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Pre and post-harvest diseases of some solanaceous fruits from Amravati region

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Abstract

Survey of pre and post-harvest diseases of some solanaceous fruits used for vegetable purpose were carried out from July-2017 to December-2018. It is observed that most of the fruits get destroyed by pathogenic fungi. Some of the fungi found in post-harvest form were not reported in pre harvest condition whereas, inoculums of some pathogens remain constant in pre and post-harvest condition. In order to confirm the pathogenesity of the fungus Kochs postulates method was used to confirm the pathogenesity test. Pathogenic fungi reported in pre and post-harvest condition of *Solanum melongina* (Brinjal) were *Colletotrichum capsici* and *Dreshschlera rostrata, Cladosporium cladosporioides* while *Rhizsopus stolonifer, Rhizoctonia sp* and *Fusarium oxysporum, Phoma exiqua* were reported on *Solanum tuberosum* (Potato), *Alternaria alternata, Fusarium oxysporum* and *Curvularia lunata, Cladosporium sp* were reported on *Lycopersicon lycopersicum* (Tomato).

Keywords: Pre and post-harvest diseases, Solanaceous fruits, *Solanum melongina, Solanum tuberosum, Lycopersicon lycopersicum.*

Introduction

Diseases are form due to physiological disorders which may be nutritional imbalance or attack of pathogens. Edible fruit are available in market shows most of the saprophytic and parasitic pathogens which may cause toxicity to human being. Various surveys on pathogen causing diseased to fruits and vegetable are carried out in India [1,2,3].

Tondon and Singh [1] Rai [2] and Chary [3] investigated pre and post-harvest diseases of vegetable and fruits. Diseases cause tremendous loss to the plants every year. Fruits and vegetables damages severely due to attack of various pathogenic fungi. Pathogens of phylloplane mycoflora are found to be inoculums for stored condition. Abundance, density and frequency of pathogens in different phases were recorded to observed disease incidence.

The various mycological investigation about the fruit diseases concern to the diseases of fruits in field condition, but post- harvest diseases on these fruits are neglected. So, in present investigation an attempt was made to study diseases of solanaceous fruits plant in field as well as in stored condition. Survey of post-harvest diseases of solanaceous vegetable have been studied in different countries including [4, 5].

Pre and post-harvest diseases of fruits and vegetable in Vidarbha region carried out by Rao [6,7], Singh *et al.* [8], Raut *et al.* [9], Raut, *et al.* [10], Patil and Raut [11], Patel and Vaishnav [12], Dandge [13]. Most of diseases are cause in store condition but inoculums of diseases can be gathered in parasitic or saprophytic form in natural condition. So that in order to observed the mode and nature of inoculums, author decided to investigate pre as well as post-harvest diseases of solanaceous fruits and vegetables. Hence in present investigation the attempt has been made to study the pre and post-harvest diseases of solanaceous fruits.

Solanaceous fruits are important cash crop of Vidarbha region of Maharashtra. This crop comes in fruiting from November- January and different varieties of fruits are commonly grown in this part out of which Tomato (*Lycopersicon lycopersicum*), Brinjal (*Solanum melongina)* and Potato (*Solanum tuberosum*) are selected for present investigation. In order to observed effect of atmospheric condition on diseases development, sample from ecological varied situation were selected. Major collection was made from Amravati city at a same time collection were made from Chikhaldara which is hilly station showing distinct ecological situation and Pohra taluka Chandur railway being a rural area.

Present investigation mainly concerns with collection, identification, proper systematization of saprophytic and parasitic organisms. Identification of fungal organism was made with the help of available literature and identified from cultures present in mycopathological laboratory of Brijlal Biyani Science College, Amravati. Pathogensity of fungus was confirmed by Koch's Postulate Method.

Methodology

Regular survey of phylloplane and Carpoplane mycoflora of solanaceous fruits were carried out from July 2017 to December 2018. Fruit crop are growing natural habitat as well as from market were selected for this purpose. Solanaceous fruits are commonly used for vegetable purpose and in preliminary survey it is observed that, the vegetables were infected by some pathogenic forms. In order to known the causal organism investigation of pathogens was carried out in natural as well as stored condition.

Amravati district can be geographically divided in to two parts viz plane area and upper forest area i.e. Melghat, which is occupied by tribal peoples. The solanaceous vegetables are the main source of food by these peoples. Tribal people are not using sophisticated methods like cleaning and washing of fruits before used and so that it was thought to be essential to investigate carpoplane mycoflora of these solanaceous fruits. In order to know the mode of transmission of diseases, phylloplane mycoflora was investigated.

