DEVELOPMENT OF CONTROL PROGRAM FOR *CLAV10EPS PURPUREA* IN KENTUCKY BLUEGRASS SEED PRODUCTION, 1993

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Abstract

Ergot, an important flower-infecting pathogen affecting grass production, is particularly damaging to Kentucky bluegrass. To determine control measures without the use of field burning, three fungicides in combination with, and without, the wetting agent, Penaturf, were evaluated on two 'Coventry' Kentucky bluegrass fields located at Trail Crossing and Powell Butte. Ergot infestation was substantially higher at Powell Butte, which had been infested with 1 pound of ergot sclerotia in December and February. All treatments significantly reduced the total number of sclerotia per plot compared to the untreated check. Punch provided the best ergot control, except when applied without the normal surfactant. Double treatments of all materials at the high rate outperformed single treatments of the same rate, or double application at the half rate. This was true whether the second application was a fungicide or the wetting agent, Penaturf. Folicur was the only fungicide to reduce seed germination. There were significant differences between treatments for all variables at the Powell Butte location.

Introduction

Ergot, caused by the fungus *Claviceps purpurea,* is an important flower-infecting pathogen in grass seed production regions of the Pacific Northwest. The pathogen produces an elongated, black sclerotia that replaces seeds in infected florets and causes a reduction in yield. These sclerotia are the primary means of survival and source of inoculum. In the spring, during flowering, spores from the sclerotia infect the grass flower and produce secondary spores, which causes exudate (honeydew) and makes harvest difficult. These secondary spores can be spread by water, wind, and insects prior to sclerotia formation.

Of the grass species grown for seed in Oregon, Kentucky bluegrass is particularly affected by ergot. Surveys conducted in central Oregon, where Kentucky bluegrass is the dominant variety being grown, indicate strong regional variation with high levels in the Culver and Metolius areas, contrasted to low incidence on the Agency Plains.

Because there are no fungicides registered for ergot, the only method of controlling the disease has been through open field burning. This practice has partially suppressed the disease in the past, as indicated by research conducted by John Hardison, plant pathologist at Oregon State University. Pressure to decrease burning may leave grass seed producers with no effective tools.

Methods and Materials

Research was conducted on two first-year Coventry Kentucky bluegrass fields in central Oregon. One was with a grower cooperator in the Trail Crossing area and the other was at the Central Oregon Agricultural Research Center, Powell Butte site. The Powell Butte location was

inoculated with 1 pound of ergot sclerotia on December 18, 1992, and February 10, 1993, to insure a high inoculum level. Three fungicides, flusilazole (Punch, Dupont), propiconazole (Tilt, Ciba Geigy), and tebuconazole (Folicur, Mobay), in combination with and without Penaturf surfactant, were applied to 10-foot x 20-foot plots replicated four times in a randomized complete block design. Materials were applied with a CO2 pressurized boom sprayer. Following local standard procedure for fungicide application to grass seed, 1 pint/ 100 gals of LI 700 penetrant and 1 pint/a of 17 percent oil were applied in combination with all fungicides, except one of two 28 oz /a Punch treatments. Applications were made at Trail Crossing on June 7 and June 19, and treatments at the Powell Butte site were made on June 10 and June 19.

One hundred panicle samples were collected from each plot at Trail Crossing on July 6 and at Powell Butte on July 9. Samples were evaluated for percent of panicles with sclerotia, average sclerotia per panicle, and total sclerotia per plot. Standard seed separation and germination testing procedures were followed. Weight was determined per sample and 1,000 seed count, and percent germination per 100 seed.

Results and Discussion

A summary of the results for the Trail Crossing location are provided in Table 1, and data for the Powell Butte site is shown in Table 2. Disease levels at Powell Butte, where the trial was inoculated with sclerotia, were much more severe than at Trail Crossing. There were statistically significant differences between treatments for all variables evaluated at the Powell Butte site, and all but seed weight at Trail Crossing.

All treatments significantly reduced the total number of sclerotia per plot when compared to the untreated check. Punch provided the best ergot control, with exception of the treatment without the LI 700 and 17 percent oil. Double treatments of all three materials at the higher rate out-performed single treatments of the same rate or double application at half the rate. This was true whether the second application was a fungicide or the wetting agent, penaturf. Effectiveness of the double treatment of Penaturf at Powell Butte or the LI 700 and 17 percent oil treatment at Lower Bridge was well below that of the double fungicide treatments at the higher rates. Results for percent panicles with sclerotia and sclerotia per panicle were similar to total sclerotia per plot.

Folicur was the only fungicide to reduce seed germination, with all four Folicur treatments at the Trail Crossing location and the double Folicur treatments at Powell Butte statistically lower than the untreated plots. At the Powell Butte site, weight per sample was statistically reduced by the double Penaturf treatment when compared to the untreated. These data corroborate the trend from last year, which indicated reduced germination with Folicur applications and reduced seed weight with the use of Penaturf.

