Herbicide-tolerant canola (*Brassica napus*) systems for the southeastern United Sates of America. Timothy L. Grey, Paul L. Raymer, and David C. Bridges, Dept of Crop and Soil Science, University of Georgia, P.O. Box 748, Tifton, Georgia 31793.

Several marketing and production problems have slowed the adoption of canola (*Brassica napus* L.) in the southeastern United States. One major deterrent to canola production is the difficulty of controlling cruciferous weeds like wild radish (*Raphanus raphanistrum* L.). Wild radish is the most common and troublesome winter annual weed in small grain production in Georgia (Webster and MacDonald, 2001). Cruciferous weeds, especially wild radish, compete vigorously with canola for light, nutrients, and water, but the seeds of the species also pose a quality problem in harvested canola seed. Seed of wild radish are high in erucic acid and glucosinolates and when present in harvested grain may result in outright rejection of canola or significant price dockage at the elevator. Italian ryegrass (*Lolium multiflorum* L.) can be a significant grass weed in small grain production. Research that screened a number of herbicides failed to demonstrate any naturally occurring differential tolerance between canola and wild radish with a single herbicide (Bridges, 1998) and a limited number of herbicides are available for conventional canola production.

The introduction of herbicide-tolerant crops provides an alternative mechanism for achieving differential herbicidal selectivity between canola and weeds. To date, enhanced tolerance of five groups of herbicides has been achieved with canola: triazines, imidazolinones, glyphosate, glufosinate, and benzonitrile. Deployment of cultivars tolerant to these herbicides offers great promise for weed control in canola production systems of the Southeast. However, an understanding of crop tolerance and weed control efficacy are needed in order to develop reliable recommendations before deploying these herbicide-tolerant systems in this region. Additionally, non-transgenic niche markets may be an avenue of canola production.

Materials & Methods

Field experiments were conducted in 2001-2002 and 2002-2003 to determine dose, weed control, and timing response to glyphosate, glufosinate, and imazamox, for glyphosate, glufosinate, and imidazolinone tolerant canola, respectively. Herbicide applications rates represented the 1x and 2x levels of treatment. Treatements included imazamox at 0.035 and 0.07 kg/ha, glyphosate at 1.12 and 2.24 kg/ha, and glufosinate at 0.5 and 1.0 kg/ha. Each herbicide treatment was applied to 1-2 and 3-4 leaf canola, a nontreated check for each cutivar was included for a total of 15 treatments. Corresponding strips of canola, wild radish, and Italian ryegrass were planted in early October for each trial with a cone planter. Other weed species were naturally infested. Data collected included percent weed control, canola injury (based on a scale of 0 to 100% with 0% representing no activity and 100% complete control) yield, and oil quality.

Results and discussion

The increase in injury from imazamox was a result of crop oil concentrate and urea-ammonia nitrate solution added to the solution mixture. No other treatment resulted in any injury and the imazamox injury was transient.

Wild radish control was greater than 90% with imazamox at the 1-2 and 3-4 leaf stage of application. The 3-4 leaf application of glyphosate was required to obtain greater than 90% wild radish control. At the 1-2 leaf stage of glyphosate application, wild radish were still emerging and was not controlled due to a lack of glyphosate contact. Glufosinate did not adequately control wild radish (<65%) and this has been previously noted.

Italian ryegrass control was less than 85% for all imazamox applications and the 1-2 leaf was more effective than the 3-4 leaf application. Glyphosate control of Italian ryegrass was affective at 1.12 kg/ha at the 1-2 leaf stage of growth. However, glyphosate at 2.24 kg/ha was required for the same level of control at the 3-4 leaf stage of application. Glufosinate at the 0.5 kg/ha rate did not provide adequate control of Italian ryegrass for either stage of application. The 1.0 kg/ha rate of glufosinate provided between 80 & 90% control of Italian ryegrass.

Henbit control was similar to wild radish for glufosinate and glyphosate for both rates and timings of application. Imazamox at 0.035 kg/ha applied at the 1-2 leaf canola stage gave 85% control but this same treatment applied to 3-4 leaf canola was 70%. Imazamox at 0.070 kg/ha was required to achieve 90% control of henbit for either application timing. Wild garlic control for all herbicides was 75% for the 1-2 leaf stage of application at the 1x rate. Delaying the 1x treatment to the 3-4 leaf stage of canola growth did not improve control with imazamox, however, glyphosate and glufosinate did have improved control. Shepard's-purse control was greater than 85% for all treatments.

In conclusion, imazamox provided contact and limited residual control of wild radish, henbit, and shepard's-purse at both application timings. Glyphosate weed control improved at the 3-4 application stage. This occurred due to delayed timing allowing weeds to emerge before application. Glyphosate and glufosinate at the 3-4 leaf application stage was required for greater than 80% control of wild garlic. Glufosinate at the 0.5 kg/ha rate provided less than 50% control of wild radish, henbit, and ryegrass control was also weak. Future research should focus on screening of newly developed southern canola lines for potential imidazolinone tolerance, determining if the transgenic glyphosate and glufosinate canola tolerance is needed in the southeastern US, consider if there are niche markets for non-transgenic southeastern US produced canola, and if canola has a fit in crop rotations in the southeastern US.

References

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