The diseased leaves, buds and fruits were collected randomly and brought to the laboratory in separate in polythene bag to avoid the contaminations. They were taken in a 250 ml glass flask containing 100ml of sterile water. The washing was diluted serially (1:1000, 1:10000). Their symptoms were carefully noted completely rotten fruits were avoided for isolation as they contain secondary infections. Carpoplane mycoflora was investigated by washing method.
Healthy plant parts were also consider for this purpose washes were made by distilled water and were allow to

grow on the medium. At the same time infected leaf, bud and fruits were artificially inoculated on culture medium and comparative account of saprophytic and parasitic flora was recorded. Slides were prepared by scrapping infected tissue of the fruits bodies. The disease tissues were surface sterilized by 90% of alcohol and transfer aseptically on either Potato Dextrose Agar medium (PDA) or Asthana and Howker's Medium "A". The petridishes were incubated for 7-8 days at room temperature. At least four to five plates were taken for qualitative and quantitative estimation of mycoflora. After 7 or 8 days mycelium coming out of disease tissue was pick up and transfer to another fresh slant. They were further purified by raising monosporic cultures with the help of dummy cutter objective [14]. Morphological and cultural characters of the organism were carefully observed and recorded.

A Carpoplane mycoflora was carried out in petriplate and surface mycoflora was investigated. In this case these saprophytic micro floras from disease as well as healthy plants parts were selected for comparative purpose. Pathogenesity test were carried out for parasitic forms by Koch's postulate method.

Results and Discussion

Tremendous work on phylloplane mycoflora of various crops was carried out by Gupta *et.al* [15], Dixit and Gupta [16], Moghe *et al*. [17], Rao [18] suggested that there is no correlation between phylloplane microflora and post-harvest diseases. Since scientist like Shrivastav *et.al* [19] are of opinion that microorganisms present on leaf sporulated and remains inactive up to harvesting period but subsequently they become active in storage. So that in order to study the post harvests diseases of fruits. Sinha [20] consider that surface colonies are responsible for diseases develop-ment hence the present investigation that attempt has been made to investigate the phyloplane mycoflora of solanaceous plants and find out the role of these organi-sms in post harvest of fruits. Leaf surface mycoflora of *Lycopersicon lycoprsicum,Solanum melongena* and *Solanum tuberosum* was studied at the interval of days and the results are tabulated in following tables 1-4.

Aspergilus nigre and *Fusarium oxysporum* were present throughout the crop season while *Phoma exiqua* appears on phylloplane at the end of season while *Alternaria alternata* appears on early month of crop season i.e. Sept. and Oct 2017. Table 1.

Table 2 showed that *Fusarium oxysporum and Alternaria alternata* were present throughout the crop season while *Curvularia lunata,* and *Aspergilus nigre* were present in the early month of crop season. While *Cladosporium sp.* appears on phylloplane at the end of crop season.

Fusarium oxysporum, Aspergilus nigre and *Alternaria alternata* were present throughout the crop season while *Curvularia lunata* and *Colletotrichum capsici* were present in the early month of crop season i.e.Oct while *Drechslera sp.* appears on phylloplane at the end of crop season. Table 3.

Table 1: Fungi occurring on the Leaves of *Lycopersicon lycopersicum.*L

S.N.	Name of fungal species	2017			
		Sept-17	Oct-17	Nov-17	Dec-17
01	*Alternaria alternata*	+	+	-	-
02	*Fusarium oxysporum*	+	+	+	+
03	*Aspergilus nigre*	+	+	+	+
04	*Phoma exiqua*	-	+	-	+

+ Presence. - Absent

Table 2: Fungi Occurring on the Carpoplane of *Lycopersicon lycopersicum*.L

S.N.	Name of fungal species	2017-2018			
		Sept-17	Oct-17	Nov-18	Dec-18
01	*Alternaria alternata*	+	+	+	+
02	*Fusarium oxysporum*	+	+	+	+
03	*Aspergilus nigre*	-	+	+	+
04	*Curvularia lunata,*	+	+	-	-
05	*Cladosporium sp.*	-	-	+	+

+ Presence. - Absent

Table 3: Fungi occurring on the Leaves of *Solanum melongena L.*

S.N.	Name of fungal species	**2017 -2018**			
		Sept-17	Oct-17	Nov-17	Dec-17
01	*Fusarium oxysporum*	+	+	-	-
02	*Curvularia lunata*	-	+	+	+
03	*Cladosporium sp.*	-	+	+	-
04	*Alternaria alternata*	+	+	+	+
05	*Aspergilus nigre*	+	+	+	+
06	*Colletotrichum capsici*	-	+	+	-
07	*Drechslera sp.*	-	-	-	+

