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Studies on Distribution of Fungi from Irrigated and Non irrigated Soil of JalnaLocality (M.S)

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ABSTRACT

Diversity and seasonal variation of soil fungi were studied in irrigated and non-irrigated soil more than 30 different fungal species were isolated from sample of irrigated and non irrigated soil. Among the 30 isolates 17 fungal species was more dominantfrom both soils 08fungi were completely absent in irrigated soil, and three fungi completely absent in the non-irrigated soil. Major occurrence were observed in the non-irrigated soil in winter season 21 species like*Aspergillus flavus, Aspergillus niger, Penicillium chrysogenum, Mucor spp. and Rhizopus oryzae* were high in occurrence in winter season as compare to Irrigated soil in winter season 17 species like *Fusarium dimerium, Curvularia lunata*, *Colletotrichumfalcatum* wereshows the high occurrence.

Keywords: Irrigated, Non- irrigated, Diversity. Fungi, Soil analysis,

Article History

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INTRODUCTION

Microbial population of each species can change from habitat to habitat. Microbes plays an important role to form stable ecosystem. Recycling of nutrient, decomposing of organic matter and biological control, soil quality is additionally changes by various functions of microbes (Stefanis et al., 2013).The fungi frequency of has been changed at different stages of growth and ages the condition of plant and the leaf is different. This may be responsible age (Mane and Chavan, 2015). Soil contains many living organisms clustered intocomplex and diverse communities. the range , communitycomposition, and structure of soil microorganismsin agricultural soils are critical to the maintenanceof soil health and quality (Shen et al. 2008). Improper soil management affect ashore degradation, removal of organic matter from land without replenishing it back through crop cover, intensive tillage, erosion , atmospheric pollution, and desertification, has resulted in deterioration of soil health, a fundamental component of ecological sustainability (Doran, J.W. and Zeiss, M.R. 2000). Some soil microbes within the rhizosphere and endosphere of plants improve tolerance to abiotic and biotic stress (Mendes et.al. 2014). Some common microbes which found within the whole biosphere are

bacteria, fungi, nematodes, mycoplasma, etc. fungi also are one among them, as they're omnipresent. Most of fungi are soil born which belongs to different genus. Fungi are cosmopolitan altogether sorts of soil but some are restricted to particular habitat. Many fungi are dominantly found within the rhizospheric area and a few fungi are unevenly distributed from location to location. Plants are protected by fungi by supplying water also as phosphorus to the plant root during drought (Magdoff and VanEs, 2009). In plant growth and health diverse soil microbes play critical role. They decompose organic compounds andparticipatewithin the recycling of nutrients, like nitrogen, phosphorus, and potassium, which are important for plant growth (Marschner 2004, Kennedy, 1999). additionallyto physicochemical properties of soils, soil microbial communities largely determine agricultural productivity (Van derHeijden et.al. 2008).To develop sustainable agriculture, understanding of ecological features of microbiomes in agro ecosystems is required. The varied biotic factors like aorthropods, earthworms and microbial domains and abiotc factors like precipitation, temperature, humidity, and water affects on soil environment and highly complex system composed of microbes.
Our study showed that agricultural land-use types determined fungal community structures and specific taxa were enriched in specific sorts of agricultural land use, with distinct correlations with soil chemical properties. Furthermore, microbial interactions supported the co-occurrence patterns in soil bacterial communities also varied with agricultural land-use types. It indicate totally unique perspective of how land-use type-specific taxa reflect soil conditions and should thus be used as potential biological indicators for maintaining soil health and sustainable crop production. Further research is required to explore relationships between soil fertility, crop productivity, and microbial community structure, which may help us better understand which bacterial communities or specific taxa support sustainable agricultural management (Pei-Pei Xue, et.al. 2018). During this study fungal diversity, and their dominancy from irrigated and non-irrigated soil of the Jalna locality.

Materials and methods

Collection of samples

Soil samples were collected form Jalna locality for the analysis of mycoflora collected one sample each from irrigated and non irrigated sites at 3 different seasons*viz*.rainy, winter and summer in sterile polythene zip locked bags. All samples were kept in the laboratory for analysis in the fridge until needed. Collection of soil sample is done at the depth of 30 cm from soil surface.

