LYGUS BUG CONTROL IN COTTON THROUGH ALFALFA INTERPLANTING

EARLY SEASON treatments on cotton for control of lygus bugs often eliminate natural enemies of the bollworm, beet armyworm, cabbage looper, and spider mites. In the absence of biological control, these pests can often increase later in the season and may require multiple treatments to prevent plant damage in the cotton fields.

To reduce cotton pest problems, a new alfalfa interplanting technique to keep lygus bugs away from cotton is being tested. The alfalfa interplant technique uses 20-ft strips of alfalfa for every 300 to 500 ft of cotton planted. It was tested in a 160-acre cotton field in 1967 and in two large fields in 1968. Results were so encouraging that alfalfa interplanting is being given a wide-scale test this year in all cotton counties in the San Joaquin Valley and in the Imperial and Coachella valleys. Test fields will be sampled weekly to compare lygus bug abundance, number of chemical treatments, and populations of beneficial species found in both the interplanted and in adjacent non-interplanted fields.

The three alfalfa interplant studies in 1967–68 were supported by seven earlier experiments where millions of lygus adults were taken from alfalfa, marked with a fluorescent dust, and placed in adjacent cotton fields. In each test where there was green succulent alfalfa nearby, the majority of the lygus bugs soon left the cotton and flew back to the alfalfa.

One important interplant test was conducted in 1967 at the W. B. Camp, Jr. Ranch, Shafter. During that year many of the farm management problems were worked out. This test was followed in 1968 with a test of alfalfa interplanting in a 160-acre field of solid plant cotton near Wasco and in an 80-acre field of two-in, two-out, cotton near Lemoore.

Interplanting

It is not difficult to interplant alfalfa in cotton (see sketch). For example, in 1968 on the W. B. Camp, Jr. Ranch, the 160-acre field was furrowed out in 38-inch beds for normal cotton planting. After every 156 rows (or 494 ft) the next six rows were knocked down into a flat bed of about 20-ft width. This procedure was continued across the one-half mile field. A small blade was used to build the outside borders of the flat bed slightly higher than the usual cotton row. This was done to prevent irrigation water from breaking across and washing away adjacent cotton rows.

Moapa

In late February, the 20-ft flat beds were seeded with Moapa alfalfa. This was done with one man driving a pickup truck down each flat bed while another man sat on the tailgate with an end gate seeder to broadcast the alfalfa seed. The 20-ft strips were then cultipacked and each strip was irrigated. The strips were kept reasonably moist during the summer so they would stay green and succulent, thus serving as an attractant and trap crop for lygus (graphs 1 and 2).

When possible, an alfalfa harvester was used to mow a 12-ft swath along one edge of the 20-ft-wide alfalfa strips, and the hay was baled. Two to three weeks later, the other side of the 20-ft strips was harvested. Moving equipment to harvest the small acreage was not economical and after midsummer the harvesting was abandoned. However, the strips were kept moist to keep the new shoots growing and to attract and hold the lygus bugs. There were approximately eight acres of interplanted alfalfa in the 160-acre cotton field.

Lygus samples

In this test all lygus bug samples were obtained from the east edge of the interplanted field. That part of the field was sampled because there was a 160-acre field of solid-cut alfalfa across the road. It was desirable to test the behavior and full impact of the hundreds of lygus migrating when this field was cut. The al-

TABLE 1. AVERAGE NUMBER OF LYGUS ADULTS PER 50 SWEEPS IN THE ALFALFA STRIPS AND IN THE COTTON BEFORE AND AFTER THE ADJACENT 160 ACRES OF ALFALFA WAS CUT.*

	Alfalfa strips			Cotton		
	June	July	August	June	July	August
No. lygus adults prior to cutting	100	96	198	1	2	2
No. lygus adults after cutting	175	228	439	1.5	7	4

* The original lygus counts in the alfalfa strips were reduced about four-fold—meaning area sampled in the alfalfa strips was approximately equal to the sampling area in the cotton.

