Growers can select for easy-to-handle transplants without significantly reducing yield or increasing stalk size variation.

Celery yields and uniformity

Norman C. Welch ☐ John W. Inman

Size variability in celery stalks at harvest time is a problem to growers. Fields of transplanted celery can produce less than 40 percent of the crop in the preferred size of 2 to 2½ dozen stalks per crate. The smaller sizes account for over half the yield in some fields, with considerable loss in income. Demand for large sizes is low in the United States.

In Monterey and Santa Cruz counties, the central-coast producing area of California, yields of 800 to 1,000 crates per acre could be increased by 100 to 200 crates, if weaker, less vigorous plants could be eliminated. Discarding extremely large or very small transplants would help increase uniformity of stalk size at harvest. In a previous study on time and method of thinning in direct-seeded celery, we found that celery seedlings that were slowest to emerge were also lowest in vigor and resulted in smaller stalk sizes at harvest (*California Agriculture,* July 1978). These findings point to the possibility that seed vigor significantly affects uniformity of stalk size at harvest.

Procedure

This three-year study evaluated the effects of transplant size, leaf pruning, wet versus dry root transplants, and the use of starter fertilizer solution at transplanting on the total yield and uniformity of stalk size at harvest.

In the root treatments, the common practice of allowing roots to dry partially was compared with keeping roots moist in wet soil and covering the plants with wet burlap bags until immediately before transplanting.

These treatments were further divided by cutting the tops of the transplants back about half-way in some of the treatments. In part of the nontopped treatments, a starter fertilizer was used at a rate of ½ cup of solution per plant. The starter solution consisted of 2 pounds of ammonium nitrate, 1 quart of liquid phosphate, and 2 pounds of potassium sulfate per 100 gallons of water.

Plants in all treatments were segregated into small (0.6 to 1 cm diameter) and large (1 to 1.4 cm diameter), and those larger or smaller than these dimensions were discarded. (About 7 to 9 percent were larger, and 12 to 16 percent were smaller.) Each plot was 20 feet long, and plants were spaced 6 inches apart in rows 14 inches apart, with two rows per bed. Bed centers were 40 inches apart. Each plot was 66.7 square feet (1/653.4 acre). 'Florida 683' celery was used in all three experiments. In each experiment there were five replications.

All three experiments were conducted in the Pajaro Valley at a different location each year (1977, 1978, 1979) on a Watsonville loam

TABLE 1. Effect of root treatments, starter fertilizer, leaf trimming, and plant size on yield and size uniformity of celery transplants at harvest*

Root treatments	Pounds per experiment (270 sq. ft.)† Total yields	Large transplants	Small transplants	Total % 2-2½ dozen by number
Dry roots‡	318.0	188.8 a	129.2 a	37 a
Wet roots	490.0 b	274.4 b	215.6 b	57 b
Dry roots — fertilized	331.8 a	187.7 a	144.1 a	39 a
Wet roots — fertilized	478.0 b	261.3 b	216.7 b	54 b
Dry roots — top-trimmed	300.0 a	174.0 a	126.0 a	34 a
Wet roots — top-trimmed	445.0 b	253.0 b	192.0 b	55 b

*Average of treatment means for three experiments. Because there were no significant interactions between experiments and location, the treatments are presented as averages for the three experiments.
†Numbers followed by different letters are significantly different at the 1 percent level.
‡Dry — roots allowed to dry according to grower practice; wet — roots kept moist with moist soil and wet burlap bags.

Among treatments tested were, photo at far left: small transplants, dry roots (two rows at left) vs. large plants, roots kept wet until transplanting. Center photo: large plants with dry roots (left) vs. wet roots. Right: small plants with dry (left) vs. wet roots.

are affected by pre-transplant practices

to clay-loam soil. After transplanting, the fields were irrigated by sprinklers, as needed, for 20 to 25 days. Subsequent irrigation was by furrows. At harvest, mature stalks were cut and trimmed by hand, then graded for size according to market standards.

Results

Keeping roots moist, regardless of other treatments, resulted in more vigorous growth, a significantly higher percentage of stalks in the desired 2- to 2½-dozen size, and a significantly higher total yield than the dry root plants when all plots in each experiment were harvested at the same time (table 1).

Large transplants grew faster and produced a significantly higher celery weight per acre than small transplants, indicating seedling vigor could be a major factor in yield and variable stalk size at harvest (table 2). Top trimming did not significantly affect yield of large plants, regardless of the other treatments involved, but did significantly reduce yield of small plants. Starter fertilizer did not significantly affect yield or size distribution.

Uniformity of stalk size at harvest is expressed as a percentage of plants graded 2- and 2½-dozen size. Moist root treatments resulted in a significantly higher percentage of 2- and 2½-dozen sizes than dry root treatments. There were no significant interactions between the other treatments for percentage of stalks graded 2- and 2½-dozen sizes.

Yield differences between moist and dry treatments varied with year and location. In 1977, percent yield difference between wet and dry root treatments was lowest (22 percent) and in 1979 it was highest (40 percent). Transplanting in 1977 occurred during cool, humid weather with temperatures averaging close to 64° F. In 1979 the weather was hot, about 83° F, and humidity was very low. The temperature was in the low 70s during transplanting in 1978.

TABLE 2. Effect of plant size on yield of celery transplants*

Transplant size	Pounds per plot (270 sq. ft.)
Large plants	222.7 a*
Small plants	170.6 b

*Average of treatment means for three experiments. Numbers followed by different letters are significantly different at the 1 percent level.

Conclusion

From these experiments, it appears that growers can trim celery transplant plants to a size that facilitates ease of handling without significantly reducing yield or increasing the variation of stalk sizes at harvest, unless there is a large percentage of small plants. The addition of starter fertilizer did not affect yield. Keeping celery roots wet until transplanting, followed quickly with sprinkler or furrow irrigation, will help produce a more uniform crop with a high yield of 2- and 2½-dozen sizes.

Rigorous grading of the transplants by eliminating the weak and very vigorous seedlings increases uniformity of stalk size at harvest and total yield. The large, vigorous plants that are eliminated could be planted separately; we have observed, however, that small plants, such as those that are eliminated, develop pith before a significant number reach the desirable 2- to 2½-dozen size. The problem of seed vigor remains to be solved.

Norman C. Welch is Farm Advisor, Cooperative Extension, Santa Cruz County, Watsonville, California; John W. Inman is Farm Advisor, Monterey County.