

MANAGING REDUCED-GERMINATION SOYBEAN SEED

- Soybean production fields have the same growing-season challenges as farmer fields.
- Seeding rates may need to be increased to establish a uniform final stand if standard germination percentages are reduced.
- Seed treatments, proper handling, and diligent planting practices can help establish desired plant stands.

Soybean seed production fields experience the same environmental challenges as commercial for-market soybean fields. Rain-delayed harvests can subject seeds to challenging environmental conditions that favor diseases that can affect seed appearance and germination.

Three diseases of major importance are Phomopsis seed decay (*Diaporthe longicolla*), pod and stem blight (*Diaporthe sojae*), and Cercospora blight or purple seed stain (*Cercospora kikuchii*). Seeds infected with the two *Diaporthe* diseases can be shriveled, cracked, may have a white mold growth, and can have a loss in germination percentage (Figure 1). Pod and stem blight-infected seed can also appear healthy. *Cercospora* infected seed has varying amounts of purpling (purple seed stain) and can have a loss in germination percentage (Figure 2).

The standard warm germination percentage for soybean seed is 90%. If the environment throughout seed production areas is conducive for these diseases, the potential exists for soybean seed to be sold with reduced germination percentages. Additional tests, that can differ by seed producers, can include accelerated aging which subjects seed to high heat and humidity for several days and cold germ which subjects seed to near germination temperatures for about a week. These tests can help determine how seeds may germinate under stressful environments.



Figure 1. *Diaporthe*-infected seed.



Figure 2. *Cercospora* blight (purple seed stain) infected seeds. Picture courtesy of Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org.

Management

Seed Treatments. If seeds are infected with these diseases, fungicide seed treatments should be considered to help maintain germination potential. Fungicide treated seed can also protect young seedlings from many seed- and soil-borne pathogens.

Handling. Soybean seed should always be treated with care regardless of germination percentage. However, if the indicated germination percentage on the seed unit is lower than expected, extra caution should be exercised.

Planting and Seeding Rates. Seed tags should be checked for germination percentage to determine which products should be planted first and at what seeding rates. Products with higher germination percentages should be planted first because of the potential for unfavorable early-season environmental conditions. Seeding rates may need to be increased for germination percentages lower than 90.

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University research has shown that final soybean stands of 100,000 plants/acre can maximize yield potential and profitability.^{1,2,3} In less productive fields or low producing areas within fields, the final stand may need to be around 135,000 plants/acre.^{1,2} It is highly unlikely that every emerged seedling becomes a mature harvestable plant; on average the survival rate is 85%.³ The survival rate is arbitrary and is a function of field and environmental conditions, planting depth, soil type, individual seed product, and planting date. If the bag tag indicates a germination percentage of 85%, an ultimate survival percentage might be lower.

To determine an estimated seeding rate, use the germination percentage on the tag and an expectation for survival. For example, if tag shows 85% and 80% is used as the expected survival rate, multiply the two percentages ($0.85 \times 0.80 = 0.68$). Divide the desired final stand (100,000 plants/acre) by the percentage factor (0.68): $100,000/0.68 =$ a seeding rate of 147,059 seeds/acre.

The equipment manufacturer's manual should be reviewed for calibration settings to deliver the desired seeding rate based on seed size. Under most conditions, seed size has no impact on germination, vigor, or yield potential; however, large seed may have better emergence when planted deeper than desired – large seed has a greater amount of stored energy.⁵ In general, soybean seed should be planted at a depth of 1 to 1.5 inches.

- Plant shallower if:⁵
 - Planting early
 - The amount of residue is high
 - Soil is fine textured
 - Soil is moist
- Plant deeper if:
 - Soil is coarse textured
 - Residue is low
 - Soil is dry

Seed supplies after a challenging production season may be limited; therefore, it is best to provide the best opportunity for crop establishment the first time – replanting may not be an option. Regardless, emergence should be evaluated and stand counts assessed (Figure 3). Soybean plants can compensate for missing plants by branching and setting more pods. However, long streaks and holes within the stand can reduce yield potential and increase the likelihood for weeds to become established.



Figure 3. Evaluate soybean emergence for acceptable stand.

Sources:

- ¹ Conley, S. and Smith, D. 2019. The soybean seeding rate conundrum. Cool Bean. University of Wisconsin Extension. University of Wisconsin. <https://coolbean.info/2019/04/19/the-soybean-seeding-rate-conundrum/>.
- ² Rees, J., Thompson, L., and Mueller, N. 2018. What on-farm research has taught us about soybean seeding rates. CROPWATCH. University of Nebraska-Lincoln. <https://cropwatch.unl.edu/2018/what-farm-research-has-taught-us-about-soybean-seeding-rates>.
- ³ DeBruin, J. and Pedersen, P. 2007. Soybean seeding rates: The balance between cost and yield. Integrated Crop Management. IC-498. Iowa State University. <https://crops.extension.iastate.edu/encyclopedia/soybean-seeding-rates-balance-between-cost-and-yield>.
- ⁴ Specht, J., Thompson, L., Rees, J., Grassini, P., Glewen, K., and Tenorio, F.A. 2016. Soybean seeding tips. CROPWATCH. University of Nebraska-Lincoln. <https://cropwatch.unl.edu/2016/soybean-seeding-rate-tips>.
- ⁵ Staton, M. 2016. Soybean planting depth matters. Michigan State University Extension. <https://www.canr.msu.edu/news/soybean-planting-depth-matters>.

Web sites verified 7/30/2020.

Legal Statement

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields. ©2020 Bayer Group. All rights reserved. 3002_S3