International Journal of Basic and Applied Sciences. Vol. 6 No. 2. 2017. Pp. 44-46

Full Length Research Paper

Studies on Physico-chemical characteristics of soils of Kadurtaluk Chikkamagalur district, Karnataka, India.

Chudamani T[1] and Puttaiah E.T[2]

[1]*Research Student, Department of Post Graduate Studies and Research in Environmental Science, Gulbarga University, "Jnana Ganga" Kalaburgi-585106, Karnataka, India.*
[2]*Vice-Chancellor (Ex), Department of Post Graduate Studies and Research in Environmental Science, Gulbarga University, "Jnana Ganga" Kalaburgi-585106, Karnataka, India.*

Article history
Received: 01-03-2017
Revised: 15-03-2017
Accepted: 20-03-2017

Corresponding Author:
Chudamani T
Research Student, Department of Post Graduate Studies and Research in Environmental Science, Gulbarga University, Kalaburgi-Karnataka, India.

Abstract
Few physico-chemical parameters such as Phosphorous, Potash and Sulphur in 100 soil samples of KadurTaluk have been studied and reported in this article. It is observed that the soils are rich in Potash followed by Phosphate and Sulphur. The results show that the soils are not suitable for agricultural purpose therefore need to be amended with bio-fertilizers instead of chemical fertilizers

Key words: *Soil Characteristics, Phosphorous, Potash and Sulphur, Bio-fertilizer, KadurTaluk.*

Introduction

The soil has been rightly described as the store house of minerals, a reservoir of water and conserver of soil fertility (H. Kaur 2005). The soil provides the key links in the global carbon, nitrogen, phosphorous and sulphur cycles. The soil besides supplying nutrients to the plants but also serves as a base for agriculture, horticulture and forestry. But, unfortunately during these days the agricultural soil health has never remained the same as it was earlier as a consequence of over application of chemical fertilizers. As a result soil has become the receptor of many man-made pollutants which in turn cause deleterious effects both on flora and fauna that inhabit the soil environment. Further, before attempting to grow any crop in a particular soil environment it is very much necessary to understand the soil chemistry/properties and in fact it is a prerequisite. It is with this background the present study on soil properties of Kadur taluk has been made as there is no report available on the soil characteristics deals with certain parameters like phosphorous, potash and sulphur content in the soils of different landuse of Kadur and its surrounding area.

Materials and methods

Soil analysis is an essential part of soil resource management. Each soil sample collected must be a true representative of the area being sampled. Utility of the results obtained from the laboratory analysis depends on the sampling precision. Hence, collection of large number of samples is advisable so that samples of desired size can be obtained by sub-sampling. In general, sampling is done at the rate of one sample for every two hectare area/plot. For the purpose of investigation, in the present study, 100 different sampling sites were identified depending on different land uses. From each of the identified sites soil samples were collected during fallow period. In the standing crop area soil samples were collected between the rows. Before soil sampling was done, surface litter found at the spot was removed. Then, with the help of an auger ploughing to a depth of 15cm from the surface, about 1Kg of the soil sample was drawn. Then, any foreign materials like roots, stones, pebbles and gravel were removed from the soil samples thus collected. Further, these soil samples were spread over a clean and hard surface and divided into four equal compartments by drawing lines along and across the length and breadth. Then, two opposite quarters are discarded and the remaining quarters are remixed and the process is repeated until the desired sampling size is obtained.

Description of the study area

Kadur is located at 13^{o}33 N and 76^{o}01 E, 13^{o}55 N and 76^{o}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 known 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, areca nut and coconut. For the present study a total of 100 soil samples were collected from different landuse of Kadur and its surrounding area. Previous reviewed articles we reviewed all the studies related to soil algal studies was revealed that 100 soil samples were collected by researchers. The study was conducted during 2012. Thus collected soil samples were brought to the laboratory and later they were air dried, lumps were powdered, sieved through 0.2 mm mesh and stored in polythene cover for future analytical work. Thereafter, the samples were analyzed following the established techniques and the results were documented. In this communication the concentrations and variations of three parameters viz., phosphorous, potash and sulphur have been documented. The following methods were adopted for the analysis of the above said parameters.

I. Phosphorous- Bray's method (spectrophotometery) values expressed in terms of Kgs/acre.
II. Potash- Flame photometric method. (values expressed in terms of Kgs/acre).
III. Sulphur- Spectrophotometric method (values expressed in terms of ppm)

Results and Discussion

Phosphorous- The importance of phosphates in plant nutrition has been emphasized by Liebig (1940). Phosphorous stimulates root and plant growth and increases maturity. Its reactions with soil conditions also found to vary depending on type of soils like acidic or alkaline. Its deficiency results in restricted growth of root and shoots and causes delay in flowering and fruiting. Generally, phosphate occurs between 9 and 22 Kg/Ac. In the present study, it varied from a minimum of 6 Kg/Ac in soil number 34 to a maximum of 75 Kg/Ac in soil number 88(fig.1). By and large, about 50% of the soils contain phosphate above 35 Kg/Ac. Ganapathi et. al., (2016) have noticed higher phosphate status in soils treated with farm yard manure as compared to the soils applied with only NPK. Similarly, Jagdeesh (2000), has observed increase of phosphate in soils amended with FYM. In the present study, no definite trend of phosphate variations has been noted in the soils.

