

An approach to reduce application rate of Urea and increase its efficiency in a rice grown tropical Alfisol using rice husk biochar

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Abstract

Fertilizer use efficiency (FUE) of urea in rice cultivation is often less than 30% in Sri Lanka. Losses of urea-N through volatilization, leaching, de-nitrification and runoff cause low profits and multitude of environment issues. The objective of this study was to increase FUE in a rice growing Alfisol in the agro-ecological region IL1 in Sri Lanka using a pelletized urea-rice husk biochar composite (UBC), while reducing the quantity of urea fertilizer application. A field experiment was conducted during 2019 *Yala* and 2019/2020 *Maha* to study the effect of UBC on N uptake (NU), agronomic efficiency (AE) and grain yield of rice transplanted with variety Bg 352. Treatments were: Control (without N), 100 % recommended N as Urea in four applications (100% Urea_{4app}), 75 % of recommended N as Urea in four applications (75% N as Urea_{4app}), 75 % of recommended N as UBC in four applications (75 % UBC_{4app}), 50% of recommended N as UBC in four applications (50% UBC_{4app}) and 75 % of recommended N as UBC in three applications (75% UBC_{3app}) within the growing season. Treatment 75% UBC_{4app} has given a comparable yield and straw NU to those of 100% Urea_{4app} application ($p < 0.1$). The highest AE was in 75 % UBC_{4app}: 13.1 and 15.2 kg/kg of N in both *Yala* and *Maha* seasons, respectively. Thus, current study proves that 25 % of recommended urea could be cut down in rice cultivated in Alfisols when N is applied in the form of UBC. Neither the rate of urea application nor the number of top dressings could be further reduced through the UBC used for this experiment. Repeated application of biochar through UBC could improve the fertility levels of rice lands in the long-run and this needs to be investigated in future studies using different soils.

Keywords: Nitrogen use efficiency, N uptake, Rice, Rice husk biochar, Slow-release fertilizer

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