

PREEMERGENT HERBICIDES FOR DOWNY BROME CONTROL IN ESTABLISHED KENTUCKY BLUEGRASS GROWN FOR SEED

D.L. Walenta and J.F. Spring

Introduction

Downy brome (*Bromus tectorum*) is a problematic winter annual grass weed in irrigated Kentucky bluegrass (KBG) seed production in eastern Oregon. Season-long control of downy brome in established KBG is not possible with a single application of any currently registered herbicide. The general consensus among KBG seed producers is that best management practices for downy brome should include a preemergent (PRE) herbicide application in late summer and a postemergent (POST) application to small seedlings (no more than one or two tillers) in early fall. In some cases, a late POST application prior to the onset of winter may be necessary if downy brome emergence is delayed or a late flush occurs. Postemergent herbicide applications in late winter or early spring are not typical since, by that time, downy brome plants are well established and difficult to control. Hand-roguing escapes in early spring is a standard practice used in conjunction with herbicide application for downy brome management.

Availability of registered herbicides, research data, and recommendations for use in herbicide selection and the design of application sequence strategies are limited for downy brome control in established KBG grown for seed. The most common PRE herbicides used for downy brome control include Prowl H2O (5 pt/acre) and/or a tank-mix of Prowl H2O (3 pt/acre) plus Outlook (1 pt/acre). Other registered herbicides include Dual II Magnum, Nortron, and Eptam, but these products are not widely used due to the lack of research data related to their utility for downy brome control in established KBG seed production. In recent field trials, Alion has demonstrated potential for downy brome control, but it is not currently registered for use in KBG seed crops.

The objective of this trial was to compare KBG crop safety and downy brome control with registered PRE and POST herbicides (Prowl H2O, Outlook, Dual II Magnum, Nortron, Eptam, Beacon, and Outrider) and an unregistered PRE herbicide (Alion) when applied as components of fall sequential programs in established, irrigated KBG grown for seed. Trials were conducted

in the Grande Ronde Valley of northeastern Oregon (Union County).

Note: The active ingredient indaziflam (Alion) applied in this study is not registered for use in Oregon KBG seed production. Evaluation of this product is for experimental purposes only and is not a recommendation for commercial use.

Materials and Methods

A small-plot trial was established in a commercial seed production field of KBG (cv. 'Merit') in Union County, OR, on September 16, 2022, following harvest of the first seed crop. Postharvest residue was managed by nonthermal practices, which included raking/baling the straw followed by heavy harrowing. The trial was arranged in a randomized complete block design with four replications. Plot dimensions were 10 feet x 30 feet. Preemergent herbicide applications were made September 16, 2022 after postharvest residue management and before the first irrigation event in the fall. Early postemergent (EPOST) herbicide applications were to be applied in the early fall to actively growing downy brome in the one- to two-leaf stage. Herbicide treatments were applied with a 10-foot hand-held CO₂ sprayer delivering 16 gpa at 35 psi. Environmental conditions at the time of herbicide application are summarized in Table 1. Herbicide treatment application rates are presented in Table 2.

Visual evaluations of KBG crop injury, downy brome control, and downy brome plant density were made April 28, 2023. KBG seed yield was not measured in this trial. The field was taken out of production in 2023 following the second seed harvest due to increased downy brome infestation. A cover crop of tillage radish, turnip, and spring barley was planted in early September 2023. General observations were made in October 2023 to determine whether any of the herbicide treatments included in the trial caused cover crop injury.

Analysis of variance was performed to test herbicide treatment effects on KBG crop injury and downy brome control and density. Herbicide treatment means were separated by Tukey's all-pairwise comparison at 5% level of significance.

Table 1. Crop growth stage and weather conditions at time of herbicide application to Kentucky bluegrass (KBG).

Application timing	Preemergence (PRE) Sep. 16, 2022
KBG growth stage	Regrowth starting
Downy brome growth stage	Not yet emerged
Air temperature (°F)	69
Relative humidity (%)	40
Cloud cover (%)	None
Wind velocity (mph)	0–8 from N-NW
Soil temperature, surface (°F)	69
Soil temperature, 1 inch (°F)	70
Soil temperature, 2 inch (°F)	71
Soil temperature, 4 inch (°F)	78
1 st irrigation event after PRE application	Sep. 27, 2022, wheel line, 8-hour set = 3 inches

KBG crop injury from herbicide treatments was not observed in this trial (data not shown). The light and variable downy brome infestation across the trial site made visual evaluation of control impossible. Alternatively, downy brome plant density was determined by counting individual plants within each plot and then converting to density/ft² (Figure 1).

No significant differences in downy brome plant density were observed among herbicide treatments. This result might be attributed to the dry fall conditions that led to late emergence (approximately 2–3 months following application).

Table 2. Preemergent herbicide treatments and application rates.

Trade name	Active ingredient	Application rate (product/a)
Untreated	—	—
Prowl H2O	pendimethalin	5.0 pt
Prowl H2O + Outlook	pendimethalin + dimethenamid	3.0 pt + 1.0 pt
Prowl H2O + Dual II Magnum	pendimethalin + S-metolachlor	3.0 pt + 21.0 oz
Alion	indaziflam	2.0 oz
Alion + Prowl H2O	indaziflam + pendimethalin	2.0 oz + 3.0 pt
Prowl H2O	pendimethalin	3.0 pt
Eptam 7E	EPTC	3.5 pt

At the time of herbicide application, distinct rows were still visible in the KBG stand. Soil surface conditions in the interrow space were variable, ranging from bare soil to complete cover with fine postharvest residue. Interception of PRE herbicides by remaining residue on the field may have negatively impacted downy brome control.

