

RAPID VISCO ANALYSIS (RVA) FACTSHEET

WHAT IS RAPID VISCO ANALYSIS?

- ▶ Rapid visco analysis (RVA) is the assessment used to determine the degree of pre-germination in barley grain. This measurement is used to assess non-visual pre-germination (*Canadian Grain Commission, 2019*).
- ▶ The RVA procedure requires barley grain to be milled (crushed) and mixed thoroughly with a standard water volume. The mixture's viscosity is then tested by mixing and heating the sample to identify when starch granules swell and disintegrate.
- ▶ RVA indirectly measures the alpha-amylase content in barley grain (*Canadian Grain Commission, 2019*). Alpha-amylase is an enzyme that is produced early in the germination process, working to convert starches into sugars. Non-sprouted grain has very little alpha-amylase, which is why it can be used as an indicator of the degree of pre-harvest germination (*Canadian Grain Commission, 2019*).
- ▶ RVA testing is not a Canadian Grain Commission (CGC) standard grading test, but it's used by grain buyers and maltsters when selecting barley for malting. The test is standardized, with an established protocol available on the CGC website.



Figure 1. Preparation of ground barley grain and water mixture for RVA analysis.
Photo courtesy of Dr. Marta Izydorczyk, Canadian Grain Commission.

WHY IS THIS TEST CONDUCTED?

- ▶ Grain with high germination energy (GE) is required by grain buyers and maltsters, with contract specifications requiring over 95 per cent germination. During the malting process, raw grain starches are converted into usable and fermentable material (modification). Low grain GE causes uneven modification, which results in poor-quality malt.
- ▶ Pre-harvest sprouting is detrimental to grain GE. The GE and vigour of pre-harvest sprouted grain will diminish more rapidly when stored compared to non-sprouted grain. The severity of pre-harvest sprouting (PHS) influences how long grain can be safely stored.
- ▶ The GE test does not assess pre-harvest germination, so pre-harvest germinated samples can indicate GE greater than 95 per cent.
- ▶ There are two types of pre-germination: precocious germination and PHS. PHS is the larger concern, and it occurs when mature grain begins to germinate in the barley head.

WHAT DO RVA VALUES MEAN TO FARMERS:

- ▶ RVA values provide a general risk level of potential rapid germination loss in stored grain due to PHS.
- ▶ High RVA (>120) values indicate that less PHS has occurred. Therefore, grains with high RVA values will retain GE longer when stored.
- ▶ Low RVA values (50 <) signify that high levels of pre-germination have occurred, and that barley grain GE will probably degrade quickly in storage. These grains should be malted as soon as possible.
- ▶ Grain moisture, relative humidity, and seed storage temperature should also be considered, as these factors will influence safe storage durations.

Risk of rapid germination loss in storage	RVA Final Viscosity (RVU)
Low	>120
Intermediate	50 – 120
High	<50

Table 1. Summary of RVA values and the associated risk of GE loss in stored barley grain.

MANAGEMENT PRACTICES THAT CAN MITIGATE PRE-HARVEST SPROUTING

The main drivers of PHS are weather and variety genetics. Once grains become physiologically mature rain, heavy dew, and high humidity events can cause PHS to occur. Below are management practices that can help mitigate the effects of PHS:

- ▶ Seed early maturing varieties. This limits the risk of receiving late season and fall rains when mature crops are still in the field.
- ▶ Planting early reduces the risk of encountering adverse weather conditions that occur in the fall during harvest.
- ▶ Select a variety with a good lodging rating, as lodged plants can be more susceptible to PHS.
- ▶ Increase seeding rates to decrease days to maturity. Keep in mind that this can increase crop lodging risk.
- ▶ Consider using a plant growth regulator (PGR) if there is a lodging risk. Check with your grain buyer and confirm contract obligations prior to applying a PGR to understand if there are market access issues (e.g., barley sprayed with Manipulator [chlormequat] won't be accepted for malting or feed barley).

HOW TO MANAGE BARLEY WITH LOW RVA NUMBERS

- ▶ Get your grain tested. RVA numbers will give you a good idea of the risk of GE loss associated with storing your grain.
- ▶ Segregate impacted grain and remember that the GE of PHS grain will decrease more rapidly in storage, thereby reducing its chances of being selected for malting grade (Figure 2).

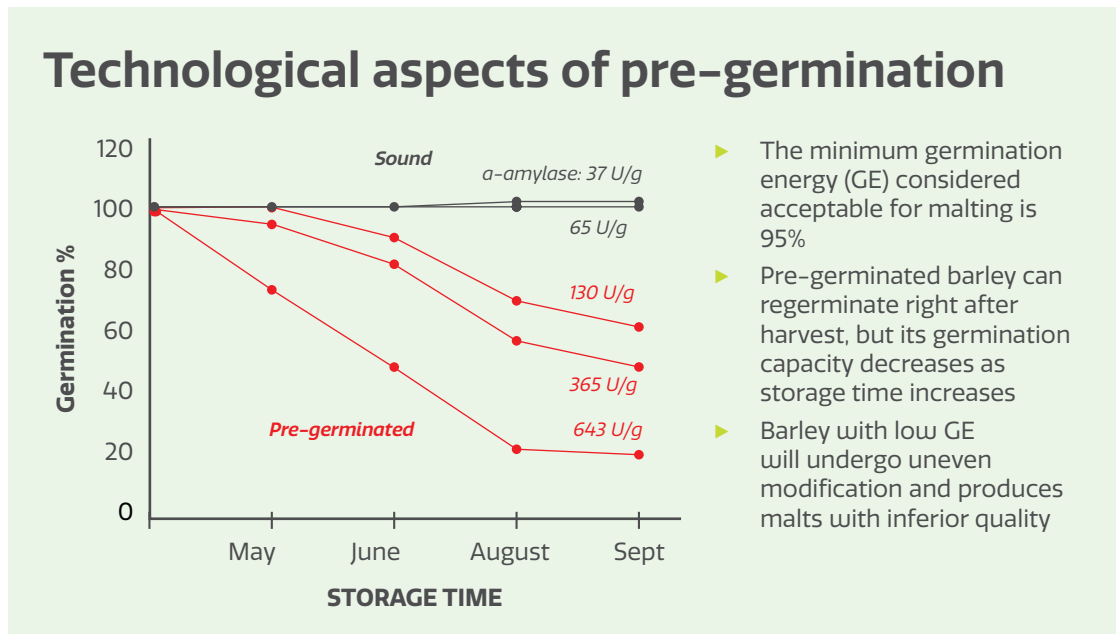


Figure 2. Average rate of germination energy loss over time in storage by severity of pre-germination of barley grain.



LEARN MORE

[Cereal-Crops.pdf \(seedmb.ca\)](#)

[Harvest Sample Program \(grainscanada.gc.ca\)](#)

[Using RVA to measure pre-germination in barley and predict germination energy after storage \(grainscanada.gc.ca\)](#)

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REFERENCES

Izydorczyk M. 2019. Using RVA to measure pre-germination in barley and predict germination energy after storage [internet]. Winnipeg (MB): Canadian Grain Commission; [2019 Feb 28; 2024 Jan 12] Available from: [Using RVA to measure pre-germination in barley and predict germination energy after storage \(grainscanada.gc.ca\)](#)

