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*Approved and Recommended Method*  
*for*  
*Combating the Boll Weevil*  
*For 1924*

BY

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## *Recommendations for Boll Weevil Control in Oklahoma*

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1. Grow a living at home and have something to sell besides cotton.
2. Mature the largest possible crop of cotton in the shortest possible time.
3. Proper cultural methods tend to insure greater production and give indirect aid in controlling weevil damage. They are:
  - a. The use of well drained, fertile soil, capable of producing a profitable yield.
  - b. A fairly deep, well prepared seed bed.
  - c. Plant good seed of an improved, early, rapid fruiting variety grown near your locality. Acala, Mebane or Triumph, Rowden and Lone Star are adapted to Oklahoma.
  - d. Plant ample seed to insure a good stand as soon as danger from frost and cold is passed and soil is warm enough to insure rapid germination and vigorous growth.
  - e. Closer spacing than under non-weevil conditions. Rows to be three to four feet apart and one or two stalks in hills from six to twelve inches apart.
  - f. Chop early and give intensive, careful, shallow and late cultivation.
  - g. Fertilize, where profitable, with acid phosphate, to induce quick growth and stimulate early maturity.
  - h. Grow a single variety in a gin community.
  - i. Maintain soil fertility.
  - j. Where practicable, destroy green cotton stalks and hibernating places in the field as long before frost as possible.
  - k. Destroy leaf and brush piles, and all other waste materials in which weevils may hibernate.
4. General poisoning is not advisable, the pre-square poisoning is all that is recommended.
5. Any desirable new or untried method should be referred to the Experiment Station for consideration.
6. Consult your County Agent, Extension Division, A. and M. College, or Experiment Station for possible trial.

# THE BOLL WEEVIL

## *Approved and Recommended Method for Combating the Boll Weevil for 1924; and Facts Relative to the Boll Weevil's Life History*

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The following summary of the important steps and measures as stated are endorsed by the Oklahoma Experiment Station members and other agricultural workers of this state as being the most practical and economical methods for combating the weevil and growing cotton under boll weevil conditions in Oklahoma:

### CULTURAL METHODS FOR GROWING COTTON UNDER BOLL WEEVIL CONDITIONS

#### **Soils**

Select for cotton planting well drained, fertile soil, if possible only land capable of producing a profitable yield. Demonstrations have shown that land that is not capable of producing 200 pounds of seed cotton per acre is not fertile enough to be profitable for growing cotton. Probably the greatest returns can be secured from cotton planted on sandy loam soils. Next to sandy loam a clay loam is to be desired.

#### **Preparation of Seed Bed**

Cotton should have a fairly deep, well prepared seedbed. The best time to plow will depend upon the kind of soil and climatic conditions. Under average prairie soil conditions winter plowing is preferable to fall or spring plowing. In all cases early plowing has given much larger yields than late plowing. Sandy types of land may be plowed later than loam or clay. If the plowing is done in the fall or winter and there are sufficient rains to settle the soil, it will probably be firm enough by planting time. But if the breaking be late, or there be little or no rain after fall or winter plowing, the soil should be firmed with a subsurface packer, or a disk harrow set straight, before planting. Cotton will not grow off rapidly if planted on a loose seedbed.

In the western part of the state cotton generally gives better returns when planted in lister furrows; in the central part when planted flat on well drained soils; and in the eastern and southern sections, especially when not well drained, when planted on ridges.

#### **Seed and Varieties**

The use of pure seed with good germinating power is strongly urged. Purchase seed that is grown as near your locality as possible and within

the state, as Oklahoma seed produces earlier cotton than seed brought from the south.

Plant good seed of an improved, early, rapid fruiting variety, known to do well or recommended for the locality by the state experiment station. The existence of a very large number of varieties of cotton and their general cultivation with inadequate knowledge of their relative merits is not recommended. The general adoption of a few of the best varieties, the merits of which have been adequately proved is urged. The following varieties have been found superior at the present time in their adapted localities in Oklahoma: Mebane or Triumph, Acala, Rowden and Lone Star.

