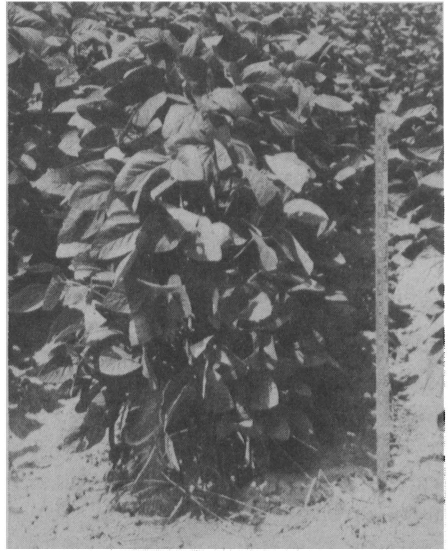
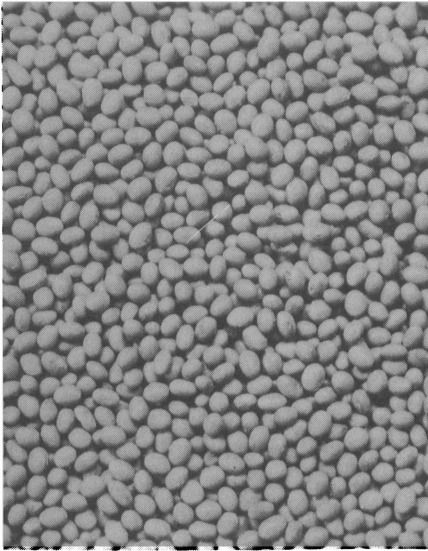


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GROWING SOYBEANS IN MISSOURI

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXTENSION SERVICE
4-H CIRCULAR 117 Columbia, Mo. MAY 1953



Good fertility, good varieties and good cultural practices will give good beans.

Growing Soybeans in Missouri

A 4-H Club Project

J. R. FLEETWOOD

The number one "cash crop" in Missouri is the distinction won by the soybean crop during both 1951 and 1952. The acreage devoted to the crop in 1952 amounted to 1,750,000 acres as compared to only 500,000 acres in 1942. This phenomenal growth in acreage and value started as a result of World War II demand for oils. The oil and resultant oil meal proved so popular, however, that there is still a high demand for soybeans and a relatively good price is being received for the crop.

Fortunately soybeans are well suited to Missouri climate and soils and are grown to a degree in every section of the state. However the highest acreages are found on the bottom land and level prairie areas.

In addition to their relatively good competitive position so far as price is concerned, the soybean crop can be grown, harvested, and sold through the use of machinery with a minimum of hand labor thus making them an excellent crop to grow in face of farm labor problems.

When soybeans were introduced to Missouri agriculture by the Missouri College of Agriculture some 30 years ago they were used primarily as a hay crop. Even as late as 1940, over 400,000 acres of soybeans were utilized for hay and only 109,000 acres were harvested for grain. The later introduction of lespedeza has largely replaced their use as hay and practically the entire crop is now harvested for grain and sold to oil processors.

In the Asiatic countries, especially China, soybeans have been cultivated for centuries, largely for human consumption. But in this country they are seldom used for direct human food. The oil from the beans has found many uses as in salad oils, oleomargarine, paints and plastics, while the soybean oil meal now rates as one of our best and most widely used protein supplements in livestock feeding.

Since soybeans are planted on land which would likely otherwise go to cotton, corn or wheat their future price is likely to maintain a relative position with these crops somewhat near present levels. Acreages are likely to level off at somewhere near the present figure.

Varieties

Most grain varieties of soybeans are yellow in color but a few are green. Other colors are less desirable and are discounted on the market. In hay production color of seed is relatively unimportant so we have brown and black seeded varieties for hay purposes. With the tremendous increase in the demand for oil beans the yellow-seeded varieties are predominant.

The Missouri College of Agriculture has been testing and breeding soybean varieties for many years. Unlike most crop varieties, soybeans are adapted to rather restricted areas, therefore the state is divided into four areas for soybean variety recommendation purposes.

