Picture at left shows a pink bollworm damaged boll, top, and a normal boll, bottom. In first picture toward the right a pink bollworm is revealed at work in a cutaway boll. The damage it leaves is readily seen in the picture at far right.

Evaluation of Insecticides for

*by T. F. Watson & D. G. Fullerton**

Insecticidal control of the pink bollworm, *Pectinophora gossypiella* (Saunders), is not only a costly venture but one in which satisfactory results are difficult to achieve. This method of controlling the pink bollworm, however, has become a necessity during recent years in many areas of Arizona because of high population levels. This situation may continue for the immediate future until research points the way to effective control through cultural and/or other practices.

Due to the urgent need for effective insecticides against the pink bollworm an experiment was conducted near Phoenix in 1967 to compare a number of insecticides in a replicated field experiment. The results obtained from that test are reported in this article.

Twelve insecticides or insecticide combinations were compared with an untreated check. All treatments, including the check, were replicated four times in a randomized complete block design in a field of short-staple cotton. Plots were 8-rows wide and 1150 ft. long. Spray applications were made with a Hahn Hi-Boy or John Deere high-clearance sprayer on a five to six day schedule.

Treatments were evaluated by collecting boll samples at weekly intervals to determine the pink bollworm infestation levels and by harvesting plot yields at the end of the season. Fifty green bolls (approximately three weeks old) per plot or 200 per treatment comprised the weekly boll sample. Initially, only the average number of larvae per 100 bolls was recorded but later both the number of larvae per 100 bolls as well as the per cent bolls infested were recorded.

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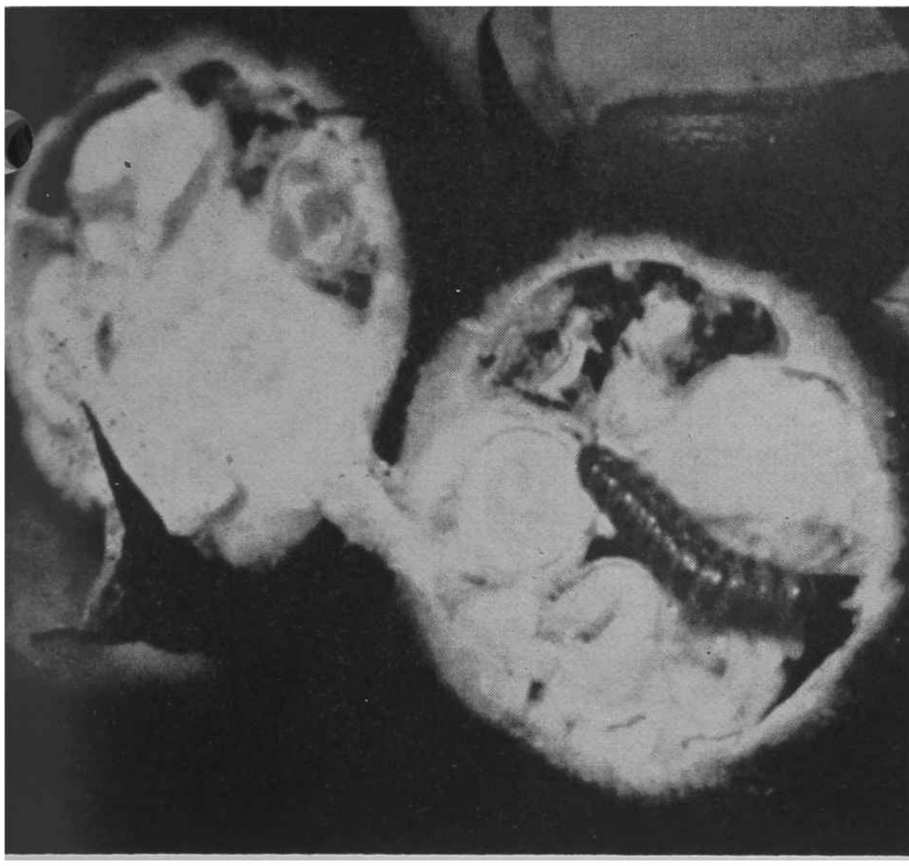


Pink Bollworm Control

Lygus populations were evaluated during early- and mid-season using the standard sweep-net method. The presence and abundance of bollworms, *Heliothis zea* (Boddie), was determined by examing 25 terminals per plot.

