

# 2020 Tech Bulletin

## What is a Vigour Test?

### **A vigour test reveals the seed lots ability to withstand a variety of different stress factors.**

Vigour tests are designed to mimic poor seeding conditions and find out how the seed lot will perform under stress, the exact opposite of a germination test.

Genetics, environmental conditions (harvest & storage), seed maturity, disease, and physical integrity (such as mechanical damage in peas) can all affect the vigour of a seed lot.

In a vigour test, the seed is tested in a stressful environment unfavourable to seedling development. This environment can be cool, cold or warm, or a combination of either high humidity and high temperatures, or heavy moisture at low temperatures.

If the seed lot lacks vigour, one or more of the stressors will suppress seedling growth. If the seed is vigorous, it will be able to withstand the stressors and grow normally.

Together, the vigour and germination results provide a more complete performance profile for the seed lot. The information can help growers make important seeding input decisions. Knowing the germination and vigour of a seed lot help growers decide when to seed.

Cereal seed lots with lower vigour should be planted in warmer soil temperatures; seed lots with high vigour can tolerate planting earlier into cooler soils.

Textbook results for germination and vigour tests are 100% germination and 90% vigour. In reality, we are more likely to see 85% germination and 75% vigour.

The vigour result represents the lowest performance level we would expect to get from the seed lot under stressful field conditions. If seedbed conditions are favourable, then the plant stand establishment will be closer to germination.

### **What are analysts looking for?**

Below are excerpts of two scientific definitions for vigour from the International Seed Testing Association (ISTA) and the Association of Official Seed Analysts (AOSA). All analysts analyzing the vigour tests are familiar with these two definitions.

**ISTA:** *“Seed vigour is the sum of those properties which determine the potential level of activity and performance of the seed or seed lot during germination and seedling emergence.”*

**AOSA:** *“Seed vigour comprises of those seed properties which determine the potential for rapid, uniform emergence and development of normal seedlings under a wide range of field conditions.”*

A vigour test must be reproducible and the results must prove to be correlated with a field performance characteristic, such as seedling emergence.

### **Why is vigour testing important?**

Vigour testing is an important component of seed testing; it is more sensitive than the germination test and loss of vigour may be noted much earlier than loss of germination.



- Vigorous seeds germinate rapidly and are able to establish an even plant stand in the field.
- Non-vigorous seeds germinate unevenly which leads to uneven plant stands

### What causes vigour loss?

Vigour loss is due mainly to seed deterioration and ageing, which begins as soon as the seed is physiologically mature. It's imperative to handle seed carefully to prevent accelerated reduction in performance through physical damage to cell membranes. This is particularly true of large seeds, such as pulses and legumes, where seed damage is the primary cause of deterioration.

- Other associated detrimental factors include:
  - Enzyme activity in immature and dormant seeds
  - Respiration during harvest and storage
  - Impaired protein and the use of protein and RNA synthesis during periods of low temperature stress (frost damage)
  - Genetic damage
  - The accumulation of toxic metabolites

### What can I expect from a vigour test?

These performance characteristics are associated with differences in seed vigour.

1. Rate and uniformity of seedling emergence and stand establishment in the field.
2. Seed lot's ability to germinate and grow in unfavorable environmental conditions.
3. Biochemical processes and reactions during germination, such as enzyme reactions and respiratory activity.

Using the appropriate vigour test for the crop kind under analysis will reveal the vigour of the seed.

### How do I interpret the results of a vigour test?

A vigour test is usually conducted in conjunction with a germination test as the latter is required to sell seed in Canada.

Most producers want to know how their seed will perform at both ends of the spectrum, and these two tests provide this information.

The germination test will almost always have the highest result as the evaluation parameters are for optimal conditions, opposite those used in the vigour test. The vigour result will be a lower percentage because the deliberately applied stress will suppress germination. The vigour test result provides producers with information on how well the seed will perform when subjected to cool spring field conditions.

Vigour testing is a sophisticated test that reveals the quality of the seed through a sensitive index. It is one of the most important tests when establishing seed quality.

**The bottom line:** Early and accurate evaluation of seed quality is essential in the planting and production of a high-quality crop. Knowing the overall seed quality will help with important crop input decisions, such as the use of seed treatments, herbicides, and fungicides, to ensure a healthy vigorous plant stand.

**To learn more** contact us at [support@2020seedlabs.ca](mailto:support@2020seedlabs.ca)

