Interaction of Peanut Variety and Insecticide[1] [2]

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ABSTRACT

It is generally assumed that insecticide performance is independent of the peanut variety; however, tests conducted for several years indicate insecticide performance is influenced by the peanut variety. The most significant variety-insecticide interaction resulted from systemic insecticides used for control of thrips and leafhoppers on bunch type peanuts.

Thimet (phorate) was more effective than Furadan (carbofuran) for thrips control regardless of the peanut variety. Erratic control of thrips and leafhoppers was obtained on bunch, Virginia type peanuts NC Ac 15754, NC Ac 15753, and 'Shulamit.' Thimet applied to runner and intermediate growth type peanuts reduced thrips and thrips damage in excess of 90%. Furadan was ineffective against thrips on NC Ac 15754 and gave less than 50% control on Shulamit.

Thimet failed to control the potato leafhopper on NC Ac 15753 and Shulamit but gave good control on NC Ac 15754. Furadan which failed to control thrips on NC Ac 15754 gave approximately 50% control of leafhoppers. Furadan which reduced thrips by only 65% on NC Ac 15753 reduced leafhopper damage by 90%.

The peanut variety also influenced insecticidal control of the southern corn rootworm. NC Ac 15753 exhibited 2 to 3 times more rootworm damage than 'Florigiant' when both peanut varieties were treated with the same rates of insecticides. Diazinon was ineffective against the rootworm on NC Ac 15753 and Mocap performance was significantly reduced when applied on NC Ac 15753. These data indicate the peanut variety should be considered an integral part of an insect control program.

Systemic insecticides are utilized by most peanut (*Arachis hypogaea* L) growers in North Carolina as an in-furrow application at planting to control an insect complex including the tobacco thrips *Franliniella fusca* Hinds and the potato leafhopper *Empoasca fabae* Harris. Erratic performance of systemic insecticides against these pests was observed among fields and among years. Although it is generally assumed that insecticide performance is independent of the peanut variety, observations suggested a variety-insecticide interaction may contribute to inconsistent insecticide performance. This study was conducted to determine if a variety-insecticide interaction was responsible for erratic performance of systemic insecticides applied to peanuts.

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[2]Use of trade names in this publication does not imply endorsement of the products named or criticism of similar ones not mentioned.

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Materials and Methods

Virginia type peanut varieties with different growth habits were planted in a split plot design and treated at planting time with Thimet (phorate) and Furadan (carbofuran). Insecticides were applied in the furrow with the seed at the rate of 1 lb active ingredient per acre (AI/A) using a Gandy® granular row applicator. Plots consisted of 4 rows 3 ft apart and 30 ft long. Plots were replicated three times.

Six peanut varieties or advanced breeding lines were used in this study. 'Florigiant,' the most widely grown peanut variety in North Carolina, has a runner growth habit. 'Shulamit,' a commercial variety developed in Israel, and two selections made from the variety NC Ac 15753 and 15754 have a bunch growth habit. NC Ac 17167, a line selected from the cross of GP-NC 343 x 'VA 61R', and GP-NC 343 have a growth habit intermediate between the two extremes, runner and bunch. All of the varieties and breeding lines are large-seeded Virginia types.

Thrips counts were taken 4 to 6 weeks following planting. This is when thrips are generally most numerous. Ten plant terminals were selected in the two center rows of each plot and all adult and immature thrips were recorded.

Thrips damage evaluations were taken approximately 6 to 8 weeks after planting by counting all the thrips-damaged leaves in 30 row ft. Thrips damage declines rapidly after pegging due to reduced thrips population and rapid foliage production; therefore evaluations were made generally just prior to pegging.

Relative efficacy of insecticides against the potato leafhopper was determined by counting the number of leaves with leafhopper yellowing or "hopperburn" in 30 row ft per plot for 1973-1975. In 1972 leafhopper control was based on a visual estimate of the percentage of foliage showing leafhopper injury in the center rows of each plot.

Insecticides were evaluated for control of the southern corn rootworm **Diabrotica undecimpunctata howardi** Barber on three peanut varieties. GP-NC 343 (intermediate growth habit with resistance to the rootworm), Florigiant (runner growth habit) and NC Ac 15753 (bunch growth habit) were treated with insecticide granules applied in an 18-inch band over the row at pegging and post-pegging. Plots consisted of 4 rows 36 in. apart by 30 ft long and replicated three times. Efficacy was based on the number of rootworm penetrated pegs and pods on 5 randomly selected plants per plot sampled in mid-September.

