Parichut Rattanapol 2012: Rice Breeding for Photoperiod Insensitivity, High Yield and Good Grain Quality by Pedigree Method and Marker Assisted Selection. Master of Science (Agronomy), Major Field: Agronomy, Department of Agronomy. Thesis Advisor: Mr. Tanee Sreewongchai, Ph.D. 99 pages.

Rice breeding for photoperiod insensitivity, high yield and good grain quality using pedigree method and marker assisted selection was conducted by crossing between Khao Dawk Mali105 (KDML105) rice variety which has good grain quality and Qiqnizhan rice variety which has new plant type (NPT) and high yield potential. The F_1 hybrid plants were obtained after crossing. Then the F_2 progenies were planted and selection was made for photoperiod insensitive plants. DNA marker Naro1 and OSR19 were used for assisted selection for aroma and low amylose content in F_2 progenies. The F_3 progenies were planted and reselection was done for aroma using DNA marker Naro1. Visual selection for new plant type was applied in F_3 and F_4 progenies. A total of 6 lines were selected from F_4 progenies. These lines were photoperiod insensitive with aroma and low amylose content in their grains. Moreover, they gave higher yield than the highest yielding variety CNT1 which exhibited the yield of 19.67 g/plant. Among then, the ATN0901-227-1-2 showed the highest yield of 23.67 g/plant.

Moreover, the DNA marker was developed to identify the function of aromatic gene and it was used for assisting selection. This marker was designed to cover the position of 8 base pairs deletion of exon 7 in the *Badh2* gene, which related to the expression of aromatic trait in rice grain. The newly devloped DNA marker is a co-dominance marker that could identify homozygous dominance, heterozygous and homozygous recessive genotype of this trait. This marker can be use for assisting selection in rice for this trait with high efficiency and accuracy.

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