

# Investigation into a New SDHI Fungicide for Stem Rust Control In Perennial Ryegrass Seed Crops

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## Introduction

Stem rust, caused by *Puccinia graminis* subsp. *graminicola* is the major disease of perennial ryegrass (*Lolium perenne* L.) seed crops in Oregon's Willamette Valley (Figure 1). Seed yield, seed weight and biomass can be reduced by stem rust. Seed producers currently use fungicides for stem rust management that contain a triazole, a demethylation inhibitor (DMI), and a strobilurin, a quinone outside inhibitor (QoI), often needing two or three applications when disease incidence and severity is greatest. The efficacy of newly available succinate dehydrogenase inhibitor (SDHI) fungicides in stem rust control and resistance management needs to be determined.

Field trials were undertaken to evaluate Trivapro®, a new SDHI (benzovindiflypyr) containing fungicide on a stem rust susceptible cultivar of perennial ryegrass.

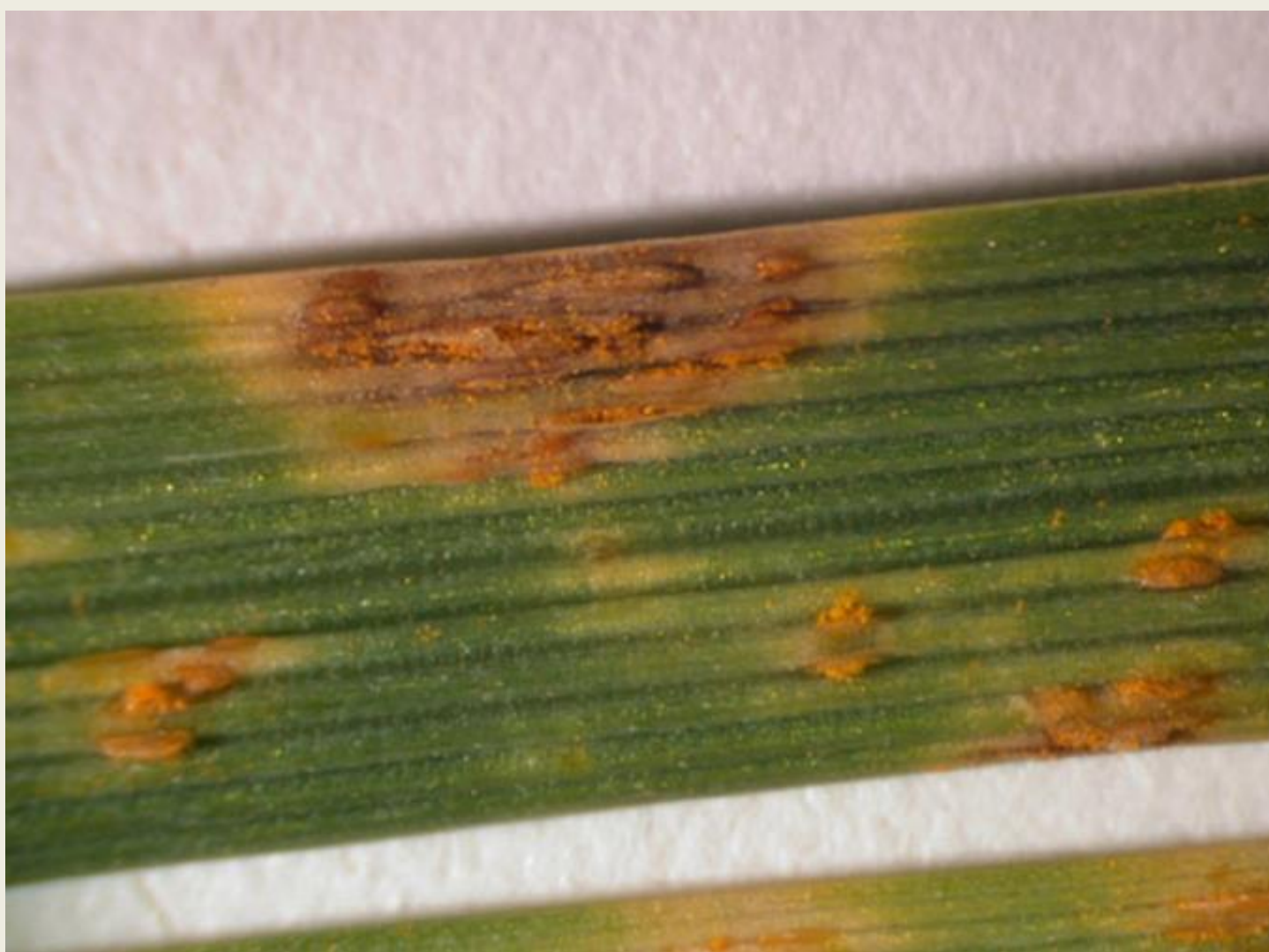
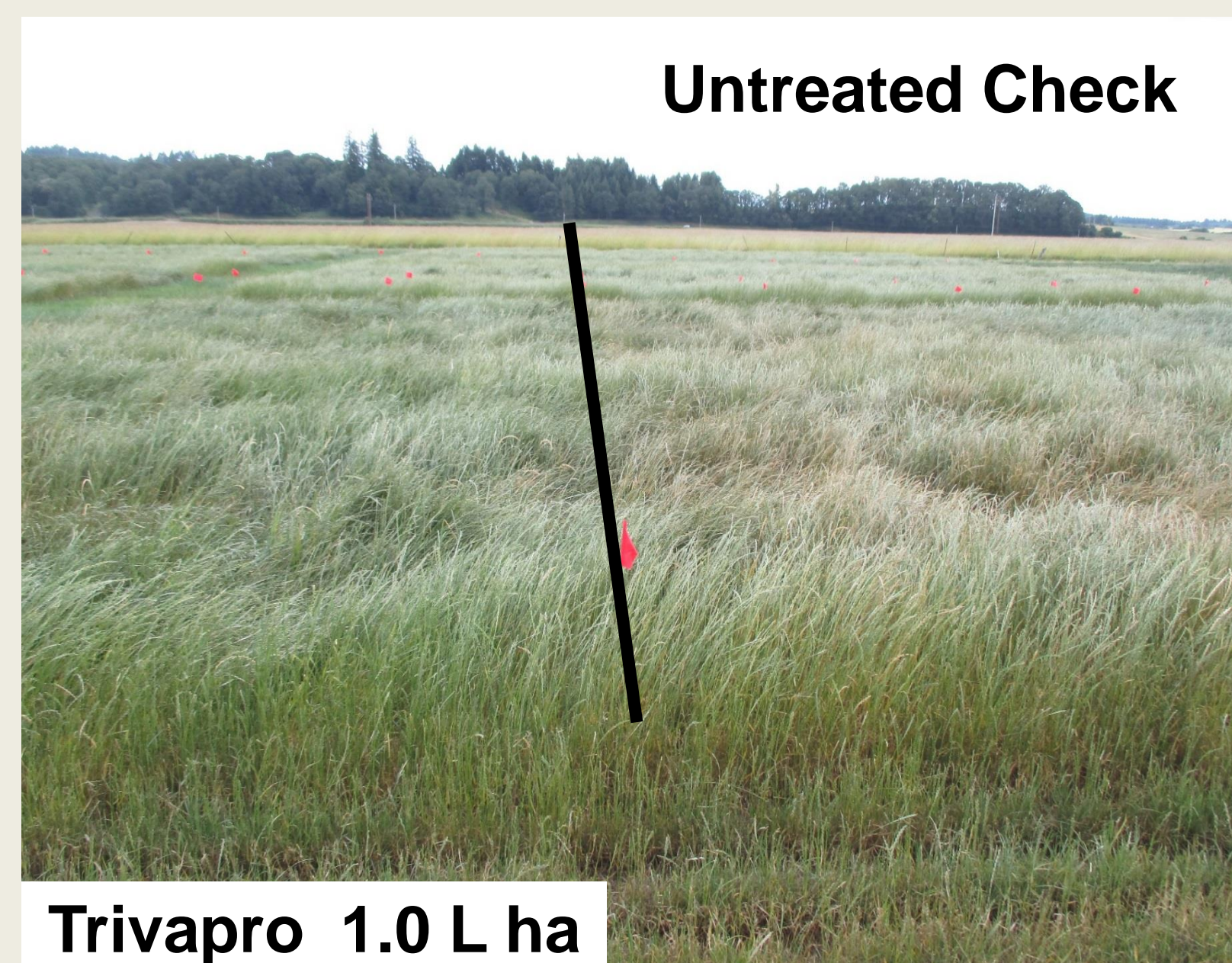


Figure 1. Stem rust pustules on a perennial ryegrass leaf blade (photo credit: Cynthia Ocamb, Oregon State University)

Figure 2. Stem Rust infection on perennial ryegrass when treated with a fungicide. (photo credit: Jess Holcolmb, Syngenta)



## Methods

Trials were conducted at Oregon State University's Hyslop Research Farm near Corvallis, Oregon in 2016 and 2017 on a perennial ryegrass seed crop (cv: 'Accent') planted in the autumn of 2015. The experimental design was a randomized complete block with four replications. Each plot was 3.4 x 10.1 m.

