Vertical Seed Placement and Tillage Effects on Wild Oat (Avena Fatua L.) Control by the Soil-Applied Herbicide Pyroxasulfone

Mangin, A. R.*, Hall, L. M. 1, 1Dep. of Agric., Food, and Nutritional Sci., University of Alberta, Edmonton, AB; 2 *(mangin@ualberta.ca)

Introduction

In Western Canada wild oat is more expensive for producers to control than any other weed species.1 It is estimated that >50% of the fields across the prairies contain wild oat resistance to the current modes of action (Group 1 or 2).2 This has lead to investigation into pyroxasulfone, a soil-applied, pre-emergent herbicide that inhibits very long chain fatty acid synthesis (Group 15), for wild oat control.3 Currently pyroxasulfone is registered in Canada only for use in corn and soybean but has potential to be used for other crops such as wheat, sunflowers and field peas.

Objectives

To observe the effects of wild oat vertical seed placement on control by the soil-applied herbicide pyroxasulfone first in the greenhouse then in small plots with the additional factor of two different tillage practices.

Methods

Greenhouse

Wild oat was planted at a depth of 0.5 cm or 6 cm in a 3.25 inch2 pots and then treated with pyroxasulfone at one of three rates: 0, 150, 300 g ai ha-1. Triallate was used as a known soil-applied herbicide at 0, 1672, 3344 g ai ha-1. All treatments were replicated 4 times. Survival was observed weekly until 28 Days After Treatment (DAT). Biomass, above ground length and below ground length were measured at 28 DAT.

Figure 1. Field work being done on small plot trials. A. Precision planting of wild oat seeds, Edmonton, AB. B. Harvest of wild oat, St. Albert, AB.

Methods (con’t)

Small Plot

Split-split plot design with the main factor being tillage type (direct seeded, cultivation), first split being herbicide treatment (pyroxasulfone at 0, 150, 300 g ai ha-1 and triallate 1672 g ai ha-1) and the final split being wild oat seeding depth (0.5 cm, 6 cm). Each treatment was replicated 4 times and the trial was conducted at 2 locations in the Edmonton area. Seeds were precision planted in a 0.25 m² sample area randomly placed within a tillage/herbicide treatment. Weekly survival counts were done until 42 DAT. At 42 DAT the plants were individually dug and washed. Plant morphology data and biomass were quantified.

Results

Figure 2. Survival (28 DAT). Figure 3. Fresh Weight (28 DAT)

Effect of seeding depth on wild oat control by the soil-applied herbicides pyroxasulfone and triallate in the greenhouse.

Response of wild oat, till and untill, seeded shallow and deep to pyroxasulfone and triallate (Edmonton). Figure 4. Fresh weight (42 DAT). Figure 5. Fresh weight expressed as percent of the untreated check.

Preliminary Conclusions

- Wild oat seed depth has an effect on control by pyroxasulfone
- Tillage had limited effect on pyroxasulfone efficacy (when expressed as % control)
- Field trials where tillage was done prior to seeding may not emulate conventional systems

Future Research

- Greenhouse trials to determine if the site of herbicide interception influences control
- Examine the vertical placement of wild oat with tillage and its effects on efficacy when pyroxasulfone is applied in the spring and fall
- Conventional tillage field trials to observe control by pyroxasulfone

References