Effect of Timing of Isoxaflutole Application on Weed Control in Desi Chickpea (*Cicer arietinum*)

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Introduction

Isoxaflutole is a Group 27 herbicide that is registered in field corn (*Zea mays* L.) in Eastern Canada. Unpublished screening trials conducted in Western Canada indicated that chickpea (*Cicer aerientum* L.) is tolerant to isoxaflutole; however, broadleaf weed control was inconsistent. Isoxaflutole is a pre-emergence soil applied herbicide and requires spring soil moisture or rainfall to activate. It was hypothesized that early spring pre-plant application may improve consistency of weed control by making use of spring snow-melt.

Objective

To determine if early spring pre-plant application of isoxaflutole will improve consistency of broadleaf weed control compared to pre-emergence application.

Materials and Methods

Five trials were conducted in 2004 and 2005 at three locations (Saskatoon, SK. 2004; Scott, SK, 2004 and 2005; and Lethbridge, AB., 2004 and 2005). The Saskatoon soil is a clay loam with 4.5% organic matter and a pH of 7.2. Scott is a loam soil with an organic matter content of 3.5% and a pH of 6.0. The Lethbridge site is a sandy clay loam soil with an organic matter content of 3.6% and a pH of 7.8. Isoxaflutole was soil applied at rates of 79, 105, and 210 g ai ha-1 in late April or early May (EAR-PP) and 3 to 5 days after seeding (PRE). The 1X rate range of isoxaflutole is 79 to 105 g ai ha-1. Desi chickpea (*cv.* CDC Desiray) was seeded one to two weeks after the EAR-PP application. Glyphosate was tank-mixed with isoxaflutole treatments at a rate of 450 g ai ha-1. Check treatments included a weedy check and an industry standard (glyphosate pre-emergence at 450 g ai ha-1 and metribuzin applied post-emergence at 210 g ai ha-1). Treatment design was factorial and experimental design was a RCBD with 4 replicates. Data collection included: visual crop injury and weed control injury taken at 7-14, 21-35, and 42-56 days after emergence (DAE), total weed fresh weight (g m-2) and seed yield. Results were consistent across site-years so combined data is presented.

Results and Discussion

Desi chickpea generally tolerated all rates of isoxaflutole at both timings; however, some injury was reported at Scott at the 210 g ai ha-1 rate. Overall, the mean injury rating for the 2X isoxaflutole rate was 3 to 6%, compared to mean injury ratings of 32, 42, and 11% for metribuzin treatments at the 7-14, 21-35, and 42-56 evaluation dates, respectively (data not shown). Weeds present included kochia [*Kochia scoparia (*L.) Schrad.], wild mustard (*Sinapis arvensis* L.), redroot pigweed (*Amaranthus retroflexus* L.), wild buckwheat (*Polygnonum convolvulus* L.) and cow cockle [*Vaccaria hispanica* (Mill.) Rauschert]. All rates of isoxaflutole provided >80% control of wild mustard and kochia; however, there was slightly better control when applied PRE (Fig. 1). A rate of 210 g ai ha-1 EAR-PP was required to control redroot pigweed; in contrast, 105 g ai ha-1 PRE provided effective control (Fig. 2). Isoxaflutole at any rate or timing did not control wild buckwheat or cow cockle (data not shown). PRE treatments resulted in significantly lower weed biomass than EAR-PP (Fig. 3). This may be due to sorption of isoxaflutole and its metabolites to soil colloids (Bresnahan et al. 2004). Rate had a significant effect on chickpea yield; however, timing did not (Fig. 4).

Conclusions

Early spring application of isoxaflutole did not improve consistency of weed control compared to pre-emergence application. This may be due to the sorption characteristics of this molecule and its metabolites.

References:

Bresnahan, G.A., Koskinen, W.C., Dexter, A.G. and Cox, L. 2004. Sorption-desorption of “aged” isoxaflutole and diketonitrile in soil. Weed Res. 44: 397-403.

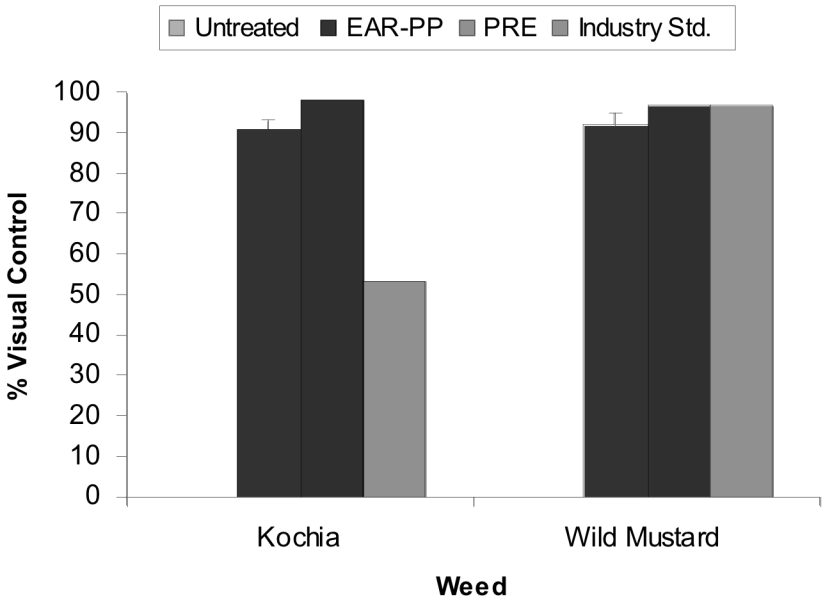

Figure 1: Effect of isoxaflutole application timing on kochia and wild mustard control. Control ratings taken 42-56 DAE. Bar represents the $LSD_{0.05}$.

