



ETHYL METHYL SULFONATE (EMS) INDUCED HERBICIDE RESISTANCE IN SRI LANKAN RICE (ORYZA SATIVA) VARIETIES

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Rice cultivators continuously apply a massive amount of herbicides on rice crop to reduce the effects of weed population. *N*-(phosphonomethyl) glycine commercially known as Glyphosate, a broad-spectrum herbicide targets the enzyme 5-pyruvyl shikimate 3-phosphate synthase (EPSPS) which involves in biosynthesis of aromatic amino acids in plants which affect the weed as well as the crop. Therefore, it is vital to carry out studies on Herbicide Resistant (HR) rice varieties. Ethyl Methyl Sulfonate (EMS) is the most commonly used chemical mutagen in plants which causes sequence change of functional mutations. Studies on induced herbicide resistance in Sri Lankan rice varieties are limited and there is a need of such studies for the inclusion of HR rice in a cropping program along with a range of weed management strategies. Mutants of EPSPS occur in Glyphosate tolerant crops and in the present study attempts were made to establish HR rice lines by conventional breeding methods instead of applying genetic engineering methods. Seeds of 25 rice varieties (S₀) were subjected to EMS treatment and non-treated seeds were served as the control. After mutagenesis, plants were exposed to Glyphosate (0.5 g/l) to check for herbicide resistance, which was examined up to the second generation (S₁) of tested rice varieties. Complete Randomized Design with three replicates was used as the experimental design. Plants with $\geq 50\%$ resistance to Glyphosate were considered as resistant varieties. Vegetative and reproductive characters were recorded from the survived plants. Results indicated that fourteen varieties increased the resistance to Glyphosate (Bg94-1, Bg352, Bg359, Bg360, At362, Bw364, Ld365, Bg366, Bg379-2, Bg403, Bg454, *Kaluheenati*, *Pachcha perumal* and *Madel*) in the first generation (S₀). The pair-wise statistical analysis of variance of agromorphological characters clearly showed significant differences ($p \leq 0.05$) between control and treated plants. Percentage of resistance of S₁ was almost similar to S₀ indicating that herbicide resistance was segregated to the second generation. EMS application was successful in enhancing herbicide resistance in certain rice varieties. Findings of the study can be used in the identification of HR rice varieties which could be used in rice breeding programs.

Keywords: *Oryza sativa*, Herbicide resistance, EMS, Glyphosate, Weed Management