Research Publications
A Few New or Noteworthy Post-harvest Diseases of Fruits from Maharashtra

PRACHI VAIDYA & V. G. RAO
A Few New or Noteworthy Post-harvest Diseases of Fruits from Maharashtra

Regular surveys were undertaken to various fruits and vegetable markets at Pune for post-harvest fungal diseases during 1987-88. A number of diseases on fruits were collected and studied in detail. The present paper describes five diseases on fruits like fig, ashgourd and watermelon caused by species of Alternaria, Botryodiplodia, Geotrichum and Phytophthora. These fungi were isolated in pure culture on PDA by the usual isolation technique and their pathogenicity to respective fruits was established, following Grainger and Horne's technique (Grainger & Horne, 1924). A review of literature (McFarlane, 1969; Bilgrami et al., 1979, 1981; Lodha & Kothari 1988) showed that these diseases were not reported earlier from Maharashtra or India. Hence, a short account of these diseases is given (Table 1). Samples of infected material are deposited in Ajrekar Table 1 — Diseases of Fruits from Markets of Pune

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>NAME OF THE FRUIT</th>
<th>SYMPTOMS OF DISEASE</th>
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<tr>
<td>1*</td>
<td>Fig. (Ficus carica L.)</td>
<td>Fruit rot: Infection is characterized by sub-circular, depressed spots, dark-green to black with profuse sporulation of the fungus. Such fruits turn soft and decay</td>
<td>Alternaria alternata (Fr.) Keissler</td>
</tr>
<tr>
<td>2**</td>
<td>Fig. (Ficus carica L.)</td>
<td>Waxy rot: Fruits show pale-brown waxy areas covered with dirty white powdery growth of the fungus. Later, such fruits turn slimy and give fermenting odour</td>
<td>Geotrichum candidum Link ex Fr.</td>
</tr>
<tr>
<td>3**</td>
<td>Watermelon (Citrullus vulgaris Schrad.)</td>
<td>Black rot: Mouse-grey infection areas cover the fruit but mostly from the stalkend. The fungus grows fast and rotted fruits turn leathery and emit foul odour</td>
<td>Botryodiplodia theobromae Pat.</td>
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<tr>
<td>4**</td>
<td>Watermelon (Citrullus vulgaris Schrad.)</td>
<td>Waxy rot: (Fig. 1) Fruits show depressed dark-brown leathery areas covered with dirty-white, waxy and sub-merged fungus colonies. These enlarge later on, and cover (envelop) entire fruit within 2-3 days. Such fruits turn pulpy and emit decaying odour</td>
<td>Geotrichum candidum Link ex Fr.</td>
</tr>
<tr>
<td>5*</td>
<td>Ashgourd (Benincasa hispida Savill.)</td>
<td>Fruit rot: (Fig. 2) Infected fruits initially show dark-brown water soaked tan-coloured areas, covered with white fluffy growth of the fungus. Such parts later become soft and exude slimy-liquid. Fruits lose their turgidity and become soft, watery; this is also called &quot;watery rot&quot;</td>
<td>Phytophthora nicotianae var. parasitica (Dast.) Waterhouse</td>
</tr>
</tbody>
</table>

*First reports.  
**New records from Maharashtra.
Mycological Herbarium of the Institute under their numbers viz. AMH 7455, 7305, 7328, 7311 and 7307 respectively.

The authors are thankful to Dr P. G. Patwardhan, Head, Department of Mycology and Plant Pathology, and to Dr A. D. Agate, Director, M.A.C.S., Pune-4 for the facilities and to the Department of Science and Technology, Government of India, New Delhi for the award of a Junior Research Fellowship to one of them (PV).

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REFERENCES


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THREE UNDESCRIBED POST-HARVEST DISEASES OF FRUITS FROM MAHARASHTRA

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ABSTRACT

The paper describes briefly three storage and market diseases of brinjal (Solanum melongena L.) pomegranate (Punica granatum L.) and mango (Mangifera indica L.) caused by fungal pathogens viz. Verticillium dahliae Kleb., Cercospora pinnicae P. Henn. and Cylindrocladium scoparium Morg. reporting for the first time from Maharashtra.

INTRODUCTION

During the period 1987-90, regular surveys were undertaken in various fruit and vegetable markets at Pune. Many interesting fungal diseases were collected and studied. This paper presents an account of three such diseases on brinjal, pomegranate and mango, which are described below:

Gray rot of Brinjal:

Symptoms:
The infection in this case showed dark brown areas on any part of the fruit. Soon gray coloured mycelium was evident on such areas which enlarge further and the fruit gets mummified. The fruits thus are rendered un consumable.

