

1. **Project Title: Fungicides for Use in Forage Seed Grasses**
2. **Project Number: ADOPT 20110331**
3. **Producer Group Sponsoring the Project: Saskatchewan Forage Seed Development Commission**
4. **Project Location(s):**
 - Allan Stewart, Carrot River, SK
 - Graham Sorgard, Churchbridge, SK
 - David Maxwell, Carrot River, SK

5. **Project start and end dates (month & year):** February 17, 2012 to December 15, 2012

6. **Project contact person & contact details:**

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7. **Project Objectives:**

The Saskatchewan Forage Seed Development Commission (SFSDC) wanted to demonstrate the use of registered fungicides, Tilt 250 E (propiconazole) on timothy and Headline EC (pyraclostrobin) on perennial ryegrass, to determine if leaf disease could be controlled and seed yield and quality improved.

8. **Project Rationale:**

Recently, some forage seed producers in Saskatchewan have reported an increase in leaf diseases that have negatively affected their grass seed fields. The main plant disease of concern on perennial ryegrass is rust (*Puccinia graminis* Pers.) and the main disease of concern on timothy is purple eyespot (*Cladosporium phlei*). The local producers wanted to see timing and efficacy of Headline and Tilt fungicide applications and also if there were economic returns for the application.

9. **Methodology:**

Two field sites were established to investigate and demonstrate the effects of Headline EC Fungicide on perennial ryegrass leaf disease, seed yield and quality. These sites were located near Carrot River in northeast Saskatchewan and near Churchbridge in east-central Saskatchewan.

Carrot River perennial ryegrass site: Year seeded: 2011. Plot size: 2 x 11 acre (180ft x 2,640ft strips) treated and 2 x 11 acre untreated plots. Fungicide application: Headline EC at 270 ml/acre applied in 40 L water per acre with a high clearance ground sprayer on June 30, 2012 at 30°C and slight wind. Crop stage at application: flag leaf emergence. Visual leaf infection data collected on July 13, 2012. Leaf diseases monitored: Rust and powdery mildew. Harvest date: August 13, 2012.

Churchbridge perennial ryegrass site: Seeding Date: August 1, 2011. Fertility: fall 2011 N 106 lb/acre, P 30lb/ac, K 30lb/ac. Herbicide application: fall 2011 MCPA Amine and spring 2012 Puma and Attain. Plot size: 2 x 11 acre (180ft x 2,640ft strips) treated and 2 x 11 acre untreated plots. Fungicide application: Headline EC at 160 ml/acre in 45 L water per acre applied with a high clearance ground sprayer (Figure 1) on June 22, 2012 at 23°C and light wind. Crop stage at application: flag leaf. Visual leaf infection data collected on July 4, 2012. Leaf diseases monitored: Rust and powdery mildew. Harvest date: August 20, 2012.

One field site was established near Carrot River, SK to investigate and demonstrate the effects of Tilt 250E fungicide on timothy leaf disease control, seed yield and quality. A planned second timothy site at a different location was not established because the grower co-operator chose to remove the timothy crop.

Carrot River timothy site: Year seeded: 2010. Plot size: 2 x 9.7 acre (160ft x 2,640ft strips) treated and 2 x 9.7 acre untreated plots. Fungicide application: Tilt 250E at 200 ml/acre applied in 57 L water per acre with a high clearance ground sprayer on June 25, 2012 at 31°C and calm wind. Crop stage at application: late heading and flowering. Visual leaf infection data collected on July 10, 2012. Leaf diseases monitored: Purple eyespot and powdery mildew. Harvest date: August 17, 2012.

Visual inspections for the presence of leaf diseases were made prior to fungicide application at all sites (Figure 2). Flag leaves and whole plants were collected at this time and submitted to the Saskatchewan Ministry of Agriculture Crop Protection Laboratory (CPL) in Regina, SK for leaf disease diagnosis. Post treatment visual leaf infection data was collected by estimating the percent leaf area that was diseased of 10 randomly selected flag leaves in each of 5 locations per treated and untreated plots. Post treatment flag leaves were collected at the Churchbridge perennial ryegrass site and were submitted to the Crop Protection Laboratory for analysis.

