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Study of Prevailing of Deuteromycetous Fungi on the Petro-Polluted Soil

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Abstract

The present paper investigates deuteromycetous fungi on the petro-polluted soil. These are conducted by the enumeration of the fungal population and the identification. Fungus observation physico-chemical analysis of soil and identification of the soil fungi. The soil sample examined for isolating fungi from petroleum contaminated site. Identified as Aspergillus, Penicillium, Fusarium, Rhizopus, Mucor, Cladosporium, Morssonina Chaetomium, Curvularia, Helminthosporium, Alternaria and Trichoderma Species. The isolation of filamentous fungi in environments containing oil or its sub products found a very similar diversity of genera to that found in our study. Petro-polluted site the growth of fungal diversity was higher due to more carbon concentration.

Keywords: Soil, Petro-pollution, *aspergillus*, *penicillium, fusarium*, *rhizopus.*

Introduction

Petroleum hydrocarbons of soil contamination are one of the world's most common environmental problems. Petroleum hydrocarbons (TPHs) are one of the most common groups of persistent organic contaminants. Crude petroleum and environmental conditions crude petroleum oil from petroleum contaminated soil from North East India[1]. With the development of the economy and petroleum exploration, the contamination of soil with petroleum compounds is a concern worldwide. Petroleum like all fossil fuels primarily consists of a complex mixture of molecules called hydrocarbons. Carbon is so popular among various elements that is has a separate branch of chemistry called organic chemistry it is common element of organic world. The hydrocarbon molecules that make up crude oil and petroleum products are highly toxic to many organisms, including humans[2]. The objective of this investigation is to assess the impact of various concentrations on the fungal population of a soil in the Niger Delta prone to crude oil pollution. This is conducted by the enumeration of the fungal population (heterotrophic and hydrocarbon-degrading fungi) and the identification of both heterotrophic and hydrocarbon-degrading fungi (types or diversity) in control and in crude oil polluted soils[3]. The present paper deals with prevailing of deuteromycetous fungi on the petro-polluted soil.

Material and Methods

Soil dilution method: 1gm of soil sample was suspended in 10ml of double distilled water to make soil suspensions (10-1 to 10-5). Dilution of 10-3, 10-4 and 10-5 were used to isolate fungi. 1 ml of soil suspension of each concentration were added to sterile Petri dishes (triplicate of each dilution) containing 15 ml of sterile Potato Dextrose Agar and Czapek,s Dox Agar. One percent streptomycin solution was added to the medium before pouring into petriplates for preventing bacterial growth. The Petri dishes were then incubated at 28 ± 20 C in dark. The plates were observed everyday up to three days.

Physico-chemical analysis of soil: The collected soil was characterized for its physico-chemical properties. The physico-chemical parameters were measured by standard methods. Physical and chemical parameters of soil such as pH, salinity, organic carbon, nitrogen, phosphorous and potassium were analyzed. The physic chemical parameters of the soil samples were analyzed at Soil Testing Laboratory (STL), From Agriculture College of Indore (MP).

Methods of microscopic examination: For light microscope the optical equipment used were dissecting microscope, research microscope (10x and 15x eye pies and 10 x to 100x objectives), equipment for microphotography, camera Lucida and ocular and stage micrometers.

Identification of the soil fungi: Fungal morphology were studied macroscopically by observing colony features (Colour and Texture) and microscopically by staining with lacto phenol cotton blue and observe under compound microscope for the conidia, conidiophores and arrangement of spores .The fungi were identified with the help of literature.

Soil Sampling and Analysis: The most common and economical method for sampling an area is composite sampling, where sub-samples are collected from randomly selected locations in a field, and the sub-samples are composite sampling provide average values for the sampled area. The actual number of sub-samples depends on field size and uniformity.

A soil sample analysis has done soil testing laboratory in the Agriculture college of Indore (MP).

Results and Discussion

The soil samples examined for isolating fungi from petroleum hydrocarbon contaminated site in Manglia depot Indore M.P. by dilution technique were identified as *Aspergillus* ,*Penicillium, Fusarium*, *Rhizopus, Mucor, Cladosporium, Morssonina* Chaetomium, *Curvularia*, *Helminthosporium, Alternaria* and *Trichoderma* species. Studies on the isolation of filamentous fungi in environments containing oil or its sub products found a very similar diversity of genera to that found in our study, such as: *Aspergillus* and *Penicillium*[4, 5].

Recently, it was recorded that the genera of fungi such as *Penicillium*, *Aspergillus, Fusarium*, *Rhizopus* and *Mucor* are associated with petroleum hydrocarbon contaminated soil. In their studies they isolated *Penicillium* and *Aspergillus sp*[6].

