



Deutscher Tropentag, October 9-11, 2002, Witzenhausen  
“Challenges to Organic Farming and Sustainable Land Use  
in the Tropics and Subtropics”

## Screening of Rice Genotypes for Early Leaf Nitrate Reductase Activity

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### Abstract

Previous studies have suggested that rice is ammonophilic and, as such, not capable of assimilating nitrate-N at the early seedling stage. Nitrate-N is available to rice grown under upland conditions, lowland direct seeded rainfed conditions and in the rhizosphere of flood grown or irrigated rice. Under these circumstances the nitrate reduction pathway is used which comprises a 2 step reaction involving the enzymes nitrate reductase and nitrite reductase with nitrate reductase being the most critical. The objectives of this study are: **(1)** to investigate, if and if yes, how early rice genotypes show nitrate reductase activity; **(2)** to find out if the nitrate reductase is substrate activated and/or dependent; **(3)** to identify rice genotypes with early nitrate reductase activity and to test them in weed-competitive environments for early vigor.

Rice genotypes have shown wide variability and considerable potential for nitrate-N assimilation. This study relates weed competitiveness to the ability of the rice plant to assimilate nitrate at early seedling stage corresponding to high nitrate reductase activity at early seedling stage.

The genotypic differences in rice cultivars representing traditional and improved glaberrima, japonica and indica groups were studied by growing the rice in culture solutions comprising of low nitrate, high nitrate, ammonium nitrate and ammonium. Leaf nitrate reductase activity was measured at 7, 14 and 21 days.

Preliminary results showed large differences in nitrate reductase activity among genotypes. Leaf nitrate reductase activity was positively correlated with the presence of ammonium in japonica and indica types but was not in traditional lowland types. Results suggest that there is a genotypic nitrate concentration threshold level that triggers nitrate reductase activity.

**Keywords:** Nitrogen management, rice, screening tools, weed competition