



Tropentag, October 9-11, 2007, Witzenhausen

“Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs”

Aerobic Rice, a Water-Saving Rice Production System, and the Risk of Yield Failure - A Case Study from the Philippines

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Abstract

Aerobic rice is a water-saving rice production system for water-short environments with favourable soils where adapted, potentially high yielding varieties are dry seeded into fields that are maintained at aerobic non-submerged conditions. Supplementary irrigation is applied as necessary. In the Philippines, wet season yields were 4 to more than 5 t ha⁻¹. In the dry season (DS), however, yields ranged from more than 6 t ha⁻¹ to complete failures of yield. The possible reasons are low soil moisture itself, nutritional problems associated with aerobic soil conditions, and soil health problems such as parasitic nematodes, pathogenic fungi or allelopathy. Dap Dap, a location with sandy loam soil in Luzon, the Philippines, where such a collapse of yield occurred in previous experiments was selected for a case study. As in those earlier trials, root-knot nematodes were observed in high numbers these were suspected to be the main problem. Two treatments were implemented in the DS 2006 and 2007 at four replications in a randomised complete block design using the improved upland variety Apo: a) control of direct dry seeded rice and aerobic soil conditions b) as control but with biocide application (Dazomet at 50 g ai m⁻², incorporated in 15 cm depth) to eliminate biotic stresses. Irrigation was applied regularly to avoid severe water stress; irrigation amounts were recorded as well as soil moisture tensions. Yield, and at crucial crop growth stages biomass development was measured and root-knot nematodes counted. The status of root health was assessed from biweekly root samples, using a grading scale from 1 to 9, and from an examination for root pathogens of these samples. Plant samples from mid-tillering and panicle initiation stages were analysed for nutrient deficiencies and the effect of biocide application on soil nitrate and ammonium was assessed through KCl-extractable N from soil samples collected at different crop growth stages. In this poster, 2 year's results and their analysis will be presented.

Keywords: Aerobic rice, root knot nematode, soil health, water-saving rice production