Causal organism:

Verticillium dahliae Kleb.

Conidiophores are verticilium branched, erect and well differentiated with whorls of 3-4 phialides. Conidia hyaline one-celled, ellipsoidal to short cylindrical measuring 3.0-5.5 x 1.5-3.5 μm, borne singly at the tips of verticillate conidiophores. Aerial mycelium also produces numerous black sclerotic bodies which measure 30.2-60.4 x 20-35 μm.

Remarks: Verticillium is strictly a root inhabiting fungus. Patel et al. (1949) recorded a wilt disease of egg plant due to Verticillium dahliae from Bombay. Patil and Anahosur (1973) noted cotton wilt due to this fungus from Mysore (Karnataka). Khan et al. (1978) observed a cigar-end disease of banana from Karnataka. However, there is no report of a post-harvest rot of brinjal so far.

Fruit spot of Pomegranate:

Symptoms:

Numerous, black, distinct, sunken spots of variable size (1-3 mm diam.) were found scattered on the surface of the fruits. These were superficial and as such infection was
Fig. 1. Gray rot of brinjal caused by *Verticillium dahliae* Kleb.

Fig. 2. Fruit spot of Pomegranate due to *Cercospora punicae* P. Herr.
not deep-seated. However, severe spotting reduced marketable quality of these fruits resulting in poor sale. (Fig. 2)

Causal organism:

*Cercospora punicae* P. Henn.

Stroma dark brown, compact and strictly sunken. Conidia pale, septate, slender, hyaline, asciular, slightly curved measure 59.5-73.5 x 3.3-3.5 μm.

Remarks: This fungus has been recorded on leaves of *Punica granatum* as a leaf-spotting pathogen. However, its detection in storage apparently carried from the field is of special significance and not studied so far.

Black spot of Mango

Symptoms:

This disease of mango was collected in Aug.-Sept. 1990 on a few fruits of *Dashhara* variety. Black spots of about 2-3 mm in diameter were found closely associated. At later stage, such fruits become soft and rot with foul odour. In the initial stage of the disease no mycelial growth of the fungus was visible but later gray colonies appeared on the infection foci with profuse sporulation.

Causal organism:

*Cylindrocladium scoparium* Morg.

Mycelium septate and branched profusely. Conidiophores septate, dichotomously branched and each terminating into three phialides. Conidia cylindrical, hyaline, 0 to 1 septate measure 41.6-45.0 x 3.0-3.5 μm., these are produced at the tip of each phialide.

Remarks: This fungus was mainly recorded as responsible for seedling blight of cashew by Philip (1973) from Kerala (S. India), while Jamaluddin et al. (1974) recorded it as a cause of post-harvest rot of tomato fruits in storage. However, there is no report of any post-harvest rot of mango.

A survey and perusal of literature (Bilgrami et al. 1979 & 1981; Mukherji & Bhasin 1986; Bhide et al. 1987) revealed no report of such post-harvest diseases from India so far. The materials have been deposited in the Ajrekar Mycological Herbarium of the Institute under Nos. AMH-7498, 7497 & 7500 respectively.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. P.G. Patwardhan, Head, Dept. of Mycology and Plant Pathology for valuable advice and to Dr. A.D. Agate, the Director, M.A.C.S. Pune 4, for the facilities. Thanks are also due to C.S.I.R., New Delhi for the award of S.R.F. to one of them (PV).

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7. New Post-Harvest Diseases of Fruits From Maharashtra

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Key words: Post-harvest, fruits, pure

During 1987-88, regular surveys were undertaken to various fruits and vegetable markets locally at Pune for post-harvest fungal diseases. A number of diseased fruits and vegetable were collected and studied in detail. The present paper describes five diseases of fruits like Fig, Ashgourd and Watermelon caused by spp. of Alternaria, Botryodiplodia, Geotrichum and Phytophthora. These fungi were isolated. Pure culture on P.D.A. was prepared by the usual tissue isolation technique and pathogenicity test were carried out on respective, following Granger and Horne's technique (1924). These diseases were report from India for the first time. Samples of infected material were deposited in Ajrakar Mycological Herbarium of the Institute Nos. (AMH 7317, 7305, 7307, 7328, 7311).
A NEW STORAGE DISEASE OF DRUMSTICK

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A storage disease of Drumstick (Moringa oleifera) incited by Fusarium oxysporum has been described for the first time from India.

Key words: Drumstick, Fusarium. Rot, Storage.

