

Evaluation of rice varieties under integrated rice-fish-horticulture farming system in the rainfed lowland of Assam

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ABSTRACT

Field trials were conducted during wet season 2010 and 2011 at the Rainfed Lowland Rice Research Station, Gerua, Assam to evaluate suitable high yielding rice varieties for inclusion in the rice-fish-horticulture farming system. Among the rice varieties evaluated viz. Ranjit, Sabita, Pooja, Jalpriya, Mahsuri, Swarna and Swarna sub-1, Ranjit recorded the highest yield (5.18 t ha⁻¹) in the first year, whereas Swarna recorded the highest yield (5.26 t ha⁻¹) in the second year. The results indicated that Ranjit, Swarna, Swarna sub-1 are suitable for the farming system.

Key words: *rice-fish-horticulture farming system, variety, Assam*

Rice is the backbone of the agriculture and livelihood security system of the majority of the farm families in Eastern India. Rice is grown in 28.7 m.ha. area and out of which 48.1% of total area under rainfed lowland conditions. The productivity of rice in this ecosystem is low and unstable due to several abiotic, biotic stresses and poor management of natural resources. To achieve the food and livelihood security of the region and the country as a whole, there is a need for enhancing the productivity, sustainability and resilience of rice based production system. FAO identified rice-fish system as one of the globally important ingenious agricultural heritage system (GIAHS) which appears to be important in terms of three global environmental issues such as climate change, shared water and agricultural biodiversity. Further, rice fields for rice-fish production tends to directly benefit food production and income as well as farm integration. About 10 million ha. under rain-fed lowland are available for rice-fish farming in the ecologies of shallow low land, semi deep water and coastal wetlands (Singh, 2002). In Assam alone around one million ha. is suitable for such system (Sinhbabu, 2001). The Brahmaputra valley of Assam offers a great scope for rice-fish farming system because of high rainfall resulting water logging in low lying rice fields for 3-5 months and preference of rice and fish by the farmers (Rautray, 2005). Since, rice is

the major component (60% of total area) of rice-fish-horticulture system, selection of suitable high yielding, non lodging and water stagnation tolerance is needed for enhancing productivity and profitability of the system. Keeping in view of the resources and needs in Eastern India, field trials were undertaken at the Regional Rainfed Lowland Rice Research Station, Assam to find out a suitable rice variety fitting into the rice-fish-horticulture farming system.

Field experiments were carried out during wet season, 2010-2011 in the integrated rice-fish-horticulture-silviculture farming system model (0.5 ha area) developed in the experimental farm of Regional Rainfed Lowland Rice Research Station, Assam. The soil was clay loam having pH 6.1, high in organic carbon, medium in available nitrogen, high in available P₂O₅ and Potash. Rice varieties viz., Ranjit, Sabita, Pooja, Jalpriya, Mahsuri, Swarna and Swarna sub-1 were evaluated in randomized block design with four replications. Rice seedlings were raised in primary nursery during end of May during both years. Seedlings (28 days) of primary nursery were closely transplanted (10cm x 10cm) in a secondary nursery. The seedlings from the secondary nursery were uprooted and transplanted in the main field at 21 days @ 2-3 seedlings hill⁻¹ at a spacing of 20cm x 15cm. Farm yard manures @ 5 t ha⁻¹ were applied at the time of puddling and no

Table 1. Growth and yield attributes of rice varieties under rice-fish-horticulture system

Varieties	Plant height (cm)		Daysto 50% flowering		No of panicles (m ²)		Panicle length (cm)		Panicle weight (g)		No of filled grain panicle ⁻¹		Yield (tha ⁻¹)		HI		Cost of cultivation (₹)		Net return (₹)		B:C ratio		
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	
Ranjit	129.03	137.25	145	142	244	249.97	26.00	27.03	3.04	3.58	126	153.30	5.18	4.93	0.48	0.41	27375	3005	22957	23115	1.84	1.76	
Sabita	176.80	163.42	150	152	225	143.37	23.90	24.39	3.25	3.49	113	122.56	4.23	4.25	0.42	0.42	27375	3005	13978	15795	1.51	1.52	
Pooja	116.90	106.95	150	152	267	338.25	22.83	23.28	2.30	2.35	92	104	4.80	4.39	0.38	0.36	27375	30050	12625	8865	1.46	1.30	
Jalpriya	177.40	-	150	-	251	-	22.90	-	2.86	-	110	-	3.72	-	0.35	-	27375	-	3965	-	1.14	-	
Mahasuri	141.60	-	140	-	264	-	22.93	-	2.39	-	125	-	4.12	-	0.38	-	27375	-	13109	-	1.18	-	
Swarna	-	116.74	-	132	-	273.07	-	23.87	-	3.32	-	153.3	-	5.26	-	0.45	-	30050	-	26470	-	1.86	-
Swarna Sub-1	-	113.63	-	130	-	272.25	-	23.72	-	3.39	-	152.8	-	4.97	-	0.44	-	30050	-	22135	-	1.78	-
CD (0.05)	11.32	3.09	-	-	6.76	22.42	2.5	1.45	0.24	0.29	9.67	9.91	0.56	0.3	0.07	0.09	-	-	-	-	-	-	-

chemical fertilizer was applied to the crop. Weed population was suppressed naturally due to high water level (upto 40cm.) and presence of fish in the field. The growth and yield attributes were recorded at different growth stages and yield data were recorded at harvest.

Growth, yield attributes and grain yield were significantly influence by rice varieties under rainfed lowland flood prone ecosystem in rice-fish-horticulture system. Rice variety Ranjit recorded higher number of filled grains panicle⁻¹, panicle length and weight that resulted significantly higher grain yield (5.18 t ha⁻¹) and harvest index (0.48) followed by Sabita (4.8 t ha⁻¹) and Pooja (4.23 t ha⁻¹) during first year of experimentation. Pooja recorded maximum number of panicle per unit area during both the years but poor number of filled grains panicle⁻¹ and panicle weight. Swarna recorded significantly higher grain yield (5.26 t ha⁻¹) followed by Swarna sub-1 (4.97 t ha⁻¹) and Ranjit (4.93 t ha⁻¹) which may be due to healthy panicle during wet season 2011. Jalpriya recorded maximum plant height (177.4 cm) but with minimum yield during wet season 2010.

Ranjit recorded the maximum net return (₹ 22957 ha⁻¹) and B:C ratio (1.84) during wet season 2010 whereas, Swarna recorded maximum net return (₹ 26470 ha⁻¹) and B:C ratio (1.88) during wet season 2011

The above findings revealed that rice varieties Swarna, Swarna sub-1 and Ranjit are suitable, and may be recommended for cultivation under rice-fish-horticulture farming system in rainfed lowland flood prone ecosystem of Assam during wet season.

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