

# EFFECT OF STAND DENSITY AND ROW SPACING ON YIELD IN SE MISSOURI

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Year 3 of 3 year project

## **Justification:**

Interest in understanding the relationship between stand density and soybean yield has increased over the past several years. Most soybean varieties have been patented, and saving back soybean grain for planting is illegal for these patented varieties.

Biotechnology license fees are incorporated into seed costs so the average price of soybean seed has increased since the mid 1990s. One reason given by some farmers for planting extra seed is improved weed control. They believe that sparse stands from reduced seeding rates might encourage weed growth.

Data from this experiment might be used to help farmers set soybean seeding rates. But, the most likely use for these data is to help crop management advisers make appropriate replant recommendations if problems arise during germination, emergence and/or stand establishment.

## **Method:**

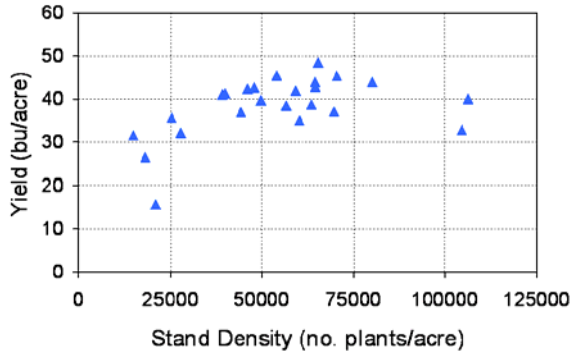
Prior to planting, the plot area was treated with a tank mix of Roundup WeatherMax, Dual II Magnum, FirstRate, and Authority. Pioneer brand 94M70 was planted on 1 May. Each of three row spacings was planted with a different planter. The planter for the 30-inch row spacing was a 4-row planter equipped with double disk openers. We used two planters to plant plots for the 15-inch row spacing. First, two outside (border) rows were planted with a planter with movable row units set 79 inches apart. This was the closest we could move the units. Then, a specially designed planter equipped with John Deere row units was used to plant the center four rows. The distance from the outside rows of this planter to the border rows planted with the first planter was 17 inches. An Almaco heavy duty drill was used to plant the 7.5-inch row spacing. The drill planted eight rows, so each plot consisted of two passes with the drill. Six seeding rates (40000, 75000, 110000, 145000, 180000 and 215000 seeds/acre) were used to produce a variety of stand densities. All plots were planted without tillage. Irrigation was supplied with an overhead lateral system.

At approximately V2 stage of development, stand densities were calculated from stand counts made for each plot. For the 30-inch row spacing, plants were counted for 10 feet in each of the two center rows. For the 15-inch row spacing, 10 feet in each of the center four rows were used. Plants were counted in three 10-square foot areas randomly selected within plots of the 7.5-inch row spacing.

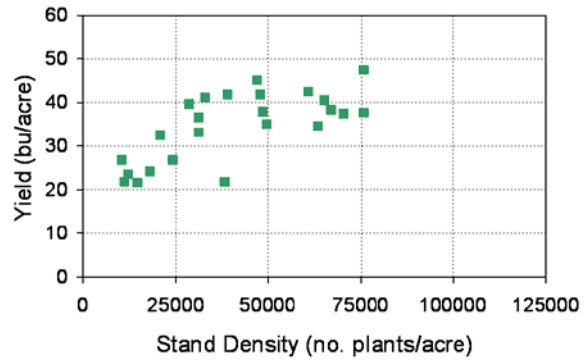
All plots were end-trimmed just prior to harvest. Harvest was conducted using a small plot combine. The numbers of rows harvested were two, four, and eight for the 30-inch, 15-inch, and 7.5-inch row spacings. Yields were corrected to grain moisture of 13%. Yield data were analyzed according a split-split plot arrangement. Whole plots were the three row spacings. Split plots were the six seeding rates.

**Results:**

Figure 1 presents individual plot data for the 30-inch row spacing. Plant density had a large effect on yield within sparse stands up to approximately 50,000 plants/acre. Yield did not change as plant density increased to over 100,000 plants/acre. Figures 2 and 3 present the same type of data for the 15- and 7.5-inch row spacings. Emergence was less in plots planted with our 15-row planter, but the reason for this difference is unknown. In general, most of the yield potential was captured by stand densities that were quite sparse, perhaps 50,000 plants/acre.

