

Effects of Transplant Digging Date on the Field Performance of Strawberry Bare-root Transplants

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Summary

This study evaluated the importance of transplant digging date or winter chilling at nursery fields on quality and performance of strawberry bare-root transplants. We tested five digging dates (9/20, 10/3, 10/10, 10/17, and 10/24) on three cultivars (Sensation®, 'Florida Brilliance', and Medallion®). Delaying the digging date from 9/20 to 10/24 increased the exposure of strawberry transplants to winter chilling in the nursery field from 46 to 360 hr. Contrary to our expectation, the results did not indicate the importance of winter chilling in the crown diameter or field performance of strawberry bare-root transplants. On average, delaying the digging date reduced marketable yield by 35%. This study will be repeated for multiple seasons to take into account seasonal variations in weather conditions.

Background

The importance of transplant digging date or winter chilling at nursery fields on quality and performance of strawberry bare-root transplants is unknown. There are two hypotheses concerning the role of winter chilling in improving transplant performance. The first hypothesis is that winter chilling promotes carbohydrate translocation into the crown, enabling transplants to be established in the field quicker. The second hypothesis is that winter chilling acts as hardening and improves stress tolerance of transplants. The objective of this experiment was to determine the importance of winter chilling for strawberry bare-root transplants and to determine the optimum transplant digging date.

Methods

A replicated field experiment was conducted during the 2022-2023 season at the UF/IFAS GCREC in Balm, FL. Transplants grown at the Cedar Point Nursery (Dorris, CA) were used in this study. Treatments included three cultivars (Sensation®, 'Florida Brilliance', and Medallion®) and five digging dates (9/20, 10/3, 10/10, 10/17, and 10/24) in a factorial combination (Table 1). Digging dates were determined based on the cumulative winter chill hours at the nursery field: 46, 126, 182, 242, and 360 hours below 45°F. Transplants were shipped to the GCREC in cooler boxes using overnight shipping. Ice was placed in the boxes to keep plants cooler. Transplants were planted in the field within 2 days after they were delivered. Commercial production and pest management practices were followed. Strawberries were harvested twice a week from November through February.

Results

Growth characteristics of bare-root transplants

The overall quality of bare-root transplants was good for all tested strawberry cultivars (Fig. 1). Crown diameter remained similar from the first to last digging date, regardless of cultivars. For Sensation® and 'Florida Brilliance', there was a trend for leaf number to decrease as the digging date was delayed, and leaf area decreased consequently. By contrast, Medallion® maintained similar leaf number and leaf area for all digging dates.

Figure 1. Bare-root transplants of three strawberry cultivars used for this study. Transplants were dug at the nursery field on 9/20/2022 after accumulating 46 winter chill hours.



Table 1. Growth characteristics of bare-root transplants of three strawberry cultivars as affected by digging date.

Cultivar	Digging date (chill hours)	Crown diam (mm)	Leaf no. (no./plant)	Leaf area (cm ² /plant)
Sensation	9/20 (46 hr)	14.2	5.83	461
	10/3 (126 hr)	16.4	4.63	368
	10/10 (182 hr)	12.2	3.88	188
	10/17 (242 hr)	13.8	4.13	245
	10/24 (360 hr)	15.0	4.13	303
Florida Brilliance	9/20 (46 hr)	14.9	5.00	365
	10/3 (126 hr)	15.0	3.63	282
	10/10 (182 hr)	14.4	4.00	196
	10/17 (242 hr)	14.9	4.13	391
	10/24 (360 hr)	16.4	4.50	405
Medallion	9/20 (46 hr)	13.6	4.33	302
	10/3 (126 hr)	15.5	4.38	349
	10/10 (182 hr)	15.1	4.25	315
	10/17 (242 hr)	12.8	4.38	261
	10/24 (360 hr)	14.3	4.38	280
Average data				
	9/20 (46 hr)	14.2	5.05	376
	10/3 (126 hr)	15.6	4.21	333
	10/10 (182 hr)	13.9	4.04	233
	10/17 (242 hr)	13.8	4.21	299
	10/24 (360 hr)	15.2	4.34	329

Crown diam = Crown diameter

Marketable yield

When the data were pooled across different digging dates, delaying the digging date from 9/20 to 10/24 reduced marketable yield by 35%, 21%, and 42% in Nov–Dec, Jan, and Feb, respectively (Table 2, the bottom part). As a result, delaying the digging date reduced total marketable yield by 35% or 1216 flats/acre. However, it is important note that the digging date effect was not consistent among the three cultivars. For example, the lowest yield occurred with the last digging date (10/24) for Sensation® and Medallion®, but it occurred when transplants were dug on 10/10 for ‘Florida Brilliance’

(Table 2, the top part). Contrary to our expectation, the results did not indicate the importance of winter chilling in the crown diameter or field performance of strawberry bare-root transplants.

Table 2. Marketable yield of three strawberry cultivars as affected by the digging date of transplants.

Cultivar	Digging date (chill hours)	Marketable yield (8-lb flat #/acre)			
		Nov–Dec	Jan	Feb	Total
Sensation	9/20 (46 hr)	597 ab	1,383 a	1,655 ab	3,635 a
	10/3 (126 hr)	648 ab	1,116 ab	1,476 ab	3,288 ab
	10/10 (182 hr)	515 ab	928 bc	1,344 a–d	2,795 a–c
	10/17 (242 hr)	286 c–d	905 bc	1,279 a–d	2,470 b–e
	10/24 (360 hr)	463 a–d	871 bc	1,027 b–d	2,367 b–e
Florida Brilliance	9/20 (46 hr)	689 a	1,021 a–c	2,163 a	3,919 a
	10/3 (126 hr)	600 ab	699 bc	1,488 ab	2,819 a–c
	10/10 (182 hr)	430 a–d	687 c	790 d	1,908 de
	10/17 (242 hr)	452 a–d	762 bc	1,395 a–c	2,610 a–d
	10/24 (360 hr)	455 a–d	819 bc	1,403 a–c	2,677 a–d
Medallion	9/20 (46 hr)	581 ab	607 c	1,708 ab	2,896 a–c
	10/3 (126 hr)	586 ab	689 bc	882 cd	2,178 c–e
	10/10 (182 hr)	497 a–c	979 a–c	1,669 ab	3,145 a–c
	10/17 (242 hr)	385 b–d	765 bc	1,049 b–d	2,200 c–e
	10/24 (360 hr)	294 d	691 bc	774 d	1,759 e
Average data					
	9/20 (46 hr)	622	1,004	1,842	3,483
	10/3 (126 hr)	611	835	1,282	2,762
	10/10 (182 hr)	481	865	1,268	2,616
	10/17 (242 hr)	374	811	1,241	2,426
	10/24 (360 hr)	404	794	1,068	2,268

Means in a column followed by the same letter are not significantly different (Tukey–Kramer test, $p \leq 0.05$)

Takeaways

- The results did not indicate the importance of winter chilling in the crown diameter or field performance of strawberry bare-root transplants.
- On average, delaying the digging date reduced marketable yield by 35%.
- This study will be repeated for multiple seasons to take into account seasonal variations in weather conditions.

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