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DUAL CULTURE OF LEGUMINOUS GREEN MANURE CROPS IN DRY SOWN RICE IN SANDY SOILS OF ONATTUKARA

The low productivity of Onattukara agroclimatic zone lying in Kollam and Alappuzha districts of Kerala is due to the low organic matter content of the porous sandy soil resulting in low water holding capacity. In the tropical situations, regular application of organic matter at proper rate is the only answer to solve this problem. But non-availability of organic manures, its high cost and high labour charges involved in its application make this impracticable. Leguminous green manures are known for their N fixing capacity and fast growth to yield 5-7 tonnes of green manures in 7-8 weeks time. Growing green manures *in situ* is the cheapest means of increasing the soil organic matter status. In Onattukara, the cropping intensity is so high with two rice crop and one sesamum that there is no time gap for growing a separate green manure crop. So a rice legume dual culture appears to be the best solution under the situations without affecting the cropping pattern.

The rice legume dual culture experiment was conducted at the Rice Research Station, Kayamkulam during the kharif season of 1987, 1988 and 1989. The test variety was Jaya dibbled at a spacing of 20 x 10 cm. A row of legume was dibbled in between two rows of rice. The experiment consisted of 12 treatments in a factorial combination of 4 legumes and 3 methods of incorporation in randomised block design and replicated thrice. The legumes were cowpea (V1), sannhemp (V2), daincha (V3) and sesbania (V4). The methods of incorporation were (T1) on 30th DAS (day after sowing) by light hoeing (T2) on 40th DAS by light hoeing and (T3) self decay by standing water of south west monsoon.

The results of pooled analysis of grain and straw yield for three dry sown crops are presented in Table 1. Grain and straw yields of dry sown rice show that maximum yield was obtained in plots where cowpea and sannhemp were dual cultured and incorporated on 30th DAS by light hoeing. It is observed that cowpea and sannhemp are easily decomposed and have beneficial effects similar to growing a green manure crop and incorporating it before planting the main crop. Bhardwaj *et al.* (1981) obtained significantly higher rice yields with sannhemp crop after wheat and found that cowpea is a drought tolerant green manure crop compared to sesbania. Kulkarni and Pandey (1988) and Morris *et al.* (1986) also got similar results and they found that short duration green manures have similar effect as that of inorganic fertilizers.

Incorporation of legumes on 40th DAS and self decaying of these in monsoon water were not beneficial to the dual cultured rice crop. This might be due to the non-decaying of the legumes beyond 30th DAS as a result of woodening of the vegetative parts. The rice crop in these plots also showed pale yellow discolouration. Dual culture of green manures beyond 30 days resulted in competition with the rice crop for light, space, water and nutrients as evidenced by the lesser number of tillers and higher plant height of legumes (Table 2).

Table 1. Grain and straw yield of rice (kg/ha)

	Incorporation on 30th DAS (T1)				Incorporation on 40th DAS (T2)				Self decaying of stalks in standing water (T3)				CD (0.05)
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean	
Grain yield	2567	2422	1961	2317	2189	1600	2245	1978	1856	1656	1405	1639	357
Straw yield	3767	3345	2895	3336	3089	2228	3117	2811	2534	2172	2511	2406	490

Table 2. Characteristics of rice and green manure crops, 1989

	30 DAS			40 DAS	
	Rice	Green manure		Rice	Green manure
	Height (cm)	Tillers/hill	Height (cm)	Height (cm)	Height (cm)
Sowpea	38	7	31	44	45
Cowpea	29	4	52	49	65
Daincha	29	5	51	43	68
Sesbania	27	10.3	31	4	50

Table 3. Nodulation and green manure yield of green manures

	Mean no. of nodules/plant		Green matter (t/ha)		
	30 DAS	40 DAS	30 DAS	45 DAS	Self decay*
Cowpea	200	30	8.00	20	10.20
Sunnhemp	114	55	8.00	55	10.00
Daincha	600	820	7.00	55	22.70
Sesbania	340	55	7.00	50	8.30

*Data on daincha and sesbania at harvest of rice and incorporation with soil

Tillering of rice is minimum in daincha grown plots showing its smothering effects by 30th DAS. However, sesbania and daincha were not found to be suitable for dual culture even up to 30 DAS. The growth of sesbania was poor as compared to cowpea. Daincha crop reduces tillering and smothers rice crop by 30 days of growth. Eventhough sannhemp grows taller than rice, it does not smother rice crop since it is non-branching.

Data on growth of rice and gren manures (Table 3) showed that under the dry sown conditions, cowpea, sannhemp and daincha produced 7-8 t/ha of green matter in 30 days time. During 30-40 days period the green manures add another 2 t/ha of green manure. Sesbania and daincha can grow in standing water and growth continues till the harvest of the rice crop. The woody stems in these plots had to be removed for preparatory cultivation of succeeding crop of rice. Regarding the nodulation of legumes, daincha and sesbania showed maximum number of nodules on 30th and 40th DAS.

Thus in can be conclude that cowpea and sannhemp are good for dual culture when incorporated on 30th DAS. Growing legumes beyond 30th DAS cannot be encouraged. When left for self decay daincha and sesbania do not decay in standing water, it smothers rice crop.

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