

and in scattered locations of Graham and Yuma Counties. Cotton in Mohave and Yavapai Counties was found to be infested for the first time.

Western flower thrips, Frankliniella occidentalis, built up to very heavy populations on seedling cotton, particularly in high elevation cotton areas. Beet armyworms, Spodoptera exigua, and numerous cutworms were also damaging to seedling cotton during May and June in Graham, Pinal, and Maricopa Counties.

Spotted, but heavier than normal, populations of cotton aphids, Aphis gossypii, damaged cotton during late spring in Pinal and Maricopa Counties. Spider mites, Tetranychus spp., were also troublesome in these same areas and at about the same time.

Medium to heavy infestations of lygus bugs, Lygus spp., caused heavy damage to squares and bolls from early June to September. Heaviest populations were concentrated in Maricopa, Pinal, and northern Pima Counties. Say stink bug, Chlorochroa sayi, and other plant bugs added to the total boll losses. However, these pests were heavy only in scattered areas.

Normal populations of bollworms, Heliothis zea, inflicted moderate to heavy damage to cotton plants in late summer, particularly in Central and Southern Arizona. Lighter than usual populations existed in Cochise and Graham Counties.

Populations of cabbage loopers, Trichoplusia ni, salt-marsh caterpillars, Estigmene acrea, and cotton leaf perforators, Bucculatrix thurberiella, were lighter than is usually found in Arizona and were not a problem except in a small number of isolated areas.

Infestations of the boll weevil complex, Anthonomus grandis complex, were greatly reduced this year when compared to the two previous years. Light to moderate numbers were found in a few fields in the Stanfield area of Pinal County and in areas of Western Maricopa and Eastern Yuma Counties.

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INSECT PARASITES AND PREDATORS OF INSECT PESTS
OF ARIZONA CROPS

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Objectives:

- A. To determine the identity, distribution, relative abundance, host relationship, and life histories of representative common and significant species of insect parasites and predators in various taxonomic groups.

- B. To evaluate by field and laboratory studies the relative effectiveness of the more common species of insect parasites and predators in controlling insect pests of important Arizona crops. To study the life histories of the more effective species and the various factors that influence their abundance.

Highlights of 1966 Research

The feeding of a big-eyed bug, Geocoris punctipes, on first instar lygus bug nymphs was evaluated in the laboratory. First, second, and third instar Geocoris nymphs ate an average of 1.5, 2.6, and 7.4 first instar lygus bug nymphs per 24 hours, respectively. Female Geocoris consumed 25.6, 6.2, and 1.6 first, second, and third instar lygus bugs, respectively, per 24 hours, and males consumed about half as many.

Studies on Telenomus utahensis were conducted to determine the effect of six constant temperatures, ranging from 59° to 95°F, on the rate of development and viable offspring produced from Chlorochroa spp. eggs in various stages of incubation, and to compare host incubation and parasite developmental periods. Results indicated that with increasing temperatures above 68°F, the period of development decreases; no emergence occurred at 59°F. The percentage of viable offspring decreased as age of host egg increased, and parasite developmental time extended beyond the incubation time of unparasitized host eggs at all temperatures.

A comparison was made on the developmental rates of Nabis alternatus and N. ferus at several constant temperatures, ranging from 68° to 95°F. Food was supplied in the form of lepidopterous larvae. Results indicated that the developmental rate of N. alternatus was slightly greater than that of N. ferus; the difference occurred primarily in the nymphal stage. Eggs of both species failed to hatch at 59°F and no adults were obtained above 81°F where larvae alone were supplied. However where larvae were supplied in conjunction with small potted alfalfa plants, a more rapid developmental rate was obtained with both species at 77° and 81°F and adults were obtained at 86°F in contrast to complete failure when only larvae were supplied at this temperature.

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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.