

Abstract

The objectives of this study were to evaluate and select local rice for photoperiod insensitivity and tolerance to gall midge infestation in local areas and to select and improve local rice varieties with special grain quality. The study was carried out in two consecutive growing seasons, dry season 2017 and wet season 2017.

In dry season 2017, the study was done at the Faculty of Agriculture, Chiang Mai University. Five sets of F_5 populations from crosses between local rice from highland of Nan province, Ble A and Jao Pluek Dum, and two advanced lines with gall midge tolerance plus cross between Jao Pluek Dum and Pathumtani 1 rice and parents were sown in pot experiment at Chiang Mai University. The F_5 of each cross were sown and selected under two conditions, dry land rice and wet land rice. Plants were recorded from morphological and agronomical characters. For grain yield, transgressive segregation was found in all crosses. Different between crosses and selection methods were found. Populations selected from wet land rice condition segregated toward higher yield than those selected from dry land rice condition. At maturity, those with photoperiod insensitivity, high yield and flowering at the same period from each cross and each were harvested. Seeds were separated into two sets. The first represented F_6 population to be sown in wet season in 2017. The second set was subjected to analysis for Fe, Zn and aroma. It was found that Fe, Zn in grain was highest in Jao Pluek Dum parent. Those of F_5 were intermediate between the parents. F_5 from some crosses derived from Ble A and Jao Pluek Dum local varieties had high Fe and Zn at the same level as Jao Pluek Dum. For aroma, 2AP fragrance substance in grain was detected in Pathumtani 1 x Jao Pluek Dum.

In wet season 2017, five F_6 populations and parents from the dry season 2017 were evaluated in farmers' fields in Nam Kwaeng Royal Project expansion area. Populations were sown in two conditions, dry land rice and wet land rice. Gall midge infestations were inspected at 40 and 80 days after transplanting. Plants grown in dry land rice had more tillers than plants in wet land rice. No gall midge infestation was detected in dry land rice in this season. When tested in wet land condition, very low infestation was found (0-1.8%) while 4.7% infestation was found in local, farmer's variety. Populations selected and tested in wet land condition had shorter culm than those selected from dry land condition. The F_6 populations were flowering at the same period as the photoperiod insensitive parents. Response to selection was shown in number of panicles per plant. All F_6 populations possessed more panicles than the local variety Ble A and Jao Pluek Dum parents and the differences were larger from those selected in wet land condition. For spikelets per

panicle, when grown under dryland progenies from the BA3 x CMU-L2 cross gave the highest number of spikelets per panicle as well as grain yield which was doubled those of the local rice parents. When grown under wetland condition, grain yield of the progenies population were higher than the local rice parents but lower than the photoperiod insensitive parents. Populations derived from and Jao Pluek Dum tended to gave higher yield than those derived from Ble A.

For special grain quality, Fe concentrations in rice grain of F_6 populations were similar to parents. For grain Zn, those of the local rice parents were higher than the photoperiod-insensitive parents. For F_6 s, highest grain Zn was found in BA3 x CMU-L2 cross from wet land condition. Very low amount of fragrance substance in grain was detected in JPD1 x PTT1 cross grown in wet land but not in dry land conditions.

