SOIL HEALTH

On-Farm Evaluation of the Impact of Rolling Soybeans on Wind Erosion

The risk of wind erosion was greater in rolled treatments due to lower surface roughness, but the amount of soil moved by wind did not differ between rolled and unrolled treatments. Overall, the amount of soil loss by wind erosion was minimal.

Soil blowing near Carman in May 2018.

WIND EROSION IS the movement of soil by wind. Soil accumulates along field boundaries and roadside ditches, resulting in the loss of topsoil and nutrients from the field. Soil-covered snow is a visible example of soil movement by wind and is a common sight in Manitoba each year.

Soybean crops pose a greater risk of wind erosion due to later crop emergence in the spring and lack of crop residue in the fall, leaving soil exposed. Currently, there is little scientific information on wind erosion and soil loss in Manitoba.

There are concerns that the practice of rolling in soybeans may increase the potential for wind erosion. Since rolling pulverizes particles on the soil surface, they are more susceptible to movement by wind. In stony fields, the benefit of rolling to ensure a smooth harvest far outweighs the risk of wind erosion. But there may be the opportunity to avoid rolling in non-stony fields where harvestability and damage to the combine is not as much of a risk.

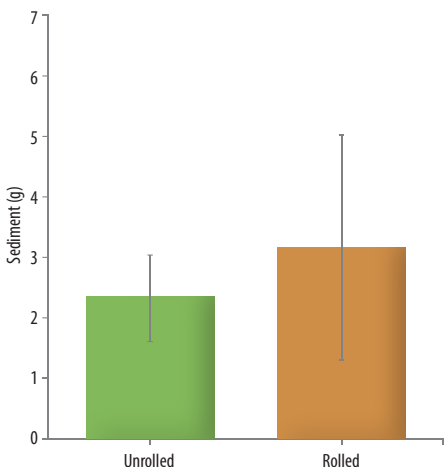
The objective of this research was to assess the effects of rolling on wind erosion. Non-replicated rolled and unrolled soybean strips were compared at eight non-stony On-Farm Network fields in the Red River Valley in 2018 and 2019. Fields were rolled within three days of seeding. The potential for wind erosion and amount of soil loss by wind was measured in rolled and unrolled strips. Young soybean plants were assessed for abrasion or sandblasting by windblown soil particles.

The potential for wind erosion was measured through soil surface roughness, stoniness, soil moisture content and crop residue cover. Actual wind erosion was measured using sediment traps in each treatment to capture any soil moved by wind. Field edges were surveyed for evidence of wind-eroded soil before seeding and after harvest.

Surface roughness is the main factor that influences the risk of wind erosion. An uneven or rough surface can better trap material, minimizing soil erosion from the field. Smoothing that surface through practices like rolling contributes to a greater risk of erosion.

In these experiments, rolling reduced soil surface roughness, increasing the risk of wind erosion. However, the actual amount of soil moved by wind and collected in the sediment traps did not differ between rolled and unrolled strips (Figure 1).

Figure 1. Soil movement by wind (grams of sediment) captured by sediment collectors in rolled and unrolled strips.



While measurable amounts of soil were collected from both treatments, the amount leaving the fields was too small to be measured. As a result, there was no evidence of soil movement away from the fields nor accumulation at field edges.

Wind erosion often occurs before the growing season even begins. For example, two severe wind erosion events happened in the spring of 2018, but they occurred before the trials were seeded and established. Once seedlings emerge, the risk of wind erosion decreases.

Abrasion of young soybean seedlings by sandblasting may cause crop damage, but it was not observed in this study.

Observations from this and other research in the region demonstrate that soil loss by wind erosion is minimal and unlikely to affect crop yields. While soil particles blowing through the air are very visible, this does not necessarily mean a significant amount of soil loss. In contrast, tillage or water erosion is a larger soil movement problem.

Surveillance of eroded soil along field edges and ditches in Manitoba is expected to continue, with particular attention to soybean fields. With soybeans and other low residue crops, the soil surface is more exposed to erosion in the fall and following spring. Future research should focus on soil conservation practices to reduce wind, water and tillage erosion in low residue crops and throughout the crop rotation.

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