RECOMMENDED VARIETIES

	<i>Early</i>	<i>Midseason</i>	<i>Late</i>
North Missouri	Hawkeye	Clark, Lincoln	Wabash
Central Missouri	Lincoln, Clark	Wabash	Perry
South Missouri	Wabash	Perry	Dorman, S-100
Southeast Missouri	Perry	Dorman, S-100	Ogden

Soil for Soybeans

Soybeans will do best on a fertile soil but can be grown on most any soil of the state if properly fertilized. They do leave the soil loose, thus subject to rather severe erosion unless proper precautions are taken. Soybeans do well on the heavy bottom land soils of the state, thus we find the greatest soybean acreage on the bottom land and level prairie soils. They can be and frequently are grown on upland soils but here they are best grown on terraced land, drilled solid, and followed with small grains to reduce erosion.

Seedbed Preparation

Obtaining a stand and weed control are the biggest problems in soybean production. A smooth firm seedbed with good moisture underneath is the best step toward insuring a stand. Early plowing and disking to kill successive weed crops as they germinate is the best approach to a good seed bed and weed control.

Soil Treatments

Soybeans give most satisfactory yields on good soils. On soils low in lime, phosphorous or potash these elements should be applied according to a soil test. Usually these are best applied ahead of plowing or disked in deeply and thoroughly. In addition, 150 to 200 pounds of a good starter fertilizer will give the beans a good start toward a good yield.

Time, Rate and Depth of Planting

The latter half of the corn planting season generally is the best time to plant soybeans. Thus the optimum range for the state is from May 10 in southeast to June 10 for the northern area.

The soybean by growing as a whip (without branches) in thick stands or branching profusely in thin stands can adjust to varying rates of planting. Thus the rate of planting within limits has but little bearing on yield. If beans are planted too thick they are likely to lodge, and if too thin the heavy branches may be broken off in combining. In general, 30 to 35 pounds is a good rate for row planting, while 50 to 60 pounds is sufficient for drilling solid. Row planting is desirable where weeds are a problem but drilling solid on weed-free ground will give slightly higher yields and save some of the labor of cultivating.

Generally soybeans should be planted as shallow as possible and still insure the seed being in contact with moist soil. Usually this means 1 to 1½ inches and seldom should beans be planted over 2 inches deep.

Inoculation

Being a legume, soybeans can draw nitrogen, one of the most generally needed plant foods, from the air if provided with the bacteria that form nodules, the knotlike growth on the roots of the plants. Hence, the seed should be inoculated unless it is definitely known that soybeans having abundant nodules on their roots were grown in recent years on the field going to this crop. This means the seed should be treated with the proper bacteria.

Inoculation material along with directions for its use can be bought from your seed dealer, or inoculation can be obtained from a field that recently grew inoculated beans. In this case from one to two quarts of soil is used per bushel of beans inoculated. It either may be made into a thin mud and applied to the beans or the beans may be moistened then coated immediately with the dry, sifted soil. In either case, mixing should be so thorough that the beans are well-coated and neither the soil nor the seed, after treatment, should be exposed to direct sunlight because this destroys the inoculation very quickly. Planting should follow soon after treatment.

Row Planting Compared With Drilling Solid

With soybeans grown for grain, row plantings are much surer than solid drilling, and weeds make the difference. Solid drilled crops will yield as heavily as the rowed crops only if the land is quite free of weeds. The rows should be wide enough to permit good cultivation with the equipment at hand. Soybeans in 36- to 42-inch rows, well cultivated, will yield more grain than beans in rows so narrow that cultiva-

tion is faulty. If cultivators are available that permit planting in closer rows, spacing the rows 18 to 24 inches apart will, under favorable soil and seasonal conditions, give maximum yields.

The practice of "double rowing" with the corn planter is discouraged even though good yields sometimes result on moderately fertile clean land. The fault in this method is that the rows are too close and irregular for good cultivation, yet too wide to keep down weeds.

Cultivation

If rains form a soil crust before the soybeans come up, cultivation should be started before the young plants appear. A rotary hoe or harrow is the best tool to break and stir this crust. However, if the plants are just breaking through when the crust forms, this cultivation had better be omitted as the plants are likely to be damaged.

After the crop is up to a good stand, use of the rotary hoe or harrow should be continued as the only means of cultivation until the plants reach the height of six to eight inches. This is the best means of keeping the rows as well as the middles clean. Harrowing should be directed across the rows and delayed until mid-morning when the beans are less likely to break than in early morning.

