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Glossary of Pesticides

Common Name	Trade Name
trifluralin	Treflan
nitralin	Planavin
diuron	Karmex
fluometuron	Cotoran
norea	Herban
disulfoton	Di-Syston
phorate	Thimet
UC-21149	Temik

THE EFFECT OF COMBINATIONS OF PREEMERGENCE HERBICIDES AND SYSTEMIC INSECTICIDES ON COTTON STANDS AND YIELDS

By H. W. IVY and T. R. PFRIMMER[1]

Systemic insecticides applied at planting sharply reduce the need for applications of insecticides early in the season and thus eliminate much labor. Also, systemic insecticides applied in the seed drill at planting have generally provided good to excellent control of thrips (**Thripidae**) for 4 to 5 weeks. Figure 1 shows four plots of cotton treated with a common herbicide and the difference in the size of the cotton plants when a systemic insecticide was added to control thrips.

Researchers at many locations have shown that the phytotoxic properties of combinations of insecticides and herbicides may increase injury to the cotton above the level expected from the use of either chemical alone. This interaction between herbicides and systemic insecticides has been studied at the Delta Branch Experiment Station for four years. Results have been variable, primarily because unfavorable weather often influences stands and yields more than any combinations of pesticides.

The present study was therefore made to obtain additional information about the toxicity of combinations of herbicides and systemic insecticides to cotton and especially on their effects on emergence, growth, and yield. Specifically, the research was designed to find combinations that cause the least damage. Thus, trifluralin and nitralin (see glossary for common names and trade names of chemicals) were applied before planting and were incorporated into the soil with a ground-driven, double lawn mower reel, diuron, fluometuron, and norea were applied to the surface at planting, and disulfoton, phorate, and Union Carbide UC-21149, 2-methyl-2-(methylthio) propionaldehyde- **0** -(methylcarbamoyl)oxime, were metered into the seed furrow as granules. Stoneville 7A cottonseed treated with 3 oz of 2.2% cyano(methylmercuri) guanidine and 10 oz. of a 65% formulation of chloroneb per hundred weight of seed was planted. The experiment was conducted as a split-plot design with 56 treatments consisting of 14 herbicides (main plot treatments) and four insecticides (sub-plot treatments) replicated six times using plots two rows wide and 55 feet long.

Results and Discussion

No valid measure of comparative weed control was obtained in the study. All herbicides were applied at the rate recommended by the Mississippi Weed Committee, and all treatments provided good to excellent control. However, plots treated with both preplanting and preemergence herbicides generally had slightly better control than plots treated with either herbicide alone though such differences were too small to permit valid measurement.

The predominant weeds were annual grasses and the greatest improvement in control obtained when both preplant and preemergence herbicides were used occurred in fields infested with annual grasses and broadleaf weeds, especially when large seeded broadleaf weeds such as morningglory and prickly sida (teaweed) predominated.

Thrips counts were made on three dates to obtain a comparative evaluation of the insecticides treatments. Table 1

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Table 1. The effect of insecticide, herbicide treatments at planting on stand, thrips population, and yield of cotton. Stoneville, Mississippi, 1967.

Insecticide in drill	Hills/acre	Plants/acre	Seed cotton	Thrips/10 plants		
lb/acre	July 5	July 5	lb/acre	5/18	5/25	6/5
Phorate, 0.75	6101c[a]	27335b	2326c	5.6b	11.3b	8.4b
Disulfoton, 0.75	6231b	32447a	2456b	5.0b	9.5b	6.4b
UC-21149, 0.75	6046c	23303c	2611a	1.1c	3.0c	2.9c
None	6322a	33418a	2069d	13.4a	16.3a	19.8a

[a]Values in a column followed by a common letter are not significantly different at the 5% level of confidence (Duncan's multiple range test).

shows that UC-21149, phorate, and disulfoton, each at 0.75 lb/acre, significantly reduced populations below that of the control (untreated), and UC-21149 gave significantly better control than disulfoton or phorate. Since the tests were made during adverse weather when timely application of postemergence insecticides would not have been possible, the benefit from the systemic insecticides is apparent.

The average yield of all plots treated with UC-21149 was 2611 lb. seed cotton/acre, an increase of 542 lb./acre over untreated plots (Table 1). Yields in plots treated with disulfoton and phorate were less than those treated with UC-21149 but all were significantly higher than those from plots receiving no insecticide.