Mebane has been found to give the best results in Western Oklahoma; Acala is adapted to the eastern part of the state as is also Rowden on the uplands and Lone Star in the bottoms, especially in the extreme southeast section of the state. In no case should cotton known to produce lint less than seven-eighths of an inch in length be planted. The ready market is for cotton producing an inch up to an inch and one-eighth inch staple.

#### **Time to Plant**

Plant seed as soon as danger from frost and cold is passed and the ground is sufficiently warm to insure rapid germination and vigorous growth. Earliness is of great importance, not for drought evasion, but on account of the shortness of the season, especially in the northern part of the state, and the boll weevil in the southern part. However, nothing is gained by planting before the ground is thoroughly warm. Cotton is a hot weather crop, and if planted too early, cool weather and disease may stunt the crop or ruin the stand. It may also enable the weeds and grass to get a good start before cultivation begins. The time of planting will vary with soil and climatic conditions, but everything considered, early planting gives higher yields than late planting. In the southern part of the state in the Red River Valley, planting begins in the last week of March while at Stillwater it is seldom started until in May.

#### **Rate to Plant**

The importance of securing and maintaining a full stand cannot be over emphasized. Sufficient seed of good germinating quality to insure a good stand requires the planting of one-half bushel of seed per acre in western Oklahoma and one bushel or over of seed per acre in eastern and southern Oklahoma. The seed are planted deep enough when they just reach moist soil, no matter how shallow that may be. In general, it may be said that the seed are too deep unless a few uncovered seed may be seen behind the planter.

#### **Spacing**

The best width of rows and spacing of cotton in the row may vary with soil and climatic conditions. Rows should be only wide enough to allow proper cultivation and cotton in the drill should uniformly be spaced closer than under non-boll weevil conditions. Cotton should be in rows three to four feet apart and there should be one to two stalks per hill when

the hills are six to twelve inches apart, and two stalks or more in each hill when they are over twelve inches apart.

### **Chopping**

Chop to the desired stand as soon as safe from cold or other adverse conditions. This will generally be about the time the plant is putting on the third pair of leaves. Early chopping in nearly all cases is preferable to delayed chopping. Observation on the experiment station farm indicates that when chopping is delayed after the plants are six inches tall with their third pair of leaves developed, the first picking is delayed in the fall proportionally up to a limit of about a week or ten days.

### **Cultivation**

Give early and frequent cultivation and continue until fairly late in the season, or at least two or three weeks beyond the usual "lay-by" time. Great care should be taken particularly in the latter part of the season to cultivate shallow and not too close to the row. Carelessness or deep cultivation at this period may mean disaster, due to destroying or injuring roots which are close to the surface. This in turn causes a large amount of shedding of squares and small bolls.

By shallow cultivation is meant sufficient depth to keep down all weeds and keep a crust from forming on the surface and still leave the surface in as smooth (not level) a condition as possible. Good cultivation can be best accomplished by using shovels for the first cultivations and small sweeps for the last cultivations.

The principal idea in cultivating is to keep the soil in as fine a condition as possible and to keep down all grass and weeds so there will be no shade or shelter for the developing boll weevil after the punctured square falls to the ground. It is a good plan to leave the middle slightly lower than the cotton rows so that there will be a tendency for the fallen squares to accumulate on the ground and be exposed to the maximum amount of sun rays so the boll weevil larvae will be killed. It is necessary that the field be cultivated frequently and there has been some evidence that it has been found helpful to cultivate the field each week. If cultivation of some kind can be done without injury to the cotton plants the fields may be cultivated until the bolls begin to open. Demonstration tests in many parts of the state have showed increased yields from each additional cultivation even after five to eight or more times.

### **Manures and Fertilizers**

The use of barnyard manure and the growing of legume crops should prove beneficial in all locations.

Commercial fertilizers should be used with judgment under Oklahoma conditions on account of varied climatic conditions and the lack of sufficient experimental evidence. It has been found that commercial fertilizers should only be used in regions of more than thirty-five inches of rainfall. Under these conditions, applications of high grade acid phosphate at the rate of about 200 pounds per acre should give profitable returns in a normal season.