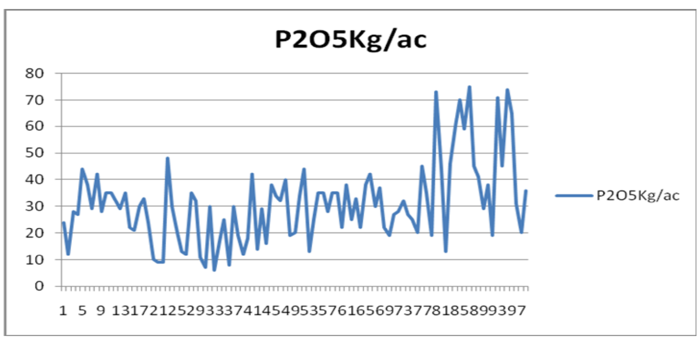

Fig 1. Phosphorous (Kg/ac) variations as observed in soils of Kadur taluk and surrounding areas (2012).

Potash- Deficiency of potassium in soils cause Chlorosis and decreases the rate of photosynthesis. In plants its deficiency could be easily noticed by a symptom of drying back tips of shoots and reduced growth. It increases formation of carbohydrates and rate of metabolism in plants. In the present investigation potassium varied from 11.01 Kg/Ac in soil number 34 to a maximum of 202.61 Kg/Ac in soil numbers 30, 47, 81, 98(fig.2). Most of the soils under study found to contain potassium above 100 Kg/Ac whereas; generally it varies from 50Kg/ Ac to 120Kg/Ac in normal soils. Potassium is considered the most important plant nutrient in banana production. It is the most abundant cation found in the cells of the banana plant (Antonio Lopez and Jose Espinosa 1998). Ganapathi et. al., (2016) have observed potassium between 95 Kg/hectare and 191 Kg/hectare in Alfisol soils and are of the opinion that continuous use of FYM alone considerably increases available potassium in soils compared with those of the soils amended with only NPK. Similar observation has been made by Sharma and Arora (1988), Jagadeesh (2000) and Prabhu Gowda Patil (2001). However in the present study, no definite comparision could be made with the observations of the above authors.

Sulphur- Sulphur has been rightly called as a 'master nutrient' for all seed formation (H. Kaur 2005). It is an essential nutrient for cereals, sugar and pulses. Sulphur is a component of numerous proteins and enzymes that regulate photosynthesis and nitrogen fixation. It promotes root growth and seed formation. The deficiency of sulphur results in brittleness of stem and leaf petioles and causes yellowing of leaves and interveinal chlorosis (Debbie Cherney and Jerry Cherney 2007). In the present study, it is found to be varied from a minimum of 11 ppm in soil number 78 to maximum of 144 ppm in soil number 96 (fig.3). Jagadeesh (2000) has observed that continuous application of FYM without adding NPK fertilizers significantly increases sulphur content of soil. Lal and Mathur (1992) and Ganapathi et. al., (2010) have made similar observation. However, the present findings are not in total agreement with the above obseravations as the sulphur content variations do not show any specific trend.

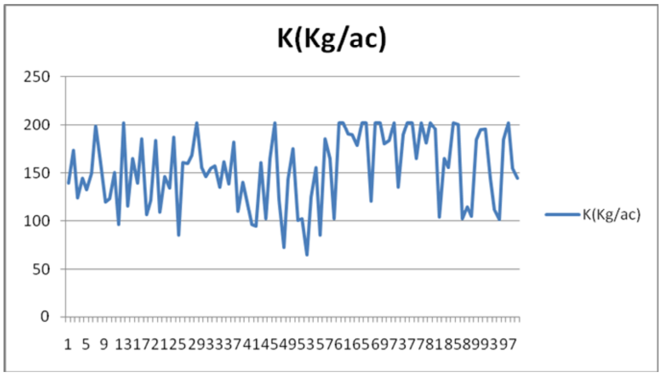

Fig 2. Potash (Kg/ac) variations as observed in soils of Kadur taluk and surrounding areas (2012).

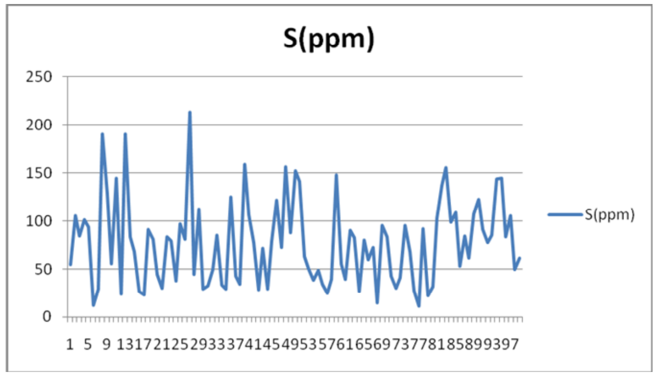

Fig 3. Sulphur (ppm) variations as observed in soils of Kadur taluk and surrounding areas (2012).

Conclusion

The foregoing discussion reveals that phosphorous, potash and sulphur appear to exhibit a similar trend in their concentration of variation. However, potash stands first in its concentration since about 85% of the soils contained it between 100 to 200 Kg/ac as compared to phosphorous which found to occur in the range of 10-40 Kg/ac in almost 75% of soils. Nevertheless, sulphur stands next to phosphorous in its concentration exhibiting a wide range of variations between 10 to 150 ppm in almost 94% of the soil studied. Therefore, it is inescapable to infer that the soils of the Kadur taluk are rich in potash followed by phosphorous and sulphur. Therefore, it is advised to amend the soils suitably with phosphate and sulphur containing fertilizers to obtain higher crop yield besides encouraging the farmers to use bio-fertilizers.

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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