# SOIL MYCOFLORA OF SOME KHARIF (MONSOON) CROPS OF NANDED DISTRICTS

Shekh N. F., [1]Mohrir M. N. and B. D. Gachande

Post Graduate Department of Botany, N. E. S. Science College, Nanded-431605 (MS)
[1]Department of Botany, Pratisthan Mahavidyalaya, Paithan Dist. Aurangabad. (MS)

**ABSTRACT**

Soil is an important panorama characterized by different physicochemical parameters that holds enormous number of microorganisms. Present study deals the rhizosphere & non- rhizosphere soil mycoflora of some kharif crops of Nanded districts. Which mainly include *Gossypium* sp, *Sorghum vulgarae* Pers, *Vigna mungo* L., *Cajanus cajan* (L.) Millsp. The soil mycoflora was studied by using serial dilution and soil plate method.

The total number of fungal species from all soil samples of Nanded district include 30 species. The number of species are vary from crop to crop. The total number of species from rhizosphere & non-rhizosphere soil mycoflora of plant namely includes *Gossypium* 20, *Sorghum vulgarae* Pers 21, *Vigna mungo* L. 17, and *Cajanus cajan* L. Millsp.24. The total numbers of species were higher in rhizosphere than non-rhizosphere soil. The most dominant fungal species were *Aspergillus*, *Penicillium*, *Trichoderma*, *Rhizopus* and *Cladosporium*.

**Key words**: Soil mycoflora, rhizosphere & non- rhizosphere, kharif season.

## INTRODUCTION

The present investigation deals with the study of rhizosphere and non-rhizosphere mycoflora associated with some kharif crops cultivated in different regions of Nanded district. The main kharif crops selected for present study includes *Gossypium* sp, *Sorghum vulgarae* Pers, *Vigna mungo* L., *Cajanus cajan* (L.) Millsp. In the past several workers suggested that there is diversity in mycoflora of same soil when it is used for cultivation of different crops. This is because soil is an important panorama of interactions between microbes and plants. The different coworkers stated that response of rhizosphere and non-rhizosphere mycoflora to plants. Rhizosphere is a zone of metabolically active which contains a higher microbial community. This is because the presence of the some organic compound in the form of exudates (Mishra, 1967; Rangaswami Bagyaraj, 1998). The number of fungal population was more at the flowering stage of crop. (Ali Farzana, 1977; Jalander and Gachande, 2011).

Besides this soil type, macro and micronutrients may also adversely affect the mycoflora (Rama Rao, 1957). The plant type, age and soil type have a significant influence the nature and number of mycoflora. (Wahegaonkar 2009; Namdas and Bhosale, 2009; Abdul-Hafez, 1982). Most rhizosphere fungi are highly dependent on association with plants that are regulated by root exudates (Bais, 2004). This study deals the Rhizosphere and non rhizosphere mycoflora of some kharif crops of Nanded district. The changes in soil mycoflora might be due to the nutritional status of soil. The soil pH, moisture content, Organic carbon, total nitrogen concentration and available K had positive correlations with fungal population (Bhattacharya and Jha, 2011). In addition to this topography influence the diversity in fungi (Tsai *et al.,* 2007). The macro nutrients such as N, P, and K content were rich in after the raining season and organic content of natural soil was also increased (Saravanakumar and Kaviyarasan, 2010).

## MATERIALS AND METHODS

### Collection of soil samples

Soil samples were collected from each crop by digging out soil around the rhizosphere area upto 20 cm from plant. To a dimension of 15 cm height and 7 cm diameter. The five samples were collected from each field and mixed together into a single. Similar sampling was taken from non rhizosphere zone (25 -40 cm away from the plant).These soil samples were collected in sterile polythene bags, brought to the laboratory and composite sample was prepared.

**Sampling schedule**

Soil sample was collected in each sampling station for a period July- October 2010 appropriate stage i. e flowering stage.

