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Effect of Seed Treatments and Fall-Applied Foliar Fungicides on Winter Wheat Stand Establishment and Yield

Brian Beres[1], T. Kelly Turkington[2], Randy Kutcher[3], Byron Irvine[4], Eric N. Johnson[5], John O'Donovan[2], K. Neil Harker[2], Christopher Holzapfel[6], Ramona Mohr[4], Guy Lafond[7], Gary Peng[8] and Dean Spaner[9]

[1]Agriculture and Agri-Food Canada, Lethbridge, AB; [2]Agriculture and Agri-Food Canada, Lacombe, AB; [3]University of Saskatchewan, Saskatoon, SK; [4]Agriculture and Agri-Food Canada, Brandon, MB; [5]Agriculture and Agri-Food Canada, Scott, SK; [6]Indian Head Agricultural Research Foundation, Indian Head, SK; [7]Agriculture and Agri-Food Canada, Indian Head, SK; [8]Agriculture and Agri-Food Canada, Saskatoon, SK; [9]University of Alberta, Edmonton, AB.

Introduction

There is disagreement between anecdotal reports regarding the influence of seed-applied fungicides, insecticides or combinations of both on winter wheat (*Triticum aestivum* L.) crop growth and vigour. Our objectives were 1) determine the influence of seed-applied fungicides and insecticides on stand establishment, and 2) quantify the effect of foliar-applied fungicides performed in fall.

Materials and methods

In the fall of 2010, experiments were established at 8 sites across the Canadian prairies. The two factor experiment consisted of 5 levels of seed treatment 1) Check – no seed treatment, 2) tebuconozole (‘Raxil 250’), 3) metalxyl (‘Allegiance’), 4) imidacloprid (‘Stress-Shield’), and 5) dual fungicide/insecticidal seed treatment: tebuconozole + metalxyl + imidacloprid (‘RaxilWW’); and 2 levels of fall-applied fungicide 1) Check – no application, or 2) foliar-applied prothioconazole (‘Proline’) performed in mid-October.

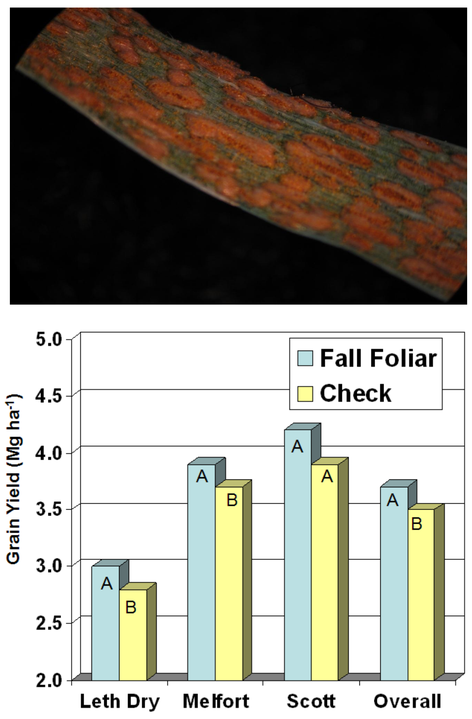
A combined mixed model analysis was performed using SAS® version 9.2 (treatment effects fixed; rep, env. and their interactions random). A biplot was generated using grain yield vs. coefficient of variation (CV) to assess overall stability of the agronomic system.

Results and discussion

- Plant stands did not differ but growth and vigour appeared to improve when a response to seed treatment was observed (Figs. 1 & 2).
- A by-site analysis of sites with confirmed stripe rust (yellow rust, caused by the fungus *Puccinia striiformis*) pressure in the fall (Lethbridge, AB; Melfort and Scott, SK) indicates that applying foliar fungicides in the fall will improve grain yield over no application of foliar fungicides (Fig. 3).
- the interaction of seed treatment and fall-applied foliar fungicide strongly affected grain yield (P=0.04). The dual seed treatment ‘Raxil WW’ improved grain yield over the check (no seed treatment) and metalxyl alone (Fig. 4).
- the dual seed treatment, with or without fall-applied foliar fungicide, produced high grain yield with optimal stability. The lowest and most variable treatment was untreated grain that did not receive a fall application of foliar fungicide (Fig. 4).

