Fungicide timing and rate to control blackleg disease in winter canola.

Project Report to the Washington Oil Seed Commission

SUBMITTED BY:

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INVESTIGATOR:

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DESCRIPTION: The goal of this project is to understand the effect of timing and frequency of application of azoxystrobin on blackleg disease in winter canola in the PNW. The outcome of this project will be recommendations for use of azoxystrobin and related fungicides on winter canola and an understanding of the relationship between level of infection and expected yield reduction.

JUSTIFICATION AND BACKGROUND:

Blackleg, caused by the fungus *Leptosphaeria maculans*, is the most serious disease of canola and oilseed rape worldwide. Blackleg was identified and confirmed in Umatilla county Oregon in March of 2015. It was observed in four fields of winter canola and was observed on canola crop residues in at eight field from the previous year. Since first confirmation of the disease, it has been observed in several fields in 2015, 2016 and 2017. It is likely that Blackleg was present in the area several years before confirmation. Blackleg has also been observed in Idaho. Blackleg poses in severe threat to the regional canola and the Brassica seed industries. It is very likely that blackleg will become a greater risk as acreage of winter canola increase in the region. Because blackleg incidence is newly identified to the region, there is not available information management of this disease. One component of management is the use fungicides. Currently there are not local recommendations for rate and timing of fungicides to control this disease. Information from Canada, while excellent is for spring canola and is not easily extrapolated to winter canola grown here. In addition, no information exists on the degree to which blackleg is lowering yields. It is critical that information on yield loss and recommendations for fungicide application be developed. Since blackleg is a serious disease and every effort should be made to contain its spread, research can only be conducted where the problem already exists.

More than 250,000 acres of canola could be grown in the region and not adversely affect the market. Development of better agronomic practices will assist in increasing the acreage of winter canola. Proper and feasible management of Blackleg will help in the effort to increase winter canola acreage in PNW. Recently acreage of canola has been expanding due to the existence of a regional crushing facility at Warden, Washington is driving the need for a rotation crop with winter wheat, and low wheat prices. As acreage expands, the risk of disease and other pests will increase.

OBJECTIVES:

1. Apply azoxystrobin in autumn, late winter and early spring in 1, 2, or 3 applications to determine the level of Blackleg control and measure the benefit of control on yield.
2. Develop recommendations for fungicide applications to winter canola for treatment of blackleg disease

RESEARCH PROCEDURES:

The effect of timing and frequency of application of Azoxystrobin (Quadris) (Group 11) fungicide to control blackleg (BL) was studied. A randomized complete block experiment with 6 treatments and 4 replications was used. Treatments were 1) control (no fungicide), 2) autumn application, 3) autumn x spring 1 application, 4) spring 1 application, 5) spring 1 x spring 2 application and 6) spring 1 x spring 2 x spring 3 application. Autumn application occurred on 30 October 2017 at 4-6 leaf stage. Spring 1 application occurred 15 March 2018 at rosette stage. Spring 2 occurred on 4 April 2018 at bud formation and Spring 3 on 26 April at initial flower with canopy height of 16 inches. For this study, a rate of 7 oz/acre Quadris were used for each application with a carrier rate of 15 gallons water per acre. A backpack CO_2 sprayer with 10-foot boom operated at 30 PSI will be used for application.

