Activity 10

Integrated Canola Disease Management: The effect of crop rotation, nutrient management, planting date and plant density on the incidence and severity of stem rot and black leg of canola.

Annual Report – March 31, 2016

Overall Objective

The objective of the proposed work is to study the effect of crop rotation, nutrient management, planting date and plant density on the incidence and severity of stem rot and black leg in canola. It is expected that this research will lead to identification of cropping practices (e.g. crop rotation, seeding rate, time of planting) that could significantly influence the incidence of stem rot and black leg disease.

Audience

The audience is crop producers, specifically those who grow or who have an interest in growing canola.

Highlights

Stem rot of canola is a disease that has a large impact on the crop. Environmental factors play a major role in the incidence and severity of this disease. The aim of this activity is to study the effect of cropping practices, crop rotation and nutrient management (N, S and B) on stem rot disease.

In general, nutrient management with the two lowest doses (0 and 50 N) of nitrogen gave significantly less disease incidence with InVigor L140P. Application of sulfur (all combinations) with 150 N yields less disease incidence as compared to other combinations. 100 series plot had shown three times less disease incidence (10 %) as compared to 400 series plot. Sulfur management shown significantly reduced disease incidence with 400 series plot (6 %) than 200 series plot. Application of boron had a positive correlation with disease incidence percentage for both hybrids.

Outcomes

The field trial was conducted at Canning, Nova Scotia. The effect of nutrients: nitrogen, sulphur and boron on the incidence of *Sclerotinia* stem rot was studied. Boron was applied at rates of 0, 500 (foliar) and 2,000 (seedling) g/ha on canola hybrids InVigor 5540 and InVigor L140P. Each treatment had 4 replication plots.

The crop rotation experiment was conducted for four consecutive seasons with soybean, maize, wheat and canola. The rotations were canola-canola-canola-canola; canola-soybean-maize-wheat; canola-wheat-maize-soybean; and canola-wheat-maize-soybean.

Disease incidence of Sclerotinia stem rot was calculated using the formula:

$$\text{Disease incidence} = \frac{\text{number of infected plants}}{\text{total number of plants}} \times 100$$

Disease severity of Sclerotinia stem rot was calculated using the formula:

$$\text{Disease severity \%} = \Sigma \frac{\text{Class x no.of plants in class x 100}}{\text{Total no.of plants x 3}}$$

Results

In the nutrient management trial with nitrogen application, InVigor L140P showed less disease incidence in general. Significantly reduced disease incidence was observed with application of 50 N followed by 0 N with InVigor L140P. Disease severity % was lowest with InVigor 5540 when nitrogen was applied at the rate of 100 and 200, respectively. However, the two lowest doses alone gave significantly less disease severity in comparison to split doses (Fig 1 and 2).

Application of sulfur in all the combinations with 150 nitrogen shown reduced disease incidence as compared to other combinations. A similar pattern was observed for disease severity % when treated with sulfur (Fig 3 and 4).

With the increasing boron dose, disease incidence increased in InVigor 5440, but there was no difference for disease incidence with InVigor L140P. However, there was no difference for disease severity % with boron application (Fig 5 and 6).

The Crop rotation trial showed significantly less disease incidence with Canola- Soybean-Maize-Wheat as compared to other rotations (Fig 7 and 8).

