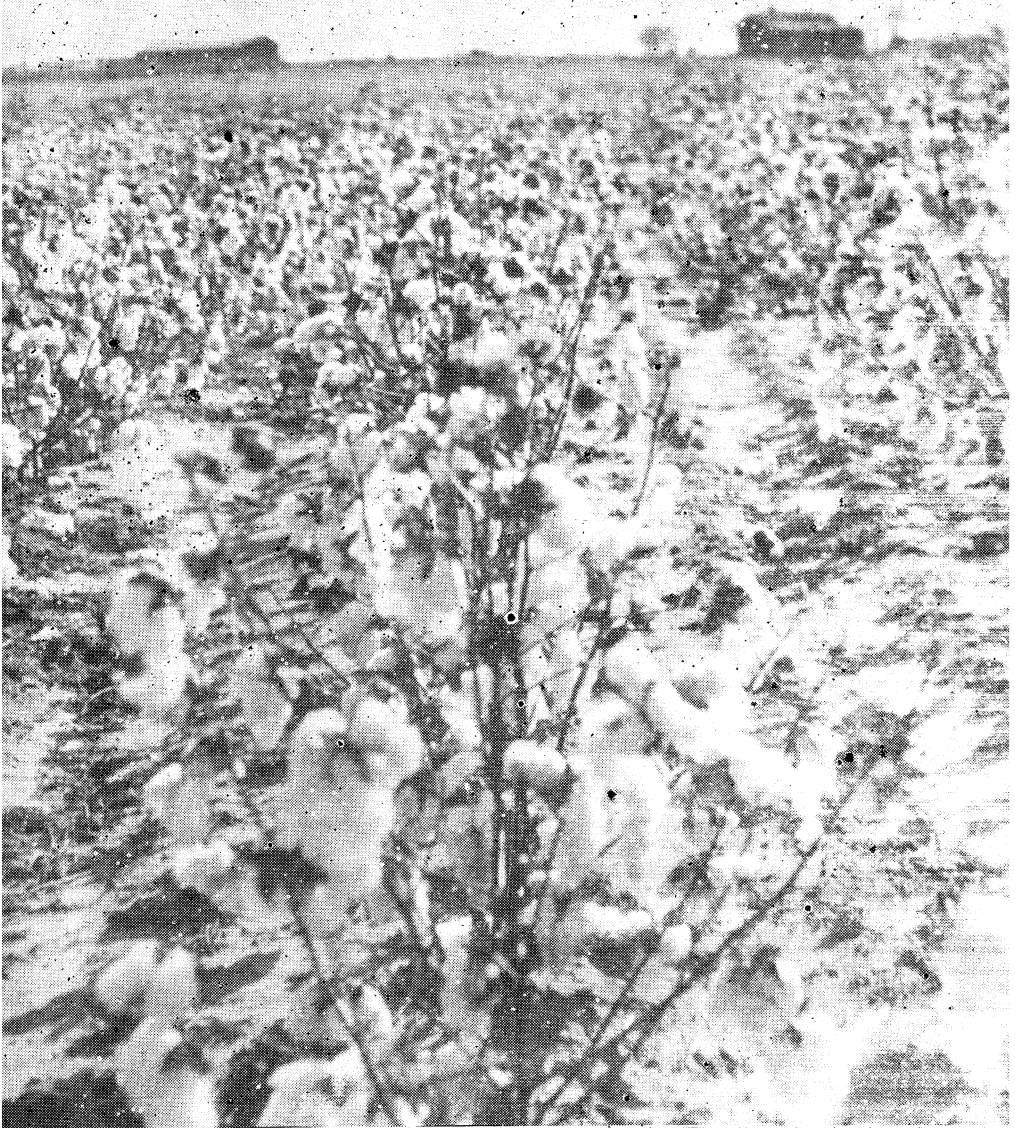


Collection

Chemical Defoliation of Cotton



OKLAHOMA AGRICULTURAL EXPERIMENT STATION

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OKLAHOMA AGRICULTURAL EXPERIMENT STATION
Oklahoma A. and M. College, Stillwater

W. L. Blizzard, Director

Louis E. Hawkins, Vice Director

Consider That:

I

In the fall when cotton bolls are thirty days old they are mature and ready to open and be harvested.

