

Survey of market storage diseases of some important fruits of Osmanabad District (M. S.) India

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ABSTRACT

The comprehensive survey of market storage and post harvest fungal diseases of some important fruits in the market of Osmanabad district was undertaken during June 2010 to January 2011. Recurrent sampling from the available market fruits depicted variable intensity of fungal flora. Fungal diseases of 9 selected fruits were studied and in all 11 fungal pathogens were observed. Among these *Aspergillus niger*, *Rhizoctonia solani*, *Geotrichum candidum* and *Penicillium* spp were found to be major disease causing organisms. Several fungal floras were observed in *Musa paradisiacal*, *Punica granatum* and *Carica papaya*. The present investigation revealed that fungal infection is mainly due to injury during storage and handling. Species of *Fusarium*, *Alternaria* and *Aspergillus* were found to be the disease causing organisms responsible for extensive damage to fruits in the markets of Osmanabad district of Marathwada region. A various fungi were isolated from the fruit, the fungi showing positive pathogenesis. Therefore this investigation gives a brief account of rotting of fruits and their infecting organisms.

Key words: Market storage, fruits, fungal diseases, post harvest.

INTRODUCTION

It has been known that fruits constitute commercially and nutritionally important indispensable food commodity. Fruits play a vital role in human nutrition by supplying the necessary growth factors such as vitamins and essential minerals in human daily diet and that can help to keep a good and normal health. Fruits are widely distributed in nature. One of the limiting factors that influence the fruits economic value is the relatively short shelf-life period caused by pathogens attacked. It is estimated that about 20-25% of the harvested fruits are decayed by pathogens during post-harvest handling even in developed countries (Droby 2006, Zhu 2006). Fungal fruits infection may occur during the growing season, harvesting, handling, transport and post-harvest storage and marketing conditions, or after purchasing by the consumer. Fruits contain high levels of sugars and nutrients element and their low pH values make them particularly desirable to fungal decayed (Singh and Sharma 2007).

Present investigation envisages the study of various fungal pathogens responsible for the post harvest, decay & deterioration of economically important fruits from Osmanabad district of Marathwada region of Maharashtra. Storage and post harvest deterioration of fruits cause considerable revenue loss. Thus many regions there is a clear harvest losses need to investigate the post (Monoharachary and Rao 1989, Thakur and Chenulu 1970, Ratnam and Neema 1967 and Grewal 1954).

Extensive study of these fruits in market storage affected by fungi therefore this work was accounted.

MATERIALS AND METHODS

Collection and Isolation of fungal pathogens from fruits

The infected nine fruits viz. *Musa paradisiacal*, *Citrus reticulata*, *Psidium guajava*, *Zizipus rotundifolia*, *Punica granatum*, *Manilkara zapota*, *Ficus carica*, *Pyrus malus* and *Carica papaya* were collected from market of Osmanabad district. Samples were brought in to the laboratory in separate sterilized polythene bags. Rotten samples were kept under refrigeration at 10°C to prevent further deterioration. Nichrome inoculating needles duly sterilized were used to isolate & the pathogens was transferred directly to PDA aseptically. The infected tissue was cut after surface application of alcohol & sterilization with 0.1% HgCl₂ in sterilized distilled water.

Identification of pathogens

The materials were examined critically with respect to symptomatology and etiology. In some cases the infected tissues were stained by cotton blue and Lactophenol (Mc Lean and Ivimey 1965) and observed under compound microscope. Identification of the pathogens was made with the help of available literature (Biligrani *et al.* 1981 and 1991, Subramanian 1971 and Barnett 1999). Some species were identified in the Agharkar Research Institute (ARI), Pune. Pure cultures of the pathogens were maintained in the laboratory on PDA slants for further study.

Pathogenicity test

The pathogens were isolated, identified and cultures were used to confirm their pathogenicity test in their respective hosts. Fresh disease free samples were brought in to the laboratory and surface sterilized with 0.1% HgCl₂. For inoculations, cork borers of (2mm) diameter were used. They were sterilized by placing in spirit lamp flame, dipping in alcohol & shaking off the

excess alcohol by flaming (Granger and Horne 1924). The inoculated samples and their respective controls were kept under sterile humid conditions at room temperature under bell jars. The artificially inoculated samples were examined daily & the extent of damage was recorded. The pathogens were reisolated and disease symptoms were clearly evident, the culture and symptoms signs were compared with original.

Table 1: Fruit showing disease causing fungi.