The centre portion of each strip was swathed, combined and weighed using a weigh wagon to determine gross seed yield. A seed sub-sample of each treatment was taken to determine seed dockage, seed size, and germination. Per cent dockage was determined by PICKSEED Canada while seed size and per cent germination was determined by SeedCheck Technologies Inc.

The 2012 growing season in northeast Saskatchewan can be described as above average precipitation (115-150%) and average temperature (April -1 to +1°C from normal; May -2 to -1°C from normal; June -1 to +1°C from normal; July +2 to +3°C from normal; August -1 to +1°C from normal; September +1 to +2°C from normal); while in east-central Saskatchewan, precipitation (85-115%) and temperature can be described as average (as listed for northeast Saskatchewan above). In both regions, soil moisture conditions were wet at the beginning of the season. Source: Drought watch site at: www.agr.gc.ca/pfra/drought/drmaps_e.htm

10. Results

It is very important to note that this is a demonstration trial, statistical analysis was not carried out and differences may or may not be significant. This is a one-year trial for demonstration purposes only.

Rust in perennial ryegrass and purple eyespot in timothy was not observed during initial inspections prior to fungicide application. Flag leaves and whole plants were collected during initial inspections and were submitted to the Saskatchewan Ministry of Agriculture Crop Protection Laboratory (CPL) in Regina, SK for leaf disease analysis. Reports from the CPL indicate that the timothy sample was slightly chlorotic (yellowing) with some necrotic (dead) edges along leaf blades to the leaf tip. *Alternaria spp* were found on leaf and stem cultures of timothy, with *Fusarium moniliformes* and *Fusarium spp* found on the root. *Alternaria* is a common foliar disease that grows on dead or dying tissue and *Fusarium* is found in agricultural soils and can lead to seedling or root diseases in favourable conditions. Neither of these pathogens cause the foliar leaf diseases of concern in this project. Reports from CPL indicate that the perennial ryegrass samples from the Carrot River and Churchbridge sites appeared healthy, except for some leaf tip dieback. Perennial ryegrass samples were cultured for potential plant diseases and only *Alternaria sp* was found on the leaves with a normal range of soil organisms identified on the roots.

A post application sample was collected from the perennial ryegrass site near Churchbridge and was submitted to the CPL for analysis. Leaf tip burn was noted without disease fruiting bodies suggesting disease was not the cause, and the leaves and roots appeared healthy. Following leaf sample culturing, *Alternaria sp* was identified, most likely growing on dead or dying tissue and not the cause of foliar disease.

The objective of the project was to determine if the application of a fungicide provides positive impacts in the production of timothy and perennial ryegrass seed yield and quality. Even though important foliar diseases such as rust on perennial ryegrass and purple eyespot on timothy were not evident at the time of application, visual ratings taken approximately two weeks after application indicated a trend to reduced foliar disease symptoms in treated areas (Tables 1-3). In the timothy site, purple eyespot was identified in the untreated areas while collecting visual disease symptom ratings two weeks following application. At all three sites, average flag leaf disease infection ratings were lower in the treated versus untreated areas. Net seed yield was higher in treated areas versus untreated areas as well as 1,000 seed weight. Per cent germination was slightly higher in untreated versus treated areas in the perennial ryegrass sites and slightly lower in the timothy site.

Extension activities for this project include:

- A description of the project in the SFSDC July 2012 Newsletter mailed directly to 175 current levy payers;
- An update with a handout at the SFSDC Annual Research Field Day held on July 25, 2012 near Carrot River, SK.
(Figure 3) with 28 growers in attendance;

- Inclusion of a summarized report in the SFSDC November 2012 Newsletter mailed directly to 190 current levy payers;
- The project report was reviewed with a summarized handout at the SFSDC grower information session on December 5, 2012 with 40 people in attendance; and
- The project report will be posted on the SFSDC website in January 2013.