II

Earlier harvest of cotton means:

1. Saving more of the crop,
2. Higher grade of lint and seed, and
3. Earlier destruction of old cotton stalks for insect control and planting winter cover crops.

III

As long as mature cotton bolls are in the field, the producer is merely storing his crop in the open with no insurance against loss from insects, diseases or weather.

IV

Mature cotton bolls are often slow in opening because heavy leaf growth prevents free air circulation and entrance of direct sunlight.

V

Leaf growth in the fall interferes with hand picking and makes it impossible to use certain kinds of mechanical harvesters.

VI

The leaves of a cotton plant carrying mature bolls are no longer necessary and serve no useful purpose.

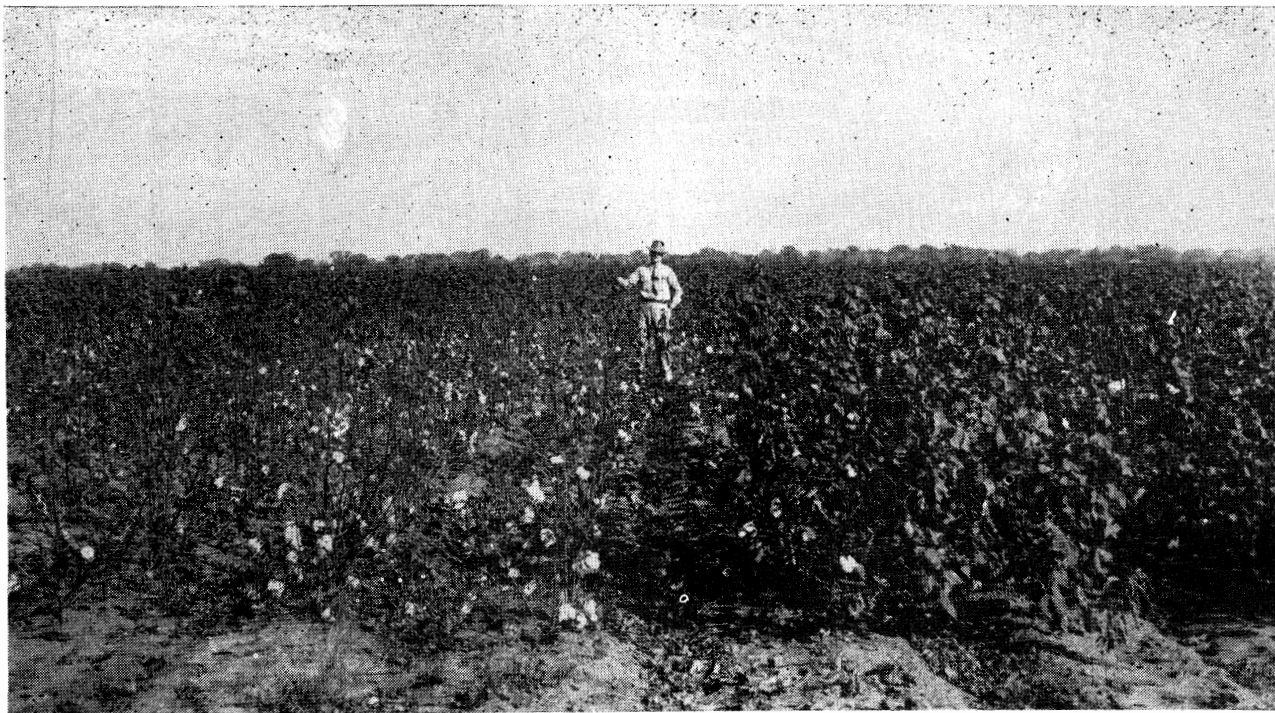
VII

Leaf growth of cotton can be easily and economically removed (defoliated) by dusting the plants with a chemical containing calcium cyanamid (Aero Defoliant).

