UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
COLUMBIA, MISSOURI

CIRCULAR 132 FEBRUARY, 1925

Report on Southeast Missouri Cotton Experiment Fields; 1924

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At the present time cotton is the leading crop in the lowlands of Southeast Missouri. It also occupies an important place in the agriculture of most of the southern border counties of the State. Previous to 1922, however, the crop was of major importance in Missouri only on the Sarpy sandy soils of Pemiscot and New Madrid Counties, and the Lintonia sandy soils of Dunklin County. The Missouri College of Agriculture has maintained an experiment field on the Lintonia sandy soil at Kennett for a number of years for the purpose of conducting experiments with cotton and other crops adapted to that region. The results of the cotton experiments are reported in Circular 122 of this Station in which attention is called to the fact that cotton yields can be materially and profitably increased on this type of soil in Missouri through a moderate application of acid phosphate and the use of a superior, adapted variety such as Acala.

The present importance of cotton production in Missouri is an outgrowth of the widespread interest in the crop that began in the fall of 1921. Since that time, a marked extension of production and an increase in acreage in the old established areas of production have occurred each succeeding year, so that by 1924 the acreage devoted to cotton in Missouri was approximately four times as large as the acreage in 1921.

This rapid development of the cotton industry in Missouri carried the crop to a new set of farm conditions and to inexperienced growers. Naturally a great many questions arose as to the best methods of seedbed preparation, cultivation, date of planting, fertilizers, varieties, spacing, etc. Most of these questions were directed to the Missouri College of Agriculture. They could be answered only in part for there was little information available upon which the answers could be based. To obtain this information, particularly that relating to the best adapted varieties, proper kinds and amounts of fertilizer to apply, and the proper distance of spacing cotton in the row, the College of Agriculture began a series of experiments in 1924. The experiment fields were widely distributed and located on as many different soil types as practicable in beginning a project of this kind.

However, the present program of cotton investigation is to be enlarged in the near future by extending it to other soil types and farming conditions, and to the study of a greater variety of problems related to cotton production in Missouri. The purpose of the College of Agriculture in instituting such an

extensive program of investigation is to solve as quickly as possible the more important practical problems that confront the cotton growers of this State.

LOCATION OF EXPERIMENT FIELDS

The approximate location of the experiment fields used in 1924, indicated in each case by the name of the nearest town, are as follow: Charleston, Bertrand, Sikeston, New Mardid, Caruthersville (north and south fields), Holland, and Kennett. Further details relating to the location and the soil characteristics of these fields are given below:

The Charleston Field is located four miles east of that town, on Thad Snow's farm. The soil has been classed under the Wabash series. The surface soil which extends to a depth of 12 to 15 inches consists of a black mellow silty, clay loam. It is abundantly supplied with organic matter and plant food, and is very productive of all staple crops adapted to that region. Yields of 80 to 90 bushels of corn, 5 to 7 tons of alfalfa and 35 to 45 bushels of wheat have been obtained from the field in the past. The productivity of the soil has been retained at this high level through proper soil management and crop rotation.

The Bertrand Field is located immediately south of town on Cecil Gaty's farm. The soil is a light brown or grayish brown, fine sandy loam of the Bertrand series. It is representative of a large area of sandy soils located in Mississippi and Scott Counties. Like practically all of the area, its initial supply of organic matter and plant food has been greatly reduced by exhaustive cropping practices of long duration.

The Sikeston and New Madrid Fields are both located on the Sikeston ridge. The former is four miles south of Sikeston, while the latter is about three miles west of New Madrid. Both fields are quite representative of the Sikeston ridge area which has been classed as Lintonia silt loam. The soil is somewhat low in organic matter and plant food. These deficiencies, however, are partly offset by the deep soil mass and its excellent physical properties. So in general the area is quite productive of practically all crops adapted to the lowland region, and is highly prized for farming purposes.

The Caruthersville Fields are located three miles east of town on Charles Tistadt's farm. The south field which was used only for fertilizer tests is deep sandy loam soil very similar to the Bertrand field. It has been in cultivation for about 70 years having been used almost exclusively for grain and cotton production.

The north field is located on one of the more productive phases of Sharkey silty clay loam. It has been used largely for cotton, grain and alfalfa and at the present time will give high yields of these crops in favorable seasons.

The Holland Field, operated by S. E. Brooker, is located immediately north of town. The field has been included in the Sarpy fine sandy loam area. It has been in cultivation about ten years and like most all the Sarpy sandy soils carries a good supply of plant food and organic matter. Practically the entire area of these soils located in Pemiscot County is now used for cotton. They are well suited to the crop.

The Kennett Field, on which the College of Agriculture has conducted experiments for the past seven years, is located about one mile east of Kennett on the Dunklin sandy ridge. The soils of this area belong to the Lintonia series. To the west and south of Kennett, a dark brown fine sandy loam, 10 to 20 inches deep is the dominant type, while to the east and north of Kennett the soil is a brown or light brown, loose, incoherent fine sand that is subject to

drifting or blowing. The experiment field is located on a typical area of the latter type of the Lintonia.

EXPERIMENTAL RESULTS

Variety Tests.—Only those varieties thought to have special merit under Missouri conditions, and a few of the poorly adapted varieties grown extensively in certain localities of Southeast Missouri were included in the experiments. Of the varieties tested on every field, Trice, Express, Acala and Delfos showed the most consistently high yields. On the basis of lint cotton per acre, Trice led in this group at Caruthersville, New Madrid and Sikeston. Express led at Kennett and Holland, while Acala and Delfos led at Bertrand and Charleston respectively.