The experiments was sown on tilled summer fallow at the Columbia Basin Agricultural Research Center, Pendleton, Oregon on a Walla Walla silt loam, coarse loamy, mixed, mesic, hyperactive Typic Haploxeroll. The trial received 80 lb N, 20 lb P_2O_5 and 15 lb S/acre in the summer fallow as a liquid mix of 32-0-0, 10-34-0 and 10-26-0. Plots of Amanda winter canola were sown 14 September 2017 at 6 lb seed/acre with a 5-foot wide Hege plot, using 6-inch row spacing, JD double disk openers and press type packer wheels. Individual plots had a dimension of 10 X 20 feet. Assure II herbicide was applied 20 March at 12 oz/acre with 15 gallons of water for control of grassy weeds and volunteer wheat. In each experiment subplots of 5 X 20 foot plot were used for combine harvest and for destructive plant sampling for assessment of BL and SC. Harvested plots were swathed with a 5-foot wide Swift Current plot swather on 22 June 2018 and combined on 27 June 2018 with a Hege 140 plot combine with draper pick-up and auger feed into the feeder housing. Harvested seed was collected in cloth bags and later cleaned with a M2B clipper cleaner with appropriately sized sieves. Seed was weighed and yield determined using harvested plot area. Oil content, percent protein, test weight and percent moisture was determined on subsamples using a Perten 9200 NIR grain analyzer that has a canola algorithm. The remaining subplot in each plot were sampled for incidence of BL and or SC. All plants in an individual row in each subplot were cut through at the base with hand shears to expose the basal stem area for presence of BL and SC. In addition stems were inspected to 60 cm height for SC stem rot. This is typical procedure for identifying BL and SC respectively. Observation of each plant was recorded as healthy, blackleg infected or sclerotina infected. In addition each BL infected plant was given a severity rating using a scale of 1 to 4. The scale was the percent of basal area blackened with disease with 1 = < 25 %, 2 = 25-50 %, 3 = 50-75 %, and 4 = >75 %. Percent BL or SC was determined by comparing those infected to the total number of plants sampled.

RESULTS AND DISSCUSSION:

This season the overwhelming factor in the trial was the severe infection of sclerotina white rot. In the 2017 trial, a side experiment showed no significant difference in plots treated or not treated for sclerotina. In addition, sclerotina has not been an issue in canola experiments at CBARC in the past 25 years, with the exception of one trial in 2003. Based on this history we did not treat for sclerotina in the 2018 season. In retrospect this was a mistake. Table 1 contains the data we collected on of Blackleg infection, BL severity rating, sclerotina infection, yield, oil content, seed protein and bushel test weight. Note that sclerotina infection ranged from 36 to 66 in the experiment. This was the overwhelming factor for low yields and the lack of treatment effects on fungicide response black leg. Statistically, all measured variables were found non-significant with the fungicide treatments. There was good correlations between yield and percent sclerotina infection (Figure 1). The regression equation with an R^2 of 0.74 projects zero infection yield of slightly over 1 ton and 13.8 lb/acre yield reduction for each percent of sclerotina present. The BL severity rating was used to estimate the severity of basal stem rot using the scale explained in the procedures. Figure 2 shows the correlation of between percent BL infection and the severity index. As percent infection increases there is fairly good correlation that severity does as well. At lower levels of infection the disease severity was less and as percent infection increase so generally does the severity rating. In general this means disease severity increases with the level of infection.

Results of this study were very discouraging and completely contrast the results of 2017. The results do warrant further study with aggressive control of sclerotina. Yield and other results were strongly influenced by sclerotina infection. In the 2017 season we observed a level of 5 to 8% Sclerotinia in this experiment. In a side experiment in 2017 where sclerotina was controlled, the levels of sclerotina were 7 and 9 percent for controlled v. not controlled. In future trials, fungicides will always be preemptively applied for control of sclerotina.

Table 1. Effect of azoxystrobin application on Blackleg infection, Sclerotina infection, yield, oil content, protein content, and test weight of winter canola at CBARC, Oregon, 2018

Treatment	Blackleg infection %	BL Severity rating	Sclerotina infection %	yield lb/acre	oil content %	Protein content %	Test Weight lb/bu
control	16.5	1.90	36.0	1374	43.5	21.7	53.0
F	4.9	1.13	66.0	1159	43.2	21.5	53.0
F, S1	10.5	1.50	49.1	1408	43.6	21.2	52.9
S1	14.6	2.03	44.0	1484	44.5	19.9	52.0
S1, S2	5.4	1.25	61.6	1110	42.4	22.0	53.1
S1, S2, S3	13.0	1.16	36.4	1652	45.5	19.7	51.9

