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Intercropping *Sesbania rostrata* with wet land rice (*Oryza sativa*) for seed and fuel

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ABSTRACT

A field experiment was conducted during the rainy season of 1992 and 1993 in Eutric Gleysoi soil of the Barind Tract, Bangladesh, to study the feasibility of growing African *dhaincha* (*Sesbania rostrata* Brem. & Oberm) for seed and fuel as intercrop with wet land rice (*Oryza sativa* L.). *Dhaincha* seedlings transplanted at 2 m x 2 m spacing in rice gave the highest rice equivalentyield in both the years. The same treatment also gave the highest gross returns, net returns, and benefit : cost ratio. The feasibility of growing *S. rostrata* as an intercrop with wetland rice proved and seeds produced in 1 ha of land was sufficient for green manuring in 2 ha.

Key words : *Sesbania rostrata* – rice intercropping, Seed, Fuel

Green-manuring (GM) with *Sesbania* before wet land rice is one of the approaches well accepted by the farmers of the area. However, *S. rostrata* proved superior to *S. aculeata* (Rinaudo *et al.*, 1987; Roger and Watanabe, 1986). Scarcity of seed is the main limiting factor for quick expansion of *Sesbania* green-manuring. There is a little scope of growing *Sesbania* as sole crop for seed and fuel as most of the land engaged for wet land rice cultivation and due to the problem of animal damage as goat and cattle like it. Considering the above situation an attempt made to grow African *dhaincha* as an intercrop with wet land rice for seed and fuel to reduce the scarcity of seed for green-manuring and fuel.

MATERIALS AND METHODS

The experiment was conducted at Farming Systems Research and Development (FSRD) site, Saroil, Rajshahi, during wet seasons of 1992 and 1993. The soil of the experimental plot was silt loam in texture having pH 6.4. The experiment was laid out in randomized complete-block design with 4 dispersed replications and the unit plot size was 12 m x 12 m. The modern rice variety 'BR 11' and African *dhaincha* were used as test crops. Five treatments used in the experiment were, viz. T_1, sole wet land rice; T_2, sole African *dhaincha* (seedlings) at a spacing of 50 cm x 50 cm; T_3, rice + African *dhaincha* (seedlings) at a spacing of 2 m x 2 m, T_4, rice + African *dhaincha* (stem cutting) at a spacing of 2 m x 2 m and T_5, rice + Afrian *dhaincha* (seedling) at a spacing of 3 m x 3 m. Plots with rice were fertilized with 80 kg N, 60 kg P_2O_5, 40 kg K_2O and 20 kg S/ha. Total

Table 1. Effect of intercropping African *dhaincha* on yield and yield components of wet land rice

Treatment	Panicles/m²		Filled grains/ panicle		Grain yield (tonnes/ha)		Straw yield (tonnes/ha)		Rice equivalent (tonnes/ha)	
	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993
Rice (sole)	217	241	86.2	74.8	4.65	4.62	6.00	6.04	5.250	5.296
Dhaincha (sole)									3.625	3.955
Rice + *dhaincha* (seedling, 2 m x 2 m)	219	242	89.0	76.2	4.67	4.66	6.05	6.08	5.483	5.560
Rice + *dhaincha* (stem cutting, 2 m x 2 m)	215	241	92.6	75.4	4.62	4.57	5.95	5.94	5.387	5.560
Rice + *dhaincha* (seedling, 3 m x 3 m)	214	242	82.3	73.5	4.57	4.59	5.92	5.92	5.281	5.372
CD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS	0.36	0.41

NS, Non-significant

quantity of P, K, S and one-third of N were applied at the time of final land preparation and rest N was applied in 2 instalaments 25 and 45 days after rice transplanting. Sole *dhaincha* plots were fertilized with P, K and S at the same rate as rice and applied as basal. Thirty-day-old rice and *dhaincha* seedlings were transplanted the same day, in the second week of August in both the years. Spacing for rice was 20 cm x 15 cm and dhaincha as per treatments.

RESULTS AND DISCUSSION

Yield and yield attributes

Rice: Number of panicles/m², number of grains/panicle and grain and straw yields of rice did not show any significant difference due to *dhaincha* intercropping in both the years. The highest grain yield of rice was obtained where *dhaincha* seedlings were intercropped with rice at 2 m x 2 m spacing in 1992 and 1993 respectively. However, sole rice gave 4.65 tonnes/ha and 4.62 tonnes/ha^{-1} grain yield in 1992 and 1993 respectively (Table 1). Aktar *et al.* (1994) reported that *dhaincha* (*S. aculeata*) seed was produced successfully in wet land rice field without reducing the rice yield significantly in the flood plain soil of Jessore.

Dhaincha: The highest plat height was attained by sole *dhaincha* (270 cm and 266 cm), followed by intercropped *dhaincha* with seedlings at 2 m x 2 m spacing (245 cm and 227 cm) in 1992 and 1993 respectively (Table 2). However, canopy cover was maximum (139 cm and 112 cm) in intercropped *dhaincha* with 2 m x 2 m spacing. Maximum growth of *dhaincha* (both plant height and canopy cover) was observed in seedling transplantation than stem cutting. This might be due to delay in establishment of *dhaincha* stem in soil. The highest seed yield (1,383 kg/ha and 1,344 kg/ha) was obtained from sole *dhaincha* in both the years. As intercroping

Table 2. Performance of *dhaincha* as sole and intercrop with wet land rice

Treatment	Plant/100 m²*	Plant height (cm)		Canopy cover (cm)		Seed yield (kg/ha)		Fuel yield (kg/ha)	
		1992	1993	1992	1993	1992	1993	1992	1993
Dhaincha (sole)	400	270	266	128	100	1383	1344	7920	6873
Rice + *dhaincha* (seedling, 2 m x 2 m)	25	245	227	139	112	78	73	465	396
Rice + *dhaincha* (stem cutting, 2 m x 2 m)	25	235	211	101	85	72	67	310	250
Rice + *dhaincha* (seedling, 3 m x 3 m)	11	241	217	132	106	42	38	292	229

*1992 and 1993

dhaincha seedling transplanting at 2 m x 2 m spacing gave the highest seed yield (78 kg/ha and 73 kg/ha) followed by stem cutting at the same spacing (72 and 67 kg/ha) in 1992 and 1993 respectively. Similarly, the highest fuel yield of *dhaincha* was given by sole crop, followed by *dhaincha* seedlings intercroped at 2 m x 2 m spacing. Similar seed and fuel yield with *S. aculeata* was also reported by Aktar *et al.* (1994). *Sesbania rostrata* did not compete with rice for moisture, as it was under wet land situation; for nutrients because of its deeper root and its self-nitrogen fixing ability; and for light because of wide spacing and thin canopy.

Economics

The highest rice equivalent was observed where dhaincha seedlings were intercropped at 2 m x 2 m spacing, being significantly higher over sole rice. However, sole *dhaincha* gave the lowest rice equivalent. The highest benefit : cost ratio was obtained from sole *dhaincha*. Among the sole and intercropped rice treatments, the highest benefit : cost ratio was obtained where *dhaincha* seedlings were intercropped at 2 m x 2 m spacing.

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