



Tropentag, October 5-7, 2011, Bonn

“Development on the margin”

## Integrated Rice-fish Culture for Poverty Reduction in Riverine Smallholder Agriculture of the Eastern Amazonian Periphery

CHRISTOPH GEHRING<sup>1</sup>, RAIMUNDO REGINALDO SOARES SANTOS<sup>2</sup>, FLÁVIO HENRIQUE REIS MORAES<sup>1</sup>

<sup>1</sup>Maranhão State University, Dept. of Agroecology, Brazil

<sup>2</sup>INAGRO, Arari Research Station, Brazil

### Abstract

Irrigated rice ranks among the most intense grain-, and fish culture among the most intense animal-production systems. Integration of both not only combines productivity in an additive manner via niche partitioning, it also offsets a series of positive interactions such as pest, disease and weed control by fish, and improved nutrition of both fish and rice, thus reducing the needs for external inputs. Integrated rice-fish culture (IRF) could therefore offer a unique opportunity for poverty reduction where land is limited, in environmentally sensitive riverine areas where the use of pesticides is undesirable. Here, we report on the economic balance of 4 on-farm IRF units in smallholder agriculture on the banks of the Mearim river, coastal lowlands of eastern Amazonia. We tested different combinations of fish with different feeding habits, rice was established via transplanting (25 × 25 cm). Production occurs during the dry season with complete water control, rice grows for 120 days and fish for 5–6 months (depending on the onset of the rainy season and on fish prices). Rice yields were 6–7 Mg ha<sup>-1</sup> (as opposed to about 400 kg ha<sup>-1</sup> in rainfed upland rice) and fish yields 1.600–1.900 kg ha<sup>-1</sup>. Installation (initial investment for dyke building, pumps and tubing system) cost R\$ 8.100 (or € 3.432) per ha in IRF, as opposed to R\$ 3.150 (or € 1.335) per ha in irrigated rice, external inputs cost R\$ 4.315 in IRF as opposed to R\$ 3.489 in irrigated rice. Depending on fish combinations, net financial returns were R\$ 8.620 per ha and year in IRF (vs. R\$ 2.657 in irrigated rice), resulting in a monthly income of R\$ 718, 168 % above the minimum wage and 225 % above sole irrigated rice production. Thus, IRF is a viable option for smallholder agriculture. Future research is directed at reductions in external nitrogen inputs via *Azolla*, at improved initial fish nutrition, at horticulture and fruit production on the well-drained dykes, and at the effects of IRF on water quality and CH<sub>4</sub> and N<sub>2</sub>O emissions. In parallel, efforts are made for massification of this promising technology in the region.

**Keywords:** Food security, integrated farming, river people, rizipisciculture