Increasing soybean yields

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There is a large push to increase soybean yields. Numerous products and ideas claim to increase yield. Which ones work? We will highlight the key factors that increase yields and profits.

Soybean yield begins with sound fundamentals. The best athletes have extreme raw talent, but they must master the fundamentals in order to maximize their effectiveness on the field or the court. The same goes for soybeans. Having excellent soils and a favorable climate are helpful, but the fundamentals must be in place to get the highest yields.

1. A high yield soybean system requires:
2. Productive soils (deep, adequate fertility, no compaction)
3. Adequate, timely rainfall (or irrigation)
4. Using good genetics (includes appropriate disease tolerance packages)
5. Rotating crops
6. Planting on time (maybe early in Iowa)
7. Planting in narrow rows (20 inches or less)
8. Capturing 95% sunlight at by about first flower (R1 growth stage)
9. Getting excellent weed control (no trophy-hunting)
10. Scouting for diseases and pests

If these nine factors are working together, then excellent yields should be obtained. Once all nine of these factors are working together, is there something else we can do to increase yield? A team of researchers set out to answer those questions. We received funding from the United Soybean Board and tested various management and inputs to identify which ones increased yields. The results from our first effort are highlighted in the Extreme Bean app from the Corn and Soybean Digest.

Extreme Soybean 1.0

That first effort occurred 2009, 2010 and 2011. All fields were brought up to the university guidelines for soil fertility. Under those conditions, we examined

- a seed treatment (Trilex 6000 in 2009 and Cruiser Maxx in 2010 and 2011);
- inoculant (Vault LV);
- additional soil-applied fertilizer (phosphorus, potassium, sulfur, boron, manganese, and zinc applied at 70 bushel removal rate and above any university guidelines);
- foliar fertilizer (Task Force 2); and
- foliar fungicide (Headline applied at beginning pod or R3 growth stage).

The combination of all of these treatments together was labeled the “High Input” and compared to the “Control” which was the university guidelines. The High Input and Control were compared in wide (30-inch) rows and narrow (20- or 15-inch) rows. The target stand was 100,000 plants per acre. Each input was removed from the High Input treatment to see if yields dropped. Other treatments consisted of only the Early Season inputs (seed treatment, inoculant, and soil-applied fertilizer) and the Late Season inputs (foliar fertilizer and foliar fungicide).

The first place to increase yields was by going to narrow row widths (less than 20 inches) (Figure 1). The High Input system increased yields compared to the control (Figure 2). The foliar fungicide appears to have contributed to increased yields. The High Input system resulted in a lower net return than the Control (Figure 3). So the High Input system increased yields, but we could not pay for the extra inputs. The Late Season system resulted in a net return similar to the Control.

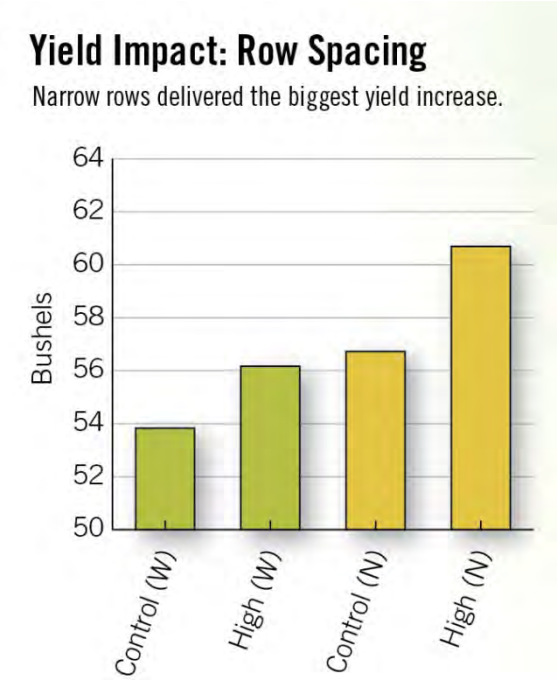

Figure 1. Row width effect on soybean yields. "Control" refers to soybeans grown according to university guidelines. "High" refers to several inputs be added in addition to the university guidelines. "W" refers to wide rows (30 inches) and "N" refers to narrow rows (20 or 15 inches). The yields are averaged over five states (Minnesota, Iowa, Michigan, Kentucky and Arkansas) and three years. Figure design was completed by Corn & Soybean Digest.

