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OLIVE SPRAY THINNING GUIDELINES

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WHY THIN YOUR OLIVE CROP?

Larger fruit. Overloaded trees bear small, unprofitable fruit. If you thin the crop (remove excess olives) during the fruit's early growing period, the remaining fruit will grow larger. The larger fruit command a higher price that more than offsets any reduction in total yield. By thinning the crop, you will bring otherwise substandard-sized olives up to canning sizes.

Higher-quality fruit. Olives harvested from spray-thinned trees have a greater flesh-to-pit ratio and a higher oil content than do fruit from untreated trees.

More consistent yearly crops. After a modest crop, shoot growth and prospects for a satisfactory crop the following year are good. In contrast, a heavy crop of olives is followed almost invariably by a light crop.

Early maturity. A moderate crop matures earlier than a heavy crop. An early crop is more likely to get a good reception from the handler, has less competition for harvest labor, is less likely to fall victim to cold weather in the early fall, and ensures a good bloom for the next year.

Lower harvest costs. Olive picking costs are figured on a per-ton basis, so the per-acre harvest costs for a moderate crop are less than for a large crop.

SPRAY THINNING WITH NAA

The plant growth regulator naphthaleneacetic acid (NAA) absorbs into the leaves and fruit of the olive tree and is then translocated to the fruit stems. An abscission layer forms during the first two weeks after NAA application, causing some fruit to drop.

NAA Formulation for Olive Thinning

NAA is manufactured in the form of an ammonium salt for commercial use on olive orchards, with 200 grams of active ingredient per gallon. This formulation is marketed as Liqui-Stik Concentrate (EPA reg #34704-382) by Platte Chemical Company. NOTE: This material does not contain wetting agents.

When to Apply NAA

Timing is critical. You can use either of two methods to determine the proper time for NAA application.

Full bloom date method. To use the full bloom date method, you must establish the date of full bloom for your orchard. For our purposes, full bloom is the point at which 80 percent of the olive flowers are open (10 percent of the flowers are not yet open and 10 percent of the flowers are dropping petals), petals are white (not brown), and pollen is shedding. To see whether pollen is shedding, you can run your hand down the full length of a blooming shoot. Yellow pollen in your hand indicates shedding. Record the date of full bloom, and apply NAA 12 to 18 days after that date.

Fruit size method. If you base your spray timing on fruit size, spray the trees when young fruit are $\frac{1}{8}$ to $\frac{3}{16}$ inch in diameter. Figured this way, the time of application varies from 12 to 18 days after full bloom, depending on weather. Most growers and advisors favor using a combination of the full bloom date and fruit size methods to determine the proper time for application.

NOTE: Once again, timing is critical. EPA registration for NAA covers the period from full bloom to 2½ weeks after bloom. NAA applications after that point are both illegal and useless. Too early an application will overthin the orchard. Too late an application will yield unsatisfactory results. An application during bloom will destroy the crop.

What Concentration to Use

The concentration of NAA you use will depend on how you determine spray timing and whether or not you use a spray oil.

Full bloom date method. If you time your spray according to the full bloom date, apply NAA as a dilute spray (300 to 500 gallons per acre [gpa] [approximately 2800 to 4700 liters/hectare]) 12 to 18 days after full bloom. If applied at 10 days, use a concentration of 100 parts per million (ppm). Thereafter, increase the concentration by 10 ppm for each day that treatment is delayed. For example, if you spray 15 days after full bloom, use a concentration of 150 ppm.

CAUTION: Abnormally cool weather will delay fruit growth. In such a circumstance, use the fruit size method for spray timing.

Fruit size method. If you use the fruit size method and spray without a spray oil, apply a concentration of 150 ppm NAA with a wetting agent or spreader-sticker, used according to the chemical manufacturer's recom-

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mendation. The commercially available NAA formulation Liqui-Stik Concentrate does not contain a wetting agent.

If you do use a spray oil, mix 100 ppm NAA with a light or light medium summer oil emulsion at a rate of 1½ gallons of oil per 100 gallons of spray mix. Do not use a wetting agent if you use oil.

The data in Table 1 show how to mix NAA Liqui-Stik Concentrate to produce specific concentrations.

CAUTION: Do not use oil with NAA when daytime temperatures are 90°F (32.2°C) or higher or when soil moisture is low. Failure to observe these precautions may result in leaf and shoot burn, defoliation, fruit injury, and excessive thinning.