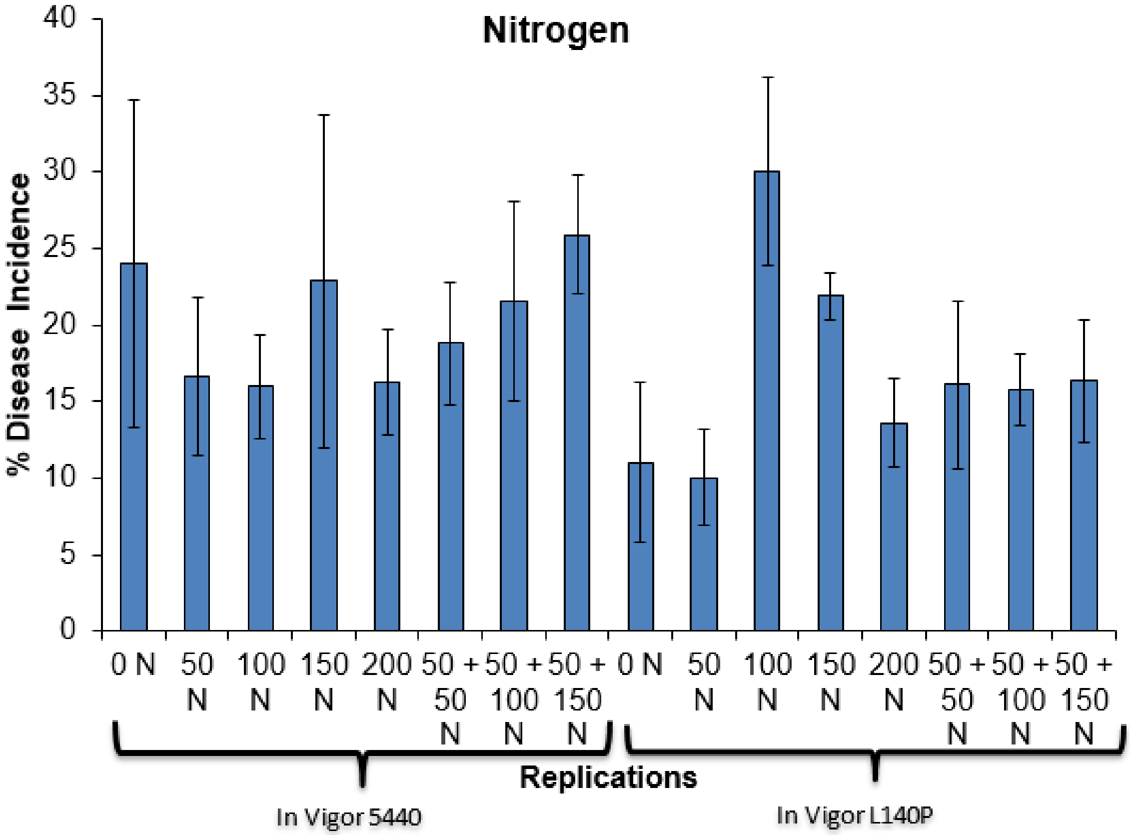


Fig 1. Sclerotinia stem rot incidence in InVigor 5440 and InVigor L140P with Nitrogen treatment. Values represent mean ± standard error. n=4