Isolation of fungi

The isolation of fungi is done by the help of soil dilution method Waksman, (1927). Soil samples were collected from different places of the irrigated and non irrigated field at 5 -15 cm depth from each field, 200g soil samples were collected and pooled together to obtain composite sample. The soil samples were collected in sterile polythene bags cleaned with alcohol and

labeled after collection. The samples were kept it in the laboratory for further analysis. The soil micro fungi were enumerated by two methods, namely Soil Dilution, Waksman (1922) on different media such as Rose Bengal Agar and potato dextrose agar media. 1 gm of each soil sample is added in each 10 ml of distilled water respectively. Up to 10^{-4}serial dilution was carried out. By using sterile spreader, 0.1 ml sample were spreaded on the petriplate containing Rose Bengal Agar and potato dextrose agar medium, One percent streptomycin solution was added to the medium before pouring into petriplates for preventing bacterial growth only for the isolation of fungi. The Petri dishes were then incubated at 28 ± 2°C in room temperature petriplates were kept in the room temperature and observed after 7 days.

Identification of fungi

The isolation of fungalpure culture was done with PDA medium in the standard petriplates by single spore culture technique. By considering some parameters like colony colours and their appearance, growth pattern, sporulation, etc. identification of fungi were done. Microscopic study was also done. Characters observed like types of hyphae their branching pattern, presence and absence of septa, types of spores,sporophore were observed during the study. All microscopic study were done with help of books and manual and most updated keys*viz*. Raper and Thom (1949), Raper et al., (1965),Nagamani A, Kumar IK and Manoharachary C. (2006), Eills (1976), Mukadam (1997) and Barnett and Hunter, (1998).

Physico-chemical analysis of soil

The collected soil samples were characterized its physico-chemical properties. The physico-chemical parameters analyzed by standard methods. Physical and chemical parameters of soil such as pH, Water holding capacity, Texture, Color, Porosity percentage, Apparentdensity, Relative density, Humidity percentage were analyzed. The physico-chemical parameters of the soil samples were analyzed at Soil Testing Laboratory.

RESULT

Table No. 1.Physical Analysis of Irrigated and Non irrigated Soil of Jalna Locality

Sr. No	Soil Physical Analysis	Soil	
		Irrigated	Non irrigated
1	pH	07.60	09.40
2	Water Holding Capacity	69.44%	76.37%
3	Texture	Light Clay	Sandy Soil
4	Color	Red color	Light red
5	Porosity Percentage	07.44%	09.89%

6	Apparent Density	00.96 (Gram/CC)	00.87 (Gram/CC)
7	Relative Density	01.40 (Gram/CC)	01.34 (Gram/CC)
8	Humidity Percentage	03.88%	05.49%

Table No. 2.Chemical Analysis of Irrigated and Non irrigated Soil of Jalna Locality

Sr. No	Soil Physical Analysis	Soil	
		Irrigated	Non irrigated
1	Salinity of Soil	00.61	00.55
2	Organic Carbon	00.80%	00.72%
3	Phosphorous	23.47 (Kg/Hector)	14.03 (Kg/Hector)
4	Potash	31.90 (Kg/Hector)	95.27 (Kg/Hector)
5	Lime	04.38%	11.00%
6	Sodium	01.90 (MLE)	01.32 (MLE)
7	Calcium	05.00 (m.l.e.)	15.91 (m.l.e.)
8	Magnesium	09.01 (m.l.e.)	15.66 (m.l.e.)

