

THE 4-H COTTON CLUB

4-H CLUB CIRCULAR 50

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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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THE 4-H COTTON CLUB PROJECT*
(Offered especially for Southeast Missouri)

INTRODUCTION.

In total production, Missouri ranks about tenth among the sixteen states where cotton is regarded as a major crop. In terms of yield per acre, this state leads all except those where irrigation is practiced. However, in terms of market value, Missouri's showing is not so favorable. Records for a recent year show that 56 per cent of the Missouri crop was less than one inch in staple length. This was less than that of the crop produced in the Mississippi bottom lands of any other state. These same records show a larger portion of Missouri cotton graded lower than middling than that produced by any other cotton producing state.

The variety used and the fertility of the soil where grown practically control the length of staple in the resulting crop. The fact that Missouri's average yield is so high, as indicated above, shows that the soil is capable of producing a longer staple. This leaves only a more wide-spread use of varieties that produce longer staple, the means of improving the standing of the Missouri crop in this respect.

Grade is determined chiefly by weather conditions to which the crop is exposed at maturity. In this respect it should be borne in mind always that the cotton region of Missouri marks the northern limit of the cotton belt. This means that successful growers must always be interested to find and apply means of hastening maturity of the crop to permit harvesting before its grade is damaged.

REQUIREMENTS.

Object.--The object of the cotton club work is to organize boys and girls into groups for the purpose of demonstrating to the members and to the community approved methods of production and crop management to the end that better practices may be adopted; and to train the members in leadership.

Work Required.--Each club member is required to raise and to market at least one acre of cotton, using the best cultural methods, which include proper preparation of seed bed and approved cultural practices together with the proper spacing, the growing of adapted varieties, and the use of fertilizer; also, weighing up the crop, keeping records, and attending and taking part in all club activities are required.

Records Required.--Each club member is required to keep an accurate account of all operations, expenses and receipts, a record of work done at club meetings and to write a story of the year's work on a report blank provided by the Extension Service of the Missouri College of Agriculture.

Ownership Required.--Each club member is required to own the crop and to be responsible for the demonstration field, and to secure pure seed of adapted varieties, fertilizer, materials recommended for insect control as needed and any tools necessary for

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cultivating the crop.

Time Required.-Time for attendance at six or more club meetings.

Time necessary for work on the crop.

Time for a club tour.

Time for a county show or achievement program at the close of the year's work.

Organization.-All clubs should be organized in March or April so that the cotton can be planted about the first week of May. No clubs should be organized after May 1. All work should be completed and reports made before December 1.

ORGANIZATION.

The Standard 4-H Club.

The standard 4-H club is composed of a group of five or more boys and/or girls from the same community between the ages of 10 and 21 years, who are working upon the same club project under the direction of a local club leader.

Each standard club usually is sponsored by a community organization of some kind, or by a small committee of interested persons, who are selected to speak and act for the community in cooperation with the county club leader in the conduct of 4-H club work.

Standard 4-H clubs are required to hold at least six regular meetings during the club year. These meetings may be conducted as often as the local club leader and members desire; however, the meetings usually are conducted once each month.

Below are suggested problems for a number of club meetings. It may be necessary to devote two or more meetings to the same subject and to change the order of some of the meetings as an adjustment to the seasons of the year. Local club leaders and members are expected to adapt these subjects to local community conditions.

Optional 4-H Club Activities.

Each club may select an optional activity to carry on during the year in addition to the cotton project, such as some phase of conservation, Everyday Courtesies, etc., as suggested by the state club office.

Suggested Subjects for a 4-H Cotton Club.

- I. Organization of the Club.-The local club leader in charge. (Reference: The Club Secretary's Record Book or the Leader's Manual.)
 1. Explanation of the duties and responsibilities of club officers and members.
 2. Election of club officers from the membership of the

club. (President, Vice-President, Secretary-Treasurer, Song Leader, and Reporter.)

3. Selection of a name for the club. (So as to identify the club's community and this project.)
4. Selection of a time and place for regular club meetings.
5. Instructions.—The local club leader in charge.
 - (1). Distribution of the club literature and explanation of its use.
 - (2). Explanation of the cotton club project requirements and the standard 4-H club requirements.
 - (3). Adoption of the constitution and by-laws, as amended to suit local conditions. (The members may indicate their desire to carry out this project by signing their names as a pledge on blanks below the constitution and by-laws in the Club Secretary's Record Book.)
 - (4). Setting cotton club goals, as:
 - a. Every member will use pure seed of one of the four varieties recommended for Missouri.
 - b. Every member will try to secure a yield of one bale or more per acre.
 - c. Every member will handle his cotton so as to secure a grade above middling.
 - d. Every member will attend each club meeting. (It is suggested that the club set up its own goals or adopt one or more of the above, and write them out on blanks provided in the Club Secretary's Record Book.)
 - (5). Discussion of the main club activities for the year and setting up of a local club calendar of events for the club, including community and county-wide events in which the members desire to take part. (See blanks in the Club Secretary's Record Book.)
 - (6). Assignment of work for the next club meetings, as:
 - a. Assignment of the national 4-H club pledge to be learned by all members before the next meeting. (See suggested outline of Meeting II.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Reference: Cotton Soils, Chapter II, Page 17, (See Meeting II, page 6, for detailed assignment.
 - d. Assignment of one or more topics to be used in response to roll call at the next meeting, as:

- (a) Name a standard 4-H club requirement.
- (b) Name three effects of organic matter on soil.
- (c) Name three sources of humus.
- (d) Name shades of soil color which indicate humus.
- (e) Name chief beneficial substances supplied by manure.
- (f) Name chief beneficial substances supplied by legumes.
- (g) Name chief beneficial substance supplied by rye and such non-legume crops.
- (h) Tell what is meant by a "warm" soil.

In order to make the regular club meetings more interesting, it is suggested that the local leader encourage the members to appoint a program committee at the next club meeting to feature some special number at each club meeting, such as: a reading, dialogue, musical selection, story, debate, or talk by an invited guest; and possibly a one-act, home talent play for some program during the year.

