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EVALUATION OF RHIZOSPHERE SOIL QUALITY AND USE OF IT AS MANURE FOR PLANT GROWTH

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ABSTRACT

Soil quality is a measure of the ability of soil to carry out particular ecological and plant productive functions. It reflects the combination of chemical, physical, and biological properties. Some of the soil properties are relatively more important than the others and unchangeable. Others can be significantly changed by human activity. Soil is the blend of minerals, organic matter, gasses, fluids, and the endless life forms that together bolster life on Earth. Soil is a medium for plant development; it is a methods of water capacity, supply and decontamination; it is a modifier of Earth's air; it is a living space for life forms; all of which, thusly, alter the soil. In this research work attempt was made to estimate quantity of Nitrogen, Phosphorous, pH of 10 different soil samples. Rhizospheric and Extrarhizospheric soil samples were used for the study. From present study conclusion can be made that Jackfruit, Sapodilla, Mango and Cashew are the plants that dead tissues from these plants can be used for compost preparation which can be further used for plant growth and promotion.

Index Terms: Soil, rhizosphere.

I. INTRODUCTION

Soil health is the foundation of productive farming practices. Fertile soil provides essential nutrients to plants. Soil health and soil quality are terms used interchangeably to describe soils that are not only fertile but also possess beneficial physical and biological properties. Soil fertility is the ability of a soil to provide the nutrients needed by crop plants to grow. The primary nutrients plants take up from soils include nitrogen, phosphorus, potassium, calcium and magnesium. Frequently, we need to supplement soil nutrients by adding fertilizer, manure or compost, for good crop growth. Organic

matter is composed of plant and animal residues, living and dead soil microorganisms, and substances produced through decomposition. Most agricultural soils contain only a small proportion of organic matter (usually less than 5%), but this small amount plays a very large role in soil quality. Soil organic matter tends to improve soil fertility, soil structure, and soil biological activity.

This study deals with use rhizospheric soil as manure. Instead of using artificial fertilizer we can use soil which is present at rhizospheric region and extra rhizospheric region. We have selected 10 fruit plants which are easily available in Konkan region. While selecting the plant care was taken to get soil which is naturally nutritious rather fertile one. Simply soil was taken from the sites where human interference was less and where will get composting by natural means.

II. MATERIALS AND METHODS

A. Sampling

Samples were collected from 10 different local sites (Ratnagiri, Maharashtra, India). Rhizospheric and extrarhizospheric region from 10 different fruit plants were selected for the same. Jack fruit, Mango, banana, Garcinia indica**,** Naseberry, Almond, Lemon**,** cashew, Guava, Jamun are the plants from where the soil sample were collected. Soil samples were collected in sterile plastic container and transported immediately to laboratory for further analysis.

B. Storage

Soil samples were stored at 4ºC. So as to avoid change in physicochemical properties of soil.

C. Sample Preperation

Soil samples were aseptically diluted with the help of sterile Double distilled water. 1gm of soil were weighed and added aseptically to the 10 ml of sterile Double distilled water. Soil particles were allowed to settle down and supernatant were used for further investigation.

D. Isolation of Rhizospheric bacteria and Fungi

For isolation of bacteria and fungi Sterile Nutrient agar and Sterile Sabouraud's agar plates were used. Isolation of bacteria were done by conventional four quadrant method.

E. pH determination

Standard buffers (ranging from pH 0 to pH 14) were prepared by using standard Chart. pH meter were calibrated and then were used for pH determination of 10 samples.

