

Implications of changing agronomics (restrictions on glyphosate use) on harvest practices and postharvest grain handling



Date: March 2021

Key Implications:

- *Late-harvest grains are at risk of spoilage and reduction in quality due to poor weather if reliant on natural harvest windows.*
- *Producers (specifically those in cooler climates) will need to consider alternative strategies for storing and drying their grain.*
- *Increased energy costs will be incurred by producers to ensure efficient grain drying and storage.*
- *Increased opportunity for soil erosion (pre-harvest weed control allows for low- or no-till practices).*
- *Less opportunity for soil carbon sequestration without low-/no-till applications.*
- *Increased costs for consumers on everyday grocery items (e.g., cereals, bread, etc.)*



Challenge:

On March 20, 2015, glyphosate was re-evaluated by the World Health Organization's International Agency for Research on Cancer (IARC) as a probable human carcinogen (IARC, 2015). Since this designation, there has been a greater urgency in some countries, and with certain food companies like Kellogg's (Glacier FarmMedia, 2020) and General Mills (Canadian Broadcasting Corporation, 2020), to reduce the amount of pesticides within their food supply chains.

Despite the findings of certain regulatory bodies around the world, such as Health Canada (Government of Canada, 2017), who have reviewed the use of pre-harvest glyphosate and deemed it safe for use (to specific maximum residue limits [MRL]), some countries continue to restrict or prohibit the use of glyphosate as a pre-harvest treatment. Canada relies heavily on its grain export markets, so it is imperative that producers are aware of how glyphosate controls are being applied globally. As restrictions and bans continue to be enacted more broadly, producers are faced with unique crop management decisions that mitigate the use of glyphosate, specifically as a pre-harvest treatment.

Glyphosate is one of the most common herbicides used in agriculture today. There are several known benefits to using glyphosates in crop management. Using glyphosate with herbicide-tolerant crops allows producers to adopt more low- or no-till practices. Several environmental factors have been found to improve through the use of low-/no-till farming. Since a producer can chemically control weed growth, the need for plowing is reduced; this contributes to lower fuel use, fewer greenhouse gas emissions (GHGs), and more soil carbon sequestration (CropLife Canada, 2019).

By applying a pre-harvest glyphosate, producers are also able to more easily manage their harvest timelines. This is especially valuable in cooler regions where the harvest season is short and often conflicts with the coming of winter.

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Mitigation:

If the use of glyphosate is not a viable option as a pre-harvest aid, effective grain management options become even more vital for producers. While there are other desiccants on the market, they can be costly and producers may need to rely on Mother Nature to bring their crops to maturity and will lose the ability to “schedule” their harvest to meet necessary weather windows. This means that in many cases, especially for producers in more northern geographies, grain will have to be taken “tough” to preserve quality and reduce harvest losses. If this is the case, producers will need to ensure that they have sufficient drying capacities, such as fan size, airflow, bin space, monitoring equipment, etc., to accommodate these tough crops. Certain studies have shown that earlier harvests for wheat and oats may have favourable ambient conditions that make them suitable for natural air drying (NAD) and supplemental heat, both of which can be effectively used late in the harvest season (Maki & Sprenger, 2020).

Alternatively, the use of swathers may need to return as a harvest practice to assist in dry-down. The use of pre-harvest glyphosates has allowed producers to move predominantly to straight combining most crops, since the crop is allowed to mature standing. Many producers have been able to remove the swather from their harvest plan for this reason. Revitalizing the use of a swather could be an additional investment and a practice that will still rely on careful management of harvest timing to reduce risk of quality damage. However, this practice could reduce storage management risks.

Another consideration for producers, without the use of pre-harvest glyphosate, is managing immature kernels and green weed seeds within a bin. Desiccation increases crop uniformity and accelerates the harvest process. If glyphosate is eliminated as a pre-harvest treatment, producers may need to harvest their crops before they reach full in-field maturity. This means the grain will likely contain more immature kernels and/or green weed seeds. Once in the bin, these kernels and seeds can respire for several days, resulting in “hot spots”. A longer aeration time along with careful bin monitoring are required to reduce the risk of spoilage even if the grain is considered dry (PAMI, 2020).

As the requirement for grain drying increases, producers will need to prepare for the associated increase in energy costs. These costs will vary depending on individual needs and crops (high-heat grain dryers vs natural air drying [NAD] vs the use of supplemental heat); however, higher energy costs can be expected with any

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conventional drying method. For guidance on the cost of adding drying capacity, Manitoba Agriculture has provided access to its grain drying cost calculator (Manitoba Agriculture, n.d.); as well, PAMI offers additional guidance in its supplemental heat FAQ (PAMI, 2018).

Summary:

If glyphosate usage becomes further restricted, producers will be faced with more challenging harvest management decisions. Because Canada relies heavily on its export grain market, producers need to consider crop management decisions that apply both at home and abroad.

Without the use of glyphosate as a pre-harvest desiccation treatment, producers will have to consider alternative strategies to effectively manage their postharvest grain loads. A greater reliance on grain drying will be required to preserve quality and overcome the challenge of taking and storing immature grain. Producers will need to ensure they have the adequate grain drying resources to adjust for increased volumes of immature crop.

While not directly related to harvest management activities, the restriction on glyphosate use will also impact weed control at other stages of production. Tillage activities may be required, which would negate many of the environmental impacts achieved by zero-till practices (i.e., increased soil carbon sequestration and reduced soil erosion). These unintended trade-offs also need to be considered.

Further research is needed into the effects of restricted glyphosate use to better understand the long-term effects and to equip producers in making their best postharvest grain handling decisions.

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