From hydrocarbon contaminated soil and identified as hydrocarbon degrading fungi along with *Tricoderma, Fusarium, Rhizopus* sp. The similar results of our study were also obtained by Obire *et al.*[3], in their studies on effect of different concentrations of crude oil on fungal populations of soil.

They isolated fourteen fungal genera from soil. These include *Alternaria*, *Aspergillus*, *Candida*, *Cephalosporium*, *Cladosporium*, *Fusarium*, *Geotrichum Mucor*, *Penicillium*, *Rhizopus*, *Rhodotolura*, *Saccharomyces*, *Torulopsis* and *Trichoderma*. The fungal isolates obtained in their study were mainly *Aspergillus* species, while others were *Trichoderma*, *Penicillum*, *Rhizopus* and *Rhodotorula* species which were all able to utilize hydrocarbon as carbon source[7]. Isolated several filamentous fungi from soil, which were able to degrade crude oil. *Fusarium* and *Aspergillus* sp[8]. They isolated and identified hydrocarbon degrading fungi from hydrocarbon contaminated soil[6]. *Aspergillus* species were isolated form soil polluted by petroleum products in cross River University of Technology, Calabar, Nigeria[9].

In our present work, *Aspergillus* and *Penicillum species* were present in dominant numbers. Our finding coincides with the work of Elisane *et al.*[10], who also isolated four strains from the contaminated soil. They were identified as *Aspergillus* sp. *Aspergillus are* the most commonly encountered genera of hydrocarbon degraders in oil contaminated tropical soils, which are in agreement with the present work[5]. Who isolated three fungi from total hydrocarbon contaminated soil and identified by microscopy as *Penicillium*, A*spergillus* and *Rhizopus* sp[11]. The different result from our findings were obtained[12], who also isolated many fungal species that were able to degrade poly-cyclic aromatic hydrocarbons. The species isolated were *Coniothyrium fuckelii, Gliocadium virens*, *Phialo-phora alba, Phialophora hoffmannii, Scopulariopsis brumptii* and *Trichoderma harzianum* along with genera *Penicillium*, which were similar to our finding. With the serial dilution plate technique, *Aspergillus* and *Penicillium species* were the richest genera in the term of number. The growth rate of each fungus shows that *Rhizopus sp.* had the highest growth diameter in low petro contaminated PDA media culture and *Aspergillus sp* had the highest growth diameter in high petro while *Penicillium sp* had the lowest growth rate at all the concentrations.

All of these isolates were able to grow on crude petroleum as the sole source of carbon and energy when screened for hydrocarbon utilization. The growth diameter of fungus decreases with increasing petro concentration except *Aspergillus sp* in which the growth diameters of colonies were increased with increasing petro concentration[7].

Thus I have reported the different types of fungus in my selected site i.e. Depot soil and Gram field soil. During the present work, heterotrophic fungal species related to a total of ten fungus were isolated from the petro polluted soil samples. These include *Aspergillus* ,*Penicillium, Fusarium*, *Rhizopus, Mucor, Chaetomium, Cladosporium,* Morssonina, *Curvularia*, *Helminthosporium, Alternaria* and *Trichoderma* species.

