Characterization of On-farm Rice Germplasm in an Area of the Crop's Center of Diversity

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ABSTRACT

The seed of rice (Oryza sativa L.) from the highlands of northern Thailand, which is located within the species' centre of diversity, constitutes some of the world's last local rice germplasm still retained on-farm, provides local farmers and communities with a readily accessible resource, and is a source of value-adding traits for rice breeding. This paper reports on the germplasm represented by 281 seed samples collected in 2013 from an area of the highlands between latitudes 17.76°N to 20.18°N and longitudes 97.76°E to 100.48°E. The samples were provided by farmers belonging to 10 ethnicities, in number that closely correlated with the groups' share of the highland population ($r = 0.84$; $P < 0.01$). Compared with the slender grain rice of the lowlands, the highland germplasm was distinctive in its grain shape, and classed as large grain type in the husk, and medium grain type as de-husked, brown rice. The rice, which was predominantly of non-glutinous grain type and grown mainly as upland rice, had generally higher iron concentrations than rice in the lowlands; thus demonstrating how an on-farm rice germplasm may directly benefit local farmers and communities who consume the rice they grow. In addition, potential value-adding traits were identified in varieties and seed samples with the highest zinc density and novel rice with pigmented pericarp and high anti-oxidative capacity.

Keywords: Anthocyanin, Antioxidative activity, Iron, Rice, Zinc