Table 1. Evaluation of fungicide treatments for ergot control on Coventry Kentucky bluegrass in the Trail Crossing area of central Oregon, 1993

Fungicide Treatments	Rate		Panicles with sclerotia	Sclerotia per panicle	Sclerotia per plot	Weight per sample	1000 seed weight	Germination
	June 7	June 19						
	(oz /a)		(percent)	(no. per 100 panicles)		(g)	(mg)	(%)
Punch 25EC	281		1.8 A'	0.8 a	3.3 ab	9.1	338	84 ab
Punch 25EC	56		0.3 a	0.3 a	0.3 a	9.1	315	81 ab
Punch 25EC	28		0.5 ab	0.5 a	1.0 a	8.9	318	81 ab
Punch 25EC, Punch 25EC	28	28	0 a	0 a	0 a	8.5	345	95 a
Punch 25EC, Penaturf	28	87	0 a	0 a	0 a	7.8	318	96 a
Folicur 3.6F	8		1.0 ab	0.6 a	1.3 a	8.9	308	58 c
Folicur 3.6F, Folicur 3.6F	4	4	2.5 ab	2.2 a	8.8 b	8.2	315	63 c
Folicur 3.6F, Folicur 3.6F	8	8	1.3 ab	0.6 a	1.5 a	9.0	323	31 d
Folicur 3.6F, Penaturf	8	87	0.5 ab	0.5 a	0.5 a	8.3	303	68 be
Tilt 3.6E	8		2.5 ab	1.2 a	4.0 ab	8.9	345	85 a
Tilt 3.6E, Tilt 3.6E	4	4	1.3 ab	1.8 a	3.5 ab	8.7	308	90 a
Tilt 3.6E, Tilt 3.6E	8	8	0.5 ab	0.5 a	0.5 a	8.5	310	93 a
Tilt 3.6E, Penaturf	8	87	0.5 ab	1.3 a	1.3 a	9.5	310	91 a
Penaturf, Penaturf	87	87	2.5 ab	1.3 a	4.3 ab	7.8	320	95 a
Untreated			3.5 b	5.3 b	16.5 c	9.4	348	96 a

1 fungicide treatment without LI 700 penetrant and 17 percent oil
2 means in column followed by the same letter are not statistically different by Duncan's Multiple Range test at $P < 0.05$

Table 2. Evaluation of fungicide treatments for ergot control on Coventry Kentucky bluegrass at the COARC Powell Butte location in central Oregon, 1993

Fungicide Treatments	Rate		Panicles with sclerotia	Scierotia per panicle	Sclerotia per plot	Weight per sample	1000 seed weight	Germination
	June 10	June 19						
	(oz /a)		(percent)	(number per 100 panicles)		(g)	(mg)	(%)
Punch 25EC	281		41 deft	2.1 abc	121 abcde	8.3 a	388 ab	65 ab
Punch 25EC	56		8 a	1.2 a	12 a	6.7 be	395 ab	67 ab
Punch 25EC	28		22 ab	1.7 ab	51 ab	6.7 be	365 ab	75 ab
Punch 25EC, Punch 25EC	28	28	17 ab	1.7 ab	31 a	7.5 ab	360 ab	83 ab
Punch 25EC, Penaturf	28	87	15 ab	1.3 a	24 a	7.2 abc	353 ab	84 ab
Folicur 3.6F	8		45 def	2.9 bcd	184 bcde	6.9 abc	343 b	64 abc
Folicur 3.6F, Folicur 3.6F	4	4	57 fg	3.2 cd	224 de	7.7 ab	343 b	56 be
Folicur 3.6F, Folicur 3.6F	8	8	30 bcd	2.2 abc	78 abed	7.6 ab	355 ab	39 c
Folicur 3.6F, Penaturf	8	87	24 abc	1.8 abc	52 ab	7.2 abc	348 ab	69 abc
Tilt 3.6E	8		45 def	3.2 cd	212 cde	7.8 ab	375 ab	87 a
Tilt 3.6E, Tilt 3.6E	4	4	50 of	3.1 bcd	191 bcde	7.5 abc	388 ab	85 ab
Tilt 3.6E, Tilt 3.6E	8	8	31 bcde	2.4 abc	97 abcde	7.8 ab	370 ab	88 a
Tilt 3.6E, Penaturf	8	87	32 bcde	1.9 abc	73 abc	7.5 ab	403 a	89 a
Penaturf, Penaturf	87	87	56 fg	3.9 d	244 e	6.1	375 ab	91 a
Untreated			70 g	4.0 d	466 f	a	383 ab	90 a

[1] fungicide treatment without LI 700 penetrant and 17 percent oil

[2] means in column followed by the same letter are not statistically different by Duncan's Multiple Range test at $P < 0.05$