As shown in Figure 2, higher yields were produced by preplant treatment with nitralin than with trifluralin, regardless of the insecticide used. Yields with nitralin were also generally higher than those obtained by preemergence treatment with fluometuron or diuron though the yields resulting from preemergence treatment with norea closely approximated those obtained with nitralin. Diuron was generally the optimum preemergence herbicide for use with preplant applications of either trifluralin or nitralin, and plots treated with trifluralin + diuron produced higher yields than those treated with nitralin + diuron, regardless of the insecticide used. Also, highest yields were produced by using UC-21149 with all herbicides except fluometuron.

When no insecticide was applied, treatment with trifluralin + diuron resulted in higher yields than preemergence treatment with norea or fluometuron after preplant treatment with trifluralin. Similarly, the combination of nitralin + diuron resulted in higher yields than were obtained with either of the other preemergence herbicides. No significant difference in yield was found between treatments with trifluralin and nitralin when no insecticide was applied.

When disulfoton was used as the insecticide, treatment with trifluralin + diuron resulted in higher yields than treatment with trifluralin + norea or trifluralin + fluometuron. When diuron and fluometuron were used with nitralin and disulfoton, the yield was better than when norea was used with nitralin and disulfoton.

When phorate was used as the insecticide no significant differences in yield were apparent when trifluralin was used as a preplanting treatment, regardless of which preemergence treatment was used. However, with phorate + nitralin, higher yields were produced when diuron was used as a preemergence treatment than when norea or fluometuron were so used. Use of trifluralin in combination with norea or fluometuron, after treatment with phorate, produced higher yields than the same combinations with nitralin. However, trifluralin and nitralin used with diuron after treatment with phorate produced essentially equal yields.

