

Investigation of glufosinate resistance mechanisms in *Eleusine indica* (L.) Gaertn.

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Summary An *Eleusine indica* (L.) Gaertn. population from Malaysia has evolved resistance to glufosinate, an important post-emergence herbicide. This population was analysed for target-site (glutamine synthetase) and non-target-site (glufosinate uptake, translocation and metabolism) resistance mechanisms. Glutamine synthetase (GS) activity extracted from susceptible (S) and resistant (R) plants was equally sensitive to glufosinate inhibition, with IC_{50} values of 0.85 mM and 0.99 mM, respectively. The extractable GS activity was also similar in S and R samples. Foliar uptake of [¹⁴C]-glufosinate did not differ in S and R plants, nor did glufosinate net uptake in leaf

discs. Translocation of [¹⁴C]-glufosinate into untreated shoots and roots was also similar in both populations, with 44% to 47% of the herbicide translocated out from the treated leaf 24 h after treatment. The HPLC and LC-MS analysis of glufosinate metabolism revealed no major metabolites in S or R leaf tissue.

Therefore, glufosinate resistance in this resistant population is not due to an insensitive GS, GS over production or altered glufosinate uptake and translocation, nor enhanced glufosinate metabolism. The exact resistance mechanism(s) remain to be determined.

Keywords Glufosinate, herbicide resistance, mechanisms, *Eleusine indica*.