

DEVELOPMENT OF CONTROL PROGRAM FOR *CLAVICEPS PURPUREA* IN KENTUCKY BLUEGRASS SEED PRODUCTION, 1994

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Abstract

Ergot, an important flower-infecting pathogen affecting grass production, is particularly damaging to Kentucky bluegrass (*Poa pratensis* L). To determine control measures for this disease, fungicides were evaluated at two locations in central Oregon. Plots at the Central Oregon Agricultural Research Center (COARC), Powell Butte location, were infested with ergot at 1 sclerotia/ft² in January to encourage presence of the disease. Incidence of ergot was extremely high at Powell Butte, but quite low at the Trail Crossing near Culver. A single application of Punch or double application of Tilt at 8 oz/a statistically out-performed a single application of Tilt at 4 oz/a with standard surfactants, weekly chlorine treatments, and the nontreated plots. A double Orthorix application provided similar control to a single application of Tilt at 4 oz/a. Differences in seed weight and percent germination between treatments were not significant.

Introduction

Ergot, caused by the fungus *Claviceps purpurea*, is an important flower-infecting pathogen in grass seed production regions of the Pacific Northwest. Of the grass species grown for seed in Oregon, Kentucky bluegrass is particularly affected by ergot. Traditional control has been through open field burning, which has partially suppressed the disease.

Fungicide evaluations in central Oregon during the 1992-93 seasons indicated excellent ergot control with Punch, while Tilt and Folicur provided moderate to good control. Ergot suppression was added to the Tilt label in 1995 through a 24(c) special local need registration as a result of this research project. Tilt was previously registered for powdery mildew and rust control on grass seed crops. Registration of Punch in the United States is not being pursued, and Folicur has been under evaluation at EPA for several years.

Methods and Materials

During the 1994 season fungicides were evaluated for control of ergot in a 'Coventry' Kentucky bluegrass seed field at Trail Crossing near Culver, Oregon. A second field of 'Coventry' located at the COARC, Powell Butte, was infested with ergot at 1 sclerotia/ft² on January 28, 1994. Fusilazole (Punch, Dupont), propiconazole (Tilt, Ciba), tebuconazole (Folicur, Bayer), and Orthorix (Best Sulfur Products) were evaluated during the 1994 season, with an emphasis on Tilt since it is currently registered for grass seed. Surfactants Silwet-77 and Penaturf were evaluated as the second of two applications following Tilt. Orthorix and chlorine were included in the trial as multiple applications, with chlorine applied weekly to simulate application during irrigation.

Materials were applied to 10 ft x 20 ft plots, replicated four times in a randomized complete block design, with 8003 TwinJet nozzles on a 9-foot CO₂ pressurized boom sprayer at 40 psi and 30 gal/a water. Silwet-77 at 8 oz/100 gal and R-56 at 1 pt/100 gal were applied in combination with all fungicides except Orthorix, chlorine, and one 4 fl oz Tilt treatment.

Treatments were applied at the Trail Crossing location on May 30 and June 10, and at the Powell Butte site on May 31 and June 10, plus weekly chlorine applications. The first treatments were applied at the initiation of anthesis at the Trail Crossing location, and early anthesis at the Powell Butte site.

One hundred panicles were collected from each plot on June 30 at the Trail Crossing location, and July 6 at the Powell Butte site. Number of panicles with sclerotia, sclerotia per panicle, and total sclerotia per sample were determined for each plot. Seed weight per sample and weight per 1,000 seed was determined following standard separation procedures. Seed germination - followed the Association of Official Seed Analysts (AOSA) rules for testing seed.

Results and Discussion

Incidence of ergot at the Powell Butte site was extremely high, with the infection level at Trail Crossing location relatively low. At the Trail Crossing location, there were no significant differences between treatments (Table 1) when comparing either panicles with sclerotia, sclerotia per panicle, or total sclerotia per sample. Comparison of the number of sclerotia per sample at the Powell Butte site (Table 2) indicates a single application of Punch providing the most effective control of ergot. A single Punch application or a double application of Tilt at 8 oz/a statistically out-performed a single application of Tilt at 4 oz/a with standard surfactants, weekly chlorine treatments, and the nontreated plots. A double Orthorix application provided similar control to a single application of Tilt at 4 oz/a.

