



STUDIES ON FUNGAL DIVERSITY ASSOCIATED WITH METHI, PALAK AND CABBAGE

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Abstract

During the present studies the common vegetables of the study region such as Methi (*Trigonella foenum-graecum*), Palak (*Spinacia oleracea*) and Cabbage (*Brassica oleracea* var. *capitata*), were collected directly from the fields and from the local vegetable markets. They were screened for the incidence of fungal diversity associated with them by moist blotter plate method. The fungi like *Alternaria tenuis*, *Aspergillus flavus*, *A. niger*, *A. nidulans*, *A. fumigatus*, *Curvularia lunata*, *Drechslera tetramera*, *Fusarium oxysporum*, *Fusarium moniliforme*, *Penicillium* spp., *Chaetomium globosum*, *Collectotrichum fulcatum*, *Macophormina phaseolina*, *Rhizoctonia solani* and *Rhizopus stolonifer* were found to be associated with the test vegetables and their seeds. The fungi like *Alternaria tenuis*, *Aspergillus flavus*, *A. niger*, *Curvularia lunata*, *Drechslera tetramera*, *Fusarium moniliforme* and *Rhizopus stolonifer* were found to be common and dominant on the test vegetables.



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INTRODUCTION

The vegetables are important sources of essential vitamins and minerals needed for human system. They have roughage in sufficient quantities, low protein and fat contents, but carbohydrates, vitamin A, C, E and minerals like P, Ca, Fe, Mg and K are in plenty and they rank next to cereals as source of carbohydrates (Singh et al., 2005). Many vegetables of different category like root vegetables, stem vegetables, leafy vegetables fruit vegetables and cole vegetables are cultivated in the Marathwada region of the Maharashtra State. In the Maharashtra particularly in the Nanded district of the Marathwada region the vegetables like Methi (*Trigonella foenum-graecum*), Palak (*Spinacia oleracea*), Cabbage (*Brassica oleracea* var. *capitata*) are commonly cultivated. It is evident from the literature that the vegetables and their seeds carry large number of fungi both in field and during storage. Most of the fungi cause decay and rots (Kunte and Yawalkar, 1991). The vegetables associated with the fungi found to be useless. The vegetable seeds associated with the fungi found to be unable to germinate. The biodeteriorated vegetables and their seeds show many changes in their

contents (Verma *et al.*, 1991). The biodeterioration of vegetables and their seeds directly related with the toxins and enzymes production by the associated fungi. It is also clear from the literature that several workers have studied extensively mycoflora associated with the seeds of different crops. However detail studies on mycoflora associated with the vegetables and their seeds, their role in vegetable bio-deterioration, seed germination, seedling emergence and their biological control are meager in the Marathwada region. Considering these facts the present research work has been selected.

MATERIALES AND METHODS

During the present studies the common vegetables of the study region such as Methi (*Trigonella foenum-graecum*), Palak (*Spinacia oleracea*) and Cabbage (*Brassica oleracea var. capitata*), were collected directly from the fields and from the local vegetable markets. They were screened for the incidence of mycoflora associated with them by moist blotter plate method as described by International Seed Testing Association (ISTA, 1966), De Tempe (1970), Neergaard (1973) and Agarwal (1978).

Moist blotter plate method:

A pair of white blotter papers of 8.5 cm. diameter was jointly soaked in sterile distilled water, placed in presterilized borosil petriplates of 10 cm diameter. The test vegetable samples were placed separately at equal distance on the moist blotter plates. The plates were incubated for seven days at room temperature. After incubation, the vegetable samples were examined under stereoscopic microscope for the preliminary determination of the fungal species associated with them. Identification and further confirmation of the associated fungal species was made by preparing slides of the fungal growth and observing under compound microscope. The common and predominant fungi associated with the test vegetables were maintained on PDA slants in the form of pure culture for further studies. The fungi associated with the test vegetables such as Methi (*Trigonella foenum-graecum*), Palak (*Spinacia oleracea*), Cabbage (*Brassica oleracea var. capitata*), were preliminary identified on the basis of sporulation characters like asexual or sexual spores or fruiting structures. Detailed examination of fungal characters was done under compound microscope and their identification was confirmed with the help of latest manuals (Subramanian, 1971; Neergaard and Mathur, 1980; Jha, 1993 and Mukadam, 1997). Pure culture of the identified fungi were prepared and maintained on PDA (Potato Dextrose Agar) slants.

