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Soybean Yield as Influenced by Planting Date and Plant Population

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Abstract

Soybean yields tend to increase with rising plant populations. 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 risen tremendously over the last couple of years. My hypothesis is that seeding rate cost can be reduced if replanting a field is advantageous because soils are warmer and seeding mortality is lower. The objective of this experiment was to determine the optimum plant population across different planting dates using different tillage systems.

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 tend to increase with rising plant populations. 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 risen tremendously over the last couple of years. My hypothesis is that seeding rate cost can be reduced if replanting a field is advantageous because soils are warmer and seeding mortality is lower. The objective of this experiment was to determine the optimum plant population across different planting dates using different tillage systems.

Materials and Methods

Two experiments were conducted using conventional tillage and no-tillage systems. Conventional tillage was accomplished by chisel plowing in the fall and field cultivating twice in the spring before planting. For no-tillage, crops were planted directly into the undisturbed residue of the previous crop. The two experiments were conducted separately and adjacent to each other in a field with corn as the previous crop. Each experiment was a completely randomized block in a split plot arrangement with four replications. Main plots were planted on April 28, May 15, June 5, and June 15. The subplots consisted of four seeding rates (75,000, 125,000, 175,000, and 225,000 seeds/acre). Plot size of the subplot experimental units was 10 ft × 25 ft. The soybean variety was Dekalb DKB 36-51 RR planted in four rows using 30-in. row spacing and a 1.5-in. depth. Plots were harvested October 25 with an Almaco small-plot combine. Grain yields were adjusted to 13% moisture.

Results and Discussion

Delayed planting decreased yield in both tillage systems (Tables 1 and 2). No differences were found among plant populations and grain yield. In general, grain moisture content was lowest for the early planting dates. No differences were found among plant populations and grain moisture content. Plant height decreased with delayed planting and plant height increased as plant population increased. Lodging increased as the plant population increased in both tillage systems.

Conclusion

It was concluded that the planting date has a larger impact on grain yield than plant population. The study will be continued in 2005.

Acknowledgments

Table 1. Effects of planting date and final plant population on soybean yield, moisture, height, and lodging in a conventional tillage system.

Main effect	Yield bu/acre	Moisture percent	Height inches	Lodging 1–5†
Planting date				
April 28	50.3	14.6	40.9	1.4
May 15	46.3	14.7	40.8	1.4
June 5	41.4	14.4	40.4	1.1
June 15	28.2	14.7	37.4	1.1
LSD (0.10)	2.3	0.2	1.0	0.2
Final plant population (P), plants/acre				
63,700	41.3	14.4	38.0	1.0
105,800	42.4	14.5	39.9	1.1
141,200	42.1	14.7	40.9	1.4
157,700	40.6	14.6	40.6	1.5
LSD (0.10)	NS‡	NS	0.5	0.2
Anova				
L*P	P=0.007	NS	P<0.0001	P=0.004

†Lodging score: the range extend from 1 = erect to 5 = flat.
‡NS, not significant at P≤0.05.

Table 2. Effects of planting date and final plant population on soybean yield, moisture, height, and lodging in a no-tillage system.

Main effect	Yield bu/acre	Moisture percent	Height inches	Lodging 1–5†
Planting date				
April 28	64.8	14.9	39.9	1.4
May 15	58.8	14.9	40.6	1.3
June 5	50.5	15.0	40.1	1.0
June 15	32.6	15.5	37.2	1.0
LSD (0.10)	3.8	0.3	1.1	0.1
Final plant population (P), plants/acre				
62,800	51.2	15.0	37.8	1.0
106,400	52.5	15.0	39.6	1.0
134,100	51.9	15.2	40.1	1.5
149,500	51.2	15.1	40.3	2.0
LSD (0.10)	NS‡	NS	0.6	0.1
Anova				
L*P	NS	NS	NS	P<0.0001

†Lodging score: the range extends from 1 = erect to 5 = flat.
‡NS, not significant at P≤0.05.