6. The Social Hour.-(Recreation and games.)

II. Cotton Soils.-(February and March).

1. The Business Meeting.-The club officers in charge.
(Reference: The Club Secretary's Record Book.)

- (1). Meeting called to order by the president, who leads the members in repeating the national 4-H club pledge, as follows: "I pledge my head to clearer thinking, my heart to greater loyalty, my hands to larger service, and my health to better living, for my club, my community and my country."
- (2). Roll call by the secretary, the members responding by reporting upon the previously assigned topics.
- (3). Reading of the minutes of the last club meeting by the secretary, which should be adopted as a permanent record by the club when approved.
- (4). Unfinished business:
 - a. Business from the last meeting.
 - b. Committee reports.
- (5). New Business:
 - a. Appointment of a program committee to plan for special activities at future club meetings. (See Secretary's Record Book.)

- b. Appointment of social committee.
- c. Anything for the benefit of the club, such as a picnic, club tour, special meeting, club dramatics, etc.

(6). Songs, led by the song leader.

(7). Adjournment of the business meeting for work.

2. Instructions.--The local club leader in charge.

(1). Discussion: Cotton Soils, page 17, Chapter II.

- a. What is humus?
- b. How can soil be made more resistant to drought? Does organic matter have any influence on "droughtiness" in soil? If so, how?
- c. What bearing does humus have on value obtained from commercial fertilizer?
- d. Name three qualities desired in soils for cotton, and give reasons for each.
- e. At what stage should green manure crops be plowed under for greatest returns?
- f. How often, at the least, should green manure crops be turned under in cotton lands?
- g. What is the relation between lessening of organic matter in cotton soil and yield of cotton?
- h. What is the relation between content of organic matter and erosion on sloping lands? Explain.

(2). Assignment of work for the next club meeting, as:

- a. Reference: Preparation of Seed Bed, Chapter III, page 18. (See Meeting III, page 7, for detailed assignment).
- b. Bringing of report blanks for use in the club meeting.
- c. Assignment of one or more topics to be used in response to roll call at the next meeting, as:
 - (a). Name three qualities desired in a seed bed for cotton.
 - (b). Name steps in preparing a good seed bed.
 - (c). Give benefits of planting on a bed as compared to level planting.

2. The Social Hour.--(Recreation and games.)

III. Preparation of Seed Bed.--(March)

1. The Business Meeting.-The club officers in charge.
(Follow order of business suggested for Meeting II.)
2. Instruction.-The local club leader in charge.
 - (1). Discussion: Preparation of Seed Bed, page 18, Chapter III.
 - a. Why use a firm seed bed in preference to a loose one?
 - b. What will help make a seed bed firm?
 - c. What is meant by a "fresh" seed bed?
 - d. How is a seed bed freshened?
 - e. What is meant by bedding cotton land?
 - f. What two tools may be used in bedding cotton land?
 - g. When, in reference to planting time, is bedding done?
 - h. How can some of the benefits of cultivation be given cotton before it is planted?
 - i. What is the relation between bedding and drainage? Between bedding and warming of a soil?
 - j. Is there any relation between whether the land is bedded or to be level planted and the time cotton can be planted safely?
 - k. How does allowing the land to settle naturally compare with settling it by mechanical means in terms of the final bed?
 - (2). Assignment of work for the next club meeting, as:
 - a. Reference: Fertilizers, Chapter III, page 18, (See Meeting IV, page 9, for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Name the three elements most commonly involved in commercial fertilizers.
 - (c). Give the purpose or purposes served by each element most common in commercial fertilizers.
 - (d). Name the element which manure lacks most.

- (e). Tell how the shortage of this element can be overcome.
- (f). Name the element which stimulates plant growth.
- (g). Name the element which stimulates maturity.
- (h). Name the element which wards off disease.

3. The Social Hour.-(Recreation and games.)

IV. Fertilizers.-(March and April.)

1. The Business Meeting.-The club officers in charge. (Follow order of business suggested for Meeting II.)

2. Instruction.-The local club leader in charge.

(1). Discussion: Fertilizers, page 18, Chapter IV.

- a. May an excess of nitrogen be serious?
- b. What is meant by 4-16-4 fertilizer?
- c. Which element do legumes supply most abundantly?
- d. Are there any dangers to avoid in applying commercial fertilizers?
- e. Name a commercial fertilizer that contains nitrogen only? Name one, phosphate only? Name one, potash only?
- f. When and where are commercial fertilizers usually applied to cotton in Missouri?
- g. What disease is important in Missouri that fertilizer helps avoid?

(2). Assignment of work for the next club meeting, as:

- a. Reference: Varieties, Chapter V, page 19, (See Meeting V, page 10, for detailed assignment.)
- b. Bringing of report blanks for use in the club meeting.
- c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Name the most important single consideration in choosing a cotton variety for Missouri.
 - (c). Name three important considerations in choosing varieties.
 - (d). Name two principal factors in choosing a variety.

(e). What variety will you grow?

3. The Social Hour.-(Recreation and games.)

V. Varieties.-(April)

1. The Business Meeting.-The Club Officers in charge. (Follow order of business suggested for Meeting II.)

2. Instructions.-The local club leader in charge.

(1). Discussion: Varieties, page 19, Chapter V.

a. How are the different cotton experiment stations helping growers in regard to varieties?

b. What disease is found in Missouri toward which some varieties are resistant?

c. Of what importance is each of the following:

(a). Earliness? (b). Productiveness? (c). Length of lint? (d). Boll size? (e) Wilt resistance? (f) Storm resistance?

d. How will growing only one variety in a community help that community?

e. What variety is recommended in Missouri for:

(a). Heavy land? (b). Varieties for medium land?
(c). Light land? (d). Wilt infested land?

f. What is meant by gin yield?

g. What is considered a good staple length for Missouri cotton growers to produce?

(2). Demonstration: Illustrate by sketch the difference in growth habits of late rank growing varieties of cotton compared to those of dwarf early varieties.