ADOPT funding for the project was acknowledged at these opportunities using the following statement where appropriate: The project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement.

11. Conclusions and Recommendations

Overall, there appeared to be a slight increase in seed yield and seed weight from fungicide application. However, due to extensive damage to flag leaves by true armyworm in the timothy site, herbicide drift in the perennial ryegrass site near Carrot River, and high dockage levels in the perennial ryegrass site near Churchbridge, it would be advantageous to repeat this project in a future year.

12. Acknowledgements

The project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement.

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13. Appendices



Figure 1. High clearance sprayer applying Headline EC Fungicide on perennial ryegrass near Churchbridge, SK in 2012. Source: Sorgard Seeds



Figure 2. Visual inspection of perennial ryegrass prior to application near Churchbridge, SK in 2012. Source: Sask AG



Figure 3. SFSDC Field Day near Carrot River, SK in 2012. Source: SFSDC

Table 1. Effects of Headline EC Fungicide on perennial ryegrass leaf disease, seed yield and quality near Carrot River, SK in 2012.

	Flag Leaf Disease Infection	Gross Seed Yield	Dockage	Net Seed Yield	1000 Seed Weight	Germination
	(%)	(lbs/acre)	(%)	(lbs/acre)	(g/1000 seeds)	(%)
	13-Jul-12	13-Aug-12	13-Aug- 12	13-Aug-12	15-Oct-12	15-Oct-12
Headline (west)	15.4	716.9	11	638	1.6	88
Check (west)	10.4	643.8	11	573	1.6	88
Headline (east)	10.6	707.8	15	601.6	1.7	90
Check (east)	18.5	561.7	14	483.1	1.6	91
Headline (average)	13	712.4	13	619.8	1.7	89
Check (average)	14.5	602.8	12.5	528.1	1.6	89.5

Comments: Herbicide drift damaged the ryegrass on the south side of the plots and so seed yield data was taken from the north half of the plots.

Table 2. Effects of Headline EC Fungicide on perennial ryegrass leaf disease, seed yield and quality near Churchbridge, SK in 2012.

	Flag Leaf Disease Infection	Dockage	Net Seed Yield	1000 Seed Weight	Germination
	(%)	(%)	(lbs/acre)	(g/1000 seeds)	(%)
	04-Jul-12	20-Aug- 12	20-Aug-12	15-Oct-12	15-Oct-12
Headline (west)	1	65	280.4	1.6	96
Check (west)	5	78	154	1.4	96
Headline (east)	2	65	257.7	1.5	96
Check (east)	1	49	354.4	1.3	99
Headline (average)	1.3	65	269.5	1.6	96
Check (average)	3.1	63.5	254.2	1.4	97.5

Comments: Dockage is mainly due to the presence of volunteer winter wheat.

Table 3. Effects of Tilt 250 EC Fungicide on timothy leaf disease, seed yield and quality near Carrot River, SK in 2012.

	Flag Leaf Disease Infection (%)	Dockage (%)	Net Seed Yield lbs/acre	1000 Seed Weight (g/1000 seeds)	Germination (%)
	10-Jul-12	17-Aug-12	17-Aug-12	11-Oct-12	11-Oct-12
Tilt (North)	11	13	258	0.38	97
Check (North)	10	13	235	0.35	93
Tilt (South)	6	14	283	0.37	94
Check (South)	13	13	297	0.38	93
Tilt (average)	8.5	13.5	271	0.38	95.5
Check (average)	11.5	13	266	0.37	93

Comments: Extensive true armyworm damage occurred on the crop. No purple eyespot was reported from the samples collected at the time of Tilt application. Purple eyespot was identified in the unsprayed check plots during post application ratings.