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Ratoon Cropping System as an Advanced Rice Production in Asia

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[Introduction]

Rice ratooning is one of the techniques for rice cultivation to increase its production by using perennial behavior potentially. Rice is one of the world's most important cereal crops and rice ratooning extends in tropical region. Based on land and water management, rice ecosystem is mainly divided into lowland, upland and deep water or floating rice. Rice ratooning is mainly practiced on lowland rice ecosystem in Asia. Ratooning provides higher resource use efficiency per unit time and unit land area. However, better yield of ratoon crop is possible by adopting appropriate management practices for main crop as well as for ratoon crop. These management practices include land preparation, adequate plant density, use of appropriate cultivars perennially, water management, application of adequate fertilizers, appropriate height of harvest, and control of diseases, insects and weeds. The purpose of this study was to clarify the regenerative capacity of rice cultivar across different environment.

[Materials and Methods]

Field experiments were done in Tsukuba and Ishigaki Island in Japan and Palembang in Sumatra of Indonesia. They are characterized by temperate, subtropical and tropical climate zones, respectively. Cultivar tested is 12 Japonica and 24 Indica in the experiments in common to the experimental site. Fertilizer of NPK 60 kg / ha as basal and N 30 kg / ha as topdressing is done during the experiments. Harvest of main crop was done at the time of maturity from 35 to 45 days after heading due to cultivar and environment of experimental site. Ratoon harvest was done at 60 days after harvest of main crop, respectively. Observations and measurements were yield of main crop and ratoon crop, newly developed tiller during ratoon crop and yield components of ratoon crop. Statistical analysis was done by the Finlay-Wilkinson method with interaction of gene and environment effect (GXE) to realize common stable cultivar of ratoon cropping.

[Results and Discussion]

Through the evaluation of main crop, mean yield was higher in Tsukuba, Ishigaki, and Palembang in the order of points. However in ratoon crop, mean yield was higher in Palembang, Ishigaki and Tsukuba. Ishigaki and Palembang showed a similar tendency among cultivars, which was inferred to be related to the temperature during the growing period. Interaction effect in yield of man crop and ratoon crop was recognized in analysis with GXE. There was a positive correlation on yield of Indonesia between main crop and ratoon crop, but the others were not the same. In general high-sink type rice were selected for common stable cultivar with high yield in any environment. Of the cultivar performance, high yields common to the experimental sites were IR 24, Milyang 23, and Takanari, both of which were high yield cultivars. It is concluded that ratoon crop is limited by natural environment in particular temperature during ratoon cropping, so lower temperature triggers failure of plant regrowth in particular newly developed tiller and grain maturity. Adequate temperature increase capacity of ratoon growth regardless of cultivar.

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