Impact of Sclerotinia Stem Rot on Soybean Yield and Seed Quality

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To determine the level of disease reduction that fungicides need to achieve to be profitable, the impact of Sclerotinia stem rot (SSR), caused by *Sclerotinia sclerotiorum*, on soybean yield must be characterized.

The impact of SSR on soybean yield has been characterized in Illinois and Iowa and initial estimates have been generated for North Dakota (Danielson et al. 2004, Hoffman et al. 1998, Yang et al. 1999), but robust estimates of the impact of SSR on soybean seed yield and quality have not been generated for North Dakota. Data from Iowa and Illinois are not likely to be representative of North Dakota; temperatures are more conducive to the development of SSR in North Dakota, SSR is a more prevalent disease of soybean at the latitude of North Dakota; SSR incidence has been reported to be lower in the soybean maturity groups planted in North Dakota, and North Dakota producers have higher Sclerotinia pressure due to their rotations with other broadleaf crops susceptible to Sclerotinia (sunflowers, dry beans, canola, etc.).

The objective of the present study was to develop estimates of the impact of SSR on soybean yield and seed quality in North Dakota. This is the first year of a multi-year project, and the results presented in this report should be considered preliminary.

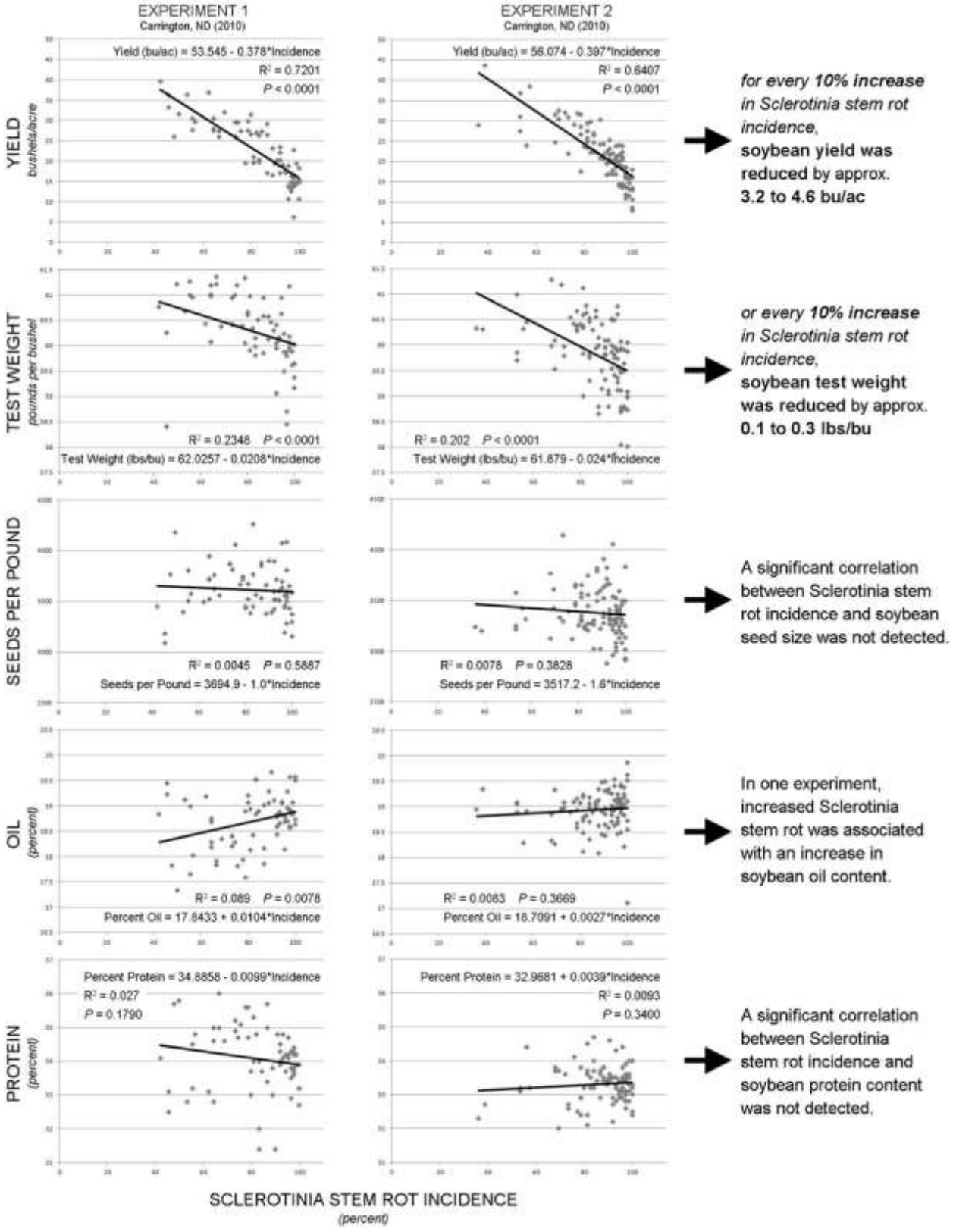
Methods

A broad range of SSR incidence levels were established within replicated experiments by applying fungicides to small soybean plots (5 feet by 20 feet) at early flowering (late R1 to early R2 growth stage) and inoculating the plots with ascospores of *Sclerotinia sclerotiorum* at early flowering (R2 growth stage). Detailed methods, including soybean variety, seeding, inoculation, and fungicide application details, are provided in the report “Field evaluation of fungicides for control of Sclerotinia stem rot of soybean” found in this volume.

Conclusions

SSR had a significant negative impact on soybean yield and test weight in both studies, and the correlation between SSR and yield was particularly strong (Pearson correlation coefficients of 0.80 and 0.85; Figure 1). A weak but statistically significant positive relationship between SSR and percent oil was observed in one of the two studies (Figure 1), suggesting that the stress caused by SSR may result in increased soybean oil content in some circumstances. Significant relationships between SSR incidence and seed size (as estimated by seeds per pound) and between SSR incidence and percent protein were not detected in either study (Figure 1).

Figure 1. Relationship between Sclerotinia stem rot incidence and soybean seed yield and quality in two fungicide trials conducted in Carrington, ND, in 2010.



The results indicate that for every 10 percent increase in SSR incidence, yield is expected to drop by approximately 3.2 to 4.6 bu/ac and test weight is expected to drop by approximately 0.1 to 0.3 lbs/bu. However, these results should be considered preliminary, as they are based on data collected from a single variety planted at a single location in a single year. To establish more robust estimates of the impact of SSR on soybean seed yield and quality, analyses will be expanded to additional soybean varieties in 2011.

Literature Cited

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