

Italian Ryegrass Control with Liberty® Herbicide in LibertyLink® Spring Canola

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Liberty® 280 SL (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). Liberty functions primarily as a contact herbicide but the mode of action is the inhibition of 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. 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. The field was in chickpeas in 2022 and the residue was left in place. On April 6, 2023, liquid fertilizer, 100-10-0-20 N-P-K-S lb/A, was drop-spread over the plot area. On April 24, the plot area was cultivated twice at 90° at a depth of 2-3 inches with a field cultivator with an attached tine harrow. Treflan HFP, a Group 3 mitosis inhibitor, was applied preplant at 24 fl oz/A and incorporated (PPI) twice in opposite directions with a field cultivator/harrow. Spring canola cultivar ‘InVigor LibertyLink/TruFlex® LR354PC’, resistant to glufosinate and glyphosate, was seeded on April 25 with a Great Plains drill with double-disc openers on 10-inch spacing. The seeding rate was 15 seeds per ft² and seed were placed 0.75 to 1.25 inches deep. By May 5, 10 days after seeding, the canola had emerged. Early postemergence (EPOST) applications of Roundup PowerMax® glyphosate at 22 and 44 fl oz/A and Liberty 280 SL at 29 oz/A were applied on May 20 when the canola had 3-4 leaves and the Italian ryegrass had 1 leaf to 1 tiller. Late postemergence (LPOST) treatments of PowerMax at 22 fl oz/A and Liberty at 29 oz/A, were applied on June 1 when the canola had 6 leaves and was beginning to bolt. The Italian ryegrass plants ranged from 3 leaves to several tillers. 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. All Liberty applications included AMS at 3



Figure 1. Top photo: Liberty following preplant Treflan on Italian ryegrass in canola. Bottom photo: Liberty on Italian ryegrass with no preplant Treflan.

lb dry granules/A, and all PowerMax applications included AMS at 17 lb dry granules/100 gallons of spray mix.

Italian ryegrass control was rated visually 12 days after the EPOST treatments as a percent of the nontreated checks in all treatments on June 1. Control was rated again 15 days after the LPOST treatments on June 16, and again at harvest on August 17. Canola was harvested with a Wintersteiger plot combine and samples were bagged, cleaned, and weighed to calculate plot yield.

Table 1. Italian ryegrass control and canola yield.

Trt	April 24	May 20	June 1	June 1	June 16	August 17	August 17
	----- Canola stages* -----			Italian ryegrass control ratings**			Harvest
	PPI	3-4 leaves EPOST	6 leaves- bolting LPOST	12 DAT EPOST	15 DAT LPOST	Harvest	Yield
	--- Herbicides applied (oz/A) ---			---- % of nontreated check ----			-- lb/A --
1	Nontreated check			-	-	-	1160 b
2	Treflan	Liberty	-	96 b	91 c	97 b	1680 a
3	Treflan	PM (22)	-	99 a	99 a	99 ab	1770 a
4	-	Liberty	Liberty	68 e	79 c	90 c	1720 a
5	-	PM (22)	PM (22)	92 c	100 a	100 a	1540 a
6	-	PM (44)	-	96 b	98 a	100 a	1680 a
7	-	Liberty + PM (22)	Liberty + PM (22)	88 d	99 a	100 a	1620 a
8	-	Liberty	PM (22)	72 e	93 b	100 a	1530 a

* PPI = preplant incorporated, EPOST = early postemergence, LPOST = late postemergence.
 Treflan (trifluralin) was applied at 24 fl oz/A PPI and incorporated twice with a cultivator at 180°;
 EPOST PowerMax was applied at 44 and 22 fl oz/A and included AMS at 17 lb/100 gal;
 All Liberty applications were applied at 29 fl oz/A and included AMS at 3 lb/A.
 LPOST PowerMax was applied at 22 oz/A;
 **DAT = days after treatment. Means followed by the same letter in each column are not statistically different (P<0.05).

By May 20, when the EPOST treatments were applied, the Treflan applications had resulted in Italian ryegrass density 89% lower compared to the nontreated check (34 vs 299 plants/yd²). The reduction in Italian ryegrass density increased the efficacy of the EPOST treatments as Treflan followed by Liberty EPOST controlled Italian ryegrass 96% compared with 68% for only EPOST Liberty (Table 1). Treflan followed by EPOST PowerMax averaged 99% control and was greater than EPOST PowerMax at either 22 or 44 oz/A (Table 1). Two weeks after the

LPOST treatments, Treflan followed by Liberty was not different than Liberty applied both EPOST and LPOST. However, control was greatest with all EPOST PowerMax treatments, and all were not different than 100%. At canola harvest, control with PowerMax was still at or near 100%, and there was no difference between Treflan followed by Liberty or by PowerMax. In plots where control was not 100%, plants that had escaped control had produced some seeds, but the number declined as the control approached 100% (data not shown).

