

Chapter 6: Corn Seed Testing



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Optimizing corn profitability starts with purchasing high-quality hybrid seed. Seed-testing information is critical in making this decision. This chapter discusses the standard tests that are required on seed offered for sale, and the additional tests that might provide insights into the seed quality. Key components are provided in Table 6.1 and an image of germinated seeds are in figure 6.1.

Table 6.1 Key components in producing and testing seed quality:

1. Inspect the label to make sure it meets your goals.
2. Adjust the seeding rate based on information contained in the label.
3. Different tests provide different information about your seed.
4. Carryover seed not planted last year most likely will have lower seed quality than new seeds.

Corn Seed Testing

Seed-Testing Laboratories

Seed tests can be conducted at the SDSU Seed Testing Lab. Seed sample envelopes may be obtained from Extension Service offices or by contacting the SDSU Seed Testing Lab. Samples being submitted to SDSU should be sent to:

SDSU Seed Testing Lab
Box 2207-A
Brookings, SD 57007 (U.S. Postal Service)
or

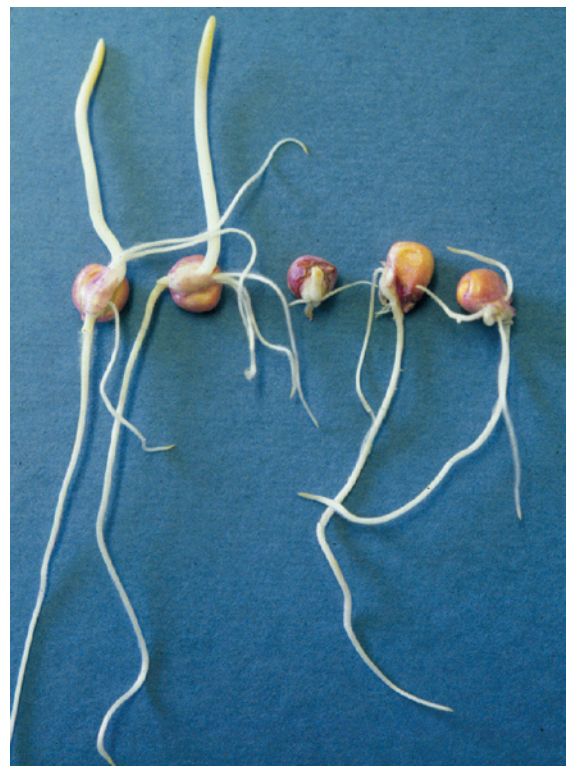


Figure 6.1 Corn seedlings evaluated after 7 days in a germination test. The two on the left are considered “normal seedlings,” capable of producing a productive plant in the field, whereas the three on the right are “abnormal seedlings” and are not capable of producing a productive plant.

SDSU Seed Testing Lab
2380 Research Parkway
Brookings, SD 57006 (UPS/FedEx/Spee-Dee)

Samples can also be submitted to other laboratories. Information about these laboratories is available at the Association of Official Seed Analysts or the Society of Commercial Seed Technologists.

Required Standard Tests

In South Dakota, it is required that all purchased seed must be tested for purity, noxious weeds seeds, and seed germination. The Association of Official Seed Analysts Rules for Testing Seeds (AOSA Rules) defines the protocols for these tests. Seed tests provide information needed to determine seeding rates. For example, a seed lot with 80% labeled germination rate requires more seed per acre than a seed lot with a 90% germination rate.

Not having a current seed label or seed-testing information puts producers and their investment at risk. Germination rates are valid in South Dakota only for 9 months from the time of testing, and company carryover seed requires a new germination test. Selected tests, purposes, analysis times, and advantages/disadvantages are provided in Table 6.2.

Additional Seed Tests that Provide Useful Information

Herbicide/insect Tolerance/resistance Trait Test

Most commercial corn varieties on the market today are tolerant to at least one of the commonly used herbicides (Roundup®, Clearfield®, and Liberty®, with others on the way) and have at least one form of BT (*Bacillus thuringiensis*) insect resistance. Seed bioassay, lateral flow strips, enzyme-linked immunosorbent assay (ELISA) tests, and polymerase chain reaction (PCR) tests can assess herbicide/insect trait resistance.

Fast Green Test

This test exposes corn seed to a green chemical stain that is subsequently rinsed off. Damage to the pericarp is readily apparent as any cracks or breaks will stain green. Damage will be classified as light, medium, and severe. The test is very useful in seed-conditioning facilities to maximize output while minimizing damage to the seed from machinery.

Genetic Purity Tests

Hybrid corn seed is always tested after production to check the hybridity, self's, and outcross levels. Each company has developed a quality specification for acceptable levels of hybridity that must be achieved to market the seed. These quality specifications must meet or exceed the minimum requirements of the Federal Seed Act. Electrophoresis or PCR testing methods are commonly used for evaluating hybridity level.

