CROP FOCUS

Soybean Stand Establishment and Seeding Rate Considerations

Introduction

- Establishing healthy, uniform stands is important to maximize soybean profitability, even though soybeans respond to reduced stands better than many other crops.
  - Increased lateral branching can compensate for lower stands that are still relatively uniform (such as stand shown at right), but only partially for gaps.

- Because there are many factors that affect soybean stand establishment, optimum seeding rates vary considerably by region, cropping practice and field.
  - Listing factors known to influence stands in each field, and adjusting seeding rates to account for potential stand losses is a practical way to make the best seeding rate decisions.
- Use of seed treatments improves stand establishment and uniformity by protecting seeds and emerging seedlings from biotic causes of stand loss including disease infection and insect feeding.
- Stand issues due to abiotic causes: crusting, residue interference, other seed-soil contact issues, cold water imbibition, hail, etc. are not remediated by seed treatments.
- This *Crop Focus* will discuss factors affecting soybean stand establishment and how to adjust seeding rates to compensate for common losses of stand.

Stands that emerge uniformly with no large gaps or skips have highest yield potential.

Seeding Rate Distribution

- Each year, DuPont Pioneer conducts a grower survey that documents soybean seeding rates used by customers on their soybean acres. 2014 results are shown below:

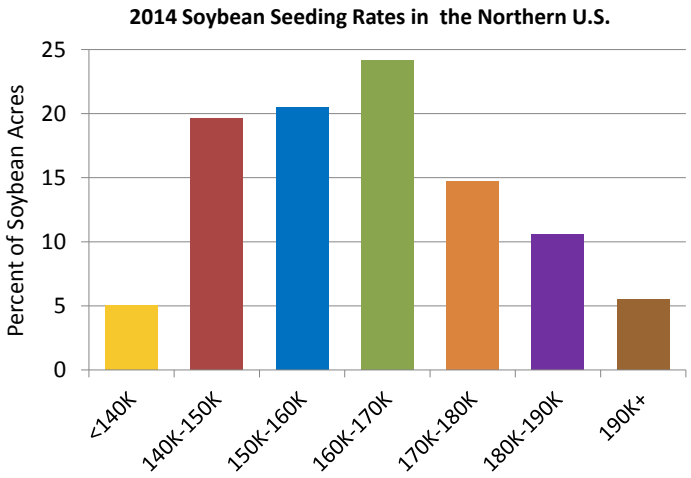

Figure 1. Seeding rate distribution by percent of soybean acres planted in the Northern U.S. Source: 2014 DuPont Pioneer brand concentration survey.

- Figure 1 shows that seeding rates in the Northern U.S. are variable, with almost 80% of acres seeded between 140,000 and 180,000 seeds/acre. Differences in soil type, soybean variety and maturity group, planting date, row width, (planter vs. drill), seedling disease risk, seed treatment combination, tillage/ residue cover, white mold risk and grower preferences lead to this diversity of rates within states or regions.

Factors Affecting Soybean Seeding Rate

The primary factors affecting soybean seeding rate in the Eastern U.S. are listed below. Agronomists suggest increasing seeding rates by 5% to 10% for factors that reduce stand.

- **Soil type.** Soils with high clay content are much more likely to crust and restrict soybean emergence, and also promote seedling diseases in wet springs.
- **Soybean variety / maturity group.** Some varieties respond more to higher soybean rates than others. In addition, studies have shown that early soybean varieties (e.g., MG 00, 0 and 1) require higher populations to optimize yield.
- **Planting date.** Early planting usually means colder, wetter soils, slower emergence, and reduced stands. Soybeans planted very late, including double-crop beans, require higher rates because they are destined to be shorter and produce fewer pods per plant.

Soybean stand reduced by a soil crust at emergence.

- **Planter or drill.** Planters have traditionally done a better job of seed singulation and placement, increasing plant counts and stand uniformity. Growers using drills may need higher seeding rates to establish equally productive stands.
- **Seedling disease risk.** Some regions have higher seedling disease risk due to soil types, weather patterns, and pathogen race shifts. Higher seeding rates are needed to establish target stands in areas or fields with a history of higher disease risk.
- **Seed treatment combination.** Research shows that some seed treatments improve soybean stands by using additional active ingredients that combat seedling diseases. Your Pioneer sales professional can help identify the best seed treatments for your field.
- **Tillage / residue cover.** No-till systems provide a less hospitable environment for soybean emergence due to colder soils, more residue, and possible seed placement / soil contact challenges.
- **White mold risk.** In fields with a historically high risk of white mould, very high seeding rates are not recommended.

Calculating Seeding Rate

- After deciding on a final stand target, the grower must account for non-germinating and non-emerging seeds to calculate his seeding rate, according to the following equation:

$$\text{Seeding rate} = \frac{\text{Targeted final stand}}{(\%\ \text{germination} \times \%\ \text{emergence})}$$

Example 1

- In order to reduce gaps, maximize profitability and minimize replant risk, a grower planting a maturity group 1.5 soybean variety in 15-inch rows in a well-tilled seedbed in mid May targets a final stand of 140,000 plants/acre.
  - The seed tag indicates that germination is 90%, and because he is planting under relatively good conditions, he estimates emergence at 95%. His seeding rate is calculated as:

140,000 / (.90 x.95) = 140,000 / 0.855 = **164,000 seeds/acre**

Example 2

- A grower drilling a maturity group 1.0 soybean variety in 7.5-inch rows in a no-till field in early May targets a final stand of 145,000 plants/acre.
  - Because he is planting early in a notill system, he anticipates cool soils and potential seedling disease challenges. Consequently, he estimates % emergence at 85%.
  - The seed tag shows that germination is 90%. Thus, his seeding rate calculation is:

145,000 / (.90 x.85) = 145,000 / 0.765 = **190,000**

Agronomic Advantages of Maintaining Moderate to High Seeding Rates

- Thicker seeding rates can enhance plant and pod height, which is especially important on sandy soils or with late-planted soybeans that tend to have shorter plants.
- Higher seeding rates can provide a buffer against the need to replant due to light to moderate stand reduction events such as hail.
- Higher seeding rates enable quicker canopy closure, which can be a benefit in drought and/or heat prone environments. High levels of heat reflected from the soil surface can reduce early vegetative growth.
- Quicker canopy closure due to higher seeding rates can also benefit in weed control strategies by providing shade to slow down or inhibit weed emergence and early growth.

Good seedbed conditions resulting in a uniformly emerging soybean crop positioned for highest yields.