Effect of Fertigation and Fabric Bag on Root Development |of Ilex X 'Nellie R. Stevens' Holly

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Nature of Work: In recent years the improvement of drip irrigation techniques and the introduction of the fabric bag have created some interesting production questions. Several workers have studied the effects of irrigation and fabric bags on the production of field grown ornamental (1,2,3). The injection of nutrients into the irrigation water and its effect on root development Ilex x 'Nelle R. Stevens' holly grown with and without fabric bags is the subject of this study.

Fertigation treatments were the whole plots (12 plants) and bag treatments served as subplots (6 plants). Twelve-inch fabric bags were installed by normal procedures. Holly liners in 4-inch pots were used in this study. Fertigation treatments consisted of a 1X dry standard 12-6-6 and drip applies 12-6-6 at 0.5X. 1.OX, and 1.5X rates. The 1X level increased each year as the plants grew. The drip plots were applied in 8 equal amounts from May 1 to September 15 each year. The dry standard treatment was applied 3 times during the season. Adequate soil moisture levels were maintained throughout the study. A randomized complete block statistical design with 6 replications was used for the whole plot treatments.

After 3 years of treatment, the root systems were dug using a 30-inch tree spade in order to obtain a uniform soil volume from which to measure root growth. The soil was allowed to dry and the root systems removed. A 12-inch cylinder was used to mark the roots in an area similar to the 12-inch fabric bag. Dry root weights inside and outside the 12-inch cylinder were measured and recorded.

Results and Discussion: Fertigation treatments had a significant effect on the total root weight as shown in Table 1. The dry standard 1X was heavier than the drip 1X. The weight of the roots inside the 12-inch cylinder (fabric bag or simulated zone for no bag) were in the same relationship as total weight. No significant differences were found for the root weight outside the 12-inch cylinder area.

The effect of the fabric bag on root partitioning was very dramatic as shown in Table 1. Roots within the 12-inch cylinder area with bag treatments were significantly heavier than with root systems from no-bag plots. Conversely, no-bag treatments had more roots outside the 12-inch cylinder area than bag treatments.

The application of 12-6-6 as a dry material gave a better root system than applying equal amounts of 12-6-6 through the drip irrigation system. The use of fabric bags gave a heavier more compact root ball in this study.

Significance to Industry: The fertigation portion of this study indicates that existing fertilization methods still produce good quality root systems. The use of drip irrigation to apply nutrients can be used if proper rates are used. The drip method could be more economical from a labor standpoint.

Table 1. Effect of fertilizer rate and application method and fabric bag on root weight of Ilex x 'Nelle R. Stevens' holly.

Root weight, g			
Treatment	Total	Inside z	Outside
Fertilizer, Dry Standard, 1.0X	1458.67a(y)	1197.58 a	261.08 a
Drip Applied, 0.5X	1198.08 b	972.83 b	225.25 a
Drip Applied, 1.0X	1209.33 b	984.00 b	225.33 a
Drip Applied, 1.5X	1348.92ab	1120.33 ab	228.58 a
P level	0.05	0.01	0.05
Fabric Bag			
Without bag	1156.29a(y)	786.12 a	370.17 a
With bag	1451.21b	1351.25 b	99.96 b
P level	0.01	0.01	0.01

z. Inside and outside weights represent measurements relative to a 12-inch fabric bag or equivalent.

y. Means within a column and subsection followed by a common letter are not significantly different statistically at the P levels indicated at the bottom of each respective column using the LSD test.

The use of the fabric bag is still questionable. They produce more compact root systems but tend to be rather labor intensive on both ends of the production cycle.

Literature Cited

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