Seed weight per sample or weight per 1,000 seed were not significantly different at either location, but seed weight per sample was substantially lower at Powell Butte due to the severe level of ergot infection and/or possibly cultural practices during the growing season. Differences in seed germination were not significant between treatments at either locations.

Table 1. Evaluation of fungicides applied for ergot control to 'Coventry Kentucky' bluegrass in the Trail Crossing area near Culver, Oregon on May 30 and June 10, 1994.

Fungicide Treatments	Rate		Panicles with sclerotia	Total sclerotia per sample	Weight per sample	1000 seed weight	Seed Germination
	May 30	June 10					
	(fl oz/a)		(%)	(no.)	(g)	(g)	(%)
Punch 25E	28		0.3	0.3	5.61	0.34	89
Tilt 3.6E	41		0.3	0.3	5.57	0.35	90
Tilt 3.6E + Tilt 3.6E	41	41	1.3	2.5	6.20	0.35	87
Tilt 3.6E	4		1.0	1.5	5.48	0.34	89
Tilt 3.6E	42		1.5	4.5	5.40	0.33	90
Tilt 3.6E + Tilt 3.6E	4	4	0.3	0.5	5.84	0.34	88
Tilt 3.6E + Orthorix	4	64	0.3	0.3	5.68	0.33	87
Tilt 3.6E + Silwet-77	4	8 ³	1.0	1.3	6.03	0.35	91
Tilt 3.6E + Penaturf	4	42	1.3	2.0	5.24	0.36	91
Tilt 3.6E	8		0.5	1.0	5.34	0.36	82
Tilt 3.6E + Tilt 3.6E	8	8	0	0	5.63	0.33	92
Folicur 3.6F	4		0.5	0.8	6.38	0.35	94
Folicur 3.6F	8		3.0	9.0	5.45	0.34	93
Orthorix	64	64	1.0	1.8	4.92	0.35	93
Chlorine (applied weekly)	4 ⁴		4.0	9.5	5.15	0.35	92
Untreated			1.5	4.5	5.80	0.35	92
			n.s.	n.s.	n.s.	n.s.	n.s.

¹ Aerial application

² Application with Penaturf at 42 fl oz rather than standard surfactants

³ Silwet-77 applied at 8 oz per 100 gals

⁴ Applied weekly from May 30 to June 17

Mean separation with T-method at P = 0.05

Table 2. Evaluation of fungicides applied for ergot control to 'Coventry' Kentucky bluegrass at the COARC Powell Butte site, Oregon on May 31 and June 10, 1994.

Fungicide Treatments	Rate		Panicles with sclerotia	Total sclerotia per sample	Weight per sample	1000 seed weight	Seed Germination
	May 31	June 10					
	(fl oz/a)		(%)	(no.)	(g)	(g)	(%)
Punch 25E	28		53 c	148 d	1.80	0.38	93
Tilt 3.6E	41		88 ab	665 abc	1.65	0.40	88
Tilt 3.6E	4		90 a	800 ab	1.67	0.39	89
Tilt 3.6E	42		76 ab	348 bed	1.53	0.38	94
Tilt 3.6E + Tilt 3.6E	4	4	87 ab	412 abcd	1.83	0.38	93
Tilt 3.6E + Orthorix	4	64	80 ab	596 abcd	1.90	0.41	93
Tilt 3.6E + Silwet-77	4	83	88 ab	655 abc	1.86	0.40	94
Tilt 3.6E + Penaturf	4	42	89 ab	595 abed	1.64	0.38	93
Tilt 3.6E	8		74 abc	381 abed	2.03	0.38	94
Tilt 3.6E + Tilt 3.6E	8	8	66 be	250 cd	2.06	0.38	92
Folicur 3.6F	4		80 ab	628 abed	1.59	0.39	88
Folicur 3.6F	8		87 ab	584 abed	1.81	0.39	90
Orthorix	64	64	88 ab	633 abed	1.78	0.39	93
Chlorine (applied weekly)	4 ⁴		92 a	813 ab	1.54	0.40	86
Untreated			92 a	858 a	1.59	0.38	91
					n.s.	n.s.	n.s.

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¹ Application at 20 gals/a with TeeJet nozzles rather than 30 gals/a with TwinJet nozzles

² Application with Penaturf at 42 fl oz rather than standard surfactants

³ Silwet-77 applied at 8 oz per 100 gals

⁴ Applied weekly from May 30 to June 17

Mean separation with T-method at P .. 0.05