On land in eastern Oklahoma that has been producing very small stalks it might be advisable to apply nitrogen in the form of nitrate of

soda (sodium nitrate) at the rate of 50 to 100 pounds per acre just before or during planting time. This will force a rapid and vigorous growth while the plant is young and help produce a good plant capable of carrying a large amount of cotton. In general for mixed fertilizer a 2-12-0 formula is about right for eastern Oklahoma conditions. This is to be applied at the rate of 250 pounds to the acre. In other words, the fertilizer contains 2% of nitrogen, 12% phosphorus and no potassium.

Briefly the following is the effect of commercial fertilizers on cotton:

1. Quality production is largely influenced by amount of nitrogen and moisture in soil.
2. Earlier maturity is caused by the use of phosphates.
3. Application of phosphates increases early maturity; light application of nitrogen increases early maturity to a slight extent and increased applications cause later maturity.
4. Potash has little effect on the maturing of the cotton boll but is necessary to prevent "cotton rust." This element is generally present in sufficient amounts in all Oklahoma soils.

In order that production will be larger it is necessary to adjust the amounts of phosphates and nitrogen in the soil so that the nitrogen will give quantity and the phosphates give early maturing. This may or may not be a question of commercial fertilizer. In any case it is a matter of securing a balanced soil fertility suited to early production and quantity production. The exact quantity of fertilizer that should be used and the exact formula to be used will vary with the different soil types and with farm practices.

#### **Legumes**

The lack of soil fertility is the limiting factor in much of the cotton belt of this state. In order to build up this it has been found necessary to grow legumes on the land. Cowpeas, soybeans, and sweet clover are three good soil builders. Red and other clovers can be grown in the extreme northeastern part of the state; lespedeza or Japan clover in the most eastern part, and bur clover in the southeastern corner. These growing on the land preceding cotton have greatly increased yields and in general improved soil conditions.

#### **Terracing**

Terracing of land that has a tendency to wash, especially on hillsides, is necessary to save much of fertile soil and to keep the land from becoming full of gullies or washing away leaving only poor subsoil.

#### **One Variety Communities**

A single variety of cotton in a community should be agreed upon and all planted as nearly at the same time as possible. This will then not furnish new squares at different times for the weevil to feed upon. It will also standardize the quality and staple of the cotton from that community and make for a better price than where a large number of different varieties are grown and ginned in the same neighborhood.

#### **General Economics**

1. Adopt a general program suitable to the locality for maintaining and improving soil fertility.
2. Do not increase the acreage but increase the production per acre.
3. Plan greater efficiency in every phase of cotton production.
4. Plan for a well balanced, self-supporting farm unit with a "living at home" program.

5. Cooperative marketing of cotton has proved to be the most profitable way of putting the cotton on the market.

Your attention is called to a bulletin by President Bradford Knapp which is now ready for distribution. This bulletin discusses more fully the economic phases that are barely mentioned here. The title of the bulletin is "Safe Farming".

### **Recommendations for Direct Control**

At a recent meeting of the southern agricultural workers at Birmingham, Alabama, January 10-12, 1924, nearly all the entomologists of the cotton states conferred in formulating a definite and unified procedure along the line of cotton boll weevil control.

The delegation from Oklahoma concurred in a general way with all methods advised. It was clearly shown, however, that certain methods superior for one locality were not necessarily advisable for another locality.

After very careful consideration of all methods promulgated and after several years of experiments, the Oklahoma Agricultural Experiment Station advises as follows:

### **CULTURAL METHODS**

The cultural methods as outlined in this circular are superior to all other proven methods for boll weevil control in Oklahoma.

#### **Poisoning**

If overwintering weevils appear at the rate of twenty or more per acre when young cotton plants begin to form squares, then poison them. Use either A or B of the following, although A is most highly recommended:

- A. Home Mixed Molasses Arsenate Mixture
  - One pound calcium arsenate
  - One gallon table quality syrup
  - One gallon of water

Mix thoroughly and apply within twenty-four hours after being mixed, to prevent fermentation of mixture and burning of foliage. Apply at the rate of about one gallon per acre by use of a home made mop. (Make by tying a few pieces of cloth to one end of a light stick, about twenty inches long, large enough to hold easily and long enough to extend from the down stretched arm to the cotton plant). Splatter a few drops of the sweetened mixture into the growing top of the plant. This treatment may be repeated before the blooming of plants if sufficient weevils appear to warrant its use.

