

Title : Study of the Molecular Mechanisms of Bispyribac-Sodium Resistance in Barnyard Grass
(*Echinochloa crus-galli*)

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ABSTRACT

Barnyard grass (*Echinochloa crus-galli*) is a major weed in rice paddies, reducing crop yields and developing resistance due to repeated herbicide use. One of the most widespread resistances is to bispyribac-sodium (BS), an acetolactate synthase (ALS)-inhibiting herbicide that disrupts protein synthesis. This study investigates the mechanisms behind BS resistance in barnyard grass populations in Thailand to support better weed management strategies. To evaluate herbicide resistance, a dose-response assay was conducted using both susceptible (2-CM-10 and MK-2D) and resistant (SP-4A and LB1) barnyard grass lines. Seedlings were cultured on Murashige and Skoog (MS) medium supplemented with BS at six concentrations, applied according to recommended label rates, over a 9-day period. The results indicated that a BS concentration of 500 g a.i./ha effectively distinguished resistant from susceptible lines. Additionally, multiple herbicide sensitivity assays were performed by culturing seedlings on MS medium supplemented with seven herbicides with different modes of action. The SP-4A line exhibited resistance exclusively to ALS-inhibiting herbicides, whereas the LB1 line showed resistance to both ALS inhibitors and quinclorac, an auxin mimic. Furthermore, molecular analysis of ALS gene sequences was conducted to investigate potential genetic mutations associated with resistance. Genomic DNA was extracted, and three copies of the ALS gene were amplified for sequencing. The results of the ALS gene sequence analysis for all tested barnyard grass lines will be presented in subsequent sections. These findings enhance our understanding of herbicide resistance mechanisms in *E. crus-galli* and provide a foundation for developing targeted weed control strategies in rice production systems.