Population Aggregate Report, Corn and Soybeans 2018

Introduction

Variable rate technologies have been developed as a means of intensifying management with the goal of increasing yield and reduce costs. The process for deriving value from variable rate seeding starts with good management zones. These can be based on soil type, yield history, topography, and electrical conductivity. Our goals for corn and soybean variable rate seeding are a little different. With corn we are looking to vary populations to match the yield potential across the field. With soybeans we are looking to vary populations across the field in an attempt to get a more uniform emerged population across the whole field. We do this by increasing population in "tougher" portions of the field and decreasing populations in portions of the field where we typically have more uniform and consistent emergence. While we are making these recommendations with more confidence, we find it important to test various seeding rates in a variety of soil and environmental conditions. The following study helps us test each year what optimum seeding rates should be in various environmental conditions, whether you are using VRS or a single rate across your fields.

Setup

Several corn and soybean population plots were implemented in 2018 to research the yield differences among various population ranges. Plots were arranged as blocks, and yield was collected with calibrated yield monitors. Ten corn sites with three population ranges were analyzed with 11 blocks total. Twelve soybean sites contained a total of 19 blocks. Results were analyzed using a randomized complete block analysis of variance with each field site considered a separate replication. Mean separation was performed with Tukey's HSD.

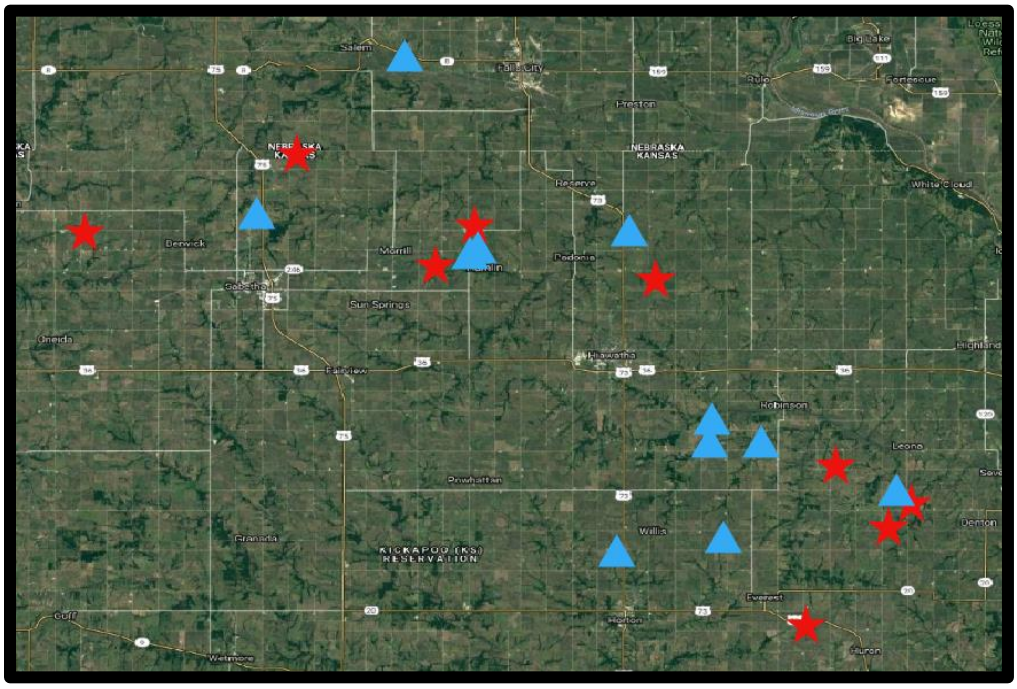

Figure 1: Blue Triangles are soybean population studies, Red stars are corn population studies

Soybean

Population (k seeds/ac)	Yield * (bu/ac)	Marginal Net Return** ($/ac)
100-140	65.3 A	480.62 A
140-160	63.9 AB	455.77 B
170-200	63.0 B	435.82 C
P-Value	0.0199	0.00

Table 1:

** Marginal net return based on $8.20/bu soybeans, and $60.00/unit of 140,000 seeds treated with base treatment.

*Values with the same letter are not significantly different at a 95% confidence level.

