

# CONTROL OF THRIPS ON CHRYSANTHEMUMS GROWN FOR CUT

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Azodrin and Temik were the most effective materials for control of thrips on chrysanthemums in these tests. Both materials gave quick and long-lasting control.

**F**LOWER THRIPS, *Frankliniella* sp., is the most serious pest, and the one most difficult to control, on chrysanthemums grown in glass or plastic greenhouses in the coastal areas of southern California. Flower thrips are generally considered to be most numerous in the spring or early summer, with the most serious damage occurring at the time the native vegetation dries up. While this is true in some areas, high populations can occur in other areas at any time from March or April through October—as indicated in the graph of thrips population in a chrysanthemum range at El Modeno in Orange County. The counts refer to the average number of immature thrips per flower. The data were obtained by collecting 25 white and 25 yellow fully open flowers each week and extracting the thrips in modified Berlese funnels. The counts of both adult and immature thrips were made with a dissecting microscope. Experience indicates that

the threshold for damage on chrysanthemums is from 10 to 20 immature thrips per flower.

## Contact insecticides

Control of flower thrips with contact insecticides has not been very satisfactory on chrysanthemum because of the difficulty of reaching the thrips inside the buds and flowers. Dimethoate, a systemic insecticide which has given good control of thrips on carnations, cannot be used on chrysanthemums because of severe plant damage. Fifteen insecticides, both systemic and nonsystemic, were tested on chrysanthemums from 1962 to 1965. On the basis of these experiments three systemic insecticides—Azodrin, Furadan and Temik—were selected for further testing in 1966 and 1967, and two new insecticides, Abate and Lannate, were included in the experiments.

## Test plots

The plants were grown in standard ground beds approximately 40 inches wide, and were maintained by the grower. Test plots were 7 ft long and a randomized block design was used. Temik was applied by sprinkling the granules over the tops of the plants with shields to prevent the granules from falling outside of the beds. The other materials were applied as full coverage sprays.

There were three replications in the 1967 El Modeno experiment. The treatments were made when the flowers were fully open. Sprays were applied with a

compressed air hand sprayer at 35 psi pressure. A Spraying Systems 4502 TeeJet tip was used and the open blooms were thoroughly sprayed.

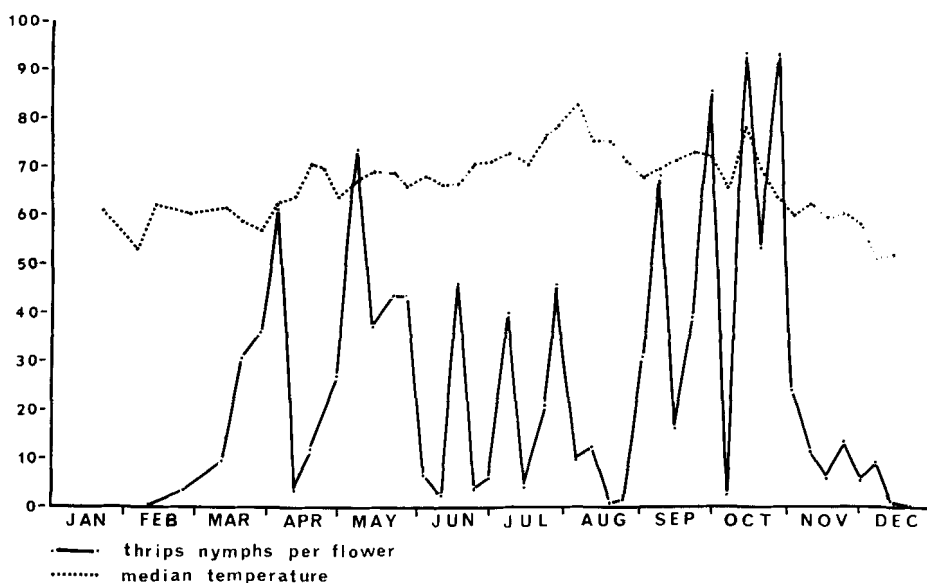
In the other experiments there were 4 replications, and the treatments were made when the buds were showing color. Sprays were applied with a power sprayer at 250 psi pressure using a rod equipped with a Spraying Systems 5003 TeeJet tip. Materials, rate of application, and dates of application are shown in tables 1-4.

## Weekly samples

Weekly samples of flowers for thrips counts were collected, beginning at the time the first flowers were cut. From five to 20 flowers per plot were taken depending on the number of open flowers available. Sampling continued as long as flowers could be found in the plots. Thrips were extracted from the flowers in modified Berlese funnels. The effectiveness of the materials was evaluated on the basis of the average number of immature thrips per flower. Immature thrips were counted since their numbers indicated the extent to which the thrips had been breeding in the flowers.

A separate phytotoxicity test with Azodrin was conducted in 1967. Sixteen varieties, both standards and pom poms in ground beds, were sprayed on Aug. 8, Aug. 21, and Sept. 8 by the grower. The Azodrin (5 lbs/gal EC) was applied as a full coverage spray at the rate of 0.75 pint per 100 gallons of water.

