Feral Rye (*Secale cereale* L.) Control in Winter Canola (*Brassica napus*)

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**INTRODUCTION**

Researchers (Western Coordinating Committee 2005) have estimated that feral rye reduces U.S. growers’ net profits by more than $27 million per year. Feral rye has been documented to reduce winter wheat yields up to 50% in Colorado, Kansas, Nebraska and Wyoming (Pester et al., 2000). The multi-state study determined that the average economic threshold values were between 4 and 5 cereal rye plants m⁻²; however the values varied between 0.9 and 4.3 plants m⁻² and were influenced greatly by environmental conditions. Before imidazolinone-resistant winter wheat technology was available, management of feral rye was accomplished by cultural methods such as increased winter wheat seeding rate and cultivar selections (Roberts et al., 2003); the inclusion of summer annual crops in rotation with winter wheat (Lyon and Baltensperger, 1995); and a single application of nitrogen compared to a split application (Anderson, 1997). As far as chemical control in winter wheat, glyphosate was applied with a rope wick applicator when feral rye was 25 to 30 cm taller than winter wheat (Lyon et al., 2002). In parts of Washington the rope wick is still used for spot-treating feral rye (personal observation). In 2003, the first imidazolinone-resistant winter wheat variety was released commercially in the Pacific Northwest (PNW) (Ball and Peterson, 2007). These varieties, for the first time, allowed growers to control feral rye selectively in winter wheat. However scientists have noted that feral rye is one of the more difficult winter annual grass weeds to control with imazamox applied to imidazolinone-resistant wheat (Pester et al., 2003; Geier et al., 2004).

In the winter wheat/summer fallow region of the PNW, very few growers have adopted the use of imidazolinone-resistant weed varieties for feral rye control. Feral rye has decreased growers’ profits by one-third because of dockage (Wade Troutman, personal communication). However, with the introduction of winter canola (Figure 1) into the winter wheat/fallow region (Young et al, 2014) an opportunity exists for growers to better manage feral rye in their production systems. The objective of this study was to evaluate clethodim, quizalofop, and glyphosate on feral rye control, above-ground dry weight and seed production as well as winter canola yield.

**MATERIALS & METHODS**

Two experiments were conducted in north central Washington during the 2011-2012 and 2013-2014 growing seasons to evaluate feral rye control in winter canola. Winter canola was seeded into conventional summer fallow by cooperating growers in a natural stand of feral rye in early September for experiment one (Bridgeport) and late August for experiment two (Okanogan). Each year glyphosate-resistant winter canola, variety Hy CLASS 115W, was planted at approximately 3.4 kg ha⁻¹ with 35-cm row spacing. Experimental sites were fertilized with 45 kg ha⁻¹ nitrogen (N) and 9 kg ha⁻¹ sulfur (S) in June of each summer-fallow year. An additional 22 kg ha⁻¹ N and 3 kg ha⁻¹ P were applied in-crop the following spring to both experiments.

**RESULTS & DISCUSSIONS**

Initial feral rye populations were 65 plants m⁻² in the fall at Bridgeport and 410 plants m⁻² at Okanogan. At Bridgeport, a second flush of feral rye occurred in the fall after the initial glyphosate application (Figure 2). Final feral rye control was poor (<70%) when each herbicide was applied in the fall and clethodim was applied in the spring (Table 1). Control was good (83%) with clethodim split-applied (fall plus spring) and control was excellent (>90%) with quizalofop and glyphosate applied either in the spring or split-applied. Greatest reduction in feral rye dry weight and plant density compared to the nontreated plants occurred with quizalofop and glyphosate applied in the spring or split-applied (Table 1). March, April, and May were extremely dry months (data not shown) and basically prevented feral rye seed production in plants treated with spring and split-applied herbicides (Table 1). Seeds were produced in fall-treated plots regardless of the herbicide applied with greatest reduction with glyphosate. Winter canola yields were low (Table 1) and were similar to yields harvested previously when canola was planted in September (Young et al, 2014). Yields were increased almost four-fold compared to the nontreated plants when quizalofop and glyphosate were split-applied. Interestingly, even though feral rye control was excellent and dry weight, density, and seed production were reduced greatly by spring applied quizalofop and glyphosate, canola yields were less than canola yields when these herbicides were split-applied. This would suggest fall, over-winter, and early-spring weed competition. The Okanogan experiment differed from the Bridgeport experiment in that there was no second flush of rye at Okanogan and the rye density was high at Okanogan compared to the moderate density at Bridgeport. Rye control was ≥90% for all three herbicides split-applied and when quizalofop and glyphosate (Figure 4) were applied only in the fall (Table 2). Rye densities at harvest reflected these excellent control ratings in that there were no plants present (Table 2) at harvest. Interestingly even though spring applied quizalofop and glyphosate controlled rye 83% and 100% respectively yields were decreased greatly compared to when these herbicides were fall applied or split-applied. Rye competition was so great that nontreated control plots were unharvestable. Canola densities were ≤2 plants per m² row in the nontreated and spring applied clethodim and glyphosate treatments.

**SUMMARY**

Our results are similar to the results found in Oklahoma (Bushong et al., 2011) in that quizalofop and glyphosate controlled feral rye in winter canola and clethodim was less effective. Our data suggests that with the use of quizalofop in conventional winter canola and glyphosate in glyphosate-resistant winter canola to control feral rye that this tool will allow the continued expansion of winter canola in the Pacific Northwest.

In the Okanogan experiment we evaluated a split application of glyphosate (fall) plus quizalofop (spring) and quizalofop (fall) plus glyphosate (spring). In both treatments, feral rye control was virtually 100% however, broadleaf weeds were not controlled when quizalofop was applied in the spring.

**REFERENCES**


Bushong, J.T., Peeper, M. Boyles, and A. Stone. 2011. Italian ryegrass (Lolium perenne), feral cereal rye (Secale cereale), and volunteer wheat (Triticum aestivum) control in winter canola. Weed Technol. 25:444-449.


