CROP FOCUS

Variable-Rate Seeding Considerations for Soybeans

Introduction

- Planter manufacturers now offer the ability to change seeding rates on-the-go as a standard or optional feature.
- This capability has been used successfully on millions of corn acres to increase yields, reduce costs and improve profits.
- Some growers are now interested in implementing variable-rate seeding (VRS) strategies for soybeans. However, soybeans may respond differently than corn to seeding rate changes.
- Soybean growers should therefore approach VRS circumspectly, having clear justifications for increasing or decreasing seeding rates in management zones within variable fields.

Soybean Stand and Yield Effects

- Lateral branching by soybeans can compensate for uniformly reduced stands; however, spotty stands still result in yield loss.
  - Thus, establishing healthy, uniform stands is important to maximize yield and profitability.
- Higher-than-normal seeding rates are needed to establish adequate, relatively uniform stands under challenging emergence conditions. Stand issues may be caused by:
  - poor seedbed conditions due to soils that are too rough, cloddy, dry, wet or cold, or fields with excess residue or other seed-soil contact issues.
  - adverse weather following planting, resulting in flooding, cold water imbibition, seed furrow closure problems, etc.
  - Disease infection and insect feeding.
- Varying seeding rates within variable fields may help overcome these challenges to uniform stand establishment.

Soybean plants showing symptoms of 'damping off' due to rhizoctonia root rot disease. Infection is most common in wet soils where germination is slow or emergence is delayed.

Other Objectives in Varying Seeding Rate

- Increasing soybean seeding rates can increase plant height and height of lowest pods, and therefore, yield.
  - This is important on droughty clay knobs and sand lenses in fields, as plants grow shorter under drought stress, resulting in fewer pods per plant and bottom pods too low for harvest.
- In calcareous (high pH) soils with iron deficiency chlorosis (IDC) occurrence, significantly higher populations in IDC “hot spots” may reduce symptoms, allowing young plants to survive the chlorotic death phase and preserve yield potential.
- If field areas vary in white mold pressure, lowering stands in white mold zones while maintaining higher stands in the rest of the field may help maximize whole-field yields.

Chlorosis and stunting symptoms of IDC are greatly reduced where population is higher at intersection of rows and end rows.

Planting no-till soybeans into heavy corn residue

Defining Management Zones

- The first step in implementing a VRS strategy is dividing the field into management zones – field areas possessing homogenous features for landscape and soil properties, etc.
- To be effective, each management zone should comprise an area of similar features that justify a common planting rate.
- In soybean VRS, basing management zones on soil properties or landscape position may be more useful than basing them on productivity or yield potential per se.
  - For example, low-lying field areas are often wetter and colder at planting, increasing the risk of compaction, crusting, seedling diseases, and consequently, reduced stands.
  - Another example is eroded clay knobs or sand lenses that tend to be droughty, resulting in reduced plant and pod height.
  - In addition, depressional field areas with poor drainage are a dominant feature in IDC occurrence (along with high calcium carbonate levels, high pH, and high salts.)
- Management zones may also be based on historical occurrence of stand issues, seedling disease infection, white mold incidence, IDC, etc., if these areas were previously mapped.

Soybean VRS Implementation Tips

- Compared to establishing a VRS strategy for corn production in the same field, a soybean prescription will likely be simpler, with fewer management zones identified, and fewer unique seeding rates used throughout the field.

- In field areas that require a higher rate due to soybean stand establishment challenges or plant and pod height issues, seeding rates should be at least 10% to 20% above the "normal" rate to provide a meaningful difference.

Soybean hypocotyl arch and cotyledons breaking through crusted soil at a Pioneer Agronomy Sciences research site in Crawfordsville, AR.

- In IDC-prone zones, seeding rates of 200,000–250,000 seeds/acre are recommended to reduce chlorosis symptoms.
- Establishing check blocks or strips at the "normal" rate within "adjusted" seeding rate zones, or at the "adjusted" rate within the "normal" zones, provides a basis for growers to evaluate the effectiveness of their VRS strategy.
  - In-season measurements of plant population (and where appropriate, plant and pod height) in adjacent "check" and "normal" strips may prove useful in understanding any yield differences documented at harvest.

Planter photos courtesy of Case IH and Deere and Co.

Author: Steve Butzen