(3). Assignment of work for the next club meeting, as:

a. Reference: Planting Dates, Rates, Methods, Chapter VI., page 20, (See Meeting VI, page 11, for detailed assignment.)

b. Bringing of report blanks for use in the club meeting.

c. Assignment of one or more topics for roll call as:

(a). Name a standard club requirement.

(b). Name two dangers of early planting.

(c). State the effect of plowing too late.

(d). Give range of good planting dates.

3. The Social Hour.-(Recreation and games.)

VI. Planting: Dates, Rates and Methods.-(April and May)

1. The Business Meeting.-The club officers in charge. (Follow order of business as suggested for Meeting II.)

2. Instructions.-The local club leader in charge.

(1). Discussion: Planting Dates, Rates, Methods, page 20, Chapter VI.

a. How much cotton seed usually is planted per acre?

b. Why is more seed usually planted than is required to produce the number of plants desired?

c. How deep should cotton seed be planted?

d. What danger is there in planting deeper?

(2). Demonstration: Illustrate by sketch possibility of thinning a thick stand resulting from a heavy rate of planting, to a desirable stand, with impossibility of thickening a stand that is too thin.

(3). Assignment of work for the next club meeting, as:

a. Reference: Cultivating and Thinning, Chapter VII, page 21, (See Meeting VII, page 11, for detailed assignment.)

b. Bringing of report blanks for use in the club meeting.

c. Assignment of one or more topics for roll call, as:

(a). Name a standard club requirement.

(b). State the primary purpose of cultivation.

(c). Name two qualifications of good cultivation.

(d). Cite dangers of barring off.

(e). State how these dangers may be avoided.

3. The Social Hour.-(Recreation and games.)

VII. Cultivation and Thinning.-(May to August)

1. The Business Meeting.-The club officers in charge. (Follow order of business as suggested for Meeting II.)

2. Instructions.-The local leader in charge.

(1). Discussion: Cultivation and Thinning, page 21, Chapter VII.

- a. When is cotton damaged least by deep cultivation?
 - b. What influence does deep cultivation have when plants are struggling for moisture?
 - c. How can the use of a harrow reduce cultivation cost? Preparation of seed bed?
 - d. How late can the harrow be used to cultivate cotton?
 - e. What are two purposes of chopping cotton?
 - f. What influence does leaving cotton thick have on:
 - (a). Yield? (b). Time of maturity? (c). Quality of lint?
 - g. Is there great danger in leaving cotton too thick? Too thin?
 - h. Describe the ideal stand in terms of plants per hill and distance between hills.
 - i. How soon may cultivation begin?
 - j. How long should cultivation continue?
- (2). Demonstration: If meeting is held on a farm could demonstrate using a 6 or 8-inch hoe to thin the stand, illustrating thick stand and showing why narrow hoes are preferable.
- (3). Assignment of work for the next club meeting, as:
- a. Reference: Diseases of cotton, Chapter VIII, page 22, (See Meeting VIII, page 13, for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Name two diseases of cotton common to Missouri.
 - (c). State which disease is most wide-spread.
 - (d). Tell which of these diseases will remain in the soil many years.
 - (e). Name the two diseases which seem to go together.

3. The Social Hour.- (Recreation and games.)

VIII. Diseases of Cotton.-(May to September)

1. The Business Meeting.-The club officers in charge. (Follow order of business as suggested for Meeting II.)
2. Instructions.-The local leader in charge.
 - (1). Discussion: Diseases of Cotton, Page 22, Chapter VIII.
 - a. Which cotton disease can be corrected to some extent by using commercial fertilizer?
 - b. Which fertilizer element is used to avoid black rust damage?
 - c. On what types of soil is black rust most common?
 - d. What crops are to be avoided on land infected with wilt?
 - e. Which crops are not subject to wilt?
 - f. How is wilt recognized? Black rust? Sore shin? Root Knot?
 - g. How can sore shin be avoided?
 - h. What variety of cotton is recommended for land infected with wilt?
 - (2). Demonstration: Display plants with different diseases. Show how to diagnose each disease.
 - (3). Assignment of work for the next club meeting, as:
 - a. Reference: Insect Pests of Cotton, Chapter IX, page 24. (See page 13, for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Name three insect pests of cotton in Missouri.
 - (c). Name season in which aphids are most common? Leaf worms? Red spiders.
 - (d). Tell how aphid damage can be avoided; leaf worms; red spiders.
3. The Social Hour.-(Recreation and games.)

IX. Insect Pests of Cotton.-(May to October)

1. The Business Meeting.-The club officers in charge. (Follow order of business suggested for Meeting II.)

2. Instructions.--The local leader in charge.

(1). Discussion: Insect Pests of Cotton, page 24, Chapter IX.

- a. How can red spider damage be distinguished from black rust?
- b. Which cotton insects, common in Missouri, feed by sucking the juice of the plant? By eating the leaf?
- c. What bearing do the feeding habits of the insect in question have on the kind of poison used?
- d. Name a stomach poison; a contact poison.
- e. Where poisons are used, state the two chief considerations.
- f. What is suggested by the statement, "Insect damage cannot be cured?"

(2). Demonstration: Display insects and infested plants. Describe feeding habits, describe control.

(3). Assignment of work for the next meeting, as:

- a. Reference: Tour - Boll Counts for comparing Probable Yields, Chapter X, page 25, (See Meeting X, page 14, for detailed assignment.)
- b. Bringing of report blanks for use in the club meeting.
- c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). State how boll counts can be used.
 - (c). Describe making boll count comparisons.
 - (d). Tell what stage should be reached in growth of cotton before boll counts become significant.
 - (e). State which is more important, bolls per acre or stalks per acre.

X. Tour - Boll Counts for Comparing Probable Yields.--(August or September)

1. The Business Meeting.--The club officers in charge. (Follow order of business suggested for Meeting II.)

2. Instructions.--The local leader in charge.

(1). Discussion: Tour, page 25, Chapter X.

- a. In your observations, did more stalks per acre also mean more bolls per acre, other factors being equal?
- b. Which cotton holds its fruit higher, that which is thick spaced or thin spaced?
- c. Which cotton was further developed, that which was thick spaced or thin spaced?
- d. Note similar comparisons of fertilizer or no fertilizer, early variety or late variety, pure seed or mixed seed.