+ Presence. - Absent

Table 4: Fungi Occurring on the Carpoplane of *Solanum melongena L.*

S.N.	Name of fungal species	2017-2018			
		Sept-17	Oct-17	Nov-18	Dec-18
01	*Aspergilus nigre*	+	+	+	+
02	*Fusarium oxysporum*	+	+	+	+
03	*Curvularia lunata,*	-	-	+	+
04	*Alternaria alternate*	+	+	-	+
05	*Cladosporium cladosporioides*	-	-	+	+
06	*Rhizopus stolssonifer*	-	+	+	+

+ Presence. - Absent

Table four depicted that *Aspergilus nigre* and *Fusarium oxysporum* were present throughout the crop season while *Alternaria alternata* and *Rhizopus stolonifer* were present in the early month of crop season while *Curvularia lunata* and *Cladosporium cladosporioides* appears on Carpoplane at the end of crop season.

Solanum tuberosum was under investigation. As this plant is not cultivated in this region, author concentrated only on post harvest diseases of this fruit vegetable, *Rhizophus stolonifer, Rhizoctonia sp. Fusarium oxysporum, Phoma exiqua* were reported from stored condition.

Table 5: **Fungal species occurring on Pre and Post Harvesting diseases of Different Solanaceous Plants.**

S.N	Name of host plants	Pre-harvest fungi	Post harvest fungi
01	*Solanum melongena* (Brinjal)	*Colletotrichum capsici,*	*Cladosporium cladosporioides*
		Dreshschla rasrostrata	*Curvularia lunata*
		Fusarium oxysporum	*Aspergilus nigre*
		Curvularia lunata	*Fusarium oxysporum*
		Alternaria alternate	*Alternaria alternate*
		Aspergilus nigre,	*Rhizopus stolonifer*
		Cladosporium.sp	
02	*Solanum tuberosum* (Potato)	*Rhizphus stolonifer*	*Fusarium oxysporum*
		Rhizoctonia sp.	*Phoma exiqua*
03	*Lycopersicon lycopersicum* (Tomato)	*Alternaria alternata*	*Alternaria alternata*
		Fusarium oxysporum	*Fusarium oxysporum*
		Aspergilus nigre	*Aspergilus nigre*
		Phoma exiqua	*Curvularia lunata*
			Cladosporium sp.

The disease appears as water soaked area on the pericarp and it gradually extend toward the central part, the colour of the spot was light brown which turns black due to production of conidia. Following fungi were isolated.

Carpoplane Mycoflora:

Rhizopus stolonifer and *Fusarium oxysporum* were present in the corpoplane of Solanaceous fruits through the crop season while *Alternaria alternata* and *Curvularia lunata* were presenton *Lycopersicon lycsopersicum* during September to October 2017. While *Phoma exigua, Colletotrichum capsici* appears on *Solanum tuberosum* at the end of the plant season.

Fusarium oxysporum and *Aspergillus niger* were highest in their percentage of abundance while *Phoma exigua* was the least. *Fusarium oxysporum* and *Rhizopus stolonifer* were highest in their percentage of frequency. There was no co-relation between percentage of abundance and frequency, Fusarium oxysporum shows highest percentage of frequency while lowest percentage of abundance on carpoplane mycoflora. Same is observed in case of *Fusarium oxysporum* and *Alternaria alternata*.

In phylloplane mycoflora there was no co-relation between abundance and density of pathogen in both the years. Appearances of fungi remain same, but abundance and density vary in next year. *Curvularia lunata* which was showing moderate frequency in 2016 became dominant in 2017. Dixit and Gupta [16], Moghe et al. [17], Raut et al. [9] observed same type of co-relation in *Colletotrichum capsici.*

Conclusion

It can be concluded from present investigation that leaf may acts as one of the sources of inoculums for fruit rot diseases in pre and post-harvest stage, so fungi present in phylloplane and carpoplane may act as inoculums for post-harvest stages. Several worker including Sinha [20] reported saprophytic existence of fungi before they become parasitic on the host. The fungi which are associated with the plant in field may come in contact with fruits, remain inactive during harvest and transport but become active in storage condition and causes the diseases. Prasad and Bilgrami [21] reported that phyllopshere of litchi contributed in causing fruit rot in post-harvest stages.

In present investigation *Colletotrichum capsci, Curvularia lunata and Fusarium oxysporum* found on leaf of Solanaceous plants remains continuous on fruit.

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