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# Studies on nutrient uptake, post harvest nutrient availability and nutrient balance sheet under integrated nutrient management practices in wet seeded rice

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## ABSTRACT

A field experiment was conducted during *Rabi* season (Oct. – Jan.) of 2001 -02 at wetland of Central farm, Agricultural College and Research Institute, TNAU, Killikulam ( 8º 48' N 77ºE42' E and 40m AMSL) to study the nutrient uptake, post harvest soil nutrient status and nutrient balance in wet seeded rice under integrated nutrient management practices. The experiment was executed in randomized block design and replicated thrice. Eight integrated nutrient management practices viz., presowing of *Sesbania* @ 50 kg ha$^{-1}$ and *in situ* incorporation at 45 DAS + 150: 50: 50 kg NPK ha$^{-1}$, presowing of *Sesbania* @ 75 kg ha$^{-1}$ and *in situ* incorporation at 45 DAS + 112.5:37.5: 37.5 kg NPK ha$^{-1}$, intercropping of *Sesbania* in rice @ 25 kg ha$^{-1}$ and *in situ* incorporation at 40 DAS + 150: 50: 50 kg NPK ha$^{-1}$ , intercropping of *Sesbania* in rice @ 75 kg and *in situ* incorporation at 40 DAS + 112.5:37.5: 37.5 kg NPK ha$^{-1}$, GLM @ 6.25 t ha$^{-1}$ + 150: 50: 50 kg NPK ha$^{-1}$, GLM @ 9.38 t ha$^{-1}$ + 112.5:37.5: 37.5 kg NPK ha$^{-1}$, FYM @ 12.5 t ha$^{-1}$ + 150: 50: 50 kg NPK ha$^{-1}$, FYM @ 18.75 t ha$^{-1}$ + 112.5:37.5: 37.5 kg NPK ha$^{-1}$ and two levels of inorganic NPK alone i.e., 150: 50: 50 kg NPK, 112.5:37.5: 37.5 kg NPK ha$^{-1}$ and control ( no manure) was adopted. The treatment receiving FYM @ 12.5 t ha$^{-1}$ + 150: 50: 50 kg NPK ha$^{-1}$ registered significantly the highest NPK uptake at all the stages and maximum uptake was recorded at harvest stage (154.24: 24.84: 171.60 kg ha$^{-1}$). Maximum Post harvest nutrient availability (196.79: 14.26: 170.80 kg NPK ha$^{-1}$) and positive nutrient balance also recorded maximum in integrated nutrient management involving FYM @ 12.5 t ha$^{-1}$ + 150: 50: 50 kg NPK ha$^{-1}$. Application of inorganic NPK alone @ 150: 50: 50 kg ha$^{-1}$ recorded the lower amount of NPK uptake at harvest stage (140.45:22.11:151.58 kg ha$^{-1}$) than all the integrated nutrient management practices. . However 100 % inorganic NPK alone (150: 50: 50 kg NPK ha$^{-1}$) recorded significantly higher amount of nutrient uptake, post harvest nutrient availability and than 75 % recommended NPK (112.5:37.5: 37.5 kg ha$^{-1}$) alone and control. Net negative nutrient balance was observed in the control treatment.


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Crop demand for nutrients is met by a combination of inherent soil fertility and externally applied nutrients. For high yielding crops with high rates of dry matter accumulation and matching high rates of nutrient uptake such as rice, soil must allow unrestricted root growth and be able to supply nutrients at the rate for maximum growth. In order to cope with the food demand of a growing population, a 60 per cent increase in rice production will be necessary during the next 25 years (Arth and Frenzel, 2000). To achieve this increase, NPK fertilization has to be done at nearly 3 fold from the present state. But escalating prices of industrial fertilizer and tier possible degradation to soil health and pollution to environment warrants the need for judicious use of chemical fertilizers. In this context, adoption of integrated nutrient management involving organic and inorganic sources is the best nutrient technology (Collins *et al.*, 1992). There is immense need to exploit the alternate source of nutrients viz., organic manure, use of legumes in crop rotation and bio fertilizer to sustain the productivity and soil fertility with more environment friendly nutrient management system (Fageria and Baligar, 1997).

The supplementary and complementary use of organic manures improves the soil physical, chemical and biological properties and also improves the use efficiency of applied NPK fertilizer as well as other inputs (Pramnik and Mahapatra 1997; Kalyanasundaram *et al.*, 1997). According to and Devi *et al.* (1997) integrated use of NPK fertilizer and organic manures is helpful in maintaining higher concentration of soil available nutrients for long period and realizing higher grain yield and NPK uptake in lowland rice. Sharma and Mittra (1991)