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Study of analytical and microbiological procedures involed in soil science

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Abstract: Soil is a key component of Earth's critical zone. It provides essential services for agricultural production, plant growth, animal habitation, biodiversity, carbon sequestration and environmental quality, which are crucial for achieving the United Nations' Sustainable Development Goals (SDGs).In their natural environment, plants are part of a rich ecosystem including numerous and diverse microorganisms in the soil. It has been long recognized that some of these microbes, such as mycorrhizal fungi or nitrogen fixing symbiotic bacteria, play important roles in plant performance by improving mineral nutrition.In this study, we focus on the interaction of microorganism associated voids percentage and moisture content summarizing the current knowledge in several research fields that can converge to improve our understanding of the molecular microorganism mechanisms.

Keywords: Soil, micro organism, Siol structure,Organic,Sampling.

I. INTRODUCTION

The soil microbiology is study of micro-organism in soil and their functions and their effect on soil properties. Between two and four billon years the first ancient bacteria and micro-organisms came into exist on earth's oceans.The soil biology is essential for the maintenance of biodiversity above and below ground. The wealth of biodiversity below is vast and unappreciated millions of microorganisms live and reproduce in a few gram of topsoil, an ecosystem essential for life on earth. As the world's increasing population and global climate change takes place which produce stress on earth's freshwater systems, microbiological and chemical pollutants in our water will create acute challenges for environmental engineers and public health scientists.The concept of using biological process in soil improvement which is known as bio-medicated The Soil improvement technique has shown greater potential in geotechnical engineering application in terms of performance and environmental sustainability.The soil micro-organism present in soil are responsible for biological process and factors that affects their metabolic activities and geometric compatibility with soil sizes.

2. LITERATURE REVIEW

In every paper and article authors gave many objectives of role of microorganism in soil health. and affect of microorganism on structure and fertility soil.which we have stated in this report. These objectives are very important for studying affect of microorganism on structure and fertility soil. usefulness of clean development mechanism. This report also defines about the impact of the microorganisms on soil and on plant health..

2.1. COLLECTION OF DATA

1) Ajit K Sarma And Jean Sabadie (2002) In this paper author Sulfonylureas are a unique group of herbicides used for controlling a range of weeds and some grasses in a variety of crops and vegetables. They have been extremely popular worldwide because of their low mammalian toxicity, low use rate, and unprecedented herbicidal activity. Knowledge about the fate and behavior of sulfonylurea herbicides in the soil-water environment appears to be of utmost importance for agronomic systems and environmental protection. Because these herbicides are applied at a very low rate, and their mobility is greatly affected by the chemicals' anionic nature in alkaline soils, a thorough understanding of their degradation/hydrolysis processes and mechanisms under aqueous and soil systems is important

2) Debendra neupane et al. (2014) In this paper author studied about the application of enzyme mediated calcite precipitation (EMCP) as soil improvement technique. They also explain various experimental works on the EMCP technique. Author also carried out mechanical experiment of the improved portion of soil specimens.

3) Deyi Hou el al . (2020) In this paper author research in the field of sustainable soil use and management should prioritize the multifunctional value of soil health and address interdisciplinary linkages with major issues such as

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biodiversity and climate change. Author also studied in field of to increase soil organic carbon levels, especially with recalcitrant forms of carbon.

4) Farhana Jamaludin Alia et al. (2015) In this paper author studied about water in the paddy field covered by acid sulfate soils having very low pH contains high amount of Al and Fe that affects rice growth. A laboratory study was conducted in a laboratory study to qualify rice grown under the adverse conditions can withstand the stresses on two rice varieties, MR219 and MR253 were grown under various pH, Al and Fe concentrations. They concluded the result that effect of Al on the root length and root surface area were negatively and highly correlated with Al concentration Author also concluded that effect of Fe on the root length and root surface area was negatively correlated with Fe concentration

5) Gui-Feng Gao el al(2020) In this paper author research about Soil microbial communities are fundamental to maintaining key soil processes associated with litter decomposition, nutrient cycling, and plant productivity and are thus integral to human well-being. Recent technological advances have exponentially increased our knowledge concerning the global ecological distributions of microbial communities across space and time and have provided evidence for their contribution to ecosystem functions.

