

Comparing Reduced Tillage Implements for Termination of Cover Crops.

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Background:

Intensive tillage practices have led to a decline in the productivity of agricultural soils worldwide. Traditionally, organic agriculture has widely relied on tillage for weed control and termination of cover crops. The potential to reduce reliance on tillage in Canadian organic cropping systems may be realized with new and existing mechanical methods for control of cover crops which include blade rolling, flail mowing and undercutting. These novel implements have been studied previously by other researchers with success.

Project Overview:

The objective of the current study is to conduct a direct comparison of the blade roller, flail mower and noble blade with standard tillage for termination of a pea-barley green manure cover crop as well as a fallow control. The experiment is being conducted at Carman, MB and Lethbridge, AB and is being repeated twice from 2010-2012. The green manure is planted and treatments are applied through termination method in year 1, followed by planting of spring wheat in year 2. The effect of termination method on surface residue, soil nitrogen, soil temperature, soil moisture, weed density and subsequent spring wheat production will be evaluated.

In early spring 2011, surface residue varied from 208-1556 kg/ha at Carman to 37-2605 kg/ha at Lethbridge with the lowest residue occurring in the fallow treatments and highest in the blade roll treatments at both sites. Excessively wet conditions in fall 2010 and spring 2011 combined with delayed seeding limited crop production at Carman. Total broadleaf weed density at stem elongation in spring wheat ranged from 115-307 plants/m². Therefore at Carman, the spring wheat was terminated with tillage and re-planted to buckwheat, which displayed a large treatment response to nitrogen. After 63 days of growth, buckwheat biomass ranged from 2678-7747 kg/ha, with the lowest biomass occurring in the flail mow and blade roll treatments and highest in the standard tillage and blade roll + tillage treatments. Following buckwheat (Carman) and spring wheat (Lethbridge) harvest, fall rye was planted with the goal of following the nitrogen dynamics into year 3 (2012).

Conclusions:

In year 2 at Carman, the blade roller and flail mower had higher surface residue, higher weed pressure and less available N than all other treatments. The noble blade provided intermediate effects on soil N and weed density relative to zero and full tillage treatments. Completion of the project in 2012 will enable us to provide technical and applied information on the impact of these implements to the entire cropping system and contribute to the advancement of low-till organic cropping systems.

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