F. Phosphorous Estimation

Phosphorous content were analyzed by Olsen's method. 2.5 gm of soil samples were weighed in 150 ml plastic conical flask, in which pinch (0.3 gm.) of phosphate free activated charcoal AR Grade were added. 50 ml of Olsen reagent were added to the mixture and shaking treatment were provided for 20 minutes on platform type shaker at 180 rpm. Furthermore mixture were filtered immediately through filter paper. 5 ml of aliquot were transferred into 25 ml volumetric flask. After that 4 ml of the freshly prepared ascorbic acid and ammonium Molybdate solution were added to the same. Standard curve were prepared using 0, 1, 2, 3, 4 & 5 ml of 5 ppm standard Phosphorous solution into 25 ml volumetric flask and the colour was develop using the same procedure as above. The corresponding Phosphorous concentration will be 0, 0.2, 0.4, 0.6, 0.8 & 1 ppm. Absorbance were Measured 882 nm after half an hour.

G. Nitrogen Estimation

Soil Nitrogen content were analyzed by Alkaline Permangnate method. 20 g of sieved soil were transferred into 1litter of round bottom flask. little distilled water were added in such a way that the particles of soil do not remain stuck to the sides of the flask. 2 to 3 glass beads were added to present bumping and 1 ml of liquid paraffin were added to prevent frothing. 100 ml of potassium permanganate and 100 ml of sodium hydroxide solution were added to the flask. Distillation was done and distillate were collected in a beaker containing 20 ml of boric acid working solution. Approximately 150 ml of distillate were collected. Distillate were further titrated with standard 0.02N H_2SO_4 till the colour change was observed from green to red and the burette reading was recorded. Blank were carried out without addition of soil.

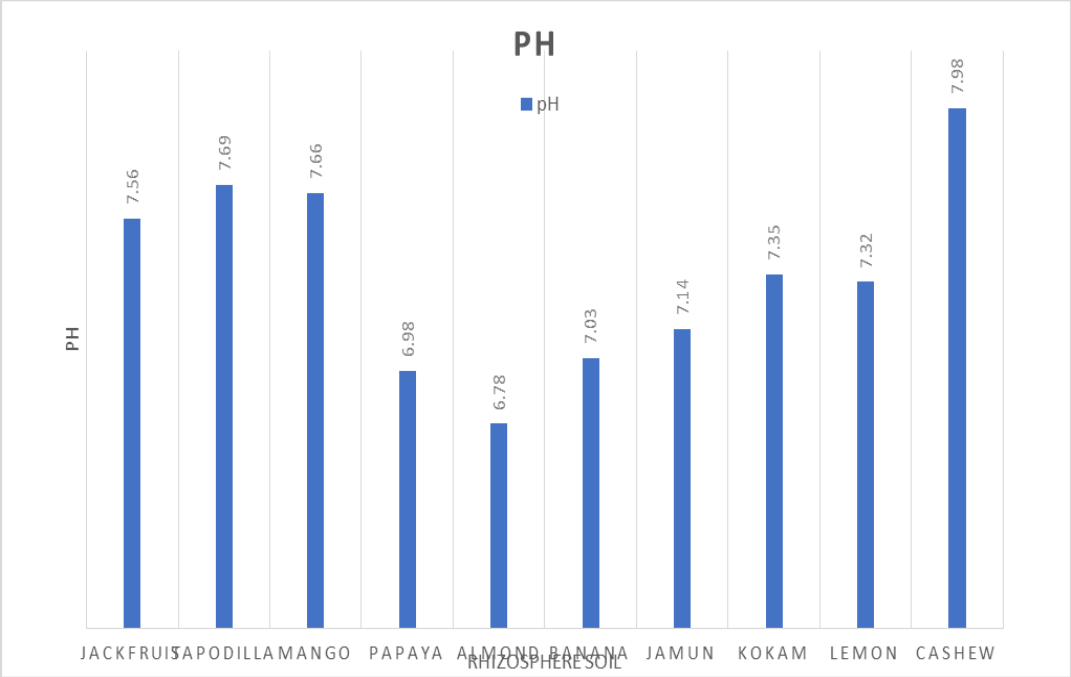
H. Evaluation of plant growth

To check plant growth in respective samples, soil was taken into plastic bags. Soil was seeded with mustard seeds. Mustard seeds were selected as it gives rapid growth. For control garden soil from local campus were selected. Plant growth were observed continuously for 4 days.

