RESEARCH ARTICLE

Mycofloral biodiversity of Tubercolariaceae in rice field soil of Gondia District, India

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ABSTRACT

Soil is one of the most diverse habitats on earth and contains the most diverse assemblages of living organisms. Biodiversity refers to all organisms living in the soil. Soil fungi are microscopic plant-like cells that grow in long threadlike structures called hyphae. The mycelium (a mass of hyphae) absorbs nutrients from the roots; it has colonized on surface organic matter or on the soil. Fungal population is maximum close to the soil surface and decreased with soil depth. The factors inorganic matter and aeration believed to limit the fungal growth. Cultivated soils of the same type contain many organisms in common, but cultivation may change the proportion of different species of soil fungi also. Fungi occur in soil either in mycelia stage or reproductive stage. Soil of Gondia district, is fertile; it is suitable for rice crop. The climate of Gondia district is tropical hot and favorable for growth of fungi. Altogether 11 species of Tubercolariaceae belonging to 02 genera were recorded throughout the study from rice field soil during 2005-06.

Key words: Biodiversity, Tubercolariaceae, soil.

INTRODUCTION

Biological activity in soils is largely concentrated in the top soil. Depending on the size and class organisms may be divided into macro, meso and micro fauna. Beyond that, bacteria, fungi, protozoa and algae are grouped as microorganisms in soil biodiversity. Soil fungi are microscopic plant-like cells that growing long threadlike structures or hyphae that make a mass called mycelium. The mycelium absorbs nutrients from the roots; it has colonized on surface organic matter or on the soil. It produces special hyphae that create the reproductive spores. The soil fungi colonize on the dead or the decaying plant residues in soil by their mycelia growth. The bacteria come on them as secondary decomposers. Some soil fungi are true soil inhabitants, while others are merely exotic or temporary soil invaders, (Waksman, 1944). The effect of a particular crop on a soil clearly exposes the changes in micro flora, especially on those microbes, which causes disease. The fungal population is constantly changing not only in numbers but also in respect to the dominant species. The fungal population is also affect by climate change (Suryawanshi & Rane, 2012). In their ability to decompose organic residues, fungus are the most versatile and the persistent group to decompose cellulose, starch, gums, lignin as well as the more easily affected proteins, and sugars. The population of Tuberculaceae group is significant in this study.

Gondia is situated at $20^0.45^1$to $21^0.30^1$north latitude and $80^0$to $80^0.30^1$ east longitudes. It is the eastern part of Maharaashtra known as Vidarbha. Gondia is "Rice city" and famous for global export quality rice grain marketing. Total 169 rice industries have been established for the quality production of polished rice, boiled rice, murmura, poha and for the extraction of rice bran oil in Gondia district. Many bricks companies are totally depend on rice bran fuel in this area. One project is also carrying the power production by using rice husk.

MATERIAL AND METHODS

Collection of samples: Soil samples were randomly taken after scraping away one inch of surface soil, from depth of 10-15 cm with a surface sterilized trowel per month during timing of the crop season from different area in polythene bags. The collected soil samples were mixed and transported to the laboratory for assessment of soil mycoflora. Under aseptic conditions the stones and organic debris were removed and spread on the sterile tray for air-drying and after drying it was gently crushed. The soil obtained after sieving by 2 mm sieve was ready for the plating.

Isolation: Soil fungi were isolated by serial dilution plate method Sieved dry soil (10 gm) was suspended for 20-30 minutes in 250 ml Erlenmeyer flask with 90 ml sterile water to make a suspension. Serial dilutions 10^{-2} to 10^{-6} was made by withdrawing 1ml into additional dilution blanks having 9 ml sterile water in flasks respectively. Finally, 1 ml aliquot of the desired dilution was aseptically pipette out into sterile petri dished and 12-15 ml of on appropriate cooled, melted agar medium was added to each petri dish just above the solidifying temperature. The dishes were gently swirled in clockwise and anticlockwise direction to disperse the diluted soil suspension on the agar medium. After solidification of the medium the petri dished were incubated in an inverted position for 3-7 day's at room temperature (25 ± 2°C) till the colonies appear. To get uniform results three replicate plates were prepared for each sample.

