

Fisseha Worede Kirkos 2014: Genetic Diversity in Rice Based on SSR Markers, Morpho-Agronomic Characters and Resistance to Brown Planthopper (*Nilaparvata lugens* Stål). Doctor of Philosophy (Tropical Agriculture), Major Field: Tropical Agriculture, Faculty of Agriculture. Thesis Advisor: Assistant Professor Tanee Sreewongchai, Ph.D. 102 pages.

The availability of and access to diverse genetic materials is important to be successful in any plant breeding effort. Three investigations were undertaken to assess genetic diversity of rice genotypes based on SSR markers, morpho-agronomic traits and resistance to brown planthopper.

In the SSR analysis, a total of 144 alleles were detected at the 29 SSR primer pairs evaluated in the 24 cultivars. The mean expected heterozygosity ( $H_e$ ) was 0.659. Cluster analysis divided the cultivars into two major groups. The SSR diversity analysis showed the presence of higher allelic diversity in the cultivars analyzed. The morpho-agronomic traits diversity showed that days to flowering, plant height, culm length, panicle length, biomass, seed length and shape were the important traits in differentiating the genotypes. The result of the brown planthopper screen experiment showed that out of the 22 genotypes tested, only Ptb33 and Rathu Heenati were resistant to all the brown planthopper populations used. Two genotypes, IR64 and RD31, were moderately resistant. However, NERICA3, NERICA4, Azucena, CH1 and TN1 were susceptible to all the six populations.

Generally, the hierarchical cluster and PC analyses were in agreement in grouping the genotypes in all experiments. Based on the results, crossing of KOH1 with Azucena, CH1, KDML105 and SPR1 may result in heterotic expression in the  $F_1$  hybrids. NERICA cultivars, which showed greater SSR diversity, could be used as parents in future breeding programs. The resistant genotypes, Rathu Heenati and Ptb33 could be used as sources of resistance for BPH in Central Thailand.

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Thesis Advisor's signature