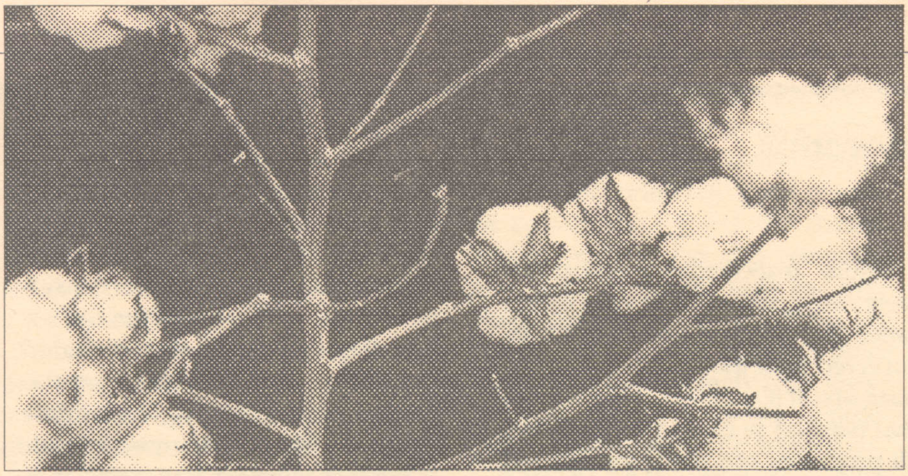


Research Update 1990

COTTON

FIRST IN RESEARCH UPDATE SERIES ON COTTON

This is the first cotton research report published in a new publication series, entitled "Research Update," inaugurated in 1989 by the Alabama Agricultural Experiment Station. The new series is meant to promote timely reporting of research results dealing with a specific crop or commodity, with distribution to all producers of that particular commodity. In this case, the target audience is all Alabama cotton producers.

Other information about cotton production and latest recommendations are available from each county Extension Service office in Alabama.

Preplant 2,4-D Provides Safe Control For Horseweed in Minimum Till Cotton

Applying 2,4-D before planting minimum tillage cotton gave good control of horseweed in AAES research. And there was no crop injury from either 0.5- or 1.0-pound (active ingredient) rates when applied either February 1 or March 1 ahead of late April planting. Applying the herbicide April 1 resulted in some crop injury in one of two test years.

Cotoran®, Prowl®, and Gramoxone® were used for general weed control in the tests conducted at the Tennessee Valley and Wiregrass (Headland) substations and the Prattville Experiment Field. A mixture of these herbicides was sprayed on after minimum tillage planting of cotton. Plots were not cultivated.

Results from the Tennessee Valley Substation show 99 percent control of horseweed from both the 0.5-pound and 1.0-pound rates of 2,4-D applied either February 1 or March 1 in 1987. In 1988, the 1.0-pound rate gave 99 and 98 percent control, respectively, from the February 1 and March 1 applications. The 0.5-pound rate provided only 70 and 83 percent control, respectively, from the two application dates.

Seed cotton yields for 1978 and 1988 at the Tennessee Valley Substation and for 1988 at the other locations are given in the table.

M. G. Patterson, W. B. Webster, D. P. Moore, and L. W. Wells

Effect of 2,4-D Treatment on Cotton Yield

2,4-D/acre	Seed cotton/acre, by app. date		
	Feb. 1	Mar. 1	Apr. 1
	Lb.	*Lb.*	*Lb.*
Tenn. Valley-1987			
0.5 lb.	1,656	1,744	1,613
1.0 lb.	1,591	1,700	1,337
Tenn. Valley-1988			
0.5 lb.	836	799	966
1.0 lb.	611	1,090	1,177
Prattville-1988			
0.5 lb.	2,398	1,976	2,057
1.0 lb.	1,853	2,369	2,463
Wiregrass-1988			
0.5 lb.	1,444	1,992	1,888
1.0 lb.	1,863	1,904	2,057

ALABAMA AGRICULTURAL EXPERIMENT STATION AUBURN UNIVERSITY
LOWELL T. FROBISH, DIRECTOR AUBURN UNIVERSITY, ALABAMA

Predators Control Beet Armyworms in 1989 AAES Research

Beet armyworms have historically been only sporadic pests of cotton in Alabama. However, when outbreaks occur, chemical control is difficult, and damage may be severe enough to cause a complete loss of the crop. Infestations have become more common in some parts of the State during the last 2 or 3 years. In California, outbreaks of beet armyworm have been induced by insecticide applications that destroy the predators and parasites that attack the pest, but the reasons for outbreaks in Alabama are unknown.

In 1989, an AAES study was begun at the Wiregrass Substation, Headland, to determine which natural mortality factors are important in controlling beet armyworm populations in Alabama. Beet armyworm eggs were placed either inside field cages which excluded all predators and parasites or inside cages that did not exclude potential natural control agents.