RESULTS AND DISCUSSION

It is clear from the result presented in table-1 that total ten fungi were found to be associated with the leaves and seeds of methi. The fungi like *Chaetomium globosum* and *Cladosporium*

sp. were found to be showed their incidence only on the seeds of methi and not on the leaves. Remaining all the fungi were found to be showed their incidence on both leaves and seeds of methi.

It is evident from the results presented in table-2 that total thirteen fungi were found to be showed their association with the leaves and seed of palak. The fungi like *Alternaria tenuis*, *Aspergillus flavus*, *A. niger*, *Curvularia lunata*, *Drechslera tetramera* and *Rhizopus stolonifer* were found to be showed their asociation with both leaves and seeds of palak. Where as the fungi like *Aspergillus carbonarius*, *Cladosporium* sp., *Macrophomina phaseolina* and *Penicillium* sp., found to be showed their incidence only on the seeds of palak and the fungi like *Aspergillus fumigatus* and *Chaetomium globosum* only on the leaves of palak.

From the results presented in table-3 it is clear that total fifteen fungi were found to be showed their incidence on cabbage. Comparatively the cabbage seeds found to be showed association of more fungi than the leaves. The fungi like *Aspergillus nidulans*, *Cladosporium* sp., *Fusarium oxysporum* and *Penicillium* sp. were found to be showed their incidence only on the seeds and the fungi like *Aspergillus fumigatus*, *Chaetomium globosum* and *Macrophomina* only on the leaves of cabbage. Where as remaining eight fungi were found to be showed their association on both leaves and seeds of cabbage.

The fungi *Alternaria tenuis*, *Aspergillus flavus*, *Aspergillus niger*, *Curvularia lunata*, *Drechslera tetramera* and *Fusarium moniliforme* were found to be common and dominant on the test vegetables.

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TABLES

Table-1: Incidence of mycoflora associated with Methi (*Trigonella foenum- graecum*) by moist blotter plate method after ten days of incubation at room temperature

Sr. No.	Mycoflora	Incidence on Methi	
		Leaves	Seeds
1.	<i>Alternaria tenuis</i>	+	+
2.	<i>Aspergillus flavus</i>	+	+
3.	<i>Aspergillus niger</i>	+	+
4.	<i>Chaetomium globosom</i>	–	+
5.	<i>Cladosporium spp.</i>	–	+
6.	<i>Curvularia luntata</i>	+	+
7.	<i>Drechslera telramera</i>	+	+
8.	<i>Fusarium moniliforme</i>	+	+
9.	<i>Macrophomina phaseolina</i>	+	+
10.	<i>Rhizopus stolonifer</i>	+	+

Note: + = incidence of mycoflora; – = No incidence of mycoflora

Table-2: Incidence of mycoflora associated with Palak (*Spinacea oleracea*) by moist blotter plate method after ten days of incubation at room temperature

Sr. No.	Mycoflora	Incidence on Palak	
		Leaves	Seeds
1.	<i>Alternaria tenuis</i>	+	+
2.	<i>Aspergillus carbonarius</i>	–	+
3.	<i>Aspergillus flavus</i>	+	+
4.	<i>Aspergillus fumigatus</i>	+	–
5.	<i>Aspergillus niger</i>	+	+
6.	<i>Chaetomium globosome</i>	+	–
7.	<i>Cladosporium spp.</i>	–	+
8.	<i>Curvularia luntata</i>	+	+
9.	<i>Drechslera tetramera</i>	+	+
10.	<i>Fusarium moniliforme</i>	+	+
11.	<i>Macrophomina phaseolina</i>	–	+
12.	<i>Penicillium spp.</i>	–	+

13.	<i>Rhizopus stolonifer</i>	+	+
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Note: + = incidence of mycoflora; – = No incidence of mycoflora

Table-3: Incidence of mycoflora associated with Cabbage (*Brassica oleracea* var. capitata) by moist blotter plate method after ten days of incubation at room temperature

Sr. No.	Mycoflora	Incidence on Cabbage	
		Leaves	Seeds
1.	<i>Alternaria tenuis</i>	+	+
2.	<i>Aspergillus flavus</i>	+	+
3.	<i>Aspergillus fumigatus</i>	+	–
4.	<i>Aspergillus nidulans</i>	–	+
5.	<i>Aspergillus niger</i>	+	+
6.	<i>Chaetomium globosum</i>	+	–
7.	<i>Cladosporium</i> spp.	–	+
8.	<i>Colletotrichum fulcatum</i>	+	+
9.	<i>Curvularia luntata</i>	+	+
10.	<i>Drechslera tetramera</i>	+	+
11.	<i>Fusarium moniliforme</i>	+	+
12.	<i>Fusarium oxysporum</i>	–	+
13.	<i>Macrophomina phaseolina</i>	+	–
14.	<i>Penicillium</i> spp.	–	+
15.	<i>Rhizopus stolonifer</i>	+	+

