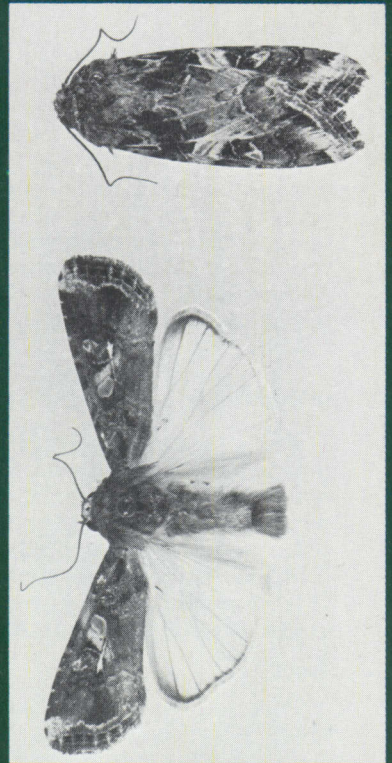


FALL ARMYWORM: Evaluation of Insecticides for Control



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The fall armyworm *Spodoptera frugiperda* (J.E.S.) has been noted as an agricultural pest in Alabama since records have been kept by the Auburn University Agricultural Experiment Station. Although infestations occur every year, only infrequently does this insect cause extensive damage on a statewide basis. During the summer of 1977, this insect inflicted its most serious damage to date on Alabama agriculture. It attacked peanuts, soybeans, cotton, grain sorghum, corn, sudan-sudex grasses, Johnsongrass, Coastal bermuda, various pasture grasses, and commercial hybrid grasses on golf courses, lawns, cemeteries, and football fields. Various other crops were attacked to a lesser extent.

As the summer progressed, the fall armyworm problem became increasingly severe and standard chemicals recommended for control failed to afford expected relief. The following tests were conducted on an emergency basis to evaluate certain labelled and unlabelled insecticides for effectiveness against this insect.

PROCEDURE

Six experiments were conducted on control of fall armyworm. Three were conducted on peanuts and three on grain sorghum. Peanut test plots were 1/100 acre, replicated four times, and randomized. Sprays were applied with a CO₂ pressurized sprayer delivering 10 gallons of mixed spray per acre. One bait

was used and it was distributed by hand in a 12-inch band over the row. Grain sorghum test plots were one acre, replicated four times, and not randomized. All materials were applied as sprays with a Hahn Hi-Boy sprayer delivering 6 gallons of mixed spray per acre.

Insecticides used in one or more of these six tests were: monocrotophos (Azodrin®), methomyl (Lannate® or Nudrin®), Bolstar®, chlorpyrifos (Lorsban®), methamidophos (Monitor®), UC 51762, ethoprop (Mocap®), Ambush®, Pydrin®, Pounce®, FMC 45498, parathion, methyl parathion, carbaryl (Sevin®), Oftanol®, acephate (Orthene®), diazinon, trichlorfon (Dylox® or Proxol®), methomyl bait (NuBait®), and Savem® (a finely ground carbaryl formulation).

The efficacy of materials was determined by counting live fall armyworm larvae 24, or 24 and 48 hours after the application of insecticides. On peanuts this was accomplished by randomly selecting a 3-foot section of row, vigorously shaking plants to cause the larvae to fall to the ground, and counting the live larvae that were dislodged. This was repeated four times in each plot, thus larval counts were made on 12 feet of row in each plot. The same procedure was followed in the tests on sorghum except that differences in plant stand was accounted for by counting the plants in each 3-foot section and then calculating the number of live larvae per plant at each counting station.

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RESULTS AND DISCUSSION

The economic injury threshold, based on number of larvae per foot of row, has not been established for the fall armyworm. However, for purposes of determining adequate effectiveness of materials, many researchers have used 80% control as an acceptable level. For purposes of this discussion, any material giving acceptable control had to reduce the population by at least 80%.

In the first test on peanuts (table 1), monocrotophos (Azodrin®), methomyl (Lannate® or Nudrin®), and Bolstar® all afforded control of 80% or better at the rates tested. Statistically these three materials were equivalent to each other in effectiveness. Other materials which approached the 80% level of effectiveness were chlorpyrifos (Lorsban®), methamidophos (Monitor®), and UC 51762. Chlorpyrifos was used at 0.5 lb/acre active ingredient (ai) in this test. In a later test, this material was used at 0.75 lb/acre (ai) and provided control well above the 80% level (tables 4 and 5). The synthetic pyrethroids used in this test (Ambush® and Pydrin®) failed to give adequate control of this insect at rates tested.

