# On-Farm Demonstration Trial: Crop Production Studies Soybean Population Trials

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## Objective

Determine the effects of soybean populations on yields to define best management practices.

## Introduction

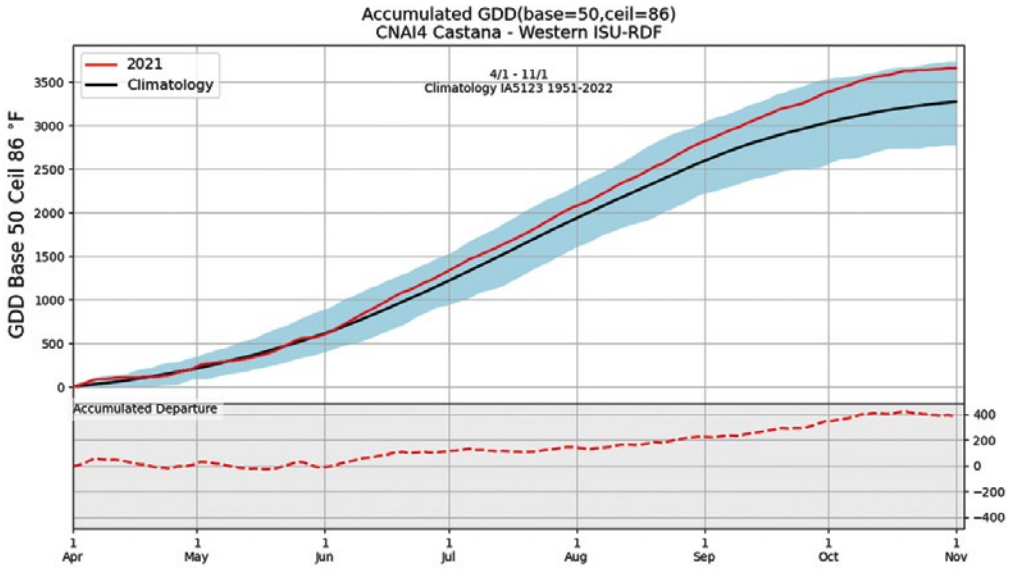
Soybean planting is one of the most critical operations of the season. Past studies have indicated soybean yields are similar across a wide range of populations, but too low of a population can result in reduced yields and too high of a population can reduce profits. Soybean tends to thrive in the space provided, and does not have as many spatial needs as corn. The objective of these trials was to investigate the effect of various plant populations and various planting dates on soybean yield.

