

Naphthalene Acetic Acid Can Differentially Reduce Growth in the Tops of Dwarf Apple Trees, Results from 2005

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Successful growing of dwarf apple trees requires control of both vegetative and reproductive growth. If trees grow too tall, it seems natural to remove the excessive growth with dormant-season or summer pruning. The result often is a vigorous, vegetative response and no fruiting in the top of the tree. A better approach is to not prune the top of the tree, allowing it to reach its desired height. Without question, fruiting in the top will be enhanced by not pruning, and that fruiting will slow further vegetative growth. The question is whether or not this taller tree is compatible with the constraints of your training system.

Over the last few years, we have studied some alternatives to pruning, including bending and girdling. Both work to some degree to reduce vegetative growth and potentially reduce the need for pruning and the subsequent disruption of the balance of vegetative and reproductive growth in the top of the tree. The results from these trials show clearly that girdling can reduce vegetative growth in the top of apple trees and could be used by growers as a tool to control growth. This process can be used effectively in relatively low-density plantings, but becomes very time consuming in high-density plantings. Therefore, we became interested in alternative approaches. In Europe, orchardists have used naphthalene acetic acid (NAA, as Tre-hold Sprout Inhibitor) mixed in a flexible pruning paint as a way to suppress growth in the top of high-density, dwarf apple trees.

To study the potential of NAA for growth suppression, four trials were conducted in 2004. Across these trials, NAA at 1.5% in latex paint (3-inch band) across all cultivars resulted in a 14% reduction in leader growth and a 32% reduction in total shoot growth.

In 2005 at the UMass Cold Spring Orchard Research & Education Center, Belchertown, MA, two new trials were conducted. The source of NAA was Tre-hold Sprout Inhibitor A112 (15.1% NAA) provided by Amvac Chemical Corporation (also sold by Monterey Chemical Company as Sucker Stopper Concentrate). Details of the trial are given in Table 1. The objectives were as follows: 1) to compare treatments to 1-year-old wood and 2-year-old wood and 2) to compare paint as an NAA carrier to lanolin paste (which should have maximized possible absorption).

Results

From the trial utilizing 4-year-old Suncrisp trees on B.9 rootstock, mixing NAA in lanolin paste resulted in a greater reduction in leader growth than when the NAA was mixed in latex paint (Table 1). Reductions in overall growth likewise were greater, but not statistically significant.

From the trial utilizing 4-year-old Golden Delicious trees on B.9 rootstock, treating the base 1-year-old wood with NAA resulted in a reduction in the number of laterals and the overall shoot growth from the 1-year old wood in the top of the tree compared to treatment at the base of 2-year-old wood or the control (Table 1). Fruit set was not affected by treatment, and growth from the 2-year-old wood was not affected.

These results show clearly that NAA differentially reduced growth in the top of dwarf apple trees and may be a viable commercial tool for managing such trees. To date, our research points to the specific recommendations listed on the next page.

Table 2. Set and growth in 2005 as affected by treatments applied to the tops of super spindle apple trees at or near bloom in 2005 (fourth leaf) at the University of Massachusetts Cold Spring Orchard Research & Education Center, Belchertown, MA.

Treatment	Fruit set 2005 (no./cm ² TCA)	Number of lateral shoots			Leader growth (cm)	Shoot growth (2005, cm)		
		From 1- yr-old wood	From 2- yr-old wood	Total		From 1- yr-old wood	From 2- yr-old wood	Total
<i>Suncrisp/B.9</i>								
Control	2.6 b	8.0 a	11.2 a	19.1 a	41.2 a	152 a	184 a	337 a
NAA in latex paint	2.5 b	5.8 a	12.3 a	18.2 a	27.5 b	95 a	150 ab	245 ab
NAA in lanolin paste	2.8 b	8.7 a	13.7 a	22.3 a	18.2 c	102 a	143 ab	244 ab
Apogee	5.9 a	4.2 a	7.0 a	11.2 a	12.8 c	62 a	78 b	141 b
<i>Golden Delicious/B.9</i>								
Control	0.1 a	12.0 a	21.3 a	33.3 a	34.3 a	237 a	374 a	612 a
NAA/1-yr-old wood	0.3 a	6.8 b	20.5 a	27.3 a	30.3 a	120 b	404 a	524 a
NAA/2-yr-old wood	0.3 a	10.0 a	17.8 a	27.8 a	34.9 a	164 ab	293 a	457 a

NAA treatments were at 1.5% and were applied at early bloom (May 12, 2005). Latex paint was standard, white, interior latex, and lanolin was hydrous lanolin heated slightly by microwave to a paint consistency. NAA treatments were applied in a 3-inch band around the trunk at the base of two-year-old wood (Suncrisp and Golden Delicious) or at the base of one-year-old wood (Golden Delicious only).

Apogee was applied at petal fall (May 20, 2005) at 250 ppm (12 ounce/100 gallons) along with Quest at 0.125% (0.5 quart/100 gallons) and Regulaid at 0.138% (0.55 quart/100 gallons). Application was to all canopy above the base of two-year-old wood on the trunk.

Means within cultivar and column not followed by the same letter are significantly different at odds of 19 to 1.

Use Recommendations

- Target the base of 1-year-old wood.
- Utilize a reasonably flexible paint-like carrier.
- NAA at 1.5 % gives good growth control.
- Paint the NAA mixture as a 3-inch band completely encircling the trunk.
- Apply at or near bloom.

