

Research Paper :

Integrated nitrogen management with vermicompost on soil nitrogen fractions in onion - radish cropping system

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ABSTRACT

A field experiment was conducted on a sandy loam soil during *Kharif* (onion) and *Rabi* (radish) seasons of 2007-08 with a view to study the effect of integrated use of nitrogen (0, 60, 90 and 120 kg N ha⁻¹) and vermicompost (0, 5 and 10 t ha⁻¹) on soil nitrogen fractions in onion-radish cropping system. Among the treatments tried, higher buildup of all the N fractions could be observed in integrated application of vermicompost @ 10 t ha⁻¹ along with 120 kg N ha⁻¹ (V₃N₃) in soil after harvest of onion over their initial status. At the end of onion-radish cropping system, residual effect of vermicompost and nitrogen applied to preceeding onion crop and cumulative application of 75 per cent recommended dose of fertilizers to succeeding radish showed significant effect on all the inorganic and organic N fractions in soil. Among the cumulative treatments, all the inorganic and organic forms of N showed build up of soil status over their initial status. In case of residual treatments, exchangeable NH₄⁺, fixed NH₄⁺, total hydrolysable N, acid insoluble N showed depletion of soil status while build up of NO₃⁻-N, hydrolysable NH₄⁺, hexosamine N and amino acid N over their initial soil status.

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Onion (*Allium cepa* L.) is one of the major bulbous crops of the world and one of the most important commercial vegetable crops grown in India. But the productivity of onion in India is quite low compare to USA, Spain, Turkey and Iran. Increased use of the fertilizer nitrogen is probably the most important single factor that has enabled the crop production to increase significantly in recent years. Nitrogen is an essential constituent of various metabolically active compounds of cell like amino acids, proteins, nucleic acids, pyrimidines, flavines, purines, nucleoproteins, enzymes and alkaloids, therefore, it plays an important role in plant metabolism. The critical role of nitrogen in plant metabolism and its low supply in soils, the management of nitrogen through organic and inorganic sources is an extremely important aspect of crop production (Reddy and Reddy, 1998). Vermicompost is a rich source of macro and micro nutrients, vitamins, enzymes, growth hormones and microflora. This organic manure plays a significant role in improving the fertility of top soil and in boosting the productivity of the crop. There is a need to promote use of organics in addition to inorganic fertilizers for sustained maintenance of soil fertility (Vasanthi and Kumaraswamy, 1999).

Most of the soil 'N' is in the originally combined form associated with organic matter. Puranik *et al.* (1978) reported that about 92-96 per cent of total N present in

soils was in organic form and rest in inorganic form. The organic form of nitrogen may occur in hydrolysable (hydrolysable ammonical, amino acid, hexosamine and unidentified hydrolysable forms) and non-hydrolysable (acid insoluble-N) forms. The inorganic forms of N in soils are NH₄⁺-N, NO₃⁻-N and NO₂⁻-N.

Keeping in view the significance of integrated nitrogen management in maintaining the soil health and improvement in the productivity of crops, an experiment was conducted to study the effect of nitrogen fertilizers and vermicompost on soil nitrogen fractions in onion-radish cropping system.

MATERIALS AND METHODS

A field experiment was conducted on a sandy loam soil (Alfisol) at Student Farm, College of Agriculture, Rajendranagar, Hyderabad during *Kharif* (onion) and *Rabi* (radish) seasons of 2007-08. During *Kharif* (onion), a experiment was laid out in Randomized Block Design with factorial concept consisting of twelve treatment combinations taking 3 levels of vermicompost (0, 5 and 10 t ha⁻¹) and four levels of nitrogen (0, 60, 90 and 120 kg N ha⁻¹). Nitrogen was applied as per the treatments. The recommended doses of P₂O₅ (80 kg ha⁻¹) and K₂O (100 kg ha⁻¹) were applied uniformly to all the treatments.

In *Rabi* (radish) season, all the plots were divided