VIII

Chemical defoliation does not make more cotton, but it often makes it possible to save more of the crop. Earlier harvesting results in significantly higher grades of lint and better quality of fiber and seed.

[4]



The defoliated plants on the left are ready for immediate harvest and early destruction of stalks. The early harvesting made possible by defoliation will reduce loss of seed cotton from bolls, and also help increase grade.

Chemical Defoliation of Cotton

By HENRY E. DUNLAVY, I. M. PARROTT, MERRILL GOBER
and CHARLES H. BRETT*

The Value of Early Harvesting

Late harvesting of cotton results in a double loss to the producer.

Cotton falling from the bolls after they have been open for some time is a too familiar sight. Fields left unharvested until late in the season often have considerable seed cotton on the ground. The amount of this loss varies with the length of exposure, weather, and variety planted. It has been found to amount to as much as 11% as an average of 25 varieties left in the field until October 1.

Deterioration of cotton left unpicked in the field until late in the season accounts for a large part of the low grade lint reaching the spinners. Low grade cotton with perished fibers makes low grade textiles that are expensive to manufacture. This is a tremendous and inexcusable loss and one that can be largely eliminated.

During the last few years, Oklahoma has harvested about 21% of its cotton in September, 37% in October, 26% in November, and 16% after December 1. By mechanical harvesting and other means of hastening the movement of cotton from field to bale, 25% of the State's crop could be harvested in September, 40% in October, 25% in November, and 10% in December.

Such earlier harvesting would mean an increase of about 10% in gross income to the growers due to average improvement in grades, on the basis of average size crop and July 1946 market prices and differentials. The increased income due to saving more of the crop is difficult to calculate, but some years it would doubtless be greater than 10 percent.

How Leaves Affect Early Harvesting

The leaves of the cotton plant, which are absolutely necessary for growth and development in the summer, may, through shading, actually retard the opening of the bolls in

*Respectively, Agronomist, Cotton (USDA); Superintendent, Southwest Oklahoma Cotton Station, Tipton (Coop. USDA); Cotton Laboratory Technician; and Assistant Entomologist.

the fall. The opening of a boll of cotton is essentially a drying out process. As soon as the bolls have reached their full development, they should have conditions that are conducive to their drying out and opening for harvest. Long delay in opening of bolls sometimes results in total loss through rotting, and always causes lower grades of cotton and deterioration of fiber.

The best cotton-producing regions of the world are those where the growing season is terminated by killing frost. Frost, coming after the cotton plants develop their maximum crop, ordinarily causes the leaves to drop when they are no longer needed. The bolls of the defoliated plants are thus exposed to better circulation of air and direct sunlight. Under these conditions, the bolls open quickly.

When frost is later than usual or the cotton plants have developed earlier, the bolls are left in the shade of the leaves after they are mature and ready to open. Under such conditions, cotton farmers sometimes encourage leaf worms to defoliate the plants. Leaf worm defoliation has two disadvantages: First, its time cannot be controlled; and second, the grade of cotton harvested is often lowered due to deposit of leaf particles and stain in the lint.

Obviously the cotton grower needs a method whereby he can defoliate the plants at a time of his own choosing. To be practical, the method must be cheap, speedy, and not injure the fiber.

Chemical Defoliation

Within recent years it has been found that dusting cotton plants with a material containing calcium cyanamid will remove the leaves. The only such material now on the market is sold under the name of Aero Defoliant.

Aero Defoliant applied at the rate of from 30 to 35 pounds per acre when the plants are moist (in the presence of dew or after rain), will usually result in defoliation in from five to fifteen days. The leaves wilt very soon after application and fall from the plant without shattering. (Shattered and broken leaves are objectionable because of the fragments that lodge in the cotton and lower grade.) After defoliation, bolls start opening immediately.

Cost of material for this type of defoliation is from \$1.20 to \$1.60 per acre. Application can be made with any machine satisfactory for applying poison dust for insect control.

