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NUE and N Uptake of Upland Rice as Influenced by Integrated Nitrogen Management Through Leaf Colour Chart (LCC)*

Upland rice is grown in an area of 17.15 m ha in world and 6.33 m ha in India. Compared to the world rice productivity (3.5 t ha^{-1}), India recorded very low average productivity levels of rainfed-lowland rice. (2.4 t ha^{-1}) and upland rice (0.8 t ha^{-1}) (Anon., 1995). The main reason for lower yields of drilled upland rice is inadequate and improper nutrient management apart from vagaries of monsoon. Hence boosting productivity by proper management practices in upland rice cultivation plays a significant role. Therefore, field investigation was carried out during kharif season of 2001 at ARS Mugad, UAS, Dharwad to study the integrated nitrogen management in drill sown upland rice through leaf colour chart (LCC). The soil of the experimental site was clay loam and neutral in reaction with pH of 6.91. It was low in organic carbon(0.38%), low in available N (385 kg ha^{-1}) medium in available P_2O_5 (30 kg ha^{-1}) and high in available K_2O(420 kg ha^{-1}).

The factorial experiment was laid out in randomized block design with single control and was replicated three times. Treatments included as first factor were two varieties namely Amrut and Dodiga. Two organic nutrients viz., FYM @ 10 t ha^{-1} and vermicompost @ 2.5 t ha^{-1} along with no organic control were the second factor. And two nitrogen management practices viz., that at LCC threshold value of 3 and recommended practice were the third factor. Farmer's practice with the application of FYM @ 10 t ha^{-1} and N and P_2O_5 @ 80 kg and 57.5 kg per ha, respectively was the check for comparison. All the treatments received 20 percent N and entire P_2O_5 at sowing in the form of DAP. .In. farmer's practice 22.5 kg N ha^{-1} was given basally. Whereas, K was applied basally at sowing in the form of muriate of potash (MOP) in all the treatments, except farmer's practice. In recommended method of N management(100 kg ha^{-1}) 20 per cent N was applied basally through DAP, 40 per cent N as first split at 40 DARE (days after rice emergence) and 40 per cent N as second split 'at 60 DARE was applied through urea. The LCC readings were taken once in every 7 days, starting at 21 days after seeding until the first flower appeared. Average of 15 LCC readings of three replications were calculated and when the average leaf colour reading was below the set critical value (3), nitrogen fertilizer was top dressed. The amount of N fertilizer applied at different growth stages was as recommended by IRRI i.e., 20 kg ha^{-1} at early growth phase, 30 kg ha^{-1} at rapid growth phase and 20 kg ha^{-1} at late growth phase. Rainfall during the cropping season of upland rice (June to November, 2001) was less than the average (859mm) by 53 percent. Life saving irrigation was given to the entire crop at the later 'part of reproductive phase. This was not much useful to Amrut, an early variety(105 days), but was useful to Dodiga, a longer duration variety (135 days).

Nitrogen use efficiency (NUE) was significantly higher in treatments that received anyone of the organics compared to no organic treatment. Nitrogen use efficiency was higher with N management at LCC-3 than at recommended practice of N management. This indicates that, NUE decreased with increase in amount of N applied and it also depends on time of N application and added nitrogen in presence of different organics (Table1). This is in line with the work of Jadhav *et al*. (1997) and Zaini and Erythrina(1999). Dodiga variety recorded significantly higher grain yield than Amrut. Higher N uptake was recorded with vermicompost application with N management at LCC-3 in Dodiga variety than other treatment combinations and check.Total N uptake and its accumulation in leaf and panicle was significantly higher with N

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Table 1. Grain yield lodging index, nitrogen use efficiency and quantity of N applied in upland rice as influenced by variety, organics and N-management methods