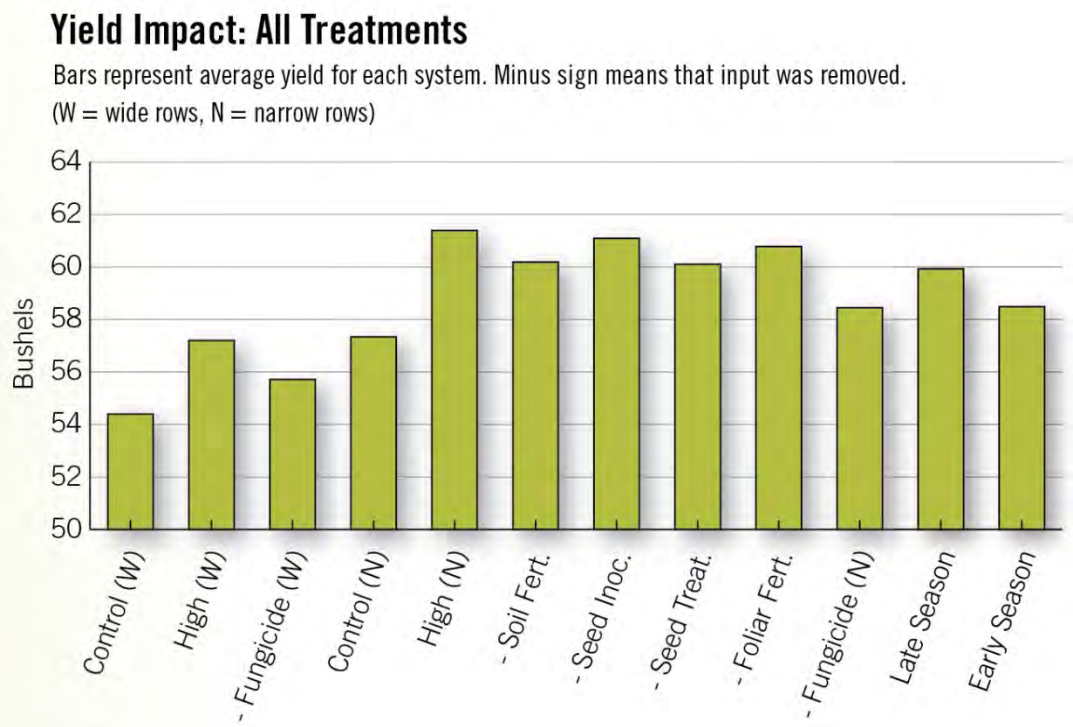

Figure 2. High Input effect on soybean yields averaged over five states (Minnesota, Iowa, Michigan, Kentucky and Arkansas) and three years. Graphics were completed by Corn & Soybean Digest.

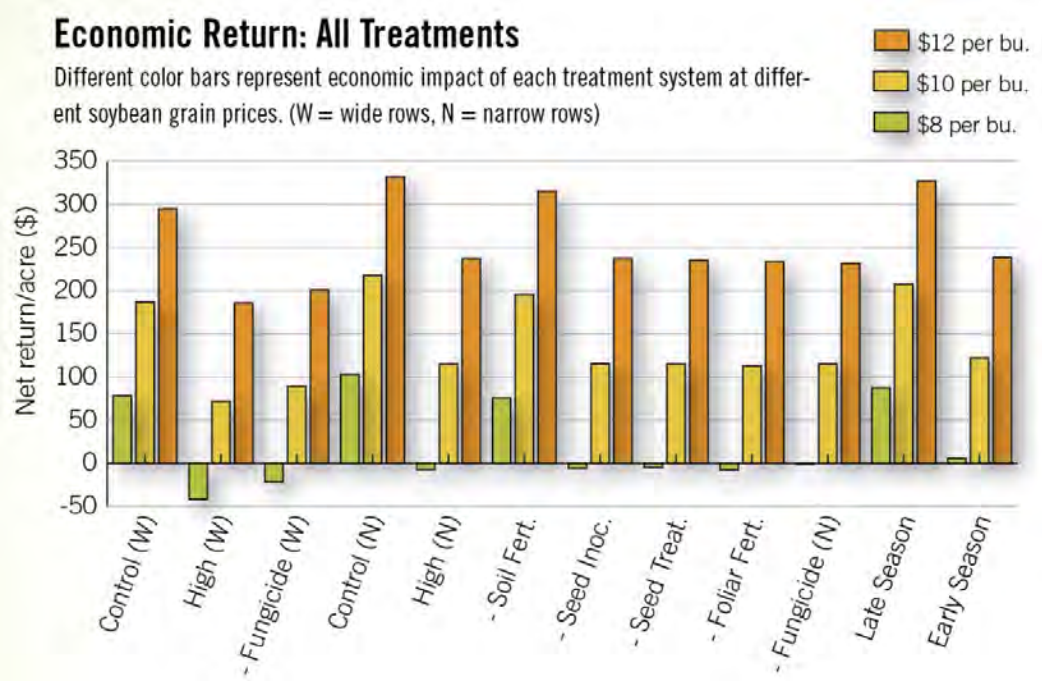

Figure 3. Economic return of the various input treatments for soybeans valued at $8, $10 and $12 per bushel. Calculations are based on yields over five states (Minnesota, Iowa, Michigan, Kentucky and Arkansas) and three years. Graphics were completed by Corn & Soybean Digest.

Extreme Soybean 2.0

The second phase of the high input system involves nine states. The treatment list has been modified to include three different levels of seed treatments, nitrogen fertilizer, Cobra herbicide, foliar fertilizer, Bio-Forge (antioxidant), foliar fungicide and foliar insecticide. The first year for these treatments was in 2012, one of the hottest and driest summers in the last 30 to 80 years.

Under those conditions, which did not favor higher yields, the foliar insecticide and Bio-Forge appeared to increase yields. At the time of press, the 2013 harvest was delayed and ongoing. A glimpse of some of those yields may be included at the time of the presentation.

Conclusions

Applying a lot of inputs on soybeans will increase yields, as long as the fundamentals are in place. However, adding all of the inputs together does not pay for the extra costs. We need to understand when, where and how inputs increase yield and target those situations rather than making blanket applications. Some of those situations will be discussed during the sessions.

Acknowledgements

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