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Control of Rootsuckers on Apple Trees with Growth Regulators[1]

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Abstract. **Naphthalenacetic acid ethyl ester (NAA ethyl ester) applied to actively growing rootsuckers on 'Oregon Spur Delicious' apple trees (*Malus domestica* Borkh.) at 0.5 and 1.0% provided effective sucker suppression 70 days after treatment. Combination sprays of NAA and *N*-butyl-*N*-ethyl-*a,a,a*-trifluro-2,6-dinitro-*p*-toluidine (benefin) or NAA and straight chain fatty alcohols (Off-Shoot-T85) gave good control of rootsuckers. Lower rates of NAA and NAA plus Off-Shoot-T85 were equally effective when a paraffin based petroleum oil spray adjuvant (Agicide Activator) was added. NAA at 1.0% was the only treatment to provide effective rootsucker supression in the season following treatment.**

NAA has been shown to be an effective sprout control agent on above ground portions of established fruit (2, 3, 5, 6, 7) and nut (5) trees and apple nursery stock (4). Shoots produced from below ground portions on fruit trees (rootsuckers) are generally controlled by summer or winter pruning or by both. Rootsucker control on apple and pear trees with NAA and Off-Shoot-T85 has been reported in England (1). The purpose of the present paper is to report the effect of several growth regulators on rootsucker control in young 'Delicious' apple trees.

Five-year-old 'Oregon-Spur-Delicious' on seedling rootstock exhibiting severe suckering were selected for the study. Each treatment consisted of 5 replicated plots with 4 trees per plot. Treatments were applied with a knapsack sprayer on July 20, 1976. Suckers were in various stages of growth at the time of treatment ranging from 1 inch to 12 inches tall (succulent tip, woody base); the majority were succulent and 6 to 8 inches tall. Applications were made to thoroughly wet the foliage of existing suckers. Previous sucker control on trees in this orchard consisted of pruning back at the ground level. No attempt was made to remove old stubs remaining from cut suckers before treatment. The chemical treatments used and rates applied are presented in Table 1. All rates of growth regulators are active ingredients; spray adjuvant rate is a % vol/vol basis. Suckers were observed 48 hr after spraying for signs of chemical activity. Control was visually evaluated Sept. 3, 1976, Oct. 5, 1976, and May 10, 1977 (6 weeks after full bloom) on a scale of 0 (no control) to 10 (complete control). A treatment rating of 8.0 or better was considered as commercially acceptable control.

Chemical activity was evident on all treatments 48 hr after sprays were applied with the exception of *a*-cyclopropyl-*a*-(*p*-methoxyphenyl)-5-pyrimidine-methanol (ancymidol) at 50 and 100 ppm and benefin at 1.0% where no visual activity was apparent. Visual symptoms ranged from mild epinasty and/or leaf necrosis to severe epinasty, severe leaf necrosis, stem necrosis or terminal die-back. The first sign of NAA activity was epinasty followed by leaf necrosis and then stem necrosis.

NAA was an effective sucker control agent during the active growing season when applied alone at 0.5% and 1.0% (Table 1 and Fig. 1A and 1B). A com-

Table 1. Rootsucker control in 5-yr-old 'Oregon Spur Delicious' on seedling rootstock and chemical activity with various growth regulators applied July 1976.

Treatment	Rate(s)	Activity symptoms[z]	Control rating[y] Sept. 3 1976	Oct. 5 1976	May 10 1977
NAA	0.5%	ME, MN	9.5	9.7	5.2
NAA	1.0%	SN, STN	9.8	10.0	9.5
NAA + Agicide Activator	0.25% + 0.5%	ME, MN	9.8	9.5	3.4
Benefin	1.0%	NA	2.5	0.8	0
Benefin	5.0%	TD, STN, SLN	8.5	5.1	0
Venefin + NAA	1.0% + 0.25%	ME, MLN	9.6	9.9	3.9
Off-Shoot-T85 + NAA	4.0% + 0.05%	ME, MNL	7.9	7.3	1.0
Off-Shoot-T85 NAA	2.0% + 0.25%	SE	9.1	9.9	2.6
Off-Shoot-T85 NAA + Agicide Activator	1.0% + 0.125% + 0.5%	SE, MLN, STN NA	9.8	9.9	4.7
Ancymidol	50 ppm	NA	2.3	2.9	0
Ancymidol	100 ppm		0	0	0

[z]Visual symptoms 48 hr after treatment (ME = mild epinasty, SE = severe epinasty, MN = mild necrosis, SN = severe necrosis, MLN = mild leaf necrosis, SLN = severe leaf necrosis, STN = stem necrosis, TD = terminal die-back and NA = no activity).