Tests show that this type of defoliation in no way injures the quality of the fiber or seed. In fact, the quality of the



Heavy leaf growth has been 91 percent removed from plants on left, 11 days after application of chemical defoliant. The defoliated cotton is ready for harvest, while bolls are only partially opened on the untreated plants at the right. Yields on this test were greatly reduced by boll weevil. The weevil will continue to have ideal conditions for growth and reproduction in undefoliated cotton after defoliated plants are harvested and the land planted to a winter cover crop.

crop is actually improved if defoliation is followed by earlier harvest.

Defoliation and Machine Harvesting

Cotton farmers are faced with the absolute necessity of producing cotton more economically, and the most promising field for new economic practices is in harvesting. Hand harvesting sometimes costs about 40% of the gross value of the cotton, and machine harvesting can materially reduce this proportion.*

The presence of green leaves at harvesting time always makes hand harvesting more difficult. Cotton pickers show decided preference for defoliated cotton, as it is easier to pick and working condition are much better.

With machine harvesting the need for defoliation is even greater. Leafy cotton cannot be harvested with a stripper type harvester; and even with the finger type picker, leaf particles and stain are often a factor. Defoliation will doubtless become a standard practice in those sections that practice mechanical harvesting.

*Okla. Agri. Exp. Sta. Bul. B-286, "Mechanical Harvesting of Cotton."

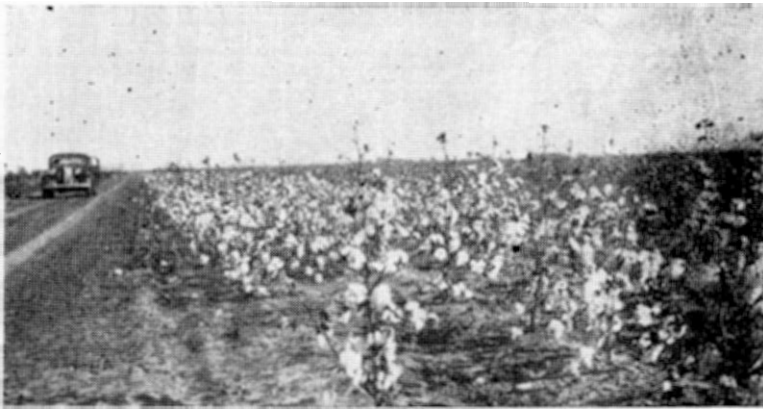
The earlier harvesting aided by defoliation is very helpful in the control of insects. Boll weevil and other insects often thrive in leafy fields of cotton in the fall and are able to go into winter hibernation in such good condition that the emergence in the following spring is very heavy.

Results of Defoliation Tests in 1945

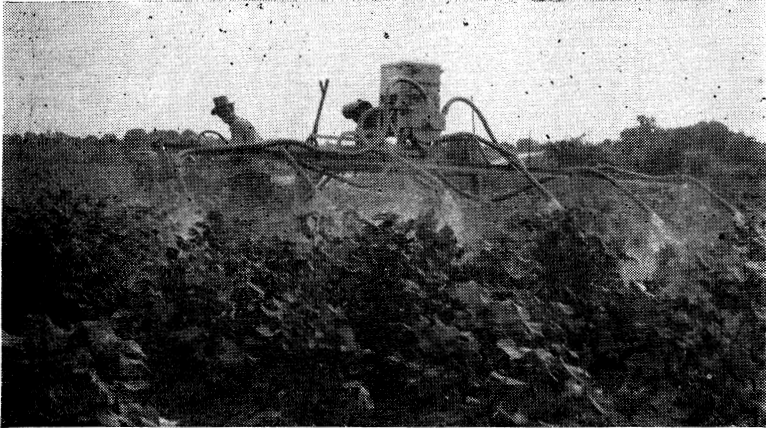
In the fall of 1945, the Office of Cotton Improvement of the Oklahoma Agricultural Experiment Station did some defoliation on a cooperative basis at Webbers Falls, Chickasha, Tipton, and Pocasset. Aero Defoliant was applied at the rate of 15, 30, 45, and 60 pounds per acre with a standard type cotton duster drawn by a tractor.

