Saflufenacil (Sharpen® WG Herbicide): new crop topping herbicide for the control of seed set of wild radish (*Raphanus raphanistrum* L.) in wheat (*Triticum aestivum* L.)

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Introduction

Wild radish (*Raphanus raphanistrum* L.) causes significant yield and quality loss in Australian cereal production. Crop topping is the application of selective and non-selective herbicides to crops at late stage of development to desiccate the weed population with varying effect on crop. The systemic nature of Sharpen®'s active ingredient saflufenacil (Group G or PPO), allows the molecule to be transported from the leaf to the developing flowers and siliques (pods). With the increased pressures of glyphosate resistance in the wild radish populations an alternative is needed. The aim of the crop topping practice is to target the seed development and reduce the weed seed bank in subsequential years.

Materials and Methods

The crop topping efficacy and crop safety of Sharpen® was evaluated in 18 field trials conducted between 2013 and 2015 in the Southern cropping region of Australia (Vic, SA and WA) covering a range of common cereal varieties grown in each of the regions. Trials were conducted as randomised complete block design with 4 to 6 replicates. The plot size ranged from 12 m2 to 30 m2 in the field and sprayed with a hand held boom incorporating flat fan nozzles at an application volume of 83 to 143 L/ha.5

Trea®ents per hectare:

- Sharpen® WG (700 g/kg saflufenacil) was applied at 17, 26, 34 and 68 g with 1% v/v HASTEN
- 2,4-D (Nufarm Amicide 625 and Nufarm Amicide Advance) applied at 700 to 875 g a.i./ha,
- Glyphosate (Roundup Attack, Roundup Power Max) applied at 970 g a.i./ha,
- Diquat (Reglone) 600 g a.i./ha,
- Triasulfuron (Logran 750 WG) 11.25 g a.i./ha.

Herbicide applications were made between flowering (BBCH 65) and hard dough/fully ripe crop (BBCH 89). Some applications were made at an earlier growth stage than what is recommended for the current commercial standards used in crop topping applications. The wild radish growth stage ranged from inflorescence emergence (BBCH 50) to mature pods (BBCH 79)

Efficacy assessments were completed between 6 and 65 DAT, aimed to evaluate the effect of the trea®ents when applied to wild radish. These included: visual percentage of control/burndown and biomass reduction on wild radish plants, visual percentage of wild radish regrowth, pod density and seed count, and percentage of wild radish seed germination. Selected field trials were also taken to harvest to evaluate any impact of grain yield and quality from the application of Sharpen® at the crop topping timing.

Fig.1 Effect of crop topping on Wild radish pod density relative to untreated control

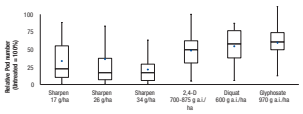


Fig.2 Effect of crop topping on Wild radish seed germination

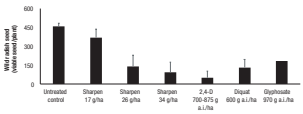
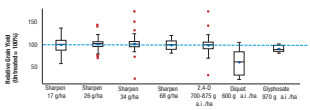


Fig.3 Effect of crop topping on wheat yield when applied at BBCH 71
(none of these trea®ents are currently registered or not registered at this crop timing)



Results and Discussion

Sharpen® showed the greatest reduction in pod density relative to untreated controls compared with other trea®ents (Fig.1). Even though the number of seeds per pod was not affected by the application. Moreover, the germination tests of wild radish seeds collected after an earlier application of Sharpen® showed significant reductions in viable seeds (Fig.2). Figures 4 and 5 show the effect of 34 g/ha Sharpen® on various growth stages of wild radish. Plants with no visible flowers where rapidly burned down (less than 8 days post application) yet plants with flowers and pods required slightly longer for comparable control as the Sharpen® first burns down the flowers and pods and later the vegetative leaves (Fig.5). Crop yield was not effected by Sharpen® and 2,4-D in these trials but was affected by glyphosate and diquat although these chemicals are not registered at the BBCH71 timing (Fig.3). The low level of phytotoxicity observed on the wheat crops, and generally no negative effect on grain yield, showed that Sharpen® has an excellent technical fit in early crop topping application timing (Fig.6). With populations of wild radish having resistance to glyphosate and 2,4-D, Sharpen® is effective in the control of these, as well there are no identified populations of any weed species in Australia to Sharpen (or any PPOs). The combination of reduced number of pods and then reduced germination of the seeds from those pods that were present at harvest provides a significant reduction in wild radish seed that is able to contribute to the weed seed population in a field for following seasons.

Literature

Walsh M J, Powles S B, 2009, Impact of crop-topping and swathing on the viable seed production of wild radish (Raphanus raphanistrum). Crop & Pasture Science, 60, 667-674

Situation facing many Australian farmers

Fig 4. Sharpen® impact on wild radish at various growth stages 8 days after trea®ent

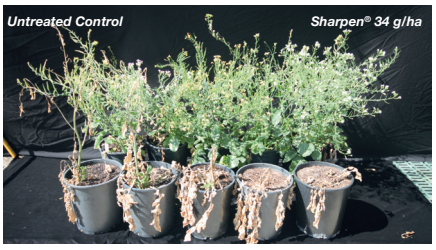


Fig.5 Sharpen® impact on wild radish at various growth stages 30 days after trea®ent

Fig.6 Visual effect of 34 g/ha Sharpen® on wheat.

W0507/26_Sharpen 05/2016