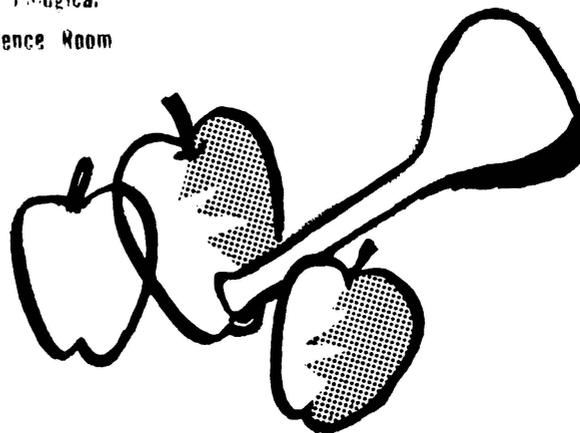


THIN APPLES CHEMICALLY



by

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An apple tree will often set more fruit than it can support. When this occurs it becomes necessary to remove some of the fruit in order that the remaining apples may attain optimum size and quality. Some of the advantages of fruit thinning are, larger size, improved quality, less limb breakage and a greater return bloom.

Apples may be thinned by hand but this is usually not practical on a large scale and is frequently not completed soon enough to provide the full benefits of thinning.

The use of chemicals to thin apples is increasing and rapidly becoming a routine commercial practice. Recent research findings have made it possible to reduce the variability in results frequently obtained in the past. However, the judgement and experience of the grower is still important to the successful use of chemical thinning sprays.

Apple Thinning Chemicals

There are three chemicals in general usage in the East to thin apples: NAA (naphthaleneacetic acid), Amid-Thin (naphthaleneacetamide) and Sevin (1-naphthyl N-methylcarbamate). In the western fruit regions a fourth chemical, DNOC (dinitro-ortho-cresol), is also widely used. This material is applied during the bloom period and causes thinning through damaging floral parts. It has not generally proven satisfactory under eastern fruit growing conditions.

NAA (naphthaleneacetic acid)

NAA is a hormone type chemical that is widely used to thin apples throughout the country. In the Appalachian area it has been most successfully used on the variety Golden Delicious, but

certainly has not been limited to this variety.

NAA was first used in the early post-bloom period or about petal fall. While this early timing did result in effective thinning, it also caused severe foliage flagging or downward bending of the leaves. It was then found that satisfactory thinning could be obtained using NAA up to three weeks after full bloom and that at this timing foliage injury was greatly reduced. Most workers now agree that NAA should be used at this later timing.

NAA has been satisfactorily used on a number of fall and winter varieties in Virginia but has not proven satisfactory on summer varieties. NAA applied to summer varieties two to three weeks after full bloom, results in pre-mature ripening and splitting of the fruit often rendering the crop worthless. If NAA is used earlier it frequently causes more severe foliage injury than can be tolerated.

An important reason why NAA was not more widely used in the past, was due to the erratic results obtained. These variable results are now known to have been caused in part by variations in the amount of active chemical entering the plant. NAA must enter the plant to result in thinning; however, the amount applied on the tree is not always a measure of the amount that enters the tree. Plant surfaces vary greatly in the uptake of applied materials. Twice as much NAA from a given spray may enter the plant and effect thinning under one set of conditions as under another. Many of the factors that influence absorption are now known, others are yet to be discovered.

If the temperature drops to within the general

range of 28 to 31°F. during the post-bloom period prior to the application of a thinning spray, the amount of thinning will be greatly increased. It has been shown that following these conditions, apple leaves will absorb more NAA. It is also probable that these low temperature conditions may affect the developing fruit making it more sensitive to the influence of hormone spray treatments.

The temperature at the time the spray chemical is applied will influence the amount of chemical that will be absorbed. This is particularly true within the general range of from 50 to 70°F. In radioactive tracer studies in New York nearly twice as much active chemical was absorbed at 70°F. at the end of 90 minutes as was absorbed during the same period of time when the temperature was but 50°F. The influence of temperature increases above 70°F. were not as pronounced.

Weather conditions prior to the application of the hormone spray also influence the leaf and consequently the amount of NAA that will be taken into the plant. In general, greater absorption and thinning will take place if weather prior to the application of the spray is cool, overcast, and rainy than will occur when the weather is warm, bright, and sunny.

Recent research in Virginia by Dr. Frank Horsfall, Jr. and R. C. Moore has shown that when such pesticide chemicals as guthion, parathion, or malathion are added to a spray mixture containing naphthaleneacetic acid, greater thinning will result. It has also been shown that there is a similar influence if naphthaleneacetic acid sprays are applied soon after the application of a regular pesticide spray containing one of the above chemicals.