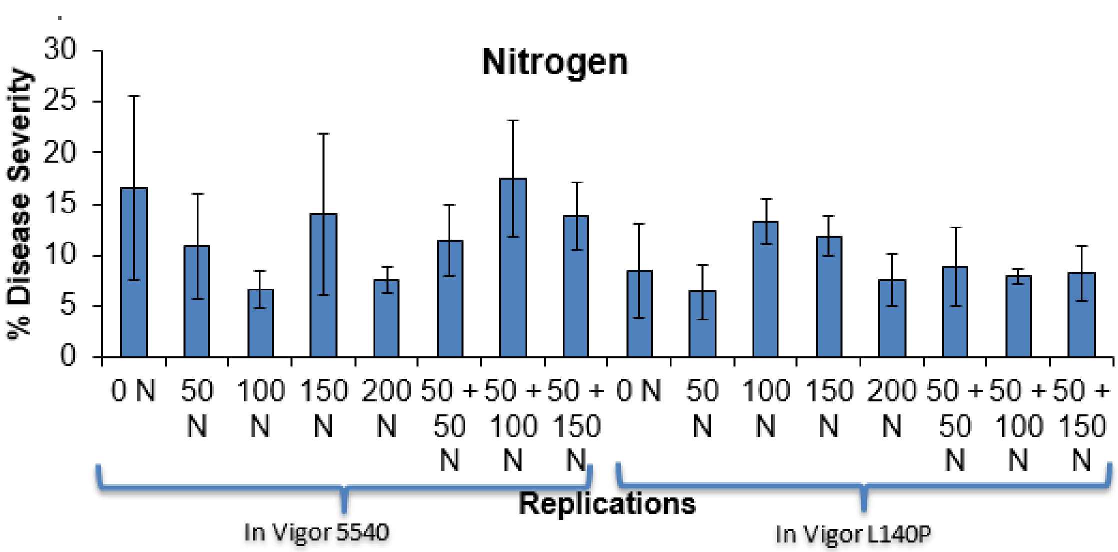


Fig 2. Sclerotinia stem rot severity % in InVigor 5440 and InVigor L140P with Nitrogen treatment. Values represent mean ± standard error. n=4

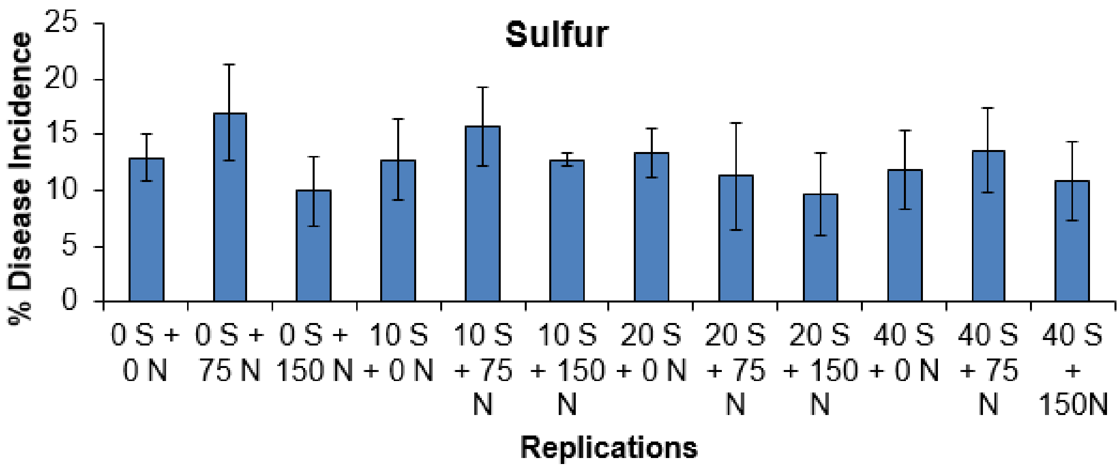


Fig 3. Sclerotinia stem rot incidence with sulfur treatment. Values represent mean ± standard error. n=4

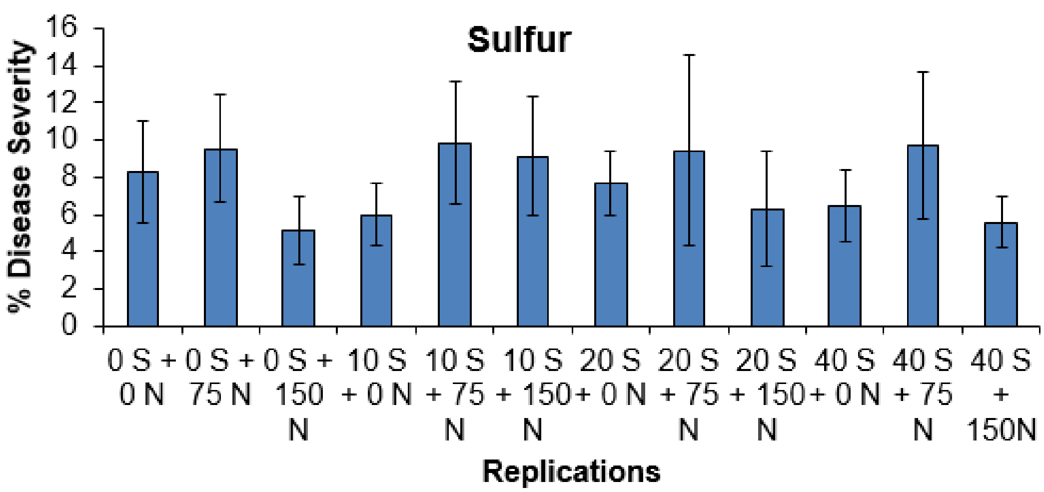


Fig 4. Sclerotinia stem rot severity % with sulfur treatment. Values represent mean ± standard error. n=4

