

2020 Tech Bulletin

What is a Falling Number (Hagberg) test?

The Falling Number test was originally created in the 1950's by Harald Perten and Sven Hagberg and it measures the extent of preharvest sprouting (PHS) in wheat and other cereals by estimating the activity of a protein called alpha-amylase (AA).

Alpha-amylase is an enzyme released during seed germination and it is responsible for breaking down the starch stored in the endosperm into simpler sugars that provide energy for the growing embryo. Although bakers need some amounts of AA in their flour to breakdown the starch into sugars that feed the yeast in the fermentation process, allowing for the dough to rise, increased levels of AA in grain that has experienced PHS directly affect the quality of flour produced. Flour quality parameters such as mixability, crumb strength, sliceability and loaf volume are reduced in flour produced from grain with low falling number (high AA activity).

How is the Falling Numbers test conducted?

The falling number represents the time in seconds it takes for a stirrer to fall through a hot slurry made by mixing ground wheat with water. Flour produced from grain that has low levels of AA produce a thick slurry as the starch molecules are still intact and a higher falling number. Grain with elevated levels of AA produces a thin or non-viscous slurry and a low falling number. Good quality wheat will typically have a falling number ranging between 300-400.

Who uses the Falling Number Test?

The falling number test is one of the important specifications used in the grain industry in sales contracts of Canadian wheat. This scientific method replaces the unreliable approach of estimating sprout damage visually. There are suggestions in the industry that this might become a grading factor at elevators and growers will need to know what their falling number is for the load of wheat they deliver as this will affect the price of the load.

What accounts for varying levels of PHS?

Environmental conditions at the time of maturity of the heads play a direct role in PHS. Plants that experience periods of cooler, rainy days at the stage of maturity in the field followed by warm and dryer weather are more prone to PHS as the continuous wetting and drying cycle breaks the dormancy in the seed and allows for germination. Such conditions usually occur in the fall and in fields that experience rain or heavy dew after swathing, PHS can be exacerbated.

Another commonly overlooked cause for low falling number in cereals is late maturity alpha amylase (LMA) which is caused by large temperature swings during grain maturation. This is especially common in a year like this where most fields experienced high temperatures during the grain maturation stage.



In years where fields experience rainfall during the time of harvest and grains are harvested with high moisture content than preferred, low falling number may become a problem especially if the grains experience heating damage during hot air drying. The heat from drying damages the structure of the starch molecules which leads to a low falling number.

Poor storage condition has also been shown to increase sprouting damage in grains. When grains are harvested at less than optimum moisture and stored in poorly ventilated bins, sprouting of the grains becomes an issue for growers to grapple with.

Visual inspection of the grains for PHS alone is not enough as the chemical process of sprouting starts deep within the seed before any visual signs become apparent.

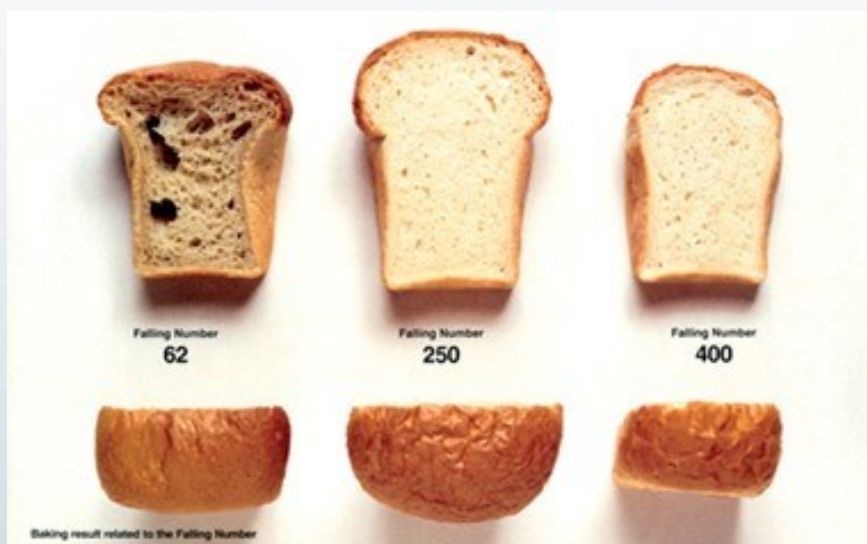
Please send samples for Falling Number test to our Nisku laboratory for testing. Also do not hesitate to contact the lab at 780-944-3435 or support@2020seedlabs.ca with questions.



Examples of sprouted kernels of amber durum. Photo: Canadian Grain Commission.



Photo by Star of the West



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