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Genotype Performance of M6 of Local Rice Mutant Lines on Tidal Swamp by Crop Modelling Approach

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Abstract

Background – South Kalimantan has around 143.738 ha of tidal swamp that is planted by local rice once a year. The local high yield rice varieties have been developed in order to gain a new variety which has local characters those are preferred by local people (adaptable, fluffy, slender) but shorter in life cycle as extreme weather anticipation.

Purpose – The purposes of the research are to analyze variations of water consumptive use (evapotranspiration) of tested lines and to analyze the performance of M6 mutant lines at tidal swamp, which have short-lived period, slender, fluffy and higher yield compare to local rice.

Design/methodology/approach – Simulation activity was carried out at Agro-climatology laboratory, Faculty of Agriculture on 50 lines of M6 mutant lines and 2 local varieties which had cultivated at Sungai Rangas Hambuku village, Martapura Barat district, South Kalimantan in growing season 2016. Crop modelling simulation consists of 4 sub-models: plant development, plant growth, water balance and Nitrogen balance. The model has daily resolution as daily weather input needed, i.e. sun radiation, temperature, humidity, wind and rainfall. Model validation was done in graphics and t-paired test.

Findings – The 25 lines of 50 M6 mutant lines have been chosen those are performed the best agronomic characters. These 25 lines have evapotranspiration 853.9, 846.2, 824.0, 454.0, 492.4, 719.5, 873.3, 798.3, 602.8, 610.0, 855.1, 762.2, 827.6, 769.8, 790.2, 781.3, 698.5, 837.3, 802.0, 572.7, 864.8, 745.2, 961.7, 941.5, and 473.5 mm respectively. Water consumptive use of these lines is about 3 - 11 mm per day, at the age of 111 - 115 days of harvest. The model validity was approved in describing extreme climate effect and water availability on rice biomass from 14.070 ton ha⁻¹ reduce to 11.813 ton ha⁻¹, which eventually gave impact on grain reduction to 1.619 ton ha⁻¹.

Research limitations – The simulation was done only at one site of tidal swamp in South Kalimantan. This must be improved by explore to another location in the future.

Originality/value – This study is an effort to anticipate global climate change in relation to short-lived rice lines. Furthermore, the model simulation is a pioneer on local - high yield varieties in particular on tidal swamp.

Keywords: local rice, tidal swamp, short-lived, crop modelling

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