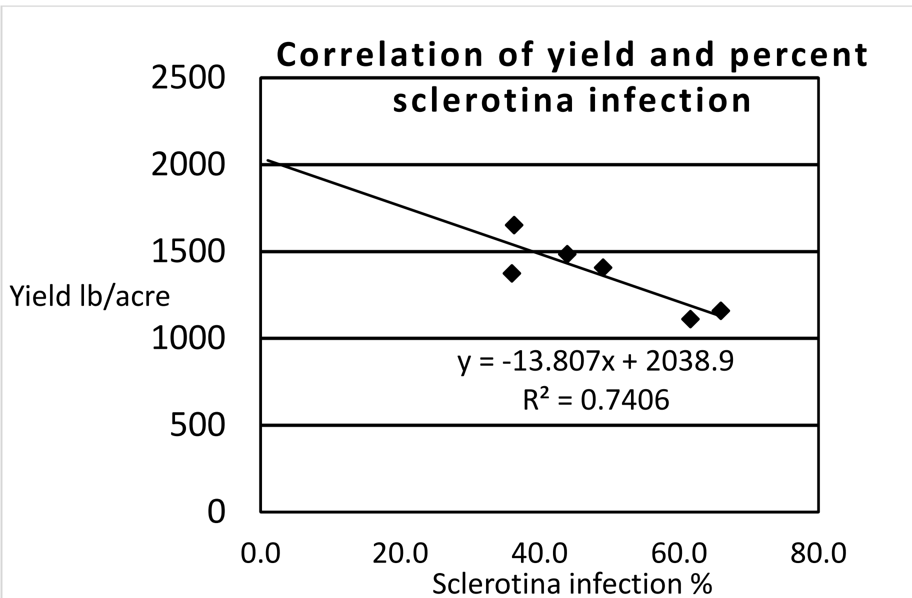

Figure 1. Correlation of yield and percent sclerotina infection.

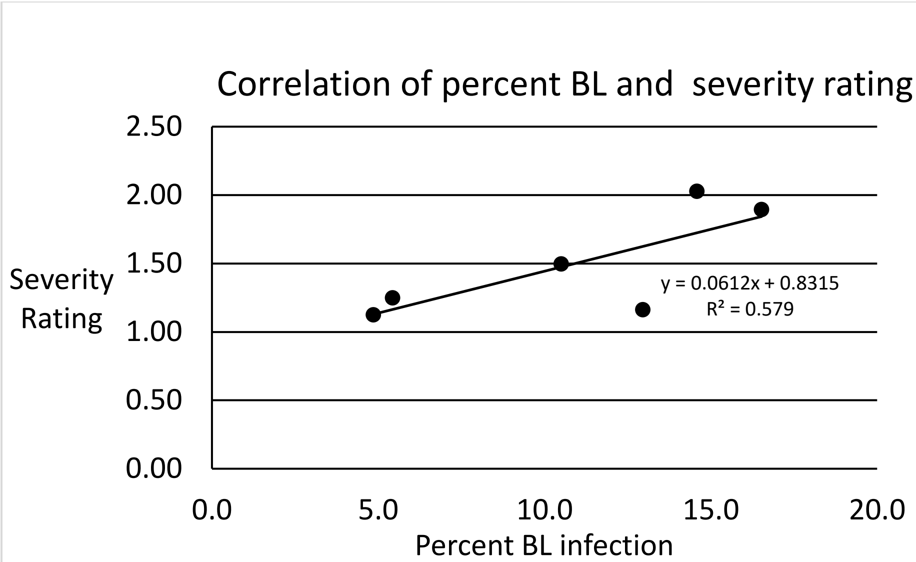

Figure 2. Correlation of percent Blackleg infection and severity rating.