[y]Visual observation of control (0 = no control, 10 = complete control).

[x]6 weeks after full bloom (Middle Georgia conditions).

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Fig. 1. Rootsucker control on 'Oregon Spur Delicious' on seedling rootstocks 70 days (10/5/76) after treatment with various growth regulators. A) 0.5% NAA. B) 1.0% NAA. C) 1.0% Off-Shoot-T85 + 0.125% NAA + 0.5% Agicide Activator. D) Control – no treatment.

bined spray of NAA at 0.25% plus 0.5% adjuvant resulted in a slightly lower control rating in Oct. 1976 than with the 0.5% and 1.0% NAA treatments; however, this combined treatment was still quite effective. The 5% benefin treatment produced the quickest "kill" but regrowth soon occurred on below ground stem sections not contacted by the spray. A combination spray of either Off-Shoot-T85 at 2% and NAA at 0.25% or Off-Shoot-T85 at 1%, NAA at 0.125% and a spray adjuvant at 0.5% (Fig. 1C) gave excellent control of suckers during the season of application. The adjuvant material appeared to enhance the activity of NAA and/or Off-Shoot-T85, thus permitting reduced rates. Ancymidol at either 50 or 100 ppm proved ineffective as a sucker control agent.

A carryover effect, as evidenced by sucker suppression the year after treatment, was observed in all treatments containing NAA at 0.125% concn or greater (Table 1). While rates of NAA below 1.0% were quite effective for sucker control during the season of application, these rates were not as effective as the 1.0% NAA treatment in supressing suckers the following season.

Rootsuckers were controlled on young 'Delicious' apple trees with NAA at 0.5% and 1.0% alone or in combination with several other growth regulators. NAA at 1.0% appears to be the most effective treatment for commercial use since suckers were suppressed the season following treatment.

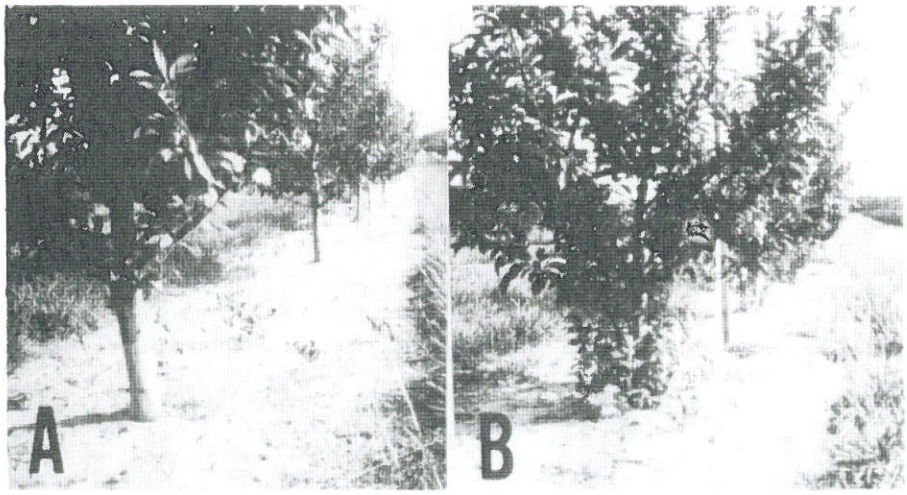

Fig. 2. Rootsucker suppression as seen on 'Oregon Spur Delicious' the year after treatment; dead suckers removed by clipping at ground level, winter 1976-1977. A) 1.0% NAA. B) Control – no treatment.

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