Visual observations of cover crop injury were made on October 19, 2023. Herbicide treatments including Alion (indaziflam) thinned the stand of all species within the mix by 80% or more (data not shown).

In this trial, PRE herbicides such as Prowl H2O + Outlook, Alion + Prowl H2O, and Alion alone showed potential utility for downy brome control in established KBG. Additional investigation of underutilized herbicides is warranted to determine their potential for downy brome control. For example, Nortron (ethofumesate) has both PRE and EPOST activity and may have potential utility for downy brome control in a sequential application program.

Further research is needed to explore whether multiple heavy harrowing could expose more soil surface between rows than a single harrowing event in young established KBG stands (first and second seed harvest years). Research is also needed on the timing and frequency of postharvest irrigation to improve soil-active herbicide efficacy.

Results and Discussion

Dry early- to mid-fall conditions (lack of rainfall) in 2022 delayed downy brome emergence and negatively impacted activity of PRE herbicides despite timely herbicide application and supplemental water provided by irrigation in late September. Since downy brome emerged and developed several tillers over winter, EPOST herbicide treatments were not applied in spring 2023, as by that time downy brome exceeded the optimal growth stage for postemergence control.

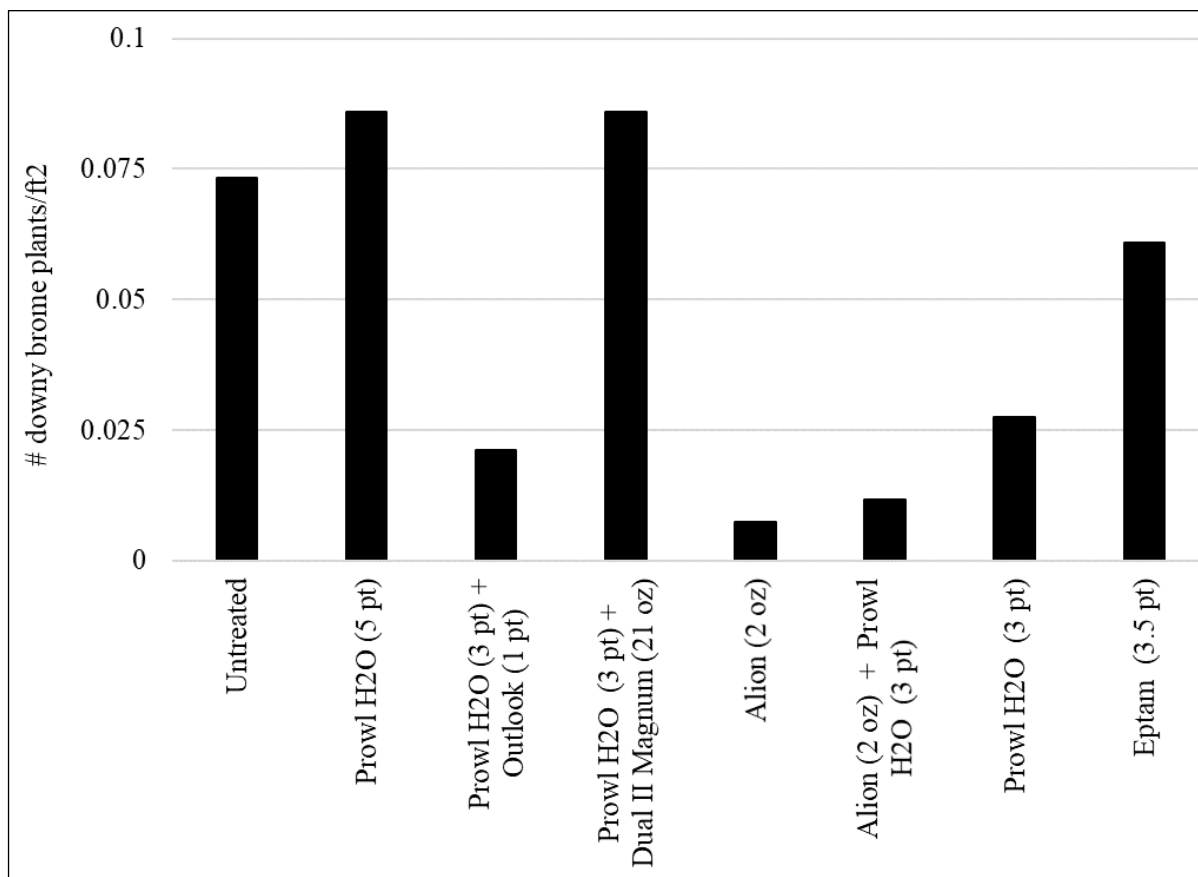


Figure 1. Downy brome density (number of plants/ft²) in spring 2023 following fall preemergent herbicide application in established Kentucky bluegrass grown for seed in northeastern Oregon (Grande Ronde Valley).

References

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