The Potential for Varying Soybean Seeding Rate

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Summary Points

- Changing the soybean seeding rate based on soil maps and past yield history has potential to reduce seeding costs.
- Precision farming technologies are a valuable tool to help with on-farm research.

Introduction

Precision agriculture technologies related to crop production have had a slow adoption rate in Oklahoma. Many Oklahoma producers recognize the role of these technologies in the Midwestern corn and soybean belt, but are concerned about their economic feasibility in this state. Automated or embedded technologies such as guidance systems and swath control are being adopted faster than management technologies such as yield monitors and variable rate controllers. One technology that may have a great amount of potential in Oklahoma is variable rate seeding. With the inherent variability in soil type, which affects soil water holding capacity, and depth of top soil in the majority of dryland soybean fields in Oklahoma it is likely that one flat seeding rate is not ideal. Currently, only a few producers have the capability of changing the seeding rate on the go but as newer planters are purchased, producers need to know if this technology will pay in order to make the investment.

Both yield data and soils maps can be a useful tool in identifying management zones. Typically, these management zones can be either consistently high yielding, consistently low yielding, or average. Higher yielding areas may respond better to higher seeding rates, while low yielding areas may benefit from a lower seeding rate. With the technology and soil data readily available, the potential to improve yield and save on seed cost exists.

The objective of this project was to evaluate the feasibility of using soil maps and/or past yield to make variable rate seeding recommendations.

Methods

A soybean field in Kay County was identified where the producer had the capability to vary the seeding rate. The tractor was equipped with a GreenStar3 monitor. Areas of the field were targeted that we felt may respond differently to seeding rate. These areas were identified by using historical yield data that the Producer Partner had collected and soil maps through NRCS web site. To evaluate variable seeding rates we randomly placed strips where the seeding rate was varied (Figure 1). The width of these strips were 60 ft wide. Seeding rates evaluated were 90,000, 125,000 and 140,000 seeds/ac. Yield monitor data was collected by the producer.

All yield data points were filtered and erroneous data points were deleted. Grid cells (60 ft x 60 ft) were created and yield data points within each cell were averaged, providing an average grain yield

for each cell. To compare response to the three population's, yield of grid cells (side by side) for the length of the strips were compared.
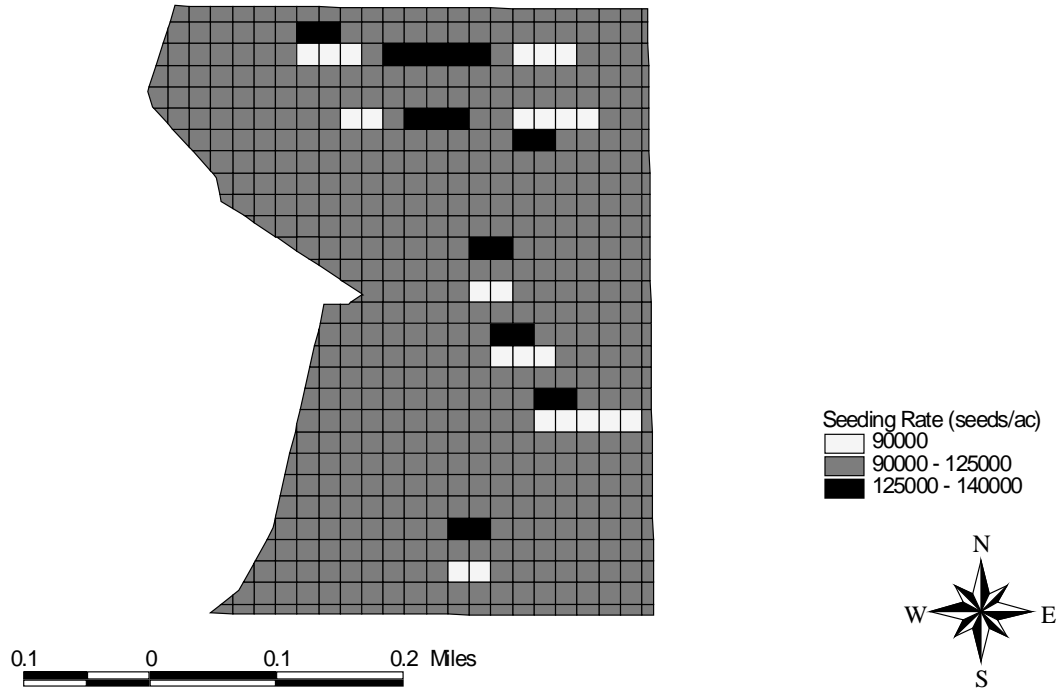