After soybeans have grown too tall for this sort of cultivation one or two row workings usually will still be needed. Sweeps should be used to make sure the cultivation will be shallow and level.

Harvesting

Combining is the most satisfactory method of harvesting soybean seed. Yet the binder-thresher method has the advantage of permitting removal of the crop about two weeks earlier, which in turn permits seeding small grain on the soybean field sooner than if the combine is used.

For combining, the crop should be allowed to stand until the grain is as dry as possible without shattering. If the binder is used the crop need stand only until three-fourths the pods are ripe and most of the leaves have shed. The bundles should be made fairly small, tied loosely and placed in small shocks to permit rapid drying.

The cylinder speed of the combine or thresher should be reduced to about 600 RPM and the clearance between concaves and cylinder set wide to avoid splitting the grain.

Since soybeans heat in storage if they contain too much moisture — over 14 % — they need close attention for a time following harvest. It is advisable to spread the grain no deeper than 12 to 18 inches on a

wooden floor and to stir it at frequent intervals during the first few days of storage, unless the crop had very favorable conditions for ripening.

To produce green, leafy soybean hay the first step is to cut when the pods are no more than one-third to one-half filled and before the leaves have begun dropping. The hay should be allowed to lie in the swath long enough only to wilt thoroughly, otherwise, loss of color and possibly leaves is likely to result. Usually, the wilted hay is then raked into windrows where curing is completed. The side delivery rake is particularly useful for this purpose because it forms a loose cylinder of hay in which curing occurs quickly. Also, in the case of rain these windrows can be rolled a half turn to promote drying with least disturbance of the hay.

Higher quality hay can be expected if it is brought together into narrow high shocks from the windrow when about three-fourths cured. However, this involves considerable extra work. When soybean hay is stacked it should be covered suitably else spoilage is likely to result.

Market Grades for Soybeans

For the purpose of official grain standards of the United States, soybeans shall be any grain which before the removal of dockage, consists of 50% or more of threshed soybeans and not more than 10% of other grains for which standards have been established under the provisions of the United States Grain Standards Act.

Soybeans are divided into five classes as follows:

Class 1 — yellow soybeans, Class 2 — green soybeans, Class 3 — brown soybeans, Class 4 — black soybeans, and Class 5 — mixed soybeans.

Each class of soybeans is broken into five grades; No. 1, 2, 3, 4, and sample. Thus yellow soybeans or any of the other classes are designated as No. 1, 2, 3, 4 or sample yellow dependent upon the test weight, moisture, splits, damage and foreign material other than dockage.

No. 1 grade of soybeans of any class must test at least 56 pounds per bushel, carry no more than 13% moisture, have no more than 10% splits, show no more than 2% damaged kernels and carry no more than 1% foreign material other than dockage. Further, green or yellow grade 1 soybeans may contain not more than 2% brown, black or bi-colored soybeans, singly or combined.

Grade 4 shall test at least 49 pounds per bushel, carry no more than 18% moisture, 30% splits, 8% damage and 5% foreign material other than dockage.

Sample grade includes all soybeans of any class which do not meet

the requirements for the grades from 1 to 4 or which contain stones, are musty or sour, or heating, or which have any commercially objectionable odor or which are otherwise of distinctly low quality.

Dockage includes weed seeds, weed stems, chaff, straw, grain other than soybeans, sand, dirt, and any other foreign material which can be removed by the use of a standard soybean dockage screen. Dockage is expressed in terms of percentage and is added to the grade designation. Example, yellow soybeans, first grade, 1% dockage. Class 1, number 1, dockage 1.

There is a special grade for soybeans which are infested with live weevil or other insects injurious to grain. Weevily soybeans are graded according to regular grade standards but the term "weevily" is added as a part of the grade designation. Grade 3 weevily, dockage 1%.

Preparing Soybeans for Exhibit

The factors which are considered in grading soybeans all have a bearing on preparing beans for exhibit. First, all foreign material should be removed, damaged and split kernels should be taken out, and off color beans should be removed.

Demonstrations

1. Inoculation, commercial, soil.
2. Determining test weight, dockage and foreign material.
3. Cultural practices.
4. Home cleaning of beans to remove foreign material, dockage, splits.
5. Storage depths of high moisture beans.

