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MICROBIAL ECOLOGY

PRATICAL REPORT

TITLE: ISOLATION OF SOIL MICRO-ORGANISMS

AIM: ISOLATION OF SOIL MICRO-ORGAMISMS AND MEASUREMENT OF PHYSICAL AND CHEMICAL PARAMETERS

MATERIALS: TEST TUBES, CONICAL FLASKS, MEASURING CYLINDER, BEAKER, PIPETTE, TEST TUBES RACKS, PETRI DISHES, SPIRIT LAMPS, SOIL SAMPLES, AUTOCLAVE AND SPATULA.

PROCEDURE:

* Soil samples were collected from different depths (soil surface, 15cm and 30cm) from a botanical garden and kept in beaker.
* The physical and chemical parameters (color of soil, nature of soil particles, temperature and ph) of the soil samples collected at different depths were recorded.
* 100ml of distilled water was measured using a measuring cylinder and transferred into a sterile beaker.
* 1g of the soil sample was weighed and added to the beaker containing the distilled water (stock solution).
* empty sterile test tubes were labelled “10-1”,”10-2”,”10-3”,”10-4” and “10-5”.
* 9ml of distilled water was transferred to each testtubes using one of the pipettes.
* 1ml of the stock solution was transferred to the test tube labelled 10-5 using a new pipette and swirled gently.
* 1ml of solution in 10-3 was transferred to test tube 10-2 with a new pipette and then swirled. this method was repeated to transfer solution from 10-2 to 10-3 and solution 10-3 to 10-4 and then from 10-4 t0 the 10-5 test tube.
* Test tube 10-3 and 10-5 were cultured into petri dishes using the pour plate method.
* The plates were incubated for 24hours at 37.c and the individual colonies were counted and recorded.

OBSERVATION

|  |  |  |  |
| --- | --- | --- | --- |
| **Dilution** | **number of colonies cfu/ml** | | |
| **soil surface** | **15cm** | **30cm** |
| 10”3 | 24 | 16 | 16 |
| 10”5 | 7 | 6 | 3 |

Incubated at 37.c for 24hours

Most of the microbial colonies were bacteria and fungi colonies based on the cultural characteristics observed. The bacterial colonies were more than the fungi colonies at each depth.

|  |  |  |  |
| --- | --- | --- | --- |
| **physical and chemical parameters** | **soil surface** | **15cm** | **30cm** |
| **color of soil** | slightly dark | dark | very dark |
| **nature of soil particles** | Sandy | sandy | aggregated |
| **Temperature** | 32`c | 24`c | 20`c |
| **Ph** | Acidic | acidic | acidic |

DISCUSSION AND CONCLUSION: From the individual colonies counted we can see that microbial population decreases with increasing soil depth.

A litmus paper was used to measure the PH. The red litmus paper turned purple and blue litmus paper turned red. Abiotic processes such as rainfall can also affect the ph of the soil. In areas of high rainfall, acidic soils can be created through leaching of bases from the soil, while more basic soils are typically located in arid environments. ph affects microbial diversity because many microbial species cannot tolerate extreme levels of ph (high or low). Alterations in ph can render essential microbe enzymes inactive and/or denature proteins within the cells and prevent microbial activity from occurring. However, there are microbes that can withstand extreme ph environments.

Soil temperature changes with depth: the surface soil (~0-20cm) is highly affected by the solar radiation. Soil temperature is also affected by the soil color, soil cover, and the water content of the soil. A darker soil can absorb more heat compared to lighter color soil. The higher the temperature, the more active microbes are, with microbial activity typically doubling with a 10° rise in temperature. However, some bacteria thrive at very low temperatures (psychrophiles) and very high temperatures (extremophiles)

Nature of particles indirectly influences properties such as: water holding capacity, porosity, aeration and nutrient availability.

In conclusion, Microbial populations in the soil are determined by various physical and chemical factors such as soil depth, temperature, ph, nature of soil particles.

Temperature and ph have a positive correlation with the increase in microorganism where depth has a negative correlation. Also with increasing soil depth temperature and ph decreases.

ANSWERS TO QUESTIONS

1. DISADVANTAGE OF YOUR METHOD OF STUDY

The method of study used was Serial Dilution Method

* The Petri dishes and agar used had specific nutrients and specific environmental conditions (pH, temperature. etc.) so the fungal colonies appearing are those favored by the environmental conditions and those not favored are inhibited.
* Some microorganisms grow faster than others; the fast growing ones may over grow and suppress the slow growers.
* Colonies arising from soil plate techniques are predominantly from spores. Therefore the technique seems to favor species that spore heavily in soils.
* Spores attached to the large soil particles will not grow because they will settle at the bottom of the dish; while those attached to fine particles will be seen growing because those particles will be at the surface.

1. POSSIBLE ROLES OF MICROORGANISMS ISOLATED IN THE SOIL

The major microorganisms observed from the practical are bacteria and fungi

* Soil fertility
* Decomposition of dead plants and animal matter.
* Degradation activities improve soil texture and organic composition.
* May be Pathogenic to plants and may cause considerable damage to crops.
* Increases the availability of mineral nutrients.
* Nutrient cycling.