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The Qualitative Estimation of Fungi Distributed in the Fruit and Vegetable Market

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ABSTRACT

Fungal spores are approximately ten times more than pollen grains in air. Exposed petri plate method was used to obtain qualitative estimation respectively. Concentration of fungal spores in vegetable market environment was examined to collect the basic information required for further studies. Most of the fungal samples were collected and isolated from main vegetable market of district Hapur during January, 2022 by visual and sticky slide methods. Alternaria sp. was found most dominant and Phytophthora sp. was the least dominant fungus found during present study. The study also showed a common representation of many fungi in vegetable market and as well as their occurrence in the vegetable crop fields near the vegetable market.

KEYWORDS: *Alternaria sp., Qualitative estimation, Fungal spores, Petri plate, Phytophthora sp., Vegetable market.*

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INTRODUCTION

Air pollutants are divided into two major heads i.e. gaseous and particulate pollutants. Granular tiny matter can be a prime reason of respiratory allergies and infections of related to respiratory system. Allergic sensitization of the intra-thoracic air tract (Asthma) or hypersensitive pneumonitis may be a great health issue and an important matter of long term. Microorganisms always present in the nature and they migrate through one place to another by air currents Singh et al., 2015a,b; Singh et al., 2016; Singh et al., 2017; Singh et al., 2018). Fungus is a common microorganism in the environment. Fruits and vegetables are the safest home for fungal growth and sporulation. Although, Researches related to fungal isolation, identification and antimicrobial activities of fruits and vegetables have already been done by numerous workers (Singh et al., 2021 and Singh et al., 2022). There is always a scope available to find out something new so, present investigation was carried out by random sampling method. For present study fungal samples were collected from the vegetable market of district Hapur (U.P.). Fungal spore can grow at temperature as low as 2 to 4°C and can infect surrounding vegetables during storage. They often precipitate on the stored materials from the field, after which they can grow, sporulate and spread through batches of stored strains. Storage area may also become contaminated with airborne fungal spores. Microorganisms grow at optimum temperature 28+1°C but low temperature is not suitable for the growth of microorganism. Research of airborne fungal spores in atmosphere at tea gardens of a city of Bangladesh was published by Abdullah et al. (2019). During a study fungal spores were also identified in the aeromycoflora of fruit and vegetable market at Bangalore (Nagadesi and Reddy, 2020).

MATERIAL AND METHODS

Experimental field work was done at vegetable market, Hapur (U.P.). The study and sub study areas of the investigation are described below**.**
Studies were carried out at Hapur, which is a part of the Indian gangetic plain lying at 28.72°N latitude and 77.78°E longitude about 200 meters above sea level. It receives about 30 inches annual rain fall and comes under a semiarid zone with extreme fluctuations in temperature. The main occupations of Hapur are agriculture and leather industry. The comprehensive survey of vegetable market was done and the samples of some selected vegetable fungal diseases were taken during January, 2022. 35 genera of different fungi belonging to 65 species were isolated by visual and sticky slide methods.

Sampling and Isolation Method

To collect samples of fungi from different locations sterilized petri plates containing sterile Rose Bengal, Penicillin, Streptomycin and Sabouraud agar medium were exposed. Three petri plates per location were exposed for few minutes. The exposed petri plates were incubated in an inverted position at 27 °C for 5 to 7 days. Different colonies of fungus were identified by observing cotton blue -lacto-phenol stained one under 10x, 40x and 100 x of compound microscope.

Composition of Rose Bengal Medium

Glucose	10.00g
Bacto peptone	2.00g
Potassium di hydrogen phosphate	0.50g
Magnesium sulphate	0.50g
Rose Bengal dye	0.05g
Bacto agar	20.00g
Distilled water	1000m
Penicillin and Streptomycin	each pinches

Medium preparation

All constituents except agar were dissolved in 1000 ml distilled water. The agar was added to the medium and boiled in sterilized conical flask. Subsequently medium was sterilized by autoclaving at 15 lbs. steam pressure at 121.4°C temperature for 15-20 minutes. After cooling the medium to 45°C to 50°C crystalline streptomycin (40 mg/ litre) and rose bengal dye (50µg/litre) was added under aseptic conditions, that is inside laminar flow ambient which was already sterilized by HEPA filters and UV lights.

Identification of Airborne Micro Fungi

The fungi were identified by consulting the following literature Raper and Thom (1975); Gilman (1959); Subramanian (1971); Booth (1971); Ellis (1971, 1976); Nilsson (1983); Ellis and Ellis (1985); Kendrick (1990) and Smith (1990).

