Italian ryegrass control with BAS 101005H glufosinate and Sonalan® HFP in spring canola

Mark Thorne and Drew Lyon

Glufosinate is a Group 10 herbicide and is an alternative to glyphosate, Group 9, for the control of Italian ryegrass in spring canola (Figure 1). Glyphosate is currently being used for Italian ryegrass control in glyphosate-resistant spring canola, and its extensive use increases the likelihood of developing Italian ryegrass resistant to glyphosate. Sonalan HFP (ethalfluralin) is a Group 3 herbicide that inhibits cell division in plant roots, and therefore, must be incorporated in the soil prior to seed germination to be effective. Glufosinate's mode of action differs from glyphosate's mode of action and works by inhibiting glutamine synthetase, an enzyme involved in the synthesis of the amino acid, glutamine. Inhibition of glutamine synthetase quickly results in a toxic buildup of ammonia in plant cells that destroys cell membranes. Glufosinate is commercially available in several products; however, all currently labeled glufosinate products contain two glufosinate molecular isomers, but only one isomer has herbicidal activity. BAS 101005H is a new glufosinate product being tested that consists of only the active isomer.

Figure 1. Italian ryegrass and common lambsquarters in spring canola in a nontreated control plot (left), spring canola in plot with preplant incorporated Sonalan HFP (middle), flowering spring canola in a nontreated control plot in the foreground and preplant incorporated Sonalan HFP in the background (right).

LibertyLink® spring canola is resistant to glufosinate because of a gene that codes for an enzyme that converts glufosinate to a non-toxic metabolite in the plant. Glufosinate-resistant canola was first developed in 1995. Glufosinate-resistant canola provides an herbicide option for Italian ryegrass control that can help delay the development of glyphosate-resistant Italian ryegrass.

We compared herbicide treatments for Italian ryegrass control in spring canola at the WSU Cook Agronomy Farm. In addition, common lambsquarters germinated in all plots as the canola was emerging and was included in the weed control assessments. The study site had produced chickpeas in 2023, and the residue was left in place through the winter. On March 22, 2024, liquid fertilizer, 100-10-0-20 N-P-K-S lb/A was stream-jet applied and then cultivated to incorporate the fertilizer. On April 2, Sonalan HFP, was applied at 24 and 32 oz/A preplant and incorporated (PPI) twice at 90° at a depth of 2-3 inches with a field cultivator and attached tine harrow. Spring canola cultivar 'InVigor® LibertyLink/TruFlex® LR345PC, which is tolerant of both glufosinate and glyphosate, was seeded on April 15 with a direct-seed drill with double-disc openers on 10-inch spacing. The seeding rate was 12 seeds per ft^2 at 0.75 to 1.0 inch deep. Early postemergence (EPOST) applications were applied on May 15 (see Table 1 for rates) when the canola had 3 leaves. The Italian ryegrass had 1-4 leaves and averaged 180 plants yd^{-2} in the nontreated check plots. Common lambsquarters plants ranged from cotyledon stage to 2 inches in diameter and averaged 1800 plants yd^{-2}. Late postemergence (LPOST) treatments were applied on May 27 when the canola had 6 leaves. The Italian ryegrass plants were tillered and 4-12 inches high and the common lambsquarters ranged from 1-4 inches in diameter.

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 CO_2 backpack. Spray output was 15 gpa at 40 psi with a ground speed of 3 mph. All BAS 101005H and Surmise® 5 (glufosinate) applications included ammonium sulfate (AMS) at 3 lb dry granules/A, and all PowerMax® (glyphosate) applications included AMS at 2.6 lb dry granules/A. Italian ryegrass and common lambsquarters control were rated visually on May 15 (43 days after PPI application), and June 10 (14 days after LPOST applications) as a percent of the nontreated checks. Canola was harvested with a plot combine and samples were bagged, cleaned, and weighed to calculate plot yield.

