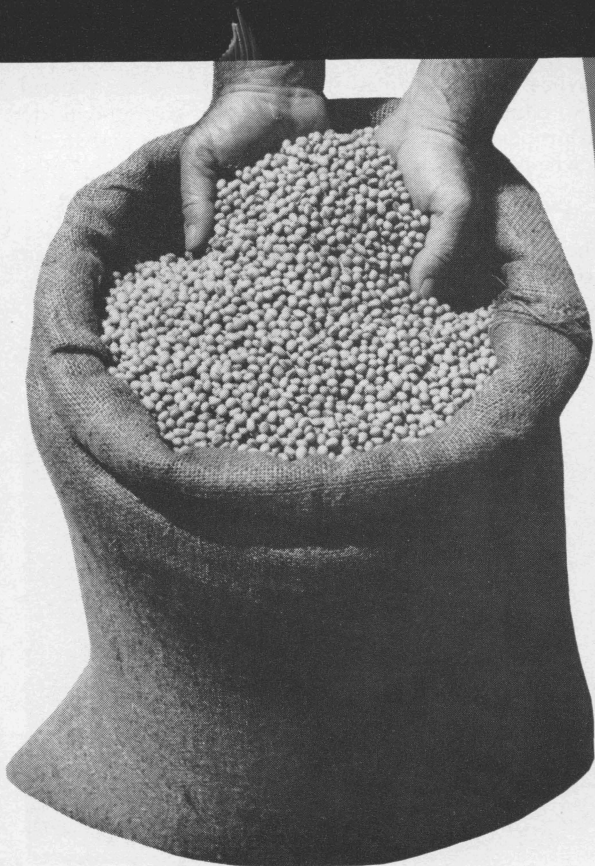


L-411

SOYBEANS



TEXAS AGRICULTURAL EXTENSION SERVICE
J. E. Hutchison, Director, College Station, Texas

Soybeans

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GROWTH REQUIREMENTS

Soybeans can be grown in all irrigated sections of Texas, but most of the commercial acreage harvested for seed is on the High Plains. Although profitable yields have been produced in some seasons under dryland conditions on bottomland soils of the Red River Valley and in the eastern part of the Coast Prairie, yields over a period of years have been so inconsistent the crop has not been grown widely. Elsewhere in the State, where supplemental irrigation is not provided, yields are too low or inconsistent for profitable production.

Soybeans are adapted to about the same general soil and climatic conditions as corn or cotton and do well on properly drained, mellow, fertile loams and sandy loams when adequate moisture is available.

PLANT CHARACTERISTICS

The soybean plant is a legume whose seed contain approximately 20 percent oil and 40 percent protein.

**Respectively, agronomist, Texas Agricultural Extension Service and assistant agronomist, Texas Agricultural Experiment Station.*



Lee soybeans showing pod set and natural defoliation of leaves at maturity. Note heavy leaf litter and weed-free conditions of field.

The plants of most adapted varieties are indeterminate in growth and the flower development begins near ground level and progresses upward. At maturity the plants vary from 2 to 3½ feet in height depending upon the variety, soil fertility and available moisture. At full maturity or frost, the plants shed their leaves and stand erect.

RECOMMENDED VARIETIES

Lee. This variety is shatter resistant and is more disease resistant than other varieties tested in Texas. At present, it is recommended for all areas of the State where soybeans are grown for beans. Seed yields of 30 to 40 bushels per acre have been obtained under irrigation at several locations. It has a yellow seed coat which is desirable in commercial markets.

Ogden. At Lubbock, under irrigation, Ogden and Lee produced identical yields of 22 bushels per acre during the 3-year period, 1955-57. Ogden is adapted in the north and central portions of Texas, but the Lee variety is considered more desirable because of its resistance to seed shattering. Ogden matures 5 days earlier than Lee, but its green seed coat is objectionable in certain markets.

Dorman. This variety has a yellow seed coat, and is comparable with Ogden in seed and foliage production, but matures approximately 2 weeks earlier. It produces good-quality seed with high oil content and holds its seed better than Ogden. Dorman should perform satisfactorily on the Northern High Plains.

Jackson. This variety is approximately 2 weeks later than Ogden in maturity. It has a yellow seed coat, stands well in the field and is one of the best producers in this maturity group. Jackson should perform satisfactorily in Central and South Texas.

Improved Pelican. This is a tall-growing, late-maturing variety with a yellow seed coat. The seed quality and oil content of this and other late-maturing varieties are inferior to the earlier-maturing varieties. It is subject to considerable lodging and shattering. For seed production, Improved Pelican should be limited to the east and southern portions of the Rio Grande Plain and the Coast Prairie.

