The keys prepared erred on the side of being too inclusive. Therefore, modifications have been made and the keys are continually being simplified for more practical use. Our goal was to develop a key to the important parasites which could be used by nontechnical personnel.

Beginning in June, a sampling and identification program was started in 19 Pinal County cotton fields in 4 areas (Coolidge, La Palma, Mammoth, and Maricopa), with adjacent fields being sampled in 4 directions from each cotton field. Vegetation in adjacent fields included cotton, alfalfa, desert, safflower, sorghum, sugar beets, mesquite, and weeds. All cotton fields sampled were included in the Pinal County Pest Management Project. Fields were sampled weekly with a sweep net from June 25 to October 18. Each sample, 100 strokes of the sweep net, was returned to the laboratory in alcohol, sifted, and the parasites identified under a stereomicroscope. Parasite data from each field were compiled, using a computer, and distributed to cotton scout supervisors within one week after being collected.

A total of 81 parasite taxa were recorded from all samples. All records have been computer-processed and have been used for some preliminary analyses. Parasites averaged 29 per sample over all and 10 per sample in cotton. The 12 most abundant parasite taxa found in cotton are listed in Table 1.

Our findings indicated that it is feasible to monitor parasite information for making pest management decisions. A practical approach would likely use parasite monitoring when a pest population approaches an economic level with greatest emphasis being placed on identifying parasites which are known to parasitize the pest.

Table 1. Most abundant parasites sampled from cotton during June 25 to October 18, 1973.

Taxon	Number of Individuals	What It Parasitizes
Copidosoma	745	Mainly loopers, plus other lepidoptera
Telenomus	542	Lacewing and lepidoptera eggs
Trissolcus	401	Stinkbug eggs
Chrysocharis	371	Leaf Miners
Derostenus	368	Leaf Miners
Closterocerus	217	Leaf Miners and Perforators
Trichogramma	198	Lepidoptera eggs
Abbella	166	Leafhopper eggs
Aphelinoidea	154	Leafhopper eggs
Anagrus	144	Leafhopper eggs, plus other eggs
Encarsia	125	Whiteflies and Lepidoptera eggs
Tetrastichus	84	Lacewing and other eggs, alfalfa seed chalcid

ENVIRONMENTAL IMPROVEMENT THROUGH BIOLOGICAL CONTROL AND PEST MANAGEMENT

T.F. Watson, B.W. Engroff and D.T. Langston

Objective: To develop information and methods essential to the management of insect pests in cotton.

Summary of Progress:

At the Yuma Experiment Farm three studies were conducted on pest management and environmental improvement. These studies involved: 1) strip-cutting all alfalfa on the farm; 2) diversifying the cotton agroecosystem with grain sorghum and soybeans; and 3) achieving selective action of a broad spectrum insecticide by selective placement of the spray.

The data are not completely summarized in any of the studies. However, partial summaries permit certain generalizations. In both areas of the farm strip-cutting the alfalfa effectively herded lygus back and forth into adjacent half-grown alfalfa strips. In area 1, adult lygus exceeded the treatment level twice during the growing season but both times the populations declined within 2 to 3 days as the lygus apparently migrated back into the alfalfa. The treatment level was exceeded only once in cotton in area No. 2. Large fields of alfalfa adjacent to both areas were solid-cut during the season which resulted in part of the lygus problem in the cotton.

Predator populations in cotton peaked at about the same time as they did in the alfalfa but at much lower levels. Sweep-net sampling showing seasonal trends indicated that Orius sp. was the most abundant predator (of those examined to date) in alfalfa, followed by Geocoris sp. and then Nabis sp. In cotton Geocoris sp. was by far the most abundant predator for most of the season. Orius sp. was intermediate in numbers until early August at which time it equalled Geocoris numbers. Nabis species, of the 3 predators studied, was found in lowest numbers.

Soybeans and grain sorghum were planted near cotton in an effort to determine the occurrence of pest and beneficial species that also occur on cotton. Both crops were planted later than planned; late-season sampling was initiated. It appeared that soybeans were a favorable host for lygus and might serve as a more manageable crop in a row-crop scheme than does alfalfa. Sampling to date indicates a striking preference for certain predators for one crop or the other. For example, in the sample collected on October 10, Nabis sp. were taken in soybeans but not in sorghum; while few Orius sp. were taken in soybeans much higher numbers occurred in sorghum.

A pilot study was initiated to determine the effects of spray-nozzle arrangement on pink bollworm infestations and predaceous insects. The treatments were 1) untreated check, 2) normal spray pattern of 3 nozzles/row and, 3) two nozzles/row directed at the lower 2/3 of the plant.

Results indicated that pink bollworm infestations can be maintained below the economic threshold by using only 2 nozzles per row and at the same time conserve considerably more predators in the terminal area than where 3 nozzles are used.

BIOLOGICAL CONTROL INVESTIGATIONS

D.E. Bryan, R.E. Fye, C.G. Jackson, R. Patana
W.C. McAda, E.G. Neemann, and R.L. Carranza

Objective: To develop parasites and predators for control of cotton pest and to integrate them into a total management system.