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Research Paper :

Dynamics of N, P and K in rice - groundnut cropping system as influenced by crop residue incorporation and nitrogen management practices

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ABSTRACT

Field experiments were conducted in the wetland farm of S.V. Agricultural College, Tripati (Acharya N.G. Ranga Agricultural University), Andhra Pradesh for two consecutive years 2002 - 2003 and 2003 - 2004 and results revealed that regardless of the preceding crops tried for incorporation of crop residues prior to rice. Nitrogen management practice of substituting 100 per cent of recommended dose of nitrogen through FYM to rice has resulted in build up of soil fertility status in terms of organic carbon. availahle N, P and K after entire cropping system. By raising a reasonably short duration leguminous crop (either a pulse crop or vegetable crop depending up on the farming situation) preceding to rice and incorporation of the crop residues after picking the economic yield and supply of 50 per cent recommended dose of nitrogen each through fertil izer and FYM to rice followed by raising groundnut as residual crop, to utilize the residual fertility was found the best nitrogen management package for rice-groundnut cropping system, not only in terms of higher productivity and economic returns, but also for sustaining the soil fertility status at a fairly high level.

Key words : Rice, Groundnut, Crop residue incorporation, Nitrogen management practices

Currently used management practices which art: over dependent on mineral fertilizers do not provide a good balance between soil nutrient supply, crop requirements, deteriorating the sustainable soil fertility and health on long term basis. Organic manures, which can supply a portion of the P and K along with the secondary and micronutrients required by crops, can help offset the negative nutrient balances and slow down nutrient depletion processes. Farmyard manure was considered as nutrient rich renewable source to substitute partially the fertilizer nitrogen. Instead of using higher than recommended dose of nitrogen exclusively through fertilizer, a strategy of integrated use of recommended dose of nitrogen through fertilizer in combination with any amount of cheaper organic source, which is abundantly available locally should be tried to satisfy the higher nitrogen requirement of rice crop to produce higher yield, without impairing soil health.

The version of crop residue incorporation is beneficial depending upon the farming situation. Grain legumes, in contrast with green manures, provide grain to augment income and protein as well as reduce the use of mineral nitrogen in rice-based cropping systems. In areas, where clear cut fallow of a short duration is available preceding the transplanted low land rice crop, crops like green gram, cluster bean, fieldbean and cowpea can be raised as preceding crops to rice and after the harvest of the saleable yield, the left over crop residues of these crops can be incorporated prior to transplanting of succeeding rice. The practice of crop residue incorporation after pod harvest is feasible and economical, where a period of 45 to 60 days is available before planting of rice and this can contribute about 50 to 60 kg N ha^{-1} to the succeeding rice crop (Kulkarni and Pandey, 1988). Research efforts to maximize the productivity and economic returns of the rice by developing appropriate and viable nitrogen management practices, without any discount of soil health are long due in the southern agro-climatic zone of Andhra Pradesh. Hence, the present study was conducted to assess the effectiveness of incorporation of crop residues, farm yard manure and fertilizer on growth and yield of rice and groundnut and finally on dynamics of N, P and K in rice - groundnut cropping system.

MATERIALS AND METHODS

Field investigations were conducted during 2002-03 and 2003-04 at wetland farm of S.V. Agricultural College, Tirupati (Andhra Pradesh). Soil analysis for physico-chemical properties was carried out initially, prior to the start of the experiment, by drawing soil samples at random from 0-30 cm depth of the experimental field. The results of physico-chemical analysis revealed that experimental field was sandy clay loam in texture, slightly alkaline in reaction, low in organic carbon and available nitrogen