(2). Assignment of work for the next meeting, as:

- a. Reference: Picking and Ginning, Chapter XI, page 27. (See page 15, for detailed assignment).
- b. Bringing of report blanks to the meeting.
- c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Tell when picking should be started.
 - (c). Name effect that leaving cotton in the field has on its grade.
 - (d). Tell whether ginning should follow picking immediately, and state why or why not.
 - (e). Name damages of ginning wet cotton.

3. The Social Hour.--(Recreation and games.)

XI. Picking and Ginning.--(September to November)

1. The Business Meeting.--The club officers in charge. (Follow order of business suggested for Meeting II.)
2. Instructions.--The local leader in charge.
 - (1). Discussion: Picking and Ginning, page 27, Chapter XI.
 - a. Why not harvest cotton by snapping?
 - b. Why not leave cotton until all is open before picking?
 - c. Which picking or pickings generally produce most valuable lint?
 - d. Which picking or pickings produce the best seed? Why?
 - e. Name three profitable precautions to observe

from picking to ginning.

- f. What two harmful influences must be guarded against most carefully in storing baled cotton?
 - g. Which harmful influence generally cuts down the worth of baled cotton most?
 - h. To what extent can trashy cotton be cleaned with modern gin equipment?
 - i. Why should late picked or otherwise inferior cotton be kept separate from the better cotton?
- (2). Demonstrations: Individual demonstrations by all members as try-outs to be one of the club demonstration team.
- (3). Assignment of work for the next club meeting, as:
- a. Reference: The 4-H Club Achievement Program. (See Meeting XII, for detailed assignment.)
 - b. Bringing of completed report blanks to give to the leader before the achievement club program is held.
 - c. Appointment of committees to help prepare for the achievement club program and conduct it, as:
 - (a). Committee on arrangements, place, equipment, etc.
 - (b). Courtesy committee to welcome visitors and to act as ushers, if needed.

3. The Social Hour.-(Recreation and games.)

XII. Suggested 4-H Cotton Club Achievement Program.-(To be held when the club work is completed.)

1. A regular 4-H club meeting, with the club officers in charge.
2. Exhibits:
 - a. Each member exhibit a typical plant of his variety taken from own plot.
 - b. Each member bring from his plot one fruiting branch with the largest number of bolls on it.
 - c. Each member bring one plant representing thick spaced cotton.
 - d. Each member display, preferably on a background of black velvet, ten seeds from as many different plants in his field with the lint combed out.*

*A comparison of such a display from a field planted to pure seed with a similar display from a field planted with scrub seed should be an interesting exhibit of the value of good seed.

3. A team demonstration of an approved cotton club practice.
4. Plans for next year.
5. Presentation of club achievement pins, if awarded, by the extension agent or a representative of the local sponsoring organization.
6. A 4-H club play or dramatic presentation of some kind.
7. Adjournment.

Suggestions.—Only club members who make a complete report or have their records up-to-date should be eligible to take part in county or state contests, club camps, etc.

II. COTTON SOILS.

While cotton may be found growing more or less successfully on soils varying from the light, sandy types to the heavy, fertile, black types, the crop responds very directly to fertility. Another way of viewing this question is that cotton will produce as much more for being planted on fertile soil than it will yield on a poor soil as will any other common field crop.

The importance of having cotton yield heavily is shown by the following test made by the Arkansas Experiment Station in 1924.

<u>Yield Per Acre</u> (Lint)	<u>Production Cost Per Lb. of Cotton</u> (Lint)
100 lbs.	27.9¢
200 lbs.	16.3
400 lbs.	10.5
500 lbs.	9.4

While the cost per pound of producing cotton will vary widely from year to year, and in different sections of country, it is true, as these figures show, that it costs considerably less per pound to produce this crop with high yields than it does with low yields.

An ideal soil for cotton might be described as being well drained; rich in organic matter (decayed plant matter); rich in the elements nitrogen, phosphorus and potash; and one that warms early and thoroughly in the spring. Too, it should be able to retain moisture for use of the crop in periods of limited rainfall during the growing season.

Drainage may be brought about naturally through the slope of the land. In case this is lacking, it may be achieved by other means, such as tiling and ditching.

Caring for the organic matter (humus) in the soil may well be one of the chief concerns of the cotton grower. Throughout the history of the crop in our cotton belt, it is found that wherever this important demand is not met, the farmer or section of country, as the case may be, falls behind. In other words, definite steps must be adopted to hold up the organic matter in

cotton lands, else it will most certainly decline. As the organic matter declines, requirements of commercial fertilizers rise and even then less net benefit frequently is had from the fertilizer than might be had on land richer in organic matter. As this goes on, erosion becomes more serious on the sloping lands, yields decline and production costs rise. To hold up the supply of organic matter, the practice of returning all stalks and crop remnants to the soil should always be done. Barnyard manures turned under not only will replenish the organic matter but add nitrogen, phosphorus and potash as well. However, since the supply of manure is insufficient on the average cotton farm, the use of green manure crops deserves wide application. Legumes, such as cowpeas, soybeans, vetch and clover turned under at the height of their growth will add both nitrogen and organic matter. While not actually adding phosphate and potash (these crops merely return that part of these elements taken from the soil in their growth), they furnish a good store-house for these elements. Planting, then pasturing these crops off, though not quite as beneficial to the land as turning under the entire green crop, is certainly much better than not growing them at all on cotton land.

Rye and other like crops do not build up either the nitrogen or other elements in the soil. But these crops, when turned under, are a good source of organic matter.

A good practice would be turning under at least one green manure crop each four years on the best cotton soil - oftener on thinner lands.

III. PREPARATION OF SEED BED.

The ideal sought in preparing a seed-bed for cotton should be a firm, compact bed, free of weeds and grass, ready to receive the seed usually in early May. Naturally, conditions on the particular field will determine how this can be had best.

