17 to 19 being commonplace. Where insecticides were discontinued 2 to 3 weeks before defoliation in October, late infestations rose rapidly. Infestation of the top crop might approach 50% if these fields adjoined fields with little or no control during the season.

As a further indication of control needs, three separate fields in the Mesa and Chandler areas with no control produced 90 to 100% infested bolls. One Buckeye grower with 160 cotton acres applied no controls and infestation levels were similar to the eastern Maricopa County fields.

Growers and insecticide fieldmen also found that poor application was a considerable source of trouble in controlling the corn earworm under scheduled spraying. In two cases custom picker operators could even identify streaks in fields at harvest time where common bollworm (corn earworm) control had been unsatisfactory. As a consequence numerous growers will be considering the need for adequate application equipment in the coming year.

Maricopa County yields are again reduced as occurred in 1966. A cool spring retarded plant growth and fruiting which was identified by plant measurement and flowering rate records. This condition along with 4 x 4 planting patterns and corn earworms decreased yields in numerous fields. Total harvest was much earlier than during previous years. A total of 111,673 bales of Upland cotton had been classed in the Phoenix Classing Office through October 27 compared to 82,060 bales in 1966.

The January 15 deadline for plowing cotton ground was extended to January 31 because of excessive rainfall during December. Three to four inches of rain fell in various communities to delay what easily might have been the earliest completion of plowing on record.

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EFFECT OF CULTURAL PRACTICES ON PINK BOLLWORM MOTH EMERGENCE

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The experiment referred to in this report was conducted at the Safford Experiment Station. The cages which were used to collect moths in order to measure the emergence rate were furnished by USDA and the Graham County Farm Bureau.

The purpose of the experiment was to determine for a higher elevation (approximately 3000 ft.) environment the effect of cultural practices on emergence rate of the pink bollworm moth.

The field used for the experiment was a field of Pima S-2 purposely planted late (1 June 66) under the direction of Dr. George Wene to ascertain the effect of late lush growth on late season infestation by the pink bollworm. The infestation level of the field was estimated to be 75-80% of unopened bolls

infested. This was determined by counting the number of bolls per hundred that had at least one exit hole or one larva present in the boll.

Materials and Methods

The cotton was harvested on December 10, 1966 and the experiment placed in the field on December 14, 1966 using 2 replications of the following treatments:

Treatment Number	Cultural Practices Performed*
1	Plants left undisturbed after harvest.
2	Stalks shredded - debris left on surface.
3	Stalks shredded - debris removed.
4	Stalks shredded - debris removed - disked - plowed to 12 inches.
5	Stalks shredded - debris removed - disked - plowed to 12 inches - planted barley - irrigated twice.
6	Stalks shredded - debris left on surface - disked - plowed to 12 inches.
7	Stalks shredded - debris left on surface - disked - plowed to 12 inches - planted barley - irrigated twice.

*Only those functions which are indicated were performed.

Removal of debris was accomplished by first raking up the debris and then using a broom to sweep the surface of the soil completely free of any remnants of cotton seed, lint, or stalk. The stubs of the stalk were left standing in place. The stalks were shredded using the Brady Flail-type shredder.

The 6-foot square cages were placed in position on December 16, 1966 and sealed to prevent escape of emerging moths.

Total rainfall for the period of time from December 1, 1966 to June 1, 1967 was less than .75 inches. Approximately .75 inches of rainfall occurred in June and July making a total rainfall forthe period of the experiment approximately 1.50 inches. The lowest temperature during the experiment occurred in January and was 11°F. During a three-week period in January the overnight low never exceeded 25°F.

Mr. Pearson began checking the cages for emerging moths on April 1, 1967. No set schedule was established for checking the cages. However, the cages were checked 3 to 5 times per week. During the month of July the cages were checked by Mr. John Sears, Jr. The experiment was terminated on July 31, 1967 and the results analyzed statistically.

Results and Discussion

Differences in the number of moths emerging were detected with regard to month and with regard to treatment. The number of moths emerging per month was as follows:

April	May	June	July
19.5 c	11.0 b	33.5 d	4.0 a

Standard error of the mean = 0.468

The values for months are means of two replications and are not influenced by treatments. The values not followed by the same letter are significantly different.

The greatest number of moths emerged in June and the lowest number in July. A cycling in emergence was also observed; greater emergence occurred in April and June than in May and July.

The number of moths emerging per treatment for the four-month period was as follows:

Treatment Number	
1	9.0 c
2	7.0 bc
3	4.5 a
4	22.5 e
5	6.0 ab
6	7.0 bc
7	12.0 d

Standard error of the mean = 0.624

The values for treatments are means of 2 replications and values not followed by the same letter are significantly different.

The greatest number of moths emerged from treatment 4 and the least emergence occurred in treatment 3. The only difference between these treatments was in treatment 3 the soil was undisturbed. An interesting aspect here is that in treatments 3 and 4 as well as treatment 5 the only emergence which could have occurred was from larvae overwintering in the soil.

The effect of shredding may be seen by comparison of treatments 1 and 2. No significant difference was observed between treatments 1 and 2 implying that shredding the stalks with a flail-type shredder did not cause a reduction in the emergence of moths.

A comparison of treatments 1 and 2 versus treatment 3 shows the number of moths emerging which can be attributed to the cotton residue left on the surface. The soil in each of treatments 1, 2 and 3 was undisturbed.

Treatment 7 had the next to highest emergence of moths although it was a considerably lower emergence than that which occurred in treatment 4. In treatment 7 the cultural practices recommended for control of pink bollworm were followed.

One overriding factor which affected the emergence of moths was the extreme climatic conditions that occurred during the winter of 1966-67.

Again, looking at the emergence from treatments 3 and 4 one can see the effect of burying the moths and protecting them from the extreme weather conditions. The implication from this is that an interaction exists between climatic conditions and cultural practices. It is not within the scope of this experiment to more precisely define the interaction.

Conclusions

Climatic conditions play an important role in survival of overwintering pink bollworm larvae. Dessication and cold temperatures have an adverse effect on the survival of the larvae.

There was no reduction in survival of the pink bollworm larvae when stalks were shredded with a flail-type shredder.

As larvae enter diapause many do leave the boll and enter the soil to overwinter.

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ECOLOGICAL FACTORS AFFECTING THE ABUNDANCE AND CULTURAL CONTROL OF THE PINK BOLLWORM

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Objectives:

A. To study environmental factors influencing behavior and abundance of the pink bollworm.
B. To investigate physical, mechanical, cultural, chemical, and biological agents as possible control measures under Arizona conditions.

Summary of Progress:

Eight methods of burying plant debris were compared in a replicated field experiment. Results are shown in Table 1. Total moth emergence was greatest in the treatment which was only shredded and disked. However, more moths emerged after squares were available in the deep-plowing (12") treatment. Fewer moths emerged from the treatment which was rototilled than from any other; no emergence occurred in this treatment after squares were available.

Table 2 presents the results obtained from an experiment designed to evaluate various irrigation practices on pink bollworm control. Water applied only as a preplant practice resulted in significantly greater moth emergence than with any of the other treatments. There was no difference in numbers of moths emerging from the nonirrigated check, two winter irrigations--both border or furrow irrigated--or the treatment which simulated the practice of irrigating-up.