. Rev.* 7:110-143.
5. Davis, E. A. 1949. Effects of several plant growth regulators on wound healing of sugar maple. *Bot. Gaz.* 111:60-77.
6. ————. 1949. The wound healing of trees as affecting by plant growth regulating substances. *Proc. Amer. Soc. Hort. Sci.* 53:233-238.
7. Haberlandt, G. 1902. Culturversuche mit isolierten Pflansensellen. *Sitz. Ber. K. Akad. Wien. Math. -nath. Klasse.* 111. 1:69-91.
8. Jones, O. P. 1973. Effects of cytokinins in xylem sap from apple trees on apple shoot growth. *J. Hort. Sci.* 48:181-188.
9. Kender, W. J. and S. Carpenter. 1972. Stimulation of lateral bud-growth of apple trees by 6-benzylamino purine. *J. Amer. Soc. Hort. Sci.* 97-374-380.
10. Marshall, R. P. 1931. The relation of season of wounding and shellacking to callus formation in tree wounds. *U.S. Dept. Agric. Tech. Bul.* 246, 28 p.
11. McQuilkin, W. E. 1950. Effects of some growth regulators and dressings on the healing of tree wounds. *J. Forestry.* 48:423-428.
12. Monteverde, E. 1975. Effects of several wound dressings on the healing of pruned 'Marsh' grapefruit branches. *M.S. Thesis, Univ. of Florida, Gainesville.* 55 p.
13. Shear, G. M. 1936. Lanolin as a wound dressing for trees. *Proc. Amer. Soc. Hort. Sci.* 34:286-288.
14. Wittwer, S. H. 1968. Chemical regulators in horticulture. *HortScience.* 3:163-167.

Proc. Fla. State Hort. Soc. 90:278-280. 1977.

EFFECT OF PLANTING DATE AND PLANT CHILLING ON GROWTH AND FRUITING RESPONSES OF THREE STRAWBERRY CLONES[1]

E. E. Albregts and C. M. Howard
University of Florida,
Institute of Food and Agricultural Sciences,
Agricultural Research Center,
Rt. 2, Box 157, Dover, FL 33527

Additiona lindex words. 'Florida Belle', 'Tufts'.

Abstract. **Strawberry plants of the clones 'Florida Belle', 'Tufts', and Florida 71-729 were chilled (36 F, 2 C) for 0, 15, and 30 days before transplanting in fruiting field in 1975. In 1974, the 'Florida Belle' plants received the same chilling treatments as in 1975; however, some of the chilling treatments were not applied to the clones 'Tufts' and 71-729 in 1974. The plants were set on September 15, October1, October 15, and November 1 in 1974 and on October 1, October 15, and November 1 in 1975. Chilling plants for 30 days or setting on November 1 reduced early yields of all clones. Seasonal yields with 'Florida Belle' were highest when set on October 1 or October 15 in 1975-76 but were unaffected by planting date in 1974-75. Seasonal yields were lowest with November 1 planting date. The clone 71-729 gave highest seasonal yields with the October 1 planting date, but seasonal yields were unaffected by chilling. The best planting date for 'Tufts' appears to be mid-October. Early planting and/or 30 day chilling caused stolon production especially with the 'Tufts' clone.**

New cultivars are frequently introduced into the Florida strawberry industry. Two of the most recent introductions have been 'Florida Belle' and 'Tufts'. The amount of chilling given the plant before transplanting in the fruiting field as well as the planting date can influence the growth and fruiting response (1, 3, 6). We previously reported on the response of 'Tioga' to plant chilling and date of transplanting in the Plant City area (1). Delaying the planting date reduced plant size while increasing the length of the plant chilling period increased plant size. Fifteen days chilling at 36 F gave best yield results. The purpose of this study was to evaluate the effect of planting date and plant chilling prior to transplanting on plant response in central Florida with the clones 'Florida Belle', 'Tufts', and 71-729.

Materials and Methods

The experiments were conducted during the winters of 1974-75 and 1975-76. The 3 clones used were 'Florida Belle', 'Tufts', and Florida 71-729. The latter clone was chosen since it produces high yields of good shipping quality fruit. All plants were grown in nurseries at ARC-Dover or in the local area. Plants were dug from nurseries and stored for 0, 15, or 30 days at 36 F. Plants were set on September 15, October 1, October 15, and November 1 in 1974 and October 1, October 15, and November 1 in 1975. The 'Florida Belle' clone received all treatments both years. The 'Tufts' clone received all treatments in 1975, and in 1974 the clone was set on all dates with zero days of plant chilling and on October 1 and 15 with 15 days of plant chilling. In 1975, the clone 71-729 received all treatments except the 30 days of chilling on October 1. In 1974, the 71-729 plants were set on all dates with zero days of plant chilling and on October 15 and November 1 with 15 days of plant chilling.