If the soil is not subject to blowing or washing, flat breaking as soon as possible after the preceding crop is harvested is generally a good start. Then in early spring - usually March or April - the cotton land is bedded either with turning plows or middlebusters. Bedding is desirable whether or not the field was plowed. This practice promotes surface drainage and lays the foundation for making a "fresh" seed-bed. If commercial fertilizer is to be used, it should be distributed slightly below the surface just before bedding and the ridges located over the fertilizer.

Immediately before planting, the ridges are dragged down either with a section harrow or board drag. This leaves a firm seed-bed, "freshened" and free of weeds. In this way, cultivation that actually benefits the cotton as much as later cultivation is given it, at a time and in a way it can be done quickly and easily.

IV. FERTILIZERS.

Due to the fact that cotton lands in Missouri vary widely, because of their origin and the manner in which they have been

handled, only rather general facts about fertilizers are possible in a treatment of this sort.

The three elements most frequently involved in commercial fertilizers are nitrogen, phosphorus and potash. Their influences are:

1. Nitrogen promotes plant growth. An excess of it in relation to the other two elements, particularly phosphate, will tend to delay maturity.
2. Phosphate hastens maturity and stimulates development of fruit.
3. Potash keeps plants healthy.

The following are given merely as general treatments:

On thinner and worn soils use of a "complete" fertilizer, such as 4-12-6 or 4-12-4 is desirable. The first number in such a fertilizer refers to pounds of nitrogen per 100 pounds fertilizer; the second, to pounds phosphate; and the third, to pounds of potash per 100 pounds of fertilizer. Thus, we have here fertilizers containing all three of the most important elements.

Where land has been manured heavily, heavy green crops of legumes plowed under, or elsewhere that cotton has been noted to make excessive plant growth and the fruiting was faulty, the need of phosphate is indicated. Applications of 200 to 300 lbs. per acre of 20% superphosphate would be desirable.

Where rust is prevalent, application of 150 lbs. to 250 lbs. per acre of Kainit will yield good returns.

Fertilizer should be applied shortly before planting and in such manner that the seed will not lie in contact with the fertilizer. If this is not done, the germination of the seed will be lowered sharply. A common manner of applying fertilizer is to distribute it in a shallow furrow where the bed will be made and just below the surface of the ground. The ridge is then thrown up directly over the fertilizer. When the ridges are dragged down to make the bed just before planting, the fertilizer is located 2 to 4 inches below the seed. This is far enough to avoid injury, yet close enough for young plants to get the full benefit.

V. VARIETIES.

In choosing a variety of cotton it should be borne in mind that Southeast Missouri, as related to the remainder of the cotton belt, has fertile soil (the kind that tends to grow stalk and delay fruiting) and as short a growing season for cotton as anywhere the crop is grown. For these reasons, the use of dwarf, early maturing varieties is as important as any other single question the grower must decide. In other words, no matter how good a variety may be elsewhere and otherwise, if it won't mature early, the person growing that variety in Missouri is handicapped seriously.

The next most important traits to be considered in choosing a variety are productiveness and length of lint (market quality).

Resistance to disease is particularly important on lands where wilt is present. Boll size should be considered, for, other things being equal, the larger the boll, the more quickly the cotton can be picked. Storm resistance, meaning the ability of a variety to hold its cotton during storms, is still another consideration. The first three factors mentioned generally are by far the most important.



Typical Cotton Plants.

This matter of varieties is so important, the Missouri Experiment Station has conducted tests in 14 different places in Southeast Missouri during the last 10 years. Some have been run as long as six years. Other states are doing the same, sometimes testing as many as 70 different varieties and strains. This excellent means of finding best varieties for a particular section suggests the following for Southeast Missouri.

For fertile, heavy land - Stoneville 4A.

For medium land - - - - - D and P L 11A and Stoneville 5A.

For thin, sandy land and
lands infected with
wilt and rust - - - Rowden 40.

Note: If the club is located in a one-variety community, by all means the variety of that community should be adopted.

VI. PLANTING: DATES, RATES AND METHODS.

Dates.

Cotton, being a hot weather plant, simply will not grow off normally, unless the soil is warm. Thus, when planted too early, the crop is subject to the following dangers, which may make re-planting necessary:

Poor germination;
 Diseases - Damping off, etc.;
 Weediness;
 Insect injuries.

Too late planting will delay maturity, which means lower yields and poorer quality.

The range in planting dates in Missouri is from about April 15 to May 15. Only on deep, fertile and well drained soils and then only in those seasons when the spring weather has been favorable for warming and drying the soil early, will April planting be safe. In most cases, from April 25 to May 5 is the best time for planting.

It is well to remember that the general tendency is to plant too early. Yet a good stand is much more important than early planting. Poor stands and too early planting go together.

Rates.

From one to one and one-half bushels seed planted per acre should produce a thick row which can be thinned to a satisfactory stand. In this respect, it should be remembered it is easy to thin a stand to the point desired but it is impossible to thicken a stand that is too thin.

Methods.

Whatever the implement used for planting, the seed should barely be covered. The sprouts are not able to emerge from deep planting. It pays to be sure the seed-bed is firm and free from weeds and grass.

VII. CULTIVATION AND THINNING.

Should packing rains cause crust to form immediately after planting, it is a good practice to run a section harrow diagonally across the rows with the teeth slanted back to break this crust. Repeating this soon after the plants are up (during the afternoon when the plants will bend without breaking off) and going diagonally across the field the other way is good, efficient cultivation, if there is a thick stand. This method not only cleans and breaks such crust as there might be between the rows but stirs the soil within the rows as well.

Unless weeds and grass get very bad, which is not likely if the harrow is used as described above, barring off is not necessary. If barring off is done, the plow should be run shallow and sloping with the bed to avoid cutting roots. Further, after barring off, chopping and cultivation should be hastened to return the soil back around the plants.

Since there are so many factors that influence the percentage of seeds planted that actually produce healthy, strong plants, it is a common practice to plant many more seed than the number of plants left in the field. This is as it should be. If it is not done, such things as unfavorable weather or soil conditions, diseases, insects, poor qualities in the seed and too deep planting may result in an irregular stand and too few plants to make full yields.