Results and Discussion

Insect pests other than the pink bollworm were considered to be of little or no consequence in this experiment. The bollworm was present at low levels throughout the test period but its influence on yields is considered unimportant since similar infestation levels existed in practically all insecticidal treatments; they were slightly greater however in the untreated check and may have possibly had some influence on the check yields.

Several of the insecticides and insecticide combinations effectively reduced the pink bollworm even though applications were initiated in a field already heavily infested. At this time there was an average of 62.7 larvae per 100 bolls inspected. This infestation, however, did not necessarily mean that yield losses had already occurred since research has shown that fairly large populations can be present without resulting in losses. Although all treatments resulted in lower infestations than those occurring in the untreated checks some were poor to intermediate in effectiveness. The infestation counts showing both the average number of larvae per 100 bolls and the per cent bolls infested are presented in Tables 1 and 2, respectively. These sampling data indicate that an initial high infestation can be reduced with the proper insecticide and proper application technique.

Yield data from the treatments in this experiment are shown in Table 3. In general, the relative effectiveness of the various insecticides as shown by infestation counts is reflected in the yields. Yields were more than twice that of the untreated check in six of the insecticidal treatments, with azinphosmethyl (Guthion) and azinphosmethyl plus toxaphene resulting in yields considerably in excess of the two-fold increase. There was, however, no apparent advantage of adding toxaphene to the azinphosmethyl. It should also be pointed out that in other tests, carbaryl (Sevin) at 2.0 lbs. per acre and azinphosmethyl at the rate of 0.5 lb. per acre gave results comparable to azinphosmethyl applied at the 1.0 lb. rate.

Rates at which some of the insecticides were applied probably influenced their position in the array as shown in Table 3. For example, treatments falling in the intermediate position, such as methyl parathion at 0.5 lb. per acre, probably would have shown better results at a higher dosage rate. This was also true of Azodrin and the combination of toxaphene-Azodrin.

The uniform pink bollworm infestation present in the field at the time the test was initiated may have caused some yield loss. Since it was uniform, however, yield differences at the end of the season should have been primarily the result of the insecticidal treatments in the experiment. Initial individual plot infestations provided a continuous source of reinfestation regardless of the effectiveness of the treatments in adjacent plots. Therefore, plot-size was considered adequate to accomplish the objective of this test and yield differences and infestation levels at the end of the season reflect valid comparisons of the treatments involved.

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Table 1. Effects of several insecticides and/or insecticide combinations in reducing pink bollworm infestations. Phoenix, 1967.

Treatment[1]	Rate lbs./A.	Pre-treat	Mean No. Larvae/100 bolls Collected on: August 1	8	17	25	30	Sept. 13	21
Check	—	95.5	95.0	77.0	102.5	103.5	212.5	249.0	307.0
Thuricide	2 qts.	68.0	68.5	61.5	62.5	92.0	132.5	147.5	130.5
Methyl Parathion	0.5	60.0	62.5	45.0	17.5	44.0	100.0	92.5	84.5
Toxaphene-Dylox	3-1.5	56.0	55.0	30.5	34.5	54.5	62.5	77.0	74.0
Toxaphene-Methyl Parathion	3-.63	48.0	47.5	40.0	26.5	22.5	70.5	44.0	50.0
CP 47114	1.0	84.0	84.5	41.0	17.0	31.5	55.5	39.5	48.0
Azodrin	0.63	54.5	60.0	34.5	16.5	22.0	47.5	41.0	32.0
Mobam	1.0	61.5	68.0	28.5	26.0	24.0	43.5	29.0	30.0
GC 6506	1.0	58.0	58.0	35.0	27.0	37.5	60.0	35.5	29.0
Toxaphene-Azodrin	3-.63	43.5	41.0	29.0	12.0	18.0	29.0	20.0	19.5
Toxaphene-DDT	4-2	45.5	48.5	29.5	17.0	20.0	28.5	15.5	18.5
Toxaphene-Azinphosmethyl (Guthion)	3-1	63.5	69.0	45.5	14.0	11.0	8.0	5.5	5.5
Azinphosmethyl (Guthion)	1.0	77.5	63.0	29.0	18.0	14.0	6.5	2.0	3.0