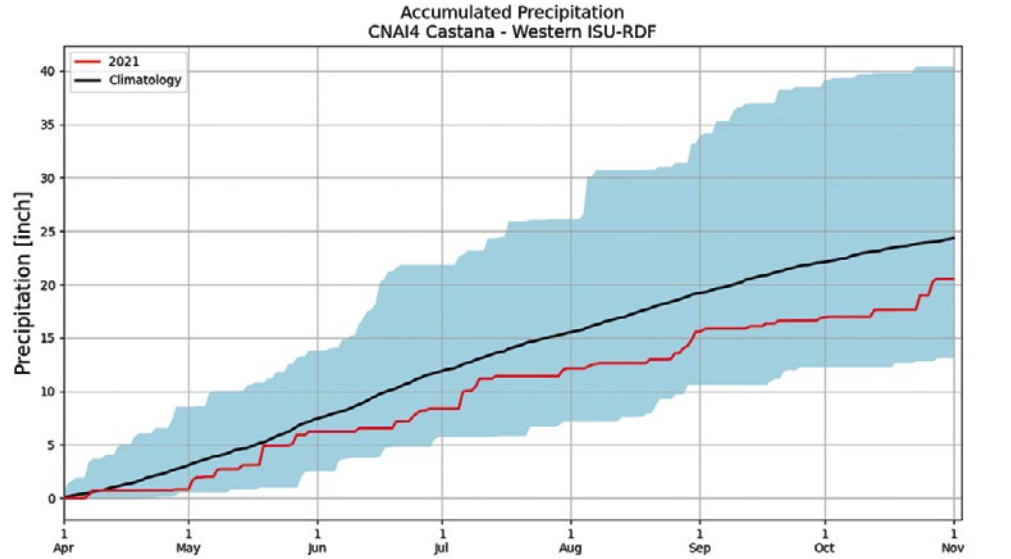
## Materials and Methods

**Crop Year–2021**

| Trial | 210302 | 210303 | 210304 | 210007 | 210507 | 210508 |
|---|---|---|---|---|---|---|
| Trial County | Monona | Monona | Monona | Lucas | Boone | Boone |
| Soil Type | Monona, Ida Silt Loam | Monona, Ida Silt Loam | Monona, Ida Silt Loam | Haig, Grundy | Webster, Clarion | Webster, Clarion |
| Previous Crop | Corn | Corn | Corn | Corn | Corn | Corn |
| Tillage | 1 pass disk – 1 pass Vertical till | No-Till | No-Till | Fall disk Spring Cultivate | Conventional | Conventional |
| Current Crop | Soybean | Soybean | Soybean | Soybean | Soybean | Soybean |
| Hybrid– Number | TP28E8 | TP25E8 | TP25E8 | 31A22X | P26T23E | 2393 E3 |
| Hybrid–Company | Titan Pro | Titan Pro | Titan Pro | Pioneer Corteva | Pioneer Corteva | Miller |
| Row Spacing | 30 in. | 30 in. | 30 in. | 30 in. | 30 in. | 30 in. |
| Seeding Rate | 70,000/ac 90,000/ac 110,000/ac 140,000/ac | 80,000/ac 100,000/ac 120,000/ac | 80,000/ac 100,000/ac 120,000/ac | 40,000/ac 80,000/ac 120,000/ac | 40,000/ac 80,000/ac 120,000/ac | 80,000/ac 120,000/ac |
| Planting Date | 5/16/2021 | 5/10/2021 | 5/13/2021 | 4/21/2021 | 5/14/2021 | 5/14/2021 |
| Harvest Date | 10/8/2021 | 10/10/2021 | 10/13/2021 | 10/18/2021 | 10/8/2021 | 10/8/2021 |
| Experimental Type | On-Farm Demo | On-Farm Demo | On-Farm Demo | On-Farm Demo | On-Farm Demo | On-Farm Demo |
| Replications | 4 | 3 | 3 | 3 | 4 | 4 |

## Location Climate Analysis




## Results

| Trial Number | Treatment | Yield (bu/ac)[a] | P-value[b] | Return on Treatment[c] |
|---|---|---|---|---|
| 210302 | 70,000 | 72.9 bc | <0.01 | $762.72/ac |
| | 90,000 | 71.7 c | | $742.73/ac |
| | 110,000 | 77.2 a | | $795.09/ac |
| | 140,000 | 75.0 ab | | $760.80/ac |
| 210303 | 80,000 | 65.0 b | <0.01 | $673.88/ac |
| | 100,000 | 67.0 ab | | $688.44/ac |
| | 120,000 | 70.6 a | | $720.31/ac |
| 210304 | 80,000 | 64.5 a | 0.75 | $668.48/ac |
| | 100,000 | 67.0 a | | $688.44/ac |
| | 120,000 | 65.2 a | | $661.99/ac |
| 210007 | 80,000 | 71.0 b | 0.10 | $738.68/ac |
| | 110,000 | 73.1 ab | | $750.81/ac |
| | 140,000 | 78.0 a | | $793.20/ac |
| | 170,000 | 76.0 ab | | $761.05/ac |
| 210507 | 40,000 | 56.6 a | 0.17 | $597.22/ac |
| | 80,000 | 60.5 a | | $625.28/ac |
| | 120,000 | 61.9 a | | $626.35/ac |
| 210508 | 80,000 | 53.3 a | 0.23 | $547.52/ac |
| | 120,000 | 55.7 a | | $559.39/ac |

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.10. [b]P-value = the calculated probability that the difference in yields can be attributed to the treatments and no other factors. For example, if a trial has a P-value of 0.10, there is 90% confidence the yield differences are in response to treatments. This is consistent for demonstration trials. [c]Return on Treatment based on Seed prices at $49.20 per 140,000 seeds. Cost from ISU Ag Decision maker cost of production 2021. $10.80 soybean commodity prices. ((Yield x Price)-Costs). Commodity price is the 2020 national average cash price for soybean.

## Key Takeaways

- Three trials displayed a significant difference in yields based on planted populations.
- Return on treatment calculations are variable per experiment with different populations being more profitable.
- There is no plant population that will consistently be the best yielding for soybean, as there are many other variables.

NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location. stem diameters, with compost treatment showing higher value.