PLANTING SEED QUALITY

Use certified seed from the previous year's crop for planting purposes. Soybean seed deteriorate more rapidly with age and improper handling than most legume

seed because of their high oil content. Seed more than 1 year old, or cracked, chipped or broken seed are unsafe for planting. A seed germination test should be made prior to planting so that planting rates may be adjusted if necessary.

INOCULATION

Soybean seed should be inoculated each year, even though soybeans were grown on the land before. A special soybean bacterial culture is available and should be used. Nodulation is important. To obtain proper nodulation, some farmers apply a recommended amount of inoculant to the soil when phosphate fertilizer is applied and also inoculate the seed before planting. Others prefer to apply double the recommended amount of inoculant to the seed. Inoculate seed and plant as soon as possible since sunlight, heat and excessive drying may impair or destroy the effectiveness of the bacteria.

TIME OF SEEDING

Texas farmers tend to plant soybeans too early for best results. Soybeans should be planted after the minimum soil temperatures have reached 65 degrees F. and after the effective daylight period reaches or exceeds 14½ hours. The effective daylight period is from about ½ hour before sunrise to ½ hour after sunset. Due to sensitivity of the soybean plant to both light and temperature, better plant growth and production of beans are obtained by delaying planting until these requirements are met. In general, areas south of an eastwest line from Waco to El Paso should plant soybeans between May 15 and June 1. Areas north of this line should plant between June 1 and June 15.

SEED TREATMENT

Seed may be treated with 2 ounces per bushel of Arasan, Arasan SF-X, Sperguson or similar non-mercuric chemicals prior to planting if germination is low. These chemicals give significant increases in stands when germination is less than 85 percent. Fungicides containing mercury reduce germination and are not recommended. When an inoculant is applied to seed that previously were treated with a fungicide, the seed should be planted immediately. Seed treatment may make inoculation less effective, if planting is delayed for 2 or more hours after inoculation.

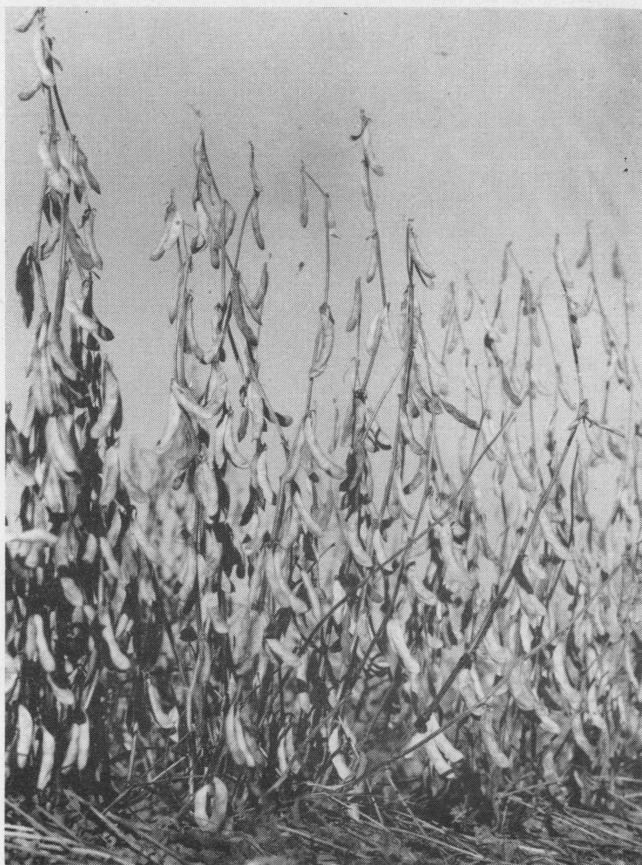
SEEDBED PREPARATION

Seedbed preparation for soybeans is the same as for cotton or grain sorghum. In irrigated areas, unless

good subsoil moisture is available, a preplanting irrigation should be applied to wet the soil to a depth of 4 to 6 feet. The seedbed should be free of weeds, since the young plants start slowly. It should be firm and the surface of the row should be level or slightly above general ground level to facilitate irrigation and harvest.

PLANTING RATE AND DEPTH

Soybeans usually are planted in 36 to 42-inch rows; however, limited tests show a slight advantage in yield by using closer row spacings. The wider rows permit utilization of regular cultivating equipment. Enough viable seed should be planted to insure one plant per inch in the drill row for high yields that are easier to harvest. Forty to 60 pounds of seed per acre will be



Closeup of Lee soybeans on the High Plains. Proper planting and cultivation permit harvest of low-set pods.

required, depending on the size of the seed. Thinner stands may produce equal yields, but weeds will be more troublesome during the seedling stage. Poor stands increase harvest losses as the resulting short-bushy plants with pods set close to the ground are difficult to harvest. Thicker stands are more subject to lodging if good growing conditions exist. Seed should be planted 1 to 2 inches deep, and in such a manner that the surface of the seedbed, after final cultivation, is level with or slightly above ground level to permit efficient combine operation. Soybeans may be planted with a corn or cotton planter equipped with a bean plate. They can be cultivated with a rotary hoe and later with regular cultivating equipment. Cultivation should be shallow and often enough to control grass and weeds.

