Effect of Pronamide (Kerb®) Herbicide on Winter Wheat Yield in the Year Following Applications for Italian Ryegrass Control in Spring Canola

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Pronamide herbicide has been considered for use in controlling Italian ryegrass in spring canola; however, the plant back interval to winter wheat is unknown and a concern for crop safety. Pronamide is effective for controlling Italian ryegrass in labeled crops, but it is not currently labeled for use in wheat or canola. Pronamide is a Group 3 herbicide that controls seedlings as they germinate; however, if pronamide is still present in the soil when winter wheat is seeded in the fall, it will also damage or kill the germinating wheat.

Breakdown of pronamide in the soil is primarily through microbial degradation; however, summer precipitation is limited in the inland Pacific Northwest, which often results in slower microbial degradation of herbicide than elsewhere in the US where summer precipitation is common. Furthermore, during fall and winter when precipitation is more likely, soil temperatures are low, which also slows microbial activity. Other Group 3 herbicides, e.g., trifluralin and ethalfluralin, have safely been used for Italian ryegrass control in spring canola, but it is unclear if pronamide can also be included as an additional herbicide option in the inland Pacific Northwest. Italian ryegrass is a serious problem weed, and it has evolved resistance to most herbicides used for grass weed control in the region. In recent years, many growers have incorporated glyphosate-resistant spring canola into their production systems to control Italian ryegrass, but sole reliance on glyphosate (Group 9) risks selection for glyphosate-resistant Italian ryegrass biotypes. Having sites of action, other than glyphosate, that are effective in controlling Italian ryegrass is critical for crop production in the region.

The objective of this study was to evaluate the crop safety of pronamide in spring canola and the subsequently planted winter wheat crop in the inland Pacific Northwest. We established a trial in 2021 on the WSU Cook Farm near Pullman, WA. Kerb SC (pronamide @ 3.3 lb ai/gal) herbicide was applied at two rates (1.25 and 2.5 pints/A) on November 8, 2021, and on March 10, 2022, ahead of spring canola seeding on May 20, 2022. The experimental design was a randomized complete block with 10- by 50-ft plots and six replicates per treatment. Kerb treatments were applied with a CO_2-pressurized backpack sprayer at a volume output of 15 gpa.

The spring canola crop was harvested on September 5, 2022. The plot area was then cultivated 2-3 inches deep and harrowed to spread residue and loosen the soil so that winter wheat seed could be planted at least 1½ inches deep below the surface. The trial area was fertilized on October 10, 2022, with 145-22-22-23 lb/A N-P-K-S and then seeded on October 20, 2022, with 100 lb/A of 'Sockeye' winter wheat using a Great Plains drill with 10-inch row spacing. Huskie® and MCPA herbicides were applied for broadleaf weed control in the spring of 2023. All plots were harvested in August 2023 with a small plot harvester. Grain samples were bagged, cleaned, and weighed to determine crop yield, which was then reported on a 12% moisture basis.

Crop injury was not seen in the 2022 spring canola crop (data not shown); however, injury to the 2023 winter wheat crop was evident early in the spring as the treated plots had sparse wheat stands (Figure 1).

Figure 1. Kerb injury to winter wheat. Photo taken April 26, 2023.

Precipitation in 2023 was low, therefore, the nontreated check treatment yielded only 74 bu/A (Table 1), which was consistent with other yields in the area; however, all Kerb treatments reduced yields even further. Fall-applied Kerb at 1.25 pints/A resulted in 57 bu/A yield, while fall-applied Kerb at 2.5 pints/A and the spring-applied 1.25 pints/A rate resulted in wheat yields of 44 and 40 bu/A, respectively. The greatest yield reduction was from the spring-applied Kerb at 2.5 pints/A. The reduction of wheat yield indicates that rate and time are critical for the breakdown of the herbicide. Fall-applied Kerb had approximately 12 months to degrade before winter wheat was seeded and began to germinate, while the spring-applied Kerb had only seven months to degrade. Furthermore, with each timing, the higher rate of Kerb resulted in more yield loss than the lower rate.

Although Kerb appears safe to use in spring canola for Italian ryegrass control, should it be labeled for this use, winter wheat should not be planted in the fall following spring canola harvest in the inland Pacific Northwest

Table 1. Winter wheat yield following Kerb applications in spring canola.

Treatment	Application rates	Application date	Winter wheat yield*
	pt/A		bu/A
Nontreated control	--	--	74 a
Kerb SC (pronamide)	1.25	Nov 8, 2021	57 b
Kerb SC (pronamide)	2.5	Nov 8, 2021	44 c
Kerb SC (pronamide)	1.25	Mar 10, 2022	40 c
Kerb SC (pronamide)	2.5	Mar 10, 2022	13 d

*Means followed by the same letter are not statistically different.

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