Soil plays an vital role in agricultural ecosystem playing important role growth of a plant as well as mycobiota. Different chemicals were influence the growth of a plant and playing important role in growth of the crop. during the physio-chemical analysis of irrigated and non irrigated soil were shown that the physical characteristics pH, Water holding capacity, Texture, Color, Porosity percentage, Apparent density, Relative density, Humidity percentage it is clear from the table the maximum soil pH was recorded under non agricultural soil as compare to irrigated soil the pH of the soils under different land use systems ranged from 09.40 in non irrigated soil and 07.60 irrigated soil, soil pH was having slightly alkaline pH range (7.0-7.5). The water holding capacity also shows that higher percentage in non irrigated soil (76.37 %) as compare to irrigated soil (69.44 %), light clay texture in irrigated soil and sandy non-irrigated soil. Soil colour of irrigated shows red and light red in non-irrigated. Porosity percentage of non irrigated soil

(9.89%) is also shows more as like non irrigated (7.44 %). The apparentdensity was shown morein the irrigated soil(0.96 Gram/CC) as compare to the non irrigated soil (00.87 Gram/CC). The relative density ranges more in irrigated in soil (01.40 Gram/Cc). The humidity percentage ranges more in non irrigated soil (05.49 %) as compare to the irrigated soil (03.88 %).

The chemical analysis of irrigated and non-irrigated soil of Jalna locality during the study 8 parameters for chemical analysis viz. Salinity of soil, Organic carbon, Phosphorous, Potash,Lime, Sodium, Calcium and Magnesium. In the comparative analysis of irrigated and non irrigated soil the salinity of soil were shows more in irrigated soil (0.61) as compare to the non irrigated soil (0.55) the organic carbon is also more shown in the irrigated soil (0.80%) as 0.72 % were seen in the non irrigated soil, Phosphorous were seen more in irrigated soil (23.47Kg/Hector)as compare to the non irrigated soil (14.03Kg/Hector). it was interesting that potash percentage were observed more in non irrigated soil (95.27Kg/Hector) but in irrigated soil it was seen (31.90Kg/Hector) as like a potash lime, calcium, magnesium also more in non irrigated soil Potash (95.27) Lime (11.00%) Calcium (15.91%) Magnesium (15.66m.l.e.).

