

Agronomic and Yield Response of Three Upland Rice Varieties to Varying BIO-NTM and Inorganic Nitrogen Fertilizer Combinations in Ratanakiri Province, Cambodia

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Abstract

Increasing the upland rice yield is crucial in coping with rice shortages and for food security of upland communes. A baseline survey was conducted from June – July in Lum Choar Commune, Ou Ya Dav District, Ratanakiri Province, Cambodia, to describe the existing production system, and identify constraints to increased yield and income of upland rice farmers. The quality of seeds used by ten upland rice farmers in the study sites was evaluated. A field trial was conducted in Ratanakiri Province to evaluate the field performance of farmer's variety, and local improved varieties and farmers' N fertilization with various biofertilizer (Bio-NTM), and inorganic N fertilizer combinations. The interviewed farmers generally had low education and low income. Low yields could be attributed to their existing farm practices which follow the traditional paths of production, such as no weeding, and no or minimal N fertilizer application. Farmers used seeds generated from their previous harvests for many years resulting in poor seed quality and low seedling vigor. All of the upland farmer seeds had low vigor, while only 50% had high germination. To increase yield, some practices need to be changed, such as the use of improved variety, fertilization, and access to knowledge on new technologies. In using farmer's variety, there is a need to increase seed rate and also improve seed quality. In the field, the two new improved rice varieties, Phkar Chan Sen Sor and Phkar Romdeng, out-yielded farmer's selection variety in all locations, and across fertilizer treatments. The improved varieties also had better agronomic and yield components. Application of 100 kg N ha⁻¹ produced the highest yield across varieties and locations. Bio-NTM inoculant with 50 kg N application had lower yield (2.309-ton ha⁻¹) than 100 kg N application (2.59-ton ha⁻¹), but had higher return on investment due to reduced cost of fertilizer material