Influence of Crop Rotation and a Cover Crop on Sclerotinia in Canola

Paul Porter & Dave LeGare
University of Minnesota
612-625-6719 & 218-281-4487
pporter@umn.edu & legar001@umn.edu

Funded Plan of Work: Development of Sclerotinia Management Programs in Canola

Abstract

Research began in 2003 to better understand the effectiveness of crop rotation and cover crop management on white mold development in canola.

The primary objective of this project is to evaluate sclerotinia incidence and severity in canola when grown in a number of crop rotations with and without the presence of a cover crop. The crop rotations involve canola grown continuously for three years as well as after one year and two years of wheat. The canola is grown with and without the presence of a fall-planted winter rye cover crop in the cropping sequences. In addition to an evaluation of sclerotinia incidence and severity, canola yield and the economics of the cropping practices will be determined.

The objectives will be accomplished by conducting a three-year field study that was initiated in 2003 at one site and again in 2004 at a second site. The field study involves eight cropping-sequence treatments the first two-years, after which the plots will be divided allowing for sixteen cropping-sequence treatments the third year:

Treatments in 2003 & 2004	Crop year 2003	Crop year 2004	Crop year 2005	Treatments in 2005
1. W-C-C	W	C -&+ rye[1]	C	1. & 9.
2. W-W-C	W	W -&+ rye	C	2. & 10.
3. Wr-C-C	W + rye	C -&+ rye	C	3. & 11.
4. Wr-W-C	W + rye	W -&+ rye	C	4. & 12.
5. C-C-C	C	C -&+ rye	C	5. & 13.
6. C-W-C	C	W -&+ rye	C	6. & 14.
7. Cr-C-C	C + rye	C -&+ rye	C	7. & 15.
8. Cr-W-C	C + rye	W -&+ rye	C	8. & 16.

[1] *The plots will be split following harvest in 2004, with half planted to rye.*

The results of this research will provide information on the influence of crop rotation and the use of a rye cover crop on the incidence and severity of sclerotinia in canola. If such practices are shown to reduce the incidence and severity of sclerotinia, and an economic analysis of the practices suggests such practices are cost effective, this research may lead to modifications in agronomic practices by canola growers. The results may not provide information that will be immediately beneficial to canola growers throughout the region. However, by conducting this sort of research our knowledge of sclerotinia management through the use of alternative cropping practices will be enhanced, which may benefit canola producers in the long run.

Wheat and canola plots in July 2003.

Study location.

A Steadman plate to monitor ascospore presence in wheat.

Planting Information

The whole site was fertilized with 90 lb/ac of N as anhydrous ammonia on 29 April. Each subplot (20 ft X 30 ft) was inoculated with 1.5 cups of Sclerotia mixed with sunflowers (2:1) acquired from the Dahlgrens' sunflower plant in Crookston. The Sclerotia were hand-spread over a 20 ft X 20 ft area in each subplot prior to the final tillage on 13 May.

Canola – 'InVigor 2663' 4.0 lb/ac on 13 May, 114 lb/ac of 11-52-0 applied with seed.

Canola plots of the 2nd and 4th replicates of the trial were over seeded on 4 June with '46A76' due to carry-over injury caused in those plots from Pursuit Plus residue applied in 2002. The InVigor 2663 was at about the 3-leaf stage at the time of the over-seeding, but was not damaged much and continued to grow nicely. The only places that the 46A76 grew nicely were in the spotty areas where the InVigor 2663 had been damaged by the Pursuit. These patches were about two weeks later to flower and at about 10% seed color change at swathing time.

Wheat - 'Alsen' 108 lb/ac on 13 May, 95 lb/ac of 11-52-0 applied with seed.

Herbicide

The wheat and canola were sprayed with Stinger (8 oz/ac) on June 9 to kill volunteer soybeans and sunflowers. No other herbicides were applied to the wheat and canola.

Steadman Test

The Steadman test plates were placed, one per subplot, on the following dates: 5, 12, 18, & 26 June; 3, 8, 15, & 23 July; and 1 & 7 August. The plates were exposed out for two hours at or around noon. Each plate was positioned on the ground at the exact same location each date. After ~3 days the plates were scored for the number of yellow spots indicating ascospore exposure.

Canola and Wheat Harvest

Canola was swathed on August 11 at about 40 to 50% seed color change. Sclerotinia severity and infection levels were also recorded. The canola and wheat were combined on 26 and 20 August, respectively.

Winter Rye

The residue from the wheat and canola were flailed on 29 August and the plots were chisel plowed 2x the same day. The plots were lightly rotor tilled to break up large clods on 3 September and the winter rye (Homil 21) was seeded on 4 September at a rate of 120 lb/ac and a depth of 1 to 1.5 inches into very cloddy dry soil. The site stayed dry until it rained the following week. Rain and temperature data were collected the entire summer, and are available for further analysis if necessary.

Canola and Wheat Yields

Across the entire trial, canola yields averaged 1800 lb/ac and wheat yield averaged 60 bu/ac. The canola yields were thought to be decreased slightly (perhaps 10%) because of the later planting of the second variety in some plots.

Sclerotinia Pressure

The average sclerotinia incidence and severity ratings for all canola subplots at canola swathing were 8.3% and 3.3, respectively. The range in incidence and severity was from 0 to 22% and 0 to 5, respectively. These values suggest that there was only limited disease pressure at this location in 2003, in spite of the application of sclerotia earlier in the spring. The previous crop was wheat in 2001 and soybean in 2002.

Results from the Steadman test indicated essentially no difference between plate counts from canola versus wheat plots. Counts per plate varied within a given date, ranging from as 0 to over 50, however, the average number of counts per plate (subplot) was 2.0, 0.1, 0.6 and 1.8 in June; 5.5, 0.9, 10.7, 3.6 in July; and 12.1 and 9.7 in August. The real interest in this trial is how the previous crop and cover crop influence these values in 2004 and 2005.

UNIVERSITY OF MINNESOTA

Sclerotinia Initiative Annual Meeting 2004
20-22 Jan. 2004 – Bloomington, MN