

Mississippi Soybean Variety Trials, 2020

INTRODUCTION

Procedures

There has been a proliferation of soybean varieties in recent years, and many good varieties are available to Mississippi producers. No single variety is superior, but in some situations, there are varieties that are more specifically adapted than others. Selecting a variety for planting requires knowledge of disease, nematode, and herbicide reactions, as well as the yield performance of each variety on a particular soil type. In many cases, planting the proper varieties will make substantial differences in yield and profitability on a farm. Proper management, including adequate lime, fertilizer, and weed control, is required to produce high yields of any variety, but yields may be limited, even under good management, unless the proper varieties are planted.

Soybean variety trials were conducted at eight locations in 2020 (see map). Commercial seed companies were given the opportunity to enter varieties for testing. Seed of all private entries were supplied by the participating companies. Public varieties were selected by the Technical Advisory Committee for evaluation at each location. The experimental design at each location for each maturity group was a randomized complete block, with three replications of each entry.

Seeding Rate. All seeds were packaged for planting at the rate of nine seeds per foot of row for 30-inch row spacing and at the rate of six seeds per foot for 19-inch row spacing. Plots were planted with a cone planter or vacuum planter, depending on the location. Irrigated plots had four rows, spaced 30 inches apart; nonirrigated plots had three rows, spaced 19 inches apart. All irrigated plots were planted to a plot length of 15 feet by using a planter

with a cable trip system. All nonirrigated plots were planted to a length of 18 feet. Plot ends were trimmed to a uniform length 3 to 4 weeks after emergence.

Cultural Practices. Cultural and pest control practices for optimum yields were followed. Plots were limed and fertilized on the basis of an annual soil test. All seeds were treated with an insecticide/fungicide before planting. Only herbicides currently registered for use on soybean with strict adherence to all label instructions were used in these studies.

Maturity Date. Maturity is considered to be the date when the pods are dry and most of the leaves have dropped. Under most conditions, the stems are also dry.

Yield. An Almaco plot combine was used to harvest each plot. Harvested seed were allowed to dry at ambient temperature to a uniform moisture content before weighing. Weights were converted to yield in bushels per acre (60 pounds per bushel) at 13% moisture.

Plant Height. Plants were measured from the soil to the top extremity, at maturity, and plant height was recorded as the average of the height of plants measured.

Lodging. Lodging was rated and recorded on a scale of 1 = almost all plants erect, 2 = all plants leaning slightly or only a few plants down, 3 = all plants leaning moderately or 25 to 50 percent of plants down, 4 = all plants leaning considerably or 50 to 80 percent of plants down, and 5 = all plants down.

How to Select Varieties

In Problem or Difficult Fields

(1) Identify fields that have had problems in the past. Problems to consider may include diseases, nematodes, or fields that make planting or harvest difficult because of extremely dry or wet conditions. The Mississippi State University Extension Service offers a disease diagnostic service and nematode analysis free of charge.

(2) Use Tables 83 to 90 to select varieties for fields that need disease resistance.

(3) Select varieties using multiyear averages from all available locations. Identify those varieties that have desired pest resistance along with a high yield potential. Use data from a test site or sites with a soil type similar to that where the soybeans will be grown. Consider planting dates and maturity dates that may allow you to avoid historical field problems.

In Nonproblem Fields

(1) Identify the farm's highest yielding fields that have no specific disease problems.

(2) Select varieties with the best yield potential using multiyear averages from all available locations. Use data from a test site or sites with a soil type similar to that where the soybeans will be grown.

(3) Try new varieties on a limited number of acres. Don't abandon older, consistent-performing varieties that are yielding well unless research and experience show an advantage for newer varieties.

Planting Date and Maturity Date

(1) Varieties in Maturity Groups IV and V are recommended. Earlier maturing varieties should be considered for planting where fall seedbed preparation was done the previous year and in fields that are subject to drought stress during the growing season and/or wet soils during the usual harvest period. Later maturing varieties should be considered for planting in fields that are not as prone to drought stress, where irrigation will be used to alleviate drought stress, and for later planting. However, early

planting of all acreage is encouraged to reduce risk from drought and obtain higher yields.

(2) Early-season production is a practice that has been quite successful and consistent for several years. Cool, wet soils at planting may justify the use of a seed treatment that has activity against *Pythium*, since no varieties have resistance to infection and resulting damage from this organism. Most Maturity Group IV soybeans have a narrow growth habit. Given their growth, habit narrow rows are quite advantageous. Early April to early May planting is recommended for early-season production of Group IV varieties. Irrigation allows later planting of early-maturing soybeans; however, the full yield potential may not be realized when planted late. Timely harvest is crucial with early-maturing varieties because dry weather at maturity may promote shattering. There is a wide range in maturity within Group IV soybeans. Determine if an early Group IV or a late Group IV variety, or some acreage of both, will fit into your operation.