Sr. no.	Fruits	Symptomatology	Disease causing fungi
1	<i>Musa paradisiaca</i>	Fleshy creamy rot, white floppy irregular spots	<i>Fusarium oxysporum</i> , <i>Aspergillus niger</i> & <i>Geotrichum candidum</i>
2	<i>Citrus reticulata</i>	Circular to irregular dark brown to dull black spots	<i>Penicillium expansum</i> , <i>Alternaria alternata</i> & <i>Geotrichum candidum</i>
3	<i>Psidium guajava</i>	Linear to irregular reddish brown pustules & its becomes patches.	<i>Rhizoctonia solani</i>
4	<i>Zizipus rotundifolia</i>	Brown to blackish spots	<i>Diplocladium</i> spp, <i>Rhizoctonia solani</i>
5	<i>Punica granatum</i>	Infection begins from dorsal surfaces sticky watery fluid developed inside the fruits	<i>Rhizoctonia solani</i> , <i>Aspergillus niger</i> , <i>Alternaria solani</i> , <i>Aspergillus fumigates</i>
6	<i>Manilkara zapota</i>	Infected part shows light brown, coloured patch in the center surrounded by white or creamish boundary	<i>Geotrichum candidum</i> , <i>A. flavus</i> , <i>A. niger</i> , <i>Rhizoctonia solani</i>
7	<i>Ficus carica</i>	Dark brown to whitish surface covered	<i>Geotrichum candidum</i> , <i>Rhizopus nigricans</i>
8	<i>Pyrus malus</i>	Small lesions on dorsal side, Blackish or brownish patches on pulp on fruits	<i>Penicillium expansum</i> & <i>A.niger</i>
9	<i>Carica papaya</i>	Spots appear as brown which develop in to circular lesions coalesce & sparse mycelia growth appears on the margins of spots	<i>Fusarium oxysporum</i> , <i>Rhizopus stolonifer</i> & <i>Aspergillus niger</i> and <i>Penicillium digitatum</i>

RESULTS AND DISCUSSION

During the market surveys fruits were found to be affected by various fungal infections and illustrated in table 1.

1) *Musa paradisiaca* L. (Banana). Symptoms of the diseases are clear and concise, irregular fleshy creamy spot were observed on the fruit and they were very dominant. Pathogens were isolated and identified as *Fusarium oxysporum* Schl.ex Fries, *Geotrichum candidum* Link. ex Fries and *Aspergillus flavus* Link. ex Fries causing cream rot of banana.

2) *Citrus reticulata* Blanco (Orange). Pericarp of fruit was infected. Circular or irregular spots formed which soon enlarged and became dark brown to dull black,

covered with grey to black mycelial growth and fungi were isolated as *Penicillium expansum* Link ex Fries, *Alternaria alternata* (Fr.) Keissl. & *Geotrichum candidum* Link. ex Fries

3) *Psidium guajava* L.(Guava). Spots linear to irregular, reddish brown in colour, pustules from large irregular patches. Fungus was isolated *Rhizoctonia solani* Kuhn

4) *Zizipus rotundifolia* Lam. (Jujube). Brown to dark black coloured spots formed. Fungi were isolated *Diplocladium* spp, and *Rhizoctonia solani* Kuhn

5) *Punica granatum* L. (Pomegranate). Pericarp and seeds of fruits were infected. Infection begins from

dorsal surface and spreads towards the seed occupying the rotting of complete fruit. At severity sticky watery fluid developed inside the fruit. Fungi were isolated i.e. *Rhizoctonia solani* Kuhn, *Aspergillus fumigatus* Fres, *A. niger* V.Tieghem and *Alternaria solan* Sorauer,

6) *Manilkara zapota* L.(Sapota). Initially the infection appeared as discolored patches which gradually advanced downwards the entire surface of fruit. Infected part shows light brown coloured patch in the centre surrounded by white or creamish boundary and at severity complete rotting of fruit took place. Isolated fungi were *Geotrichum candidum* Link ex Fries, *Aspergillus flavus* Link, *A. niger* V.Tieghem, and *Rhizoctonia solani* Kuhn.

7) *Ficus carica* L.(Fig). Dark brown coloured patches formed, on the surface white mycelium covered. Fungi isolated are *Geotrichum candidum* Link ex Fries and *Rhizopus nigricans* Ehrenberg

8) *Pyrus malus* L.(Apple). Infection brings from small lesions on dorsal side and spread fairly towards the centre occupying the complete fruit surface with blackish or brownish patches on the pulp of fruit. Rotting of fruit take place at severity. Fungus was isolated *Penicillium expansum* Link. ex Fries, and *A.niger* V.Tieghem.

9) *Carica Papaya* L.(Papaya).The spots on fruit first appear as brown superficial discoloration of the skin which during into circular & slightly sunken gradually the

lesions coalesce & mycelia growth appears on the margins of the spots. Fungi were observed *F.oxysporum* Schl.ex Fries, *Rhizopus stolonifer* (Ehrens.)Vuill, *Aspergillus flavus* Link. ex Fries & *Penicillium digitatum* Sacc.

Similar results on post harvest fungi on storage fruits were reported by earlier workers (Philip Susamma 2002 and Sharma and Mashkorr 1998). Post harvest pathogens on some fruits were reported by Basha *et al.* 2009, Rao 1963, Srivastava *et al.* 1964 and Mandal and Dasgupta 1983. Extensive damage of the citrus fruits by pathogens (Kanaujia, 1979 and Mukerji and Bhasin, 1986). Similar finding has been reported by Dange (1998) and Cherian (2005). Ghurde and Pachkhede (2010) was reported the market and storage diseases of fruits from Amravati. Recently, Gadgile *et al.* (2011) was reported post harvest fungi associated with mango fruits.

CONCLUSION

Fruits are the essential requirement of human diet. Among these fruits producing the chief source of vitamin C, minerals and salts. During the survey it is observed that the number of are harboured by the high number of contaminants and pathogens which causes the spoilage of fruits during the storage. Exposure on consumption of these spoiled fruits may be responsible for serious health hazards. In present investigation, the fungi like *Fusarium*, *Alternaria*, *Rhizoctonia* and *Geotrichum* species were found on edible fruits which may causes allergenic effects on human health. Therefore it needs to undertake the management practices by using botanicals.

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