

# ► Effect Of Soil Moisture And Pre-Flood N Source On Volatilization, NUE, And Yield Of Rice In A Drill-Seeded Delayed Flood Production System

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Soil moisture at the time of nitrogen (N) fertilizer application can play a large role in nitrogen use efficiency (NUE) of pre-flood applications in rice production. Losses of N can occur from ammonia volatilization and from nitrification/denitrification. The objectives of this study were: 1) evaluate NUE and grain yield response when pre-flood fertilizer N is applied on a dry, moist and flooded rice soil; and 2) quantify N volatilization losses of pre-flood fertilizer N when applications are made on a dry, moist and flooded rice soil.

Two field yield trials and one field volatilization trial were initiated at the Rice Research Station in Crowley, Louisiana, USA, in 2013. Field yield trials consisted of three soil moisture conditions at pre-flood N fertilization: 1) dry, 2) moist, and 3) flooded. Three N fertilizer sources were evaluated: 1) urea, 2) urease inhibitor-treated urea, NBPT [N-(n-butyl) thiophosphoric triamide]-urea (low rate), and 3) NBPT-urea (high rate). Volatilization was measured in the field over a 15-d period of time after fertilization using semi-open volatilization chambers and an acid trap.

When fertilizer N was applied on moist ground, rice yield and NUE were reduced compared with similar applications on dry ground, regardless of source. NBPT-urea (both rates) had higher yields and NUE compared with untreated urea. Rice yield and NUE were significantly lower when applied into standing water compared with applications on moist or dry ground, regardless of source. NBPT-urea did not provide a yield or NUE advantage over untreated urea when applied into standing water.

Rice yield and NUE were greatly reduced when pre-flood fertilizer applications were made on moist soils or into standing water, regardless of fertilizer source. NBPT-urea provided excellent volatility control when applications were made on dry or moist soils, but control was very poor when applications were made into a standing flood. Increased nitrification/denitrification and volatilization losses will occur when fertilizer applications are made onto moist soils or into flooded rice fields when rice is at the 4- to 5-leaf stage of development. Pre-flood fertilizer applications should always be applied on a dry soil.