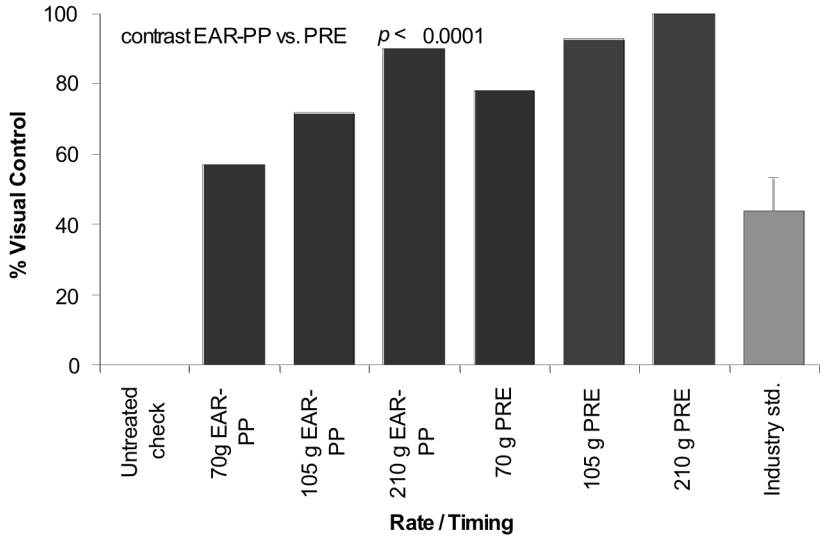

Figure 2: Effect of isoxaflutole rate and application timing on redroot pigweed control. Control ratings taken 42-56 DAE. Bar represents the $LSD_{0.05}$.

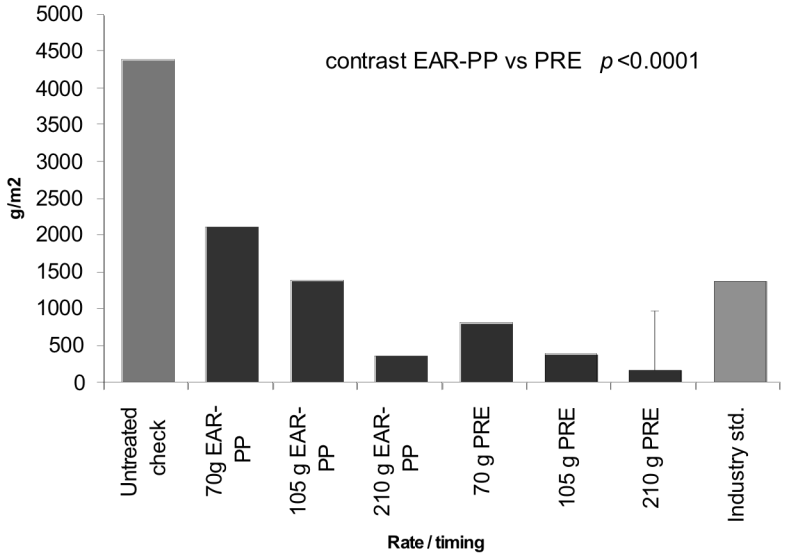

Figure 3: Effect of isoxaflutole rate and application timing on weed fresh weight (g m-2). Bar represents the $LSD_{0.05.}$

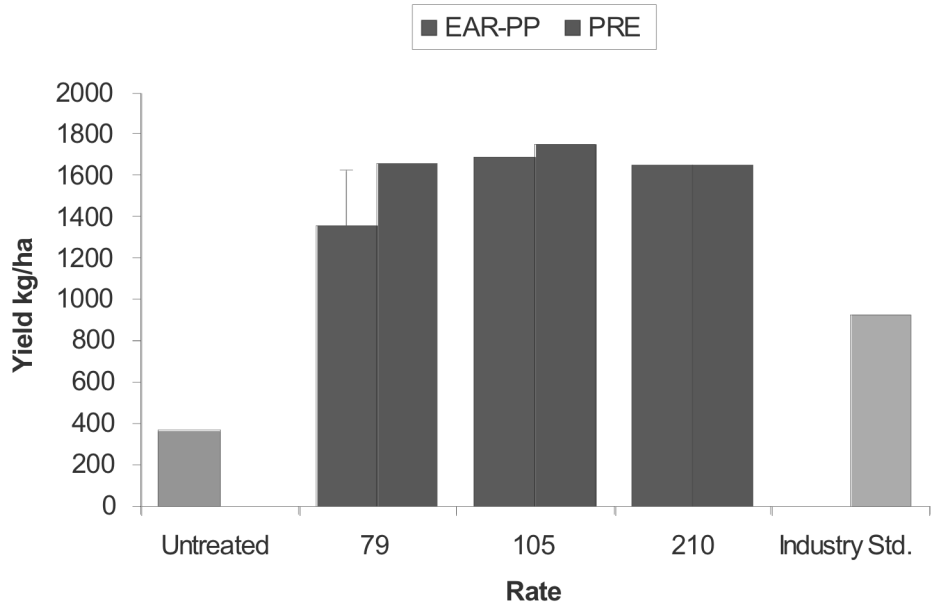

Figure 4: Effect of isoxaflutole rate and application timing on chickpea yield (kg ha-1). Bar represents the $LSD_{0.05.}$