

Strategic tillage reduces emergence of key sub-tropical weeds

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Summary The increased incidence of glyphosate resistant and difficult to control weeds in the sub-tropical grain region of Australia have led industry to consider applying tillage in zero till systems for improved weed control. This paper examines the impact of different types of strategic tillage on emergence of flaxleaf fleabane (*Conyza bonariensis* (L.) Cronquist), feathertop Rhodes grass (FTR) (*Chloris virgata* Sw.) and windmill grass (WM) (*Chloris truncata* R.Br.).

Flaxleaf fleabane was first confirmed as having glyphosate resistance in 2010 (Preston 2012). Since this time, the incidence of glyphosate resistance has increased to 48 confirmed cases across Australia. Both FTR and WM grass are prevalent in northern farming systems infesting summer fallows and crops. Few herbicides are registered for control of these weeds, and there have been 2 confirmed cases of glyphosate resistant windmill grass (Preston 2012).

A field trial was established on a vertosol in southern Darling Downs, Queensland to examine the impact of zero till, harrow, gyral, offset discs and one-way discs on weed emergence. Prior to tillage, seeds of each species were sown onto the soil surface in separate 1 × 1 m² fixed quadrats. Emergence was counted following each flush in the fixed quadrats and in the subsequent two (1 × 1 m²) quadrats in the direction of tillage to account for seed movement.

In addition to weed treatments, glass beads, simulating weed seeds, were distributed on the soil surface and recovered *via* soil coring after tillage to measure 'seed' burial. Soil cores were taken to a depth of 10 cm for all treatments and separated into depths of 0–2, 2–5 and 5–10 cm. An additional soil core (10–20 cm) was taken in the one-way disc treatment to account for the expected deeper burial of beads.

Across four flushes, cumulative emergence density in zero till was 696 (fleabane), 437 (FTR) and 1247 (WM) plants over 3 m². Across all species, emergence generally decreased as soil intensity increased. The greatest reduction in emergence was generally after a one-way disc, which caused large amounts of soil inversion.

Impact of tillage type on emergence differed between species (Table 1). Averaged across tillage

treatments, emergence of the small-seeded species fleabane was reduced the most (>90%). The two grasses responded similarly to different forms of tillage with harrow, gyral and offset disc treatments reducing emergence by 61–80%. In contrast, the one-way disc treatment resulted in a greater reduction in emergence (84–90%).

Table 1. Cumulative emergence over 3 m² as % of emergence in zero till.

Tillage type	Fleabane	FTR	WM
Harrow	9	30.6	30.7
Gyral	8.1	20.5	37.4
Offset disc	2.6	36.0	38.9
One-way disc	1.3	16.4	10.6

Tillage type greatly affected burial depth of beads. While 77% of beads remained in the top 2 cm following a harrow, only 48, 27 and 9% remained in the top 2 cm for gyral, offset disc and one-way disc treatments respectively.

Results from this experiment show that tillage in different forms can greatly reduce the emergence of these three weed species. Further work is needed to examine if and where strategic tillage fits within long-term zero till systems of the sub-tropical grain region, with minimal adverse impact on benefits gained from zero till.

Keywords Tillage, feathertop Rhodes grass, windmill grass, fleabane.

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