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Systemic Insecticides for Thrips Control on Peanuts

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THRIPS ARE VERY small insects, dark in color, and about 1/25 inch long. When disturbed, they move quickly with a hopping or jumping motion. The immature thrips (nymphs) are light in color and are smaller than the adults. They are also highly evasive, and hide in small crevices of folded leaves or unopened buds. These insects breed on volunteer peanuts and weeds that emerge ahead of the main crop. They later migrate to the main crop of peanuts.

DAMAGE

Thrips cause a disorder of peanuts called "possum ears." Damage from thrips occurs to some extent on peanuts in the early spring every year. Some years injury causes plants to be severely stunted. The injury results from thrips feeding in the buds and folded leaflets. They rasp the surface of the tender leaves causing them to be scarred and distorted when unfolded.

Although several species of thrips have been collected from peanuts in Alabama, the tobacco thrips[1] is by far the most important species.

EXPERIMENTS WITH PHORATE (THIMET)

Results of tests conducted during the 1940's at the Wiregrass Substation show that thrips were effectively controlled on peanuts by dusting with 5 per cent DDT or 10 per cent toxaphene. However, applying insecticides to the plants after thrips injury began to appear did not result in significant yield increases.

During recent years plant systemic insecticides have been developed and interest in thrips control on peanuts has been revived. A systemic insecticide is a compound that is taken up from the soil or absorbed through the leaves of a plant, as the insects feed on the plant they are killed.

Since 1952, research has been conducted at the Wiregrass Substation with systemic insecticides for thrips control on peanuts. The most extensive investigations have been made with phorate (Thimet), known chemically as O,O-diethyl-S-(ethylthiomethyl) phosphorodithioate. Research with phorate was started in 1955.

Phorate has been tested for five years as soil treatments at rates varying from ½ to 5 pounds per acre, see table. During the period, treatments were significantly effective in increasing peanut yields for 3 of the 5 years. In 2 years, 1956 and 1959, the average yields from phorate-treated

PEANUT YIELDS FOLLOWING SOIL TREATMENTS AT PLANTING TIME WITH PHORATE 1955-59 WIREGRASS SUBSTATION

Phorate rate/a.	Yield per acre by years				
	1955[1]	1956[1]	1957[2]	1958[2]	1959[2]
Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
0	1,762	1,584	924	1,339	325
0.5				1,496	
1.0		1,853	1,127	1,623	334
1.5					
2.0				1,673	352
2.5		1,772	1,358		
3.0					
3.5					
4.0				1,615	
5.0	2,278	2,019			
LSD	*325*	*None*	*218*	*257*	*None*

[1] Dust in row at planting.
[2] Granular in row at planting.

[1] *Frankliniella fusca* (Hinds)

plots were also higher than yields on untreated plots. The differences, however, were not statistically significant. An analysis of the data for the 4-year period, 1956-59, during which the 1-pound rate of phorate was used, revealed that the average yield increase of 191 pounds of peanuts per acre was highly significant. Results of experiments over the 5-year period show a very close relationship between the rates of phorate and the numbers of thrips on peanuts. There were also significant correlations between the numbers of thrips and the yields of peanuts. Of the various rates of phorate tested, 1 pound technical per acre proved to be the most practical.

Phorate has been applied as a seed treatment, in the soil at planting, and combinations of soil treatment before planting with sidedress applications. Soil applications at or just prior to planting were the most satisfactory methods of application. Seed treatment adversely affected stands. Sidedress applications in combination with preplanting treatments were ineffective in increasing yields.

A 44 per cent dust base phorate formulation was used in experiments in 1955 and 1956. Granule formulations were used in subsequent years. Granules were easier and safer to handle and apply. Five and 10 per cent granules gave equal results when the same amount of technical phorate per acre was used. However, it was more difficult to get even distribution of 10 pounds of granules per acre than 20 pounds. Ten pounds of 10 per cent or 20 pounds of 5 per cent granules are both equivalent to 1 pound of technical phorate. In small-plot experiments at the Wiregrass Substation, granules were usually applied to the rows with a fertilizer horn. Machines are available that attach to planters for applying granules directly into the row.