TABLE 2. AVERAGE NUMBER OF LYGUS ADULTS PER 50 SWEEPS IN THE ALFALFA SEED STRIPS AND IN THE COTTON IN THE 80-ACRE INTERPLANT FIELD AND IN AN ADJACENT NON-INTERPLANT COTTON FIELD.

	June 13	June 21	June 27	July 8	July 15	August 8
Alfalfa seed strips*		35†	46†	58	18	33
Cotton in the interplant field	0.1	0.6	0.6	15†	0.7	3
Non-interplant cotton field	1.5	12†	10†	8	16†	12†

* The alfalfa seed strips were not sampled on June 13.

† Designates dates of lygus treatments. The seed strips were treated twice and the interplant cotton was treated once. The adjacent non-interplant cotton was treated three times for lygus and once for both worms and lygus.

V. M. STERN

A. MUELLER

V. SEVACHERIAN

M. WAY

falfa was cut on approximately the tenth day of each month. The cotton and alfalfa strips were sampled three to seven times each month. The samples of greatest interest were those taken before and after each alfalfa cutting (table 1).

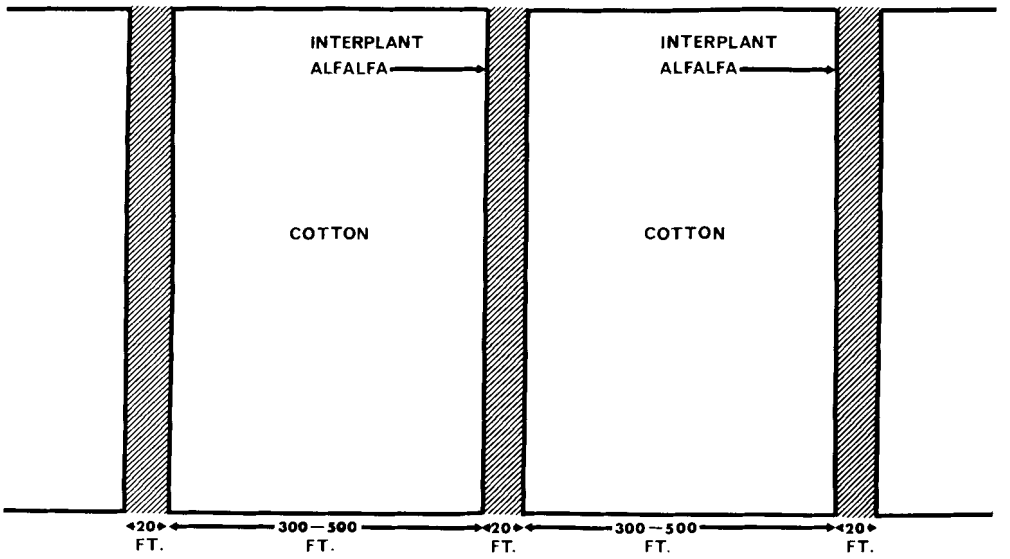
Between June 6 and 18 the lygus adult population in the alfalfa strips increased from about 100 adults per 50 sweeps, before cutting, to 175 per 50 sweeps after the alfalfa was cut. The number of adults in the alfalfa strips increased from 198 before the August cutting to 439 after cutting. At the same time, adult lygus bugs in the interplant cotton only increased from two to four per 50 sweeps.

