Trifluralin resistance in *Lolium rigidum* Gaudin

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Summary   *Lolium rigidum* Gaudin is Australia's number one damaging crop weed, and has evolved resistance to many herbicides with different sites of action (e.g. ACCase, ALS inhibitors). Trifluralin, a pre-emergence herbicide, was first introduced for *L. rigidum* control in Australia in the 1960s and is vital for Australian minimum/zero tillage agriculture as it remains effective in controlling multiple resistant *L. rigidum*. Trifluralin resistance was early reported in 1995, and now the resistance has reached a worrisome level.

Pot experiments were conducted with three putative resistant *L. rigidum* populations, and trifluralin resistance confirmed in these populations. In addition, a Petri dish seedling-growth system has been established to rapidly quantify trifluralin resistance in terms of seedling root and shoot growth. This system has been adjusted to allow for determination of cross-resistance patterns to other microtubule-inhibiting herbicides.

Resistance mechanisms are being investigated. Preliminary α-tubulin gene sequencing in one population revealed three novel mutations. Rice genetic transformation is underway to confirm these putative resistance-endowing mutations. In contrast, non-target-site based resistance is most likely to be involved in two resistant populations with no mutation detection, and these populations will be used for trifluralin uptake, translocation and metabolism studies. Work is currently underway to characterise the mutations using purified sub populations with plants homozygous for a specific tubulin mutation. Genetic inheritance and fitness of trifluralin resistance will also be investigated.

Keywords   Trifluralin resistance, tubulin gene mutation, *Lolium rigidum*.