Soybean Yield Response to Planting Populations in Delaware

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Introduction and Objectives

Many agronomic practices and standards need periodic evaluation. Soybean population studies are being evaluated across the United States and observing that lower populations do not necessarily result in lower yield. While Delaware results may be like those of other regions, our climate and soil types will still have an interaction with plant population. This study will observe yield results from 5 different planting populations between 60-180,000 seeds per acre.

Methods

Soybeans were planted at the UD Warrington Irrigation Research farm in May 2021. There were 5 planting populations between 60-180k seeds per acre separated by 30k between each treatment (60, 90, 120, 150, 180k). For each treatment there will be 5 replications, planted on 15-inch rows in plots 10 feet wide and 100 feet long. An additional set of treatments were planted in 30-inch rows (Figure 1).

Figure 1: Soybean populations at Warrington.

Plots were harvested in November 2021 with a plot combine. There was a clog found in the lead to the weighing bucket that reduces the reliability of yields obtained in this study. The results were analyzed statistically as a randomized complete block design with two factors (population*row-spacing) with means separation by Fisher's LDS (alpha = 0.1).

Results and Discussion

Due to an error with the weigh bucket in the plot combine, yields were unusually low for this study. There was a two-inch rainfall that saturated soils immediately after planting which did cause some later emergence and slower growth at the site, but the clog in the plot combine is the most likely source of the very low yields.

By population, yields ranged from 14.8 to 21.3 bu/acre, but no significant differences between planting populations (Figure 2). The highest absolute yields were in the 90k (21.3 bu/acre) and 120k plots (21.1 bu/acre). There were also no significant differences by either the 15-inch (19.3 bu/acre) or 30-inch (17.3 bu/acre) when averaged by population (Figure 2).

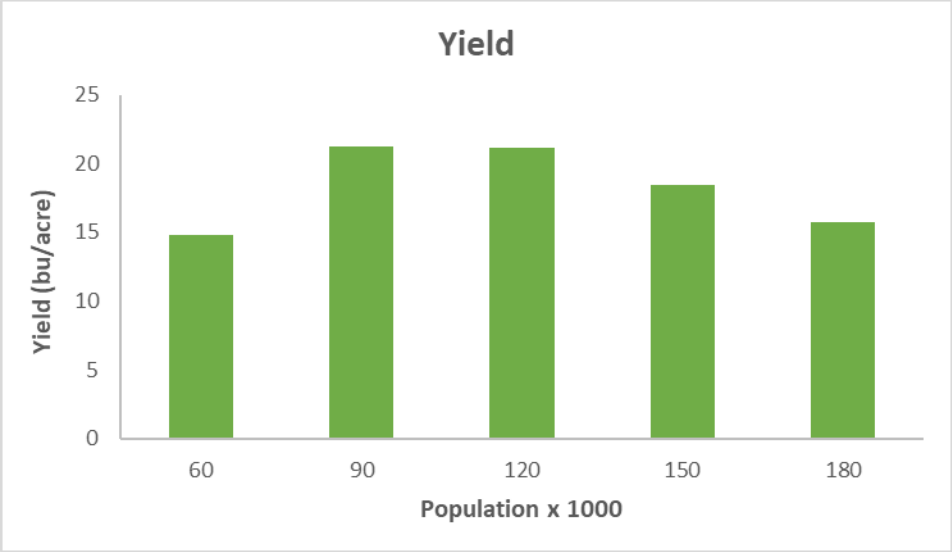

Figure 2: Soybean yields by planting population, averaged across row spacings.