This raises the question then of how many plants should be left. A majority of the many tests of this problem throughout the cotton belt agree that thick spacing (leaving a relatively large number of plants) is desirable. Thorough tests in Missouri over a five-year period show that leaving 2-3 plants in hills 10 to 12 inches apart give largest yields. On thin land the cotton



A Practical Method of Properly Spacing Cotton
Using An Eight-inch Hoe.

should be left more closely spaced than on fertile land. This thick spacing was found to offer the following added advantages: the hastening of maturity; the lessening of competition with weeds, insects and disease; and, since cotton closely spaced tends to hold fruit higher from the ground, the lessening of weather damage to lint.

Thinning or chopping should begin when the danger of reduction of the stand by cold spells or other natural agencies has passed.

Cultivation should be frequent and shallow. Frequent cultivation means as often as necessary to keep the land free of weeds and grass. In this way, weeds and grass are kept from growing at the expense of the cotton. It pays to keep ahead of the weeds.

Shallow cultivation means just deep enough to stir the surface of the ground, destroying weeds and grass before they get well started and thereby conserving moisture and plant food for the use of the cotton. If the early cultivations are thorough, so grass and weeds do not get a start, the later cultivations are much easier and should be only about an inch deep. Sweeps, single harrows, and such tools are good for the late cultivations when one trip to the middle will accomplish the desired purpose.

VIII. DISEASES OF COTTON.

Rust, wilt, root knot anthracnose and sore shin are the most common diseases of cotton in Missouri.

Black rust, (frequently referred to simply as rust) is the most serious in terms of damage done. Where the crop is affect-

ed, the leaves show a pale green color. Later, yellow and reddish brown spots appear. The spots gradually enlarge, become darker. Finally the leaves turn black, curl and are shed. Many young bolls also are shed. Those bolls remaining don't develop properly, either failing to open or producing a poor quality of lint.

Black rust is not caused by an organism but is due to improper soil condition. Lack of potash, low organic matter and poor drainage are possible causes. Applying potash fertilizer is one of the most effective control measures in Missouri. Rates of 150 to 250 pounds of Kainit per acre, depending upon seriousness of the disease, are recommended. Such treatment may make the difference between a good crop and a very poor crop.

The relation of this disease to drainage and organic matter re-emphasizes the importance of these points covered under the section entitled, "Soils".

Wilt, though not so widespread as black rust, may be more serious if it gets established on a particular farm, because of the difficulty of controlling it. This disease is caused by a fungus that may live in a soil a long period of years. Soil treatments do not have so direct a benefit in controlling this disease as in the case of rust.

Symptoms of wilt are: The leaves begin to wilt and shed without apparent reason; the main stem becomes dwarfy; and the joints shorten. If a freshly wilted plant is cut off and black or brown discolorations are found just inside the inner bark, it is a sure sign the trouble is wilt. This disease is most common on sandy soils.

The most practical control is to plant wilt-resistant varieties, such as Rowden 40, and rotate crops on the infected field, using crops resistant to root knot, a disease which increases the severity of wilt.

Root Knot is a disease caused by tiny eelworms - nematodes - that enter the root of cotton and certain other plants to live. They cause knots or galls varying in size from that of a small shot to the size of a quail's egg, to form on the roots.

Other crops subject to the disease are cowpeas (other than the Brabham and Iron varieties), soybeans, potatoes, tobacco and watermelons. The nematodes may be spread from one field to another in any way that the infested soil may be transferred. Surface drainage water, farm tools and the feet of both men and livestock are means whereby infected soil is spread.

Root knot is best controlled by crop rotation with the frequent use of immune crops. Such immune crops are corn, oats, wheat, rye, barley, sorghums and all the hay grasses.

Sore Shin causes most damage during cold, wet periods in early spring by killing or stunting the young plants, often making it necessary to replant.

Characteristic symptoms are the presence of dark, reddish brown cankers on the stems of the small plants near the surface of the soil. In severe cases the spots become so enlarged that they weaken the plant, causing it to fall over and die. Many

plants, when not so severely affected, will recover on the arrival of warm weather and outgrow the injury.

Sore shin is caused by a fungus that lives in the soil. No entirely satisfactory methods of controlling it are known. But the damage it causes can be partially avoided by using practices that will start the young plants off quickly into a strong, vigorous growth. A heavy rate of planting is recommended to provide enough plants, in order that the loss of a few will not ruin the stand.

IX. INSECT PESTS OF COTTON.

The cotton leaf worm, red spider and cotton aphid are the most common insect enemies of cotton in Missouri. Elsewhere in the cotton belt the Mexican boll weevil and pink boll worm are extremely serious pests but they are not common to the Missouri crop.

Cotton Leaf Worm is the most destructive insect pest to the crop in Missouri. The insect probably does not winter in Missouri but spends the winter farther south where the weather is milder. The moths (the adult form, tawny in color with a wing spread of about $1\frac{1}{2}$ inches) fly here from winter quarters. They lay their eggs on the under side of the leaf. These eggs hatch in 3 to 20 days. The small worms (larvae) vary in color, being yellowish green without stripes, some with a black stripe down the back and others with a fine yellow stripe. All have four black dots on each segment (joint). The worm remains in this stage 10 days to 3 weeks and then webs itself into the fold of a leaf and pupates there (passes through resting stage emerging as a moth). The pupal stage lasts one to four weeks, after which the moth or adult form emerges, completing the life cycle.

The Leaf Worm makes its appearance in Missouri generally in mid-summer. If conditions are not favorable for its multiplication, little damage is done. If conditions are favorable, the insects may multiply in great numbers and strip cotton plants of their leaves, unless brought under control.

The leaf worm, being a chewing insect, is subject to control with a stomach poison like calcium arsenate. From 3 to 6 lbs. per acre (depending on size of the plants and seriousness of infestation) applied when the plants are wet with dew or rain is an effective control measure. The dusting may well be done at night.

Dusters used vary in type from hand guns to the dusting apparatus used on airplanes. A good low cost duster may be provided at home by hanging two muslin bags partially filled with calcium arsenate from a pole as long as the rows are wide. The operator by riding horseback between the rows may treat two rows at a time. The movement of the animal and some agitation by the operator will cause the dust to be shaken out fairly uniformly.

