

Evaluating the Genetic and Physiological Diversity of Rice (*Oryza sativa* L.) Strains in the Regions of Mindanao, Philippines: A Basis for Sustainable Agricultural Adaptation

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Abstract: The Philippines heavily relies on rice as a staple crop making it pivotal to ensure its sustainable production. Notably, rice cultivation plays a significant role in the livelihoods of farmers in Mindanao and contributes substantially to the country's agricultural economy. Genetic diversity refers to the variation in genes and genetic markers among different rice varieties, while physiological diversity encompasses the variability in traits related to drought tolerance. With the increasing challenges posed by climate change, resource limitations, and population growth, it is essential to evaluate and harness the genetic and physiological diversity of rice strains. This study aims to evaluate the genetic and physiological diversity of rice species in three drought-prone regions in Mindanao. The rice species under investigation are NSIC Rc192, Rc222, and PSB Rc14 which show promising drought traits according to PhilRice Institute. The genetic data of the rice strains will be obtained via collection of leaf tissue samples, employing CTAB-based DNA method to extract DNA, and using next-generation sequencing (NGS) equipment to assess genetic markers and allelic variations associated with drought tolerance. Furthermore, physiological data such as water use efficiency, stomatal conductance, leaf morphology, and biochemical analyses will be measured. Data analysis involved chi-square test to analyze categorical data and analysis of variance to analyze numerical data. The findings of the study can be beneficial as this would facilitate the development of climate-resilient rice crops, and provide practical recommendations on sustainable agricultural practices, thus, enhancing food security and productivity in the face of changing environmental conditions.

Keywords: rice strains, sustainable agricultural adaptation, rice cultivation, genetic diversity, physiological diversity

Related SDG Goals: SDG2: Zero Hunger, SDG1: Sustainable Cities and Communities, SDG12: Responsible Consumption and Production, SDG13: Climate Action, SDG15: Life on Land