Artichoke Plume Moth

chemical control now possible if applications of proper chemicals are correctly timed

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Commercial production of the globe artichoke is limited to several coastal counties—San Mateo, Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara—where approximately 8,000 acres are grown.

The greatest threat to production for a number of years has been the artichoke plume moth. The caterpillars of this moth—*Platyptilia carduidactyla* (Riley)—by boring into the artichoke buds have caused as high as 25% to 75% losses during the past several years.

The specialized nature of the crop—high cost of production, and high returns per acre—makes any reasonable degree of control economically feasible. A partial control is now available through the use of chemicals. Such a control is practical provided more than 10% of the crop is lost, but the full possibilities of control remain to be tested in commercial practice.

Damage to artichokes is caused by the burrowings of the larvae, which tunnel into the bracts, receptacles, and hearts of the buds. These blackened areas, and holes, together with frass, are characteristic of the feeding. Damaged buds are a complete loss, in addition to loss of time in sorting them out prior to packing. The larvae can also feed on the young interfolded leaves in the centers of the plants or can bore inside the leaf stalks. Damage can thus occur to young plants.

Pupation occurs on the buds, leaves, or inside the stems. The buff-colored adults are rarely seen in artichoke fields as they fly during the day only if flushed from the plants. Adults hold the wings in a horizontal manner, with the divided hind wings folded up under the fore wings. Eggs are laid toward evening or at night on the undersides of the woolly leaves, rarely on the buds. The young larvae migrate to the bases of the plants and enter a developing bud if present, or feed on the young foliage and later bore into the stems.

A knowledge of the seasonal cycle of this moth is important to a good chemical control as timing of applications is very critical. All stages of this moth can be found during every month of the year. The plants are usually cut off entirely, below the ground level, from April through June. Moths present in the fields at this time lay eggs on the new shoots.

Artichoke showing damage caused by a larva of the plume moth, and a mature larva.

This starts the *summer brood* which usually completes its cycle before the commercial production of buds. These worms bore inside the stems and cause little damage. A *fall brood* starts in September, and the worms cause commercial damage to buds during October, November, December and January. A third or *spring brood* starts in December and extends through to the time the plants are cut again.

Past research demonstrated that control was possible through the use of certain sanitation practices. These include quick and thorough removal of the cut plants during the summer, removal of the native host plants—thistles of the genus *Cirsium*—and the destruction of all wormy artichokes at the packing sheds. In actual practice sanitation practices have proved of limited value. Chemicals available in the past also proved inadequate.

Tests conducted during 1949 at Half Moon Bay and vicinity indicated that certain of the newer chemicals were effective in controlling the summer brood on the small plants. With this lead applications were directed against the fall brood and several acres of experimental trials demonstrated the value of the applications.

In 1950 further experiments against the fall brood substantiated the 1949 results, and three growers obtained satisfactory controls under commercial practices. Residue studies were made at this time to determine the safety of insecticide applications to control the fall brood.

Control

Results to date have shown that sprays and dusts of parathion, parathion-DDT, and lindane are effective in controlling the worms. Applications against the summer brood are only feasible if plants are not cut or if replants are made with stumps so that artichokes are produced during August. Applications should be made for the summer brood on approximately June 15, June 30, and July 15. The third application on July 15 may not be necessary under all conditions. The first application should be made when not over 10% of the eggs are hatched.

For the fall brood, where control should be directed under most growing

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Control of Summer Brood Larvae of the Artichoke Plume Moth in Replicated Plots in Two Fields at Half Moon Bay during 1949.

Treatment	Rate per 100 gallons spray or as indicated	Average per cent control	
		Field No. 1	Field No. 2
DDT spray	4 lbs. 50%	74.8	81.6
Lindane spray	2 lbs. 25%	91.9	97.9
Aldrin spray	4 lbs. 25%	50.7	79.9
Dieldrin spray	4 lbs. 25%	70.0	19.2*
Parathion spray	4 lbs. 25%	95.7	100.0
Aldrin dust	2.5%	58.6	35.8
Parathion dust	2%	97.6	99.3

* First application omitted.
Sprays applied at rate of 68–84 gallons per acre, dusts at 30 pounds per acre.

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conditions, two applications are necessary—about August 30 to September 2, and about September 20. A third application may be possible or necessary depending on the time the plants are cut and the presence of buds.

