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Morpho-genetic Characterisation, Diversity Analysis and Evaluation of Rice Landraces in Benguet

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Abstract

The study aimed to characterise rice landraces collected in Benguet based on morphological and genetic traits; determine relationships and diversity; evaluate their growth, yield and resistance to pests and diseases, grain quality; and determine the most preferred landraces based on yield performance and sensory evaluation.

Fourteen Benguet rice landraces were characterised and evaluated in Kibungan, Benguet. Single nucleotide polymorphism (SNP) genotyping was done at the International Rice Research Institute-Genotyping Services Laboratory using Infinium Illumina 6K to determine their diversity analysis. Grain quality parameters were determined at the IRRI-Grain Quality and Nutrition Center.

Based on 40 agro-morpho characters, 4 clusters were identified through Ward's Method. Three clusters were grouped using SNP markers. The Lamadya and Camporo group in both analyses shows their similarities on morpho-agronomic traits' expression in the field and confirmed at molecular level. Oklan cluster has a unique profile from the rest. The combination of morphological and SNP markers is reliable in discriminating these landraces.

High diversity quantitative morphological traits such as leaf blade width, ligule length and flag leaf width may be used to discriminate rice landraces and as markers for future breeding programs. Low diversity qualitative traits such as leaf blade colour, auricle colour, flag leaf attitude, culm anthocyanin colour, stigma colour, presence of awn, panicle attitude of main branches, caryopsis shape and caryopsis pericarp colour may likewise be used as markers to improve yield.

Based on the correlation analysis, landraces with more productive tillers or panicles have higher grain yield. But taller rice plants with thicker and longer culms, longer and wider flag leaves have lower grain yield. On grain quality, grains of most of the rice landraces have positive grain traits such as small to medium chalkiness, low to intermediate amylose content, low to intermediate gelatinisation temperature and soft gel consistency.

Initial grain quality results should be tested further in replication for validity of results. Nevertheless, these results are valuable for future researches to increase yield and explore other value-addition interventions for a higher farmers' profit. Moreover, findings in this study can be used by stakeholders for rice landraces conservation and protection.

Keywords: Genetic diversity, landraces, single nucleotide polymorphism