Results and Discussion

Thimet gave in excess of 90% control of thrips and in excess of 85% reduction in leafhopper damage when applied to Florigiant peanuts (Table 1). Furadan reduced thrips damage and leafhopper damage in excess of 90% on Florigiant peanuts but was ineffective against thrips and reduced leafhopper damage by only 50% on the bunch, Virginia type peanut NC Ac 15754.

Three peanut varieties were treated with Thimet and Furadan in 1973. The best thrips and leafhopper control was obtained on Florigiant (runner growth habit), less effective control was obtained on GP-NC 343 (intermediate growth habit) and the poorest control was obtained on NC Ac 15753 (bunch growth habit). For example

Table 1. Peanut variety-insecticide interaction effect on thrips and leafhoppers. North Carolina. 1972.

Variety and Insecticide	AI/A	Avg. no. thrips/10 terminal leaves	Avg. no. thrips-damaged leaves/30 row ft.	Avg. % leafhopper damage/30 row ft.
Florigiant[a]				
Thimet	1	5.0	2.3	5.7
Furadan	1	21.0	11.0	2.7
Untreated	---	68.0	133.7	36.7
Acc 15754[b]				
Thimet	1	30.3	7.7	10.7
Furadan	1	116.0	127.7	31.7
Untreated	---	110.3	149.0	68.3
LSD at 5%		35.6	37.2	24.5

[a] Virginia type runner

[b] Virginia type bunch

leafhopper damage reduction with Thimet exceeded 98% on Florigiant peanuts, 80% on GP-NC 343, but only 60% reduction on the bunch line NC Ac 15753 (Table 2).

Thrips counts were obtained during the normal population peak in June. In general, thrips counts correlate well with thrips damage. However, since insect counts will vary during the season, emphasis is placed on accumulative seasonal damage from thrips and accumulative damage from leafhoppers.

Thimet was more effective against thrips than Furadan in the 1974 test regardless of the variety (Table 3). Furadan was significantly less effective against thrips on Shulamit peanuts, a cultivar

Table 2. Peanut variety-insecticide interaction effect on thrips and leafhoppers. North Carolina. 1973.

Variety and Insecticide	Lb AI/A	Avg. no. thrips/10 terminal leaves	Avg. no. thrips-damaged leaves/30 row ft.	Avg. no. leafhopper-damaged leaves/ 30 row ft.
Acc 343[a]				
Thimet	1	15.3	40.3	17.0
Furadan	1	20.7	134.3	16.0
Untreated	---	70.7	547.3	98.7
Florigiant[b]				
Thimet	1	7.0	18.7	2.3
Furadan	1	25.0	78.7	1.3
Untreated	---	92.7	648.0	112.7
Acc 15753[c]				
Thimet	1	20.0	159.7	105.7
Furadan	1	39.0	219.0	37.3
Untreated	---	98.7	767.7	292.7
LSD at 5%		18.0	31.0	67.8

[a] Virginia type intermediate

[b] Virginia type runner

[c] Virginia type bunch

with a bunch growth habit, than the intermediate type NC Ac 17167. Leafhopper damage reduction exceeded 90% on Florigiant and NC Ac 17167 but Thimet reduced leafhopper damage only 50% on Shulamit peanuts.

Peanuts with different growth habits were treated with Thimet and Furadan in 1975 and evaluated for seasonal control of thrips and leafhoppers. Thimet reduced thrips damage on Flori-

Table 3. Peanut variety-insecticide interaction effect on thrips and leafhoppers. North Carolina. 1974.

Variety row Insecticide	Lb AI/A	Avg. no. thrips/10 terminal leaves	Avg. no. thrips-damaged leaves/30 row ft.	Avg. no. leafhopper-damaged leaves/ 30 row ft.
Acc 17167[a]				
Thimet	1	1.7	4.0	6.0
Furadan	1	9.3	32.7	6.0
Untreated	---	25.7	129.3	78.3
Florigiant[b]				
Thimet	1	8.3	8.7	5.7
Furadan	1	14.0	43.7	2.3
Untreated	---	36.0	387.0	66.7
Shulamit[c]				
Thimet	1	10.7	38.0	108.0
Furadan	1	31.0	84.3	18.3
Untreated	---	52.0	243.3	210.0
LSD at 5%		16.7	41.6	74.7

[a] Virginia type intermediate

[b] Virginia type runner

[c] Virginia type bunch

Table 4. Peanut variety-insecticide interaction effect on thrips and leafhoppers. North Carolina. 1975.

