

Research Note

IN SITU RECOVERY OF DRIP IRRIGATED CABBAGE ROOTS^{1,2}

Drip irrigation is a method of partial wetting of the root zone; the shape of wetting zone resembles an onion. The study of root activity in this zone is essential for efficient irrigation management. Some of the factors affecting root development are soil type, nutrient and moisture availability, and mulching. Bar-Yosef³ observed an increased activity of nutrient uptake near the drippers where most of the tomato roots were concentrated. Keng et al.⁴ found that more than 50% of the drip irrigated pepper roots in an oxisol were within a soil depth of 5 to 15 cm. Goyal⁵ observed more than 80% of drip irrigated pepper roots in a mollisol within a soil depth of 0 to 22 cm. In general, soil particles are washed from the roots in running water; it is a tedious and time consuming job.⁶

A preliminary study was conducted to recover cabbage roots under drip irrigation by means of the in situ method at the Fortuna Substation, Juana Díaz, P. R.

In a 0.32 ha cabbage field, a cylinder (diameter 45 cm, length 30 cm) was installed in a raised bed to a depth of 30 cm. The dripper (2 L/H) was placed at the center of the cylinder. Four-week-old cabbage seedlings (var. Market Prize) were planted 17 December 1985, at the center of the cylin-

der. Irrigation scheduling was based on a moisture tension of 15 to 50 cb indicated by a tensiometer at 15 cm depth. No fertilizer was applied. A similar experiment was conducted to fertigate 150 kg of N per ha (37,037 plants/ha) in 10 equal weekly applications. Plant canopy and cabbage head width were measured on days 22, 30, 36, 43, 59, 69, 78 and 87. On the last day, leaves were carefully removed and weighed. The cabbage head was hung loosely to a tripod and the cylinder was carefully removed. Soil around the roots was carefully loosened with running water at 6 psi. After all the soil was removed from the roots, the cabbage head with the root system was picked and then dipped several times in a bucket full of water. The root system was then photographed (figures 1 and 2).

For nonfertilized and fertigated cabbage, figure 3 shows canopy diameter and cabbage head width versus days after transplanting curves. Values of growth parameters of fertigated plants were higher than those of non-fertigated plants. Plant canopy diameter did not increase after the 69th day. Ninety-six percent of canopy diameter was attained by day 59. Cabbage head continued to increase in width until the 78th day, and 73% to 85% of width was complete

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²This study was conducted under Southeast Regional Project S-143 (H-326-A), "Trickle Irrigation in Humid Regions—Puerto Rico."

³Bar-Yosef, B., C. Stammers and B. Saving, 1980. Growth of trickle irrigated tomato as related to rooting volume and uptake of N and water. *Agron. J.* 72: 815-22.

⁴Keng, J. C. W., T. W. Scott and M. A. Lugo-López, 1981. Fertilizer for sweet pepper under drip irrigation in an oxisol in north western Puerto Rico. *J. Agric. Univ. P. R.* 65 (2): 123-28.

⁵Unpublished data.

⁶Schuurman, J. J. and M. A. J. Goedewaagen, 1971. Methods for Examination of Root Systems and Roots. Center for Agricultural Publishing and Documentation, The Netherlands. Pages 22-43.



FIG. 1.—In situ recovery of root system.



FIG. 2.—Cabbage head with root system.

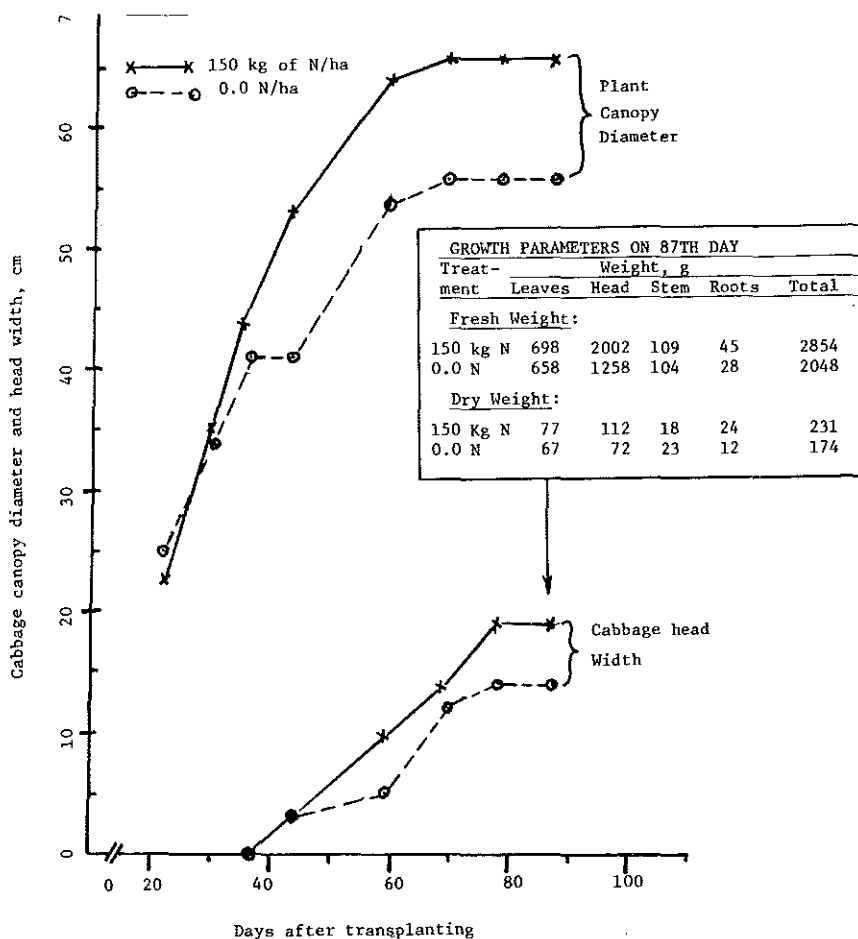


FIG. 3.—Growth characteristics of drip irrigated cabbage.

by the 69th day. This finding implies that cabbage can be harvested on the 69th day and thereafter.

Fresh weight of roots of a fertigated plant was 45 g, versus 28 g in a non-fertigated plant. A cabbage head weighed 2002 g in a fertigated plant; 1258 g in a non-ferti-

gated plant. It can be assumed that most of the roots in the wetting zone around a dripper were recovered by an in situ technique, which is simpler and provides a view of the complete root system. This method should be studied in more detail.

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