Managing weeds in pulses – the wiping alternative

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Summary

Weed wiping is a useful method for late-spring control of weed seed set in low growing pulses. A survey of practitioners in the Victorian Wimmera showed muskweed seed set control at between 50 and 100%. We still need more research to determine the best combination of herbicide brew and timing. However, preliminary results indicate translocated herbicides provide more thorough control than contact herbicides. Some crop damage will result from drip and drag, but experienced operators can minimize this.

Impact of weeds on pulse crops

Weeds in pulses reduce the yield of the pulse crop by readily competing with pulses as they are often low growing and not highly competitive. Pulse crops are generally used for human consumption so weed seed contamination in grain is undesirable especially when the seeds are of a similar size and not easily screened out. Weeds may also lead to quality problems. For instance green wild radish pods can release chemicals which reduce the viability of seed. Crop topping may bleach pulse grains making them undesirable as food.

Figure 1. Typical messy lentil crop infested with sow thistles.

Typical problem

Lentils are probably the least competitive crop even when they are well established. Weeds will quickly emerge above the lentil canopy and out-compete. Few post-emergent herbicide options exist to control broad-leaved weeds in pulses once they have become a problem.

Broadstrike® is registered for post-emergent broadleaf weed control in legumes. However, crop damage can be a problem, particularly if weather conditions are unsuitable.

Preparation, preparation, preparation…

Pulses can be the weak link in a rotation, because of the limited range of control options. This is the time when broad-leaved weeds get out of control. Pre- and post-emergent herbicides are not the only answer. But what is?…

Choose the least weedy paddock, use clean seed and good pre-emergent weed control. Follow this with the best agronomic practice for the specific pulse and local conditions, i.e. choose the right variety, get the timing right, sow carefully and provide adequate nutrition, inoculum and disease prevention.

'Too late!' she cried… or not?

Late spring weed control can minimize weed seed set for the benefit of future crops and herbicide resistance management. Techniques may include green manuring, non-selective crop topping, weed wiping, desiccation or windrowing. Timing is essential, unless green manuring, to avoid damage to the grain. With crop topping beware of bleaching, yield loss and reduced grain seed viability for future generations. Weed wiping is the subject of my work in 2003 and the remainder of this article.

Weed wiping survey 2003

The Wimmera is the premier pulse growing region in Australia with the greatest intensity and diversity (Jones *et al.* 2000). Weed wiping technology is particularly suited to controlling tall weeds emerging above the canopy of low growing pulse crops, particularly lentils and chickpeas. The wiper, often mounted on a trailing boom, is set up to run at least 10 cm above the crop canopy and wipe herbicide directly onto the weeds.

A broad range of these innovative machines is available; both commercial and home made. All of them are different and include rope wicks, weeping hoses, Smucker® and foam. Blanket wipers are common in Western Australia. Everyone has different combinations of herbicides including glyphosate or Spray.Seed® or both at different rates, or glyphosate with metosulam (Eclipse®). Some machines are privately owned, some owned by farmer co-operatives and some by contractors. As with most things on farms all of them have their own techniques and machinery secrets.

Survey method 2003

In 2003, I contacted over 20 farmers or contract wipers. Most were tackling muskweed, mustard, turnip weed, sow thistle and/or ryegrass. I asked them about their methods, machines, chemicals, timing, etc. After each paddock was wiped I photographed the weed control, and collected wiped weeds before harvest to count ripe and unripe seeds. Grain was also collected from the header to count seed contamination. I am currently in the process of analysing samples and data, but will present the initial outcomes.

Survey results 2003

Timing is critical (… but you knew that already). Aim to control weeds early as it is easier to cover the weed with herbicide and to maximize prevention of weed seed set. It is essential to wipe both ways (drive around twice) for heavily branched and tough weeds like muskweed.

Figure 2. Wiping with a translocated herbicide thoroughly kills the weed, preventing branches below the canopy from setting seed.

