# SOIL APPLICATION OF SYSTEMIC INSECTICIDES FOR MITE CONTROL ON CHRYSANTHEMUMS

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## ABSTRACT

Granular formulations of UC 21149 (Temik®), disulfoton (Di-Syston®), phorate (Thimet®) and CL 47031 were broadcast directly over bedded chrysanthemums. UC 21149 was the only compound that provided good control of the two-spotted spider mite, *Tetranychus urticae* (Koch). The higher rates of CL 47031 reduced the mite population somewhat, but also caused a considerable amount of marginal necrosis.

Rates of UC 21149 as low as 2 lbs active/acre provided very good mite control. Results also indicate that the effectiveness of UC 21149 is considerably reduced when the compound is combined with at least some fertilizers.


## INTRODUCTION

Chrysanthemums are plagued with many arthropod pests, but none are consistently as damaging as mites. In discussing the control of mites, Kelsheimer (1957) suggested three foliar applications of recommended miticides be made at weekly intervals and indicated that established and flourishing populations are hard to control. Neiswander (1962) was among the first workers to utilize soil applications of systemic insecticides for mite control on chrysanthemums. His work carried out on potted plants in the greenhouse, showed that phorate and disulfoton protected the plants from mite injury until they were in bloom and ready for sale.

Since soil applications of systemic insecticides usually require fewer applications, provide better control because coverage is not as critical and do not leave residues on the foliage, tests were started with field-grown chrysanthemums.

## MATERIALS AND METHODS

Tests were conducted with the cooperation of E. Rossi of Pineland Farms, J. Hoke of Arvida Flowers, Delray Beach, Fla. and E. Miller, Jr. of Miller Farms, Stuart, Florida. Plots consisted of 20 ft sections of 3 ft wide beds. Treatments were replicated four times.

Granular formulations of the compounds were applied directly over the plants with a shaker bottle. Overhead irrigation was utilized to dislodge most of the material that remained on the plants. The materials were not incorporated into the plant beds. Evaluations were made by picking 10 leaves of the same age from each plot and counting the number of mites observed. Except in the first test where a rating system was used, the average number of mites per leaf was used as an index. The mites found were identified as *Tetranychus urticae* (Koch) by H. Denmark, Division of Plant Industry, Florida Dept. of Agriculture.

## RESULTS AND DISCUSSION

A preliminary test was initiated on April 19, 1965 to determine the effectiveness of four

Table 1. Mite control resulting from a single application of granular systemic compounds to 12 week old chrysanthemums. Test 1.

| Treatment | Lbs AI/a | Average Rating * | |
|---|---|---|---|
| | | April 27 | May 6 |
| Check | | 5.37 d** | 3.47 d** |
| UC 21149 | 10 | 1.05 a | 1.15 a |
| UC 21149 | 20 | 1.00 a | 1.07 a |
| UC 21149 | 30 | 1.00 a | 1.07 a |
| UC 21149 | 40 | 1.00 a | 1.10 a |
| CL 47031 | 10 | 4.55 cd | 2.85 c |
| CL 47031 | 20 | 4.12 bc | 2.32 b |
| CL 47031 | 30 | 3.27 b | 1.95 b |
| Phorate | 20 | 4.65 cd | 3.90 e |
| Disulfoton | 20 | 5.00 cd | 3.32 d |

* Rating Scale: 1 = 0 mites per leaf; 2 = 1-4; 3 = 5-9; 4 = 10-24; 5 = 25-49; 6 = 50+

** Duncan's Multiple Range Test. Means followed by the same letter are not significantly different at the 5% level.

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Table 2. Mite control resulting from applications of granular UC 21149 at various dosages and intervals to chrysanthemums planted on Aug. 27, 1965. First insecticide application made on Sept. 16, 1965. Test 2.

| Lbs AI/a of UC 21149 per application | Treatment interval | Average No. mites/leaf | | | |
|---|---|---|---|---|---|
| | | Oct. | | Nov. | |
| | | 7 | 28 | 11 | 24 |
| 0.0 (check) | | 1.9 | 11.2 | 1.5 | 0.3 |
| 10 | 1 appl. | 0 | 1.1 | 6.4 | 0.8 |
| 10 | 6 wk | 0 | 0.9 | 0 | 0 |
| 5 | 3 " | 0 | 0.2 | 0 | 0.1 |
| 5 | 4 " | 0 | 0.1 | 0.1 | 0 |
| 2.5 | 3 " | 0 | 0.2 | 0 | 0.4 |
| 2.5 | 4 " | 0 | 0.1 | 0.5 | 0 |

Table 3. Mite control resulting from applications of granular UC 21149 at 3 dosages and 3 intervals to chrysanthemums planted on Nov. 10, 1965. First insecticide application made on Nov. 24, 1965. Test 3.

| Lbs AI/a of UC 21149 per application | Treatment interval | Average No. mites/leaf | | | | |
|---|---|---|---|---|---|---|
| | | Jan. | | | Feb. | |
| | | 6 | 13 | 21 | 4 | 11 |
| 0.0 (check) | | 2.0 | 5.0 | 8.5 | 2.6 | 3.6 |
| 5 | 3 wk | 0 | 0 | 0 | 0 | 0 |
| 5 | 4 " | 0 | 0 | 0 | 0 | 0 |
| 5 | 5 " | 0 | 0 | 0 | 0 | 0.1 |
| 2.5 | 3 " | 0 | 0 | 0 | 0 | 0.1 |
| 2.5 | 4 " | 0 | 0 | 0 | 0 | 0.1 |
| 2.5 | 5 " | 0 | 0 | 0 | 0 | 0.3 |

