

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 2019 and wet season 2019.

In dry season 2019, the study was done at the Faculty of Agriculture, Chiang Mai University. Five sets of F_9 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_9 of each cross were sown and selected under two conditions, dry land rice and wet land rice. Different between crosses and selection methods were found. Populations selected from wet land rice condition tended to give 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 were harvested. Seeds were separated into two sets. The first represented F_{10} population to be sown in wet season in 2019. The second set was subjected to analysis for Fe, Zn and aroma. It was found that Fe and Zn in grain was highest in Jao Pluek Dum and Ble A parents. Those of F_9 were intermediate between the parents. F_9 from some crosses derived from Ble A and Jao Pluek Dum local varieties had high Fe and Zn at the same level as local rice parents. For aroma, 2AP fragrance substance in grain was not detected in Pathumtani 1 x Jao Pluek Dum.

In wet season 2019, five F_{10} populations and parents from the dry season 2019 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. No gall midge infestation was detected in both fields. Populations selected and tested in wet or dry land conditions were not differed in culm length. Response to selection was shown in number of spikelets per panicle. All F_{10} populations possessed more spikelets per panicle than the local variety parents. Population derived from JPD1 x CMU-B2 gave the highest yield when grow at dry land rice, and BA3 x CMU-L2 followed by JPD1 x CMU-B2 at wet land condition. For special grain quality, grain Fe concentrations of F_{10} 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, JPD1 x PTT1 displayed the high level of Zn as the BA3 parents, follow by BA3 x CMU-L2. For aroma, 2AP fragrance substance in grain was not detected in JPD1 x PTT1 population.

