



Crop Rotation Influences Canola and Wheat Diseases and Production – 2005 Update

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

Introduction

Research began in 2003 to better understand the effect of crop rotation and a rye cover crop on white mold development in canola. The primary objective was to evaluate sclerotinia incidence and severity in canola when grown in a number of cropping sequences with and without the presence of a fall-planted rye cover crop. A three-year field study was initiated in 2003 at one site (03CRye) and again in 2004 at a second site (04CRye). This update focuses on results of the second year of the studies.

Abstract

Canola grown following a rye cover crop compared with no rye cover crop: In the second year for both studies, canola yields were reduced (15.5 and 10.7%) and seed protein content was increased (6.6 and 9.5%) but test weight was not influenced when rye was grown as a cover crop. Canola plant height at harvest was reduced by 6.7% when rye was grown in 03CRye, but was not influenced by the rye in 04CRye. Canola plant biomass was reduced when rye was grown in 03CRye, but not in 04CRye. In 03CRye, time to 30% flowering was delayed by about 1 day, whereas in 04CRye time to beginning flowering was not influenced when rye was grown. Canola seed oil content was not influenced by the rye in 03CRye, whereas in 04CRye the seed oil content was increased by 4.7%. For both studies, sclerotinia disease severity was not influenced when rye was grown, but in 03CRye sclerotinia disease incidence was greater where no rye was grown (but both incidence and severity were quite low).

Canola grown following wheat or canola: In the second year for both studies, test weight, plant height, seed protein content, and sclerotinia disease incidence and severity were not influenced by whether the previous year's crop was wheat or canola, but canola yield following canola was reduced by 9.0% in 04CRye. In both studies, canola grown after canola delayed time to 30% flowering by about a day compared with canola grown after wheat. Only in 04CRye was canola seed oil content influenced by previous crop, with canola grown after wheat slightly greater.

Wheat grown following a rye cover crop compared with no rye cover crop: In the second year for both studies, wheat yields were reduced (9.2 and 19.1%), wheat test weights were reduced (0.5 and 1.6%), mid-season wheat biomass were reduced (29.0 and 66.4%), and wheat plant heights at harvest were reduced (4.5 and 8.9%) when rye was grown as a cover crop compared with no rye. Heading date was not influenced by rye in 03CRye. Although wheat scab disease severity was not influenced for either study, in 04CRye wheat scab disease incidence was lower when rye was grown. In 04CRye, wheat protein content and 1000 kernel weight were decreased (8.1 and 10.5%, respectively) when rye was grown, but this did not occur in 03CRye.

Wheat grown following wheat or canola: In the second year, wheat yield was reduced by 9.2% when grown wheat on wheat compared with wheat on canola in 03CRye, but in 04CRye there was no statistical difference (in spite of a numerical 8.0% difference). In both studies, protein content was reduced (2.8 and 2.4%) when grown wheat on wheat. Wheat test weights were reduced slightly in 04CRye when grown wheat on wheat, but not in 03CRye. For both studies, wheat scab disease incidence and severity were not influenced with wheat on wheat compared with wheat on canola.

Wheat

2004 Results from 03CRye

	6-May	8-July	-----Wheat Scab-----		Height	1%	1000
	Yield	Test weight	Rye	Wheat	headed	Protein	Kernel
	kg/ha	qu/hl	biomass	biomass	m	%	g
			kg/ha	kg/ha	DAP	%	
				Disease %	Disease Severity		
'03 crop – winter '03-'04 cover crop							
Canola – NoRye	3957	0.777	--	2803	1.12	65.3	34.7
Canola – Rye	3621	0.779	--	1782	1.07	65.3	36.8
Wheat – NoRye	3621	0.781	--	2220	1.09	64.3	35.6
Wheat – Rye	3273	0.772	--	1794	1.04	64.8	36.1
'03 crop – averaged across winter '03-'04 cover crop							
Canola	3789	0.778	--	2298	1.09	65.3	35.8
Wheat	3441	0.776	--	2007	1.07	64.5	35.8
Winter '03-'04 cover crop – averaged across '03 crop							
NoRye	3789	0.779	--	2511	1.10	64.8	35.1
Rye	3441	0.776	--	1782	1.05	65.0	36.5
Statistics							
Mean	3621	0.777	--	2152	1.07	64.9	35.8
LSD (0.05)	127	0.003	--	266	0.02	0.5	1.1
C.V.	4.7	0.5	--	16.8	49.2	42.7	2.9
Pr > F:							
2003 Crop	0.000	0.109	--	0.033	0.891	0.800	0.952
Winter cover	0.000	0.016	--	0.000	0.142	0.458	0.002
Crop X Cover	0.898	0.001	--	0.030	0.496	0.184	0.004