[1] *Insecticidal applications were made on the following dates*: 7/28, 8/2, 8/8-9, 8/15, 8/22, 8/28, 9/2, 9/6-7, *and* 9/12.

Table 2. Influence of insecticidal treatments on per cent bolls infested with pink bollworm larvae. Phoenix, 1967.

Treatment	Rate lbs./A.	Per Cent Infested Bolls Collected On: 8/17	8/25	8/30	9/13	9/21
Check	——	51.5	56.5	86.0	95.0	98.0
Thuricide	2 qt.	45.0	53.0	67.5	73.5	64.5
Methyl Parathion	0.5	13.5	33.0	59.0	54.5	47.5
Toxaphene-Dylox	3.0-1.5	22.0	29.0	41.0	41.0	36.5
Toxaphene-Methyl Parathion	3.0-.63	19.5	14.5	42.5	34.0	32.5
CP 47114	1.0	14.0	26.5	37.0	28.0	31.5
Azodrin	0.63	13.5	19.5	33.5	27.0	22.0
Mobam	1.0	19.5	20.5	29.0	23.5	21.5
GC 6505	1.0	18.0	29.5	39.5	27.0	18.5
Toxaphene-Azodrin	3.0-.63	10.0	18.0	21.5	18.5	12.5
Toxaphene-DDT	4-2	14.0	15.0	19.5	12.0	10.5
Toxaphene-Azinphosmethyl (Guthion)	3.0-1.0	8.5	10.0	7.5	5.5	4.5
Azinphosmethyl (Guthion)	1.0	16.0	12.0	5.5	1.5	3.0

Table 3. Comparison of yields from insecticidal treatments for pink bollworm control. Phoenix, 1967.

Treatment	Rate lb./A.	Mean Plot Yields	Stat. Sig.[1] 5%	1%
Check	——	201.0	a	a
Thuricide	2 qts.	285.0	b	b
Toxaphene-Dylox	3-1.5	355.0	c	c
Mobam	1.0	358.5	c	c
Methyl Parathion	0.5	378.5	cd	cd
CP 47114	1.0	395.0	cd	cd
Toxaphene-Methyl Parathion	3-.63	396.5	cd	cd
GC 6505	1.0	413.5	de	cde
Toxaphene-Azodrin	3-.63	418.0	de	cde
Azodrin	0.63	430.5	de	cde
Toxaphene-DDT	4-2	431.5	de	cde
Toxaphene-Azinphosmethyl (Guthion)	3-1	453.0	ef	de
Azinphosmethyl (Guthion)	1.0	485.5	f	e

[1] *Duncan's Multiple Range Test; treatment means followed by the same letter are not significantly different.*

Turfgrass

(From Page 3)

Both the Pennsylvania and the Ohio survey added replacement value of lawn equipment to their maintenance totals to estimate the total magnitude of turfgrass expenditures in their states. In both cases the replacement estimates were nearly twice those for maintenance. If we assume that in Arizona replacement costs were only equal to those for maintenance we would derive estimated annual values of $46.8 million or $47.8 million for turfgrass as a segment of Arizona's total economy. Among the traditional agricultural sectors of the economy for which statistics are kept, these estimates exceed all but three — cotton, cattle, and vegetable crops.[11] Although turfgrass expenditures are primarily toward aesthetic and practical values rather than monetary returns they do represent a major part of the Arizona economy and turfgrass as a crop is one of the most important in the state.

[11] *1968 Arizona Agriculture. Arizona Cooperative Extension Service and Agricultural Experiment Station Bul. A-54.*