

## Soil pH and Plant Population Effects on Soybean Yield

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### Introduction

The liming of soils is an important part of the overall fertility program for soybean production. Liming requirements are generally based on the soil pH. Soybeans are adversely affected by acidity when the pH falls below about 5.8. There is considerable interest in specific soil pH management recommendations in Iowa. Since soil pH varies across Iowa, it is likely that current plant populations for soybeans need to be optimized depending on soil pH. The objective of this study was to identify the optimum plant populations for soybeans at different soil pH readings.

### Materials and Methods

The experiment was a randomized complete block in a split-plot arrangement with four replications. Main plots had five lime treatments (0, 1.7, 5, 15, and 45 tons ag-lime/acre) applied in 1995. Soil pH readings for the different treatments were, on the average, 5.4, 6.0, 6.5, 7.1, and 7.8. Continuous corn has been grown in the field since 1995. The subplots consisted of five seeding rates (75,000, 125,000, 175,000, 225,000, and 275,000 plants/acre). Plot size of the subplot experimental units was 10 ft × 37.5

ft, and a 5 ft × 32.5 ft area was used for harvest. The soybean variety was Pioneer 92M80 planted on May 10 with a John Deere MaxEmerge planter. Seed was inoculated with *Bradyrhizobium japonicum* (Liphatech, Milwaukee, WI), and each plot was planted in four rows with 30-in. row spacing at a 1-in. depth.

Plots were harvested September 30 with an Almaco small-plot combine. Grain yields were adjusted to 13% moisture.

### Results and Discussion

Summarized in Table 1 are the results of the study. Overall, small differences were observed among lime treatments and plant populations. This is the third year of this study, and I have decided not to continue it since the data has been consistent every year.

It was concluded that soil pH did not influence the optimum plant population based on three years of data.

### Acknowledgments

I would like to thank Jeff Butler for his help with planting and spraying.

**Table 1. Effects of lime and final plant population on soybean yield, moisture, height, and lodging.**

Main effect	Yield (bu/acre)	Moisture (percent)	Height (in.)	Lodging (1-5) <sup>1</sup>
<u>Lime (L), tons ag-lime/acre<sup>2</sup></u>				
0	62.3	10.0	29.0	1.0
1.7	61.4	10.1	29.8	1.0
5	61.9	10.1	28.9	1.0
15	61.5	10.1	29.5	1.0
45	62.5	10.2	29.2	1.0
LSD (0.10)	NS <sup>3</sup>	NS	NS	NS
<u>Final plant population (P), plants/acre</u>				
47,300	58.2	10.0	28.1	1.0
78,700	62.1	10.0	30.0	1.0
95,200	63.7	10.0	30.3	1.0
95,000	62.9	10.2	29.4	1.0
136,300	64.5	10.1	28.8	1.0
LSD (0.10)	1.9	0.1	0.8	NS
<u>Anova</u>				
L*P	NS	NS	NS	NS

<sup>1</sup>Lodging score: the range extends from 1=erect to 5=flat.

<sup>2</sup>Soil pH for the different lime treatments: 0 (pH 5.4), 1.7 (pH 6.0), 5 (pH 6.5), 15 (pH 7.1), and 45 (pH 7.8).

<sup>3</sup>NS, not significant at P≤0.10.