Yields

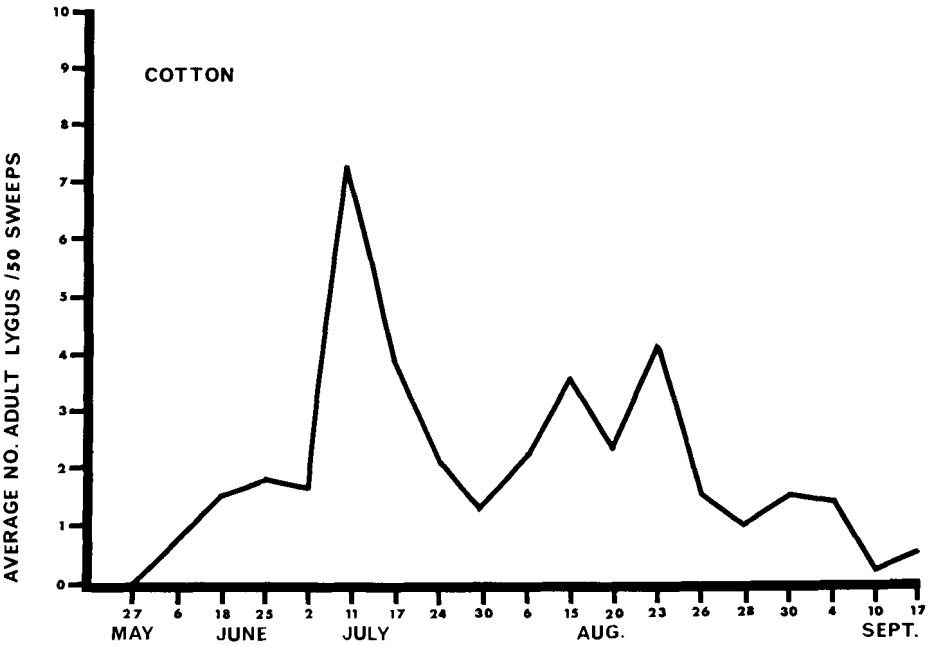
The interplanted field that was never treated for lygus or for worms produced about 2.75 bales per acre. There was more cotton on the plants but they had lodged and a noticeable amount of cotton was lost during the machine picking. Most cotton fields in the area were treated four to six times during the season.

A second interplant test was conducted in cotton on a large ranch in Fresno County. An 80-acre field was furrowed out for normal cotton planting. In late March, after every 96 rows (or every 320 ft) of cotton planted with two rows in and two out, Moapa alfalfa was planted on the top of the next six rows as a seed crop. The same alfalfa seed and cotton spacing was continued across the 80-acre field.

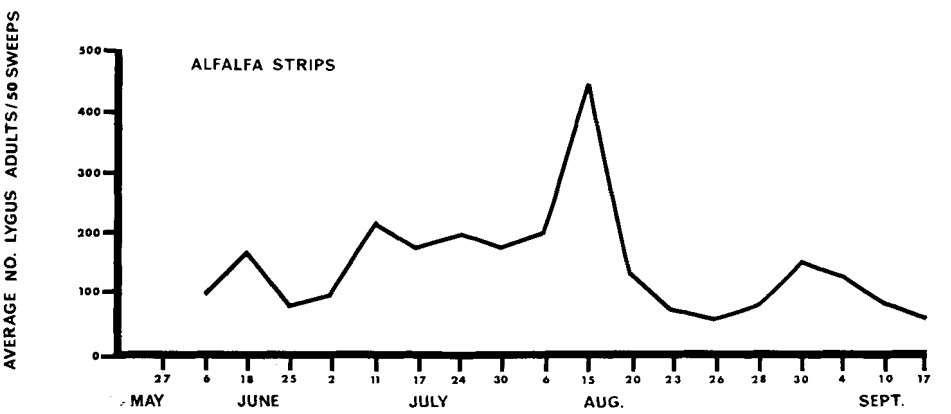
Table 2 compares the number of lygus adults in the alfalfa seed strips with the cotton in the interplant field and in an adjacent non-interplant cotton field. A heavy lygus invasion began between June 17 and 19. While there was a count of 35 adults per 50 sweeps in the alfalfa seed strips, there was less than one adult in the interplant cotton. In the adjacent



Schematic diagram of alfalfa interplanted in cotton.