The choice of herbicide needs more research. However, first impressions are that a translocated brew is better. Translocated herbicides can travel down the plant and control more than just the branches contacted by the herbicide. With the contact herbicides it was common to find plants with some branches controlled, while other branches had perfectly formed seeds, particularly branches emerging from below the wiping zone.

Anecdotal evidence given by growers is that controlling drips can be a real problem and every machine is different. Generally, a tap is used to regulate the rate of herbicide flow rather than a pump. The weeping garden hose (made of recycled tyres) varies, and even neighbours have found different flow rates from brand new hose.

Drawbacks with wiping

Many weeds are difficult to wipe herbicide onto properly. Ryegrass is relatively easy, however muskweed and wild radish both have a shiny surface and strong branched structure that minimizes contact with the wiper. For these weeds it is essential to traverse the paddock twice, wiping from both directions. Sow thistle is another common weed of pulses which can be hard to control later because it produces thick branched plants minimizing the area that can be wiped, and because it can set seed even if completely killed while flowering.

Crop damage is also a significant issue. Dripping is a particular problem with wipers when the herbicide flow is not carefully controlled. Also, when the wiper passes over weeds it pushes them over into contact with the pulse crop. This can lead to herbicide contacting the crop, or in thick stands there is an increased likelihood of herbicide dripping off the weeds onto the crop. Wiping equipment varies and each must find their own best speed, tap adjustment, etc.

Latest publication

For broad ranging and up-to-date information refer to a recent CRC for Australian Weed Management publication. 'Weeds in winter pulses – integrated solutions' by Di Carpenter and Annabel Bowcher is only available as a 2 Mb download on the CRC website at www.weeds.crc.org.au, then click on *New CRC Publications* and then on *Books*.

Reference

Jones, R., Alemseged, Y., Medd, R. and Vere, D. (2000). The distribution, density and economic impact of weeds in the Australian annual winter cropping system. Technical Note Series No. 4. CRC for Weed Management Systems.

Predicting clodinafop efficacy

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Background

Correlation of Syngenta registration data and environmental variables by Medd *et al.* (2001) showed that clodinafop (Topik®) efficacy on wild oat was affected by a number of factors:

Y (efficacy) =

- Baseline +
- Adjuvant +
- Sum of minimum temperatures from 7 previous days (PRE 7) +
- Soil moisture deficit 10 days prior to spraying (SMPRE 10) +
- Maximum temperature on day of spraying (TMAX) +
- Spray water volume +
- Maximum temperature * Spray water volume interaction +
- Error

The temperature by spray water volume interaction infers that increasing spray water volume can increase herbicide efficacy under adverse conditions. These analyses also indicated that wild oat density and growth stage did not affect efficacy. All of these findings require further field testing for confirmation.

Current research

Clodinafop was applied to wild oat infestations on six occasions at four contrasting field sites in NSW during 2003. On each occasion, the herbicide was applied at five dose rates and in three water volumes. Efficacy was assessed in terms of plant mortality approximately 30 days after application and wild oat panicle density around anthesis. Fully automated stations collected a comprehensive set of soil and weather data at each site. These data, along with other measurements such as leaf extension rates at the time of spraying, are being analysed to test for association with efficacy at each spray time and location using multi-site mixed model statistical techniques.

Discussion

This research is attempting to provide a more prescriptive approach for weed control with herbicides. Functional models of the effects of environment on herbicide efficacy will enable advisors and users to define specific conditions that reduce wild oat control. Such information could provide growers with the options of avoiding application, or using the highest recommended rates during adverse conditions and using lowest recommended rates under ideal conditions. Long term simulation analyses have indicated that using such a flexible rate approach would increase the efficiency of clodinafop use and reduce the risk of herbicide failure.

Reference

Medd, R.W., van de Ven, R., Pickering, D.I., Nordblom, T. (2001). Determination of environment-specific dose-response relationships for clodinafop-propargyl on *Avena* spp. *Weed Research* 41, 351-68.