

Insecticides for Alfalfa Aphid

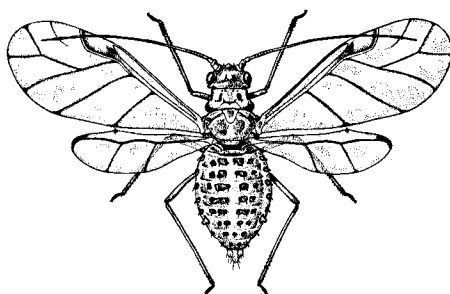
chemical control of spotted alfalfa aphid essential until natural enemies or resistant alfalfa varieties available

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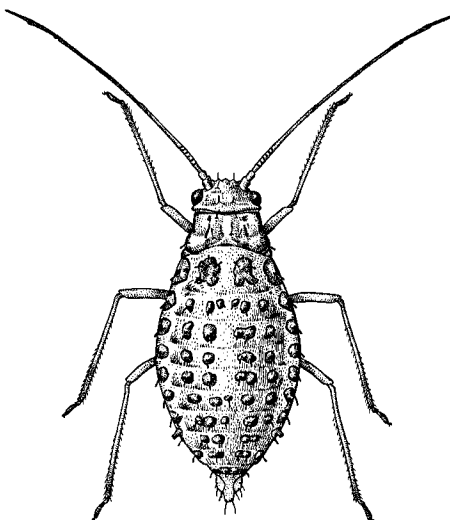
Many insecticides will kill the spotted alfalfa aphid—*Therioaphis maculata* (Buckton)—but even the most effective chemicals provide only a temporary relief from aphid attack. In most infested areas chemical control of the aphid is essential for successful alfalfa production. Furthermore, chemical control will continue to be essential until highly promising research on resistant alfalfa varieties—adapted to California growing conditions—can be completed or until fungus diseases or imported beneficial insects provide a more permanent control. Unchecked, this aphid can hamper alfalfa production, reduce the yield, and impair the quality of alfalfa hay, but it can be controlled economically by the careful use of chemical treatments that are properly applied.

The spotted alfalfa aphid infests over 75% of the state's alfalfa acreage and the entire state will probably become infested during 1956. At times of the year when spotted alfalfa aphid populations are high, the aphid is able to reinfest an alfalfa field soon after chemical treatments. Reinfestation is largely due to three reasons:

1. The aphid is able to multiply rapidly in warm weather. A female can produce five offspring per day and these young can be reproducing in about a week.
2. Many chemical treatments are not made properly. Any skips in application leave aphid islands in the field from where the aphid is able to spread out and quickly re-create high infestation levels over the field. Ground and air treatments must be applied so the spray swaths overlap slightly, and areas around fences, pole



Above—Winged adult spotted alfalfa aphid. Below—Wingless adult female spotted alfalfa aphid. Drawn by Celeste Greene.



lines, trees, ditches, and similar potential aphid islands must be treated.

3. Perhaps the most common reason for rapid reinfestation is the winged aphid's ability to move in huge numbers from heavily infested fields to neighbor-

ing alfalfa fields which have been recently treated. An alfalfa grower who does not take care of his fields greatly intensifies his neighbor's problem. Therefore, all heavily infested fields should be treated or destroyed.

Since the spotted alfalfa aphid appeared in California, it has settled into annual patterns of abundance so periods of high populations can be predicted with a certain degree of accuracy. In the Imperial, Coachella and Palo Verde Valleys the aphid is most destructive in the spring and again in the fall of the year. In inland areas of southern California and in the San Joaquin and Sacramento valleys the aphid is a problem from early summer to mid-fall. In coastal areas population peaks generally occur in late summer. In some coastal areas the aphid may not reach pest proportions at all unless there is a period of hot, dry weather.

Proper timing of insecticide application
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Insecticides and Rates per Acre for Spotted Alfalfa Aphid Control*

Material	Rates per acre	Remarks
Malathion	8-10 oz. by ground 10-12 oz. by air	Must not be applied within 7 days of cutting nor used at all on seed alfalfa.
Parathion	2-3 oz. by ground 3-4 oz. by air	Must not be applied within 14 days of cutting nor used at all on seed alfalfa. Preferred material on small seedling stands.
Demeton (Systox)**	2-4 oz.	For use on seed alfalfa only. Straw must not be fed to livestock. Where spider mites are also a problem, a rate of 6 oz. per acre is effective.
TEPP	1 pint 20% concentrate	For use in special cases only, and within 7 days of cutting when it is not possible to cut a few days early. Useful occasionally when chopping a little at a time for green feed. Not to be applied within 2 days of cutting.

* Warning: Parathion, demeton, and TEPP are hazardous materials and permits for their purchase and use must be obtained from the Agricultural Commissioner. Precautions stated on the label must be followed.

** Toxaphene as used for lygus bug control may be combined with demeton. Toxaphene alone will help suppress, but will not control heavy aphid populations. Toxaphene, 15% + DDT, 5% + Sulfur, 40% as used on seed alfalfa in a few areas will give adequate aphid control.

Ground sprayer with 16 low volume nozzles mounted on adjustable boom applying spotted alfalfa aphid treatment in southern California.