- B. Calcium Arsenate.

Dry calcium arsenate may be used instead of the home made sweetened mixture. It may be applied with a machine (power duster or ordinary hand duster), or by means of a porous cheese cloth bag. Not more than five pounds per acre is necessary if properly distributed.

Dry applications, rained off within twenty-four hours after being applied, should be repeated until desired results are obtained.

Poison applications are not advised for Oklahoma after blossoming begins.

#### **Gathering Punctured Squares**

In some instances during the early part of the season the gathering of punctured squares may be advisable. These, however, should not be burned or otherwise destroyed, but should be placed in a screened enclosure (fourteen to sixteen meshes per inch) through which the emerging weevils cannot get out, but through which their parasites that may be in the squares can escape. Within a month, when the weevils are dead and the parasites have escaped through the screen, the squares may be discarded.

### Early Stalk Destruction

If cotton can be picked out a few weeks before killing frosts occur it is advisable to destroy the stalks to prevent further green growth and weevil development. Since green cotton is the only food of the boll weevil, the destruction of the green cotton squares and bolls will not only destroy the young ones, but without green cotton the adults will be forced into hibernating quarters in such a weakened condition that many of them will be unable to survive the winter.

### Fall Clean-up

Fall clean-up of gins, cotton storage houses, cotton hulls, brush piles, and similar weevil sheltering places should be practiced, not only from the standpoint of weevil control, but from the standpoint of other injurious insect pests, some of which hibernate in such places.

### FACTS RELATIVE TO THE LIFE HISTORY

The boll weevil can neither subsist nor develop on any plant grown in the state other than cotton. (Why mistake cocklebur and other weed weevils, and cottonwood weevils for the boll weevil?)

The boll weevil passes the winter in the full grown stage, which is a beetle. It can pass the winter in no other stage in this state.

The boll weevil hibernates to some extent in cotton bolls. It has never been found in Oklahoma hibernating in any part of the plant except in hulls and stored seed.

About the time of the first killing frost, the adult weevils fly from the cotton fields seeking protection in such places as will furnish shelter from moisture and low temperature.

Immature weevils are easily destroyed by the freezing of the bolls, consequently, development is discontinued as soon as the cotton plants are frozen.

The hibernating weevils begin to appear in the spring at the time when the young cotton plants come up. The hibernating weevils do not all issue at once, but continue to come forth possibly until the month of July. The early issuing weevils feed on the tender young leaves of the plants and later, on the developing squares.

In the young developing squares and young bolls, the females deposit the eggs in the punctures made by their beaks. The puncture made for the reception of the egg is very similar to the punctures made in the squares by the weevils for food purposes. Rarely more than one egg is deposited in one square. When the weevils become numerous and the squares become scarce, the females will lay eggs in the developing bolls. As many as a dozen eggs may be deposited in a single boll when the weevils are numerous and the bolls are scarce. The females may deposit as many as one hundred forty eggs each.

The eggs hatch into larvae within two or three days. The larva, grub, or maggot, as it may be called, is footless and develops only inside of the square or boll and in a period of from seven to twelve days.

The pupa stage, or transitional stage of the larva to the adult, takes place in the cavern of the square or boll made by the larva in obtaining its food. This stage requires from three to five days.

The total length of time required, during the summer, therefore, is between two and three weeks for complete development. The time required for an entire generation is about six weeks. Three or four generations can develop in this state in one season. The total progeny of one pair may amount to between four and five millions of boll weevils in one year.

Much confusion has arisen among cotton planters concerning the identity of the boll weevil. Notwithstanding the fact that authentic statements have been repeatedly made, relative to the food and winter habits of this pest, persons sometimes arrive at erroneous conclusions.