

## QUALITY AND APPEARANCE OF SOYBEAN SEED

Challenging growing conditions can affect soybean seed size and appearance. However, soybean seed appearance normally does not affect quality. Seed that looks almost perfect can have a poor germination percentage, while seed that appears flawed may be very high in quality. Farmers should focus on germination rate and the ability of seed to produce a healthy seedling as they select seed for the upcoming season.

### What are common soybean appearance issues?

Environmental and disease issues from the previous growing season, combined with a few storage challenges since harvest, can lead to poor appearance of some soybean seeds. However, poor appearance is not necessarily an indicator of poor seed quality. Conditions such as drought, aphids, bean leaf beetles, viruses and other pathogens, and a quick harvest dry-down may result in poor seed appearance. Low harvest moisture levels can increase the chances of mechanical damage from handling during conditioning and packaging. Rapid shutdown of soybean plants at harvest can create immature green seeds. Excess moisture in bins can contribute to surface mold on seed. However, the germination rate, not appearance, should be the focus as several of the conditions that cause poor seed appearance and surface mold do not affect germination or seedling vigor.

**Purple Seed Stain (Cercospora blight)** (Figure 1), also known by the names purple blotch, purple speck, purple spot or lavender spot, is caused by the fungus *Cercospora kikuchii*. In cases with mild seed infection, the seed coat may be shed before seedling infection can occur. In more severe cases, the pathogen can be transmitted from the seed coat to the seedling as the seed germinates, and infected seedlings may show a reduction in growth.<sup>1</sup> Fungicide seed treatments can help prevent transmission of *C. kikuchii* to the germinating seedling.

**Seed coat damage** (Figure 2) can occur during harvest and the handling process when seed is dry and humidity is extremely low. Chips, cracks, and broken seed result from mechanical damage. Handling equipment should be designed to handle seed gently to reduce mechanical damage. Conditioning equipment should remove most of the mechanically-damaged seed during the cleaning process.



*Figure 1. Purple seed stain is caused by the fungus *Cercospora kikuchii*. Effects on germination are usually slight unless infection of the seed is severe.*

Picture courtesy of Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org.



*Figure 2. Seed coat damage often takes place at harvest when seed is dry and humidity is extremely low. Chips, cracks and broken seed result from mechanical damage.*

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Seed coat development is influenced by genetic and environmental factors (Figure 3). Highly specialized cell layers within the soybean seed coat rapidly change as the seed develops.<sup>2</sup> Genetic expression also changes during seed development and can be influenced by environmental conditions.

**Green coloring** (Figure 4) can be found in areas where late-planted fields were hit by an early frost. The green tint occurs because the chlorophyll has not dissipated entirely. The coloring has no effect on quality if the seed is fully mature.<sup>3</sup>

**Bleeding hilum** also known as seed coat mottling, can be caused by specific genetic conditions, stresses during seed development, or by soybean mosaic virus infection. Bleeding hilum does not indicate that the virus is present in the seed. In most soybean seed products, transmission of the virus from seed to plant is less than 5%.<sup>4</sup>

## Seed Treatment

Fungicide seed treatment is recommended for seed that will be planted early in the growing season.<sup>5</sup> Fungicide seed treatments can help protect the seed and young seedlings from seedborne and soilborne pathogens, and seed treatments have been shown to increase warm germination scores by 10-15% when pathogens are present on the seed.<sup>7</sup> Seed treatments can also help protect seed and seedlings from labeled pests, and result in more uniform plant stands, and higher yield potential.

Wet, poorly drained soils, common during spring planting and crop emergence, favor the development of fungal and water-mold pathogens that cause soybean seedling diseases.<sup>6</sup> These diseases may slow germination and plant growth. Early-season insect pest feeding can damage soybean seeds and seedlings, which can cause adverse effects on plant growth.

## Planting Date

It is recommended that farmers plant the highest quality seed first and the poorest quality seed last. Avoid planting low quality seed into cold, wet soils, poor seed beds, or high residue conditions that may reduce seed-to-soil contact. Planting late-maturity varieties early can help maximize yield potential, while planting early-maturing varieties early can help spread out the harvest window.<sup>7</sup>



*Figure 3. Growth marks usually result when the seed coat does not close completely. The cause of this condition is not entirely understood but is believed to occur when the seed embryo develops faster than the seed coat.*



*Figure 4. Green coloring can be found in areas where late-planted fields are hit by an earlier than normal frost.*

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## Sources

<sup>1</sup> Giesler, L. J. Purple seed stain and Cercospora blight. University of Nebraska-Lincoln. <https://cropwatch.unl.edu/plantdisease/soybean/purple-seed-stain>.

<sup>2</sup> Ranathunges, K., Shao, S., Qutob, D., Gijzen, M., Peterson, C.A, and Bernards, M.A. 2010. Properties of the soybean seed coat cuticle change during development. *Planta*. Vol. 231: 1171-1188.

<sup>3</sup> Berglund, D. R. Quality factors of green frosted soybeans. North Dakota State University. <https://www.ag.ndsu.edu/winterstorm/winter-storm-information-farm-and-ranch-information1/farm-and-ranch-crops-soybeans/quality-factors-of-green-frosted-soybeans>.

<sup>4</sup> Giesler, L.J. 2002. Soybean mosaic virus. Crop Watch. University of Nebraska- Lincoln. <https://cropwatch.unl.edu/plantdisease/soybean/mosaic-virus>.

<sup>5</sup> Staton, M., Andersen, J., and Singh, M. 2020. Reducing weather risk in soybean production. Department of Plant, Soil and Microbial Sciences. Michigan State University Extension. <https://www.canr.msu.edu/news/reducing-weather-risk-in-soybean-production>.

<sup>6</sup> Christmas, E.P. 2001. Soybean seed quality and planting date. Purdue University Extension. [https://www.agry.purdue.edu/ext/corn/news/articles.01/Soy\\_Seed-0406.html](https://www.agry.purdue.edu/ext/corn/news/articles.01/Soy_Seed-0406.html).

<sup>7</sup> Staton, M., and Chilvers, M. 2019. Soybean seed quality considerations for 2019. Department of Plant, Soil and Microbial Sciences. Michigan State University Extension. [https://www.canr.msu.edu/news/soybean\\_seed\\_quality\\_considerations](https://www.canr.msu.edu/news/soybean_seed_quality_considerations).

Web sources verified 09/28/20.

## 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.

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