In test 2 (table 2), in counts made 24 hours after the insecticides were applied, acephate (Orthene®) at 1 lb/acre (ai), methomyl at 0.5 lb/acre (ai), and methomyl bait (NuBait®) applied at the rate of 20 lb of the 1.25% bait or 0.25 lb/acre (ai) provided control of 80% or better. Acephate and methomyl were statistically superior in effectiveness to the bait at 24 hours, but at 48 hours (table 3) these three materials and diazinon [1 lb/acre(ai)] were all statistically equal and all gave acceptable control.

Trichlorfon (Dylox® or Proxol®) and carbaryl (Sevin®) were used and failed to give acceptable control. Personal communications with researchers in other states have indicated that trichlorfon and carbaryl generally have not been effective against this insect *on peanuts*. On the other hand, observations by county agents of farmer applications of both trichlorfon and carbaryl have indicated that under certain conditions both of these materials have been effective [carbaryl at 2 and trichlorfon at 1 lb/acre (ai)] against fall armyworm *when applied on grasses*. The diet of insects is known to affect their susceptibility to certain in-

TABLE 1. AVERAGE NUMBER OF LIVE FALL ARMYWORM LARVAE PER 12 FEET OF ROW PER PLOT AND PERCENT CONTROL 24 HOURS AFTER TREATMENT WITH INDICATED INSECTICIDES. PEANUTS, AUGUST 1977, TEST 1

Material	lb/acre (ai)	No. live larvae ¹	Percent control
Monocrotophos 5EC	0.63	8.0 a	90
Methomyl 1.8EC	0.45	13.3 a	84
Bolstar® 6EC	0.75	14.0 ab	83
Chlorpyrifos 4EC	0.50	20.3 b	76
Methamidophos 4EC	1.00	20.5 b	76
UC 51762 75WP	0.45	21.8 bc	74
Ethoprop 6EC	1.00	27.5 cd	67
Ambush® 2EC	0.10	35.5 de	58
Pydrin® 2.4EC	0.10	37.0 ef	56
Ambush® 2EC	0.05	40.3 ef	52
Parathion EC	1.00	43.5 ef	48
Methyl Parathion EC	1.00	45.0 efg	46
Carbaryl 80 WP	1.50	46.5 fg	45
Oftanol® 6EC	1.00	53.0 g	37
Check	—	83.8 h	—

¹Mean of four replications. Means with the same assigned letter are not significantly different at the 5% level.

TABLE 2. AVERAGE NUMBER OF FALL ARMYWORM LARVAE PER 12 FEET OF ROW PER PLOT AND PERCENT CONTROL 24 HOURS AFTER TREATMENT WITH INDICATED INSECTICIDES. PEANUTS, AUGUST 1977, TEST 2

Material	lb/acre (ai)	No. live larvae ¹	Percent control
Acephate 75S	1.0	8.50 a	90
Methomyl 1.8EC	0.5	11.25 a	86
Methomyl Bait 1.25% (on citrus pulp)	0.25	16.25 b	80
Diazinon 2EC	1.0	33.50 c	59
Trichlorfon 4EC	2.0	41.50 d	49
Carbaryl 80WP	2.0	53.50 e	35
Savem® 4EC	2.0	67.00 f	18
Check	—	81.75 g	—

¹Mean of four replications. Means with the same assigned letter are not significantly different at the 5% level.

secticides and this could be a factor in this case. The present research does not elucidate this inconsistency.

Test 3 (tables 4 and 5) included only materials which had shown promise in previous tests. Counts of live larvae made 24 hours after the insecticidal application revealed that methomyl, chlorpyrifos, and monocrotophos gave acceptable control at rates tested (table 4). Forty-eight hours after application all materials (methomyl, monocrotophos, Bolstar®, methomyl bait, chlorpyrifos, and acephate) were providing acceptable control (table 5).

The results of tests 4, 5, and 6 are presented in table 6. These tests involved only certain synthetic pyrethroids (Pounce®, Pydrin® and FMC 45498) and methomyl for control of fall armyworm on grain sorghum. None of the synthetic pyrethroids provided acceptable control in any of these three tests. Ambush® and Pydrin® had previously failed to afford acceptable control in test 1 (table 1). Methomyl was used as a standard treatment in test 6 and provided 95% control at the rate of 0.45 lb/acre (ai).

