

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 2018 and wet season 2018.

In dry season 2018, the study was done at the Faculty of Agriculture, Chiang Mai University. Five sets of F_7 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_7 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_8 population to be sown in wet season in 2018. The second set was subjected to analysis for Fe, Zn and aroma. It was found that Fe in grain was highest in Jao Pluek Dum parent while grain Zn of Ble A parent was highest. Those of F_7 were intermediate between the parents. F_7 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 2018, five F_8 populations and parents from the dry season 2018 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 and wet land gave about 4-14 tillers per plant. No gall midge infestation was detected in both fields. Populations selected and tested in wet land condition had longer culm than those selected from dry land condition. Response to selection was shown in number of panicles per plant and spikelets per plant. All F_8 populations possessed more panicles than the local variety parents. Population derived from JPD1 x CMU-L2 gave the highest yield, followed by JPD1 x PTT1. Yield of both crosses were more than double of that from the local variety parent. For special

grain quality, grain Fe concentrations of F_8 populations were similar, closed to the local rice parents and classified as intermediate group. For Zn in grain, both BA3 and JPD1 local rice parents were significantly higher than those of the photoperiod insensitive rice parents. When grown in dry land condition, progeny populations had Zn concentration within the same range as the photoperiod insensitive parents. When grown in wet land condition, BA3 x CMU-B2 displayed the high level of Zn as the BA3 parents, follow by JPD1 x PTT1. For aroma, 2AP fragrance substance in grain was detected in Pathumtani 1 x Jao Pluek Dum grown under dry land condition.