Table 1 gives the amount of defoliation secured on three of these tests, measured as percentage of leaves removed from the plant. This is a conservative measure of defoliation, because the count after defoliation frequently included a few small leaves left on the top of the plant that in no way interfered with the harvesting operations.

WEBBERS FALLS TEST.—At Webbers Falls, the dust was applied to a field of Deltapine cotton grown in the bottom. Plants were five to six feet tall, extremely leafy, and considerable boll rot had already developed. Dusting was done October 10, and a leaf count made 21 days later. On the plots that were dusted with 30 pounds or more defoliant per acre



Ideal conditions for mechanical harvesting are presented by this field of Mebane 140 cotton at the Southwest Oklahoma Cotton Station, Tipton. It was defoliated with 30 pounds of chemical defoliant per acre. Early harvesting will clear the land for planting winter cover crop.



Chemical defoliant can be applied by any duster suitable for poisoning cotton insects.

the only leaves remaining were in the tops of the plants and their presence did not interfere with harvesting.

This field was defoliated too late for most effective results as boll rot had already done considerable damage.

At the time leaf counts were made, leaves were collected and weighed. The percentage of complete defoliation by weight for applications of 15, 30, 45, and 60 pounds per acre was 62, 88, 94, and 98 percent respectively. The total weight of green leaves on the undefoliated cotton was calculated to be 7,511 pounds per acre.

CHICKASHA TEST.—A field of Acala 892 cotton near Chickasha was dusted with defoliant on October 13. This cotton was very rank and boll weevil had destroyed most of

TABLE 1.—*Percent Defoliation as Measured by Leaf Count.*

Pounds of Defoliant per Acre	Webbers Falls ¹		Chickasha ²		Tipton ³	
	First Count	Second Count	First Count	Second Count	First Count	Second Count
None	--	--	1.7	3.4	2.0	5.5
15	--	21.2	10.5	45.3	28.3	75.9
30	--	70.9	14.3	70.9	62.9	92.1
45	--	77.8	23.0	91.1	66.4	93.4
60	--	88.7	23.9	94.7	75.7	86.6

¹ Only one record taken (final) 21 days after application of defoliant.

² First record taken 4 days and final record 11 days after application of defoliant.

³ First record taken 7 days and final record 10 days after application of defoliant.

the crop. On all plots dusted, application of 30 pounds or more defoliant was sufficient to insure rapid opening of bolls.

This crop was picked November 1, when 57% of the total yield was secured from the undefoliated plots. At this time the 15-lb. application plots yielded 62% of the total crop, 30 pound application 67%, and the 45 and 60 pound applications 86% of the total crop. In the defoliated plots harvesting was much cleaner and more rapid and pickers showed a decided preference for the defoliated cotton.

TIPTON TEST.—At Tipton, defoliant was applied to a field of Acala 892 cotton on October 11. Dusting was done under ideal conditions following an extremely heavy dew. This cotton had been irrigated and was about 30 inches high with moderately heavy foliage.

On plots receiving 30 pounds of defoliant per acre, 92% of the leaves were removed in 10 days. The percentage of all bolls opened 14 days after application was: undefoliated, 30%; 15 lbs. dust, 53%; 30 lbs. dust, 64%; 45 lbs. dust, 69%; and 60 lbs. dust, 71%. The first picking of this test was on October 27, when 55% of the total crop was harvested in the undefoliated check. On the plots receiving 15, 30, 45, and 60 lbs. of defoliant their percentages of total crop harvested at first picking were 56, 68, 74, and 75 respectively.

POCASSET TEST.— A field of Lankart cotton located near Pocasset was defoliated on October 12. The cotton in this field was of medium size with bushy plants and very heavy foliage. At the time of application, the plants were in an active growing condition. Dust was applied late in the morning with minimum moisture, but defoliation was practically complete. This cotton was mature and ready for the bolls to open, but opening was being retarded by excessive leaf growth. Twenty days after 30 pounds of dust per acre were applied to this field, 87% of the bolls on the defoliated plot were open and ready for harvest as compared to 55% on the undefoliated check.

Direction for Use of Defoliant

Cotton defoliant is sold in packages that bear directions for handling and application. These directions should be carefully followed.