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

J. W. BURCH, Director, Agricultural Extension Service
Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914

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For Members in the 4-H Soybean Project

To be used with 4-H Circular 117

Name _____ Age _____

Address _____ County _____

Name of Club _____

Name of Club Leader _____

Project Leader _____

Jr. Project Chairman _____

Club meetings attended during year _____ Project meetings held _____

Number attended _____ Number of units in completed project _____

Number of _____ demonstrations given at:

Club meetings _____, Project meetings _____, County meetings _____,
District meeting _____, State meeting _____.

Number of times participated in Judging work in:

Project meetings _____, County _____, District _____, State _____,
Interstate _____.

Number of exhibits made in:

Community _____, County _____, District _____, State _____, Interstate _____.

Participated In:

County Achievement _____, District Round-up _____, State Contest
Program _____, National Contests _____, County Fair or Show _____,
District Fair _____, State Fair _____, Interstate Show _____, Marketing _____,
County Camp _____, District Camp _____, State Camp _____, National
Camp _____, National Club Congress _____, News stories published _____,
Radio Programs participated in _____.

Served on _____ Standing Committee.

4-H Activity selected for this club year _____

Brief statement of club achievements in club activity, health and recreation

Year _____

Practices to Use

I shall check in the left hand column below the practices I expect to follow in growing this crop. I shall check in the right hand column those that I did follow.

<u>I expect to:</u>	<u>I did</u>
Fertilizing -	
_____ Discuss soil treatment of my soybean field with my County Agent	_____
_____ Test soil if recommended	_____
_____ Apply limestone if needed	_____
_____ Plant down or drill deep fertilizer if recommended	_____
_____ Apply starter fertilizer as recommended	_____
Preparing Seedbed -	
_____ Plow six or eight weeks ahead of planting time	_____
_____ Disk two or three times before planting to control weed growth	_____
_____ Roll and harrow just ahead of planting	_____
Planting -	
_____ Inoculate the seed	_____
_____ Plant seed during last half of the corn planting season	_____
_____ Plant one of the varieties recommended for this section of state by the Missouri College of Agriculture	_____
Check One _____ Plant in rows 36 to 42 inches apart or 18 to 24 inches if cultivator permits	_____
_____ Drill solid at the rate of 60 to 75 pounds to the acre	_____
_____ Plant in rows at the rate of 25 to 35 pounds to the acre or more	_____
_____ Plant for hay at the rate of 40 to 50 pounds to the acre	_____
_____ Put the seed 1 to 1 1/2 inches deep	_____
_____ Plant rolling land on the contour	_____
Cultivating -	
_____ Break crust with rotary hoe or harrow if rain causes a crust to form before the plants come up	_____
_____ Refrain from cultivating when the plants are breaking through the ground	_____
_____ Cultivate with harrow or rotary hoe as often as necessary to control weeds until the beans are 6 to 8 inches tall	_____
_____ Give one or two shallow cultivations with a cultivator after the beans are 8 inches high	_____
Harvesting and Storing -	
_____ Combine grain when pods are dry but before seeds shatter	_____
_____ Cut with binder when one-half the pods are ripe	_____
_____ Store on wooden floor not deeper than 18 inches and stir frequently for the first few days	_____

I expect to:

I did

- _____ Cut for hay when the bean is about one-third developed in the pod and before leaves drop
- _____ Rake hay beans into windrows as soon as the plants are wilted
- _____ Provide suitable cover if hay is stacked

Protecting Soybean Stubble Land -

- _____ Seed stubble land without plowing to a fall sown crop

Using the Crop -

- _____ Feed the hay crop to
- _____ Sell the grain for commercial purposes
- _____ Sell grain for seed
- _____ Save _____ bushels of grain for seed
- _____ Make use of threshed soybean stems for feed and manure ..

My Production Goal

I hope to produce _____ bushels of grain soybeans or _____ tons of high quality hay on _____ acres of land.

Summary

Variety Grown _____

Acreage _____

Date Seeded _____

Date Harvested _____

Bushels Produced _____

Cash Expense

Seed _____

Limestone _____

Fertilizer _____

Inoculation _____

Other _____

Total _____

Value of Crop _____

STORY

Signed _____
member

Approved by _____
leader

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