Three-Year Summary: Effects of Transplant Digging Date on the Field Performance of Strawberry Bare-root Transplants

Shinsuke Agehara

Summary

This study began in the 2022–23 season to evaluate the effects of transplant digging date and winter chilling at nursery fields on the quality and performance of strawberry bare-root transplants. The data presented in this report represent the third season. In this study, we tested three digging dates (9/25, 10/10, and 10/23) on three cultivars (Sensation, Brilliance, and Medallion). Delaying the digging date from 9/30 to 10/28 increased the exposure of strawberry transplants to winter chilling in the nursery field from 140 to 360 hr. Although delayed digging did not result in thickening of crown diameter, it induced leaf senescence and greater dry matter allocation to crown and root tissues. Delayed digging also slowed canopy establishment and reduced marketable yield of Sensation and Brilliance by 16%, 14%, and 22%, respectively. Overall, the results were consistent with the previous two seasons, demonstrating that winter chilling does not play an important role in improving transplant quality or field performance.

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. This study began in the 2022–23 season, and the data presented in this report represent the third season.

Methods

A replicated field experiment was conducted during the 2024–2025 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, Brilliance, and Medallion) and three digging dates (9/25, 10/10, and 10/23) in a factorial combination. Digging dates were determined based on the cumulative winter chill hours at the nursery field: 140, 265, and 360 hours below 45°F. Transplants were shipped to the GCREC using a refrigerated truck. Transplants dug on 9/25, 10/10, and 10/23 were planted in the field on 9/30, 10/15, and 10/28, respectively, within 2 days of delivery. Commercial production and pest management practices were followed. Strawberries were harvested weekly from November through February.

Results

Transplant morphological characteristics (Fig. 1)

The overall quality of bare-root transplants was good for all tested strawberry cultivars from the first to last digging date. Delayed transplant digging did not result in thickening of crown diameter, but it caused leaf senescence and greater dry matter allocation in crown and root tissues.

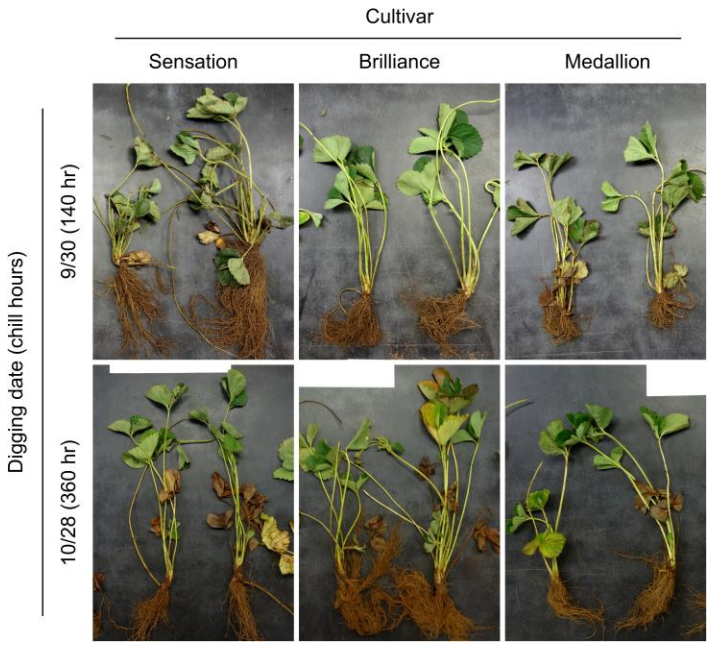

Figure 1. Bare-root transplants of three strawberry cultivars from the first and last digging dates (9/30/24 and 10/28/24) used for this study.

Table 1. Canopy growth of three strawberry cultivars as affected by the digging date of transplants.

Cultivar	Digging date (chill hours)	Canopy projected area (cm^2/plant) 32 DAT	50 DAT	92 DAT	157 DAT
Sensation	9/25 (140 hr)	195	404	876	1,221
	10/10 (265 hr)	264	414	770	1,237
	10/23 (360 hr)	135	273	611	995
		36%↑	33%↓	30%↓	29%↓
Brilliance	9/25 (140 hr)	136	357	931	1,398
	10/10 (265 hr)	68	192	685	1,169
	10/23 (360 hr)	88	239	661	1,096
		50%↓	46%↓	29%↓	22%↓
Medallion	9/25 (140 hr)	80	190	905	1,259
	10/10 (265 hr)	54	135	703	1,057
	10/23 (360 hr)	72	136	552	877
		32%↓	29%↓	39%↓	30%↓

DAT = days after transplanting.
Percent changes represent the maximum difference relative to the first digging date (9/25).

Canopy growth (Table 1 & Fig. 2)

Only the plants from the first digging date were established before Hurricane Milton, which struck on Oct 10. In Sensation, canopy establishment of the first digging date was negatively affected by the hurricane, as indicated by the smaller canopy size compared with the 10/15 digging date at 32 days after transplanting (DAT). Canopy growth quickly recovered from the hurricane damage. As a result, delaying the digging date reduced canopy area by 29% to 33% throughout the rest of the growing season. In the other two cultivars, canopy establishment showed minimal hurricane damage. Delaying the digging date reduced canopy area by 22% to 50% for Brilliance and by 29% to 39% for Medallion throughout the growing season.