**Soil analysis**

The chemical analysis of samples made for different parameters like Moisture content, water holding capacity, pH, EC, nitrogen, Phosphorus & Potassium etc.

**Isolation of soil mycoflora**

The soil mycoflora were isolated by using mainly serial dilution method described by Waksman, 1957 and soil plate method by Warcup, 1950.

In serial dilution method add the 10 gm of sample in 90 ml of sterile distilled water to make $10^{-1}$ dilution and from this dilution take 10 ml suspension and add to another flask containing 90 ml sterile distilled water it will be $10^{-3}$ similarly make such type of dilution upto $10^{-5}$.

Then from each dilution i.e $10^{-2}$ to $10^{-5}$ take 1 ml suspension and transfer to sterilized petriplates. Make three replicates for each dilution. Then transfer the cooled sterilized medium (45˚c) to each petriplate and mixed inoculums by gentle rotation. Then allow the media to solidify and incubate the all plate in an inverted position at 25˚c for 2-7 days.

In soil plate method add 0.005-0.15 g of soil in 5 sterile petriplates with help of sterilized cooled loop or transfer needle. Add 15-20 ml of melted cooled medium. For isolation of mycoflora we use different medium such as Potato dextrose agar, Martins rose Bengal streptomycin agar (MRSBA) and Czapek- dox agar each containing streptomycin sulphate.

**Observation**

The colonies growing on different media with different morphology were counted separately. A portion of growing edge of the colony was placed up with the help of needles and mounted on a clean glass slide with lactophenol and cotton blue stain. Then the slide was observed under a compound microscope. By using colony colour and morphology the isolated fungi were identified up to species level by using (Mukadam DS. 1997, Barnett and Bary, 1998, Gilman, 2001).

**RESULTS AND DISCUSSION**

It is clear from the results that, the total number of fungal species from all soil samples include 30 species. The numbers of species vary from crop to crop. The total number of species from rhizosphere & non-rhizosphere soil mycoflora of plant namely includes *Gossypium* 20, *Sorghum vulgarae* Pers 21, *Vigna mungo* L. 17, and *Cajanus cajan* L. Millsp. 24. The total numbers of species were higher in rhizosphere than non-rhizosphere soil.

**Cropwise composition of species**

The Rhizosphere and non-rhizosphere samples of each plant vary in their species composition. In the *Gossypium* total no. of species 20 & 9, in *S. vulgarae* 21 & 9, *V. mungo* 17 &7 & *C. cajan* 24 & 7 were present.

**Dominant mycoflora**

The most dominant species were *Aspergillus niger*, *A.flavus*, *A. fumigates* followed by, *Trichoderma viride*, *Alternarai solani, Curvularia lunata* and *Mucor* sp. etc. The changes in mycoflora may be due to the nutritional status of soil and specificity of plant species.

The number of fungi was higher in rhizosphere soil of all the four crops than non-rhizosphere. That may be due to root exudations, decomposition of moribund root hairs, epidermal cells and cortex accumulation of cell materials (Rovira 1956, Vancura and Hovodik 1965).

The changes in mycoflora may be due to the nutritional status of soil and specificity of plant species. Nutrient availability and climatic conditions (temperature, humidity and rainfall) influenced the occurrence and colonization pattern of fungi (Vibha and Asha Sinha 2007). The fungal population was positively correlated with total organic carbon, moisture content and total soil respiration but negatively correlated with soil temperature (Panda *et al*., 2009).

From the result it is found that Diversity in soil mycoflora of Nanded due to the difference in Nutrient and climatic condition of area.

**Acknowledgement**

The authors are thanking to University Grants Commission, New Delhi for financial assistance Under Major Research Project.

