

Full Length Research Paper

A Preliminary Investigation on the Dynamics of Nitrogen in the Soils of Kadur and its surrounding areas

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Article history

Received: 30-08-2016

Revised: 05-09-2016

Accepted: 18-09-2016

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Abstract

Variation in the concentration of Nitrogen in 100 soil samples collected from different landuse of Kadur Taluk has been discussed. Out of 100 soil samples analyzed about 84% of soil samples found to contain Nitrogen in the range of 250 Kg/hectare to 300 Kg/hectare. Majority of the soil sample studied belong to black cotton category of soils.

Key words: Kadur Taluk, Pedology, Different landuse, Nitrogen Variations.

Introduction

Ecosystem productivity in terms of higher crop yield is a matter of great concern during the present day food and nutrition problems of the developing world. Soil is one of the most important components of the terrestrial ecosystem which supports the biotic communities. Its physico-chemical properties determine the productivity and yield of the food crops which play a vital role in the human nutrition. Therefore, it is very important to understand the chemistry of soils before any crop is grown in any particular soil type. That generally, the surface soils contain 0.02 to 0.5% of nitrogen while a hectare of such soil would likely to contain about 3.3Mg of nitrogen. Further, in most of the natural soils nitrogen is present in its organic form. Only about 2-3% of organic nitrogen is mineralized each year and under normal conditions of the soils (Nyle C. Brady1995).

The variations in the concentration of nitrogen in the soils have been discussed and documented by various researchers viz., Bongale U.D. and Bharati S.G.,(1980), Thind H.s. and D.L. Rowell (1999), Mcinter B.B.,(2001), Firoza Akhter et.al., (2002), Trikey J. and S.P. Adhikary (2006) and Kabiro R.R. and Gaisina L.A. (2009). A critical perusal of the available literature has revealed that no systematic study has been carried out on the physico-chemical properties of different landuse of Kadur and its surrounding areas. It is with this background, in the present paper the dynamics of Nitrogen in the soils of Kadur has been discussed and documented.

Nitrogen is an important element for plant growth and can be fixed by lightening or it is added as a chemical fertilizer to the soils. It is used to make fertilizers, dyes and explosives. It is naturally cycled by living organisms through the Nitrogen cycle and is taken up by green plants and other microbes as nitrates and used to form DNA, RNA and amino acids. Amino acids are the building blocks of proteins. Animals obtain nitrogen by consuming other living things. Microbes in the soil convert the nitrogen compounds back to nitrates for the plants to reuse. The nitrate supply is also replenished by nitrogen fixing bacteria. Further, Cyanobacteria are known to increase the soil fertility through the process of nitrogen fixation and play a significant role in the increase of crop yield.

Materials and Methods

Description of the study area

Kadur is located at 13°33 N and 76°01 E, 13°55 N and 76°01 E. It has an average elevation of 763msl. The larger portion of the Taluk consists of the Malnad or the hilly region, which contains some of the wildest mountain scenery in the southern part of India. The major soil types found in this region include red loamy, red sandy, mixed red soil and black cotton soils. Annual rain fall of this area is around 620mm. Major crops of this area are jowar, ragi, sunflower, arecanut and coconut.

In order to study the physico-chemical parameters of the soil samples of Kadur and surrounding areas, 100 sampling sites of different landuse were identified and from each of those identified sites 500 grams of soil samples were collected, numbered and stored in a suitable size of polythene covers and then labelled and brought to the laboratory for analytical work. After being brought to the

laboratory, the soil samples were air dried, lumps were powdered and then sieved through 0.2mm mesh which is further used for analysis of various physico-chemical parameters. In this communication only nitrogen variations in soils of Kadur has been considered, discussed and documented.

Determination of Nitrogen

For the estimation of available Nitrogen, alkaline Potassium Permanganate (KMnO₄) method described by M.L. Jackson (1967) was followed.

