

Risks associated with inter-row weed control in row cropping

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Summary The decision to increase row spacing in broad-acre cropping in Australia is often made to conserve water for use by the crop at later stages, to reduce the incidence of pests and frost damage, and to reduce the problems of sowing directly into stubble.

Another relatively new reason for increasing row spacing is to increase weed management options between crop rows, where traditional application of selective herbicides may not be effective due to weeds developing herbicide resistance. Combined with precision farming, wide row spacing can provide an opportunity to define 'on-row' and 'inter-row' zones for completely different methods of weed control. Selective chemicals that may be too expensive for broadcast application over the whole paddock can be applied in the in-row zone only. Non-selective chemical, physical or mechanical control methods can be practiced in the inter-row zone. Inter-row chemical control is usually applied via sprayshield using non-selective chemicals, such as glyphosate or a mixture of paraquat and diquat. Mechanical control usually involves the use of inter-row cultivation or mowing.

Although there are many benefits associated with the 'two zone' weed management system, there are also several risks.

Many of these risks are short-term and associated with the immediate season. Yields might be reduced because wide row spacing limits the number of crop plants grown per hectare or because of crop damage resulting from non-selective inter-row weed control methods. There may be no registered non-selective herbicides for use within the inter-row or the equipment needed to implement this technology may be too expensive. Technology failure and inadequate weed control may lead to more weeds due to the reduced competitive pressure in wide-row systems.

Two important long-term risks are the evolution of herbicide resistance due to the repeated application of non-selective herbicides and weed species shift.

The most common method of inter-row weed control in the wide row cropping system is to spray

non-selective herbicides, usually glyphosate, on the inter-row spaces using sprayshield. As glyphosate resistance is known to develop due to prolonged selection pressure, this poses a serious long-term risk of glyphosate resistance where reliance is placed on one herbicide.

There is also a substantial risk of altering the weed floristic composition. Some weed species may have evolved resistance or are naturally tolerant to glyphosate or paraquat. Continual use of the same herbicides in the inter-row using sprayshield or other application methods may select for tolerant weeds resulting in their eventual dominance. In USA, continual glyphosate usage in glyphosate resistant crops is already resulting in weed species shifts.

Similarly, weed species differ in their degree of control with cultivation. Deep-rooted plants and vigorous early season weeds are more difficult to control with cultivation and quite often are transplanted afterwards.

Timing of weed emergence and control application may also select for different weeds species. Should the inter-row weed control (either chemical or physical) be implemented too early then some weed cohorts may escape control measures, allowing them to dominate the weed flora. If control is too late, the weeds become more difficult to control with either herbicides or cultivation. The timing of weed emergence and critical removal periods vary with species, allowing some to escape control and set seed.

Wider row spacing may also select for different weed species by altering the light, moisture and nutrient status available to crop and weeds, and subsequently affecting crop competitive ability.

Keywords Wide crop rows, herbicide resistance, weed species shift.

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