**Table 1: Soil Mycoflora of Some Kharif (Mansoon) Crops of Nanded Districts.**

| Sr No. | Name of s fungal species | Cotton | | Sorghum | | Black gram | | Cajanus | |
|---|---|---|---|---|---|---|---|---|---|
| | | R | NR | R | NR | R | NR | R | NR |
| 1 | *Aspergillus flavus* | + | + | + | + | + | + | + | + |
| 2 | *A.niger* | + | + | + | + | + | + | + | + |
| 3 | *A.fumigatus* | + | + | + | - | + | + | + | - |
| 4 | *A.nidulans* | + | + | - | - | + | - | - | + |
| 5 | *A.terrus* | + | - | + | + | + | - | - | - |
| 6 | *A.parasiticus* | + | - | + | + | - | - | + | - |
| 7 | *Pennicillum citrinum* | + | - | - | - | - | - | + | - |
| 8 | *P.chrysogennum* | + | - | + | - | + | - | + | - |
| 9 | *P.islandicum* | - | - | + | - | - | - | + | - |
| 10 | *Fusarium oxysporum* | - | - | + | - | + | + | + | + |
| 11 | *Fusarium sp.* | + | - | - | - | + | - | + | - |
| 12 | *Cladosporium herbarum* | + | + | + | - | + | - | + | - |
| 13 | *C.cladosporides* | + | - | + | + | - | - | + | + |
| 14 | *Rhizoctonia solani* | - | - | - | - | + | - | + | - |
| 1-5 | *Curvularia lunata* | + | - | + | - | + | - | + | - |
| 16 | *Curvularia sp.* | + | - | - | - | - | - | + | - |
| 17 | *Drechslera tetramera* | - | - | + | - | + | - | + | - |
| 18 | *Alternaria solani* | + | + | + | - | + | - | + | - |
| 19 | *A.alternata* | - | - | + | - | - | - | + | - |
| 20 | *Rhizopus stolonifer* | - | - | + | + | + | + | + | + |
| 21 | *Mucor sp.* | + | - | + | + | + | + | + | + |
| 22 | *Mycelia sterilia (brown)* | + | + | + | - | + | - | + | - |
| 23 | *Mycelia sterilia (black)* | + | - | - | - | - | + | + | - |
| 24 | *Trichoderma viride* | + | + | + | + | + | - | + | - |
| 25 | *Paecilomyces varioti* | - | - | - | - | - | - | + | - |
| 26 | *Pythium middlestoni* | - | - | + | - | - | - | - | - |
| 27 | *Fusarium poe* | - | - | + | - | - | - | - | - |
| 28 | *Pennicillum italicum* | - | - | + | + | - | - | - | - |
| 29 | *P. cyclopium* | + | - | - | - | - | - | + | - |
| 30 | *Cephalosporium sp.* | + | + | - | - | - | - | - | - |
| | **Total** | **20** | **09** | **21** | **09** | **17** | **07** | **24** | **07** |

**Table 2: Chemical analysis of soil of some crop plants of Nanded Season:-**Kharif (Mansoon) Year 2010

| Sr No. | Name of Crop | Moisture content | Water holding capacity | PH | EC Milisimen/cm | Nitrogen Kg/h | Phosphorus Kg/h | Potassium Kg/h |
|---|---|---|---|---|---|---|---|---|
| 1 | **Cotton** | 15.66 | 62.56 | 8.08 | 0.331 | 0.44 | 45 | 444 |
| 2 | **Sorghum** | 18.23 | 64.65 | 7.95 | 0.326 | 0.31 | 39 | 376 |
| 3 | **Blackgram** | 16.33 | 66.14 | 8.08 | 0.409 | 0.18 | 12 | 766 |
| 4 | **Cajanus** | 19.36 | 63.28 | 7.91 | 0.325 | 0.31 | 53 | 382 |

