

Weed Management with Cover Crops in Organic Pulse Crops

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Organic pulse production can be challenging since pulse crops generally do not compete well with weeds. In 2009, the Manitoba Pulse Growers Association funded a project on “Weed management in organic pulse production”. Research trials were conducted in 2010 and 2011 to learn more about various approaches to weed management, including early-season in-crop weed control operations, pulse crop varieties, and weed suppression with cover crops. This article focuses on our cover crop research.

Suppressing weeds in pulse crops through the use of cover crops is a novel approach in Manitoba. Cover crops are crops planted outside the main growing season for the purpose of providing soil conservation and other benefits to the cropping system. Using cover crops for weed suppression may reduce the amount of tillage required for weed control and provide additional soil cover.

Experiment Description

Cover crop experiments were conducted at the Ian N. Morrison research farm at Carman MB in 2009-2010 and 2010-2011 with separate trials for soybeans and navy beans. The purpose of these experiments was to see whether cover crops grown before the pulse crops would be able to suppress weeds without competing with the pulses for resources such as moisture, nutrients, and light.

Five different cover crops, along with a control treatment (no cover crop), were established in fall (mid-Sept 2009; late August 2010) in preparation for the following year’s pulse crops. These cover crops were chosen for various reasons:

- fall rye cover crops are known to suppress weeds and are used successfully in soybean production systems in the U.S.;
- winter wheat, another winter cereal, could provide similar benefits as fall rye;
- oats, barley and oilseed radish, planted in fall, could provide some weed suppression while using less soil moisture than winter cereals and eliminating the need to terminate the cover crop the following spring before planting the pulse crop.

The following spring, each cover crop plot was divided into “tilled” and “no-till” cover crop termination treatments. In tilled treatments, cover crops and weeds were soil incorporated with a rotovator immediately before seeding soybeans and navy beans. In no-till treatments soybeans and navy beans were direct-seeded; in the fall rye and winter wheat treatments, this meant seeding directly into the standing cover crop (Fig. 1). Pulses were solid-seeded in 15 cm (6 inch) rows.

In the control and oat, barley and oilseed radish no-till plots, weeds were flamed when the pulses were just beginning to emerge. The untilled fall rye and winter wheat cover crops were terminated by mowing with a flail mower just after rye and wheat flowering. Pulse crops were about 15-20 cm tall at this time (Fig. 2). No further weed control was conducted in any treatments.



Figure 1. Seeding pulse crops directly into a standing fall rye cover crop, Carman 2011.



Figure 2. OAC Prudence soybeans growing within the canopy of a winter wheat cover crop, a few days before terminating winter wheat by mowing, Carman, 2011.

Results

Results presented are mainly from the fall rye and winter wheat treatments of the 2009-2010 soybean trial. Results from the 2010-2011 soybean and navy bean experiments are currently being compiled.

Cover Crop – Pulse Crop – Weed Dynamics

The fall rye and winter wheat cover crops provided excellent weed suppression in the no-till treatments. However, in these treatments, mowing fall rye and winter wheat cover crops did not provide complete termination and there was some regrowth from these crops, especially the winter wheat. This regrowth, along with the killed cover crop residue, suppressed soybean and navy bean growth in these treatments but also provided very good weed suppression.

Pulse Crop Yield

In 2010, soybean yield ranged from 1130 to 2170 kg/ha (17 to 32 bu/ac; Fig. 3). The fall rye cover crop system produced similar yields as the control, in both tilled and no-till treatments. The winter wheat cover crop system responded differently to the cover crop termination treatment: the no-till system produced the lowest yield due to poor termination of the winter wheat, while the tilled system produced the highest yield in the trial.

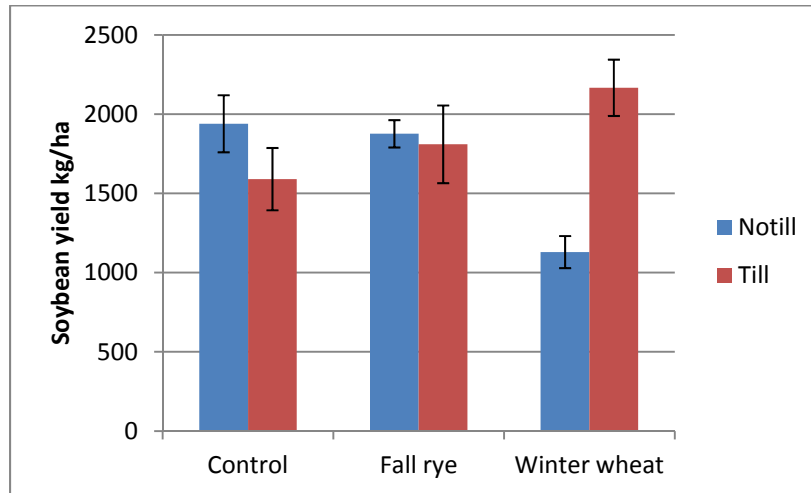


Figure 3. Soybean yield as affected by cover crop type and termination treatment. Error bars represent \pm the standard error of the mean.

Preliminary Conclusions and Ongoing Research

These preliminary results indicate that winter cereal cover crops suppressed weeds and did not reduce soybean yield, as long as the cover crops were terminated adequately. However, when winter wheat was used as the cover crop, termination by mowing was not effective and resulted in excessive competition with the soybean crop.

Results from the 2011 soybean and navy bean experiments will give an indication of how consistent these cover crop effects are in soybeans and whether similar effects will be observed in navy beans.

For more information on this study or our other organic pulse research, contact Martin Entz at m_entz@umanitoba.ca.

