SOIL HEALTH

Residue Management Following Soybeans

With appropriate seeding equipment, it is possible to eliminate or reduce tillage after soybean harvest without negatively affecting spring seedbed conditions or following crop yields.

FARMERS THROUGHOUT MANITOBA are investing resources and time incorporating soybean residues in the fall using varying amounts of tillage. In other soybean growing regions in North America, farmers most often direct seed subsequent crops into soybean stubble. The purpose of this project was to evaluate residue management options (i.e., tillage) following soybeans in Manitoba.

On-farm experiments were established in the fall after soybean harvest, from 2013 to 2017 in five fields near Boissevain, Winkler, Carman, Landmark and New Bothwell.

Four tillage treatments were compared from 2013 to 2015:

1. deep-till cultivator or double disc tillage,
2. no tillage or direct seeding,
3. vertical tillage – low disturbance (discs set on 0° angle so that residue is somewhat incorporated but mostly left on the soil surface) and
4. vertical tillage – high disturbance (discs set on a 6° angle so that residue is incorporated with little residue left on the soil surface).

The impact of these tillage treatments on spring seedbed conditions (temperature, moisture) and on the plant stand and yield of subsequent wheat, corn and soybean crops were evaluated. In the last year of the experiment (2016), this approach was simplified to become a part of the MPSG On-Farm Network. This meant each farmer's standard tillage method for soybean residue was compared to direct seeding into soybean stubble.

There were remarkably few differences between soybean residue management treatments in this four-year study. Once the next crop was planted, it was often hard to distinguish treatments within the field (Figure 1).

Following soybean harvest in the fall, soybean residue provided 40–88% ground cover in the no-till treatments. This ground cover decreased 31–57% by the following spring. This means soybean residue can be expected to breakdown between harvest and spring planting, even when residue is left unincorporated on the soil surface.

In the spring, soil moisture and temperature at a seeding depth of 5 cm were recorded for each treatment over the emergence period of the following crop. No significant differences in soil moisture nor temperature were found between residue management treatments at any site.

There were no differences in test crop stand nor test crop yields between soybean residue management treatments in four out of five experiments. Dry conditions following corn planting near Carman in 2016 resulted in uneven corn emergence and differences in final plant stands among treatments.

For the experiment at Landmark in 2017, the subsequent soybean test crop yield was three bushels per acre higher in the fall tillage treatment than in the direct seeding treatment. However, there were no differences in plant stand, soil temperature or moisture to explain this yield difference.

With appropriate seeding equipment, it is possible to eliminate or reduce tillage after soybean harvest. This finding is especially important given the wind erosion events that have occurred frequently across southern Manitoba over the winter and in early spring.

Decisions about residue management are always farm, field and equipment-specific, but the results of this on-farm study suggest that conventional tillage of low-residue crops such as soybeans may not be necessary in Manitoba, regardless of soil type.

Some of the concerns about direct seeding into soybean residue that were not addressed in this project should be investigated further, such as the impact of ruts after harvest and seeding equipment or openers for planting directly into soybean residue. The financial and time costs of residue management, as well as the risk of soil loss from erosion after soybeans, are good reasons to test your own residue management ideas on your farm.

Figure 1. Soybean residue management treatments near Winkler in 2015.

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