There are many factors known to influence the absorption of naphthaleneacetic acid and the degree of thinning. These factors have caused variable results in the past. Fortunately, there is now a means of reducing much of this variability. If Tween-20 is added to a mixture containing naphthaleneacetic acid, the absorption of NAA is greatly increased. In this way the amount of NAA applied more nearly equals the amount that reaches the site of thinner action. This reduces the influence of other factors on absorption. Since Tween-20 increases the absorption of NAA, only about one-third to one-half as much NAA is needed when Tween-20 is added to the spray. The use of Tween-20 with a reduced amount of NAA reduces the hazard of variable results.

Amid-Thin (naphthaleneacetamide)

Amid-Thin is a milder thinning chemical than NAA. It has rarely caused injury to foliage and has seldom resulted in overthinning. Following good pollinating conditions Amid-Thin has frequently failed to thin off enough apples.

Amid-Thin may be used soon after bloom without the foliage injury that has been associated with NAA. Because of this, Amid-Thin is the material of choice on summer varieties. Amid-Thin is not suggested for use on Red Delicious because it usually causes small, worthless apples to remain on the tree through to harvest.

There are conflicting opinions as to the best time to apply Amid-Thin sprays. Good results have been obtained on a number of varieties with applications ranging from petal fall to approximately two weeks after petal fall. Amid-Thin may have a greater thinning influence if used at the earlier timing. However, other workers have reported that more consistent results are obtained with the later timing.

Sevin (1-naphthyl N-methylcarbamate)

The insecticide Sevin has been found to have thinning properties and considerable research effort has recently been devoted to determine its potentialities. The principal interest in this chemical as a thinner is due to the apparent consistency of the results obtained. Neither the timing, nor the concentration of the spray appears to be critical. In general, effective thinning has resulted from rates of from 1.0 lb. to 3.0 lb. per 100 gallons of spray and from sprays applied from full bloom to twenty-five days after full bloom.

Virginia results would indicate that Sevin may not thin enough fruit from the varieties Golden Delicious and York to be satisfactory. It has, however, resulted in effective thinning of the varieties Rome and Winesap in Virginia. Results from other areas would indicate that Sevin also has possibilities for use on Red Delicious. Growers interested in Sevin as a thinner should try it on a limited scale using from 1.0 to 2.0 lb. of the 50% wettable powder per 100 gallons of spray and applying it between 15 and 21 days after full bloom. In blocks where thinning is needed, Sevin could be used as the insecticide in the second cover spray. Sevin has a tendency to foster the development of mite populations, thus when used it may be necessary to take additional precautions for mite control.

The effective use of chemical thinning sprays will always require a certain amount of experi-

ence and judgment on the part of the individual grower. He must first consider the age of the tree, since it is generally recognized that until a tree has borne a couple of crops and settled into a production pattern, it may respond erratically to chemical thinning treatments. Tree vigor will also influence results. Weak trees must be sprayed with caution if at all, while on the other hand trees that are very vigorous may require higher concentrations of chemical thinning sprays to produce desired results. It is also important that a grower evaluate pollinating conditions in making spray thinning decisions. If pollinating conditions have been poor, chemical thinning sprays may result in over-thinning. However, if weather conditions and bee activity were favorable for pollination and fruit set it may be necessary to use a more potent thinning spray mixture to obtain desired results.

Current Recommendations

Timing

NAA (naphthaleneacetic acid) should be applied 15 to 21 days after full bloom.

Amid-Thin (naphthaleneacetamide) should be used from 4 to 8 days after full bloom on summer varieties. This same timing has proven effective on fall and winter varieties; however, these varieties have also been satisfactorily thinned with Amid-Thin applied up to 3 weeks after full bloom.

Sevin (1-naphthyl N-methylcarbamate) is suggested for limited trial only to be applied from 15 to 21 days after full bloom.

Concentration

Variety	NAA plus 1 pt. Tween-20	Amid Thin	Sevin(²)
Williams Early Red	NR(¹)	40 PPM	
Yellow Transparent	NR	40 PPM	
Grimes	5 PPM	50 PPM	
Jonathan	5 PPM	50 PPM	
Red Delicious	5 PPM	NR	1-2#/100 gal.
Golden Delicious	8 PPM	NR	
Stayman	5 PPM	50 PPM	
York	5 PPM	50 PPM	
Rome	5 PPM	50 PPM	1-2#/100 gal.
Winesap	NR	NR	1-2#/100 gal.

¹NR--Not Recommended.

²For limited trial only.

Remarks and Cautions

1. Use chemical thinning sprays only on vigorous trees where heavy set is expected.
2. Following low-temperature conditions (28-31° F.) chemical thinning sprays should be used with caution if at all.
3. Spray trees thoroughly, particularly the tops.
4. Avoid the use of chemical thinning sprays on weak trees as they may be easily over-thinned.
5. Slightly higher rates of thinning sprays may be necessary to produce satisfactory results on very vigorous trees.
6. Leave check trees.
7. Keep accurate records of timing, concentration, varieties, full bloom dates, etc. for future reference.



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