Sampling of the smaller parasitic wasps and flies associated with the insects of cotton and other crops was accomplished fairly readily by the use of the conventional insect sweep net. But it was necessary to transfer the contents of the net to alcohol for us to learn which parasitic insects had been taken. Very few are large enough that they can be identified as they leave the net. The technique used in this project was to bring the samples to the laboratory, sift out plant parts and larger insects, and examine the residue under a stereomicroscope. Most of the parasitic insects are in the size range of thrips or smaller.

Sampling the larger species is much more difficult, and is probably best accomplished by holding host insects in containers long enough for adult parasites to emerge. The sweep net method is definitely not useful unless extremely large populations of the adult parasites are present, a very unlikely event.

As has been indicated, we do not visualize sampling for parasites to be feasible on a routine basis, at least under ordinary management practices. But it would be most desirable that someone at the supervisory level in a pest management program be prepared to undertake sampling and evaluation at critical times. The main objective for the remainder of this project has thus become to develop a manual for the identification and evaluation of the parasitic insects on cotton and associated crops in Arizona.

As we have emphasized in a previous report, it is fully as important to avoid protecting a population of parasites of no importance to the target crop as it is to protect those that regulate pests. This manual will cover all the groups of parasites that we took in a year of sampling, as well as many others that we have obtained only by rearing or by other means. The known hosts will be indicated for every group, to permit rapid evaluation.

Identification of all parasitic species would be an immense task, actually impossible at the present state of knowledge. The keys, descriptions, and illustrations we have developed concentrate on abundant or important species, and the ways in which they can be told from the numerous unimportant species. By developing keys for particular situations, we have usually been able to limit the number of choices to a reasonable level. In some cases, such as known host associations based on rearing, one need know only the group to which a species belongs to be reasonably sure what species it is.

An important part of the manual is a concise summary of known parasite-host associations and appropriate indexes. We have been using these in one form or another for some years, and have found them extremely useful, especially by using the list of known parasites of a pest to narrow the choices for a reared parasite. We have had the advantage of having identified specimens for comparison. By providing illustrations, descriptions, and keys, we hope to simplify the job for others.

We are in the final stages of verifying identifications, preparing keys and illustrations, and choosing methods of presentation. The manual should be completed and available in 1976.

CULTURAL PRACTICES TO MAINTAIN EFFECTIVE NATURAL ENEMY/PEST RATIOS


Objective: 1. To investigate cultural practices to maintain beneficial insects in the area.
2. To determine the control capabilities of common predators.
3. To determine the effect of crop production practices and rotations on both pests and beneficial insects.
4. To determine crop production efficiency in this system.

Summary of Progress:

Initiation of this research during the first year has consisted of establishing the rotation sequences that will be used for implementation of this project. The rotation system that was established follows:

2. Rotation cotton (one-year rotation), planted March 1975.

The wheat-soybeans, safflower-grain sorghum, and rotation cotton will be staggered from year to year in a rotation system so that each unit of the rotation will be compared with continuous cotton and continuous alfalfa. Yields and other pertinent production information has been taken and recorded in an effort to determine the efficiency of land use and crop production, economics of the production practices as a result of the insect management system, and the effectiveness of the cropping sequences in the rotation.

Intensive sampling was done on all the crops in the rotation sequence during the past year in an effort to determine population densities and movement of any given species. This data is still in the process of being analyzed and it is hoped that from this information a threshold base can be established for each pest, predator, and parasite that can be utilized in future comparisons.

Additional research in this area includes the evaluation of a continuous cotton and early-maturing barley double cropping system as an aid to insect management and efficient crop production. An early-maturing barley, Arizona 1970-1, was planted on two different dates in Nov. 1975 and will be followed by a planting of Deltapine 61 cotton in April 1976. Determinations of the effects on insects and pests will be established with major emphasis on the pink bollworm.

BIOLOGY AND CONTROL OF INSECTS AFFECTING COTTON IN ARIZONA

T.F. Watson, D.G. Fullerton, Sanford Young
R. Bertwell, T.M. Pack, R. Wright, and L. Meinke

Objective: To determine the effectiveness of various insecticides against certain cotton pests.

Summary of Progress:

A. Control of Pink Bollworm:

The objective of this experiment was to compare the effectiveness of three synthetic pyrethroid insecticides against the pink bollworm. Results of population reduction of the pink bollworm larvae in the bolls showed that FMC 33297 at two rates, 0.1 and 0.05 lbs. AI/acre, and Shell SD 43775 at 0.1 lbs. AI/acre, were equally effective against this insect. American Cyanamid AC 206,797 was not as effective in reducing larval populations.

Yield data, as shown in Table 1, indicates that all insecticide treatments produced significantly more seed cotton than did the untreated check. Shell SD 43775 produced more cotton than did American Cyanamid AC 206,797 and the higher rate of FMC 33297. It should be noted that the low rate of FMC 33297 produced more, but not significantly more, seed cotton than did the higher rate.

Table 1. Effects of Three Synthetic Pyrethroids on Cotton Yields when Applied for Control of Pink Bollworm. Yuma, AZ 1975.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Rate #/A.</th>
<th>Yield in lbs. seed cotton per acre(^1)</th>
<th>Statistical significance(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check</td>
<td>-</td>
<td>2,369</td>
<td>a</td>
</tr>
<tr>
<td>AC 206,797</td>
<td>0.1</td>
<td>3,273</td>
<td>b</td>
</tr>
<tr>
<td>PMC 33297</td>
<td>0.1</td>
<td>3,679</td>
<td>bc</td>
</tr>
<tr>
<td>PMC 33297</td>
<td>0.05</td>
<td>3,988</td>
<td>cd</td>
</tr>
<tr>
<td>SD 43775</td>
<td>0.1</td>
<td>4,106</td>
<td>d</td>
</tr>
</tbody>
</table>

1. Harvested on October 30, 1975
2. Mean yields followed by the same letter are not significant at the 0.05 level. No significant differences occurred between replications.