



IWM ON A BATHURST PUMPKIN FARM:

Advantages & drawbacks of
ground cover use, tillage and
residual herbicides

TRIAL SET UP

Grey pumpkins (var. Sampson) were planted the week of 4 November 2019, following strip tillage of terminated ryecorn and conventional tillage (rotary hoe) of terminated oats and vetch cover crop areas respectively. Clomazone herbicide was applied post-sowing pre-emergent (PSPE) at a rate of 0.4 kg a.i./ha and incorporated immediately with 25 mm irrigation water. A small control area was left untreated (no herbicide), both for the strip tilled ryecorn and conventionally tilled oats and vetch cover crop areas. A month post-sowing, most of the conventionally tilled area was inter-row cultivated.



Figure 1. Early stage pumpkin plants in ryecorn stubble zones and conventional tillage zones with/without inter-row cultivation.

An inter-row weed assessment was done 40 days post-sowing, with 10 replicates per treatment. This was ideal timing as the pumpkins had not started to vine out, the conventional areas had been inter-row cultivated 10 days before and the weeds had grown up through the cover crops and were easily identifiable. Finally, a second rough inter-row assessment was carried out on 13 January 2020.

RESULTS

Weeds controlled by clomazone were wireweed (*Polygonum aviculare*), cathead (*Tribulus terrestris*), pigweed or purslane (*Portulaca oleracea*), fat hen (*Chenopodium album*), mustard (*Brassica* sp.), nightshade (*Solanum triflorum*) and hairy panic (*Panicum effusum*). As expected, no weeds were found where inter-row cultivation had been practised, regardless of herbicide input. Stubble with herbicide showed low weed pressure as well, whereas stubble without herbicide had the second highest weed pressure. Interestingly, conventional till with herbicide and no inter-row cultivation showed the highest weed incidence (Figure 2).

The weeds not controlled by clomazone were castor oil (*Datura stramonium*), Prince of Wales feather (*Amaranthus tricolor*), Bathurst burr (*Xanthium spinosum*) and barnyard grass (*Echinochloa colona*). Again, lowest weed numbers were found where inter-row cultivation had been practised. Stubble treatments showed similar weed pressure to the conventional till without herbicide (but with inter-row cultivation). Highest weed numbers

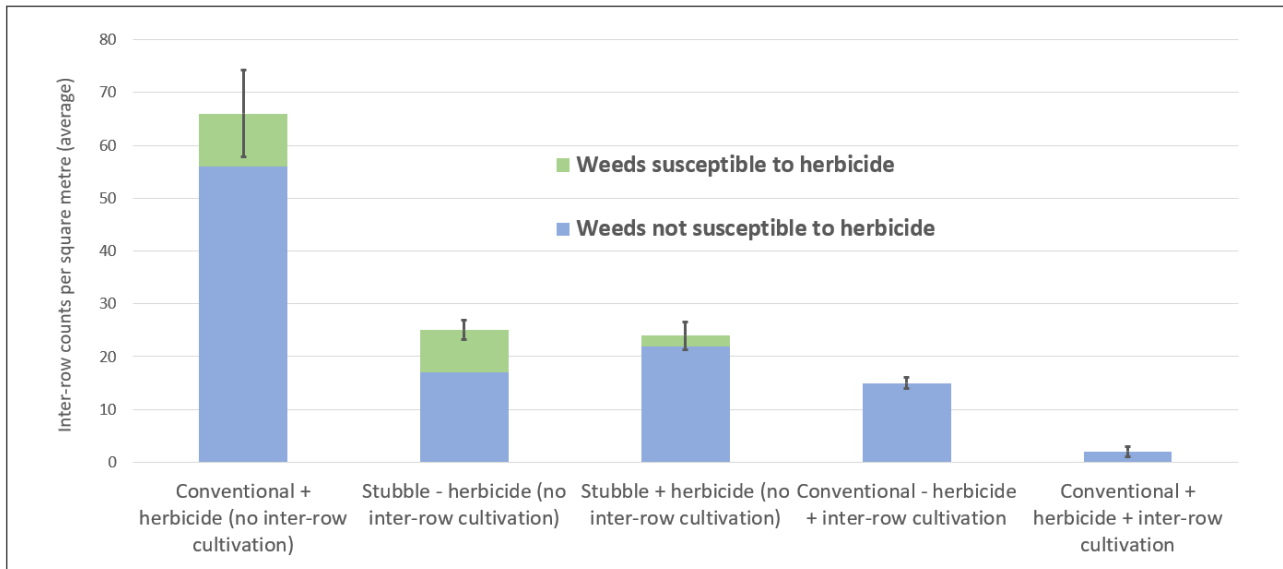


Figure 2. Inter-row weed counts per m² on 18/12/2019. Weeds counted that are susceptible to clomazone herbicide: wireweed, cathead, pigweed (purslane), fat hen, mustard, nightshade and hairy panic. Weeds counted that are not controlled by clomazone herbicide: castor oil, Bathurst burr, Prince of Wales feather and barnyard grass. The vertical bars indicate the standard error of the mean total counts (n = 10).

were found again for conventional till without inter-row cultivation (Figure 2).

A second assessment 4 weeks later showed no significant increase in weed numbers for all treatments (data not shown). Note that there had been almost no rain since the first assessment; nor irrigation, due to severe water restrictions in the Bathurst region.

DISCUSSION

Overall, we noted a satisfactory result from the **strip tilled cover crop combined with clomazone herbicide**. However, one of the challenges of strip tilling large stubbles (i.e. cover crops like ryecorn) is getting herbicide contact with weeds growing under the stubble cover, as well as herbicide tie-up on the stubble organic matter. Using large, coarse droplets and high water rates can help minimise this problem, but often weed escapes still occur. The herbicide clomazone is moderately soluble off stubbles and therefore readily available to plants (weeds) via root and/or coleoptile uptake. Clomazone is very similar to metribuzin in

solubility. Conversely, actives like trifluralin and pendimethalin have high potential to tie up in stubble.

One advantage of **conventional tillage** is the option to **inter-row cultivate weeds**. Growers must weigh up the weed control benefit against subtle costs like time, crop injury, root pruning, soil drying, and breaking the herbicide band (sometimes resulting in higher weed pressures later in the crop life cycle, especially in less competitive crops).

CONCLUSION

Clearly there is an advantage of inter-row cultivation when there is a high pressure of weeds not controlled by any registered herbicide. There is also a clear advantage to having inter-row ground cover and no soil disturbance (i.e. strip tilled cover crop) to suppress weeds – not to mention better water infiltration rates and moisture retention.

It should be noted that the majority of weed escapes are species not controlled by the herbicide applied. This strengthens the case for integrated weed management.