
Effectiveness of chemical seed treatments in improving the agronomic performance of cereal crops derived from *Fusarium*-infected seed lots

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Introduction

For the last decade, Fusarium head blight (FHB), caused mostly by *Fusarium graminearum*, has resulted in significant losses to the grain industry in the eastern Canadian Prairies. Its potential spread further westward is of major concern to wheat and barley growers. Planting *F. graminearum*-infected seed may introduce this pathogen into areas that for the most part are still free of FHB. Fernandez and May (2004) reported that currently registered seed treatments would not prevent the spread of *F. graminearum* from infected common or durum wheat seed to underground plant tissue.

This paper reports on another objective of the same study which was to determine whether seed treatments can improve the performance of barley, common and durum wheat crops derived from *Fusarium*-infected seed lots.

Materials and Methods

In 2003 and 2004, *F. graminearum*-infected seed of barley (2004 only), common and durum wheat treated with fungicides currently registered in Canada: triticonazole (Charter 2.5), difenoconazole + metalaxyl-M (Dividend XL), tebuconazole (Raxil 250), carbathiin + thiram (Vitaflo 280) and fludioxonil (Maxim) (2004 only) were planted at three locations in eastern Saskatchewan, Indian Head, Sintaluta and Canora (2004 only). Seed were treated with these products at recommended rates. Controls consisted of untreated *Fusarium*-infected seed and seed from an uninfected lot.

The experiment had a split-plot design with crops as main plots and seed treatments as sub-plots, with four replicates. Plot size was 41.6 m² (3.9 m wide and 10 m long). Plots were seeded directly into standing stubble using a low disturbance no-till plot seeder with a row spacing ranging from 20 to 30.5 cm. Seeding rates were adjusted to achieve a target plant density of 200 plants m⁻².

The number of seedlings and grain heads were counted in two 1-m sections of crop row within each plot, at 2-3 weeks after emergence and after heading, respectively. Plant height was measured after heading. Kernel weight was calculated by weighting between 700 to 1000 kernels using a seed counter. Seeds head⁻¹ were calculated using panicles m⁻², grain yield and kernel weight. Seeds m⁻² were calculated using grain yield and kernel weight. Test weight was measured using the methodology specified by the Canadian Grain Commission (1998).

Data were analysed with the PROC GLM procedure of SAS (SAS 1999).

Results

Treating *Fusarium*-infected seed with fungicides commercially available in Canada did not consistently affect seedling density or grain yield of barley, common or durum wheat (Tables 1 and 2). At one site year out of 8, Indian Head 2003, the application of Charter or Dividend XL increased seedling density compared to both the untreated infected and untreated uninfected treatments, but there was no effect on grain yield. At another site year, Indian Head 2004, the treatments of Dividend XL and the untreated uninfected seed had higher grain yield than the untreated infected seed, Charter, Vitaflo 280 or Maxim treatments, but had no effect on seedling density.

In 2005, at all three locations the untreated infected wheat treatment had a significantly reduced plant density compared to the other treatments. The untreated uninfected, Raxil 250 and Vitaflo 280 treatments had higher plant densities than the untreated infected treatment at all three locations. For wheat, the grain yield of Vitaflow 280 at Canora and the untreated uninfected treatment at Redvers was significantly higher than the untreated infected treatment. For barley, there was no difference among treatments for plant density or grain yield.

Conclusion

Based on our observations, we conclude that registered seed treatments currently available in Canada were not effective in consistently improving the agronomic performance of *Fusarium*-infected barley or wheat seed lots planted in eastern regions of Saskatchewan. The use of uninfected seed lots is recommended.

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