Ergot Evaluations of Kentucky Bluegrass Cultivars in Central Oregon, 2015-2017

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Introduction

Cool-season grass seed is produced in a wide range of climates in Oregon, ranging from mild and moist conditions in the Willamette Valley, semi-arid high elevation deserts in central Oregon and the Columbia Basin of eastern Oregon, and high mountain valleys in northeastern Oregon. Consequently, the incidence and severity of ergot epidemics in grass grown for seed can vary among and within growing regions and from year to year. In some years, the timing of ascospore release by the fungus may not coincide with grass flowering, which is the only period of host susceptibility. Cultivars with short, uniform flowering periods, or cultivars that flower outside of periods of peak spore production, may potentially escape ergot infection. The objectives of this study were to: 1) evaluate Kentucky bluegrass cultivars for the potential to escape or resist ergot infection under central Oregon field conditions; and 2) determine the seasonal timing and concentration of ergot ascospores in central Oregon

Materials and Methods

Plots of Kentucky bluegrass cultivars were established in August of 2014, 2015, and 2016 for ergot evaluations in 2015, 2016, and 2017, respectively. Plots (26 ft long and 5 ft wide consisting of 6 rows of plants) were planted with each cultivar at a seeding rate of 5 lb seed/acre. Each plot was replicated four times and cultivars were arranged in a randomized complete block design. The borders of the experiment area was artificially infested in October with ergot sclerotia collected from Kentucky bluegrass seed lots produced in central Oregon.

A Burkard 7-day recording volumetric spore sampler was used to collect airborne ascospores from the experimental areas. The spore sampler was placed in the middle of the plots from April to June of each year with the air intake orifice located approximately 2 ft above the soil. Spore trap tapes were replaced weekly and each tape was cut into daily segments, stained, and the number of *C. purpurea* ascospores were determined for each hour and then totaled to establish daily counts. Disease incidence (number of infected seed heads) and severity (number of sclerotia) were determined from a random sample of 50 seed heads collected from each plot at harvest. An ergot disease index (EDI) value was calculated by multiplying ergot incidence by ergot severity. EDI data were analyzed using ANOVA and multiple comparisons were made using Fisher's protected LSD test.

Results and Discussion

Significant differences in EDI values were observed among Kentucky bluegrass cultivars in all three years (Table 1). Differences in ergot incidence and severity among years were also observed among cultivars and individual years (Fig. 1). In general, ergot was most severe in 2017 and least severe in 2015.

The first occurrence of ascospores was on May 20, May 1, and May 15 in 2015, 2016, and 2017,

respectively. Ascospore production continued for 24 days in 2015, 51 days in 2016, and 44 days in 2017. Ergot incidence and severity was greater in 2017 than 2016 for most cultivars despite the fact that more overall spores were produced in 2016 (3,748 spores) compared to 2017 (2,390) and spore production occurred for 7 days longer. Differences in ergot incidence and severity could potentially be attributed to differences in ergot resistance and/or differences timing of spore production and flowering among the three years (Fig. 2).

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Table 1. Ergot disease index values for Kentucky bluegrass cultivars grown in artificially-infested plots at COARC in 2015, 2016, and/or 2017

	Ergot Disease Index			
Cultivar	**2015**	**2016**	**2017**	**Overall**
PST-K4-7	0.5 bc	0.2 c	1.2 b	0.6
Jumpstart	0.1 c	3.5 c	7.2 b	3.6
Geronimo	NT	NT	3.9 b	3.9
Right	0.3 c	4.1 c	11.2 b	5.2
Shamrock	0.5 bc	2.6 c	13.9 b	5.7
Fielder	0.1 c	1.2 c	18.3 b	6.5
DB-1013	1.2 bc	11.7 bc	10.0 b	7.6
Merit	NT	2.1 c	22.0 b	8.8
Blue Ghost	3.8 bc	22.7 b	15.9 b	14.1
Gladstone	4.3 b	6.0 c	35.0 ab	15.1
Crest	NT	NT	17.0 b	17.0
Gateway	1.0 bc	7.1 c	69.9 ab	26.0
Midnight II	9.9 a	48.7 a	45.9 b	34.8
Nuglade	3.6 bc	NT	89.7 ab	46.6
Bluechip	2.3 bc	NT	114.4 a	58.4
Rhythm	NT	NT	166.0 a	166.0
***P*-value**	0.0005	< 0.0001	< 0.0001	NS

[1] Ergot disease index values were calculated by multiplying ergot incidence (number of panicles with ergot) by ergot severity (number of sclerotia in each panicle). A total of 50 panicles were evaluated from each plot.