6) Hong Yan,David E. Crowley (2000) In this paper authors performed an experiment with barley plants under iron-limiting and iron-sufficient growth condition and plants were grown in an iron-limiting soil in root box microcosms. And there results showed that the microbial communities associated with the different root locations produced many common 16S rDNA bands but that the com munities could be distinguished by using correspondence analysis.

7) Noor Muhammad et al. (2019) In this paper author studied about the presence of aluminium in the soil surrounding the plant roots. They have observed the ill-effects such as less growth of roots, less water uptake capacity, reduction in nutrients of soil and roots due to the presence of aluminium. Authors also stated that the phosphorous value also increases in the soil , also there is change in the cell membrane of the plant.

8) Ron J. Yates el al (2004) In tnis paper author studied about the Bacteria were isolated from root-nodules collected from indigenous legumes at 38 separate locations in the Gascoyne and Pilbara regions of Western Australia. Authentication of cultures resulted in 31 being ascribed status as root-nodule bacteria based upon their nodulation of at least one of eight indigenous legume species. The authenticated isolates originated from eight legume genera from 19 sites. Isolates were characterised on the basis of their growth and physiology; 20 isolates were fast-growing and 11 were slow-growing.

9) SHI Ren-yong et al (2019) In this paper author studied about extensive acidic soils which are found in southern China. Author also summarized the positive effects and mechanisms involved in the correction of soil acidity and the increase of soil pH buffering capacity by crop residue biochars. They also concluded that application of crop residue biochars may be a better option than traditional liming to ameliorate acidic soils.

10) Shi Ren-young et al. (2019) In this paper author studied about extensive acidic soil, which suffer from accelerated soil acidification, are found in south China and also soil acidity, aluminium toxicity and nutrient deficiencies severely limited crop productivity. Author also summarized the positive effects and mechanism involved in correction of soil acidity. Author also concluded that application of crop residue biochars may be a better option than traditional liming to ameliorate acidic soils.

11) Yuan Hong-zhao1 et al (2019) In this paper author studied in brief about the application of straw and biochar for the improvement of soil fertility. The author carried out an investigation to study the diversity of microbial carbon use patterns in paddy soils amended with straw in a 3-year field. And they concluded investigation with a result that the functional diversity of microorganisms in organic paddy soils is affected by both physicochemical properties of amendment and plant growth stage.

3.METHODOLOGY

In this project we are studying the analytical and microbiological procedures involed in soil science First of all we have to study the role of micro organisms in soil soil and also there classfication . Then we have collected soil sample from different location and at differnent depths.

Soil Sampling-The methods and procedures for obtaining soil samples vary according to the purpose of the sampling. Analysis of soil samples may be needed for engineering and agricultural purposes. Soil sampling for agricultural purposes, i.e. for soil fertility evaluation and fertilizer recommendations for crops. The results of even very carefully conducted soil analyses can only be as good as the soil samples themselves. Thus, the efficiency of a soil testing service depends on the care and skill with which soil samples are collected.Non-representative samples constitute the largest single source of error in a soil fertility programme. The most important phase of soil analysis takes place not in the laboratory but in the field where the soil is sampled. Soils vary from place to place. In view of this, efforts should be made to take the samples in such a way that they are fully representative of the field. Only 1–10 g of soil is used for each chemical determination and this sample needs to represent as accurately as possible the entire surface 0–22 cm of soil, weighing about 2 milliokg/ha.