Weed control from the PPI Sonalan HFP applications average ≥89% for Italian ryegrass and ≥83% for common lambsquarters by May 15 when the canola had three leaves and the EPOST treatments were applied (Table 1). Densities of both weed species were substantially reduced by the PPI treatments, which would have benefited the EPOST applications. Initial Italian ryegrass and common lambsquarters densities on May 15 averaged 180 and 1800 plants/yd^2, respectively. By June 10, two weeks after the LPOST applications, the most effective treatments for both Italian ryegrass and common lambsquarters were the tank mix of BAS 101005H + PowerMax at 22 oz/A EPOST, and split applications of PowerMax at 44 oz/A EPOST followed by (fb) BAS 101005H LPOST, and Sonalan HFP PPI at 24 oz/A fb PowerMax EPOST at 44 oz/A (Table 1). The single application of PowerMax at 44 oz/A EPOST was less effective at controlling Italian ryegrass than when followed by BAS 101005H LPOST. Control of Italian ryegrass (85%) and common lambsquarters (80%) with a split application of BAS 101005H was substantially more effective than the split application of Surmise 5, which was not effective on either species. Finally, there was no added benefit of applying Sonalan HFP at 32 oz/A compared with 24 oz/A for controlling either weed species.

In this trial, spring canola yield was exceptionally high with the highest yielding treatments averaging 3330 to 3580 lb/A (Table 1) with control of early flushes of Italian ryegrass and common lambsquarters with Sonalan HFP contributing to higher yields. For example, Sonalan

HFP fb PowerMax EPOST at 44 oz/A yielded 3500 lb/A compared with 3200 lb/A with only a single EPOST application of PowerMax at 44 oz/A. Furthermore, Sonalan HFP, alone, at 32 oz/A resulted in one of the highest yields of 3580 lb/A even though it did not give the highest level of weed control. The split application of BAS 101005H also resulted in a higher yield, 3330 lb/A, without giving the highest level of weed control. In contrast, the split application of Surmise 5 did not control either Italian ryegrass or common lambsquarters and resulted in the second lowest yield of 2300 lb/A and only greater than the nontreated check yielding 1760 lb/A.

Controlling Italian ryegrass with PPI treatments is an effective strategy for reducing the chances of developing resistance because of the reduced plant density to which the postemergence treatments will be applied. Additionally, canola yield was enhanced by the early season weed control provided by Sonalan HFP. BAS 101500H can be an effective alternative to glyphosate but would require a second application or be preceded by an effective PPI herbicide.

Table 1. Italian ryegrass and common lambsquarters control in spring canola.

Herbicide applications*			Visual control ratings**				Canola yield
			Italian ryegrass		Common lambsquarters		
PPI	EPOST	LPOST	15-May	10-Jun	15-May	10-Jun	
---------- (fl oz/A)----------			-----(percent of nontreated check)-----				(lb/A)
Nontreated check			0	0	0	0	1760 e
---	BAS(24)	BAS(24)	---	85 bc	---	80 b	3330 abc
---	SUR5(16)	SUR5(16)	---	0 e	---	7 c	2300 d
---	BAS(24) + PM(22)	---	---	89 abc	---	92 a	3380 abc
---	BAS(24) + PM(44)	---	---	82 cd	---	94 a	3230 bc
---	PM(44)	BAS(24)	---	93 ab	---	95 a	3170 c
---	PM(44)	---	---	84 c	---	95 a	3200 bc
---	BAS(24)	PM(22)	---	83 cd	---	93 a	3229 bc
SLN(24)	---	---	89 a	73 d	87 a	77 b	3330 abc
SLN(32)	---	---	91 a	84 cd	89 a	80 b	3580 a
SLN(24)	BAS(24)	---	90 a	73 d	83 b	72 b	3480 abc
SLN(24)	PM(44)	---	89 a	94 a	86 ab	95 a	3500 ab

*Application timings: PPI=preplant incorporated (April 2, 2024); EPOST=postemergence with canola at 3 leaves (May 15, 2024); LPOST=canola at 6 leaves (May 27, 2024). Herbicides: SLN=Sonalan HFP; BAS=BAS 101005H; SUR5=Surmise 5; PM=PowerMax. All glyphosate treatments included ammonium sulfate at 3 lb/A. All BAS 101005H treatments included ammonium sulfate at 2.6 lb/A.

**Means in each column followed by the same letter are not significantly different (P≤0.05).

Off-Label or Experimental-Use Disclaimer

Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to $7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance.