Soybean Seeding Rates to Achieve Target Stands at Harvest
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Midwestern soybean population studies have demonstrated that yield is maximized with uniform, harvest stands near 100 thousand plants per acre regardless of row width. Traditional recommendations were to seed around 130, 160, and 200 thousand seeds per acre for 30-in, 15-in, and 7.5-in soybean rows, respectively. However, I like to start at 130 to 150 thousand seeds per acre regardless of row widths then increase or decrease based (1) seed quality, (2) planting equipment and (3) field conditions.

1. Seed Quality
   Seed purity is usually a given in commercially purchased seed, so the focus on quality will be centered on viability. A measure of viability is the standard warm germination test, which is the percent of the seed that germinates and develops into normal seedlings under “ideal conditions” (plenty of moisture and seven days at 77°F). If a seed lot was rated at 90% germination, the maximum plant population potential would be 117 to 135 thousand plants per acre when seeded at 130 to 150 thousand seeds per acre. Cool germination and accelerated aging tests can be performed as a better indicator of the seed response to planting in cooler soils.

2. Planting Equipment
   Ideal conditions begin with good seed-to-soil contact, which is a factor of the planting equipment and the field. Planting equipment varies in performance in seed placement vertically (seed depth) and horizontally (seed spacing down the row). Seed depth can be a story of too shallow (sometimes even on the soil surface), too deep, and just right depending on the equipment. In many cases, these three depths all occur with one piece of equipment across one field and thus, seeding rates should be increased ~10 to 20% from our base. A more uniform seed placement is better than clumps of seed here and there, especially as seeding rates are lowered. Nearly 70% of soybean acres in Indiana are no-till, and thus, setting the coulters, row cleaners, and any other equipment is critical to prevent “hairpinning” (placing soybeans in a slot that is lined with crop residue rather than soil) and to avoid increasing seed rates. Planters tend to have good seed placement; whereas, drills tend to be variable and will require an increase in seeding rates.

3. Field Conditions
   Previous crop residue and weed density play a role in seed-to-soil contact as previously mentioned. Soil temperatures are often a few degrees cooler in our fields of no-till than conventional tillage especially early in the planting season. Seeding rates are often higher in our early plantings due to the cool and wet soils, since soybean germination is slow and disease infection can be higher. Fungicide seed treatments are normally a good fit for planting in cool, wet soils (see a recent article from Cari Bradley for more information on fungicide seed treatments, http://ipm.illinois.edu/bulletin/article.php?id=1274).
Soils and fields of Indiana vary from sands to organic mucks, from prairie flats to clay knolls, from river bottoms to rolling hills, and some combinations even occur in the same field. Seeding rates to establish the same target plant stand could potentially be different based on these inherent factors. However, we currently do not have enough data to provide such recommendations. We are conducting on-farm seeding rate trials to fine tune recommendations across various planting conditions, regions, and soils. If you are interested in participating in the research, please visit the following Web site for more details http://www.agry.purdue.edu/ext/ofr/.

Plant populations of approximately 100 to 120 thousand plants per acre at harvest provide a savings in seed costs without sacrificing yield (Figure 1). Seeding rates to achieve this harvest stand vary depending on seed quality, planting equipment, and field conditions as well as other emergence factors. In a few cases, increasing the plant populations above 120 thousand plants per acre may slightly increase profitability provided the market price is high enough to absorb the increased seeding rate costs (see a recent article by Vince Davis for some economic seeding rate scenarios, http://ipm.illinois.edu/bulletin/article.php?id=1296).

![Graph showing yield potential for soybean plant stands at harvest](image)

Figure 1. Yield potential for soybean plant stands at harvest. Data from trials conducted from 2004 to 2006 using seeding rates from 55 to 275 thousand seeds per acre.