FERTILIZATION

Fertilize according to a soil test. Apply fertilizer as a side-dressing at the time of planting or below the seed before planting. Avoid application directly in the seed drill. Nitrogen and potash are particularly harmful to seed germination. If nodulation is poor, an application of 15 to 30 pounds of nitrogen may be applied as a sidedressing. Chlorotic or yellow-colored plants sometimes indicate that nodulation is poor. In 1957 on fine sandy loam soils, yields of soybeans at the Lubbock Experiment Station were increased approximately 5 bushels per acre by the application of 60 pounds of phosphoric acid.

MOISTURE REQUIREMENTS

The water requirement to produce a soybean crop is approximately the same as for cotton. The most critical need for moisture on both soybeans and cotton is during the latter part of the growing season. However, irrigations on cotton usually end in late season, thereby forcing maturity, while irrigations on soybeans continue until the seed mature naturally. Yields on all soybean varieties may fall short if there is a shortage of available moisture during August or September. Late-maturing varieties may require additional moisture through early October. In most areas, one preplanting irrigation and three to four postplanting irrigations should provide ample moisture. During the plant's early life, adequate moisture to assure continuous growth is all that is required, but moisture stress from the flowering and fruiting period to maturity should be avoided. Under dryland conditions, the pattern and amount of rainfall received during the flowering period and until the pods mature

will determine the economy of utilizing soybeans in a farming system. In general, average yields produced under dryland conditions in Texas have been so low, regardless of the variety used, that soybeans have not been profitable.

HARVESTING

Soybeans should be harvested when fully mature and before the first pods begin to shatter. Harvesting before the pods are fully mature causes the seed to wrinkle on drying and increases the storage problem. Delay in harvesting results in serious losses from shattering even when using shatter-resistant varieties, such as Lee. Direct combining is the most efficient method of harvesting soybeans. Seed shattering due to excessive beating of the plants, caused by improper reel speeds, may be reduced by converting the reel mechanism to a ground wheel drive. Follow the operator's manual for a particular combine to assure proper combine adjustment. Slow cylinder speeds and properly adjusted concaves prevent cracking of the beans. The cutter bar should be kept close enough to the ground to cut below the pods. Cutting high enough to leave five to six pods per foot of row means a loss of 1 bushel per acre. The soybean plant defoliates naturally as the beans approach maturity. After the leaves turn yellow and drop, the beans should dry on the plant until the moisture content is no higher than 14 percent. Defoliating soybeans with chemicals to hasten maturity reduces yield and bean quality.



Harvesting soybean variety test at Texas Agricultural Experiment Station, Lubbock.

VARIETIES FOR HAY

In some areas of the State, particularly East Texas, soybeans have been used successfully for hay. Soybean hay may be produced from row or broadcast plantings. Varieties adapted for hay production are Improved Pelican, Laredo, Red Tanner and Otootan. Jackson and Lee, although primarily used for seed production, will produce satisfactory forage yields from row or broadcast plantings. Broadcast plantings for forage purposes require 75 to 100 pounds of seed per acre.

SOIL IMPROVEMENT

The soil-improving effect of a soybean crop harvested for seed is of questionable value from the standpoint of adding nutrients. The amount of total nitrogen remaining in the soil after removing a bean crop is about the same or slightly above its previous level, if the plants were well nodulated. With the possible exception of nitrogen, harvested soybeans reduce other mineral elements of the soil. However, soybeans leave the soil in a loose, friable condition which is beneficial for succeeding crops. This good tilth may be due to the protection afforded the soil by the thick leafy plant growth during the growing season and by the incorporation of plant residues after harvest. Where wind or water erosion is serious, this loosening effect may create problems between crops in a rotation system.

Soybeans may be used most effectively for soil improvement by incorporating the plant growth into the soil when pods begin to form. Varieties recommended for hay are suitable for soil improvement purposes.

IN ROTATIONS

Soybeans may be used in crop rotations as full-season crops or as part-season crops following other crops. A 3-year rotation using grain sorghum the first year, soybeans the second year and cotton the third year has been successful on the irrigated High Plains. Farmers report that weeds and volunteer crops cause less trouble when cotton follows soybeans.