# FLOWERS



## Best materials

The results of the experiments are summarized in the tables. Azodrin and Temik were the most effective materials. Azodrin gave a quick and long-lasting control. Temik appeared to take about two weeks to become effective, but after that it compared favorably with Azodrin. This delay in effectiveness was probably due to the method of application.

Furadan gave good initial control but did not have the residual effectiveness of Azodrin and Temik. Lannate needs to be tested more thoroughly as populations

were low in the two experiments in which it was used. Abate, a nonsystemic insecticide, was not significantly better than the check in the single experiment in which it was tested.

## No damage

None of the materials caused any significant plant damage in any of the experiments—not even to open blooms in the 1967 El Modeno experiment. The varieties sprayed three times with Azodrin without injury were: Copperhead, No. 2 Copperhead, Fred Shoesmith, Yel-

low Shoesmith, White Iceberg, Yellow Iceberg, Bronze Spider, Dunlope's White Spider, Imperial, Imperial Yellow Hurricane, Starburst, Jack Straw, Detroit News, Pink Champagne, Nightingale, Tuneful, Yellow Knight, and Pink Pom.

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TABLE 1. EFFECT OF AZODRIN, TEMIK AND FURADAN\* ON FLOWER THRIPS (FRANKLINIELLA sp.) POPULATIONS IN CHRYSANTHEMUM FLOWERS. VARIETY: WHITE ICEBERG. TREATED: JUNE 9, 1966, ENCINITAS, CALIFORNIA.

Material and Rate	Days after treatment		
	14	21	28
	Ave. no. immature thrips per flower		
Azodrin, 5 lbs./gal. EC, 1 pint/100 gal.	0.3 a†	0.3 a	1.7 a
Temik, 10% granular, 40 lbs./acre	21.6 bc	1.9 ab	1.1 a
Furadan, 50% w.p., 1 lb./100 gal.	6.5 ab	5.9 bc	24.8 b
Check	67.9 c	9.6 c	33.2 b

\* Azodrin is 3-hydroxy-N-methyl-cis-crotonamide dimethyl phosphate; Furadan is 2, 3-dihydro-2, 2-dimethyl-7-benzofuranyl methyl carbamate; and Temik is 2-methyl-2-(methylthio) propionaldehyde O-(methylcarbamoyl) oxime.

† In each column, numbers followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

TABLE 3. EFFECT OF AZODRIN, LANNATE\* AND TEMIK ON FLOWER THRIPS (FRANKLINIELLA SP.) POPULATIONS IN WHITE ICEBERG CHRYSANTHEMUM FLOWERS TREATED JULY 18, 1967, EL MODENO.

Materials and rate	Days after treatment	
	7	14
	Ave. no. immature thrips per flower	
Azodrin, 5 lbs./gal. EC, 1 pint/100 gal.	1.2 a†	2.0 a
Lannate, 90% w.p., 0.5 lbs./100 gal.	2.5 ab	8.6 ab
Temik, 10% granular, 40 lbs./acre	1.4 a	19.0 bc
Check	3.7 b	26.3 c

\* Lannate is methyl N-[(methyl carbamoyl)oxy] thioacetimidate.

TABLE 2. EFFECT OF ABATE,\* AZODRIN, FURADAN AND TEMIK ON FLOWER THRIPS (FRANKLINIELLA sp.) POPULATIONS IN YELLOW ICEBERG CHRYSANTHEMUM FLOWERS TREATED JULY 21, 1966, ENCINITAS.

Material and Rate	Days after treatment		
	14	21	28
	Ave. no. immature thrips per flower		
Azodrin, 5 lbs./gal. EC, 1 pint/100 gal.	0.2 a†	1.6 a	1.8 a
Temik, 10% granular, 40 lbs./acre	0.8 b	2.3 a	7.1 ab
Abate, 6 lbs./gal. EC, 0.75 pint/100 gal.	3.1 d	3.9 ab	12.1 bc
Furadan, 50% w.p., 1.5 lbs./100 gal.	1.8 c	17.2 b	15.2 bc
Check	3.1 d	6.1 ab	13.6 c

\* Abate is 0,0-dimethyl phosphorothioate 0,0-diester with 4, 4'-thiodiphenol.

TABLE 4. EFFECT OF AZODRIN, LANNATE AND TEMIK ON FLOWER THRIPS (FRANKLINIELLA SP.) POPULATIONS IN WHITE ICEBERG CHRYSANTHEMUM FLOWERS TREATED JULY 27, 1967, ENCINITAS.

Material and rate	Days after treatment	
	21	28
	Ave. no. immature thrips per flower	
Azodrin, 5 lbs./gal. EC, 1 pint/100 gal.	0.03 a†	0.33 a
Lannate, 90% w.p., 0.5 lbs./100 gal.	0.08 a	2.05 c
Temik, 10% granular, 40 lbs./acre	0.10 a	1.18 b
Check	0.16 b	5.43 d