Influence of Planting Depth on Growth of Young Apple Trees[1]

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Abstract

Shallow planted trees of 'Delicious' apple (*Malus domestica* Borkh.) on Malling 7A (M 7A) and Malling-Merton 111 (MM 111) rootstock were smaller in the 5th year following planting and had higher bloom densities than deep-planted trees. Trees on MM 111 also had more fruit per cross sectional area when shallow planted. Deep planted trees of MM 111 had greater depth to the first root. No differences were observed in degree of lean of either rootstock.

Index words: *Malus domestica,* bloom density, graft height, tree height, fruiting, rootstock shank

Introduction

Clonal apple rootstocks are popular in landscape planting and commercial orchards because they offer both small size and earlier production. Their use, however, has led to some problems such as cold injury to roots, suckering, burrknots, and poor anchorage of dwarfing rootstocks. Deep planting (setting the graft union at the soil line) has been offered as the solution to all these problems (1, 4, 5, 6). Recent evidence has shown, however, that deep planting may sometimes have negative attributes. During the first 2 years deeply planted trees were more prone to have air pockets around their base and the first leaves produced by young transplants were smaller (3).

Materials and Methods

Trials were initiated during 1981 at the Winchester Agricultural Experiment Station, Winchester, Virginia to determine the effects of deep planting on apple trees. Standard 'Red Delicious' grafted on M 7A, rootstock at 30 cm (12 in) height and spur 'Red Delicious' grafted on MM 111 at 20 cm (7.8 in) height were planted at 2 depths. Trees were set either 5 cm (2 in) below nursery depth or with their graft union 5 cm (2 in) above the ground line. Planting in this manner left either a 5 cm (2 in) or a 25 cm (10 in) rootstock shank above ground for the trees on M 7A and a 5 cm (2 in) or 15 cm (6 in) rootstock shank for those on MM 111. Ten trees were set at each depth alternating depths in the row.

In May 1985, each tree was visually rated for bloom density on a scale of 1 to 10 with 1 being no bloom and 10 a heavy bloom. In July 1985, the experiment was terminated and measurements of fruit per tree, fruit per trunk cross sectional areas, degree of lean from the vertical, depth to the first root and tree height.

Results and Discussion

Deep planting of spur 'Red Delicious'/MM 111 resulted in greater tree height with fewer blooms and greater depth to first root (Table 1). No differences were found in fruiting or degree of lean from vertical.

Deep planting of standard 'Delicious' on M 7A resulted in fewer blooms, fewer fruit per cross sectional area and greater tree height (Table 2). No differences were observed in degree of lean, depth to first root or fruit per tree.

The findings of this study show that shallow planting gives additional tree size control and more bloom on young trees. This extra dwarfing could be beneficial in an area where many semi-dwarf trees get too large for reasons of climate and soil type, however, increased occurrence of burrknots will result.

This study also shows that spur red delicious scions on MM 111 rootstock planted deep did not develop roots in the upper 5 cm (2 in) of soil as is desired. The spur 'Delicious' on MM 111 had significantly deeper first roots when planted 15 cm (6 in) deeper than nursery depth than shallower planted trees (Table 1). These findings are consistent with field observations (2) from a survey where poorly performing spur 'Delicious' on MM 111 had significantly deeper crown roots compared to healthy actively growing trees.

Significance to the Nursery Industry

The heavier blooming potential with both rootstock and scion combinations when shallow planted with a rootstock shank above ground deserves more attention

Table 1. Effect of planting depth on performance of spur 'Red Delicious' on Malling Merton 111 rootstock.

	Planting Depth[z]	
	15 cm	5 cm
Bloom rating[x]	4.4a[y]	8.7b**
Number fruit per tree	178.2a	151.6a
Fruit—cross sectional area	3.8a	3.8a
Degree of lean[w]	4.0a	8.5a
Depth to first root (cm)	8.3a*(3.3'')	3.0b*(1.2'')
Tree height (m)	3.94a*(12.8')	2.5b**(8.2')

[z]Deeper than original nursery planting depth.

[x]Rating of 1 (least) to 10 (most bloom)

[w]Degree of lean from the vertical

[y]Means in rows followed by the same letter are not significant at the 5% level (*) or the 1% level (**) as determined by Duncan Multiple Range Test.

[1]Received for publication May 16, 1987; in revised form August 7, 1987.

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Table 2. Effect of planting depth on growth and production of standard 'Delicious' on Malling 7A rootstock.

Treatment	Planting Depth[z] 25 cm	5 cm
Bloom rating[x]	2.4a[y]	6.9b**
Number fruit per tree	162.0a	202.0a
Fruit—cross sectional area	2.8a	4.0b*
Degree of lean[w]	23.5a	35.5a
Depth to first root (cm)	1.8a(7")	1.0a(4")
Tree height (m)	4.7a(15.4')	4.10b (13.5')

[z]Deeper than original nursery planting depth.

[x]Rating of 1 (least) to 10 (most bloom)

[w]Degree of lean from vertical

[y]Means in rows followed by the same letter are not significant at the 5% level (*) or the 1% level (**) as determined by Duncan Multiple Range Test.

and research than it is now receiving. If a grower or homeowner is planting with the desire for earlier flowering, above ground rootstock shanks of reasonable length may be part of the answer. The problem of cold injury and burrknots on many rootstocks must still be addressed. We also would not expect all combinations of scion variety and rootstock to react the same and suggest that trials with the more popular rootstock and scion combinations would be warranted in each production area.

Our data does not support the belief that deep planting overcome poor tree anchorage thereby reducing the degree of lean. For this reason we believe that nurseries should maintain a reasonable budding height of not more than 15 cm (6 in) so planting depth can be adjusted without great risk of poor plant performance.

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Consumer Attitudes Toward the Defoliation of American Arborvitae, *Thuja occidentalis*, by Bagworm, *Thyridopteryx ephemeraeformis*[1]

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Abstract

A group of 93 retail nursery customers were surveyed to determine their attitudes toward defoliation of American arborvitae, *Thuja occidentalis* L., caused by the bagworm, *Thyridopteryx ephemeraeformis* (Haworth). More than half of the customers surveyed perceived plants with 4% of the leaf area missing or discolored as damaged. The proportion of customers who refused to buy a plant corresponded closely ($r = 0.98$, $p < .0001$) with the proportion of those who perceived the plant as damaged.

Index words: marketing, economics, aesthetic injury, integrated pest management, bagworm

Introduction

The bagworm is a widespread defoliator of many evergreen and deciduous shrubs in the eastern United States. On American arborvitae, high populations can strip plants of foliage during a single growing season.

Overwintered bagworm eggs hatch during late May and early June. Prior to feeding, each larva spins a silken bag around its body. As the larva begins to feed, bits of foliage are attached to the bag. With its head and legs free, the larva moves along branches or to nearby shrubs in search of food. Bagworms continue their development until they pupate in bags up to 5.1 cm (2 in) long in late summer. After mating the female deposits eggs in her bag and dies. These eggs remain in the bag through the winter until they hatch the following year (1).

[1]Received for publication May 14, 1987; in revised form August 12, 1987.

[2]Graduate student and extension professor, resp. Computer support was provided by SEA grant funds and Computer Science Center of the University of Maryland. Special recognition to J.A. Davidson, C.S. Koehler, J.J. Holmes, and K. Reichelderfer and the nursery retailers for their support and assistance. Scientific Article No. A-4678 Contribution No. 7674 of the Maryland Agricultural Experiment Station.