As no adequate spray equipment is available in most areas, dusts should be used. In these experiments the best control was obtained with a 2% parathion dust, or a combination dust of 2% parathion and 5% DDT. Dusts should be applied at the rate of 30 pounds per acre for the summer brood, and 40 to 50 pounds per acre for the fall brood. Lindane should be applied to artichokes in restricted quantities until the full effects upon artichoke quality are determined. Both parathion and lindane may cause burning to artichoke stems or foliage if applied heavily and unevenly.

Control with parathion lasts from three to four months. To date no adequate means of controlling the spring brood has been found, due to greater residue hazards, and the difficulty of entering fields during the rainy season.

If the dusts are applied properly control is possible, but two points are important:

Power duster showing proper arrangement of nozzles for control of the plume moth.

1. It is necessary to time the applications. This was done in the experiments by caging individual artichoke plants and following the brood development in detail. It is often difficult to determine broods in the field.

2. It is necessary to cover all parts of the plants, and force the dusts into the centers of the plants. This has been possible only through the use of several nozzles per row—six are preferable—so placed that all parts of the plants are covered.

The results of the 1950 residue experiments indicated that the use of parathion or lindane dusts does not constitute a dangerous health hazard if precautions are taken. New regulations based upon these results provide that in San Mateo County parathion can be applied up to 15 days of harvest. Lindane and DDT should not be applied within 30 days of harvest.

Growers must take adequate precautions outlined by the manufacturers of these chemicals in applying them, and workers should not enter fields and expose themselves to residues, particularly parathion, for a week following application.

State rules and regulations govern the use of parathion and certain other chemicals, and for this reason growers should acquaint themselves with these laws by contacting the agricultural commissioners in their respective counties.

Control of Fall Brood Larvae of the Artichoke Plume Moth in Replicated Plots, Half Moon Bay, 1950.

Treatment	Average per cent wormy artichokes at several time intervals				
	Oct. 16	Oct. 23	Nov. 3	Nov. 15	Dec. 1*
No treatment	28.3	31.7	28.2	26.9	36.8
Parathion 2%, DDT 5% dust	6.8	9.6	9.2	11.1	20.4
Parathion 2% dust	4.2	8.6	6.8	10.5	24.1
Lindane 1% dust	7.3	16.9	11.4	14.1	32.8

* Plants "drowned out" at this time, no further counts possible. Dusts applied at rate of 38 to 49 pounds per acre on August 31 and September 21, 1950.

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The use of soluble organic and inorganic fertilizers is being studied with a number of common lawn grasses and mixtures. Watering and mowing practices, especially height of cut, are under investigation both from the standpoint of drought tolerance and depth of rooting, and from the standpoint of weed encroachment. Ideal management practices are sought for the maintenance of the best turf for lawns and recreation areas.

Studies in nursery management include the propagation of ornamentals in cold frames with emphasis on the use of root promoting substances, controlled humidity, propagating media, and supplemental bottom heat during the winter.

The fertilizing and the growing of nursery materials are being investigated. The standardized soil mix developed in the University of California, Los Angeles, is being tested for the growing of ornamentals as a possibility of eliminating a variety of mixtures for different plants. The merits of liquid feeding of organic or inorganic fertilizers are being studied for a large variety of nursery materials.

Labor saving for the nurseryman and the propagator is receiving considerable attention. Semiautomatic controls of humidity in propagating beds are being studied as a means of eliminating frequent syringing of cuttings during periods of low humidity. The use of Skinner systems, sprinkler systems, constant water levels, and injection methods for canned plant materials in lath houses is being studied as means of eliminating the expensive and inefficient hand watering commonly used in nurseries.

Commercial floriculture research stresses production and handling problems of commercial flower crops. Under investigation is the effect of spacing in the bench upon quality, production, and bottom breaks of roses. The length of time required at all seasons between rose crops is being determined; and the inbreeding of white roses is being investigated in an effort to build up superior inbred lines which can be used for parents in rose breeding.

The advisability of year round production of chrysanthemums in California is under study along with controlled spray formation and the timing of bloom. Other projects being studied or considered are problems involved in long term storage and shipping of cut flowers, the use of a standard soil mix, mulches for roses, labor saving methods of watering and humidity control in the greenhouse.