III. RESULTS

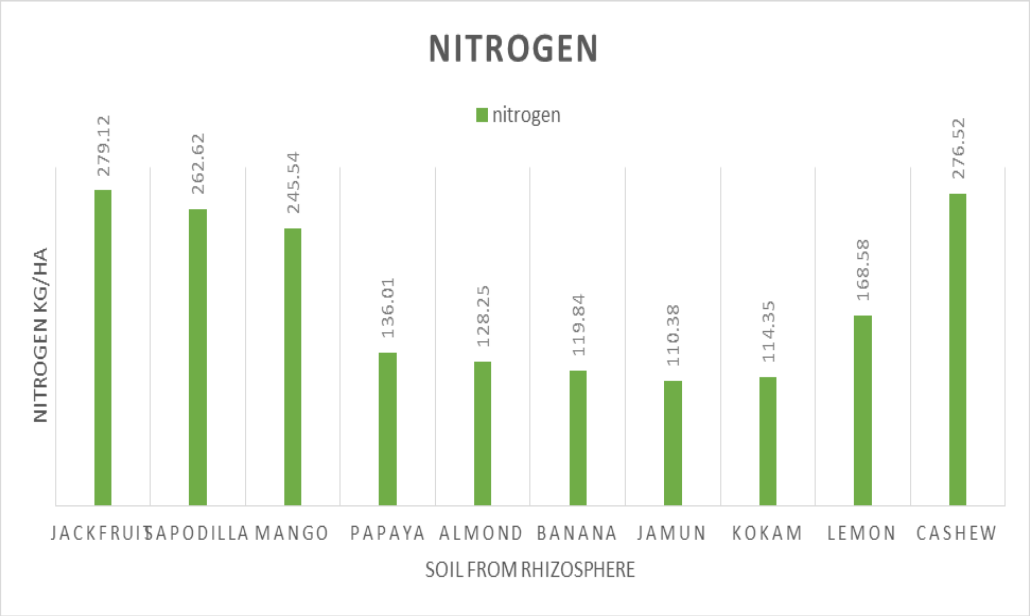
A. pH Determination

pH of 10 soil samples was ranging from 6.78 to 7.98. That is pH of rhizospheric soil of Jackfruit was 7.56, rhizospheric soil of Sapodilla was 7.69, rhizospheric soil of Mango was 7.66, rhizospheric soil of Papaya was 6.98, rhizospheric soil of Almond was 6.78, rhizospheric soil of Banana was 7.03, rhizospheric soil of Jamun was 7.14, rhizospheric soil of Kokam was 7.35, rhizospheric soil of Lemon was 7.32, rhizospheric soil of cashew was 7.98.