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Sampling Tools And Asccessories-Depending on the purpose and precision required, the following tools may be needed for taking soil samples A soil auger is a tube i.e dolly with height of 112cm and diameter of 4.5cm for taking sample. A clean bucket,tray,and a hammer (3kg), air tight steel boxes. Plastic bags of a specific size , weighing balance and oven.Copying pencil for markings, colour pen and tags for tying plastic bags. A soil sample information sheet to coolect information

Selection Of A Sampling Unit-A visual survey of the field were done precede the actual sampling in our colleage campus.The variation in slope, colour, texture, management and by traversing the field were noted. Demarcate the field into uniform portions, each of which must be sampled separately. Where all these conditions were similar, one field can be treated as a single sampling unit. Such a unit should not exceed 1–2 ha. The sampling unit is a compromise between expenditure, labour and time on the one hand, and precision on the other.

Sampling procedure-We prepare a map of the college campus area to be covered in a survey showing different sampling position and marking them on map of our college campus. Enter a plan of the number of samples and manner of composite sampling were mark on the map, and designating different fields by letters (1,2,3,4etc.).

We scrape away surface litter to obtain a uniformly thick slice of soil from the surface to the plough depth from each spot. Made a round-shaped cut with a dolly to remove a 1–2- cm slice of soil. And collect the sample from the dolly and put it in a clean bucket. In this way, collect samples from all the spots marked for sampling unit mark. We collect it and put in a plastic cloth bag and we mark each bag clearly in order to identify the sample. The bag used for sampling were clean and free from any contamination and if the same bag is to be used a second time,we turn it inside out and remove the soil particles and make it clean. As well as we writing write the details of the sample on the information sheet and puting a copy of this information sheet on the bag. We tie the mouth of the bag carefully because there should no loss of moiture from soil sample. Similary we repeated above process more 30.

For the further test of soil sample it has been carried to laboratory. As soon as the samples arrive at the soil testing laboratory information regarding samples had be recorded in a register. For moisture content determination.

1.We clean the steel container with a cotton cloth and fill it with the soil speciem of the samples and weigh it with lid as W1.

2.Futher we kept the container in oven at 105℃ for 24 hrs.

3.After completing 24 hrs we weigh the same sample as W2

4.Using following formula we calculated moisture %

MOISTURE % $= \frac{W1-W2}{W2} \times 100$

4.RESULT

From this study we understand the importance of microbes in the soil. The soil without microbes turned into the non-fertile soil. The soil in the study area has good quantity and availability of the soil microbes and has better moisture holding tendency.

4.1 CONCLUDING REMARK

The soil samples collected during the study has uniform structure, in some part of the college campus the hard soil is present and in these soil no moisture and microbes found. This study can be useful for the usefulness of the soil in the agri activities as well as engineering landscaping to get more yields and infiltrate the water to the ground water table.

It is crucial to understand the impact of the microorganisms on soil and on plant health in order to be able to manage and control disease outbreaks.

REFERENCES

1. Ajit K Sarama and Jean Sabadie, Microbiological processes affecting chemical transformations in groundwater, in Ground Pollution Microbiology, pp.89-15(2020)
2. Dehendra Neupane, Probing reveals many microbes beneath earth's surface, ASM New, 53.78-79(2014)
3. Deyi Hou, Effect of orgainc contamination upon microbial distrubations and heterotrophic uptake in a Cape Cod, Mass aquifer, Sppl Environ microbiol 48,1197-1202(2020)
4. Farhana Jamaludin Alia, Transfert Dun croneau dulution dans une colonne de sol non satuen, Measureet simulation, C. R. Rcad Sci,Paris,SetB,281,615-617(2015)
5. Gui-fing goe, Some principal of continous culture in recent Progess in microbiology ." Journal of Resources, Conservation and Recycling, 58 (2020), 143–151.
6. Hong Yan, The bacterial glycocalyx in nature and diesease, AnnuRev, Microbiol, 35,,299-324,(issue2000)
7. Noor Muhammod, Microbial expolymerse Ecological and economical considerations, Am,soc, Microbial News,48,9-14(2019)
8. Ron j yets , Mass transfer in porous media with immoblie water. J.Hydrol 41,59-67(2004)
9. Shi ren young Direct observation of bacteria in soil, in the Ecology of soil bacteria pp.171-192, Universityof Toronto Press(2019)

