Transplant Age Has Little Effect on Broccoli Head Weight and Diameter

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Premature heading of broccoli renders the crop a complete loss to either a commercial grower or home gardener. Two primary causes of premature heading are exposure to low temperature before head initiation (Fontes et al., 1967) and seedling size at transplanting (Baggett and Mack, 1970). The latter observed that larger broccoli plants (33 to 50 g/plant) tended to form heads earlier than smaller plants (4 to 13 g/plant) when exposed to the same conditions. I determined whether severe stunting or hardening of broccoli transplants caused by size restriction in container cells and stress induced by the extreme age of the transplants would affect head size and weight.

Broccoli (*Brassica oleracea* L. var. *Italica* Plenck.) cultivars evaluated were 'Bravo', 'Premium Crop', and 'Green Valiant'. Three container sizes were used: Todd (Speedling, Sun City, Fla.) planter flats 080A (2.0 cm wide × 4.5 cm deep, volume 5.9 cm³); Todd 125 (3.2 cm wide × 4.6 cm deep, volume 15.5 cm³); and #72 plastic cell pak tray liner (CP) (TLC Polyform, Minneapolis) (3.8 cm wide × 5.0 cm deep, volume 24.1 cm³). "Old" (217 and 191 days) and "normal" (16 and 43 days) transplants were used in 1985 and 1986, respectively. The transplants were seeded for Fall 1985 planting on 15 Jan. (old) and 4 Aug. (normal) and for Spring

1986 planting on 4 Sept. 1985 (old) and 29 Jan. 1986 (normal). The old and normal transplants were regularly watered and fertilized weekly with a soluble 20N-8.6P-16K fertilizer injected into the water system. The greenhouse was maintained at 31/18C (maximum/minimum). Before transplanting on 20 Aug. 1985 and 14 Mar. 1986, fresh weights, plant height, stem diameter, and number of nodes were determined on 15 randomly sampled plants per treatment.

Field experiments were conducted at the Central Crops Research Station, Clayton, N.C., on a Norfolk loamy sand (fine-loamy, siliceous, thermic Typic Paleudult) with pH 5.6% and 0.3% humic matter. Plots were arranged in a randomized complete-block design with five replications and single-row plots 4.5-m long on 1.5-m centers, with plants spaced 30.5 cm apart. In both seasons, fertilizer (94N-47P-188K, kg·ha⁻¹) was broadcast and disked before bed preparation and before application of 0.03-mm black embossed plastic mulch and a drip irrigation tube (0.20 mm thick, emission spacing 30 cm, flow rate of 1.5 liters·min⁻¹ per 30 m of row) (Roberts Irrigation Products, San Marcos, Calif.) on 10 Aug. 1985 or mulch alone on 6 Mar. 1986. Irrigation was supplied when soil tensiometers indicated -0.25 kPa. Drip irrigation was used in the fall experiment, whereas overhead irrigation was used in the spring. At harvest, beginning 14 Oct. 1985 and 7 May 1986, heads were cut

with 15-cm-long stalks, and head weights and diameters were measured on 10 plants per treatment per replication.

At the time of planting, the old transplants were woody, with three of four leaves at the growing point and a dense root ball. They were heavier and taller, with a greater stem diameter and more nodes than normal transplants in both years (Table 1). Plants grown in the larger containers (Todd 125 and CP) were also heavier, taller, and had thicker stems and more nodes than those grown in Todd 080A containers (data not presented). This result is consistent with findings of Dufault and Waters (1985). Cultivars performed similarly, with only slight differences in the magnitude of response to age at transplanting. Therefore, cultivars are combined for presentation.

The old transplants resumed active growth after planting and at harvest could not be visually distinguished from plants grown from normal-aged transplants, except for a localized pattern of closely spaced nodes that had developed before transplanting. In conclusion, although there were obvious differences in plant size between old and normal plants at the time of transplanting, there were no consistent treatment effects on head weights or diameters at harvest (Table 1). Therefore, transplant age does not appear to significantly influence the marketable quality of the crop at harvest.

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Table 1. Broccoli development at the time of transplanting and head production at harvest as influenced by transplant age.

Variable age (days)	Fresh wt (g)	Transplants			Head production	
		Plant ht (cm)	Stem diam (mm)	Nodes (no.)	Head wt	Head diam (cm)
Fall 1985 harvest						
217	30.3 a ^z	14.2 a	4.4 a	15.7 a	280	12.9
16	28.9 b	8.1 b	2.9 b	3.8 b	270	12.6
Spring 1986 harvest						
191	25.8 a	14.4 a	3.5 a	15.3 a	300 a	12.5 a
43	17.6 b	12.7 b	2.8 b	4.8 b	330 b	12.9 b

^{*}Mean separation in columns by LSD, *P* = 0.05.