

## Effects of Controlled Released Urea on the Yield and Nitrogen Nutrition of Flooded Rice

### ABSTRACT

Nitrogen (N) loss is one of the key problems faced by rice farmers, and Nitrogen-use efficiency in rice is often poor as a result of high N loss through volatilization, leaching, and denitrification. One of the ways to improve N efficiency is by using controlled-release area (CRU). The CRU generally outperformed granular urea fertilizer in reducing N losses, stimulating plant growth, and increasing N concentrations. A field experiment with the flooded rice variety MR220 was conducted to compare the effect of six different types of CRU fertilizers on yield and N nutrition of a flooded rice cultivar. Bakau series soil (Typic Tropaquept) was used in this study. Rice plants were grown in a cylindrical culvert measuring 90 cm in diameter by 60 cm in height, and all culverts were filled with soil (approx. 210 kg). The soil was flooded and preincubated for 3 weeks to stabilize physiochemical properties before sowing. The experiment was carried out over two planting seasons on the same plot using a completely randomized design (CRD) and was replicated three times. The CRUs evaluated were CDU Uber-10, Meister-20, Meister-27, humate-coated urea, Duration type V, and sulfur-coated urea (gold-N). Fertilizer was applied once throughout the study. For both seasons, CRU-treated plants had significantly greater rice yields [6 t ha<sup>-1</sup> (first planting harvest) and 6.2 t ha<sup>-1</sup> (second planting harvest)] than urea-treated plants [3.7 t ha<sup>-1</sup> (first planting harvest) and 2.2 t ha<sup>-1</sup> (second planting harvest)], respectively. The N accumulations in rice straw and rice grains of the CRU-treated plot were significantly greater than in the control. It can be inferred that CRU performs significantly better than granular urea. This finding is important, considering the usually high N losses in rice-growing areas.

**Keyword:** Herbaceous plant, Spermatophyta, Angiospermae, Monocotyledones, Gramineae, Rainfed lowland rice cultivation, Nitrogen fertilizer, Nitrogen, Urea, Oryza, Nutrient recovery, Substance loss, Nutrition, Yield, Slow releasing fertilizer