Procedure: 5 grams of soil was transferred into 250ml of conical flask. To this 25 ml of sodium hydroxide was added and distilled for 15 minutes. Further, the distillate was collected in a conical flask containing boric acid mixed indicator until colour turns to bluish from red. Then the distillate was titrated against 0.1% sulphuric acid until colour changes from blue to red. Finally, burette reading in ml was considered for the calculation of available nitrogen and expressed in Kg/hectare. The following formula was used to calculate the available nitrogen in the soil:

$$\text{Available N}_2 = \frac{\text{TV} \times 0.01 \times 0.014 \times 2 \times 10^6}{\text{Weight of the soil sample (5 grams)}}$$

Result

In all, 100 soil samples have been analyzed following the above said technique to know the content of nitrogen and the obtained result have been presented in line graph and the values are expressed as Kg/hectare.

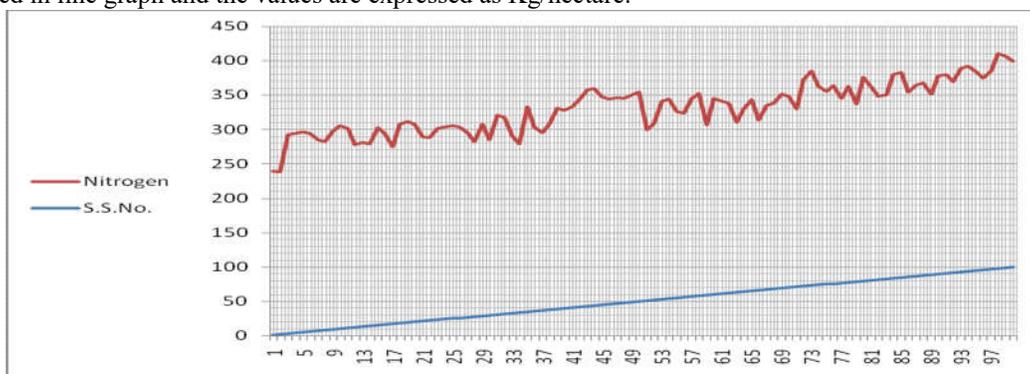


Fig. 1 variations in the concentrations of nitrogen in different soils of Kadur and its surrounding areas.

Discussion and Conclusion

Nitrogen is an important and integral component of the soils which is essential for plant growth processes. Nitrogen can be added to the soil by some microbes from the atmosphere and can then be released back to the atmosphere by still other organisms (Nyle C. Brady 1995). In the present study, it is observed that the content of nitrogen varied from a minimum of 236.4 Kg/hectare in soil sample collected from Haruvanahally (soil sample no. 2) to a maximum of 315.6 Kg/hectare in soil sample no. 44 collected from Tangali. It is very interesting to note that 84% of the soil samples studied found to contain nitrogen between 250 Kg/hectare to 300 Kg/hectare indicating the fact that the soils are generally rich in nitrogen content which may be due to the luxuriant growth of nitrogen fixing blue green algae and also due to the addition of nitrogenous fertilizers in excess. Nevertheless, 10% soil samples found to contain very high amount of nitrogen, as high as 300 Kg/hectare which may probably due to addition of extragenous nitrogen based fertilizer in excess so as to enhance crop productivity. Bongale U.D. and Bharati S.G.(1980) while working on nitrogen fixing blue green algae of cultivated soils of Karnataka concluded that the nitrogen content increased after the crop harvest which may be due to the left over nitrogen fixing algae. In the present study also a similar observation has been made. Therefore, the findings of the present study are similar to that of Bongale and Bharati(1980). A similar observation has also been made by Yagya Prasad Paudel and Shreeti Pradhan (2012). It is concluded that 80% of the different landuse of Kadur Taluk contain higher amounts of nitrogen which is due to the luxuriant growth of nitrogen fixing blue green algae as has been corroborated by the presence of dense blue green algae in different landuse of Kadur. Plants respond quickly to the applications of nitrogen, but nitrogen deficiency reduces crop productivity. Therefore, it must be conserved and carefully managed.

Ethics: The authors read and approved the manuscript and no ethical issues involved.

Acknowledgement

One of the authors (C.T.) is thankful to the Head, Department of Environmental Science, Gulabarga University, Kalaburgi for laboratory facilities.

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