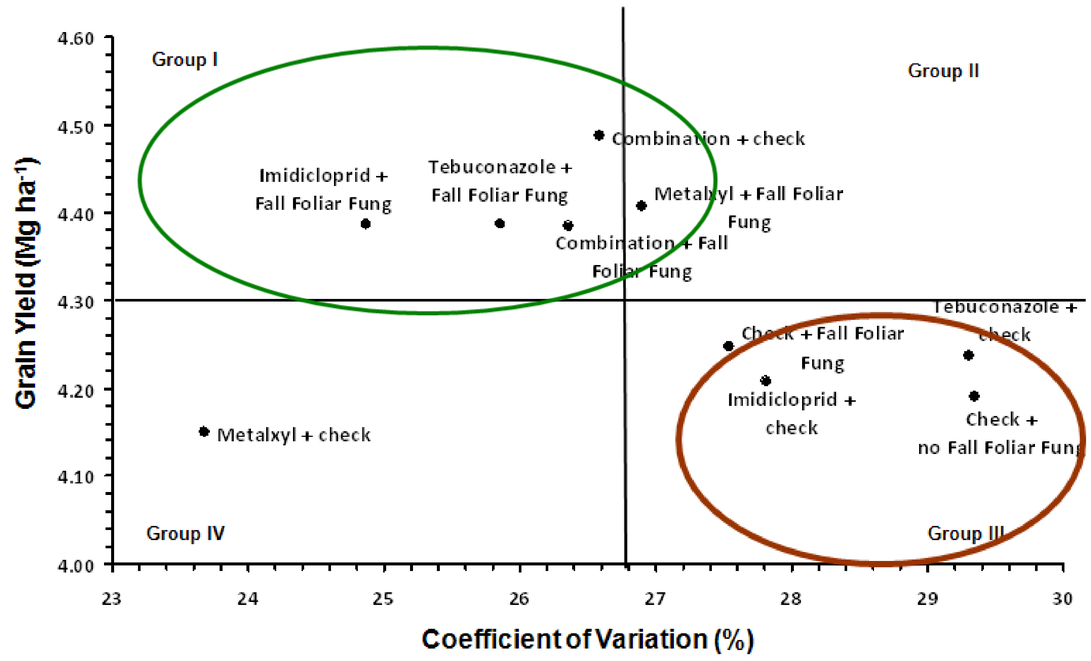
Fig. 1. Control treatment of winter wheat (cv. CDC Buteo) - no seed treatments applied (Lethbridge, AB Canada, 2011).

Fig. 2. Winter wheat (cv. CDC Buteo) treated with dual fungicide/insecticde (Lethbridge, AB Canada, 2011).



Upper left photo: R. Kutcher, Melfort SK. Fall 2010. Above photo: M. Gretzinger, Lethbridge AB. Fall 2010.

Fig. 3. Effect of fall-applied foliar fungicide (Prothioconazole) on grain yield of winter wheat with confirmed stripe rust infection in the fall of 2010 or spring 2011. Means within a site not sharing the same letter are significantly different (P=0.05; Fisher Protected LSD).



Group I: High mean, low variability (optimal)
Group II: High mean, high variability
Group III: Low mean, high variability (poor)
Group IV: Low mean, low variability

Fig. 4. Biplot of grain yield vs. coefficient of variation for each treatment combination of seed treatment (Raxil WW vs. no seed treatment) and fall-applied foliar fungicide. ‘Combination’ = dual fungicide/insecticide ‘Raxil WW’.

Conclusions

- dual fungicide/insecticide seed treatments appear to stabilize grain yield and thereby reduce risk in winter wheat production systems.
- fall applications of foliar fungicides improved grain yield in environments with observed stripe rust symptoms in fall. Applications are therefore warranted when stripe rust symptoms are observed in the fall.

Acknowledgements

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