Rice-Based Cropping Systems

Yield of rice-fish cultivation at Cuttack, India

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We explored the prospects of aquaculture by controlled breeding and short-term (4½ mo) seed-rearing of air-breathing clariid catfish *Clarias batrachus* in renovated fields cropped with high-yielding rice cultivar CR1018 (Pankaj/Jagannath).

The experiment consisted of a control plot of rice alone and plots of rice with fish. The plots were 0.05 ha each and had a gradient of 1.80%. A 10% area was excavated at the lower end of each rice-fish plot for a fish-shelter pit. Farmyard manure (5 t/ha) was applied to all plots during land preparation. A basal application of 40-9-17 kg NPK/ha was incorporated before direct seeding rice the first week of Jun 1985. Standard cultivation practices were followed.

One month after sowing, four male and four female catfish were released in each plot. To encourage breeding, a few round earthen pots were embedded in the soil at the periphery of the plots. The spawners bred profusely 10-15 d from release. The fish spawns were fed daily with low-cost feed — minced fish offal and raw cow dung. Fish were harvested with rice in late Nov 1985. Plots were slowly drained, allowing the fish to move to the pits where they could be collected by drag-netting and hand.

Rice production was about the same in both treatments (see table). Growing clariid catfish with rice under intermediate rained lowland conditions, with provision of the fish-shelter pit, could boost farm returns 55.4% over rice monocropping. □

Compatibility of rice caltivar CR1018 with air-breathing clariid catfish at CRRI, Cuttack, India.

Item	Rice alone	Rice + fish
Grain yield (t)	4.1	3.1
Fish yield (t)	–	0.4
Grain value ($)	440.40	400.3[a]
Fish value ($)	–	361.9[b]
Total value ($)	440.4	768.2
Additional costs ($) to raise fish crop/ha		
Land preparation		32.8
20 g/160 brood fish		32.8
1 t fish offal		free[c]
1 t cow dung		2.9
Harvesting		12.3

[a]Sale price is $108/t on farm. [b]Sale price is $l/kg on farm. [c]Collected from fish market.

A rice - grain legume cropping system

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Rice farmers of Kerala find cultivating grain legumes during the rice fallow season a promising technology to augment their family incomes. To identify a viable rice - grain legume cropping system for rice fallows, we studied four grain legumes (greengram *Vigna radiata,* blackgram *Vignu mungo,* cowpea *Vigna unguiculata,* and redgram *Cajunus cajun)* and two cropping systems: relay (sowing legume in standing crop of rice) and sequential (sowing legumes soon after harvest of rice) during kharif and rabi, 1985-86.

Soil was a sandy loam (pH 5.07, organic C, 1.6%; Bray's available P, 47 kg/ ha; and exchangeable K, 248 kg/ ha). The experiment was in a randomized complete block design with four replications. Treatments were factorial combinations of grain legumes and cropping systems.

Triveni rice was transplanted on 6 Aug 1985 at 15 × 10 cm spacing and fertilized with 70-15-29 kg NPK/ha. Harvest was on 27 Oct 1985. Grain legume seeds were dibbled on 19 Oct in relay cropping and on 28 Oct in sequential cropping. Redgram was dibbled at 30 × 20 cm spacing and other legumes at 30 × 15 cm. Fertilizer for the legumes was 20-13-17 kg NPK/ ha, half N and full P and K basally and the remaining N as a combined foliar spray of 2% urea and 0.1% phosphamidon 100 EC at 25 d after dibbling. The rabi legumes were raised without tillage and irrigation.

The main effects of grain legumes and cropping systems are presented in Table 1, and the interaction effects in Table 2. Legume grain yield showed a significant interaction of legume and cropping system. Blackgram relay-cropped with rice produced significantly high grain yield (0.92