**Table 3: Chemical analysis of soil of some crop plants of Nanded Season:-**Kharif (Mansoon) **Year:-** 2011

| Sr No. | Name of Crop | Moisture content % | Water holding capacity | PH | EC Milisimen/cm | Nitrogen Kg/h | Phosphorus Kg/h | Potassium Kg/h |
|---|---|---|---|---|---|---|---|---|
| 1 | **Cotton** | 16.66 | 60.15 | 7.94 | 0.327 | 0.64 | 32 | 376 |
| 2 | **Sorghum** | 19.23 | 62.00 | 8.07 | 0.401 | 0.38 | 11 | 349 |
| 3 | **Blackgram** | 20.33 | 63.42 | 7.93 | 0.323 | 0.64 | 55 | 511 |
| 4 | **Cajanus** | 18.36 | 65.23 | 7.63 | 0.368 | 0.40 | 39 | 242 |

**LITERATURE CITED**

**Abdul-Hafez SII, 1982.** Rhizosphere and rhizoplane fungi of *Triticum vulgare* cultivated in Saudi Arabia. *Mycopathologia,* **78**: 79-86.

**Ali Farzana**, **1977**. Study of rhizosphere and rhizoplane mycoflora of soybean. Ph.D thesis, University of Karachi, Karachi.

**Bais HP, 2004.** How plants communicate using the underground information superhighway? *Trends in plant science.* **9**: 26-32.

**Barnett HL and Bary, 1998.** Illustrated Genera of Imperfect Fungi. IV Edn.APS Press St. Paul, Minnesota.

**Gilman JC.** A manual of soil fungi, 2nd. Ed. Iowa, The Iowa state college Press, P.450.

**Jalander V and Gachande BD, 2011.** Rhizosphere and non Rhizosphere mycoflora of different varities of Pigeon pea. *Geobios.* **38**(1): 2011.

**Mishra RR, 1967.** Nature of Rhizosphere fungal flora of certain plants. *Plant and soil XXVII*, **2**:162-166.

**Mukadam DS, 1997.** *The Illustrated kingdom of fungi*, Akshar Ganga Prakashan, Aurangabad (MS) India.

**Namdas D, Bhasale A and Khillare C**, **2009**. Rhizosphere and soil mycoflora of Sorghum and Tomato growing at Ahemadnagar. *Bioinfolet*. **6**(3): 244-245.

**Panda T, Panda B, Prasad BK and Mishra N, 2009.** Influence of soil Environment and surface vegetation on soil microflora in a coastal sandy belt of Orissa, India. *J. Hum Ecol.* **27**(1): 69-73.

**Rama RP, 1970.** Seasonal variation & distribution of microfungi in some soils of Andhra Pradesh (India). *Mycopathologia*. **3**(4):277-298.

**Rangaswami G and Bagyaraj DJ, 1998.** *Agraicultural Microbiology.* 2 nd edition*.* Prince Hall of India Pvt. Ltd. New Delhi.

**Rovira AD, 1956.** Plant root excretion in relation to rhizosphere effect.I.The nature of root exudates from oats and peas. *Ibid* **7**:178-194.

**Saravankumar K and Kaviyarasan, 2010.** Seasonal distribution of soil fungi and chemical properties of montane wet temperate forest types of Tamilnadu. *African Jrl.of plant science.* **4**(6): 190-196.

**Vancura V and Hovodik A, 1965.** Root exudates of plants II composition of some vegetables.
*Plant and soil* **22**:21-32.

**Vibha and Asha S, 2007.** Variation of soil mycoflora in decomposition of rice stubble from rice-wheat cropping system. *Korean society of Mycology.* **35**(4): 191-195.

**Wahegaonkar N, Shinde S, Salunkhe S and Palsingankar P, 2009.** Diversity of rhizosphere and rhizoplane mycoflora of *Cajanus cajan* L. *Bioinfolet*. **6**(3), 186-192.

**Waksman SA, 1992.** A method for counting the numbers of fungi in the soil, *J.Bo*. **7**:339-341.

**Warcup JH, 1950.** The soil plate method for isolation of fungi from Soil. *Nature London,* pp 117-118.