Before insecticidal applications were made, virtually no eggs inside cages that allowed predator access survived until they hatched. In contrast, about 80 percent of the worms that hatched in cages that excluded all predators and parasites reached maturity. No worms survived to maturity when they were available to attack by predators. Although a diverse complex of predatory insects was present in the field, the imported fire ant was, by far, the most abundant.

No parasites or diseases were found in worms collected from the field early in the season. After malathion applications (as part of the boll weevil eradication program) began to be made at about 5-day intervals, predator populations declined but were not completely eliminated. Although beet armyworm survival increased when predator populations were reduced, survival was always considerably less than in cages that excluded predators.

In mid-August and early September, a heavy flight of beet armyworm occurred in the Wiregrass Substation fields. Despite repeated insecticidal applications, predators maintained the wild population far below those in cages that excluded predators. Nevertheless, populations reached damaging levels in late August. The beet armyworm outbreak was attacked by a complex of parasites, but these parasites were unable to significantly reduce the pest population. Eventually, after severe damage to the cotton, the pest population was virtually eliminated by a complex of fungal diseases. Thus, predators (especially fire ants) effectively controlled early-season infestations of beet armyworm.

Parasites and diseases may be effective in reducing an outbreak of beet armyworm, but probably will not attack the infestation soon enough to avoid crop damage. Avoiding unnecessary early-season insecticidal applications is advisable, since such treatments might reduce the effectiveness of beneficial insects.

M.J. Gaylor

Gossym-Comax Cotton Model Promising

The Gossym-Comax cotton computer model has three main uses: (1) predicting irrigation timing, (2) predicting nitrogen fertilizer requirements, and (3) predicting defoliation timing. Beginning in 1987, AAES evaluation experiments were conducted to verify Gossym-Comax's usefulness to Alabama farmers. On-farm evaluations were conducted with irrigated cotton in 1988 and 1989. Each year, changes have been made in Gossym-Comax and the 1989 version was found to be significantly improved over the earlier years.

Based on the 3 years of evaluations, several factors were identified for consideration in using Gossym-Comax:

1. Initial computer and weather station will require a $9,000 - $10,000 investment.
2. Extensive soil water availability measurements will be needed on each soil type. The soil factors were found to be a major component in driving the Gossym-Comax model.
3. Cotton modeled with Gossym-Comax should have access to irrigation. Large periods of drought stress have led to inaccurate predictions. Results with irrigated cotton have been good, especially in irrigation timing.
4. In Alabama, Gossym-Comax will often over-estimate cotton's nitrogen fertilization requirement, especially on nonirrigated cotton.

C.H. Burmester

Insecticide-Resistant Aphids Controlled by Predators

Many Alabama cotton producers have experienced difficulty in controlling cotton aphids in recent years. The insect reproduces so rapidly that high levels of control are required to bring a dense population to below damaging levels. Aphids may attack cotton at any stage of plant growth and may reduce yields. In addition, late-season infestations may reduce quality of the lint.

In 1988, when many growers had great difficulty in controlling aphids, cotton aphids collected from several parts of Alabama were found to have developed high levels of resistance to a wide range of insecticides.

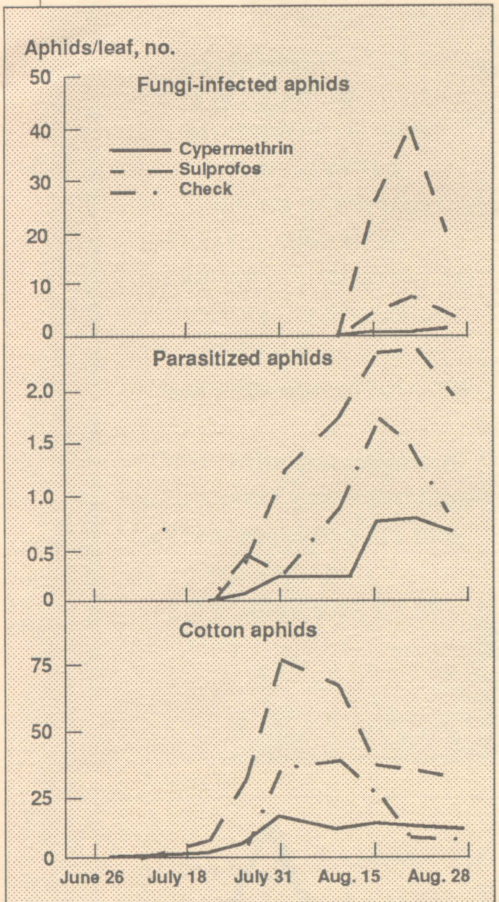
Resistance levels increased rapidly with additional insecticidal applications. For example, in a population from Tallassee, resistance to an organophosphorus insecticide increased from about 15-fold to 40-fold following a single application of the insecticide.

For the first time in several years, few control failures were reported in Alabama in 1989. Concurrently, little insecticidal resistance was detected. Reasons for the absence of resistance in 1989 are unknown, but probably are related to fewer insecticidal applications in early and mid-season. Also, heavy spring rains provided ideal conditions for infection by fungal diseases and may have washed many aphids from the plants. The fungal diseases had virtually eliminated the aphids by late August.