Red Spider is in reality a tiny red mite that lives on the leaves of a number of different plants, including cotton. It is red or reddish brown in color. It may be found on close examination on the under side of the leaf where it feeds by sucking the sap of the plant. These leaves turn brown and fall off.

Usually red spider injury begins in a spot or spots within the field and spreads from these. If found early, the best control is simply to burn the infested plants, either where they are found, or, if removed, given care that the insects are not spread to other parts of the field in removing the infested plants.

If the area infested is quite large when found, dusting or spraying is the only control. Whatever is used must be applied to the under side of the leaves. Lime sulphur, kerosene emulsion and fine dusting sulphur are some of the materials which have merit for this purpose.

Cotton Aphis is an insect commonly called the cotton louse. It is a small, green or greenish black insect that attacks the leaves of the plant soon after it comes through the ground, causing them to curl and sometimes causing the plant to die. The greatest damage is done in early spring when the weather is cool and plant growth slow.

Aphis may be controlled by the use of nicotine sulphate, either in the form of a dust or spray. Absolute control being difficult, use of the following methods of combatting the pest are particularly recommended:

Do not plant too early.

Use good seed and a heavy rate of seeding.

Apply cultural practices that promote rapid growth.

Carefully select the best plants at the time of thinning.

X. TOUR - BOLL COUNT FOR COMPARING PROBABLY YIELDS.

Boll counts on equal lengths of row made after the period of shedding, is both a fair and highly interesting comparison to make, particularly during cotton club tours. By this means, the effects may be compared of such practices as spacing, fertilizing and time of planting. It is a good way to compare the crop from gin run seed to that from high bred seed. If proper adjustment is made for size of boll and gin turn-out, comparisons of different varieties are possible.

In all cases where two fields or parts of one field (plots) are being compared to learn the effect of one of these factors, all the other factors that might influence yield should be the same on both fields. For instance, where the effect of spacing is to be measured, the cotton on both fields or plots compared should be: the same variety; planted at the same time; same width rows; fertilized the same, if fertilized at all; and the land should be uniform. While it is recognized that very seldom will just exactly these conditions be found, this principle must be kept in mind if comparative boll counts are to be fairly comparative and therefore significant.

When making boll counts, other significant facts may be observed, such as nature of growth (open or close), height of fruiting above ground, proportion fruiting to vegetative growth, earliness, etc.

How to Make the Count.

Make a mark across the middle between two rows. Measure off 30 feet either way along this middle and make another mark. This

may be paced or actually measured but one must be careful that all measurements are the same wherever made in the field.

Count and write down the number of stalks on one row between these marks. Then count and record the number of stalks on the other row between these marks.

Note: Wherever any comparison except for spacing is made, the average number of stalks per 30 feet of row in the two fields or plots compared should be practically the same.

Comparison of Effect of Spacing.

<u>Thick Spaced</u>			<u>Wide Spaced</u>		
Rows	No. Stalks Per 30 Ft. of Row	No. Bolls	Rows	No. Stalks Per 30 Ft. of Row	No. Bolls
1	32	288	1	18	184
2	27	265	2	21	219
3	36	304	3	16	178
4	33	290	4	23	232
5	26	258	5	22	239
6	38	311	6	20	224
Total	192	1716	Total	120	1272
Average	32	286	Average	20	212

$$286 - 212 = 74$$

$$74 \div 212 \times 100 = 35\% = \text{percentage by which thick spaced cotton is exceeding wide spaced cotton in fruiting.}$$

In the spaces below compare two fields for effect of spacing and two for the effect of some other factor, such as time of planting or effect of fertilizer on fruiting.

Comparison of Effect of Spacing.

<u>Thick Spaced</u>			<u>Wide Spaced</u>		
Rows	No. Stalks Per 30 Ft. of Row	No. Bolls	Rows	No. Stalks Per 30 Ft. of Row	No. Bolls
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
Total			Total		
Average			Average		

$$\text{_____} - \text{_____} = \text{_____}$$

$$\text{_____} \div \text{_____} \times 100 = \text{_____}\% = \text{percentage by which thick spaced cotton is exceeding wide spaced cotton in fruiting.}$$

Comparison of Effect of _____

Rows	No. Stalks Per 30 Ft. of Row	No. Bolls of Row	Rows	No. Stalks Per 30 Ft. of Row	No. Bolls of Row
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
Total			Total		
Average			Average		

$$\text{_____} - \text{_____} = \text{_____}.$$

$$\text{_____} \div \text{_____} \times 100 = \text{_____}\% = \text{percentage by which } \text{_____} \text{ cotton is exceed-}$$

ing _____ cotton
in fruiting.

Next count and write down the number of bolls on one row between the marks. Then count and record the number of bolls on the other row between these marks.

Repeat this in at least three average places of each field or part of the field in the comparison. More would be still better. Average the number of stalks and the number of bolls in each and compare, thus:

XI. PICKING AND GINNING.

Unless cotton is picked both clean and dry, it is impossible to have the best market quality that might be had in the lint. Further than that, ginning cotton while it is wet with dew or rain may easily actually reduce the market quality still further. On the other hand, leaving the cotton to stand too long in the fields where it is exposed to weather damage has frequently reduced its value one-half. Seed from a crop so exposed is likely to be worthless for planting.

For these reasons, the most successful cotton club members realize there is a proper time to pick the crop and it is extremely important to do it at that time. Picking should begin when a relatively small portion of the crop is open and weather conditions preferably are favorable. While it is possible to harvest the entire crop in two pickings, three or even four pickings are preferable to picking immature cotton or wet cotton or allowing the cotton to stand in the field unnecessarily exposed to weather damages.

Picking the cotton as clean as possible of boll parts, leaves and other trash and dirt is a means of producing a brighter, cleaner lint. Although marked progress has been made in gin machinery to clean out some sorts of trash, it is still true that the cotton picked cleanest, other things being equal, produces lint having the best market qualities.

