Proceedings published at http://www.m.elewa.org/econferenceIeCAB.php

The effect of method, rate and time of urea application on nitrogen use efficiency and yield of wetland rice in Rwamagana district of Rwanda

Abstract ID: IeCAB011-431

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ABSTRACT

Rice is the staple food for more than half of the world population and for most low income people in Asia. In Africa, over 50 million people depend on rice farming. In Rwanda, the livelihood of nearly half a million individuals is rice-based. Rice is often very responsive to nitrogen fertilization and the high yield potential of modern varieties cannot be realized without adequate Nitrogen supply to the plant during the entire growing period. Recovery of applied nitrogen by lowland rice with reliable water supply is invariably low and hardly exceeds 30-50%.This low recovery is attributed to several loss processes operating in the rice fields such as volatilization, nitrification, denitrification, leaching, seepage and NH_4^+ fixation by clays. Reports suggest that Nitrogen use efficiency is optimized when Nitrogen is applied in a single basal application at four-to-five leaf stage. Multiple, or split applications may be employed to fertilize tall, lodging-prone cultivars or semi dwarf cultivars grown on some clay soils that require high Nitrogen rates. Deep

placement method has been also reported to be well protected from various Nitrogen loss mechanisms at the placement sites in the soil. However the knowledge of mode of application, time of application and rates of nitrogen fertilizer are not known by farmers, in Rwamagana district of Rwanda. Therefore the purpose of this study will be to evaluate the effect of mode of application, rates, and timing of urea on rice productivity in Rwamagana marshland, Rwanda and hence increase rice yield through efficient use of inputs which will improve livelihoods of many small scale farmers in Rwanda. Gakire variety will be used in the experiment. This study will have two separate experiments, the first one will assess the effect of application method and at different rates and it will be a factorial experiment arranged in Completely Randomized Design with two factors; application method with 2 levels (types) and rate of Nitrogen fertilizer with 4 levels giving in total 8 treatments. The second one will assess the effect of time and application rate of Nitrogen fertilizer applied on surface and the experimental design will be a CRD with 11 treatments with three replicates each. SAS package will be used as statistical software to analyze data, and Fischer's protected LSD at the 5% significance level will be used for means separation. The generated information from the study will be used to advise the farmers on the proper fertilizer management which will lead to increased rice yields as a part of food security and improved income.