[2] Means followed by the same letters are not statistically different using Fisher's protected LSD. NT = Not tested.

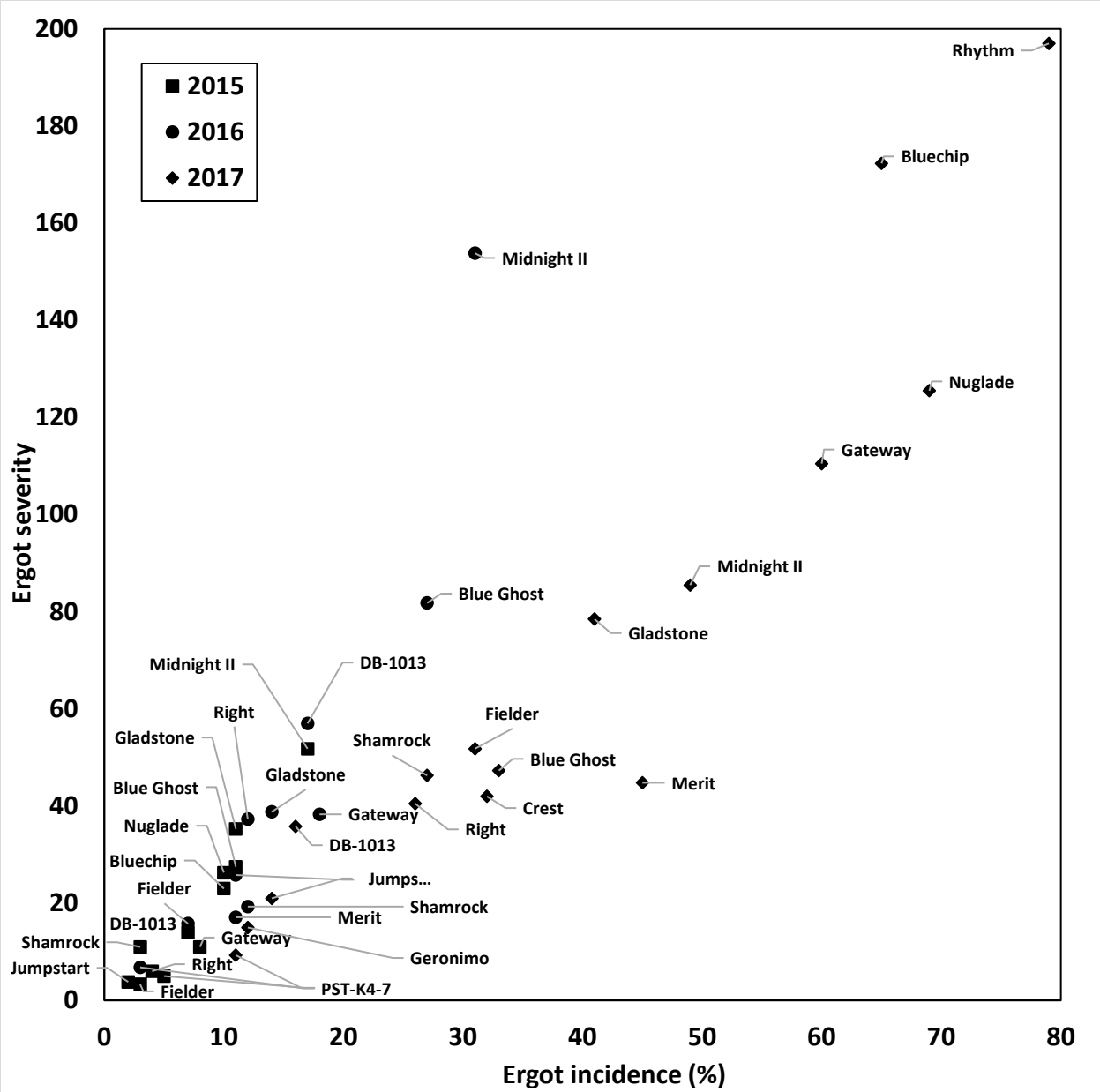

Figure 1. Dot plot of ergot incidence and severity for 16 cultivars grown in artificially infested Kentucky bluegrass plots located at COARC in 2015 (squares), 2016 (circles) and/or 2017 (diamonds).