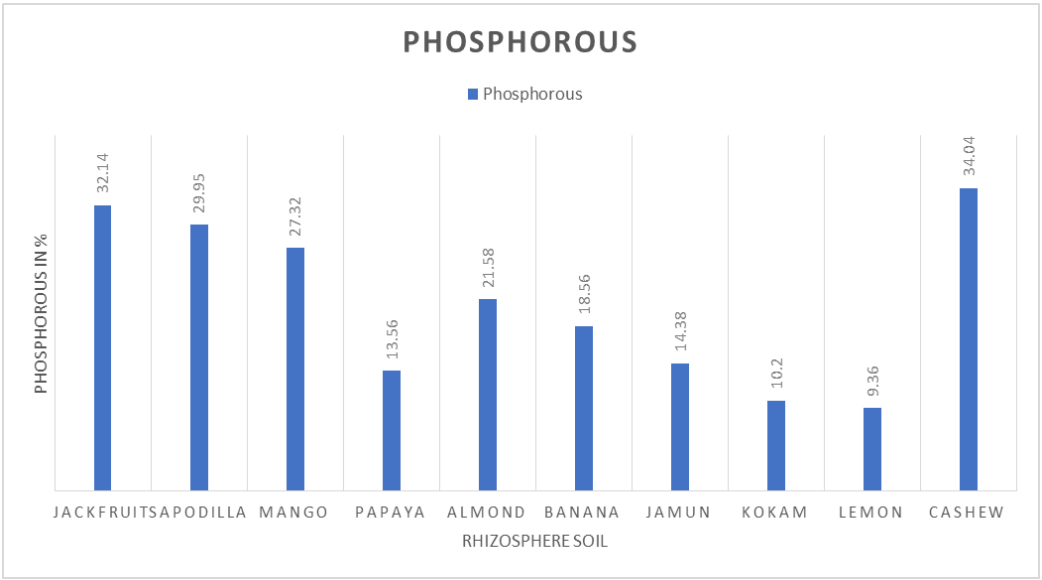
B. Nitrogen Estimation

Nitrogen content of rhizospheric soil of Jackfruit was 279.12, rhizospheric soil of Sapodilla was 262.62 Kg/Ha, rhizospheric soil of Mango was 245.54 Kg/Ha, rhizospheric soil of Papaya was 136.01 Kg/Ha, rhizospheric soil of Almond was 128.25 Kg/Ha, rhizospheric soil of Banana was 119.84 Kg/Ha, rhizospheric soil of Jamun was 110.38 Kg/Ha, rhizospheric soil of Kokam was 114.35 Kg/Ha, rhizospheric soil of Lemon was 168.58 Kg/Ha, rhizospheric soil of cashew was 276.52 Kg/Ha.



C. Phosporous Estimation

Phosphorous content of rhizospheric soil of Jackfruit was 32.14%, rhizospheric soil of Sapodilla was 29.95%, rhizospheric soil of Mango was 27.32%, rhizospheric soil of Papaya was 13.56%, rhizospheric soil of Almond was 21.58%, rhizospheric soil of Banana was 18.56%, rhizospheric soil of Jamun was 14.38%, rhizospheric soil of Kokam was 10.2%, rhizospheric soil of Lemon was 9.36%, rhizospheric soil of cashew was 34.04%.



D. Plant Growth Determination

	Day 1	Day 2	Day 3	Day 4
Jackfruit				
Sapodilla				
Mango				
Papaya				
Almond				

Banana				
Jamun				
Kokam				
Lemon				
Cashew				

Plant growth determination in respective soil samples are showing growth promotion in Jackfruit soil, Sapodilla soil, Mango soil and Cashew soil.

IV. DISCUSSION

India is having largest Agriculture industry in world. There is increasing demand of fertilizers and manure for plant growth and promotion. Current industry for fertilizer production is fully depend on chemical formulation which is harmful for biogeocycles. There is great need for alternative bioformulations. Rhizospheric and extrarhizospheric regions of every plant is naturally supplemented with dead plant tissues such as leafs, bark, flowers fruits etc. of respective plants. Organic content of each and every plant is different than that of the others. In this study work was done just to check which fruit plant is providing essential nutrients after composting so as to promote growth of plants. Attempts was made in present study which demonstrates that jackfruit soil (279.12 kg/ha) and cashew soil (276.52 kg/ha) are showing considerably moderate amount of Nitrogen. Whereas papaya soil (13.56kg/ha), Almond soil (21.58 kg/ha), Banana soil(18.56 kg/ha) and Jamun soil (14.38 kg/ha) are showing considerably moderate amount of Phosphorous. Determination of plant growth in respective soil samples are showing good results for Jackfruit soil, Sapodilla soil, Mango soil and Cashew soil. From present study conclusion can be made that Jackfruit, Sapodilla, Mango and Cashew are the plants that dead tissues from these plants can be used for compost preparation which can be further used for plant growth and promotion.

V. REFERENCES

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