Photo Plate 1. Isolation of soil mycobiota of Jalna locality

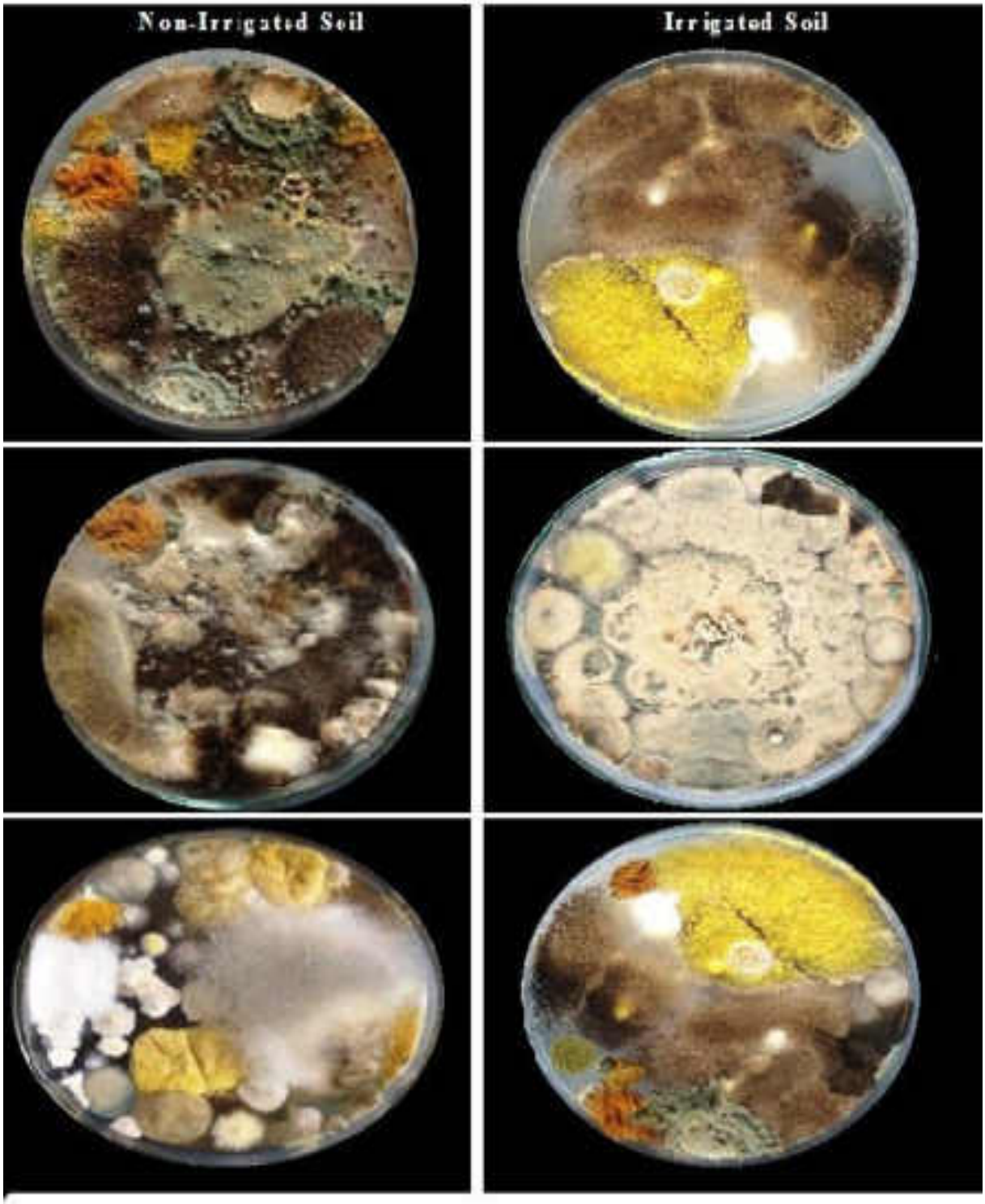

Table No. 3. Seasonal variation in Fungal Occurrence at Jalna locality

Sr. No	Name of Fungi	Irrigated Soil			Non Irrigated Soil		
		Rainy	Winter	Summer	Rainy	Winter	Summer
1	*Absidia sp.*	-	-	-	+++	+	-
2	*Alternaria alternate*	++	+	+	-	+	-
3	*Alternaria macrospora*	++	+	+	-	-	-
4	*Alternaria solani*	+++	++	+	-	+	-
5	*Aspergillus japonicas*	-	+	-	++	-	++
6	*Aspergillus flavus*	+	-	+	+++	+++	++
7	*Aspergillus niger*	-	-	+++	-	+++	+++
8	*Aspergillus terreus*	-	-	-	+	++	+++
9	*Beauveriabassiana*	-	-	-	+++	+	+
10	*Cladosporium gleosporidis*	-	-	+++	-	++	+++
11	*Colletotrichum falcatum*	-	+++	-	-	-	-
12	*Curvularia lunata*	++	+++	+	-	+	-
13	*Drechslera sp.*	-	-	-	++	-	+++
14	*Fusarium dimerium*	+++	+++	+	-	+	-
15	*Fusarium oxysporum*	++	++	+	-	-	-
16	*Fusarium sp.*	-	-	-	-	+	+
17	*Helminthosporium turcicum*	+	+	-	-	+	-
18	*Macrophominaphaseolina*	-	-	+++	-	+	++
19	*Mucor sp.*	-	-	-	+	+++	-
20	*Masoniella sp.*	-	-	-	+++	+	+
21	*Penicillium chrysogenum*	-	+	-	-	+++	+
22	*Penicillium citranum*	-	+	+++	+	++	++
23	*Penicillium sp*	+	+	+	-	-	+
24	*Rhizoctonia solani*	++	+	+	-	+	+++
25	*Rhizopus oryzae*	-	+	-	+	+++	+
26	*Rhizopus Stolonifer*	-	+	-	+	+	-
27	*Sclerotiumrolfsii*	++	++	+	-	-	+

28	*Sterile mycelia (white)*	-	-	-	+++	+	-
29	*Trichodermaviride*	+	-	-	+	+	+++
30	*Trichoderma sp.*	-	+	-	+	-	-

Study of the microbial occurrenceatdifferent seasons ofJalna locality in irrigated and non-irrigated soil results shows the variation of mycoflora were observed soils under different land use systems range as well as seasonal variations. Total 30 fungal species were dominantly found in all seasons at Jalna locality. The fungal occurrence was depleted by the season. The study was conducted in three different seasons.