Figure 1. Variable rate soybean seeding map

Results

In 2011, dryland soybean yields were low across the state due to low rainfall and high temperatures. The yield map from the field is illustrated in Figure 2. No response was observed between the three different populations (Table 1). If we would have experienced a higher yielding year we could have separated seeding rates based on yield potential for different areas of the field.
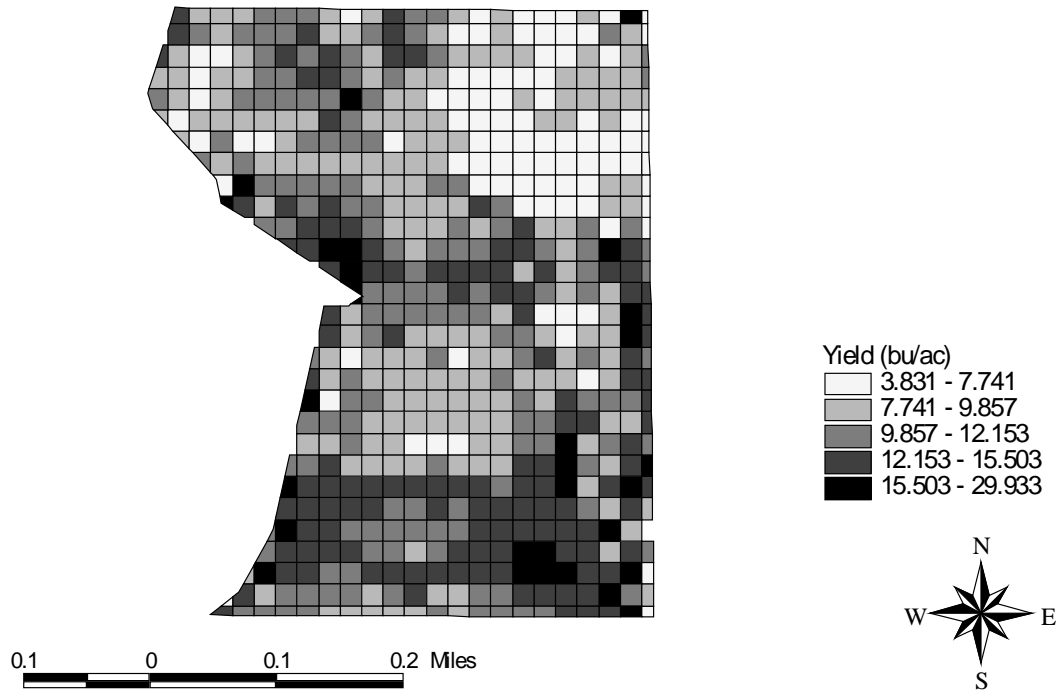
Figure 2. Soybean yield in 2011.

Table 1. Soybean yield in population strips.

	Seeding Rate (seeds/ac)		
Strip	90,000	125,000	140,000
1	13.8	13.7	*
2		12.7	11.4
3	10.8	9.7	
4	13.0		8.9
5	11.6	10.4	13.0
6	14.7	9.4	
7		11.8	11.9
8		5.0	5.9
9	12.9	8.3	
10		7.1	9.1
11	7.7	7.2	

12	12.8	13.1	13.3
13		9.3	9.6
14	6.8	6.6	
15	12.9	8.3	
16	12.1	8.3	9.6
17		8.1	9.8
18		6.2	8.8
Avg.	11.7	9.1	10.1

*Blank cells indicate that cells were not
evaluated adjacent to the other two populations.

Summary:

Even with the poor yields observed in 2011, we still have observed the potential exists to vary the soybean seeding rate to minimize seed costs and potentially increase yield. We need to continue to evaluate the potential when we have a better production year. If nothing else, we demonstrated precision farming technologies are a valuable tool to conduct on-farm research.