Indaziflam Effects on Seed Production and Viability for Various Rangeland Grasses

Beth Fowers1,2, Hannah Ostheimer1, and Brian Mealor1,2

Introduction
Annual weeds negatively impact grass seed production by directly competing for resources and by contaminating seed lots. Herbicide options in grasses grown for seed are relatively limited; further, for an herbicide to be useful it must provide acceptable weed control with little reduction in seed production and viability. Indaziflam controls annual grasses and other weeds, but little is known about how it affects seed production and germinability.

Objectives
Our objectives were to evaluate the effects of the herbicide indaziflam on seed production and germinability across a range of established perennial grasses.

Materials and Methods
Seventeen grass species/varieties were seeded in a randomized complete block design with four replicates in 2013 at the Sheridan Research and Extension Center (ShREC) property east of Sheridan near Wyarno, Wyoming. We applied Esplanade 200 SC® (5 oz/ac) plus Roundup WeatherMAX® (12 oz/ac) to one-half of each grass plot on March 27, 2017, leaving the other half as a non-treated control. Cheatgrass (aka downy brome, Bromus tectorum) and several of the perennial grasses were actively growing at the time of application. We harvested, counted, and weighed mature inflorescences (seedheads) on July 3, 2017, from three bunchgrasses per grass + herbicide plot or, if the species was rhizomatous, from three 0.25 m² (2.7ft²) frames within each grass plot. We evaluated cumulative germination using 50-seed lots in petri dishes with filter paper in a growth chamber set at 70°F daytime and 50°F nighttime temperatures for one month. We analyzed data as a two-way analysis of variance with plant material and herbicide as the two treatments.

Results and Discussion
While herbicide application controlled annual grasses across the site (p<0.0001), it also negatively impacted some of the perennial grasses. Responses varied highly among grass species/varieties. Inflorescence number was reduced for several wheatgrasses, several wildryes, and one bluegrass (p=0.0001; Figure 1). ‘Bozoisky-Select’ Russian wildrye showed more than a 60% reduction in inflorescence number while ‘Mankota’ Russian wildrye exhibited more than a 90% reduction. Other impacted species expressed mild differences between treated and untreated inflorescences while the majority of species were not affected by herbicide application. Similar trends were observed with inflorescence weight, including large negative impacts to Russian wildrye (>90% reduction) and Siberian wheatgrass (>45% reduction), but most other species were not affected by the herbicide.

Total number and weight of inflorescences have a direct relationship to seed production. Because germination was decoupled from overall seed production, we can determine germination regardless of the total amount of seed produced. While herbicide application affected overall germination (p=0.01), germinability of most species was not impacted (Figure 2). Herbicides noticeably reduced germination in two varieties: ‘Opportunity’ Nevada bluegrass (100%) and ‘Washoe’ basin wildrye (>50%; p<0.0001).

First-year herbicide impacts on seed production and germinability should be interpreted cautiously since we could not separate glyphosate from indaziflam effects in this year. The two species with the greatest impact on inflorescence number are also species that begin active growth very early in spring—indicating that they may have been most susceptible to glyphosate damage at the time of application. Continuing data collection will allow us to determine impacts of indaziflam alone on seed production and germination of established species.

Acknowledgments
We thank ShREC interns for their help with data collection and Bayer Crop Science for funding support.

Contact Information
Brian Mealor at bamealor@uyo.edu or 307-673-2647.

Keywords: indaziflam, perennial grass, seed production

PARP: III:5,7,11
Figure 1. Inflorescence number by grass species/variety and herbicide treatment.

Figure 2. Germination by grass species/variety and herbicide treatment.