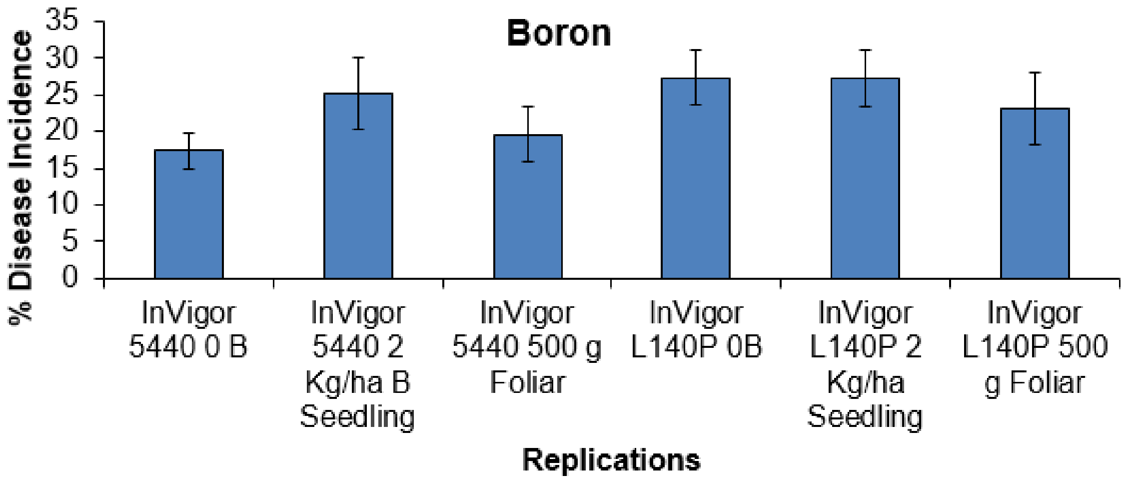


Fig 5. Sclerotinia stem rot incidence in InVigor 5440 and InVigor L140 P with boron treatment. Values represent mean ± standard error. n=4

