Maximizing Yield Potential of Soybean

Selection of high-yielding soybean products may have the greatest effect on yield potential above all other management decisions. Proper and timely insect, nematode, disease, and weed management may improve yield potential. Planting considerations including earlier planting, higher plant populations, and narrower row spacing lead to quicker canopy closure, which may increase yield.

Product Selection

Because yield potential is primarily determined by genetics in soybean, products should be selected that perform well in yield trials over a wide geographical range and over several years. Besides increased yield potential, soybean products can be selected for maturity groups, standability, plant height, and disease, insect, and nematode resistance. Soybean products engineered with herbicide tolerance traits are also available. Consider the characteristics of the field, the planting history, and the history of disease and insect problems before selecting soybean products for the next season.

Insect and Disease Management

Soybean yield can be negatively affected by insect pests, fungi, bacteria, viruses, and nematodes. An integrated pest management (IPM) approach is the most economically sound way to protect yield potential while limiting input costs and environmental hazards. The IPM strategy utilizes host resistance with biological control, pest monitoring, chemical control when thresholds are reached, and good agronomic management practices to mitigate yield losses. Management decisions are usually made on a field by field basis and control tactics depend on the particular pests or diseases present.

Excessive foliage loss from insect feeding can affect soybean yield, especially when it occurs during the reproductive stages. Soybean plants can compensate for insect feeding damage by adjusting the number of pods, seeds per pod, and seed size. Foliage feeders are targeted with insecticides when insect populations are at or above the number required to cause defoliation levels listed for the developmental stage of the plants. Stem feeders are usually targeted from plant emergence to 10-inches in height when plant stand is being reduced below recommended plant populations.[1]

Some soybean pests, such as soybean cyst nematode, cannot be eradicated from a field once established. To help protect yield potential, nematode population densities can be controlled through soybean seed treatment, crop rotation, soybean resistance, and good agricultural practices.[2]

Weed Management

Soybean plants are relatively resilient in terms of weed competition; however, yield loss due to inadequate weed control can occur. For optimum weed control, weeds should be managed early and completely using Roundup Ready PLUS® Crop Management Solutions. Begin with a preemerge program, followed by a postemerge program that controls herbicide-resistant weeds. Proper application timing, rates, and use of herbicides with residual activity and multiple sites of action should be considered. For best results, eliminate weeds prior to planting and control new weeds when they are small. Scout and monitor fields throughout the season for weed escapes. Weeds should be controlled so they don't set seed prior to harvest and create future weed control problems in following seasons. Consider rotation to other crops in future seasons to allow for the use of different weed management and cultural practices. For more information about weed management solutions, visit www.roundupreadyPLUS.com.

Fertility

Soybean plants can obtain 50 to 75% of their nitrogen requirements from biological nitrogen fixation; therefore, it is important that the nitrogen fixing bacterium is present in the soil.[4] Seed inoculation can increase nitrogen fixation and may improve yield potential. When the supply of nitrogen from the soil and nitrogen fixing nodules is not adequate, benefits may be achieved from applying a nitrogen fertilizer.

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Soils tests are an important management tool for determining soil pH and fertility needs; however, soil tests cannot accurately predict the need for nitrogen fertilizer in soybean. Growers should consider these field conditions when determining the need for supplemental nitrogen:

- Crop is not uniformly dark green in color.
- Soil pH is lower than 5.5 and/or soil is light colored/eroded/ compacted.
- A soybean crop has not been grown in the field for several years.
- Active nodules are not seen on roots.
- Nitrogen deficiency symptoms are present.[5]

If additional nitrogen is needed, application is recommended closer to early pod fill, during the R5 to R8 growth stages, when nitrogen is in greatest demand by soybean plants.

Earlier Planting

Planting earlier may help increase yield potential because an earlier canopy closure can help maximize light interception during June and July. Early canopy closure can lead to an increase in the number of plant nodes, earlier flowering and a longer reproductive period, an increased crop growth rate during pod set leading to a greater seed filling rate, and earlier harvest. In addition, early canopy development can help in conservation of soil moisture, which is critical during reproductive periods. Researchers at the University of Wisconsin found that soybean yield decreased by 0.4 bu/acre per day when planting was delayed past the first week of May.[6]

When planting early, it is important to wait until good soil and seedbed conditions exist. Planting when soil is too wet can result in compaction and poor seed placement and stand establishment. Additionally, seeds that are planted when soils are too wet and temperatures are too cool may sit dormant and can become more vulnerable to diseases, insects, and animal predators. Planting soybean seed into wet soils is likely to negate any yield advantage from planting early.

Higher Plant Population

Higher plant populations can also lead to quicker canopy closure and improved yields; however, this outcome can vary by relative maturity (RM). Higher plant populations have some advantages including quicker canopy closure, greater light interception, and decreased weed competition. However, yield does not always increase as soybean plant population increases. To maximize yield potential, growers should have no less than 100,000 plants/acre in 7.5- and 15-inch rows and no less than 80,000 plants/acre in 30-inch rows.[8,10]

The goal is to have a uniform population of well podded, equally spaced plants at harvest (Figure 1). Seed treatments, such as Acceleron® Seed Applied Solutions should be considered to help.

Figure 1. Well podded and disease free soybean plants.

Row Configurations

Research has shown that narrow rows (less than 30-inches) yield greater than wide rows (30-inches or greater). Narrower rows also promote quicker canopy closure, which, in turn, improves light interception, weed control, and soil moisture retention. In Iowa, an average 4.5 bu/acre increase can be expected when using 15-inch row spacing, compared to 30-inch row spacing.[8]

Sources:

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