Based on the results of these six tests it would appear that methomyl (Lannate® or Nudrin®), monocrotophos (Azodrin®),

Fall armyworms on opposite page are shown on three crops: (top) peanuts; (middle) grasses; (bottom) corn. Note color variation. (Photos courtesy John C. French, Cooperative Extension Service.)



TABLE 3. AVERAGE NUMBER OF FALL ARMYWORM LARVAE PER 12 FEET OF ROW PER PLOT AND PERCENT CONTROL 48 HOURS AFTER TREATMENT WITH INDICATED INSECTICIDES. PEANUTS, AUGUST 1977, TEST 2

Material	lb/acre (ai)	No. live larvae ¹	Percent control
Methomyl 1.8EC	0.5	2.25 a	97
Acephate 75S	1.0	4.00 a	94
Methomyl Bait 1.25% (on citrus pulp)	0.25	12.00 a	83
Diazinon 2EC	1.0	12.75 a	82
Trichlorfon 4EC	2.0	50.50 b	29
Carbaryl 80WP	2.0	58.00 bc	19
Savem® 4EC	2.0	64.50 cd	9
Check	—	71.25 d	—

¹Mean of four replications. Means with the same assigned letter are not significantly different at the 5% level.

TABLE 4. AVERAGE NUMBER OF FALL ARMYWORM LARVAE PER 12 FEET OF ROW PER PLOT AND PERCENT CONTROL 24 HOURS AFTER TREATMENT WITH INDICATED INSECTICIDES. PEANUTS, SEPTEMBER 1977, TEST 3

Material	lb/acre (ai)	No. live larvae ¹	Percent control
Methomyl 1.8EC	0.50	2.50 a	95
Chlorpyrifos 4EC	0.75	5.25 a	89
Monocrotophos 5EC	0.75	7.50 ab	84
Bolstar® 6EC	1.00	12.50 bc	73
Methomyl bait 1.25% (on citrus pulp)	0.25	14.25 c	69
Acephate 75S	1.00	24.00 d	48
Check	—	46.25 e	—

¹Mean of four replications. Means with the same assigned letter are not significantly different at the 5% level.

TABLE 5. AVERAGE NUMBER OF FALL ARMYWORM LARVAE PER 12 FEET OF ROW PER PLOT AND PERCENT CONTROL 48 HOURS AFTER TREATMENT WITH INDICATED INSECTICIDES. PEANUTS, SEPTEMBER 1977, TEST 3

Material	lb/acre (ai)	No. live larvae ¹	Percent control
Methomyl 1.8EC	0.50	1.75 a	96
Monocrotophos 5EC	0.75	3.25 ab	92
Bolstar® 6EC	1.00	3.75 ab	91
Methomyl bait 1.25% (on citrus pulp)	0.25	3.75 ab	91
Chlorpyrifos 4EC	0.75	4.75 ab	89
Acephate 75S	1.00	5.25 b	88
Check	—	42.50 c	—

¹Mean of four replications. Means with the same assigned letter are not significantly different at the 5% level.

TABLE 6. AVERAGE NUMBER OF FALL ARMYWORM LARVAE PER SORGHUM PLANT AND PERCENT CONTROL 24 HOURS AFTER APPLICATION OF INDICATED INSECTICIDES. SORGHUM, JULY 1977

Material	lb/acre (ai)	No. live larvae/plant ¹	% control
TEST 4			
Pounce®	0.1	2.18 a	44
Pydrin®	0.1	2.72 a	30
Check	—	3.87 b	—
TEST 5			
FMC 45498	.01	3.47 a	10
FMC 45498 .....	.005	3.66 a	4
Check	—	3.82 a	—
TEST 6			
Methomyl .....	.45	0.2 b	95
FMC 45498 .....	.01	2.8 a	35
FMC 45498 .....	.005	3.7 a	16
Check	—	4.3 a	—

¹Four 3-foot sections of row were chosen per plot. Larvae were shaken onto a ground cloth. The number of larvae were divided by the number of plants to obtain larvae/plant. Numbers shown are the means of four replications. Means with the same assigned letter within each test are not significantly different at the 5% level.

chlorpyrifos (Lorsban®), methomyl bait (Nubait®), Bolstar®, and acephate (Orthene®), at rates indicated in the various tables will provide acceptable control of the fall armyworm. However, these results are based on only 1 year's research.

Also, some of the materials used are not labelled for use on some crops attacked by the fall armyworm. Therefore, presentation of these data does not constitute recommendations for use.



Information contained herein is available to all, regardless of race, color, or national origin.