Control of a cone moth with dimethoate and azinphosmethyl

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The cone moth, *Eucosma tocullionana* Heinr., infests second year cones of white pine, *(Pinus strobus);* Virginia pine, (P. *virginiana) ; and* possibly other pine species. In superior tree seed orchards it can become a major pest causing serious economic loss. For example, second year cone crop losses on one Virginia pine seed orchard in the North Carolina Piedmont averaged about 50 percent for 1971, 1972, and 1973 in untreated areas. Reported here are the results of 1973 field tests of dimethoate (Cygon®. 0,0-Dimethyl S-(N-methylcarbamoyl methyl) phosphorodithioate) and azinphosmethyl (Guthion®. 0,0-Dimethyl S-[(4-OXO-1, 2, 3-benzotriazin-3 (4H)-yl) methyl] phosphorodithioate) for controlling *E. tocullionana* on Virginia pine.

Materials and Methods

This test was conducted on a 13-acre Virginia pine seed orchard at the Edwards State Forest Nursery, Morganton, N.C. Twenty clones are represented in the orchard with ramets ranging in age from 8 to 11 years. The orchard is divided into, circa 0.15-acre subunits containing one ramet from each clone on a 15- x 30-foot spacing. Ramets within each subunit are randomly distributed; the only restriction being that individuals from the same clone are never adjacent to each other.

For this test, the orchard was divided into four approximately equal blocks to which the treatments were assigned at random. Treatments consisted of one application of 0.2 percent azinphosmethyl, one and two applications of 0.125 percent dimethoate, and a control. All spray blocks were treated on May 9 and 10, 1973. The second dimethoate spray was applied on May 23, 1973. Tree crowns were sprayed to the point of run-off with a hydraulic sprayer.

Previous experience with *E. tocullionana* in this orchard had shown a strong clonal influence in the insect attack pattern. Four clones known to be highly susceptible to attack were selected for sampling. All of the ramets from each of these clones in a treatment block were used as sample trees. The number of sample trees per clone per treatment varied from 5 to 14 (average 10.18).

All second year cones on sample trees were examined for insect damage prior to spraying. The final inspection was made during the last week in July 1973 after all *E. tocullionana* larvae had pupated. Data were based on a 100 percent count of all healthy and infested cones on each sample tree and the percentage infested was calculated for analysis. Infested cones were collected and examined to determine the causal agent.

For analysis, the data were handled as for a completely randomized design with one classification variable. Because clones were known to vary in susceptibility to attack, clones within treatments were considered replications. This was based on the assumption that the insect population distribution was homogeneous within the test area. There were, therefore, four replications, i.e., observations, for each of the four treatments. The transformation $Y = \arcsin \sqrt{X}$ was used to equalize the variance of the original percentage data.

Results and Discussion

The percent of cones infested by *E. tocullionana* for each treatment was as follows: control, 39 percent; azinphosmethyl, 9 percent; one application of dimethoate, 34 percent; and two applications of dimethoate, 10 percent. The hypothesis that the variances within treatments are homogeneous was accepted. An analysis of variance showed that only azinphosmethyl and the double application of dimethoate significantly ($\alpha = .05$) reduced the degree of damage but there was no evidence as to which one was better.

Substantial rainfall immediately following both applications (rainfall of .75 inch and .45 inch occurred during the 24-hour periods ending at 8:00 a.m. on May 11, 1973, and May 24, 1973, respectively) probably reduced the effectiveness of the pesticides. An additional improvement in the performance of the pesticides probably could be achieved by more accurate timing of the sprays.