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STUDIES ON THE UTILITY OF LEUCAENA AS GREEN LEAF MANURE ON N ECONOMY IN RICE (IR 20)

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ABSTRACT

Studies on *Leucaena* as green leaf manure with sub optimal levels of N on N economy in rice revealed that combined application of *Leucaena* @ 10 t.ha^{-1} along with 50 kg N recorded equal grain yield to that of recommended level of 100kg ha^{-1}N. The combined application of *Leucaena* with 75kg N ha^{-1} was found to be significantly superior in recording higher grain yield over the recommended level of 100kg N ha^{-1}.

KEYWORDS : Leucaena, Green leaf manure, Rice.

In rice production low fertilizer use efficiency warrants the application of higher doses of fertilizer for desired results. But judicious and balanced application of organic manures along with inorganic fertilizers causes an increase in the fertilizer nutrient efficiency. The use of green manures along with fertilizer nitrogen (N) can aid for N economy in low land rice (Khind *et al.* 1982). Brewbaker (1975) described *Leucaena leucocephala* as a renewable source of green leaf manure. Bottenberg and Harry (1981) recorded significant influence on the growth and yield of IR 36 rice when *Leucaena* was used as green leaf manure. In the present investigation, an attempt has been made to find out the relative advantage of the use of *Leucaena* as green leaf manure with different sub-optimal levels of N for lowland rice.

MATERIALS AND METHODS

A field experiment was conducted at the Agricultural College and Research Institute, Madurai in *Rabi* season of 1986-1987 in a randomised block design replicated three times. Three sub-optimal levels of N (0, 50, 75 kg. ha^{-1} N) alone and in combination with *Leucaena* as green leaf manure @ 10 t.ha^{-1} were compared with the existing recommended level of 100 kg.ha^{-1} N. The soil type was sandy loam in texture with low in available N, medium in P and high in K. The ruling IR 20 rice was used as the test crop.

Fifty days old *Leucaena* crop was harvested from two years old forage plantation and used as green leaf manure. *Leucaena* was applied @ 10 t.ha^{-1} ten days in advance of planting as per treatments. A common dose of 50 kg ha^{-1} P_2O_5 and 50 kg ha^{-1} K_2O were applied basally to all the plots. As per treatments, half of N was applied basally at the time of planting and the rest was top dressed in two equal splits on 30th and 45th day after planting. (DAT).

At harvest, the biometric observations such as plant height, total number of tillers hill^{-1}, number of productive tillers hill^{-1}, number of filled grains panicle^{-1}, length of panicle, thousand grain weight and yield of grain were recorded.

RESULTS AND DISCUSSION

Growth Characters

From the experimental results (Table 1) it was observed that the growth characters such as plant height and total number of tillers hill^{-1} were significantly influenced by *Leucaena* green leaf manure with different sub-optimal levels of fertilizer N (T_4, T_6) compared to the application of different levels of fertilizer N alone (T_3, T_5). Among the treatments, the T_6 with 75 kg N with *Leucaena* green leaf manure recorded explicitly higher plant height and more number of tillers hill^{-1} over T_7 which received recommended

level of N alone. This increase in growth characters might be due to the efficient utilization of mineralised N from incorporated *Leucaena* and applied N fertilizer which could have increased the availability of N throughout the crop period.

Yield Components

It was noticed from the results (Table 1) that the treatments with different levels of N along with *Leucaena* green leaf manure (T_4, T_6) showed a noteworthy increase in the production of yield components over treatments (T_3, T_5) which received N alone. Among the treatments, T_6 was found to be eloquently superior in influencing the number of productive tillers hill^{-1}, number of filled grains panicle^{-1}, length of panicle and the thousand grain weight as compared to other treatments. The above yield components recorded by the treatment (T_4) which received 50 kg.ha^{-1}N plus *Leucaena* were on a par with 100 kg .ha^{-1} N alone. This increase in yield component might be due to better nutrient absorption and translocation of photosynthates to the sink (spikelets) due to increased availability of N in soil, which is in accordance with the finding of Shanmugan (1983).

Grain Yield

Application of N either as fertilizer or green leaf manure or in combination exhibited a pronounced effect on grain yield over no N. Among the treatments, 75 kg .ha^{-1}N plus *Leucaena* green leaf manure (T_6) was found to be superior in recording higher grain yield over the application of recommended level of 100 kg ha^{-1}N alone (T_7). The grain yield obtained from T_7 was comparable with the T_4 which received a combination of *Leucaena* plus 50 kg ha^{-1}N and they were on a par with each other. This increase in grain yield might be due to the fact that *Leucaena* being a leguminous crop, decomposed quickly and supplied the available N steadily to the rice crop throughout it's life cycle besides increasing the efficiency of applied N . Meelu and Rekhi (1981) reported that combined use of greenleaf manure and 60 kg ha^{-1}N as inorganic fertilizer gave rice yields equivalents to those obtained with using 120 kg ha^{-1}N alone as inorganic fertilizer. Further, it was observed that about 50 per cent of total N requirement can be substituted through the combined use of green leaf manure and inorganic nitrogenous fertilizers.

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Table 1. Effect of Leucaena as green leaf manure on growth characters, yield components and yield of Rice.

Treatments	Yield components						Grain yield (kg/ha^{-1})
	Plant height (cm)	Total number of tillers hill^{-1}	Number of productive tillers hill^{-1}	Panicle length (cm)	Number of filled grains panicle^{-1}	Thousand grains weight (g)	
T_1 - No nitrogen	72.2	5.8	4.2	18.62	78.0	16.42	2764
T_2 - Leucaena @ 10 t/ha^{-1}	82.6	8.0	5.8	19.76	93.2	18.60	3598
T_3 - 50 kg N/ha^{-1} alone	83.0	7.8	6.0	19.80	92.6	18.64	3627
T_4 - 50 kg N + Leucaena @ 10 t/ha^{-1}	92.4	8.8	8.0	20.64	105.6	19.56	4299
T_5 - 75 kg N/ha^{-1} alone	91.4	8.6	7.2	20.52	99.8	18.78	4033
T_6 - 75 kg N/ha^{-1} + Leucaena @ 10 t/ha-1	97.4	10.2	9.8	21.32	110.2	20.74	4764
T_7 - 100 kg N/ha^{-1} alone	93.8	9.2	8.2	20.96	104.6	19.68	4316
$SE_D \pm$	1.4	0.3	0.5	0.21	1.8	0.36	183
CD (5%)	3.1	0.7	1.1	0.46	3.9	0.78	398