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03j. Water, soil and nutrient management

RESPONSE OF LOW LAND RICE TO NITROGEN FERTILIZATION UNDER DIFFERENT IRRIGATION REGIMES

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Purpose:

Nitrogen is one of the most yield limiting nutrients in irrigated rice production in Brazil. In order to make rational use, it's necessary to consider how the irrigation is managed, and possible alterations to soil processes in which nitrogen participates. The transformations of forms that can be assimilated by plants (NO_3^- and NH_4^+) are dependent on soil potential redox, which in turn is principally related to the available organic material, and soil moisture content. The objective of this study was to evaluate response of irrigated rice to nitrogen fertilization under different irrigation regimes.

Approach and methods used:

A field experiment was conducted on an Inceptisol. The experimental climate location was AWi (Koeppen), with precipitation of about 1300 mm during the crop growing season. The experimental design was random blocks with four replications and split plot. Irrigation regimes were in the main plots: AWDL (Alternate Wet and Dry Long: 21 days flooding followed by 7 days draining), CF (continuous flooding), and NF (no flooding). Plots received N at **four** application levels: 0, 50, 150, and 250 kg ha⁻¹. Grain yield was determined at the crop physiological maturity. Data were analyzed by using quadratic regression equation, and the significances of the curves were assessed by an *f*-test.

Key results:

Significant responses to nitrogen rates were found for all irrigation schemes. For NF scheme, the relationship between grain yield and N rate was $y = -0.1045x^2 + 34.625x + 6292.8$ and greatest productivity occurred at 150 kg N ha⁻¹. For AWDL, the relationship was $y = -0.0447x^2 + 21.07x + 6133.8$ and best yield was observed at 250 kg ha⁻¹ of N. For CF, relationship was $y = -0.0514x^2 + 29.54x + 4285.9$ and best yield at 250 kg ha⁻¹ of N. The NF showed average yield superior than AWDL and CF water schemes.

Synthesis and Applications:

The results demonstrate that using N levels for rice production should be taken into consideration the irrigation regime. Because the efficiency of the N fertilization is influenced by water management. Without flooding regime presented higher yield compared to continuous flooding, demonstrating the viability of the NF technique for regions where rice is cultivated during the rainy season without water limitation.