By all means the badly discolored end-of-the-season pickings

and cotton inferior otherwise should be kept separate and baled separate from the good cotton. If cotton of two or more grades, color, etc., is baled together and this difference shows in the sample, (as it invariably will) the price will be that of the lower grade. In this way if 50 pounds of poor quality cotton are mixed in a bale that otherwise is uniformly good, the price paid for the entire bale will not be higher than that for the poorer cotton in that bale.

Picking clean, picking dry, keeping the seed cotton dry and ginning it dry are means whereby the club member can capitalize to the fullest on all his other work growing the crop. How many of the foregoing precautions he adopts will have a direct bearing on the ultimate market value of his crop. Indirectly, they will influence the value of the cotton crop in his section.

If the cotton is not to be sold promptly, it should be stored off the ground or concrete floors from which it will readily take up moisture and with a shelter above it. Cotton stored without regard to this may readily lose 10 to 50% of its value.

METHODS.

1. Records and Reports. - Each 4-H Cotton Club member will keep a record of his project work throughout the year on the report blank provided, and submit it to the local club leader for approval when the club work is completed in the fall but before the achievement club program is held..

The local leader will include the reports of each member in his report to the county extension agent. When both the local club leader and the county extension agent approve a member's report, that member is eligible to receive an achievement club pin, if awarded in the county.

2. Exhibits. - The following suggestions are offered:

- a. Typical stalks from thick planting reset as they stood in the field and recording the estimated or comparative yield with
- b. Typical stalks from thin planting;
- c. Ten locks and 10 seeds, with lint combed out, from as many stalks in field planted with pure seed. Might compare this to the same from a field planted to mixed seed.

DEMONSTRATIONS.

In so far as possible, all club members should be instructed in regular club meetings by the demonstration method. As a usual thing one or more members of each club can begin doing before the club useful phases of the work program soon after the processes have been demonstrated to the club by the club leader.

After two or three months of practical experience in handling real things, mature club members should be able to give public team demonstrations. The scope of the team demonstration

usually should be limited to the essential processes of some practical phase of the club work of the current year on one subject. A team of two of the best demonstrators should be selected from the membership of one club, either by mutual consent, by designation of a committee, or by vote of the members, after making individual try-outs in competition. All teams should have an opportunity to demonstrate before the local club group and the people of the home community, and the championship team should represent the local club at the county achievement program or round-up, if one is held.

(Suggestive Outline of a Typical Club Demonstration)

Improved Practices in Cotton Production.

- Team - - - - - Two members from one club designated in this outline as "A" and "B".
- References - - - - Plans for Conducting 4-H Club Work in Missouri.
- Equipment Needed - Sample of trashy, cloddy soil; sample of well prepared soil; blackboard, chalk and eraser; stalk showing characteristics of a good cotton variety, stalk showing characteristics of a poor variety, one fruit limb showing short joints and good boll characters of a good variety, one fruit limb showing long joints and poor boll characters of a poor variety; one empty fertilizer sack showing approved analysis or formula, one empty fertilizer sack showing low grade analysis or formula; small bucket or jar samples of the three main fertilizing materials - nitrate of soda, acid phosphate, and potash (usually in the form of Kainit); samples of high germinating seed, and sample of low germinating seed; one hoe 6 to 8 inches wide, several small cotton plants, or stalks; stalks showing effects of wide spacing or earliness and total yield, stalks showing effect of close spacing on earliness and total yield.
- Time - - - - - Fifteen to twenty minutes.

Procedure

"A" speaks and demonstrates -

"A" leads in giving a spirited club song or in repeating the national 4-H club pledge; gives brief history of the club; introduces his teammate and himself; and then explains importance of the problem.

1. Purpose of demonstration -
 - a. To illustrate methods of efficient and profitable cotton production.
2. Soil Preparation -
 - a. Exhibits and explains samples of trashy, cloddy soil, and a well prepared soil, as to time and method of preparation. (In localities where sandy soils predominate, the use of cover crops should be illustrated.)
 - b. Illustrates on blackboard the principle of listing or bedding cotton land, and explains the advantages and disadvantages of the practice.
 - c. Explains final preparation (discing or dragging) of seed bed and illustrates with soil samples.
3. Cotton Variety -
 - a. Names variety used and writes same on blackboard.
 - b. Illustrates and explains the characteristics of a good cotton variety and a poor cotton variety by use of sample stalks.
 - c. Illustrates and explains good and bad fruiting characters by means of sample fruit limbs.

"B" assists -

"B" joins in giving the club song or pledge. Stands at attention.

Gets samples of soils ready for use in the demonstration. Assists "A" in exhibiting the soils.

Gets soil samples ready for demonstration.

Prepares cotton stalks and fruit limbs for demonstration.

Assists "A" in exhibiting stalks and limbs.

Prepares hoe and sample plants for chopping, or spacing demonstration.
Assists "B" in demonstrating chopping or spacing, by holding sample plants while "B" demonstrates thinning by using the hoe.

Prepares stalks for demonstration.

Assists "B" in exhibiting stalks.

c. Chopping -

- (1) Explains proper time for chopping with its practical limitations.
- (2) Explains and demonstrates proper spacing of cotton plants in the row. Explains and demonstrates improper or wide spacing of cotton plants in the row.
- (3) Explains and demonstrates by means of sample stalks, the results of close spacing on -
 - (a) Earliness.
 - (b) Larger yield.
 - (c) Ease of handling.

"B" informally turns attention to "A". " " will now summarize the demonstration."

"A" speaks -

6. Summary -

- a. Soil preparation
- b. Cotton variety.
- c. Fertilizers.
- d. Cultural practices.

7. Asks for questions.

(Each demonstrator should answer questions on part he or she demonstrated and questions referred to him.)

8. Thanks audience for attention

"B" assists -

Collects materials and cleans up the table

Stands at attention.

REFERENCES

- Extension Service Circular 199 - Thick Spacing of Cotton for Missouri.
Experiment Station Bulletin 299 - Cotton Production in Missouri.
Experiment Station Circular 194 - Good Varieties of Cotton for Missouri.