Fertilizer, pesticide, and cultural practices standard to the area were used (4). Fruit were harvested twice weekly, counted, and weighed. Plants were evaluated for growth several times each season. The statistical analysis was as described by Steel & Torrie (5), except for the analysis of the clone 71-729 in 1975-76 when a modification described by Anderson (2) was used.

Results and Discussion

Fruit wt was unaffected by treatments except in 1974-75 when the seasonal avg fruit wt of 'Florida Belle' was re-

[1]Florida Agricultural Experiment Station Journal Series No. 763.

duced from 14 to 13 g when 30 days chilling was given to the plants on the first three planting dates (data not presented). Daughter plant production was quite evident by mid-January 1976 with the October 1 and October 15 planting dates. 'Florida Belle' for the October 1 planting date had 0.10, 0.33 and 0.91 daughter plants/plant for the treatments with 0, 15, and 30 days chilling, respectively. For the October 15 planting date only the 30 day chilling treatment produced daughter plants, 0.37/plant. For the October 1 planting date, 'Tufts' had 1.14, 1.49, and 0.87 daughter plants/plant for the 0, 15, and 30 day chilling treatments, respectively. For October 15, 'Tufts' had 0.30, 0.87, and 0.07 daughter plants/plant for the 0, 15, and 30 day chilling treatments, respectively. The clone 71-729 had daughter plant production intermediate to that of 'Tufts' and 'Florida Belle'. Daughter plant production was evident in 1974-75, but it was at a much lower level and mostly confined to the 'Tufts' clone.

Chilling of transplants from all clones reduced plant size early in the season but by December 1975, all plants, as related to chilling treatments, were about equal in size (Table 1). Data on plant size was similar both years. Delaying the planting date to November 1 reduced plant size in those treatments for most of the season. For those plants set on October 15, 1975, plant size soon became equal to those set on October 1, 1975.

Table 1. Effect of plant chilling and planting date on relative plant size of transplants in 1975-76.[z]

Evaluation date	Planting date[y]			Chilling (days)		
	Oct. 1	Oct. 15	Nov. 1	0	15	30
71-729						
Nov. 11, 1975	9.8a	7.9b	6.6b	8.2a	8.4a	6.7b
Dec. 2, 1975	9.8a	9.0b	6.9c	8.5a	8.7a	7.9a
Dec. 24, 1975	9.8a	9.1a	7.7b	8.8a	8.9a	8.4a
Feb. 10, 1976	10.0a	9.2a	7.7b	8.8a	9.0a	8.5a
March 10, 1976	10.1a	9.5a	9.4a	9.5a	9.7a	10.0a
Tufts						
Nov. 11, 1975	7.1a	6.7a	5.5b	7.1a	7.3a	5.3b
Dec. 2, 1975	8.3a	7.9a	5.8b	7.7a	7.7a	6.5b
Dec. 24, 1975	7.6a	7.9a	6.5b	7.6a	7.3a	7.0a
Feb. 2, 1976	9.0a	8.9a	7.1b	8.3a	8.3a	8.4a
March 10, 1976	10.1a	10.3a	9.5a	9.7a	9.8a	10.5a
Florida Belle						
Nov. 11, 1975	8.7a	7.5b	6.4c	8.1a	7.9a	6.5b
Dec. 2, 1975	9.3a	8.5a	6.5b	8.3a	8.5a	7.5a
Dec. 12, 1975	9.7a	8.8a	7.2b	8.5a	8.9a	8.3a
Feb. 10, 1976	9.8a	9.0a	7.5b	8.6a	8.8a	8.9a
March 10, 1976	10.1a	10.2a	9.3a	9.3a	9.8a	10.5a

[z]Plant size rated 1 to 11 with 11 being largest. Plant size is relative only within a rating date.
[y]Mean separation in rows for planting date or chilling by Duncan's multiple range test, 5% level.

The chilling of transplants did not enhance yields for either year with the clone 'Florida Belle' (Table 2). The 30 day chilling of transplants generally reduced January, February and the seasonal yields in 1976. The January yields were less in 1974-75 when plants were set on October 15 or later. However, for both years, the seasonal yields for October 1 and October 15 were not significantly different. Numerically, yields are greatest with the October 1 planting date. However, plant size with the October 1 planting date can become so large that fruit rot can become a serious problem, especially in warm weather. The large plant size reduces pesticide penetration of foliage and allows fruit to

Table 2. Main effects of planting date and number of days chilling at 36 F on marketable fruit yields of Florida Belle strawberry plants.[z]

