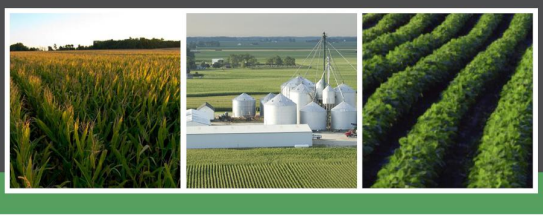

Agronomic Spotlight

Understanding the Impact of Corn Seed Size on Yield Potential

- All corn seeds from the same plant have the same genetic yield potential regardless of seed size or shape.
- Corn yield potential is primarily influenced by genetics, management practices, and growing conditions.
- All seed goes through cleaning, processing, and a rigorous quality control process to ensure industry-leading quality standards are met.

Impact on Yield Potential and Seed Quality

The size and shape of a corn seed does not affect its genetic yield potential. Research has been conducted for decades to evaluate the effect of corn seed size on yield potential. Results have consistently shown that corn seed size and shape is not related to genetic yield potential under normal growing conditions. However, seed quality, emergence, and early growth can be impacted by seed size and shape when certain environmental and management conditions are unfavorable, which may impact yield potential.

Figure 1. Seed size and shape on a corn ear varies from large rounds (cob base), flats (middle of cob), to small rounds (cob tip).

A variety of seed sizes and shapes can come from the same corn product. Large rounds typically come from the base of the ear, flats from the center, and small flats and small rounds from the tip (Figure 1). Plateless seed usually comes from the base or the tip. All seeds from the same ear, regardless of size or shape, have the same genetic material, and thus the same genetic yield potential. Corn yield potential is determined by the product's genetics and can be dramatically affected by environmental conditions throughout the growing season and by management practices such as planting under optimal conditions into a proper seedbed at the correct depth and ensuring proper soil fertility.

Seed quality is not influenced by seed size or production location. Seed quality is influenced by genetics, growing conditions in the seed production field, and handling after harvest. However, if the growing conditions in the seed production field were unfavorable, seed quality can vary relative to the placement of the seed on the ear. Kernels at the ear tip are more vulnerable to stress because they are often the last to be pollinated. Small rounds (which come from the ear tip) can have lower quality if the seed field experienced severe stress during the grain fill period. Large rounds may be more vulnerable to physical damage during the seed conditioning process because the embryo is more exposed than it is in other seed types. Growing areas for seed production are selected to provide the best environmental conditions and seed processing facilities are carefully managed to assure that quality is maintained through conditioning and handling. Externally validated quality management programs help to assure that all production activities deliver consistent products and quality to customers.

Impact on Emergence and Early Growth

Though genetic yield potential is not affected by seed size, there can be differences in germination related to seed size under adverse planting conditions. Large seed can have slightly decreased emergence rates in dry soil conditions because large seed requires more moisture to germinate compared to small seed. Small seed can have slightly decreased emergence in cool or crusted soils because the energy needed for emergence in these environments may be greater than the amount stored in the endosperm. The differences noted in early growth related to seed size are usually not apparent after tasseling. Similar silking dates and grain yield are expected when emerged plant populations are the same regardless of seed size and shape.

Quality Control in Seed Production

All seed lots are tested to ensure that the seed lot adheres to industry-leading quality standards. Seed lots are tested prior to processing to determine their initial quality and then again once packaging is complete to ensure they pass specifications. Some of these tests are needed to meet legal requirements and some are to meet industry or internal quality standards. Before any seed is sold, it goes through cleaning, processing, and a rigorous quality control process as outlined below:

Germination (Warm) Testing (warm germination test, viability test, tag test, date test). The germination test measures the germination potential of the seed lot by planting seeds under ideal temperature and moisture conditions. The percent germination that is listed on the seed tag (Figure 2) is determined by the germination test. This test is standardized across the industry and can provide a consistent measure of quality for customers when they purchase seed.

Vigor (Cold) Testing (cold test, saturated cold test, soak test). The vigor test measures the ability of the seed to emerge rapidly and uniformly under stressful conditions (cool and wet) in order to identify seed lots with lower

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performance. This test is not standardized across the industry. Therefore, vigor test scores should not be compared between different seed testing laboratories and across different seed companies. An internally developed vigor test is used that exposes seeds to high-stress conditions in order to ensure that standards of emergence rates and germination percentages are met by each seed lot and to help identify and position the top performing seed lots in the marketplace.

- The **emergence rating** is an additional rating found in the seed guide which reflects a combination of the warm and cold germination test results as well as genetic attributes of the plant that determine its response to environmental factors like soil conditions, seedling diseases, and other factors that can affect germination and emergence.
- The germination and vigor tests do not predict actual field performance. The germination test indicates the potential percentage of the seed to germinate under ideal conditions and the vigor test indicates the probability of germination under stressful conditions. Many environmental conditions that are not part of these tests, such as soil type, soil compaction, planting depth, and seed-to-soil contact, can have a direct impact on actual field performance.

Physical Purity Testing (batch purity, seed purity, label purity). The physical purity test is conducted to ensure that there are no contaminants in the seed lot. Physical purity tests often address the following components: percentage of pure seed, weed seed, noxious weeds, and inert matter (Figure 2). This test is standardized across the industry to provide a consistent measure of quality.

Genetic Purity Testing uses molecular analyses to ensure that the product contains the labeled traits (herbicide tolerance, B.t. traits) in the correct germplasm.

Storage. The two conditions that have the greatest effect on seed viability are moisture and temperature. Following cleaning, processing, and quality control, all corn seed is stored in moisture resistant packages and carefully monitored during storage to ensure that temperature and humidity are maintained for maximum seed viability. Though seeds can remain viable for several years when stored properly, germination testing is conducted every six months according to federal seed law requirements to assure that US farmers receive viable seed with every purchase. Dealers and customers should also take the necessary steps to prevent their seed from being exposed to moisture, high temperatures, rodents, or other pests.

You can be confident that the seed you purchase is of very high quality. All seed, regardless of seed size, shape, or product, is subject to the same quality standards.

Figure 2. Quality control information contained in seed tags includes the seed lot number, physical purity scores, and the date and score of the warm germination test. Also included are planter recommendations for the specific seed type.

Management of Different Seed Sizes

Seed weight is becoming the more common way in which farmers purchase their seed and the choice is often based on how their planter is configured. More seed companies today are selling their seed based on the weight of the seed as opposed to size. When purchasing corn seed by weight, review the seed bag labels and your planter manufacturer's recommendations and talk with your seed brand agronomist or representative for information on dealing with different types of seed, planter specifications, and field placement. When properly managed and properly positioned, corn seed of any size and weight can produce a successful crop.

- Planter settings should be adjusted for accurate seed positioning, placement, and seeding rate based on the size of the seed. When adjusted for seed size, a planter can more accurately singulate and deliver seed. Planters can deliver excessive numbers of doubles or skips when improperly adjusted for seed size.
- If there are concerns about seed size and placement with regard to your planter, consider selecting products based on seed size in addition to yield potential and other important agronomic traits.
- Plant seed when soil temperature and moisture conditions are optimal. If there are concerns about seed size and planting conditions, consider waiting to plant until conditions are conducive to rapid germination and emergence.
- Understand the soil types in your fields and their effect on seedling emergence and early growth.

Sources

Nielsen, R.L. 1996. Seed size, seed quality, and planter adjustments. Purdue University. www.agry.purdue.edu/
Web source verified 4/18/16. 160126095249