APHID

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tions is partially a matter of experience. It is difficult to base applications on aphid numbers because of difficulties encountered in making accurate counts and because of large variations in numbers from day to day and place to place within a field. Seedling plants are especially susceptible to injury and although one aphid will not kill a very tiny plant, treatments must be made when the population averages one—or more—aphid per seedling.

Damage can be prevented in hay fields by basing applications on the general appearance of low quantities of honeydew. This, plus an increasing aphid population, indicates the need for prompt treatment.

If aphids are counted, treatment is necessary when the count over the field averages approximately 20 to 40 aphids per stem. At times a lower population, which persists, even though not increasing rapidly in numbers, will have to be eliminated to prevent the gradual accumulation of honeydew. This pest seems to do better on the more succulent hay alfalfa than it does on seed alfalfa. It must not be allowed to defoliate or gum up seed alfalfa plants unduly with honeydew. The same general rules governing need for treatment on hay fields apply to alfalfa grown for seed production.

When insecticides are needed, application must not be delayed.

The alfalfa grower must keep aware of aphid development within his field. During critical periods, frequent inspections—preferably at two-day or, at the most, three-day intervals—are required. The plants must be examined gently because of the tendency of the aphid to fall or jump off the plant. The aphid prefers the lower leaves of the plant so they should always be observed.

If not used properly malathion—and particularly parathion—may cause severe mortalities among pollinating insects. When no bloom is present in the field usually there is little hazard. However, when there is a shortage of normal bee forage, they are attracted to aphid honeydew and to weeds in bloom within the alfalfa field. Tests have shown that both insecticides will kill bees present in the field at time of application, and that parathion will continue to kill bees coming into the field for a few hours after treatment. Applications of either material should be restricted to the hours when the bees leave the field in the evening until they return the following morning.

Beneficial insects which feed on the spotted alfalfa aphid—lady beetles, green lacewings, hover flies, and several other kinds of insects—are important factors in the control of the spotted alfalfa aphid. In most areas when weather conditions

are favorable for the aphid, the beneficial insects are not capable of holding the aphid in check. However, the beneficial insects help delay and will occasionally prevent aphid build-up. Proper timing of treatment, and use of minimum amounts of insecticide for good aphid control, reduce the hazard to beneficial insects.

Systox, when correctly used on seed alfalfa, is relatively safe insofar as beneficial insects—except lady beetles—are concerned.

Sprays are more effective than dusts and reduce the problem of insecticide drift. Sprays applied by either air or ground equipment are satisfactory providing a thorough job of coverage is made. Airplane sprays are generally applied at rates ranging from five to 10 gallons of water per acre and the swath width should not exceed 35 to 40 feet. The use of flagmen is essential. Sprays with ground equipment vary greatly in gallonage of water applied per acre, but excellent results have been obtained with rates ranging from 10 to 20 gallons per acre applied at pressures of from 40 to 60 pounds per square inch.

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CUTTINGS

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mally open type. With this valve a power failure would simply mean a continuous mist. With a normally closed solenoid, on the other hand, a power failure would cut off the mist entirely, which—in a bed in the open sun—could soon result in the death of the cuttings.

An electrically operated timer—successfully used this past season—has two timers acting together. One timer turns the entire system on in the morning and off at night. The second timer operates the system during the daylight hours to produce an intermittent mist—at any desired combination of timing intervals—such as 40 seconds on and 60 seconds off. This type of control mechanism is relatively foolproof and while it does not automatically compensate for variations in humidity conditions, it can be adjusted closely enough to give entirely satisfactory results.

Various difficulties often arise in operating a mist propagating bed. One of these is the lack of sufficient water pressure to properly operate the nozzles. This can be overcome by installing a small electrically operated rotary booster

pump between the water source and the solenoid valve. If there is much sand in the water it is advisable to install filters in the supply line which will reduce clogging in the nozzles.

In propagating cuttings under mist it is essential that a well drained rooting medium, such as sand or vermiculite be used. In addition the bed should be raised or equipped with drainage tile, to provide for ready removal of excess water.

Moving the cuttings, once they are rooted, from the very moist conditions of the mist to a drier environment must be done carefully. This is probably handled best by gradually withholding the mist—decreasing the on periods and increasing the off periods—until the cuttings are able to survive without the mist. The rooted cuttings may then be potted or left in the rooting medium until the dormant season when they may be more safely dug.

Mist propagation permits the use of soft, succulent, fast growing cutting material taken early in the season which is often more likely to root than more mature hardened wood taken later in the season.

In tests at Davis the use of root-promot-

ing hormones—particularly indolebutyric acid—has been almost indispensable in obtaining satisfactory rooting of the species used, even under mist. Considering the ease of application and effectiveness in stimulating rooting, the concentrated-solution-dip method of application has been the most satisfactory to use. By this method a fairly concentrated solution, 4,000 ppm—parts per million—to 5,000 ppm of the chemical in 50% alcohol is prepared. The basal ends of the cuttings are dipped in this for about five seconds just before they are inserted in the rooting medium. If the cuttings have been prepared in advance it is advisable to make a fresh basal cut just before they are dipped.

An approximate 4,000 ppm solution of indolebutyric acid can be prepared by dissolving a level one fourth teaspoon of the pure crystals in three and one third fluid ounces of 50% alcohol. Rubbing alcohol can be used satisfactorily. This solution will keep indefinitely without losing its effectiveness but should be tightly sealed and stored in the dark.

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