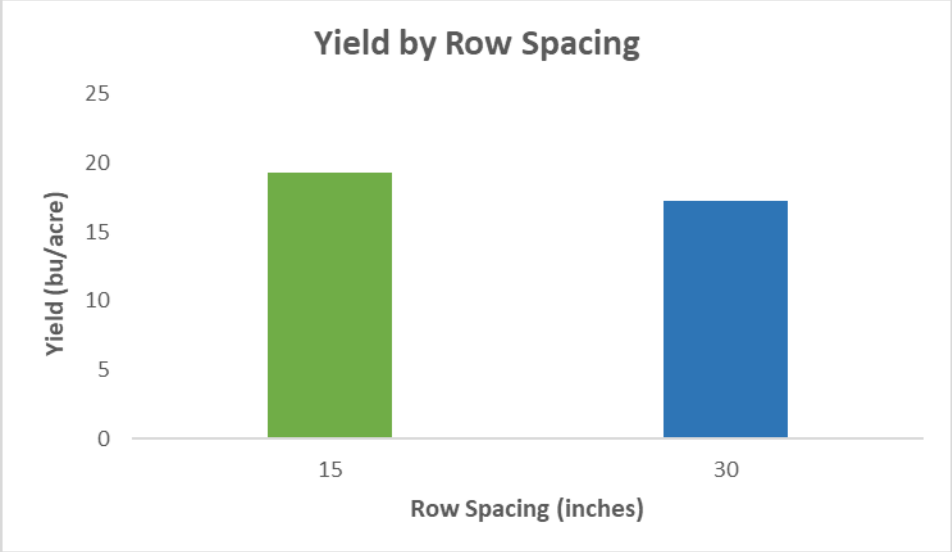

Figure 3: Soybean yields by planting population, averaged across row spacings.

When the interaction between row-spacing and planting population are evaluated, there was also

no statistical differences. However, the absolute highest yield was for 15-inch rows planted at 120k/acre (23.8 bu/acre), dropping off as rates went up or down from that planting rate (Figure 4). A similar pattern can be seen for 30-inch rows in Figure 4, where yields are highest at 90k seeds/acre (20.2 bu/acre) and dropped off as planting rates increased. These results are similar to a report from 2018 at Warrington, where irrigated plots had higher yields between 80-120k seeds/acre. However, in this case, the error with the plot combine may have reduced differences and convoluted any results, as well as lowering overall yields.

Across all of the populations except 180k seeds/acre, 15-inch rows had slightly higher (but not statistically significant) yields. Past results have shown that 15-inch rows yield better in Delaware than 30-inch.

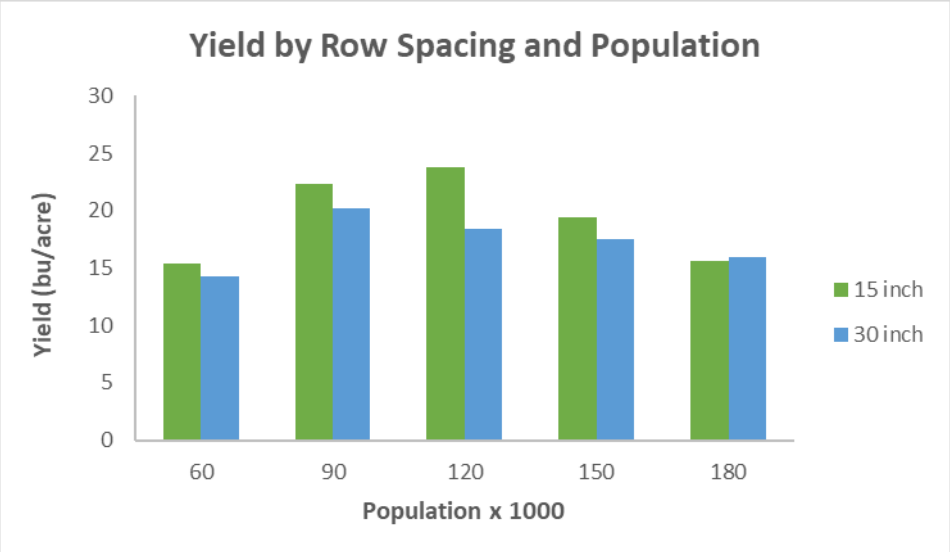

Figure 4: Interaction between row spacing and planting populations for soybean yields at Warrington.

Conclusions

Data from this project is erroneous due to a plot combine error. However, overall patterns at both 15 and 30-inch rows indicate that planting rates of 90-120 k seeds/acre may be sufficient for full-season beans. Past research has shown increased yield with 15-inch rows, and the same absolute values were observed here at every planting population besides 180k. This project will be repeated in 2022 to provide more consistent results and recommendations.