Treatments	Grain yield (t ha^{-1})	Lodging index	Nitrogen use efficiency	Quality of N applied (kg ha^{-1})
$V_1O_1N_1$	2.32b	7.4	33.1f	70
$V_1O_1N_2$	2.20b	12.9	22.0g	100
$V_1O_2N_1$	2.57b	8.3	36.7ef	70
$V_1O_2N_2$	2.35b	12.0	23.5g	100
$V_1O_3N_1$	2.17b	7.5	24.1g	90
$V_1O_3N_2$	2.02b	8.2	20.2g	100
$V_2O_1N_1$	4.47a	35.8	63.9ab	70
$V_2O_1N_2$	4.23a	49.6	42.3d-f	100
$V_2O_2N_1$	4.82a	36.3	68.9a	70
$V_2O_2N_2$	4.40a	51.3	44.0de	100
$V_2O_3N_1$	4.13a	35.0	59.0bc	70
$V_2O_3N_2$	3.97a	40.8	39.7ef	100
FP (C)	4.10a	54.0	51.3cd	80

Note: Factor- Varieties — Factor II- Organics — Factor III-N Management

Amrut (V_1) — FYM@ 10 t ha-1 (O1) — LCC3(N_1)

Dodiga (V_2) — Vermicompost 2.5 t ha-1 (O2) — RDN (N_2)

No organics (O_3)

FYM- Farm yard manure, RDN -Recommended dose f nitrogen (100:50:50kg N:P2O5:K2Oha-1),
FP= Farmers practice
Figures subscribed by abod ..... indicate the sinificant/ non-significant differences at 5% level of significance as per the duncan's multiple range test.

management at LCC-3 than recommended N management. This was due to higher total dry matter production and its accumulation in grains(Table2). N management at LCC-3 with vermicompost seems to be promising with respect to NUE and grain yield. Total N uptake and its accumulation in panicles was significantly higher in LCC-3 than that in recommended N management.It can be concluded from the present study, that NUE can be increased and chemical fertilizer N could be saved to an extent of 20 percent with incorporation of vermicompost and N-management at LCC-3, without significant reduction in yield.

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Table 2. N uptake in upland rice at harvest as influenced by variety, organics and N-management methods

Treatments	Leaf	Stem	Panicle	Total
$V_1O_1N_1$	16.5d	13.4ef	26.2de	56.1e-g
$V_1O_1N_2$	14.4de	12.9ef	24.1de	51.4e-g
$V_1O_2N_1$	18.0d	15.3e	27.8d	61.1e
$V_1O_2N_2$	16.6d	14.2ef	27.0de	57.8ef
$V_1O_3N_1$	14.3de	11.9ef	24.3de	48.5fg
$V_1O_3N_2$	12.6de	11.11	22.0e	45.7g
$V_2O_1N_1$	28.3e	25.3ab	46.3a	99.9ab
$V_2O_1N_2$	25.5ab	24.2bc	41.6ab	91.3bc
$V_2O_2N_1$	31.1bc	28.1c	47.1a	106.9a
$V_2O_2N_2$	29.8a	26.2ab	45.1a	101.7
$V_2O_3N_1$	23.1	20.5b	37.1bc	80.7d
$V_2O_3N_2$	22.6c	21.2cd	35.1c	78.9d
FP (C)	24.0c	22.9b-d	39.8bc	86.7cd

Note: Factor- Varieties	Factor II- Organics	Factor III-N Management
Amrut (V_1)	FYM@ 10 t ha-1 (O_1)	LCC3(N_1)
Dodiga (V_2)	Vermicompost 2.5 t ha^{-1}	(O_2)RDN (N_2)
	No organics (O_3)	

FYM- Farm yard manure, RDN -Recommended dose f nitrogen (100:50:50kg N:P2O5:K2Oha-1),
FP= Farmers practice
Figures subscribed by abod indicate the sinificant/ non-significant differences at 5% level of significance as per the duncan's multiple range test.

References

ANONYMOUS, 1995, *Agricultural Situation in India*, 52(9): 644

JADHAV, A.D. TALASHILKAR, S.C. AND POWER, A.G.,1997, Influence of the conjunctive use of FYM, vermicompost and urea on growth and nutrient uptake in rice. *Journal of Maharashtra Agricultural Universities*, 22:249-250.

ZAINI,Z. AND ERYTHRINA, 1999, Indonesia experience in using leaf colour chart for nitrogen management in irrigated, transplanted rice: case of North Sumatra Province. Paper presented at 2nd CREMENT *Workshop cum Group Meeting*, Tanjavur, 24--27, Agusust, 1999, p.73-82.