

Introduction

Perennial ryegrass (*Lolium perenne*) is grown for seed production across Western Canada. Traditionally, it is sown with wheat in the first year, harvested for seed in the second year, and subsequently removed from production, allowing the field to be used for another annual crop. Canola is an excellent crop for establishing grasses due to its lower competitiveness compared to cereals. Moreover, controlling volunteer canola in the following year is more manageable than controlling volunteer cereals. However, the compatibility of herbicides with both canola and seedling grass is limited, posing a challenge. Glufosinate tolerant canola varieties make up 65% of the canola acres seeded each year in western Canada

Objective

A three-year study was conducted to evaluate the effects of different rates and timing of glufosinate applications on stand establishment of perennial ryegrass seeded with glufosinate tolerant canola.

Materials and Methods

A series of trials were conducted for 3 years (2020-2022) in grower's fields to investigate the interseeding of glufosinate-tolerant canola and turf-type perennial ryegrass. The canola was sown at a rate of 5.6 kg/ha, while the perennial ryegrass was seeded at a rate of 13.5 kg/ha in the same row as the canola.

- Plot size was 2m x 10m. Experimental design was a randomized complete block design with four replications.
- Treatments were applied with a 2-meter handheld boom (4 TeeJet 80001 nozzles) pressurized by a propane sprayer. The sprayer and walking speed were calibrated to provide 100 l/ha of water at a pressure of 270 kPa.
- Treatments were applied at various rates of glufosinate when canola was at the 2 to 4 leaf stage and perennial ryegrass at the 1-2 leaf stage (Stage A). Treatments requiring a 2nd application of glufosinate were applied 14 days after the first application just prior to the canola bolting and the perennial ryegrass at the 2-3 tiller stage (Stage B).
- Visual percent injury ratings were taken 28 DAT, following canola harvest and once again the following spring. Visual percent stand reduction ratings were taken after canola harvest and the following spring.
- No perennial ryegrass seed yield data was collected from the trials. The results are based only on visual assessments.



Figure 1 and 2 Establishing perennial ryegrass with glufosinate canola trial.

Results

Precipitation patterns varied across the growing seasons. In 2020, precipitation was well above average, while in 2021, it was well below average. However, in 2022, the precipitation was considered average. Single applications of glufosinate at 410 g ai/ha or 480 g ai/ha resulted in minimal leaf burn but did not visually reduce plant populations of seedling perennial ryegrass. On the other hand, glufosinate applied at the 2x rate of 960 g ai/ha did cause significant visual injury and stand reduction to perennial ryegrass. Two applications of glufosinate at 410g ai/ha or 480 g ai/ha caused slight injury and visual plant stand reduction to seedling perennial ryegrass, but the stand fully recovered by harvest.

In 2019, clethodim was added to one glufosinate treatment. The application of clethodim caused severe visual stand reduction to perennial ryegrass. Quinclorac was added to glufosinate in 2021 and 2022 and showed no visual injury compared to glufosinate alone at the same rate. Note that perennial ryegrass seed yields were not collected from the trials and the data is based on visual assessments.

Table 1. Effects of herbicide applications applied in 2020 on perennial ryegrass seeded with glufosinate tolerant canola, La Glace, AB.

Herbicide	Rate Ai kg/ha	Stage	Visual % Injury		Visual % Stand Reduction	
			09/25/2020	05/25/2021	09/25/2020	05/25/2021
glufosinate	0.500	A	0	0	0	0
glufosinate	0.500	A+B	0	0	0	0
glufosinate	0.410	A+B	0	0	0	0
glufosinate+ clethodim+Amigo	0.500+0.03 0+0.5% v/v	A	100	100	95	95
Check			0	0	0	0



Figure 3. Perennial ryegrass establishment with glufosinate canola in 2021.

Table 2. Effects of herbicide applications applied in 2021 on perennial ryegrass seeded with glufosinate tolerant canola, La Glace, AB.

Herbicide	Rate Ai kg/ha	Stage	Visual % Injury		Visual % Stand Reduction	
			06/23/2021	07/28/2022	10/13/2021	07/28/2022
glufosinate	0.410	A	0	0	0	0
glufosinate	0.500	A	0	0	0	0
glufosinate	1.0	A	30	12	30	32
glufosinate + quinclorac	0.500+ 0.050	A	0	0	0	0
glufosinate	0.500	A+B	0	0	15	0
Check			0	0	0	0

Table 3. Effects of herbicide applications applied in 2022 on establishment of perennial ryegrass seeded with glufosinate tolerant canola, La Glace, AB.

Herbicide	Rate Ai kg/ha	Stage	Visual % Injury	Visual % Stand Reduction
			06/23/2023	10/20/2022
glufosinate	0.410	A	11	0
glufosinate	0.500	A	20	11
glufosinate	1.0	A	33	36
glufosinate + quinclorac	0.500+ 0.050	A	15	13
glufosinate	0.500	A+B	20	25
Check			0	0

Note: Winter injury to perennial ryegrass at La Glace 2022 occurred and 2023 visual assessments could not be conducted.

Summary

- A single application of glufosinate at 0.410 or 0.500 ai kg/ha appears to be quite safe on seedling perennial ryegrass seeded with glufosinate tolerant canola.
- Two applications of glufosinate at 0.410 or 0.500 ai kg/ha will result in some damage to perennial ryegrass but does recover the year after application if moisture conditions are good.
- The high rate of glufosinate at 1.0 ai kg/ha causes damage to perennial ryegrass and should be avoided unless necessary for improved weed control.
- The application of quinclorac to glufosinate did not cause any visual injury or stand reduction to perennial ryegrass.
- The addition of clethodim to glufosinate causes severe visual injury and stand reduction to perennial ryegrass.
- Stage of perennial ryegrass, stage of canola, moisture conditions and temperature at spraying will have an effect on the tolerance of perennial ryegrass to glufosinate.

Establishing perennial ryegrass with glufosinate tolerant canola has proven to be an effective practice. Future work should look at the effect of desiccants on perennial ryegrass as the majority of growers prefer to straight combine their canola. It is estimated that 75% of the perennial ryegrass grown in western Canada is now established using this method.

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