

Challenging target site EPSPS gene mutations (Pro-106-Ser vs TIPS) with crop competition and glyphosate: implications for goosegrass management

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Goosegrass (*Eleusine indica*) is regarded one of the worst weed species in agriculture. Not only it is often found at high densities in crops but also has evolved resistance to many herbicides. Single (Pro-106-Ser: P106S) and double (Thr-102-Ile + Pro-106-Ser: TIPS) target site EPSPS gene mutations conferring glyphosate resistance have been identified in goosegrass. Experiments were conducted to estimate ecological costs and benefits endowed by the single or double TIPS mutation under soybean competition (55 pl m⁻²) as well as the detrimental effect of the mentioned glyphosate resistance mutations on soybean yield under with and without glyphosate selection (1,080 g ha⁻¹). Whereas both ecological benefit and cost of resistance encompass population fitness, they are estimated under with and without glyphosate selection (1,080 g ha⁻¹), respectively. In absence of glyphosate selection, WT and P106S genotypes produced similar aboveground vegetative biomass which was significantly higher (95% and 44%) than that of the TIPS genotype under with and without the effects of soybean competition, respectively. This result denotes a significant resistance cost associated with the TIPS mutation. In the presence of glyphosate, soybean competition equally reduced aboveground vegetative biomass in the glyphosate resistant P106S (-98%) and TIPS (-97%) genotypes. Interference caused by the P106S and WT genotypes on soybean yield was greater than that caused by the TIPS genotype under no glyphosate treatment. Glyphosate application increased soybean yield due to the mortality effects on both WT and P106S, and growth and fecundity of P106S and TIPS glyphosate resistant goosegrass genotypes.

Palavras-chave: Fitness, *Eleusine indica*, soybean, herbicide resistance

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