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DIGGING INTO RESEARCH

Assessing flax tolerance to herbicides

CATEGORY weeds | *July 17, 2019*

Of the seven unregistered herbicides assessed, flax has excellent crop tolerance to fluthiacet-methyl, pyroxasulfone, and topramezone. Flumioxazin caused severe crop damage in high moisture situations and is not recommended for further trials.

Field experiments were conducted in 2015 and 2016 at the Kernen Research Farm and the Goodale (2016 only) Research Farm near Saskatoon, Saskatchewan and at the Ian N. Morrison Crop Research Farm at Carman, Manitoba. The trial was seeded with the flax variety CDC Glas at a target rate of 80 seeds per square foot (800 seeds/m^2). Flax was seeded on fallow and kept free of weeds during the growing season in order to assess crop tolerance and other agronomic traits free of weed competition.

Treatments consisted of 7 herbicides not currently registered for flax production applied at 1X and 2X rates. Unregistered herbicides included fluthiacet-methyl (Group 14), fluthiacet-methyl + MCPA, pyroxasulfone (Group 15), pyroxasulfone + sulfentrazone (Group 14), flumioxazin (Group 14), topramazone (Group 27), and topramazone + bromoxynil (Group 6).

Three registered herbicides were included as industry standards for comparison consisting of bromoxynil + MCPA, MCPA (Group 4), and sulfentrazone applied according to label directions.

The pyroxasulfone, flumioxazin and sulfentrazone treatments were applied preseed 5 to 7 days before seeding. The others were applied post-emergent when the flax was 2 to 4 inches (5 to 10 cm) tall. All treatments were assessed for tolerance and compared to the non-treated control.

Crop injury was assessed at 7 to 14, 21 to 28, and 56+ days after treatment. Flax plant population, height, yield, and thousand-seed weight were also measured.

Pre-emergent herbicides caused more crop injury than post

Pre-emergent herbicides caused the most crop injury at Carman in both years. When evaluated at the 7 to 14 and 21 to 28 days after treatment periods, pyroxasulfone, pyroxasulfone + sulfentrazone, and flumioxazin caused unacceptable to severe crop damage. However, flax was able to recover from herbicide injury 56 days after treatment, except for flumioxazin where severe crop injury of 26 to 82% continued to be observed.

Crop damage was less severe and less frequent at Kernen in 2015 and 2016 and at Goodale in 2016 with these pre-emergent herbicides. At Kernen, treatments containing pyroxasulfone did not cause unacceptable injury at 7 to 14 days after treatment in 2015 and 2016. Flumioxazin caused unacceptable damage in 2016 at both application rates when evaluated at 7 to 14 days after treatment. At 21 to 28 days after application at Kernen in 2016, crop injury from pyroxasulfone, pyroxasulfone + sulfentrazone, and flumioxazin ranged from 13 to 51%, with flumioxazin causing the most injury.

Pre-emergent treatments did not cause any unacceptable crop damage at Goodale in 2016.

The researchers thought that differences in environmental conditions and soil characteristics, especially with high moisture conditions when herbicide activity is also high, might explain why pre-emergent herbicides caused unacceptable crop injury at some locations in some years.

The post emergent herbicides fluthiacet-methyl and topramezone had acceptable crop safety in both years at all locations with only a few exceptions. Where crop injury did occur, flax showed signs of recovery by 21 to 28 days after treatment and all post-emergent herbicides had acceptable crop injury ratings by 56 days after treatment.

Plant population, height and yield effects varied

At Carman, several of the pre-emergent treatments reduced flax populations and height. This was attributed to the severe phytotoxic damage observed for these treatments. However, the only herbicide that yielded less than the control was flumioxazin, occurring in 2015.

At Kernen in 2015 and 2016, flax population and height were not affected by any herbicide treatment even when crop injury was observed. Similarly, no treatment significantly affected crop yield compared to the untreated control.

At the Goodale site, topramezone + bromoxynil (2X rate) significantly reduced flax population by 19.4 plants per square foot (194 plants/m^2). However this reduction in flax population did not influence crop height. Additionally, no treatment caused a significant yield loss, even when initial crop injury occurred.

Thousand seed weight was not impacted by any treatment at any site

The researchers concluded that fluthiacet-methyl, pyroxasulfone, and topramezone have the greatest potential to be registered in flax. At the majority of site-years, these herbicides did not injury the crop or reduce stand density, height or yield.

Registration of fluthiacet-methyl, pyroxasulfone, and topramezone on flax would provide growers three new modes of action to help manage herbicide resistance. Additionally, pyroxasulfone could be safely tank-mixed with sulfentrazone for further herbicide diversity in pre-emergent applications. However, mixing fluthiacet-methyl or topramezone with MCPA or bromoxynil cannot be recommended because of substantially increased crop injury.

Flumioxazin is not a viable option for use in flax because of the severe crop damage it can cause during growing seasons with high-moisture events.

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Kurtenbach ME, Johnson EN, Gulden RH, Willenborg CJ (2019) Tolerance of flax (Linum usitatissimum) to fluthiacet-methyl, pyroxasulfone, and topramezone. Weed Technol 33: 509–517. doi: 10.1017/wet.2019.8

https://www.cambridge.org/core/journals/weed-technology/article/tolerance-of-flax-linum-usitatissimum-to-fluthiacetmethyl-pyroxasulfone-and-topramezone/9CED52F5850C9BC30F7F1F51E3B0CD0E