Planting dates	1974-75			1975-76		
	January	February	Seasonal	January	February	Seasonal
			cwt/acre[x]			
Sept. 15	45.6b	71.7a	249.1a			
Oct. 1	71.0a	57.4a	266.0a	10.2a	25.6a	245.1a
Oct. 15	35.6b	54.5a	213.0a	14.3a	33.1a	221.7a
Nov. 1	16.0c	72.7a	231.1a	0.4b	29.7a	136.3b
Chilling[y]						
0	69.6a	78.0a	255.7a	12.5a	47.8a	212.4a
15	54.4a	78.6a	262.4a	11.4a	34.5a	213.6a
30	2.2b	35.7b	201.2b	0.5b	6.0b	177.2b

[z]Mean separation within a column because of planting date or length of plant chilling by Duncan's multiple range test, 5% level.
[y]Number of days chilling at 36 F.
[x]One cwt/acre = *ca.* 112 kg/ha.

remain wet longer. Therefore, the October 15 date may be a more desirable planting date for 'Florida Belle'.

The January yield was reduced both years for the 'Tufts' clone by planting on November 1 (Table 3). However, the seasonal yield response due to planting date varied for the 2 seasons. Chilling the plants before transplanting for 30 days reduced yields during 1975-76. From these results, the highest January and perhaps seasonal yields would probably come from setting plants with no chilling on October 15. Daughter plant production would also be lower than from those set on October 1.

Table 3. Main effects of planting date and number of days chilling at 36 F on marketable fruit yields of Tufts strawberry plants.[z]

Planting dates	1974-75[y]			1975-76		
	January	February	Seasonal	January	February	Seasonal
			cwt/acre[w]			
Sept. 15	34.2a	42.7a	136.2b			
Oct. 1	30.7a	43.6a	142.5b	9.8a	21.7a	182.3a
Oct. 15	38.9a	56.4a	173.8b	9.7a	29.0a	156.1a
Nov. 1	15.8b	65.6a	271.6a	0.5b	20.8a	95.9b
Chilling[x]						
0				9.0a	37.0a	167.5a
15				9.4a	31.2a	159.0a
30				2.6b	3.4b	107.8b

[z]Mean separation within a column because of planting date or length of plant chilling by Duncan's multiple range test, 5% level.
[y]Plants without chilling only.
[x]Number days chilling at 36 F.
[w]One cwt/acre = *ca.* 112 ha/kg.

For both years the October 1 planting date gave highest January, February, and seasonal yields for the clone 71-729 (Table 4). Chilling did not appear to be beneficial to yields. The clone produces high yields early in the harvest season, and the reduction in yields in January and February reduces seasonal yields. These data indicate that this clone should be planted in early October without *chilling.*

Late planting reduced January yields of all clones. It is important to obtain high early yields since the price of fruit generally declines with time after January. Transplanting any of these clones in November or later would reduce the average price received for the crop.

Table 4. Main effects of planting date and number of days chilling at 36 F on marketable fruit yields of 71-729 strawberry plants.[z]

Planting dates	1974-75[y]			1975-76		
	January	February	Seasonal	January	February	Seasonal
			cwt/acre[w]			
Sept. 15	85.2a	95.8b	240.4ab			
Oct. 1	99.4a	132.8a	298.3a	24.7a	84.7a	270.1a
Oct. 15	57.6b	95.8b	204.8b	19.6b	55.1b	223.3b
Nov. 1	11.4c	74.1b	152.4b	5.4c	51.0b	168.0c
Chilling[x]						
0				21.9a	83.5a	222.8a
15				23.2a	85.7a	243.2a
30				4.7b	21.6b	195.4a

[z]Mean separation within a column because of planting date or length of plant chilling by Duncan's multiple range test, 5% level.
[y]Plants without chilling only.
[x]Number days chilling at 36 F.
[w]One cwt/acre = *ca.* 112 kg/ha.

Literature Cited

1. Albregts, E. E., and C. M. Howard. 1974. Effect of planting date, plant chilling, and plant source on 'Tioga' strawberry growth and fruiting response. *Proc. Fla. Sta. Hort. Soc.* 87:187-192.
2. Anderson, F. L. 1946. Missing plot techniques. *Biometrics* 2:41-47.
3. Locascio, S. J. 1972. Influence of planting date and pre-plant chilling on yield of 'Tioga' strawberries. *Proc. Fla. Sta. Hort. Soc.* 85:110-113.
4. Kostewicz, S. R., and J. Montelaro. 1974. Strawberry production guide. *Univ. Fla. Agr. Expt. Sta. Cir.* 142D, 14 p.
5. Steel, F. G., and J. H. Torrie. 1960. Principles and procedures of statistics. McGraw-Hill Book Co. N. Y.
6. Voth, V., and R. S. Bringhurst. 1970. Influence of nursery harvest date, cold storage, and planting date on performance of winter planted California strawberries. *J. Amer. Soc. Hort. Sci.* 95:496-500.