EFFECT OF SPACING ON TWO SOYBEAN PLANT TYPES

by

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INTRODUCTION

In the early history of soybean production in Kansas most of the area was planted with horse drawn planters, in 36 to 40 inch rows. Wide spacings were used for ease of using existing machinery and to allow post-emergence cultivation. With the availability of chemicals for satisfactory weed control and evolution of new varieties which have a better yield response, determination of optimum plant population and planting pattern is important.

Several studies have shown that soybeans planted in narrow rows have produced higher yields, especially in the northern states. Studies with narrow rows in Kansas and in some southern states have also given some encouraging results.

Plant spacing relates to both row spacing and within the row spacing. Plants may respond differently to variations in both row and within the row spacings, at the same density per unit area.

The spacing that will result in the maximum yield depends on many factors including the growth type of the varieties. Soybean plant types in northern U. S. have an indeterminate growth habit. Determinate plant types have been developed with the same background as some leading varieties.

This study was carried out to compare two plant types, namely an indeterminate and a tall determinate (Dt_2) plant type with the common genetic background of Clark soybean variety, at nine plant spacings.

REVIEW OF LITERATURE

According to Wiggans (25) highest yield can be obtained from a uniform planting pattern, especially equidistant spacing. There is an optimum plant density beyond which there will be no further yield increase. He also observed that soybean plant, like other plants, has the ability to adjust to space, and optimum rates and spacings for soybeans should be determined for different varieties.

Buttery (2), Johnson and Harris (10), Nelson and Roberts (18), and many others have found that plant height increased at higher plant densities. Probst (19) found that varying the distance between the plants within the row had little influence on plant height, though plants spaced farther apart were generally shorter.

Buttery (2), using four populations with a row width of 30.5 cm, found that high plant density resulted in small plants but high dry weight per unit area, and low density produced larger plants with a lower dry weight per unit area. Intermediate densities produced intermediate plant size and yield. He noted that shoot/root, bean/shoot ratio, and leaf area index decreased as density increased.

Studying the effect of planting date and row width on three soybean varieties, Kilgore (14) observed that plants in 50 cm rows produced an average of 6 percent more than the plants in the 76 cm rows, and the 76 cm rows produced 8.4 percent more than the plants in the 100 cm rows.

Lehman and Lambert (16) reported that seed yields tended

to be higher at the narrow row spacings, but the effects of spacing within the row were variable. The relative importance of branches varied with spacing for seed and pod number but had little or no effect on seed weight and seeds per pod.

For an average of four seeding rates, Reiss and Sherwood (20) found that plants in 60 cm rows produced the highest yields, followed by plants in 40, 20, 80, 100 cm rows.

Advantage of narrow rows has not been great in the south, (3) but in some cases yield advantages have been reported. In North Carolina, Clapp (4) noted that by narrowing the rows, a better ground cover could be obtained, especially with late planting, thus resulting in a better utilization of light and other factors.

Yields in Minnesota and Illinois in 45 to 60 cm rows have been up to 15 per cent greater than in 90 to 100 cm rows (3). In southeastern Kansas 50 cm rows produced higher yields than 100 cm rows, 75 Kg/Ha seeding rate was found to be superior in 50 cm rows, while 45 Kg/Ha was the optimum rate in 100 cm rows (3).

In Florida, in a study of the effects of date of planting and row width on yields, Smith (21) found that early and mid-season varieties, for an average of three years, produced the highest yields at row widths of 15 and 30 cm, when planted on May 15 and June 15. Yield for the late variety at the same dates and spacings was equal to or better than the yields from wider rows.

Lodging has been considered a major barrier to higher yields. Cooper (5) concluded that early lodging was very detrimental to yields in a highly productive environment, with rapid early growth resulting in severe lodging. He studied the effects of two levels