

High Yield Soybean Production — What's New?

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Soybean varieties have a maximum yield potential that is genetically determined. This genetic yield potential is obtained only when environmental conditions are perfect – such conditions rarely exist. The theoretical yield potential for soybeans varies considerably according to environments. In a field situation, environmental conditions provide the major portion of the environmental influence on soybean growth, development, and yield. The goal of every management decision should be to improve plant conditions during specific growth periods and thus minimize stresses that will influence crop growth and development during critical phases of yield formation. To achieve high yields, it takes a combination of management decisions and genetic potential. If we do not manage our soybeans correctly, we are simply not going to be able to unlock all the yield potential of the new varieties. Recently, this has been documented by Kip Culler from Missouri when he achieved 155 bushels per acre by micromanaging his field. This happened despite the scientific community having generally concluded that the theoretical yield potential of soybean in the absence of drought stress was approximately 110 to 120 bushels per acre.

Producers can use management to alter the effect of interactive stresses. In the Midwestern United States, water stress (deficient or excessive moisture) is often viewed as the biggest yield-limiting factor. However, other factors such as weeds, diseases, and insects also cause significant yield loss. However, it is often difficult to understand these complex interactions, and to determine how much each factor may affect soybean yield because of the magnitude of compensatory growth and alterations in plant development.

Since 2003 a large research project has been conducted in Iowa funded by the checkoff and the Iowa Soybean Association. The project has been set up to determine the maximum yield potential in Iowa at diverse locations with different soil types and different yield potentials, and to identify yield limiting factors. The project has shown that there are no magic bullets or “quick fixes” that can be applied throughout the growing season. Raising high yielding soybeans is a combination of optimizing all manageable variables and the agronomic decisions have to be done correctly from the beginning. Seven steps are needed to maximize your yield potential in Iowa no matter where you are located:

1. Variety selection is the key to high soybean yield and is one of the more important decisions farmers make every year. Today it makes a big difference what variety you

grow since we now deal with more stresses in our fields resulting from numerous years of the corn and soybean rotation. Use replicated data from multiple locations when selecting your varieties. If planting a new variety without any yield data, it is highly recommended that you take a cautious approach and only plant a small acreage to be sure that it really will give you a better yield.

2. Soybean cyst nematode needs to be managed. No yield drag exists today between SCN-resistant and SCN-susceptible varieties. As soon as SCN has been confirmed, a management plan needs to be implemented using SCN-resistant varieties and rotating with non-host crops such as corn. Soybean cyst nematode-resistant varieties can also help minimize the incidence and severity of many pathogens such as sudden death syndrome, brown stem rot, and Pythium damping-off.
3. Early planting is a must. Optimum time to plant soybeans in Iowa is April 25 for the southern two-thirds of the state, and May 1 for the northern third of the state if seedbeds are satisfactory. If bean leaf beetles and sudden death syndrome are common in your area they should be managed appropriately so they do not diminish the yield advantage of planting early.
4. Soybeans should be planted in rows with less than 30-inch row spacing to move the yield potential up to another level. Soybean rows need to close as quickly to improve the light interception since it is important to have a rapid crop growth rate starting at flowering.
5. Soybeans are sensitive to early season weed competition and weeds should be managed early so they do not intercept any light that should be used to build the canopy quickly. Use of a preemergence herbicide can help minimize the risk of early season weed competition.
6. Weekly scouting is a must to help minimize the impact of any in-season stresses that can rob “easy bushels.” By scouting, weekly population densities of particular insects can be monitored carefully so they can be managed at economic thresholds using integrated pest management strategies. Particularly bean leaf beetles and soybean aphids are insects that should be monitored frequently. Scouting can also be used to plan for next year’s crop since it is often much easier to see what the yield limiting factors are in the field during the growing season rather than just looking at the yield monitor.
7. Soil sampling should be done at least every other year to be sure that appropriate fertility levels are available to the crop. The best time to sample is in the fall and to collect soil samples at the same time to assess SCN population densities.

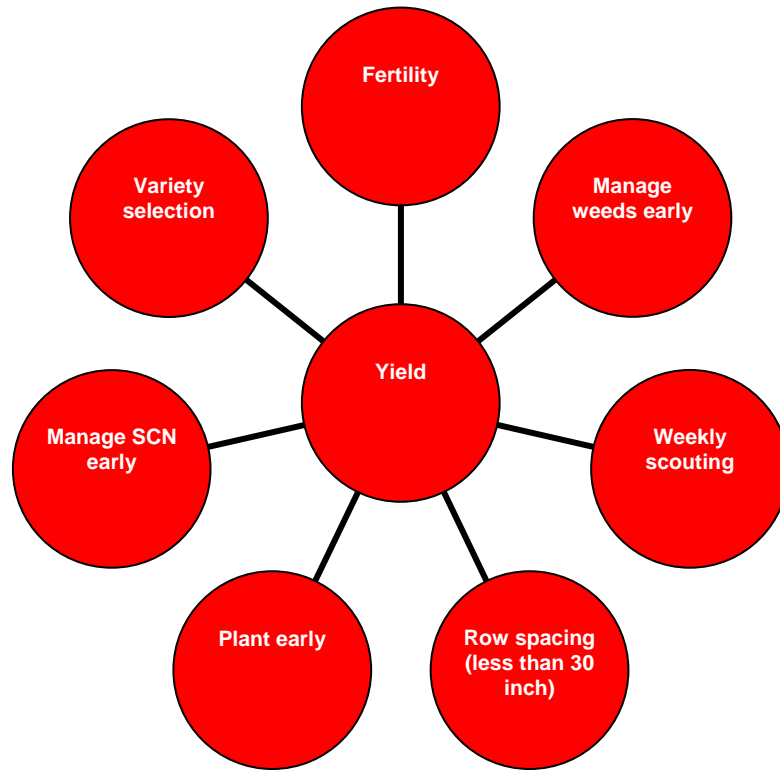


Figure 1. High yielding soybeans have nothing to do with a “silver bullet.” It is a combination of many agronomic and cultural variables that are manageable.

Because of high costs and high prices, we are now dealing with much more risk than ever before. Simply put, there is a lot to gain but there is also a lot to lose. Many things have changed and we should rethink our production strategies. It is now all about yield and controlling your input costs – very similar to the European system with high output production systems. This is simply because the high land prices restrict the growers to increase their operation. The challenge to increase productivity per acre is that we do not want to use any inputs that cannot guarantee an economic return. What we often have referred to in the U.S. as “insurances” should be reassessed simply because of the additional expense. Recently, the promotion of inputs that not have been commonly used in soybean production like seed treatments, inoculants, foliar fungicide, and foliar insecticide have been “pushed” for soybean to increase overall “plant health.” In this presentation, data from the 2008 growing season will be presented from Iowa on the complex interactions between weeds, diseases, and insects in soybean production systems planted using high yield practices.