RESULT AND DISCUSSION

The study of soil was undertaken on account of the importance of rice as an important staple food crop of the world. Food webs are ultimately based on microorganisms, including fungi, reflecting the course of evolution. Species diversity tends to be great amongst smaller organism (May, 1988). In fungi it might be thought reasonable to assume that all wood decay or litter-rotting species in site are not necessary for that ecological function to occur effectively. Such 'bootstrapping' involving fungi may be especially important in the maintenance of soils biodiversity (Perry *et al*., 1989).

However, the information is still insufficient to understand the complete biology of these organisms along soil of rice field for this region (Rane & Suryawanshi, 2012). Rice crops were cultivated in the field condition twice during a year (Kharif and rabbi) and mycofloral biodiversity in soil was studied.

Fungal species were assigned to their respective groups like Phycomycetes, Ascomycetes and Deuteromycetes and population of these groups at various period of one-month interval as samples were taken for study is given (Tables-1,2 & 3 and fig-1, & 2).

Table 1: Seasonal variation in taxonomic groups (species/sample) of soil mycoflora.

Cropping seasons	Date of Sampling	Phycomycetes	Ascomycetes	Deuteromycetes
Cropping (Kharif)	15th June 2005	02	01	02
	15th July 2005	01	02	03
	15th Aug 2005	01	02	04
	15th Sept 2005	01	02	03
	15th Oct 2005	03	01	05
	15th Nov 2005	02	01	01
Cropping (Rabbi)	15th Dec 2005	02	01	01
	15th Jan 2006	03	01	02
	15th Feb 2006	01	01	05
	15th Mar 2006	02	00	04
	15th April 2006	01	01	03
	15th May 2006	01	00	01