2005 Results from 04CRye

	11-May	16-June	-----Wheat Scab-----		Height	1%	1000
	Yield	Test weight	Rye	Wheat	headed	Protein	Kernel
	kg/ha	qu/hl	biomass	biomass	m	%	g
			kg/ha	kg/ha	DAP	%	
				Disease %	Disease Severity		
'03 crop – winter '03-'04 cover crop							
Canola – NoRye	2139	0.814	0	1685	1.18	0.945	35.3
Canola – Rye	1902	0.809	1063	575	1.18	0.859	31.9
Wheat – NoRye	2151	0.814	0	1405	1.18	0.940	34.8
Wheat – Rye	1569	0.794	1167	464	1.18	0.856	30.9
'03 crop – averaged across winter '03-'04 cover crop							
Canola	2021	0.812	531	1130	1.18	0.902	33.7
Wheat	1860	0.804	583	934	1.18	0.897	32.8
Winter '03-'04 cover crop – averaged across '03 crop							
NoRye	2146	0.814	0	1545	1.18	0.942	35.1
Rye	1735	0.801	1114	519	1.18	0.859	31.4
Statistics							
Mean	1940	0.808	557	1032	1.18	0.894	33.3
LSD (0.05)	284	0.011	383	163	0.074	0.074	1.58
C.V.	11.9	1.1	55.9	13.2	44.8	47.4	3.9
Pr > F:							
2003 Crop	0.108	0.049	0.690	0.003	0.683	0.407	0.119
Winter cover	0.000	0.003	0.000	0.000	0.031	0.668	0.006
Crop X Cover	0.087	0.033	0.690	0.149	0.483	0.683	0.999

Canola

2004 Results from 03CRye

	6-May	8-July	-----Sclerotinia-----		Height	30%
	Yield	Test weight	Rye	Canola	headed	Flower
	kg/ha	qu/hl	biomass	biomass	m	DAP
			kg/ha	kg/ha		
				Oil %	Disease %	Disease Severity
'03 crop – winter '03-'04 cover crop						
Canola – NoRye	2040	0.638	--	2713	1.17	64.0
Canola – Rye	1726	0.634	--	1435	1.07	64.8
Wheat – NoRye	2018	0.637	--	2612	1.12	63.0
Wheat – Rye	1704	0.633	--	1782	1.04	64.5
'03 crop – averaged across winter '03-'04 cover crop						
Canola	1883	0.636	--	2074	1.12	64.4
Wheat	1861	0.634	--	2197	1.09	63.8
Winter '03-'04 cover crop – averaged across '03 crop						
NoRye	2029	0.637	--	2657	1.14	63.5
Rye	1715	0.633	--	1603	1.07	64.6
Statistics						
Mean	1872	0.636	--	2130	1.09	64.1
LSD (0.05)	85	0.007	--	54	0.03	0.5
C.V.	6.2	1.3	--	32.1	4.2	1.0
Pr > F:						
2003 Crop	0.540	0.600	--	0.615	0.060	0.014
Winter cover	0.000	0.175	--	0.000	0.183	0.000
Crop X Cover	0.984	0.886	--	0.364	0.245	0.123

2005 Results from 04Rye

	11-May	16-June	-----Sclerotinia-----		Height	Begin
	Yield	Test weight	Rye	Canola	headed	Flower
	kg/ha	qu/hl	biomass	biomass	m	DAP
			kg/ha	kg/ha		
				Oil %	Disease %	Disease Severity
'03 crop – winter '03-'04 cover crop						
Canola – NoRye	2305	0.681	0	1015	1.33	50.0
Canola – Rye	2060	0.677	1540	931	1.35	50.5
Wheat – NoRye	2535	0.679	0	1328	1.35	48.7
Wheat – Rye	2260	0.679	1266	1282	1.28	49.2
'03 crop – averaged across winter '03-'04 cover crop						
Canola	2183	0.679	770	973	1.34	50.3
Wheat	2398	0.679	633	1305	1.31	48.9
Winter '03-'04 cover crop – averaged across '03 crop						
NoRye	2420	0.681	0	1171	1.34	49.3
Rye	2160	0.678	1403	1107	1.31	49.8
Statistics						
Mean	2290	0.679	702	1139	1.31	49.6
LSD (0.05)	150	0.003	160	294	0.064	0.7
C.V.	5.3	0.4	18.5	21.0	5.1	1.2
Pr > F:						
2003 Crop	0.001	0.641	0.020	0.004	0.834	0.000
Winter cover	0.000	0.101	0.000	0.517	0.287	0.058
Crop X Cover	0.772	0.440	0.020	0.851	0.235	0.999