

Mechanism and inheritance of resistance to clethodim in *Lolium rigidum* populations from Australia

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Summary *Lolium rigidum* Gaudin. is a major weed of agriculture in Australia and has developed resistance to many herbicides. Clethodim was the last in-crop herbicide available for its control, however recently there has been a rapid evolution of clethodim resistance in *L. rigidum* across Australia. The mechanism and inheritance of clethodim resistance was studied in a number of resistant populations. Several different patterns of inheritance of clethodim resistance were observed and included a single gene, partially dominant, nuclear encoded trait, two different patterns of two-gene inheritance, as well as maternal inheritance of the resistance trait. Amino acid substitutions at

five (1781, 2041, 2078, 2088, and 2096) of the seven known positions in the *ACCase* gene documented to confer resistance to *ACCase*-inhibiting herbicides in grass weed species were identified in clethodim-resistant populations. In addition to these previously document substitutions, many resistant individuals also contained one or more amino acid substitutions at other positions in the *ACCase* gene. Studies into whether these substitutions also confer clethodim resistance are being undertaken.

Keywords Clethodim, *Lolium rigidum*, resistance, inheritance.