

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 2016 and wet season 2016.

In dry season 2016, the study was done at the Faculty of Agriculture, Chiang Mai University. Five sets of F_3 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. Plants were recorded from morphological and agronomical characters. Plants within each F_3 populations were segregating for both morphological and agronomical characters. Due to severe high temperature during flowering, most plants set seed poorly. At maturity, those with photoperiod insensitivity trait from each cross were harvested. Seeds were separated into two sets. The first represented F_4 population to be sown in wet season in 2016. The second set was subjected to analysis for Fe, Zn and aroma. It was found that Fe, Zn in grain of F_3 were intermediate between the parents. F_3 from crosses derived Ble A local variety had higher Fe and Zn than those derived from Jao Pluek Dum. For aroma, 2AP fragrance substance in grain was detected in Pathumtani 1 x Jao Pluek Dum.

In wet season 2016, five F_4 populations and parents from the dry season 2016 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 tillering and higher gall midge infestation than plants in wet land rice. A range of 0-20.6% of gall midge infestation was found in dry land rice. Ble A and Pathumtani 1 were most sensitive parents while less than 1% were found in all F_4 populations. When tested in wet land condition, low infestation was found (0-5.3%) with local and farmer's varieties showed higher infestation than the photoperiod insensitive parents. No or very low level of gall midge infestation was found in CMU-B2 and its F_3 progenies.

Under dry land condition, mean yield of most F_4 populations were closed to high yielding male parents. F_4 from cross between Ble A x CMU-L2 was exceptional and infested by gall midge about 20% , resulting in as low average yield as the female local rice parent. Under

wet land condition, populations derived from Ble A local rice parent gave lower yield than the other and F_4 from Jao Pluck Dum and Pathumtani 1 exhibited the highest yield.

For special grain quality, Fe concentrations in rice grain of F_4 populations were similar to parents. For grain Zn, those of the local rice parents were higher than the photoperiod-insensitive parents. For F_4 populations, the highest grain Zn was found in Jao Pluck Dum and Pathumtani 1 cross from wet land condition. Fragrance substance in grain was also detected in this cross with the concentration about half of Pathumtani 1

