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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 soils are warmer and seeding mortality 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 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 soils are warmer and seeding mortality 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 randomized complete block in a split plot arrangement with four replications. Main plots were planting date (May 8, May 22, June 5, and June 17). 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 10 ft × 25 ft with only 5 ft × 14 ft used for harvest. The soybean variety was Dekalb DKB 36-51 RR planted in four rows using 30-inch row spacing and a 1.5-inch depth. Plots were harvested October 9 with an Almaco small-plot combine. Grain yields were adjusted to 13% moisture.

Results and Discussion

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

Conclusion

It was concluded that planting date has a larger impact on grain yield than plant population. The study will be continued in 2004.

Acknowledgments

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

Main effect	Yield	Moisture	Height	Lodging
	bu/acre	percent	inches	1-5†
Planting date:				
8 May	53.7	10.8	41.5	1.1
22 May	54.1	11.1	42.1	1.7
5 June	48.9	10.9	38.1	1.4
17 June	43.0	10.9	34.9	1.1
LSD (0.05)	7.4	NS‡	1.3	0.2
Final plant population (P), plants/acre				
69,300	49.9	11.0	37.3	1.0
113,900	47.7	10.7	39.0	1.0
151,300	51.2	11.0	40.5	1.3
171,100	50.8	10.9	39.8	2.0
LSD (0.05)	NS	NS	1.1	0.2
Anova				
L*P	NS	NS	NS	<0.0001

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

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

Main effect	Yield	Moisture	Height	Lodging
	bu/acre	percent	inches	1-5†
Planting date:				
8 May	41.7	9.0	34.1	1.0
22 May	40.8	9.9	35.9	1.0
5 June	32.5	11.6	33.1	1.0
17 June	26.5	11.4	30.7	1.0
LSD (0.05)	12.5	1.3	1.2	NS‡
Final plant population (P), plants/acre				
62,800	35.0	9.7	31.8	1.0
106,400	35.8	10.7	33.3	1.0
134,100	35.0	10.7	34.1	1.0
149,500	35.7	10.8	34.6	1.0
LSD (0.05)	NS	NS	1.0	NS
Anova				
L*P	NS	NS	NS	NS

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