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Soybean Yield as Influenced by Planting Date and Plant Population

Abstract

Soybean yields often increase, up to a point, with increasing plant population. However, soybean yield responses to plant population are generally small and often inconsistent. In general, when plant populations are increased, plant height increases, and there are greater yield losses from lodging. Soybean seed prices have increased tremendously over the last couple of years. Our hypothesis is that we can reduce our seeding rate cost if we need to replant a field because later in the season soils are warmer and seedling mortality lower. The objective of this experiment was to determine the optimum plant population across different planting dates in northeast Iowa.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Soybean Yield as Influenced by Planting Date and Plant Population

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Introduction

Soybean yields often increase, up to a point, with increasing plant population. However, soybean yield responses to plant population are generally small and often inconsistent. In general, when plant populations are increased, plant height increases, and there are greater yield losses from lodging. Soybean seed prices have increased tremendously over the last couple of years. Our hypothesis is that we can reduce our seeding rate cost if we need to replant a field because later in the season soils are warmer and seedling mortality lower. The objective of this experiment was to determine the optimum plant population across different planting dates in northeast Iowa.

Materials and Methods

The experiment was conducted at the Northeast farm at Nashua. The experiment was a randomized complete block in a split plot arrangement with four replications. Main plots were planting date (April 23, May 13, May 23, and June 5). The sub-plots consisted of four seeding rates (75,000, 125,000, 175,000, and 225,000). Plot size of the sub-plot experimental units was 15 ft × 50 ft with only 12.5 ft × 45 ft used for harvest. The soybean variety was NK S24-K4 planted in six rows using 30-inch row spacing and a 1.5-inch depth. Plots were harvested September 28 with a small-plot combine. Grain yields were adjusted to 13% moisture.

Results and Discussion

Summarized in Table 1 are the results of the 2003 study. Few interactions were observed among treatment effects in this study. A planting date by plant population interaction for grain moisture was observed. No differences were found for the first three planting dates; however, grain moisture decreased as plant population increased for the June 5 planting date. A planting date by plant population interaction for lodging was also observed. Lodging increased as plant population increased for the first three planting dates. No differences were found for the late planting date.

Soybean yield increased for early planting vs. late planting and no differences were found in plant populations and grain yield. Grain moisture content increased with delayed planting and no differences in grain moisture content were found among plant populations. Early planting resulted in taller plants, and plant height increased as plant population increased. Lodging was not consistent across planting dates. The highest lodging scores were observed for the second and third planting dates. Lodging increased as plant population increased.

Conclusion

It was concluded that both planting date and plant population influenced grain yield in northeast Iowa in 2003. The study will be continued in 2004 and 2005.

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Table 1. Effect of planting date and final plant population on soybean yield, moisture, height, and lodging in 2003.

| Main effect | Yield bu/acre | Moisture percent | Height inches | Lodging 1-5† |
|--|------------------|---------------------|------------------|-----------------|
| <u>Planting Date:</u> | | | | |
| April 23 | 42.0 | 12.4 | 34.8 | 1.3 |
| May 13 | 38.3 | 12.2 | 34.3 | 1.6 |
| May 23 | 36.7 | 12.5 | 34.6 | 1.6 |
| June 5 | 30.8 | 13.5 | 32.8 | 1.1 |
| LSD (0.05) | 1.4 | 0.2 | 1.0 | 0.4 |
| <u>Final plant population (P), plants/acre</u> | | | | |
| 65,500 | 35.1 | 12.7 | 33.1 | 1.0 |
| 110,000 | 36.8 | 12.7 | 34.3 | 1.1 |
| 146,800 | 38.3 | 12.7 | 34.4 | 1.4 |
| 190,800 | 37.6 | 12.6 | 34.6 | 2.1 |
| LSD (0.05) | 1.1 | NS‡ | 0.8 | 0.3 |
| <u>Anova</u> | | | | |
| L*P | NS | * | NS | * |

†Lodging score: the range extends from 1 = erect to 5 = flat.

‡NS, not significant at $P \leq 0.05$. *, **, *** are significant at the $P = 0.05$, 0.01, and 0.001 probability levels, respectively.