Yield

Results from the soybean blocks are shown in Table 1. Results indicate that planted populations of 100,000-140,000 seeds were the highest yielding population averaging 65.3 bushels per acre across all sites. The middle population range, 140,000-160,000 yielded significantly less at 63.9 bushels per acre. Finally, the highest population range, 170,000-200,000 yielded 63.0 bushels per acre. This results in a 1.4 bushel advantage of the lowest population range over the middle population range, and a 2.3 bushel advantage over the highest population range.

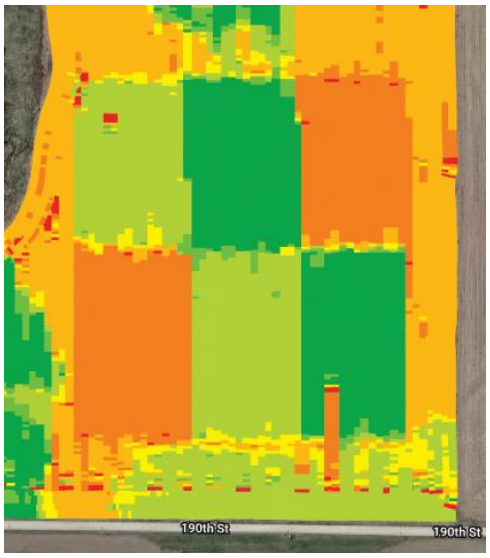

Figure 2: As applied population blocks

Marginal Net Return

Marginal Net Return was calculated based on a market price of $8.20/bushel of soybeans and a purchase price of $60.00/unit of 140,000 seeds. When taking the purchase price into account in addition to the marketable yield, the marginal net return calculates out to $24.85/acre more for the lowest

population range than the middle range, and $44.80/acre more than the highest population range. This would come to between an additional $4,000-7,000 saved on a quarter section of land.

Corn

Population (seeds/ac)	Yield (bu/ac)	Marginal Net Return** ($/ac)
26-29	167.05 B	504.93 AB
30-34	173.62 A	515.88 A
35-42	170.46 AB	491.37 B
P-Value	0.1462	0.1407

Table 2:

** Marginal net return based on $3.50/bu soybeans, and $230/unit of 80,000 seeds.

*Values with the same letter are not significantly different at an 85% confidence level.

Yield

Results from the corn blocks are shown in Table 2. Results indicate that planted populations of 30,000-34,000 seeds were the highest yielding population averaging 173.62 bushels per acre across all sites. The lowest population range, 26,000-29,000 yielded significantly less at 167.05 bushels per acre. Finally, the highest population range, 35,000-42,000 yielded similarly to the other two ranges at 170.46 bushels per acre. This results in a 3.16 bushel advantage of the middle population range over the highest population range, and a 6.57 bushel advantage over the lowest population range.

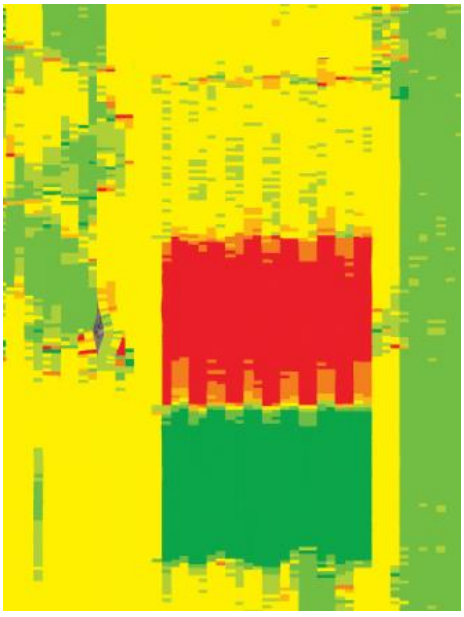

Figure 3: As planted population block example

Marginal Net Return

Marginal Net Return was calculated based on a market price of $3.50/bushel of corn and a purchase price of $320/unit of 80,000 seeds. When taking the purchase price into account in addition to the marketable yield, the marginal net is statistically similar for the middle and lower population ranges, but $24.51/acre more than the highest population range. This would come to between an additional $4,000 saved on a quarter section of land by planting in the 30,000-34,000 seed per acre range.

Summary

In 2018, the idea soybean population was between 100-140k. This was also the highest marginal net return, with a value of $491.16. The ideal corn population was 30-34k. Populations of 30-34k and 26-29k had similar marginal net returns around $505-515. These population summaries can be used as a guideline for planning you fixed rate application or as a baseline from which to vary your variable rate applications.

PEDERSON
Seed & Services

RHS 2/20/19