Graph 1. Adult Lygus in the cotton in an alfalfa interplant field. On most sampling dates there were fewer than three per 50 sweeps.



Graph 2. Lygus adults in the alfalfa strips in an interplant field. On most sampling dates the count was above 100 and often reached 200 adults per 50 sweeps.

check plot the lygus adult count suddenly rose from 1½ bugs per 50 sweeps on June 13 to 12 adults on June 21, and the non-interplant cotton was then treated. The 20-ft strips of alfalfa seed were also treated to set a seed crop.

The heavy lygus invasion continued and the seed strips and the non-interplant cotton required another treatment on June 27. During the invasion there was less than one adult per 50 sweeps in the interplant cotton.

Lygus flight

The heavy lygus flight continued through the first week in July. Unfortunately at this time the seed strips were under moisture stress. Under the constant pressure of invading lygus, the population in the interplant cotton rose from less than one, to fifteen lygus per 50 sweeps, and the field was treated.

In mid-July another lygus flight invaded the area and the non-interplant cotton was treated. During this period the lygus population in the interplant cotton remained at less than one adult per 50 sweeps. In early August both worms and lygus appeared in the non-interplant cotton and the field was treated again.

Seed strips

If the alfalfa seed strips had been green and more succulent when the early July flight occurred, the interplant cotton could probably have gone through the season without a lygus treatment. There were about five acres of alfalfa in this 80-acre interplant field. When the alfalfa seed strips were harvested in September, they produced 365 lbs of cleaned seed per acre.

The alfalfa strips not only served as a trap crop for lygus bugs, but also as an insectary for natural enemies of other pests. The natural enemy adults appear to leave the alfalfa strips and to fly into the adjacent cotton to attack eggs and small larvae of the bollworm, cabbage looper, and beet armyworm.

Vernon M. Stern is Associate Professor, Department of Entomology, University of California, Riverside. Arthur Mueller, Vahram Sevacherian, and Micheal Way are graduate students, Department of Entomology, U.C., Riverside. *This investigation was supported by Cotton Producers Institute funds administered by the National Cotton Council of America. Lew Isaak, Entomologist, W. B. Camp, Jr. Ranch, Shafter, assisted in solving management problems with the 1967 study.*

CLING PEACHES EFFECTIVELY THINNED WITH 3-CPA

J. BEUTEL • J. YEAGER • G. POST • D. ROUGH • W. ANDERSON
N. ROSS • F. PERRY • M. GERDTS • J. LA RUE • L. BROWN

Four major cling peach varieties (Halford, Peak, Paloro, Carolyn) were effectively thinned with 3-CPA. Proper timing based on ovule length (8.5 to 9.5 mm is best) was essential for best thinning. The best sprays were of 300 ppm applied at 400 gallons per acre, or 1.6 gallons of formulated material per acre. Slight phytotoxicity usually occurred whenever thinning was obtained but was limited to a few yellow leaves which dropped two weeks later and some leaf tipburning and twisting. Fruit harvested after 3-CPA sprays appeared equal in size, maturity and quality to hand-thinned fruit. A small amount of pole or touch-up hand thinning was usually needed in addition to the thinning sprays to attain good commercial thinning.

In 1967 and 1968, 21 test plots and 78 commercial applications of 3-CPA for fruit thinning were evaluated in California peach counties. Test plots contained six to 10 randomized, single tree replications and commercial applications were made to two- to eight-row sections in commercial orchards. Results were evaluated in terms of the number of fruit removed by the spray and size of fruit at time of hand thinning. In some tests, additional measurements were made of the time needed to hand thin, the percentage of split pits, the maturity of the fruit and the size of the yield. General observations were also made on the degree of leaf injury.

Halford, Peak, Paloro, and Carolyn varieties thinned well while other varieties were thinned less effectively. Table 1 summarizes 1968 results and classifies

Injury on some leaves after spraying with 300 ppm 3-CPA.