The study of irrigated soil fungal mycoflora showedlesser number of fungal occurrencethan non-irrigated soil during the seasonal variation.In a rainy season 12 species were seen among the 12 species *viz. Alternaria alternata, Alternaria macrospora, Alternaria solani and Fusarium dimerium*were shows the high occurrence, in winterseason 17 species like *Fusarium dimerium, Curvularia lunata, Colletotrichum falcatum*were shows the high occurrence among the 17 species and in summer season (14 species)*viz. Aspergillus niger, Cladosporium gleosporedis, Macrophomina, Penicillium citranum* were shows high occurrence among the 14 species.

Non-irrigated soil mycoflora shows dominant occurrence of fungal species as compare to irrigated soil. In non-irrigated soil 19 Species*Absidasp.Aspergillusflavus*, *Beauveriabassiana* and *Masoniella spp.* and Sterile mycelia (White) were high in occurrencein rainy season, 21 species *Aspergillus flavus, Aspergillus niger, Penicillium chrysogenum, Mucor spp. Rhizopus oryzae* were high in occurrencein winter season and 17 species like *Aspergillus niger, Aspergillus terrus, Cladosporium gleosporidis*and*Drechleria spp. Rhizoctonia solani*and*Trichodermaviride* having the highest occurrence.

Soil mycobiota of Jalna locality having the 30 isolate among that 08 fungal species shows the complete absence in the irrigated soil. Fungi like*Absida* spp., *Aspergillusterreus*, *Beauveriabassiana*, *Drechleria sp., Fusarium sp., Mucor sp., Masoniella sp., Sterile mycelia* as compare to the non-irrigated soil. The three fungal species like *Alternaria macrospora, Colletotrichum falctum and Fusarium oxysporum* were complete absent in the non-irrigated soil. The study of irrigated soil fungal occurrence is lesser as compare to the non-irrigated soil but at Jalna locality the abundance pf pathogenic fungi were more in number of as compare to non irrigated soil.

Discussion

During the study of fungal diversity and physio-chemical analysis of soil at Jalna locality it was found that physical parameter like pH it was observed more in non-irrigated soil as compare to the irrigated soil. Soil can be naturally acid or alkaline, and this can be measured by testing their pH value.Having the correct pH is important for healthy plant growth. Being aware of the long-

term effects of different soil management practices on soil pH is also important. Research has demonstrated that some agricultural practices significantly alter soil pH.Alkaline soils may have problems with deficiencies of nutrients such as zinc, copper, boron and manganese. Soils with an extremely alkaline pH (greater than 9) are likely to have high levels of sodium.

Microbial occurrence at different seasons of Jalna locality in irrigated and non-irrigated soil results shows the variation in mycoflora.Soil under different land use systems ranges seasonal variations in mycoflora. Fungal load found more in non-irrigated soil. A similar relationship at a similar scale had also been found by other studies(Terrat et al. 2017, Xiaet al. 2016, Hossain & Sugiyama, 2011). Agricultural management such as fertilization, irrigation, and tillage are important factors that affect the biodiversity and function of terrestrial ecosystems and can also lead to soil ecosystem degradation (Sala. et al. 2000, Navarro-Noya. et al. 2013). Previous studies show that land management practices such as chemical fertilization have a significant effect on bacterial community structure(Hartmann et al. 2015, Meriles. et al. 2009). Effects of soil parameters, including pH, electrical conductivity (EC), carbon and nitrogen contents, salinity, and texture, on microbial community composition have been reported in many studies (Fierer & Jackson 2006. Zhang, X.-Y. et al. 2007).

Conclusion

Soil fungal diversity at different seasons in irrigated and non-irrigated soil shows the variation. in mycoflora more fungal load found in non-irrigated soil as compare to irrigated soil it shows that agricultural managing such as fertilization, irrigation, and tillage are vital factors influence the biodiversity and function of terrestrial ecosystems and can also lead to soil ecosystem degradation. It is need for better management of crop and cropping system.

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