In contrast with the foregoing group, large, growthy, late maturing varieties, represented in each test by Mebane and Wannamaker-Cleveland, gave very low yields as a rule. The value of these late varieties under Missouri conditions may have been minimized by the exceptional seasonal conditions that prevailed in 1924, but there are few if any reasons to believe that they would prove superior to the first group over a period of years, or even in one of the most favorable years.

Although the tests are for a single season and were conducted under abnormal weather conditions, the results indicate in a general way the following: (1) Trice, Delfos, Acala and Express are very probably among the best adapted cotton varieties to Missouri conditions as a whole. (2) Trice and Delfos, both early, dwarf, prolific varieties, are best suited to the heavy soils, and even the lighter soil types that tend to produce rank growing, late maturing crops. (3) Acala and Express are best adapted to the light sandy soils, the latter probably having a wider range of adaptation to different soil types than the former. (4) Large, late maturing, heavy-leafed varieties, represented in all tests by Mebane and Wannamaker-Cleveland, are poorly adapted to Missouri.

Fertilizer Tests —The different kinds, combinations, and rates of application of fertilizers used in the tests are as follows:

50 lbs. Sodium nitrate at planting
50 lb. Sodium nitate as a side application
50 lbs. Sodium nitrate at planting, and 50 lbs. Sodium nitrate as a side application
100 lbs. Sodium nitrate at planting
100 lbs. Sodium nitrate as a side application
300 lbs. Acid phosphate
300 lbs. Acid phosphate and 50 lbs. Sodium nitrate
300 lbs. Acid phosphate, 50 lbs. sodium nitrate, 30 lbs. potassium chloride
300 lbs. Acid phosphate and 30 lbs. Potassium chloride

Side applications of nitrates were used only at Kennett and Sikeston. The two treatments, 100 pounds of sodium nitrate at planting, and 300 pounds of acid phosphate and 50 pounds of sodium nitrate, were omitted from the tests on the heavy black soils at Charleston and Caruthersville.

The fertilizer and seed were applied at the same time with a combination one-row planter and fertilizer distributor. Side applications of nitrate were made by hand when the plants had reached a height of 4 or 5 inches. Each test was planted to a single variety known to be well suited to the particular soil type, but the same variety was not used on all fields.

Since the results were obtained from a single series of plots, and are for one abnormal season only, the detailed data are omitted here. Instead a few

brief statements are made as to what the tests seemed to indicate and what practices they indicate should be followed in fertilizing for cotton in Missouri.

Surprisingly poor results were obtained from nitrates applied either at planting or as a side application. With the possible exception of the Kennett test, the nitrate plots failed to show a significant increase over the adjacent checks in any of the eight tests.

Three hundred pounds of acid phosphate alone, and a combination of 300 pounds of acid phosphate and 50 pounds of sodium nitrate gave practically the same yields in the different tests. These treatments gave an increase of 25 to 50 pounds of lint cotton per acre at Kennett, New Madrid, Sikeston and Bertrand. However, they made practically no difference in yields at Holland, or on the sandy field at Caruthersville.

The combination of 300 pounds acid phosphate, 50 pounds sodium nitrate and 300 pounds potassium chloride, or the combination of 300 pounds acid phosphate and 30 pounds potassium chloride were the only treatments that showed a consistent and significant increase in yields over that of the adjacent checks. These increases ranged from 30 to 90 pounds of lint per acre, with an average gain of approximately 40 pounds of lint for all tests. On the basis of price received for cotton in 1924, this average increase in yield represents a return of about $5.00 per acre above the cost of the fertilizer.

As pointed out above, the tests were conducted in a single series and under abnormal weather conditions and for these reasons cannot be taken as a basis for recommending the kinds and amounts of different fertilizers to apply on each soil type in Southeast Missouri. But they may be taken in a general way to indicate the following: (1) Sodium nitrate should not be applied alone, either at the time of planting or as a side application, except possibly on sandy land. (2) At least a small profit may be expected from acid phosphate alone on most soils in Southeast Missouri. (3) A high grade complete fertilizer, or a combination of acid phosphate and potassium chloride will give good returns as a rule over a wide range of soil types and conditions.

For areas particularly subject to rust such as those found in the sandy areas of Scott, Mississippi and Dunklin Counties, a relatively high per cent of potassium is desirable in any fertilizer that may be used.

Spacing Tests.—To find out the spacing that might be expected to give the highest yield under Missouri conditions, a spacing test was conducted on the different fields. Blocks intended for these tests were planted to a single variety. At the time of thinning which was done when the plants had reached a height of 4 or 5 inches, the blocks were considered as plots of 4 ot 6 rows and each plot thinned as desired. Two or more series were used in the tests wherever the number of rows available would permit. The following spacings were tested in each series:

Hills 10-12 inches apart 2 to 4 plants per hill
Hills 12 inches apart 1 plant per hill
Hills 18 inches apart 1 plant per hill
Hills 24 inches apart 1 plant per hill

On the deep sandy soils, 2 to 4 plants per hill with the hills 10 or 12 inches apart, gave the best returns in every case. While on the silt loam or silty clay loam soils that tend to produce tall rank growing plants, equally as good yields were obtained, on an average, from single plants spaced 12 inches apart as from 2 to 4 plants in the hill with the hills 12 inches apart. The two wider spacings used in the tests failed to give the best results in any case.