Note: + = incidence of mycoflora; – = No incidence of mycoflora

PLATES



Infected Leaves of Methi



Infected Leaves of Palak



Infected Cabbage leaves and leaf buds

Plate-1: Fungal diversity on Methi, Palak and Cabbage leaves



Plate-2: Incidence of mycoflora on the seeds of Methi
(*Trigonella foenum-graecum* L.)

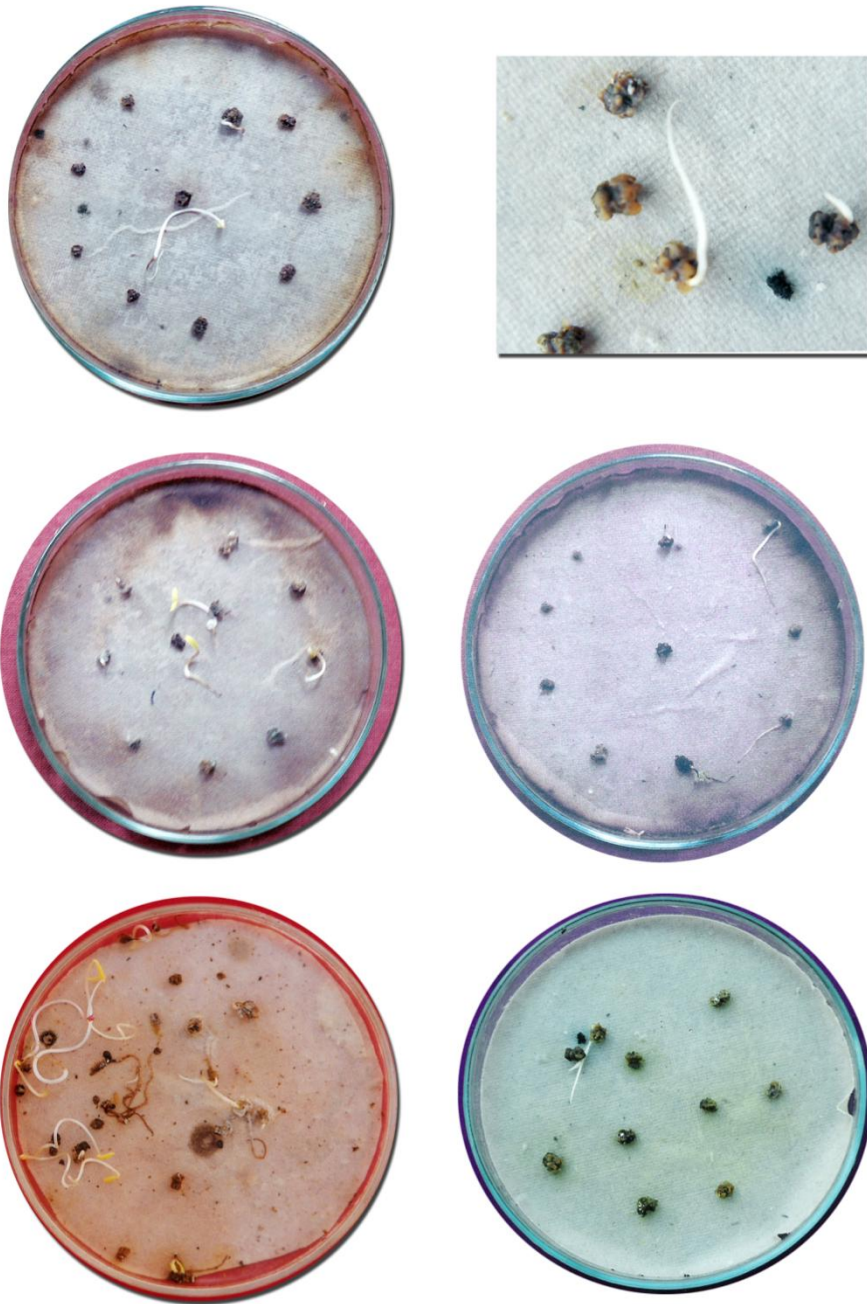


Plate-3: Incidence of mycoflora on the seeds of Spinach
(*Spinach oleracea* L.)