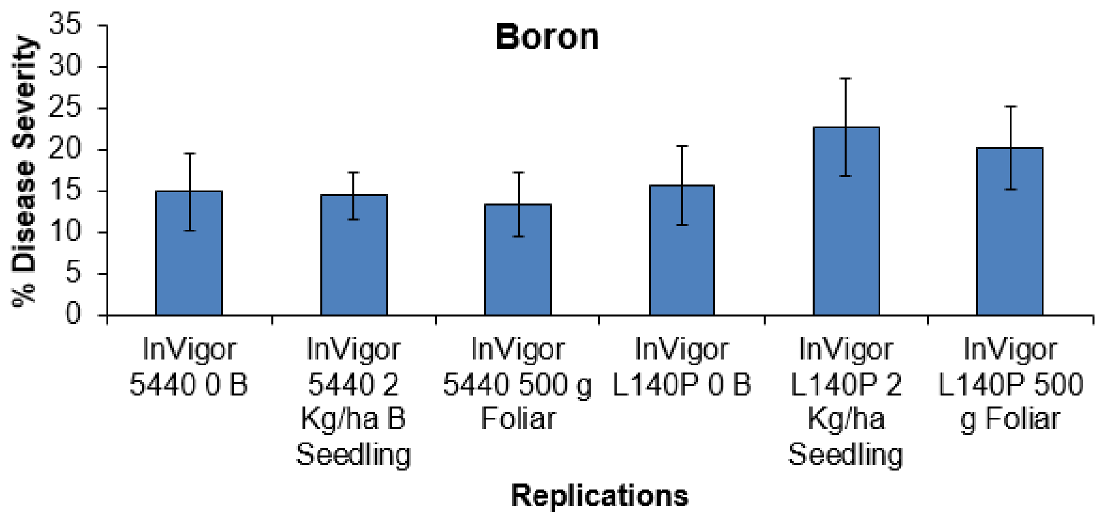
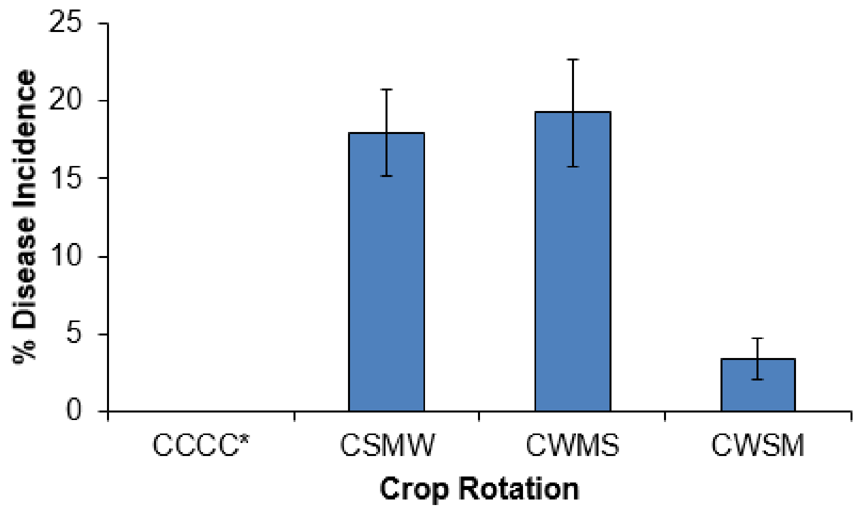
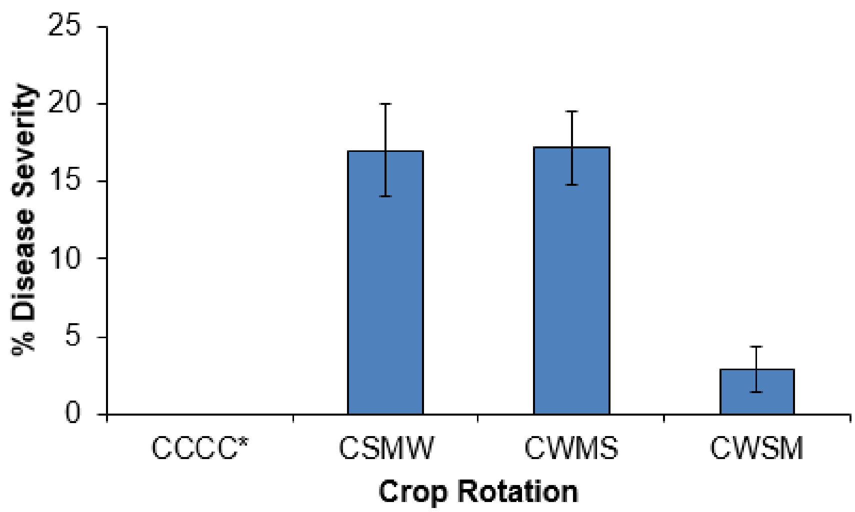


Fig 6. Sclerotinia stem rot severity % in InVigor 5440 and InVigor L140P with boron treatment. Values represent mean ± standard error. n=4



(Note: - * Indicates that all the plants in CCCC rotation plot were destroyed due to high disease and weeds)

Fig 7. Sclerotinia stem rot incidence in canola among various crop rotations (S – Soybean M – Maize - W – Wheat C – Canola). Values represent mean ± standard error. n=12



(Note: - * Indicates that all the plants in CCCC rotation plot were destroyed due to high disease and weeds)

Fig 8. Sclerotinia stem rot severity % in canola among various crop rotations (S – Soybean M – Maize - W – Wheat C – Canola). Values represent mean ± standard error. n=12

Future Work

This was the last year for the experiment.