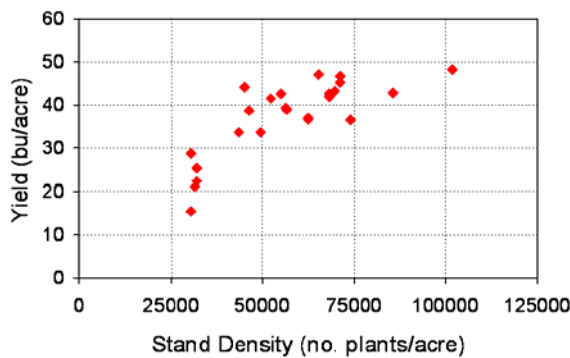


**Figure 1.** Effect of stand density on soybean yield for the 30-inch row spacing. Points on graph represent individual plots.

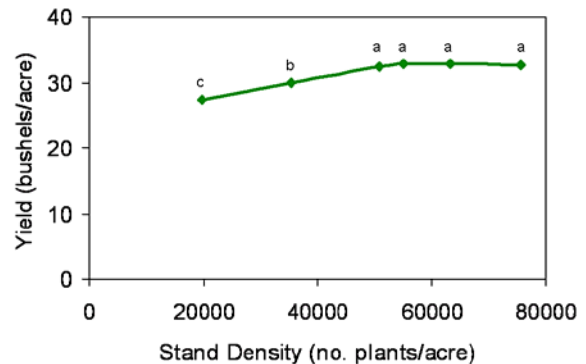


**Figure 2.** Effect of stand density on soybean yield for the 15-inch row spacing. Points on graph represent individual plots.

There was no interaction between row spacing and seeding rate for yield so data were combined over the three row spacings and presented in Figure 4. Yield increased in an almost linear manner as stand densities increased from 19,000 to 50,000 plants/acre. However, no additional yield increase was found at higher stand densities. Data from Portageville are very much similar to data collected in central Missouri.

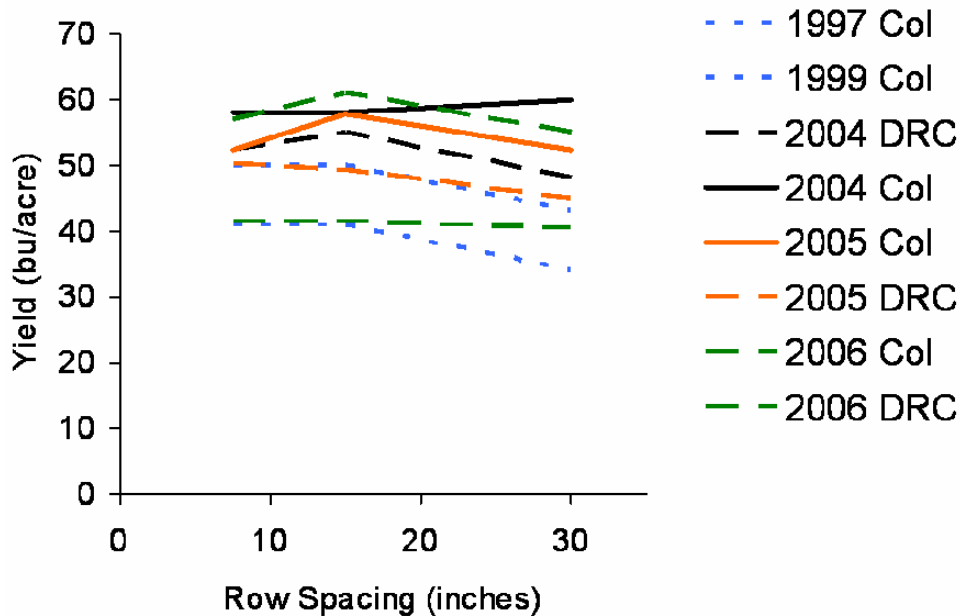


**Figure 3.** Effect of stand density on soybean yield for the 7.5-inch row spacing. Points on graph represent individual plots.



**Figure 4.** Effects of stand density on soybean yield. Points represent the average stand density and yield for four replications and three row spacings. Letters compare values.

In five of eight experiments, row spacing affected soybean yield (figure 5). In general, yield for 7.5-inch and 15-inch row spacings do not differ, but both these row spacings yielded more than 30-inch row spacing. In 2006, row spacing did not affect yield in Portageville. Irrigation may have been stopped too early to maximize yield and the effect of row spacing.



**Figure 5.** Effects of row spacing on soybean yield for eight experiments conducted at Columbia (Col) and Portageville (DRC). Experiments vary for other treatments including varieties.

### Conclusions:

1. Soybean yield response to stand density is similar regardless of row spacing.
2. Soybean yield does not increase or increases only slightly at stand densities greater than 50,000 plant/acre.
3. In most instances, but not in every instance, farmers would increase soybean yield potential from planting in rows 15 inches wide or narrower.