Varietal Responses Vary

Manzanillo, Mission, and Ascolano varieties respond well to spray thinning. Sevillano olives do not respond well to this treatment.

How Much Spray to Apply

To be effective, the spray must cover the undersides of leaves on fruiting branches, but a heavy drenching application such as is used for scale control is usually unnecessary and wasteful. **NOTE:** No less than 108 ounces of NAA from Liqui-Stik Concentrate (NAA ammonium salt, 200 grams active ingredient [a.i.] per gallon) should be applied per acre (1239 grams a.i. per hectare). See Table 2 for the number of gallons per acre required to apply 108 ounces a.i. per acre at various concentrations.

Equipment and How to Use It

Air blast sprayers. When most trees bear a heavy crop, an air blast sprayer will do the best job of covering the whole tree. For good spray distribution, drive a properly adjusted air blast sprayer at 1.5 to 2 miles per hour.

High-pressure hand gun sprayers. Use high-pressure hand guns with number 8 discs at 200 to 400 pounds per square inch (psi) pressure if some trees in the orchard are overloaded and others are not. If only certain limbs in each tree require thinning, spot spraying may be effective. **NOTE:** Always leave some unsprayed check areas to help gauge the effectiveness of spray thinning.

POTENTIAL FOR DAMAGE

If used as directed and at moderate temperatures, NAA will not damage fruit or retard fruit growth. Sometimes

Table 1. Amount of NAA from Liqui-Stik Concentrate (NAA ammonium salt, 200 g a.i. per gallon) required per 100 gallons to make solutions of various concentrations

Desired concentration of NAA (ppm a.i.)	Liqui-Stik (fl. oz.) per 100 gallons	Liqui-Stik (ml) per 100 gallons
100 ppm	24 fl. oz.	716 ml
110 ppm	26 fl. oz.	788 ml
120 ppm	29 fl. oz.	859 ml
130 ppm	31 fl. oz.	931 ml
140 ppm	34 fl. oz.	1002 ml
150 ppm	36 fl. oz.	1074 ml

Table 2. Minimum gallons at various concentrations required to deliver 108 oz. of NAA from Liqui-Stik Concentrate (NAA ammonium salt, 200 g a.i. per gallon) per acre, with metric equivalents

NAA concentration (ppm a.i.)	Gallons of solution required per acre	Liters of solution required per hectare
100 ppm	450 gal/A	4212 L/ha
110 ppm	415 gal/A	3884 L/ha
120 ppm	372 gal/A	3482 L/ha
130 ppm	348 gal/A	3257 L/ha
140 ppm	317 gal/A	2967 L/ha
150 ppm	300 gal/A	2808 L/ha

it does kill or curl young, tender tip growth on some new shoots, but this has no lasting effect.

POINTS TO REMEMBER

The effects of NAA depend upon dose, temperature at time of application, and tree condition.

Dose. The greater the applied concentration of NAA, the greater its thinning activity. You can further increase NAA activity by adding oils to the application mix.

Temperature. As temperatures rise, NAA activity increases. High temperatures (i.e., in excess of 100°F [37.8°C]) within two weeks after application can cause additional thinning.

Tree condition. Never spray water-stressed trees with NAA: it will cause excessive thinning. Trees to be sprayed with NAA must be well watered both as bloom develops and after spraying to mitigate any negative effects related to high temperatures.

FOR MORE INFORMATION

You'll find detailed information on all aspects of olive production in **Olive Production Manual**, publication 3353. To order a copy, or to request a catalog of UC DANR publications, slide sets, and videos, contact

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in their original labeled containers in a locked cabinet or shed, away from foods or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Recommendations are based on the best information currently available, and treatments based on them should not leave residues exceeding the tolerance established for any particular chemical. Confine chemicals to the area being treated. **THE GROWER IS LEGALLY RESPONSIBLE** for residues on the grower's crops as well as for problems caused by drift from the grower's property to other properties or crops.

Consult your county agricultural commissioner for correct methods of disposing of leftover spray materials and empty containers. **Never burn pesticide containers.**

PHYTOTOXICITY: Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high. Injury may also result from excessive amounts or the wrong formulation or from mixing incompatible materials. Inert ingredients, such as wetters, spreaders, emulsifiers, diluents, and solvents, can cause plant injury. Since formulations are often changed by manufacturers, it is possible that plant injury may occur, even though no injury was noted in previous seasons.

To simplify information, trade names of products have been used in this publication. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

An electronic version of this publication is available via the UC DANR Communication Services Web Site at <http://danrcs.ucdavis.edu/>

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