

Downy brome control in winter wheat with Zidua® SC and Beyond® Xtra

Mark Thorne and Drew Lyon

Downy brome (*Bromus tectorum* L.) is one of the first non-native annual grass weeds identified in the inland Pacific Northwest dating back to the 1890s. Since its introduction, it spread across the Columbia Plateau and became a major weed in winter wheat (Figure 1) capable of causing $\geq 90\%$ yield loss. Effective herbicides for controlling downy brome in winter wheat have included Beyond (imazamox) and Zidua SC (pyroxasulfone); however, there is a possibility of developing resistance to either of these herbicides if used alone and too frequently. Downy brome has already developed resistance to Beyond in some areas in the Pacific Northwest and there are reports of reduced performance from Zidua SC. Using both herbicides together may help delay development of resistance by having both modes of action working at the same time, and including an effective adjuvant mix with Beyond may help performance.

We evaluated downy brome control in winter wheat at the Wilke Farm, Davenport, WA, with Zidua SC applied in the fall alone and followed by Beyond Xtra tank mixed with different surfactants and rates of UAN 32 (urea-ammonium nitrate 32% N) in the following spring. In addition, we include fall-applied Zidua SC followed by TRICOR® DF (metribuzin) in early spring as metribuzin is often used in the region and employs a different mode of action than either Zidua SC or Beyond Xtra.



Figure 1. Downy brome growing between rows of winter wheat at the Wilke Farm, Davenport, WA, April 15, 2025. Left - early germinated downy brome with several tillers. Right - late germinated downy brome with a few leaves up to one tiller.

The experimental design was a randomized complete block with each treatment present in each of the four blocks. Blocks were arranged horizontally across the slope so that block 1 was higher on the slope than block 4. Block 4 had considerably more crop residue remaining from the 2023 winter wheat crop than the other three. Fall Zidua SC treatments were applied September 16,

2024 (Table 1), the day after Piranha Clearfield winter wheat was direct seeded at 72 lb/A into chemical fallow at 2 inches deep. Fertilizer was applied at seeding with the drill at 75-12-12 N-P-S lb/A. On March 25, 2025, early spring treatments of Beyond Xtra and TRICOR DF were applied, both following Zidua SC in the fall. March 25 was likely the earliest time period when ground applications were possible as the soil surface was drying enough to support traffic. On April 15, Beyond Xtra was applied with different surfactant and UAN combinations at a timing more consistent with grower applications in the area. Surfactants included methylated seed oil products Glacier[®] EA and MSO[®] Concentrate with Leci-Tech[®], and a non-ionic surfactant, M-90. UAN 32 was included at 5% or 30% of total spray volume. All herbicides were applied with a 10-ft hand-held spray boom with six TeeJet[®] AIXR110015 nozzles on 20-inch spacing and pressurized with a CO₂ backpack. Spray output was 15 gpa at 40 psi with a ground speed of 3 mph.

Downy brome control was visually evaluated on March 25, April 15, April 28, and June 3 (Table 1). By March 25, Zidua SC was controlling downy brome 78% to 86% compared with the nontreated check. By April 15 and 28, control was greater than 90% with all Zidua SC treatments and there was no statistical difference between Zidua SC alone or followed by the early applications of Beyond Xtra or TRICOR DF. On April 28, the later treatments with Beyond Xtra not following Zidua SC were controlling downy brome 46% to 66% with no statistical difference between treatments. Injury symptoms on the downy brome were stunted growth and yellow and orange leaf coloration. By June 3, there were no differences between any treatments with Beyond Xtra as all had greater than 90% control of downy brome. Zidua SC alone or followed by TRICOR DF only controlled downy brome 68% and 72%, respectively, and some downy brome plants produced seed. TRICOR DF was more effective when applied to later germinating downy brome, but not on earlier germinated tillered plants (data not shown). In contrast, all treatments with Beyond Xtra kept downy brome from producing seed.

In this trial, measurable rainfall in the area did not occur until October 15, 30 days after planting, therefore, germination of downy brome in the fall was slow and spotty. Downy brome established earlier in areas of the trial site that had remaining crop residue from the 2023 wheat crop, especially block 4, but did not establish in the fall in areas with bare soil. Zidua SC was effective early, but lost control later and allowed some downy brome plants to produce seed. TRICOR DF was very effective on all broadleaf weeds, and any small, late winter germinated downy brome present at time of application (data not shown) but was less effective when applied to larger tillered downy brome. All Beyond Xtra treatments were very effective whether following Zidua SC, or not. The effectiveness of Beyond Xtra indicates the downy brome population was not resistant to imazamox. Furthermore, there was no difference in efficacy with any of the surfactants and UAN 32 combinations. Furthermore, soil moisture variability and late rainfall delayed crop and downy brome emergence and establishment. If the winter wheat and downy brome had established earlier after seeding, fall applications of TRICOR DF and Beyond Xtra might have been possible before the downy brome tillered, which may have aided control.

Table 1. Downy brome control in winter wheat with Zidua SC, Beyond Xtra, and TRICOR DF.

Herbicide treatments*	-- Application dates --			----- Downy brome control -----			
	9/16	3/25	4/15	3/25	4/15	4/28	6/3
	----- oz/A** -----			----- % nontreated check*** -----			
Nontreated check	---	---	---	0	0	0	0
Zidua SC	3.25	---	---	83 a	96 a	92 a	68 b
Zidua SC fb Beyond Xtra + MSO + 30% UAN	3.25	---	6.0	78 a	94 a	94 a	99 a
Beyond Xtra + Glacier EA + 5% UAN	---	---	6.0	---	---	49 b	98 a
Beyond Xtra + Glacier EA + 30% UAN	---	---	6.0	---	---	58 b	97 a
Beyond Xtra + M-90 + 5% UAN	---	---	6.0	---	---	66 b	95 a
Beyond Xtra + M-90 + 30% UAN	---	---	6.0	---	---	57 b	94 a
Beyond Xtra + MSO + 5% UAN	---	---	6.0	---	---	46 b	99 a
Beyond Xtra + MSO + 30% UAN	---	---	6.0	---	---	51 b	98 a
Zidua SC fb TRICOR DF	3.25	6.0	---	84 a	97 a	91 a	72 b
Zidua SC fb Beyond Xtra + MSO + 30% UAN	3.25	6.0	---	86 a	99 a	94 a	99 a
Days after fall Zidua SC				190	211	224	260
Days after early Beyond Xtra				0	21	35	71
Days after late Beyond Xtra					0	14	50

*fb=followed by; UAN urea-ammonium nitrate 32% applied at the listed % volume per total volume (% v/v). Glacier EA methylated seed oil applied at 0.5% v/v; M-90 nonionic surfactant applied at 0.25% v/v; MSO (MSO Concentrate with Leci-Tech) methylated seed oil applied at 1% v/v.

**Rates for Zidua SC and Beyond Xtra are fl oz/A; TRICOR DF is dry oz/A. --- represents no application made.

***Means in each column followed by the same letter are not statistically different ($P \leq 0.05$). --- represents ratings not made or applicable.