foot), a Pn/Pw ratio of 0.048 is obtained, making the diagonal line designated by this ratio. Starting at the bottom and following the line upward and to the right, the line passes through levels of increased lint production. At the 1100-lb lint-yield level, the cost-minimizing combination of 22 acre-inches of water and 205 lbs of nitrogen per acre is indicated by the connecting dashed lines (point A). At the 1200 pound lint yield level, the cost-minimizing combination (point B) of 25.7 acre-inches of water and 222 lbs of nitrogen is illustrated for the same prevailing cost conditions.

The table shows a series of optimum rates and combinations of water and nitrogen for yield levels of 1200, 1100, and 1000 lbs of lint per acre for several different cost conditions. The Pn/Pw ratios were obtained by varying irrigation water costs. However, the ratios may be obtained by varying either the cost of water or nitrogen.

The optimum amounts of nitrogen shown in the table are somewhat greater than those normally recommended for these soils. Cotton grown in 1966 was preceded by safflower in 1965 with minimal fertilization; therefore, very little nitrogen carryover from the previous application was in evidence.

Previous studies have shown that cotton may grow excessively vegetative or "rank" on many soils when more than adequate amounts of either water or nitrogen are added. The "rankness" may depress yields by creating an unfavorable fruiting pattern. Under the soil and climatic conditions of this study, yields were depressed only by relatively high rates of nitrogen addition.

These investigations are being continued with some changes to place greater emphasis on obtaining a more generalized yield equation covering a greater variety of soil types.

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Research from which this progress report was prepared was supported in part by a grant from the California Planting Cotton Seed Distributors.

INSECT DAMAGE TO

. . . and control

ELMER C. CARLSON

(1) Adult western flower thrips, Frankliniella occidentalis Perg.

Studies of both the flower thrips and lygus bug indicate that they caused no serious sesame plant injury, reduction of pod set, or seed loss at the populations existing under the conditions of these experiments. It appeared that much larger population densities of these pests would be necessary to contribute to the poor pod set and low yields observed recently on untreated field plants. The green peach aphid caused up to 27% seed loss when present in moderate to large numbers, however. The aphid was effectively controlled by use of two applications of either oxydemetonmethyl or endosulfan.

(2) Cloth cages enclosing sesame flowers, into which thrips were introduced.

THE PREVALENT lack of pod set and low yields experienced in the production of an indehiscent strain of sesame (S. I. 151) prompted this evaluation of the effect of a few pest insects on this plant in California. A preliminary survey made in 1963 showed that the most plentiful insect pests were lygus bugs, *Lygus hesperus* Knight, western flower thrips, *Frankliniella occidentalis* (Pergande), and the green peach aphid, *Myzus persicae* (Sulzer). Later in the growing season, a striped flea beetle, *Systena* sp. nr. *bitaeniata* Lec. was present. The ability of these pests to damage sesame was studied the following year.

Thrips damage

During 1964, flower thrips (photo 1) were introduced onto flower buds enclosed by fine-mesh cloth cages (photo 2) at 5, 10, and 20 adults per bud. Thrips were introduced July 28, and produced young for the next 13 days while the flowers were blooming. A maximum of 90 nymphs were produced on one flower, as determined by hand counting an extra set of caged flowers to which thrips had been

SESAME

possibilities

GREEN PEACH APHID MORTALITIES AND YIELDS RESULTING FROM INSECTICIDE TREATMENTS OF SESAME PLANTS, DAVIS, CALIFORNIA, 1965*

Treatment and amount actual per arce	Mean no. of aphds per five terminals		Aphid Reduction		Weight of pods and seeds per ft of stem (gm)
	7 Days	15 Days	7 Days	15 Days	
			%	%	
Oxydemetonmethyl, ½ lb (2 sprays)	4.0 a	12.2 a	99	98	44.9 a
Endosulfan, 1 lb (2 sprays)	20.8 a	50.2 b	97	92	44.2 a
Oxydemetonmethyl, ½ lb (1 spray)	201.8 b	341.0 c	68	48	42.4 ab
Endosulfan, 1 lb (1 spray)	236.0 c	447.0 d	63	32	37.3 abc
Check, untreated	632.0 d	658.0 e	—	—	35.4 bc

* Treatments not having a subletter in comman are significantly different at the 5% level according to Duncan's (1955) multiple-range test.

added. The nymphs died when the flowers dried after blooming. The enclosed flowers and developing seedpods were sprayed periodically with pyrethrins after termination of the test, until harvested in November.

The results indicated that there was no significant reduction in the number of seedpods, weight of seedpods, or in seed yields due to the feeding action of the thrips. Thus, under the conditions of this experiment, it appears that thrips are not a serious factor in causing a loss of sesame seed. Observations and thrips counts on uncaged flowers indicated that when thrips migrated from adjacent harvested alfalfa hay they did not remain very long on the sesame. It appears that they would have to be present at the rate of hundreds per flower to cause appreciable economic damage.

Lygus bug damage

Adult male lygus bugs (photo 3) were introduced onto sesame flowers enclosed by small cloth cages. The bugs were introduced August 12 at rates of 1, 2, and 4 per flower bud, and were replaced with live bugs as needed throughout a 15-day period. After this, the flowers and developing seedpods were sprayed periodically to keep them insect free until they were harvested in November.

At the rates used, the male bugs did not cause any significant reduction in the number of seedpods or in seed yields. Thus, this preliminary experiment indicated that the bugs did not cause any serious production losses. Further experiments in 1965, with 2, 4, and 8 bugs per flower gave the same results.

Green peach aphid

Experimental spray applications of oxydemetonmethyl and endosulfan were made to sesame plants on September 20 and October 4, 1965. Spraying was done with a CO_2 back-pack sprayer using two "Teejet" flatfan (No. 800067) tips at 60 psi (lbs per sq inch). Each of two 25-foot rows per five replications per treatment was sprayed for 10 seconds with the proper concentration of insecticide in two gallons of water. The plants were sprayed after pod set when 50 to 75 aphids were present on each terminal cluster (photo 4).

Five infested terminals 4 to 4½ inches long were plucked per plot at 7 and 15 days after the second spraying, and the number of aphids counted (photo 5). Sesame plants were left in the field until nearly mature and then cut, brought into the laboratory, and hung to dry on November 18, 1965. The mean number of pods per foot of stem and weight of these pods and seeds were then determined.

The summary of the green peach aphid control data is shown in the table. The 7- and 15-day counts showed that two applications of oxydemetonmethyl and endosulfan gave very good aphid reductions, of great significance, when compared with the check. The data also showed that the most satisfactory treatments used under the conditions of this experiment significantly increased seed yields. This amounted to about a 27% increase in yield (or prevented a 27% seed loss). The results indicated that two applications were needed for adequate aphid control and satisfactory reduction in damage and seed loss as compared with the untreated check.

These compounds, not yet registered for use on sesame, are not suggested for use at this time.

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(3) Photo below shows an adult Lygus bug on a sesame flower.

(4) Green peach aphids on sesame terminal flowers, buds and foliage.

(5) Winged (alate) and non-winged green peach aphid on a sesame leaf.