### 2016 fungicide treatments

- Control (no fungicide)
- 1.0 L ha<sup>-1</sup> Quilt Excel (Azoxystrobin + Propiconazole)
- 0.7 L ha<sup>-1</sup> Trivapro (Benzovindiflypyr + Quilt Excel)
- 1.0 L ha<sup>-1</sup> Trivapro
- 1.3 L ha<sup>-1</sup> Trivapro
- 1.3 L ha<sup>-1</sup> Trivapro X 2 (30 d apart)
- In 2017, a Trivapro rate of 2.6 L ha<sup>-1</sup> replaced the 0.7 L ha<sup>-1</sup> rate.

### Procedures:

- Fungicides were applied at first occurrence of stem rust infection in 2016 and 25 d prior to harvest in 2017.
- Plots were sampled for total above-ground biomass at physiological maturity
- Small-plot swather and combine harvest, seed cleaned before seed yield and seed weight determination
- ANOVA was conducted and means separated by Fisher's protected LSD values ( $P = 0.05$ )

## Results and Conclusions

- All treatments resulted in decreased stem rust infection compared to the untreated control in 2016 (Table 1).
- Stem rust ratings for all fungicide treatments in 2016 remained the same until 38 d after treatment when the 1.3 L ha<sup>-1</sup> Trivapro and 1.0 L ha<sup>-1</sup> Trivapro X 2 treatment ratings were statistically lower, and remained so until harvest.
- In 2017, environmental conditions were not conducive to stem rust development.
- All fungicide treatments significantly increased seed yield and lowered percent cleanout compared to the untreated control in 2016 (Table 2).
- Seed weight was significantly increased by all fungicide treatments in 2016. Fungicides had varied effects on total above-ground biomass.
- No difference in any parameters between treatments in the absence of rust in 2017 (Data not shown).
- The addition of an SDHI (benzovindiflypyr) at high rates appears to provide protection for a longer period than a single application of a strobilurin-triazole blended product, thus lowering the need for multiple applications of fungicides, thereby reducing costs.
- Availability of another fungicide mode of action may reduce the prospect of the development of resistance in stem rust.
- In the absence of stem rust, no fungicide treatment appeared to have beneficial or detrimental effects on perennial ryegrass seed crops.

Table 1. Effect of rate and timing of SDHI fungicide treatment on stem rust infections in first-year perennial ryegrass seed crops in 2016.

Treatment	Jun 15	Jun 21	Jun 28	Jul 5
L ha <sup>-1</sup>	% Rust Infection			
Control	38.8 b	41.7 b	63.8 c	72.5 d
1.0 Quilt Excel	3.2 a	5.2 a	18.7 b	27.0 bc
0.7 Trivapro	6.6 a	9.4 a	21.2 b	30.4 c
1.0 Trivapro	2.1 a	4.0 a	10.4 ab	14.5 ab
1.3 Trivapro	2.2 a	3.6 a	5.1 a	7.0 a
1.0 Trivapro X 2	3.9 a	3.9 a	5.3 a	6.2 a

Table 2. Effect of rate and timing of SDHI fungicide treatment on seed yield and other characteristics of first-year perennial ryegrass seed crops in 2016.

Treatment	Yield	Cleanout	1000 Seed Weight	Total Biomass
L ha <sup>-1</sup>	kg ha <sup>-1</sup>	%	mg seed <sup>-1</sup>	kg m <sup>-2</sup>
Control	1163 a	6.2 b	1.692 a	1.30 a
1.0 Quilt Excel	1706 b	2.8 a	1.894 bc	1.78 b
0.7 Trivapro	1705 b	2.8 a	1.885 b	1.63 ab
1.0 Trivapro	1756 b	2.4 a	1.907 bc	1.58 ab
1.3 Trivapro	1798 b	2.4 a	1.964 c	1.46 a
1.0 Trivapro X 2	1742 b	2.6 a	1.904 bc	1.71 b

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