Table 4. Mite control resulting from 2 applications of granular UC 21149 made 5 weeks apart to chrysanthemums planted on Dec. 15, 1965. Test 4.

| Lbs AI/a of UC 21149 per application | Average Number mites/leaf | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Feb. | | | March | | | | |
| | 11 | 18 | 24 | 3 | 10 | 17 | 25 | 31 |
| 0.0 (check) | 0.8 | 9.5 | 25.3 | 23.4 | 20.5 | 35.9 | 91.9 | 57.7 |
| 1.5 | 0.0 | 0.3 | 0.1 | 0.9 | 1.0 | 4.4 | 8.6 | 3.9 |
| 3.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.5 | 0.8 | 0.4 | 1.3 |
| 4.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.3 | 0.1 | 0.4 |
| 6.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 1.0 | 2.7 | 3.6 |

compounds, two at various dosage levels, on 12 week old plants. Treatments were evaluated on April 27 and May 6. The results are given in Table 1.

Neither phorate nor disulfoton was effective in controlling the two-spotted spider mite. CL 47031 was somewhat effective, particularly at the highest level used, but caused considerable marginal necrosis. UC 21149 provided excellent control at all rates used.

Since UC 21149 was the only material that provided good control, two tests were designed to obtain data on the dosage of UC 21149 needed and the frequency of application necessary to provide control until harvest. The results are given in Tables 2 and 3.

The results of Test 2 show that a single application at 10 lbs active/acre will not provide seasonal control and indicate that a dosage under five lbs applied every 3-4 weeks would probably provide satisfactory control. This was substantiated in Test 3 where 2.5 and 5.0 lb rates were applied on a 3, 4 or 5 week schedule.

Since the mite population was not high in either test it was felt that additional data, obtained under conditions of high population pressure, would be desirable. Thus a fourth test was initiated on chrysanthemums planted on December 15. This test included a dosage series ranging from 1.5-6.0 pounds. Since there were no indications that the control was breaking down on those plots that were treated at five week intervals, only two applications were utilized, the first on January 21, the second on March 3 for the 1.5 lb rate and March 7 for the remaining treatments. The results are given in Table 4.

The results of Test 4 indicate that the 1.5 lb rate is probably not adequate to provide good control during periods of high population pressure. A possible explanation for the counts being higher in the 6.0 lb plots than in the 3.0 or 4.5 lb plots is that all of the 6.0 lb plots were either next to check plots or at the ends of rows, thus being subjected to greater influence from non-treated areas.

Since chrystanthemums are fertilized every 3-4 weeks, the possibility of combining the granular UC 21149 with the fertilizer was considered as a means of reducing application costs. To determine the effects of storage on this combination, a quantity of fertilizer was mixed with the necessary amount of UC 21149 so that both would be applied at the correct rates. This mixture was made up one week before application and also on the day of application. The remaining plots were fertilized two days after the UC 21149 was applied. The fertilizer used was an 8-6-6 with minor elements. The major ingredients were sulfate and muriate of potash, ammonium nitrate, superphosphate and natural organics. The results are given in Table 5.

It is evident that UC 21149 loses much of its effectiveness when mixed with fertilizer at least of this type, and stored for a week. A significant decrease in effectiveness is also noted when the material is mixed and applied the same day.

Table 5. Effects of UC 21149 fertilizer mixtures on mite control when applied to chrysanthemums planted on Jan. 19, 1966. Treatments applied on Mar. 3 and April 7. Test 5.

| Lbs AI/a of UC 21149 per application | Average No. mites/leaf | | | |
|---|---|---|---|---|
| | Mar. 31 | Apr. 7 | Apr. 15 | Apr. 21 |
| 0.0 (check) | 81.2 | 105.1 | 76.9 | 21.4 |
| 2.0 (a) | 6.1 | 24.6 | 10.5 | 21.9 |
| 2.0 (b) | 3.9 | 15.3 | 1.3 | 0.8 |
| 2.0 (c) | 1.5 | 3.2 | 0.9 | 0.8 |
| 1.5 (c) | 3.2 | 11.2 | 0.6 | 0.0 |
| 1.0 (c) | 8.3 | 11.5 | 0.6 | 0.0 |

(a) Mixed with fertilizer 1 week prior to application

(b) Mixed with fertilizer on the day of application

(c) Fertilizer applied on separate days

The results of the various tests show that control of the two-spotted spider mite can be obtained until harvest by using two applications of UC 21149, each at 2-3 lbs active/acre; the first 3-4 weeks after putting the plants in the beds and the second five weeks later. Applications should be made several days before or after fertilizer applications. Iceberg, Yellow Iceberg, Shasta, Yellow Shasta, Dillon Beauregard and Bluechip varieties have been treated with rates up to 10 lbs active per acre without any injury.

LITERATURE CITED

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# IN-THE-ROW AND BROADCAST APPLICATIONS OF SOIL FUMIGANTS FOR GLADIOLUS FLOWER PRODUCTION[1]

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ABSTRACT

Broadcast applications of Vorlex-201 and Vorlex at the rate of 35 gallons per acre increased gladiolus flower production 107 and 85 percent, whereas in-the-row applications (at 1/5 the broadast rate) yielded 41 to 67 percent, respectively, over the untreated controls. The test area was heavily infested with *Fusarium oxysporum* f. *gladioli*, *Stromatinia gladioli*, rootknot (*Meloidogyne incognita acrita*), sting (*Belonalaimus longicaudatus*), *stubby-root* (*Trichodorus christiei*) and stunt (*Tylenchorhyn-*

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