



## Researching pre-harvest glyphosate on oat

CATEGORY [agronomy](#) | *July 14, 2021*

Compared to direct combining without pre-harvest glyphosate, research found no effect on oat quality when glyphosate is applied at a seed moisture content at 40% or less. When applied at the recommended seed moisture content of 30%, pre-harvest glyphosate had a similar impact on oat yield or seed quality as swathing regardless of seeding rate or cultivar grown. However, growers should consult with their oat buyers to ensure that they will purchase oats treated with pre-harvest glyphosate.

Two studies were conducted to look at the benefits and risks of pre-harvest application of glyphosate on oat. Growers should be cautioned that since this research was conducted, some milling oat buyers will not accept oats treated with a pre-harvest application of glyphosate.

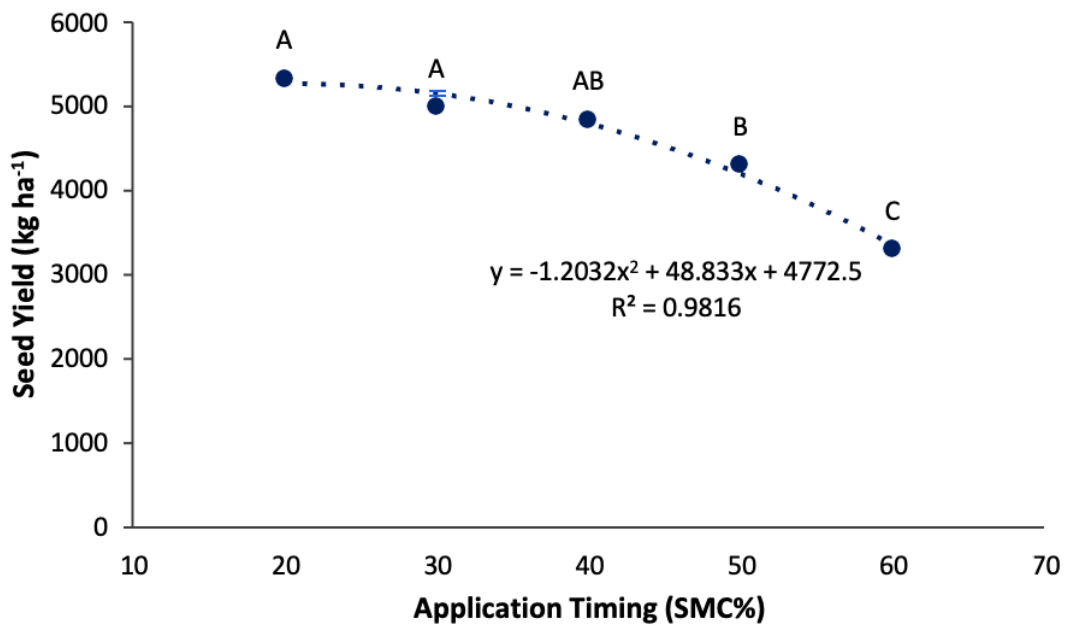
The first experiment was conducted at two locations in 2016, 2017, and 2018 at the University of Saskatchewan's Kernan Research Farm (clay loam soil) and Goodale Research Farm (loam soil). AC Morgan oat was seeded at 35 seeds/ft<sup>2</sup> (350 seeds/m<sup>2</sup>) in May on canola stubble at Goodale and wheat stubble at Kernan sites.

Pre-harvest glyphosate was applied at 60, 50, 40, 30, and 20% seed moisture content (SMC), and swathing also occurred at the same SMCs. There was also a direct harvested check at 12.5% SMC. The label application for pre-harvest glyphosate is 30% SMC or less.

Swathing resulted in a significantly lower harvest seed moisture content at 10.3% SMC. Glyphosate treatments (11.7% SMC) and direct combining (13.5% SMC) were statistically similar. Timing of glyphosate application it did not have a significant effect on seed moisture content at harvest.

Glyphosate treatments yielded 19% more and direct harvest treatments yielded 28% more than swathing treatments. Applying glyphosate at 40, 50 or 60% SMC significantly reduced oat seed yield. There was a 53 bu/ac (2028.07 kg/ha) difference between the highest yielding application at 20% SMC and the lowest yielding application at 60% SMC treatments. This represents a potential yield loss of up to 38% if glyphosate is applied when seed moisture is greater than 40%.

### Effect of application timing on oat seed yield



Source: Willenborg et al. 2019

Thousand kernel weights declined when either glyphosate or swath timings were applied at 50% SMC or greater. The lowest TKWs were observed when glyphosate or swathing occurred at 60% SMC.

Similar to TKW, glyphosate applications or swathing at higher SMCs resulted in significantly lower test weights, even more so for swathing treatments.

There was no significant impact on the percentage of thin kernels when glyphosate was applied at or below 50% SMC. There was no significant increase in the number of thin kernels when swathing occurred at or below 40% SMC.

Direct combining had the greatest percentage of plump kernels. The number of plump kernels declined as swathing or glyphosate were applied at higher seed moistures. Overall to maximize the number of plump kernels present and minimize the percentage of thin kernels, glyphosate applications or swathing should not occur at SMCs above 40%.

In both years, glyphosate residue generally increased as treatments were made at progressively more immature growth stages. For example, glyphosate seed residues in 2017 increased from 2.0 ppm at 20% seed moisture to 35.2 ppm at 60%. Average glyphosate residues did not exceed 5 ppm at the 30% application timing, or 10 ppm at 40% application timing. These values are below the Canadian maximum residue limits (MRL) of 15 ppm, or the US MRL of 30 ppm. When oats were sprayed with glyphosate at 40% seed moisture or lower, the residue levels in the groats were also below the Canadian (MRL) set for oats in Canada (15 ppm).

Beta-glucan content was similar for direct combining (4.28%), glyphosate applied at 20-40% and swathing at 20- 30%.

Compared to the direct combining control treatment, swathing at 40% or greater SMC or glyphosate application at 50% or greater SMC resulted in higher than normal hull percentage and undesirably high milling yields. In general, only swathing at 60% SMC reduced flaking quality.

### **Direct combining tended to produce the highest yield and quality**

A second experiment was also conducted at the same locations in the same years. CDC Dancer (early maturing) and Pinnacle (very late maturing) were compared, along with seeding rates at 25 and 50 seeds/ft<sup>2</sup> (250 and 500 seeds/m<sup>2</sup>), and three harvest methods of pre-harvest glyphosate (30% SMC), swathing (30-35% SMC) and direct combining (12.5% SMC).

Seed moisture content was on average 1.3 percentage points lower when treatments were seeded at 50 seeds/ft<sup>2</sup> regardless of harvest method. The highest SMC of 14.2% occurred with 25 seeds/ft<sup>2</sup> and direct harvesting. Swathing treatments had the lowest SMC regardless of seeding rate.

Increasing seeding rates also resulted in lower TKWs, and softer groats. Overall Pinnacle was less affected by changes in harvest method in regards to percent plump and thin kernels. Whereas CDC Dancer had an increase in thin kernels and a decrease in plump kernels when plots were swathed.

The results of the two experiments show that pre-harvest glyphosate can be used successfully as a harvest management tool when applied at the recommended stage of 30% SMC or less. Oat treated with pre-harvest glyphosate produced similar oat yield and seed quality as swathing. Direct combining tended to produce the highest yield and quality.

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Dr. Chris Willenborg, Dr. Nancy Ames, Eric Johnson, Moria Kurtenbach, and Sid Darras. 2019. The Effect of Pre-harvest Glyphosate on Quality of Milling Oats. ADF Final Report.