Overall, canola yields were less than in 2022 because of limited precipitation from May through July; however, yield did not differ between any of the herbicide treatments and ranged from 1530 to 1770 lb/A (Table 1). We also did not find obvious antagonism from tank mixing Liberty and PowerMax as is sometimes a concern. The least desirable outcome was from not applying anything, as the canola yield of the nontreated check treatment was only 1160 lb/A, which was lower than all other treatments.

Italian ryegrass is a strong competitor with spring canola and can significantly reduce yield (Figure 2). Liberty, while currently not quite as effective as glyphosate, can provide good control, particularly when applied with another effective mode of action (for example, Treflan HFP or glyphosate) or when applied back-to-back. Incorporating LibertyLink spring canola into the rotation can reduce dependence on glyphosate and help delay the development of glyphosate resistance in Italian ryegrass.

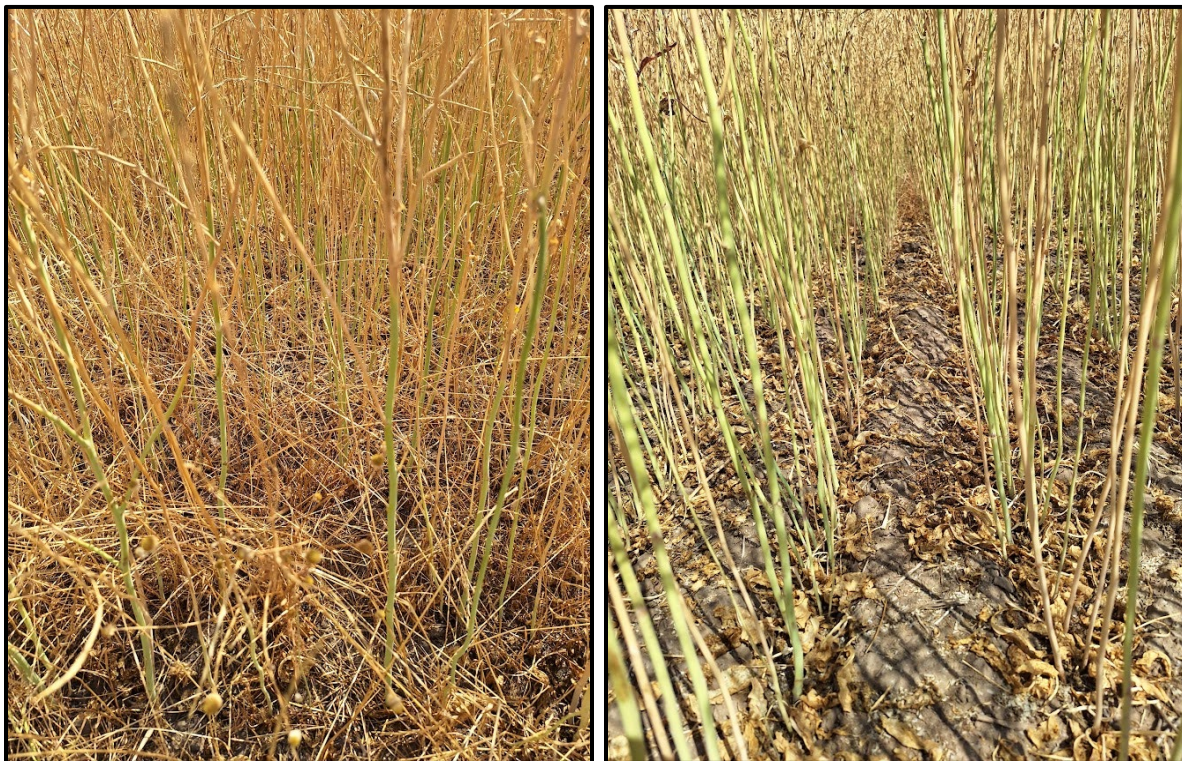


Figure 2. Spring canola with no Italian ryegrass control (photo on left) vs. spring canola with good Italian ryegrass control (photo on right).