

IN RECENT years leaf miners have been responsible for serious losses to field-grown asters in the Los Angeles area.

The mines or burrows of the larvae mar the appearance of the foliage, and if very numerous reduce the market value of the flowers. In 1947 the damage was so extensive that some growers were unable to sell the flowers from one or more of their plantings.

Asters are subject to attack from a number of species of leaf miners, but at the present time, only one species—*Liriomyza flaveola* (fallen)—appears to be of economic importance in this area. The adult is a very small fly with a yellow spot on the thorax.

The adults feed on the upper surface of the leaves and their presence is indicated by their feeding punctures which appear as small, light colored spots. The eggs are laid in the leaves and the larvae make winding or serpentine mines. In a heavy infestation there may be many larvae in a leaf with the mines running together to form a large blotch which may even cover the entire leaf and petiole.

Field observations indicate that during the summer the life cycle is completed in approximately a month. At first the infestation seems to be confined to the lower leaves, but later generations of adults may lay most of their eggs in the new foliage with the infestation thus moving progressively upward.

Control in the early stages is important. Once there is a heavy infestation in the upper leaves very little can be done except to try to prevent the spread to later plantings. A spray applied at this time might prevent further build-up but would have no effect on the mines already in the leaves.

Chlordane

During June and July 1947, chlordane was tested under severe conditions.

In a heavily infested field of King asters, parts of three different plantings received two applications of a spray containing $2\frac{1}{4}$ pounds of actual chlordane per 100 gallons. At the time the first spray was applied the mines were very numerous in the bottom leaves and adults were present in great numbers. The second spray was applied three weeks later.

Examination a month after the first application and just prior to cutting showed an average of 5.9, 1.5, and 1.0 larval mines per flower stem in the sprayed parts and an average of 41.2, 47.5, and 35.4 larval mines per flower stem, respectively, in the unsprayed.

In the sprayed parts the foliage was green and in good condition,

Aster Leaf Miner

chlordane and benzene hexachloride promising as control insecticides

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while in the unsprayed parts many of the lower leaves on the flower stems were dried and the mines so numerous in the upper foliage as to seriously affect the market value of the flowers.

The difference between the sprayed and unsprayed parts was apparent at the time of the second application and the grower then sprayed the rest of his later plantings using the same formulation. This single spray, applied when the adults were very numerous, gave very good control, but in the latest plantings a heavy infestation of the leaf miner again built up in four to five weeks.

The latest plantings had not attained their full growth at the time the spray was applied and this indicates that repeated applications are necessary on growing plants.

Further Tests

In further tests using small replicated field plots, several forms of chlordane, a benzene hexachloride dust, and sprays

containing Toxaphene and Thiophos 3422 were used. The dusts were applied at weekly intervals and the sprays at two- to three-week intervals.

The plants received from one to four treatments, depending on whether a dust or a spray was used and on the size of the plants at the time the treatments were begun.

On the basis of these tests it appears that chlordane sprays and dusts, and benzene hexachloride dust, will give satisfactory control of the leaf miner provided they are applied at regular intervals in order to keep the new foliage protected.

The benzene hexachloride also appeared to give much better control of white fly than chlordane. While both Toxaphene and Thiophos 3422 showed promise against the leaf miner, they were not tested extensively enough to suggest their use at this time.

None of the materials tested caused any injury to asters.

Chlordane was used on Rainbow, King and Giant asters; benzene hexachloride dust on Rainbow and King; and Thiophos 3422 and Toxaphene on King and Giant.

The sprays were applied with a small power sprayer using a gun with a No. 3 disk at approximately 300 pounds pressure. The dusts were applied with a small wheelbarrow type power duster.

Dusts

For those growers who prefer dusts, weekly applications of a benzene hexachloride dust containing three-fourths of 1%—0.75%—of the gamma isomer is suggested. The benzene hexachloride is suggested in preference to chlordane because of the better control of white fly obtained.

Applications should begin when the plants are small and before the infestation has a chance to build up. The dust should be applied at the rate of approximately 100 pounds per acre. Rather heavy applications were used in the experimental work and this amount is suggested until it has been shown that smaller amounts will give effective control.



Larval mine in aster leaf.