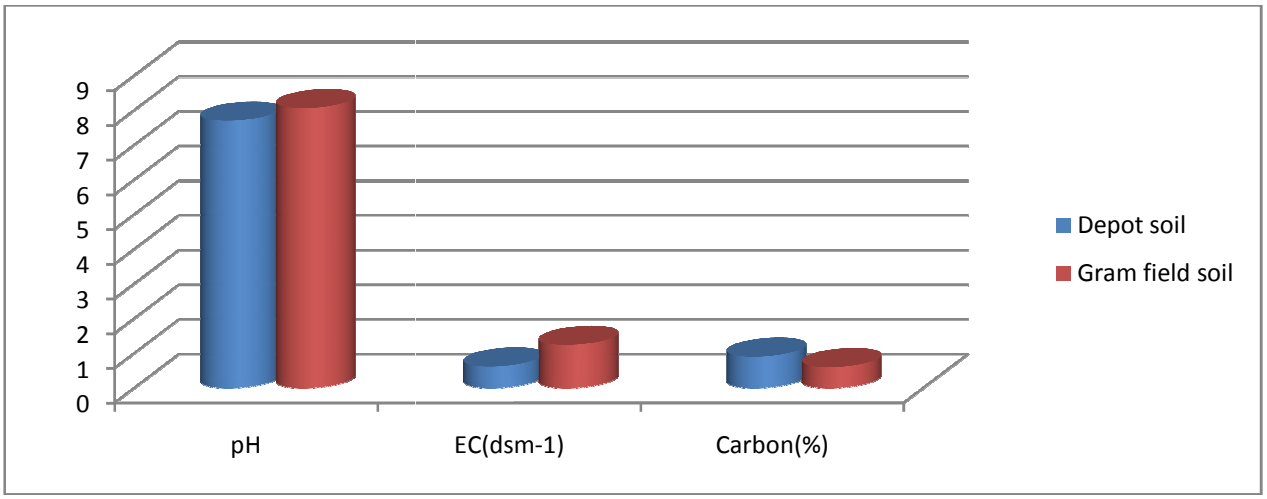

Figure-1
Comparison between depot soil and gram field soil (pH, EC&Carbon)

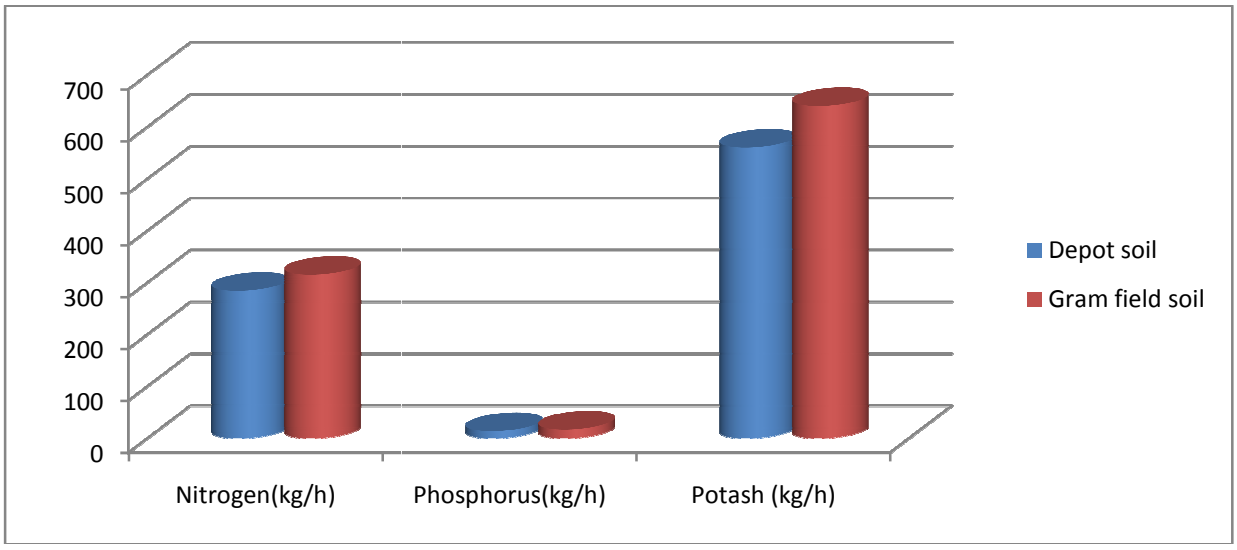

Figure-2
Graphical comparison of soil analysis (N: P: K)

Conclusion

The present study was carried out at Manglia depot to compare the soil analysis of the two sites, Petro-polluted site and Gram field site. The comparison was done on the basis of different soil parameters including pH, EC, carbon concentration Nitrogen, Phosphorus, and Potassium on the basis of the findings it can be concluded in the Petro-polluted site fungal growth is higher as compared to Gram field site. The soil samples examined for isolating fungi from petroleum hydrocarbon contaminated site in Manglia diopot Indore M.P. by dilution technique were identified as *Trichoderma, Fusarium*, *Alternaria, Curvularia*, *Chaetomium, Morssonina, Helminthosporium.spp. Cladosporium.spp., Mucor, Aspergillus, Penicillium, and Rhizopus species.*

Both sites reported similar finding of some fungi like *Fusarium*, *Alternaria, Curvularia*, *Mucor, Chaetomium, species.* In Petroleum depot soil as well as Gram field soil. *Penicillium, Rhizopus Aspergillus,Cladosporium spp.* can be used to remove of petroleum pollution in soil. So we can say that in the petro polluted site the growth of fungal diversity were higher due to more carbon concentration. Thus it may be concluded that the nature of Deuteromycetous fungi varies at different sites or locations in the study. The behavior of Deuteromycetes is also different under different soil parameters.

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