U. S. FOREST SERVICE
RESEARCH NOTE PSW- 102

PACIFIC SOUTHWEST
FOREST & RANGE EXPERIMENT STATION
Berkeley, California 1966

Malathion Aerial Spray Controls the Pine Needle-Sheath Miner

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ABSTRACT: A water emulsion malathion spray, applied by helicopter at the rate of 1 lb. of insecticide in 25 gallons of water, effectively controlled the pine needle-sheath miner (*Zelleria haimbachi* Busck). Numbers of insects in the sprayed area were reduced by 98.6 percent 24 hours after treatment.

The pine needle-sheath miner (Zelleria haimbachi Busck) can be satisfactorily controlled with an aerial spray of malathion. This control was demonstrated in late May 1965 at the Institute of Forest Genetics, Placerville, Calif., where a persistent outbreak of Zelleria threatened serious damage to many of the young pines in the plantations there. The plantations include many valuable pine species and hybrids being used in genetic and other studies. Some of the trees are virtually irreplaceable; their protection is of critical importance.

The needle-sheath miner is widely distributed over the United States and Canada. It has a single annual generation, overwintering in the first larval instar as a needle miner. Shortly after the new needles begin to elongate in the spring, the larvae abandon their overwintering locations and begin feeding on the tender growing portion of the new needles by cutting a hole in the needle sheath.

Although the insect is not generally a serious pest, heavy populations can nearly wipe out the current year's foliage. Repeated heavy defoliation over several years will kill tips and reduce stem diameter growth--particularly in young trees. Persistent heavy infestations are rare, but the outbreak at Placerville had caused severe defoliation for 2 successive years. And the large numbers of overwintering larvae made it clear that defoliation would be severe again in 1965.

In earlier tests at the Institute, malathion proved effective against Zelleria when applied as a high-volume water emulsion spray with a hydraulic sprayer.[1] However, many trees in

[1] Stevens, Robert E. Biology and control of the pine needle-sheath miner, *Zelleria haimbachi* Busck (Lepidoptera: Hyponomeutidae). U. S. Forest Serv., Pacific SW. Forest & Range Exp. Sta. Tech. Paper 30, 20 pp., illus. 1959.

the plantations were now too tall to reach with ordinary ground equipment. Therefore an aerial application was considered necessary to reach the tops of the trees. The objective of the spraying would be to minimize defoliation in portions of the plantations that had already been hard hit. This was to be accomplished by killing the larvae before they were able to do much feeding. Parasites, which are an important natural control factor in Zelleria, could not be relied on for help as most of them kill their hosts only after the larval feeding period is finished.

Spray Formulation and Application

A water emulsion spray of malathion was formulated to provide 1 lb. of the insecticide in 25 gallons of water. The spray was applied by helicopter on May 27, 1965, at the rate of 25 gallons per acre. Eight acres were treated. The helicopter flew from a site next to the plantations. The work took about 1 hour.

At the time of spraying, all the larvae had abandoned the overwintering mines and were mining the needle sheaths; some were already well developed and in the final larval instars. An estimated 20 percent of the total potential defoliation had already occurred by the time the spray was applied.

Results and Discussion

The results of the treatment were evaluated by counting live larvae on selected branches in the sprayed area and in an adjacent unsprayed check area. Prespray counts made the day before spraying and postspray counts made 24 hours after spraying showed the following:

Treatment:	Number live larvae in 100 tips (prespray)	Number live larvae in 100 tips (postspray)	Reduction (percent)
Sprayed	703	10	98.6
Check	695	673	--

The treatment was highly effective in reducing the needle-sheath miner population and in reducing defoliation. Spraying several days earlier most likely would have prevented practically all defoliation.

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