Research was began in 1959 on mixing phorate granules with fertilizer for thrips control on peanuts. Mixtures of granules and 0-14-14 fertilizer were made on April 2. The mixtures were applied at the rate of 400 pounds of fertilizer per acre on April 7. The phorate-fertilizer mixtures were as effective for thrips control as granules applied directly to the row at planting. However, because peanut yields were low, no valid conclusion could be drawn as to the effects of the phorate-fertilizer mixtures on peanut yields. Phorate residue analyses made on the fertilizer mixtures after 2 weeks storage at 40°C revealed no phorate in the samples. Thus, phorate granules were not compatible with the fertilizer.

If phorate granules are mixed with fertilizer, the mixture must be applied to the soil immediately for maximum effectiveness in thrips control. Peanuts should be planted as soon as possible after the phorate is applied to the soil. Under no circumstances should planting be delayed more than 2 weeks.

PHYTOTOXICITY

Toxicity of phorate to peanut plants from soil treatments appeared in 1959 for the first time in the 5-year tests. Damage has resulted on cotton in other experiments and from seed treatment of peanuts, but no phytotoxicity had occurred previously from soil treatment on peanuts in Alabama. Damage on peanuts has been reported from phorate soil treatments in Virginia. This damage may have been associated with heavier soils than those in the Wiregrass area, as in the case of damage on cotton.

The damage was most noticeable in the first half of May following planting on April 7. The damage initially appeared as a yellowing of bottom leaves on the plants. The yellowing leaves gradually bleached until almost white. The injury began on the leaf margins and gradually covered the entire leaf. By May 25 no injury was visible.

PHORATE RESIDUES

Phorate residue determinations were made on foliage and nuts at regular intervals during the growing season and at harvest in 1958 and 1959. Peanuts from plots receiving phorate at 1 or 2 pounds technical per acre, showed no phorate in the foliage or nuts at any time during the growing season or at harvest. When phorate was applied at 4 pounds per acre to peanuts planted on April 15, there was 0.7 p.p.m. of phorate in the foliage on June 24. The phorate content in the foliage decreased until there was essentially none after mid-July. **No phorate was found in the nuts at any time during the growing season or at harvest.**

The department of horticulture conducted studies on taste, color, and texture of raw and roasted peanuts, and peanut butter. Samples were taken from plots receiving 0, 1, and 2 pounds of phorate per acre. No differences were found that could be attributed to the insecticidal treatments.

PRECAUTIONS

Phorate is a highly toxic insecticide. It is a powerful inhibitor of cholinesterase, an essential

body enzyme. The compound has about the same toxicity as parathion. It is toxic when taken orally, and can also be absorbed through the skin. Extreme care must be used in handling this compound to prevent exposure to the skin, oral ingestion, or inhalation of the fumes.

OTHER SYSTEMICS

Other plant systemic insecticides have shown promise for thrips control on peanuts. Further research with them will be needed before they can be recommended.

SUMMARY

1. Thrips occur to some degree on peanuts every year. When infestations are heavy, yields may be reduced unless control measures are followed.

2. Thrips can be controlled with dusts of 5 per cent DDT or 10 per cent toxaphene; however, treating after the damage appeared did not result in significant yield increases.

3. Phorate, a systemic insecticide, applied as a soil treatment at 1 pound technical per acre at or just prior to planting resulted in effective thrips control and good yield increases.

4. Phorate granules, 20 pounds of 5 per cent per acre, put in the row at planting time is a good method of application.

5. Phorate was not compatible with 0-14-14 fertilizer. Until further research is conducted, it is questionable whether fertilizer mixtures should be used.

6. Phorate soil treatments caused injury to peanut plants in early May of 1959. The plants recovered in a few weeks.

7. There were practically no phorate residues in foliage or nuts during the growing season and none at harvest following application of 1 or 2 pounds of phorate per acre as a soil treatment.

8. Studies made on taste, color, and texture of raw and roasted peanuts and on peanut butter revealed that phorate soil treatments had no effect on peanuts.

9. Phorate is a highly toxic organic phosphorus compound. Extreme caution must be observed in its use.

10. Other systemic insecticides have shown promise for thrips control. Further research is needed before they can be recommended.