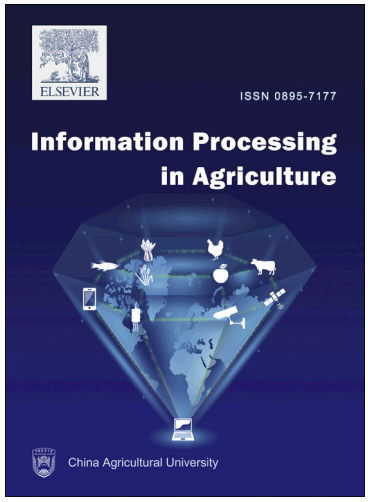

Developing Herbicide Resistant Sri-lankan Rice (*Oryza sativa* L.) Varieties: an Application of SELF Organizing Map

E.M.S.I. Ekanyaka, S.R. Weerakoon, S. Somaratne, O.V.D.S.J Weerasena

PII: S2214-3173(16)30078-6
DOI: http://dx.doi.org/10.1016/j.inpa.2017.02.002
Reference: INPA 75

To appear in: *Information Processing in Agriculture*

Received Date: 10 August 2016
Accepted Date: 13 February 2017

Please cite this article as: E.M.S.I. Ekanyaka, S.R. Weerakoon, S. Somaratne, O.V.D.S.J Weerasena, Developing Herbicide Resistant Sri-lankan Rice (*Oryza sativa* L.) Varieties: an Application of SELF Organizing Map, *Information Processing in Agriculture* (2017), doi: http://dx.doi.org/10.1016/j.inpa.2017.02.002

DEVELOPING HERBICIDE RESISTANT SRI-LANKAN RICE (*Oryza sativa* L.) VARIETIES: AN APPLICATION OF SELF ORGANIZING MAP

E.M.S.I. Ekanyaka[1, 2], S. R. Weerakoon[1*], S. Somaratne[1], O.V.D.S.J Weerasena[2]

[1]*Department of Botany, The Open University of Sri Lanka, P.O. Box 21, Nawala, Sri Lanka*

[2] *Institutes of Biochemistry, Molecular Biology and Biotechnology, University of Colombo*

Corresponding author; E- Mail: shyamaweerakoon@gmail.com

TEL: +94 714933922

FAX: +94 112806577

ABSTRACT

Application of high concentrations of post-emergent broad spectrum systemic herbicide, glyphosate is prevalently used to control rice weeds in Asian countries including Sri Lanka. Off target movements of glyphosate adversely affect growth of the rice plant reducing the yield. Inducing herbicide resistance (HR) in cultivated rice is a novel approach to enhance selectivity and crop safety. Studies on induced HR in Sri Lankan rice varieties are limited and studies are required to include HR rice in a cropping program. Ethyl Methyl Sulfonate (EMS), a chemical mutagen is used for functional mutations. The present study is an attempt of raising HR rice lines through conventional breeding methods. A suitable glyphosate concentration was determined by a preliminary study using five rice varieties (Bg300, Bg352, At362, Bg379-2 and H4) and varying glyphosate concentrations (0.25g/l, 0.5g/l, 1 g/l, 2g/l and 3g/l). Resistance percentage $\geq$ 50% was arbitrary considered as resistant varieties. Complete Randomized Design with three replicates was used in the experiment. Agro-morphological characters were recorded for the survived plants. Twelve varieties (Bg359, At362, Bw364, Ld365, Bg366, Bg369, Bg379-2, Bg403, Bg454 "Pachcha perumal", "Kalu heenati" and "Kurulu thuda") showed natural resistance to glyphosate and fourteen varieties have increased resistance after mutagenesis by EMS (S_0 – First generation). HR resistance percentage of S_1 (Second generation) plants was similar to S_0, plants indicating HR was transferred to new generation. Conventional statistics was supplemented with Self-Organizing Maps (SOM) to visualize variation of agro-morphological characters under treatment. The result proved that EMS application is an effective method in breeding new rice germplasm with HR and SOM is an important tool for visualizing the multi-dimensional dataset in lower dimensions.

Key words: Ethyl Methyl Sulfonate, glyphosate, Herbicide Resistance, *Oryza sativa*, Self-Organizing Map