RESULTS AND DISCUSSION

The present research was carried out to elaborate the quality and quantum of aeromycoflora of vegetable market of distt. Hapur. Different fungi were also examined under microscope by visible method. The prime vegetables include potato, tomato, brinjal, onion, bhindi, chilli, cucumber, pea, arbi, coriander, torai, methi, beans, cowpea, carrot, mustard, papaya, radish, cauliflower and lemon. The observed data presented in Table 1, reveals that *Aspergillus niger* was isolated from nine types of vegetables and *Aspergillus flavipes, A. solani, A. porii, A. dauci, A. tenuis, Cercospora hinisci, Chaetomium globosum, Colletotrichum dematium, C. capsci, C. papayae, Curvularia geniculata, Cylindrocarphon radicicola, Dictyoarthrinium sp., Drechslera brassicola, Erysiphae polygoni, Fusarium avenaceum, F. solani, F. equiseti F. moniliforme, F. cocruleum, Macrophomina phaseoli, Phomopsis vexans, Parcilomyces varioti*, *Peronospora brassicae*, *Phytophthora colocasiae*, P. *infestans*, *Rhizoctonia solani*, *Sclerotium rolfsii*, *Trichothecium roscum*, *Uromyces fabae and Volutina sp.* were isolated from only one type of vegetable during January, 2022. Dominant fungi in decreasing order were, *Alternaria sp. =Aspergillus sp.>Fusarium sp.=Colletotrichum sp.>Drechslera sp.>Cercospora sp.=Curvularia sp.= Cladosporium sp.=Penicillium sp.=Phytophthora sp.* The microorganisms remain associated with fruits and vegetables (Aggarwal et al., 2020; Kumar et al., 2022). Fungi are responsible for physical and biochemical changes in the substrates (Singh et al., 2020; Singh et al., 2021; Singh et al., 2023). Similar findings were also published by Kalode and Dalal (2021).

Table 1: Qualitative distribution of fungi in main vegetable market, Garh Road, Hapur by visual method under microscope (January, 2022)

Name of Fungi	Potato	Tomato	Brinjal	Onion	Mustard	Chilli	Cucumber	Bhindi	Pea	Torai	Arbi	Beans	Carrot	Papaya	Cauliflower	Citrus
Alternariabrassicae	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-
A. brassicola	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
A. melongenae	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
A. alternata	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-
A. solani	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. porii	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
A. dauci	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
A. tenuis	-	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-
Aspergillus niger	+	-	-	+	-	-	+	-	-	+	-	+	-	+	-	-
A. flavus	-	+	-	-	-	+	-	-	-	-	-	+	-	+	-	-
A. fumigatus	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. flavipes	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
A. nidulans	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-
A. terreus	-	+	-	-	+	-	-	-	-	-	-	+	-	-	-	-
A. versicolor	-	+	-	+	-	-	-	+	-	+	+	+	-	-	-	-
A. candidus	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Botryodiplodia theobromae	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
Cercospora hibisci	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
C. spina	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-
Choanephora cucubitarum	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-

Name of Fungi	Potato	Tomato	Brinjal	Onion	Mustard	Chilli	Cucumber	Bhindi	Pea	Torai	Arbi	Beans	Carrot	Papaya	Cauliflower	Citrus
Chaetomium globosum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Cladosporium herbarum	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
C. cladosprioides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colletotrichum dematium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C. capsici	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-
C. lindmulthianum	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-
C. gloeosporioides	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
C. papayae	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Curvularia lunata	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-
C. geniculata	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Corynespora cassicola	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-
Cylindrocarphon redicicola	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Doratomyces spp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dictyoarthrinium spp	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Drechslera tetramera	-	-	+	-	+	-	-	+	-	-	-	-	-	-	-	-
D. brassicola	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
D. bicolor	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
D. spicifer	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Erysiphae polygoni	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Fusarium avenaceum	--	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. solani	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. equiseti	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
F. moniliforme	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-

Name of Fungi	Potato	Tomato	Brinjal	Onion	Mustard	Chilli	Cucumber	Bhindi	Pea	Torai	Arbi	Beans	Carrot	Papaya	Cauliflower	Citrus
F. cocruleum	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Geotrichum candidum	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Macrophomina phaseoli	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Myrothecium raridum	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Mucorspp	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Penicillium multiforme	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. croyophilum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phomopsis vexans	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Paecilomyces varioti	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Peronospora brassicae	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Phytophthora colocasiae	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
P. infestans	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protomyces macrospora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudoperonspora cubensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhizopus stolonifer	-	-	-	-	-	-	-	-	+	+	-	-	-	+	-	-
Rhizoctonia solani	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sclerotium rolfsii	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syncephalast rumracemosus	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
Trichothecium roseum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Urocystis spp	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Uromycesfabae	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Volutina spp	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-

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