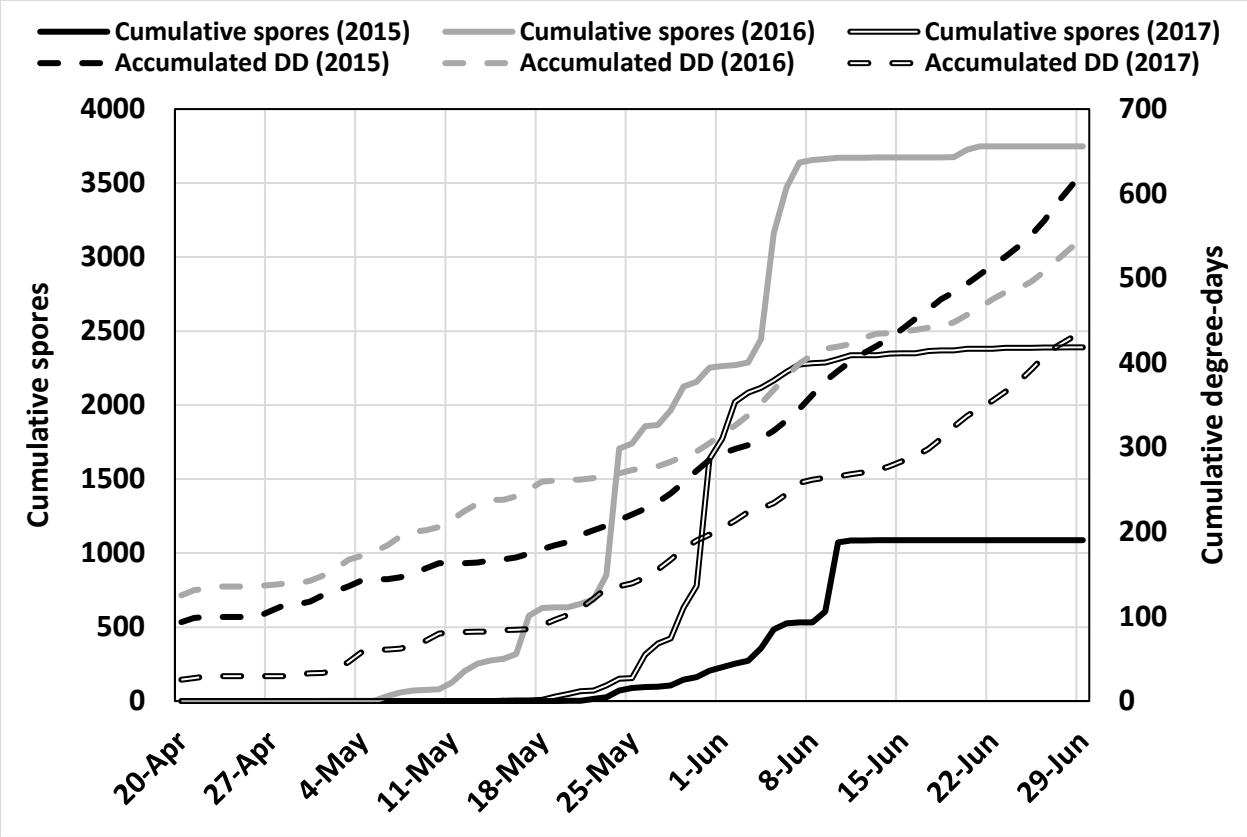

Figure 2. Cumulative ascospore captures in artificially infested Kentucky bluegrass plots located at COARC in 2015 (solid black line), 2016 (solid grey line) and 2017 (solid white line) plotted with accumulated degree-days (DD) in 2015 (dotted black line), 2016 (dotted grey line), and 2017 (dotted white line).