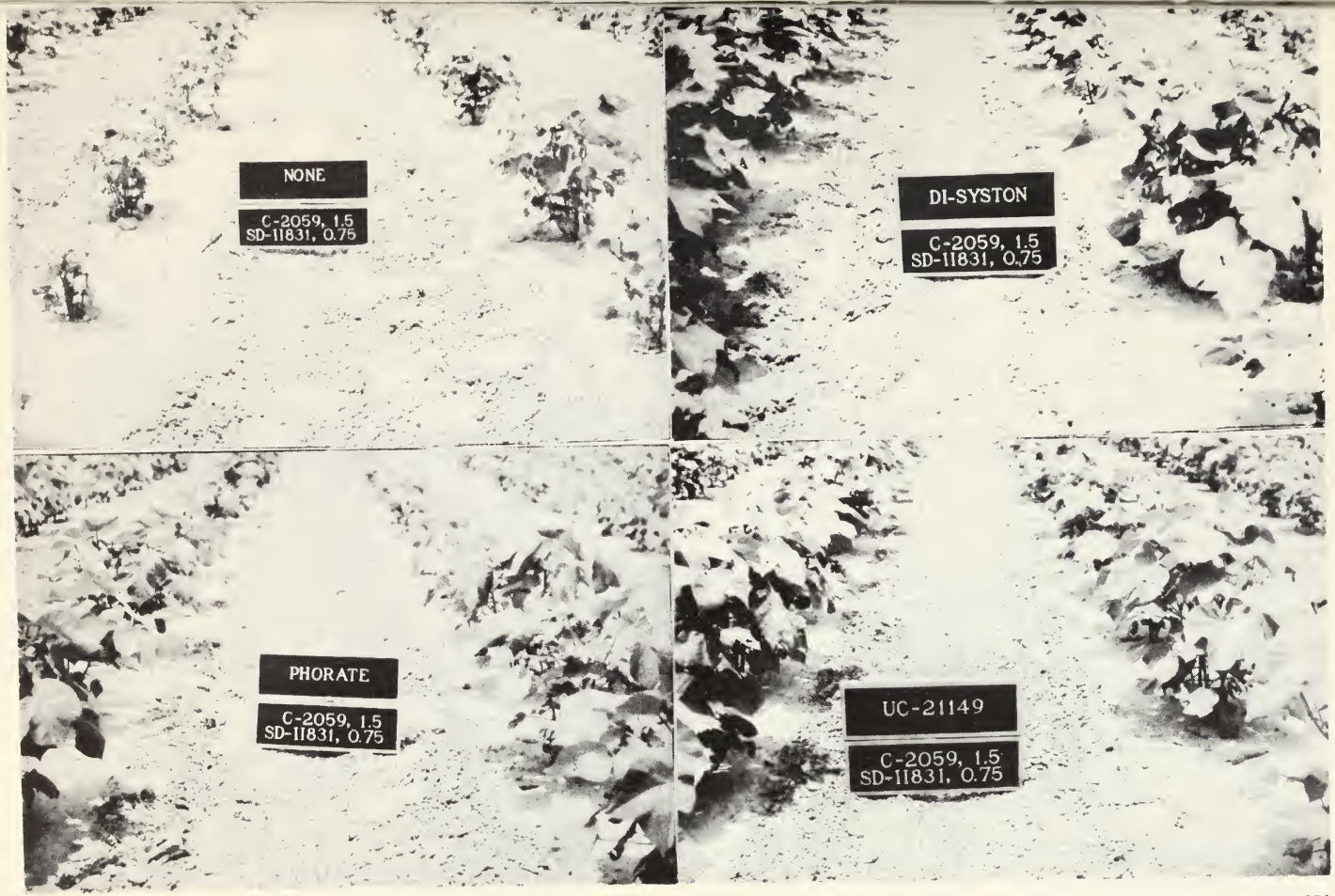

Figure 1. All plots were treated with the same herbicide fluometuron, 1.5 lb/acre (C-2059) + nitralin, 0.75 lb/acre (SD-11831). Note increased growth in plots also treated with phorate, disulfoton (Di-Syston), and UC-21149 as a result of thrips control.

As previously indicated, highest yields were generally produced in plots treated with UC-21149. When this insecticide was used, treatment with trifluralin + diuron produced higher yields than either norea plus trifluralin or fluometuron + trifluralin. Also, with this insecticide, nitralin + diuron and nitralin + fluometuron produced essentially equal yields, and nitralin + diuron produced yields significantly higher than those produced by nitralin + norea.

The stands were affected by the combinations of herbicides and systemic insecticides. Plots receiving no insecticide averaged 33,000 plants/acre compared with 32,000 plants/acre in plots treated with disfulfoton, but phorate and UC-21149 significantly reduced the stands. However, even though many treatments reduced stands 10,000 and 12,000 plants/acre, they were not generally reduced sufficiently to have any effect on yields.

Combinations giving lowest stands were trifluralin + norea + UC-21149, nitralin + norea + UC-21149, norea + UC-21149, nitralin + UC-21149, nitralin + fluometuron + UC-21149, and trifluralin + diuron + UC-21149.

A significant interaction occurred between the herbicides and the insecticides on the yield of seed cotton and the stands. However, additional information is needed on the compatability of systemic insecticides and herbicides to permit use of those combinations that are most advantageous. The present data indicate interesting trends, but additional work is needed to verify the indications.

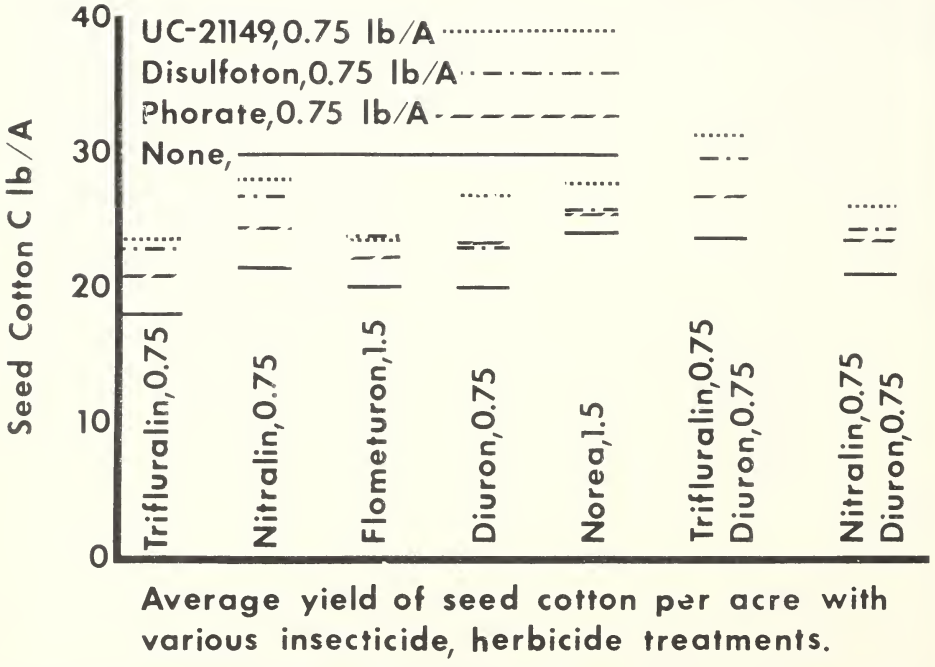

Figure 2. Note high yield from plots treated with UC-21149. In this study, thrips count was the variable that best correlated with yield.