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A novel mutant acetolactate synthase gene from rice cells, which confers resistance to ALS-inhibiting herbicides

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Abstract:

A two-point mutated gene of acetolactate synthase (ALS) was isolated from rice cells, which was cultured together with an ALS-inhibiting herbicide, bispyribac-sodium (BS). The mutations involved residues of tryptophan at position 548 to leucine (W548L) and serine at position 627 to isoleucine (S627I). The ALS expressed in *Escherichia coli* from this gene showed resistance to multiple herbicides including pyrimidinylcarboxylate (PC), sulfonylurea and imidazolinone herbicides, and showed stronger resistance to PC herbicides than to other herbicides. BS, a PC herbicide, had almost no effect on the enzyme even at 100 μ M, which is an approximately 10,000-fold higher concentration than the concentration required for 50% inhibition of the wild-type. The resistance level of W548L/S627I mutating ALS to BS was stronger than the additive effect predicted from the degree of resistance of each single amino acid mutated ALS. Transformed rice cells carrying this gene and a regenerated rice plant expressed resistance to BS, suggesting that this gene is useful as a selectable marker for introducing foreign traits into rice when used with PC herbicides.

Keywords:

acetolactate synthase, acetohydroxyacid synthase, ALS, AHAS, pyrimidinylcarboxylates, bispyribac-sodium

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