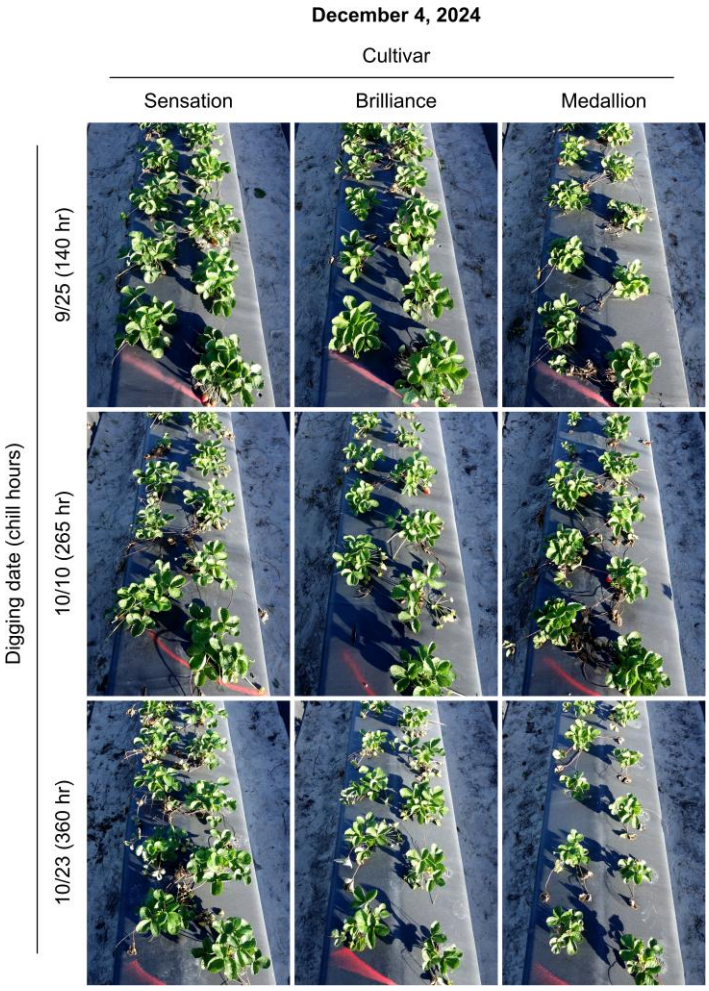

Figure 2. Plot photos during the early season (12/4/24).

Marketable yield (Table 2)

In Sensation, Nov–Dec yield was 21% lower for the first digging date (9/25) than for the second (10/10), most likely due to hurricane damage. However, yield recovered afterward. Delaying the digging date reduced yield by 24% to 36% from Jan to Feb, resulting in an overall 16% reduction in total-season yield. In the other two cultivars, yield showed minimal hurricane damage. Delaying the digging date reduced yield by 13% to 16% for Brilliance and by 10% to 34% for Medallion throughout the growing season, resulting in overall reductions of 14% for Brilliance and 22% for Medallion.

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

Cultivar	Digging date (chill hours)	Marketable yield (lb/acre) Nov–Dec	Jan	Feb	Total
Sensation	9/25 (140 hr)	565	567	1,312	2,445
	10/10 (265 hr)	685	365	1,322	2,372
	10/23 (360 hr)	615	453	996	2,063
		21%↑	36%↓	24%↓	16%↓
Brilliance	9/25 (140 hr)	602	812	1,564	2,979
	10/10 (265 hr)	517	824	1,704	3,045
	10/23 (360 hr)	543	703	1,313	2,558
		14%↓	13%↓	16%↓	14%↓
Medallion	9/25 (140 hr)	603	531	1,708	2,842
	10/10 (265 hr)	399	597	1,876	2,872
	10/23 (360 hr)	531	475	1,218	2,224
		34%↓	10%↓	29%↓	22%↓

Percent changes represent the maximum difference relative to the first digging date (9/25).

Summary of 3 years of data (Table 3)

Contrary to our expectations, results from three years demonstrate that winter chilling does not play a significant role in improving transplant quality or field performance of UF strawberry cultivars. These findings also suggest that all tested Florida cultivars have resilience to heat stress during establishment and minimal chilling requirements for floral induction. Delayed transplant digging can have the greatest negative impact on yield in the following order: Sensation > Brilliance > Medallion.

Table 3. Yield loss by delayed transplant digging in three strawberry cultivars across three seasons.

Cultivar	Season	Digging date (chill hours)	Yield loss by delayed digging
Sensation	2022–23	9/20–10/24 (46–360 hr)	7–38%
	2023–24	9/20–10/10 (99–241 hr)	13–51%
	2024–25	9/25–10/23 (140–360 hr)	3–16%
Brilliance	2022–23	9/20–10/24 (46–360 hr)	30–49%
	2023–24	9/20–10/10 (99–241 hr)	9–36%
	2024–25	9/25–10/23 (140–360 hr)	0–14%
Medallion	2022–23	9/20–10/24 (46–360 hr)	19–40%
	2023–24	9/20–10/10 (99–241 hr)	0–8%
	2024–25	9/25–10/23 (140–360 hr)	0–22%

Takeaways

- **Delayed transplant digging did not result in thickening of crown diameter**, but it caused leaf senescence and greater dry matter allocation in crown and root tissues.
- In all tested cultivars, **delayed transplant digging reduced early- and total-season yields**, demonstrating their high adaptability to early planting in Florida's environmental conditions.
- All tested cultivars have resilience to **heat stress during establishment** and **minimal chilling requirements** for floral induction.
- **3-yr data** suggest that **winter chilling does not play an important role** in enhancing transplant quality or field performance.

Contact

Dr. Shinsuke Agehara
UF/IFAS Gulf Coast Research and Education Center
P: 813-419-6583
E: sagehara@ufl.edu
Facebook: https://www.facebook.com/UFHortLab
YouTube: https://www.youtube.com/@UFHortLab
Instagram: https://www.instagram.com/UFHortLab