A study at the Tennessee Valley Substation, Belle Mina, demonstrated the need to avoid insecticidal applications until they were necessary. In plots where no insecticides were applied, predatory insects maintained relatively good control of aphids throughout the season. Aphid populations also remained low in plots treated with the synthetic pyrethroid cypermethrin, see figure. In contrast, aphid populations reached extremely high levels in plots treated with the organophosphorus insecticide sulprofos.

Reasons for the differences in the cypermethrin- and sulprofos-treated plots are unknown. Predator populations were similar in the two treatments, and there were few differences in insecticide-induced aphid mortality. Fungal diseases eventually controlled the aphid outbreak, but not until the pest populations had reached unacceptably high densities. Parasites also attacked the aphids in these plots, but were not an important factor in bringing the outbreak under control.

M.J. Gaylor



Narrow-Row Cotton Yields Higher Than Standard Row-Width Cotton

Interest in narrow-row cotton is increasing across the Cotton Belt. Growers in some areas have reported higher yields from 30-inch rows than in standard, wider rows. Cotton pickers are now available which can harvest cotton grown in 30-inch rows.

AAES research was begun in 1989 to investigate the effect of row spacings, Pix® plant growth regulator, and weed control requirements on cotton yield at the Tennessee Valley Substation, Belle Mina, and Prattville Experiment Field, Prattville. Varieties used were DPL 50 at Belle Mina and DPL 90 at Prattville, planted in solid 30-inch and 40-inch rows and in skip row 40-inch rows. Two applications of Pix at 8 fluid ounces per acre were applied to all row-spacing treatments.

Yield Per Acre at Different Row Spacings

Row spacing	Seed cotton yield/acre		
	Belle Mina	Prattville	Av.
	Lb.	*Lb.*	*Lb.*
Solid 30-in.	2,516	2,135	2,325
Solid 40-in.	2,460	1,933	2,197
Skip 40-in.	2,057	1,730	1,894

Yields were highest for the solid 30-inch row plantings when averaged across weed control and Pix treatments at both locations, as shown by data in the table. The Pix applications provided no benefit to cotton in any row width. Likewise, low or high weed control levels did not affect yield in any row spacing.

M.G. Patterson

K Fertilization Increases Yield of Cotton Following Alfalfa

Seed cotton yields were increased by applying potassium (K) fertilizer to a field that had previously been in long-term alfalfa production. The same potassium rates had been applied for 3 years preceding alfalfa in the field plots at the Tennessee Valley Substation, Belle Mina. Stoneville 825 and Deltapine 50 cotton varieties were compared in the tests.

Cotton yields were not affected by K fertilization the first year (1987) of the test. Small yield increases resulted from K application the second year (1988). Stoneville 825 yielded 1,616 pounds of seed cotton per acre that year, compared with 1,436 pounds for Deltapine 50.

Greatest yield responses to K fertilizer occurred in 1989, as shown by data in the table. Applying 60 pounds K_2O per acre each of the 3 years (1987, 1988, and 1989) increased seed

Yield Response to Potassium by Cotton Following Alfalfa

Pounds K_2O/acre/year			Total K_2O, 1987-89	Seed cotton/ acre, 1989
Fall[1]	Spring[2]	Total		
			Lb.	*Lb.*
0	0	0	0	1,777
0	60	60	180	2,649
0	120	120	360	2,814
0	180	180	540	2,942
60	60	120	360	2,860
90	90	180	540	2,840
120	0	120	360	2,740

[1]Broadcast and plowed down.
[2]Broadcast prior to planting.

cotton yields 872 pounds per acre over production with no K applied. Using higher rates of K or splitting K applications between spring and fall did not increase yields over the 60-pound rate applied in spring. Deltapine 50 outyielded Stoneville 825 in 1989—2,814 vs. 2,507 pounds seed cotton per acre.

Results from this study suggest that more than 1 year of K application may be necessary to achieve top yields of cotton following long-term forage production.

G.L. Mullins and C.H. Burmester

EDITOR'S NOTE

Mention of company or trade names does not indicate endorsement by the Alabama Agricultural Experiment Station or Auburn University of one brand over another. Any mention of non-label uses or applications in excess of labeled rates of pesticides or other chemicals does not constitute a recommendation. Such use in research is simply part of the scientific investigation necessary to fully evaluate materials and treatments.

Information contained herein is available to all persons without regard to race, color, sex, or national origin.

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SUPPORT COTTON RESEARCH

Funds appropriated by the Alabama Legislature provide the major financial support for Alabama Agricultural Experiment Station research. Hatch funds from the U.S. Government also represent an important funding source. Since these funds are limited, however, many areas of research would go unsupported except for financial support from various granting agencies, commodity groups, and other friends of the Experiment Station. Among these supporters of AAES research, the following are recognized and thanked for their contributions to research on cotton production:

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