TRANSGENERATIONAL EFFECT OF DROUGHT STRESS AND SUB-LETHAL DOSES OF QUIZALOFOP-P-ETHYL: DECREASING SENSITIVITY TO HERBICIDE AND BIOCHEMICAL ADJUSTMENT IN *ERAGROSTIS PLANA*

Marcus Vinícius Fipke[1]; Vivian Ebeling Viana[1]; Tamara Heck[1]; Natália Silva Garcia[1]; Franck Emmanuel Dayan[2]; Edinalvo Rabaioli Camargo[1]; Luis Antonio de Avila[1]

[1]Universidade Federal de Pelotas, Pelotas, RS, Brazil. marfipke@gmail.com; [2]Colorado State University, Fort Collins, CO, USA

Destaque: Transgenerational adaptation to abiotic stress in Eragrostis plana, reduces sensitivity to quizalofop.

Resumo: *Eragrostis plana* Ness is an invasive C_4 perennial grass in South America and very adaptable to environmental stresses. Our hypothesis is that there is a transgenerational cross-talk between environmental stresses and weed response to herbicide. This study aimed to: (1) evaluate if *E. plana* primed by drought stress (DRY), a sub-lethal dose of quizalofop-p-ethyl (QPE), or a combination of both drought and herbicide stresses (DRY × QPE), produce a progeny with decreased sensitivity to quizalofop and (2) investigate the potential mechanisms involved in this adaptation. A population of *E. plana* was submitted to treatments DRY, QPE or DRY × QPE for two generations (G). The progenies were analyzed for sensitivity to the herbicide quizalofop and biochemical, herbicide residue and transcriptomics analyses were performed. The resistance index to G_2 population, DRY (less sensitive) was >12.3-fold (50% injury or ED_{50}) and >8.5-fold (50% shoot dry mass reduction or GR_{50}), in comparison to CHK (more sensitive). In the G_2, the quizalofop-treated CHK population had reduced stomatal conductance and increased hydrogen peroxide concentration and lipid peroxidation. However, there was no change in stomatal conductance, hydrogen peroxide level, and lipid peroxidation in the quizalofop-treated DRY population. In addition, G_2 population had increased activity of the antioxidant enzymes superoxide dismutase, catalase and ascorbate peroxidase, in conjunction with the upregulation of *cytochrome P450 monooxygenases 72A31* (*CYP72A31*) and *CYP81A12* expression, which was accompanied by reduced quizalofop-p-ethyl concentrations inside the plants. These results suggest that quizalofop is metabolized by DRY population, mainly via the cytochrome P450 enzyme. *E. plana* demonstrated a capacity for transgenerational adaptation to abiotic stresses, with the population previously exposed to DRY becoming less sensitive to quizalofop-p-ethyl treatment.

Palavras-chave: South African lovegrass; acclimatization; CYP450; antioxidant enzymes

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