Producing High-Quality Seed

Corn seed is produced (often with contract growers) and conditioned primarily by seed companies with the proper seed handling and cleaning equipment. Farmer producers who produce, dry, and process their own corn seed are extremely rare.

Fertility and Moisture Content

High quality corn seed production begins in the field. Soil fertility plays a crucial role in ensuring the proper nutrients are present for quality seed/grain production. Nutrient deficiencies can result in small seeds with low emergence rates. The seed moisture content at harvest may influence seed quality. Corn seed will be harvested anywhere from 25% to almost 40% moisture content and carefully dried down to 12-13% moisture to minimize seed deterioration. Seed vigor and viability can be decreased by mechanical damage during the harvest and post-harvest seed-handling processes.

Table 6.2 The time and purpose of the different seed tests.

Test	Purpose of the test	Laboratory time to complete analysis
Seed counts	This is not a required test but is crucial in determining seeding rates. Seed counts in corn will vary by genetics and kernel size (flats, rounds, or a mixture of flats/rounds). Corn seed when sold in “bushel” bags is sold in units of 80,000 seeds.	
Corn germination test	The percentage of seeds that can be expected to grow and produce plants. Laboratory germination tests are conducted under favorable conditions, which do not always occur in the field.	6-7 days
Purity analysis	This test provides information about the physical makeup of the seed lot.	1-3 days
Noxious weed exams	It is prohibited to sell corn if the seed lot contains prohibited noxious weed seeds.	1 -3 days
Tetrazolium (TZ) test	This is a rapid (24-48 hour) chemical viability test that can be used to estimate germination. It can also be used to assess vigor and mechanical damage.	1-2 days
Vigor test(s) Below are a several vigor tests available for hybrid seed corn	Not all viable seeds are capable of completing their life cycle, and a vigor test provides information on this issue. Although not required by law, this test provides important information for seed-corn marketing decisions. A vigor test is recommended for carryover seed. Not all vigor tests are equivalent. When selecting a test to use, consult with your seed adviser, agronomist or the seed lab staff on what works best for your needs.	
Accelerated aging test (AA)	This test is conducted under high humidity and temperature, and it provides an excellent indicator of corn seed vigor. This test simulates less than optimum field conditions and it should be conducted in conjunction with a standard germination test. The AA test results should be within 15% of the germination test results. For example, if your germination is 90%, the acceptable AA would be > 75%.	10 days
Corn cold test	This rapid test is conducted using cold temperatures. Even though the cold test is not as consistent and reliable as the accelerated aging (AA) test, it is more useful than the AA test. The cold test is considered a direct vigor test and results are correlated to field emergence under less than optimal conditions. For acceptable quality, the cold test results should be > 80%.	12 -14 days
Saturated cold test	This test is conducted using saturated conditions and cold temperatures. The test is used to assess how well the seed will do under constant saturated soil conditions.	10-15 days

Purchasing Corn Seed

There are many companies that produce and sell corn hybrids. There is also a growing market for non-GMO corn and/or organic corn seed, and a small market for open-pollinated corn. Check with your local agronomist for a variety with the appropriate maturity and traits for your region.

Almost all the corn seed sold is protected under the Plant Variety Protection Act (PVP-94) and/or has a utility/plant patent (Roundup Ready trait, BT, etc.), which means that seed cannot be saved after harvest for replanting or sold by the farmer except as grain. These protections virtually eliminate the legal ability of farmers to plant seeds harvested on their farm. Conventional open-pollinated varieties are one exception that can be saved and replanted. However, over 90% of the seed currently sold and planted in South Dakota is GMO seed with some herbicide/insect resistant trait. Seed quality is crucial and it is recommended that you purchase seed from reputable dealers.

Leftover Unplanted Seed

Often a producer purchases more seed than he/she plants, or the weather causes a change in planting plans that results in some unplanted seed (carryover seed). Most corn seed sold has been treated with a fungicide/insecticide and, therefore, cannot be sold as grain. Due to the lifespan of corn, any unused seed should be kept in a cool, dry environment, if not returned to the source of purchase. One to three months prior to planting, a vigor test, at minimum, should be conducted. If the vigor has dropped, the seeding rate should be increased. If the seed vigor is too low, the seed must be disposed of using appropriate disposal methods. Substandard seed may be donated or planted to food plots for wildlife.

Planting low-quality seed can result in stand failures, while overplanting or underplanting rates can also cause lower yields. In addition, low-quality seed deteriorates rapidly and may produce poor stands. Corn seed has a longer lifespan (1-4 years) than soybeans (1-2 years) and can usually be carried over for a year without a significant loss of germination or vigor if stored in a dry, cool location.

References and Additional Information

Association of Official Seed Analysts (AOSA).

Iowa State University Seed Testing Lab.

Society of Commercial Seed Technologists (SCST).

SDSU Seed Testing Lab. South Dakota Crop Improvement Association. South Dakota Department of Agriculture.

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Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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