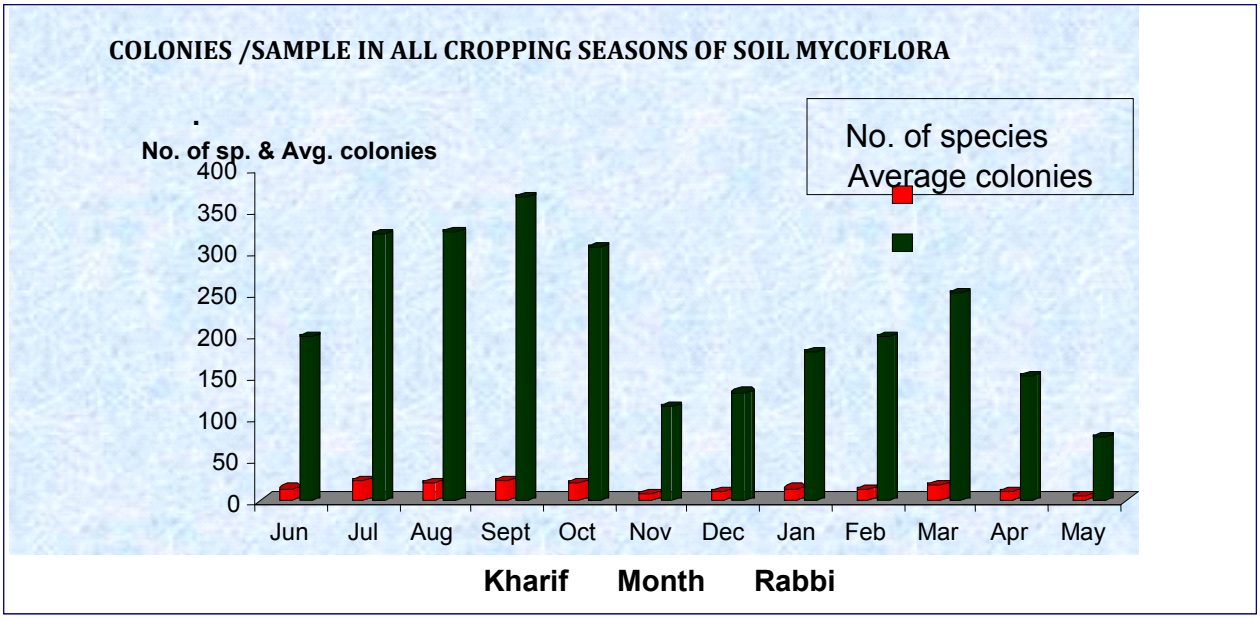


Fig. 1: seasonal variation in species and average

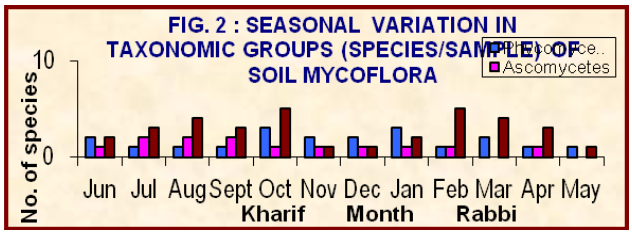
Table 2: Taxonomic account of Dueteromycetes isolated from soil of rice field.

Classes, order and family	Genera	Species
DEUTEROMYCETES:		
Sphaeropsidales : Sphaeropidaceae	01	02
Melanconiales : Melanconiaceae	02	02
Monilales		
1. Moniliaceae	05	20
2. Dematiaceae	09	17
3. **Tuberculariaceae**	**02**	**11**
Mycelia sterilia	03	03

Table 3: Biodiversity of family Tuberculariaceae species isolated from soil of rice field.

Sr.No.	Name of Organisms	Kharif	Rabbi
1	*Fusarium chlamydosporum* Wollenw. & Reinking	–	+
2	*Fusarium oxysporum* Schlecht	+	–
3	*Fusarium semitectum* Berk & Ravenel.	+	+
4	*Fusarium poae* (Peck) Wollenw.	+	+
5	*Fusarium moniliforme* J. Sheldon.	+	+
6	*Fusarium sambucinum* Fuckel.	+	–
7	*Fusarium dimerum* Penzig.	+	–
8	*Fusarium avenacea* (Fr,) Sacc.	+	–
9	*Fasurium udum* Butler.	+	–
10	*Fusarium* sp.	+	+
11	*Myrothecium roridum* Tode.	–	+

Population of Tuberculariaceae group of Deuteromycetes was also fonnd along with Phycomycetes and Ascomycetes during both cropping seasons. They showed highest peak in kharif cropping season as compared to rabbi cropping season (fig-1). Deuteromycetes were dominated in soil before the harvest time when crop shows full growth as compared to early stage of growth in all the years. Altogether 47 species of fungi belonging to 22 genera were recorded from the soil of rice field. Out of 47



species 08 were Phycomycetes, 03 were Ascomycetes and 33 were Deuteromycetes and 03 of mycelia sterilia. Total 11 numbers of species from Tuberculariaceae were recorded as mycofloral biodiversity. *Fasurium udum* Butler causes wilt of pigeonpea (Vinodkumar, *et al.,* 2007). *Fusarium moniliforme* J. Sheldon causes stalk rot of maize (Thory*, et al.,* 2012). *Myrothecium roridum* Tode causes leaf spot of soyabean (Talukdar and Dantre, 2013). *Fusarium moniliforme* J. Sheldon was recorded as disease casual organism of foot rot of rice and *Fusarium oxysporum* Schlecht, *Fusarium poae* (Peck) Wollenw shows the toxic effect on seedling of rice during this study. These above species were isolated along with others in two cropping seasons of a year.

CONCLUSION

The present study revealed that fungal population varied according to the cropping seasons exhibiting relation with rainfall, humidity and temperature. Fungal population was increased considerably in response to rainfall and higher humidity. Higher temperature and dry atmosphere did not favours fungal proliferation. Maximum count of fungi remain prevalent in kharif cropping season while it was reported minimum at the seedling and harvesting stage of rice. Higher peak of population was confined in middle age of the cropping. Altogether 11 species of Tuberculariaceae fall under 02 genera were recorded throughout a survey from rice field soil. Population of Deuteromycetous fungi was reported higher over others.

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