



Sand Germination Test for Soybean

The sand test method is useful when a seed lot is infected with fungi, when mechanical damaged seed exists or when retesting is required. The test conditions provided by the sand test closely simulate favorable field emergence conditions. The use of sand also allows extending the test two additional days (nine day sand test) to evaluate questionable seedlings.

Phomopsis (pod and stem blight) Infection

Phomopsis spp. infects the seed coat and or the embryo (cotyledons) of soybeans. The infection can be severe (dead seeds) or superficial (seed coat infection). In a Kimpak or towel test the severely infected seeds can cause adjacent normal seedlings to appear diseased resulting in difficult evaluation. The superficial infection of the seed coat may spread to the developing seedling also resulting in a seedling that appears diseased. To reduce technologist guesswork concerning proper evaluation of these diseased seedlings, a sand test is used. The presence of the sand changes the microclimate around the seed, specifically the presence of "light" and availability of oxygen. Fungal mycelium growth is suppressed under lower light and anaerobic regimes. The sand provides a "buffer region" between severely infected and non-infected seeds. The weight and friction created by the sand on the emerging seedlings tends to pull the seed coat off the cotyledons, thus reducing the spread of superficial infection into cotyledons. . Consequently, when retesting in sand, companies can obtain higher and more realistic values compared to Kimpak or towel tests. If Phomopsis is a significant problem in your production region, we recommend requesting the sand test as your primary test.

Mechanically Damaged Seed

Low moisture soybean seeds are susceptible to physical damage or breakage when they impact steel, seed or other surfaces, especially when they are traveling at a high rate of speed. When the hypocotyl or radical is impacted, a break can result. The location of the break can greatly influence the ability of the seedling to elongate and produce sufficient root growth. The sand method facilitates root growth on mechanically damaged seedlings and also provides a more uniform water uptake into the seed. Sand also allows extending questionable seedlings for an additional two days as allowed in the Association of Official Seed Analysts (AOSA) "Rules for Testing Seed". This two day extension may allow sufficient root development on questionable seedlings resulting in a normal seedling classification.

Retesting

The AOSA "Rules for Testing Seed" specifies sand as the preferred retest media when a germination retest is required. Sand provides the most uniform water uptake (the entire seed surface is in contact with moist sand) conditions when compared to Kimpak or towel methods.



Using Tolerance in Labeling Seed

We have been receiving questions regarding the use of tolerances when labeling seeds, especially in the case of mechanically damaged soybeans. The tolerances most of us refer to are published in the Association of *Official Seed Analysts (AOSA)*, *Rules for Testing Seeds* in section 5.5 (Germination Tolerances). These tolerances were developed to compare a first analysis (labeled germination on a seed lot) with a second analysis (usually at the request of a Seed Control Official). The germination percentages of the two tests are averaged (i.e. 90% and 83% = 86.5%) and this mean value is used to obtain the tolerance (7%) from Table 1 below. If the tolerance (7%) is equal to or exceeds the difference between the first and second analysis (in this case equal), then no deficiency (mislabeling) exists.

Usage of these tolerances to label seed tags at a percentage higher than the actual test result is not the intended use of these tolerances or a use recommended by MWSS. However, it is a practice that has been discussed in the seed industry. If a company does label at a higher percentage, such as 90%, when in-fact the test result is 85%, the company is increasing the risk of a seed lot being mislabeled. If a second test was found to be 82%, the regulatory official would average the two values (90% and 82%) and obtain an 86% and obtain a tolerance of 7% from Table 1. The second test of 82% was in fact near the original test of 85%, but since 90% was labeled the company would be issued a stop sale because the difference between the label and second test is 8%, which exceeds the 7% tolerance level.

It is important to realize that it is the mean of the first and second analysis that determines the tolerance level, not the actual labeled percentages. So to reduce risk of stop sales and other regulatory action, it is advisable to label accurately.

Table 1. Germination Tolerance obtained from Section 5.5 of the AOSA Rules for Testing Seeds.

Mean of first and second analysis	Tolerance
96 or more	5
90 or over but less than 96	6
80 or over but less than 90	7
70 or over but less than 80	8
60 or over but less than 70	9
Less than 60	10

When only 200 seeds of mixtures (mixtures of different species) are tested, 2% shall be added to the above germination tolerances.