(3) Timely planting is crucial for optimum production of all maturity groups of soybeans. An attempt should be made to complete soybean planting as early as possible. Planting of Group V and Group VI can be made in April. Delays in planting will result in reduced yield potential for almost all varieties in all maturity groups.

Herbicide-Resistant Varieties

(1) Evaluate overall performance characteristics of the variety — including yield potential, disease and nematode resistance, maturity date, lodging, etc. — as you would any variety.

(2) Compare these characteristics to other varieties, conventional and herbicide-resistant.

(3) Consider seed premiums, technology fees, and specific weed problems. Determine total cost of conventional and herbicide-resistant-crop weed control programs, and combine this information with factors listed above in choosing a variety.

General Characteristics of Varieties

Soybean varieties differ in significant characteristics that may not affect their performance. Tables 91 to 98 give the general characteristics of most varieties grown in Mississippi.

Pubescence and Hilum Color. Brown (tawny) and gray are the basic pubescence (hair) colors found among varieties. Varying pod-wall colors result in different intensities of mature pod colors. The “eye” of the seed is called a hilum, or point of attachment to the pod, and it differs in color by variety.

Seed Size. There is no relationship between inherited seed size and seed yield. A small-seeded variety may yield as much as or more than a large-seeded variety. The average seed per pound for different varieties is shown in Tables 91 to 98, but this is subject to seasonal variation. Knowing the number of seed per pound is important in determining the amount of seed needed for planting. Fewer pounds are required for small-seeded varieties than for large-seeded varieties. Your county Extension office has a publication (Information Sheet 1194) that deals with seeding rates and plant populations.

Flowering. Varieties of Maturity Group IV generally display an indeterminate growth habit. This means that a large portion of their vegetative growth occurs after the onset of flowering begins. In contrast, varieties of Groups V and VI display a determinate growth habit, where most of the vegetative growth occurs before flowering. The date of first flower will be determined by the time of planting and maturity. For example, a mid-Group IV variety may bloom 3 weeks earlier than a Group V variety, whereas a late Group IV variety may bloom only 1 week earlier than a Group V

variety. Soybean flower petals are purple or white. The flower color is controlled strictly by genetics, and only one flower color occurs in a pure variety.

Maturity Group. Within the Maturity Group IV trials, the wide variation in maturity dates is attributed to lack of rigid standards for classifying varieties within a group. It was decided to subdivide both the Group IV and Group V trials into two maturity groups. All maturity groups were assigned an early- and late-maturity check.

Use of Data Tables and Summary Statistics

The yield potential of a given variety cannot be measured with complete accuracy. Consequently, replicated plots of all varieties are evaluated for yield, and the yield of a given variety is estimated as the mean of all replicated plots of that variety. Yields may vary from one plot to another, which introduces a certain degree of error to the estimation of yield potential. This natural variation is often responsible for yield differences seen among different varieties. Thus, even if the mean yield of two varieties is numerically different, they are not necessarily significantly different in terms of yield potential. In other words, the ability to measure yield is not precise enough to determine whether such small differences are observed purely by chance or because of superior performance.

The least significant difference (LSD) is an estimate of the smallest difference between two varieties that can be declared to be the result of something other than random variation in a particular trial. Consider the following example for a given trial:

Variety	Yield
Abe	40 bu/A
Bill	35 bu/A
Charlie	31 bu/A
LSD	7 bu/A

The difference between variety Abe and variety Bill is 5 bushels per acre ($40 - 35 = 5$). This difference is smaller than the LSD (7 bushels per acre). Consequently, it is concluded that variety Abe and variety Bill have the same

yield potential, since the observed difference occurred purely due to chance.

The difference between variety Abe and variety Charlie is 9 bushels per acre ($40 - 31 = 9$), which is larger than the LSD (7 bushels per acre). Therefore, it is concluded that the yield potential of variety Abe is superior to that of variety Charlie, since the difference is larger than would be expected purely by chance.

The coefficient of variation (CV) is a measure of the relative precision of a given trial and is used to compare the relative precision of different trials. The CV is generally considered to be an estimate of the amount of unexplained variation in a given trial. This unexplained variation could be the result of variation between plots, with respect to soil type, fertility, insects, diseases, drought stress, etc. In general, the higher the CV, the less precise a given trial is.

The coefficient of determination (R^2) is another measure of the level of precision in a trial and is also used to compare the relative precision of different trials. The R^2 is a measure of the amount of variation that is explained, or accounted for, in a given trial. For example, an R^2 value of 90 percent indicates that 90 percent of the observed variation in the trial has been accounted for, with the remaining 10 percent being unaccounted for. The higher the R^2 value, the more precise the trial. The R^2 is generally considered to be a better measure of precision than is the CV, for comparison of different trials.