Insecticide	AI/A	Avg. no. thrips/10 terminal leaves	Avg. no. thrips-damaged leaves/30 row ft.	Avg. no. leafhopper-damaged leaves/ 30 row ft.
Acc 17167[a]				
Thimet	1	1.0	33.7	1.3
Furadan	1	36.7	162.0	11.0
Untreated	---	82.7	247.0	70.0
Florigiant[b]				
Thimet	1	16.3	48.8	2.0
Furadan	1	50.0	334.0	55.7
Untreated	---	97.0	498.7	197.0
Shulamit[c]				
Thimet	1	26.3	242.7	20.7
Furadan	1	62.0	357.3	228.3
Untreated	---	138.3	515.3	458.3
LSD at 5%		34.4	51.8	98.7

[a] Virginia type intermediate

[b] Virginia type runner

[c] Virginia type bunch

giant in excess of 90% but reduced thrips damage only 53% on Shulamit peanuts (Table 4). Furadan gave only ca. 50% control of thrips on all peanut varieties and reduced thrips damage less than 35%. Excellent control of leafhoppers was obtained with Thimet applied on Florigiant, NC Ac 17167, and Shulamit peanuts. Furadan gave only 50% control of leafhoppers on Shulamit.

The inconsistencies in insect control observed on the three related bunch peanuts are probably associated with the root absorption and translocation differences among the peanut varieties as influenced by annual environmental differences.

Peanut variety-insecticide interaction was evident in a test conducted in 1973 to control the southern corn rootworm (SCR) on three peanut varieties. GP-NC 343 was previously identified in North Carolina as possessing resistance to the rootworm (campbell et al. 1971). Florigiant and NC Ac 15753 were selected as rootworm susceptible peanuts. Excellent control of the rootworm was obtained on GP-NC 343 with low rates of insecticides (Table 5). Diazinon, however, was ineffective against the rootworm on NC Ac 15753 and Mocap gave only 50% control.

Table 5. Peanut variety-insecticide interaction effect on the southern corn rootworm (SCR). North Carolina 1973.

Treatment	Lb AI/A	Avg. no. SCR damaged pegs + pods/5 plants		
		Acc. 343	Florigiant	Acc. 15753
Furadan[2/]	1	9.0	12.0	25.3
Fur.[1/] + Fur.[3/]	1 + 1	9.3	12.3	24.3
Fur.[1/] + Fur.[2/]	1 + 2	2.3	3.3	8.0
Thimet + Diaz.[3/]	1 + 1 1/4	2.3	17.7	42.7
Mocap[2/]	2	4.3	13.3	49.7
Mocap[3/]	1	16.3	67.0	96.0
Diazinon[3/]	1/2	1.0	42.3	61.3
Diazinon[2/]	2	6.3	32.0	105.7
Untreated	---	40.7	120.7	108.3
LSD at 5%			21.7	

[1/]planting; [2/]July 10: [3/]Aug. 1

It is apparent from these data that erratic control of thrips, leafhoppers, and the southern corn rootworm was associated with the use of insecticides on bunch type peanuts; viz., NC Ac 15754, NC Ac 15753, and Shulamit. Erratic control of thrips and leafhoppers may be related to the differential ability of peanut varieties to absorb, translocate, and retain systemic insecticides. The control of the southern corn rootworm may also have been indirectly affected by the bunch growth habit of NC Ac 15753. The bunch growth habit resulted in an open foliage canopy and it is postulated that this may have caused a greater loss of insecticide from the soil and soil surface. However, since all of the bunch lines were related, the genetic system may have had an effect on the ineffectiveness of the systemic insecticide.

These data further suggest that the peanut variety should be considered an integral part of an insect control program and insecticidal recommendations should reflect varietal differences if they occur.

References Cited

Campbell, W. V., D. A. Emery, and W. C. Gregory. 1971. Registration of GP-NC 343 peanut germplasm. Crop Sci. 11:605.