Fruits of Drumstick (Moringa oleifera Lamk., F. Moringaceae) are commonly used as vegetable in culinary (domestic) preparations. An unusual fruit rot disease was noticed in storage on some drumstick fruits recently at Pune. The infected fruits showed scattered, small but irregular, slightly sunken water-soaked, tan-coloured areas. These soon enlarged and showed fluffy white mycelium of a fungus, identified later as a species of Fusarium. In about a week’s time, rotted fruits show further almost covering of the causal fungus and profuse sporulation. A typical rotting adour sets in at this stage. Fruits become pulpy and slip-off when lifted.

Routine tissue isolations were resorted to isolate the fungus (Fusarium sp.) in pure culture on Potato dextrose agar and Czapek-Dox agar. Further, P.D.A. slants were used for its cultivation and maintenance. Pathogenicity tests were conducted on healthy surface sterilized drumstick fruits in the laboratory.
Grainger and Horne's technique was used for inoculation. (Grainger & Horne 1924). Inoculated fruits were stored in glass moist chambers. A separate set of fruits was maintained as a control part. Observations made after 48 hrs., showed typical spread of infection from the point of inoculation on the inoculated fruits. The area enlarged and in about 5-8 days the fruits developed full rot. These were covered with the white, slightly submerged mycelium of the causal fungus. Reisolations made from such a fruits invariably yielded a species of Fusarium which was indistinguishable from the one used for inoculation trial. Thus, Koch's Postulates were satisfied.

In host range studies, the fungus (Fusarium sp.) was found pathogenic to fruits of chilli (Capsicum annuum L.), Lima bean (Phaseolus lunatus L.) and banana (Musa paradisiaca L.).

The fungus (Fusarium sp.) made good growth and sporulation on two (semi-synthetic and synthetic) media viz. P.D.A. and C-Dox Agar. It produced both the types of conidia. Macroconidia borne on short conidiophores were: fusoid, 3-5 sepatate with both ends pointed, measuring 17.5-21.0 x 2.5-3.5 um. Micro-conidia borne on simple phialides arising laterally on hyphae or short conidiophores were ellipsoid, 1-septate, hyaline, measure 7-8.5 x 2-3 um.

Based on cultural and morphological characters including dimensions of various fruiting structures, the fungus under study was identified as: Fusarium oxysporum Schl. emend. Snyd. & Hans. (Booth 1972). A review of literature (Bilgrami et al 1979 &

The material has been deposited in the Ajrekar Mycological Herbarium of the Institute under No.AMH 7853.

Authors are grateful to Dr. P.G. Patwardhan, Head, Dept. of Mycology and Plant Pathology for his continued interest and to Dr. A.D. Agate, Director, M.A.C.S., Pune-4 for the facilities. One of the authors (P.V.) is thankful to the C.S.I.R., New Delhi for the award of a Senior Research Fellowship.

REFERENCES


A FEW NOTEWORTHY POST-HARVEST DISEASES OF GRAPE
AND THEIR CONTROL
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(M.A.C.S. RESEARCH INSTITUTE, PUNE - 411 004.)

Grapevines (Vitis vinifera L.) suffer more from diseases than from insect pests. The most important field diseases of grape are (1) Anthracnose, (2) Powdery Mildew, and (3) The Downy Mildew. Equally, the diseases that develop during harvesting, handling, transport (Rao & Bhide 1985, Mukerji & Bhasin 1986 and Dasgupta & Mandal 1989) and storage are also extremely important and need fuller and closer attention to combat such losses. This note briefly reviews some important and common field and storage diseases of grape incited by fungal pathogens and their control measures.

Descriptions of some storage diseases of Grape:
(1) Black Rot: Incited by Aspergillus niger van Tiegh., A. foetidus (Naka.) Thom & Raper and A. carbonarius (Bainier) Thom. Worst disease. Stalk-end rot due to A. niger is very common, maximum, infected berries turn soft and pulpy. The rot develops as water-soaked spots surrounded by brown zone. Infection spreads by contact. Characteristic fungus growth is evident at the end.

(2) Blue mould Rot: Incited by Penicillium citrinum Thom and P. frequentans westling. Most severe type of decay known on grape berries during winter. High R.H. favours the disease. Infection originates from the injured points on berries as water-soaked areas, become brownish and readily covered by bluish-green powdery growth of the fungus. It has characteristic fermenting odour. The rot may develop by contact.

3) Brown Rot: Caused by Botryodiplodia theobromae Pat. Important disease of grape. Infection originates either from pedical end or from any points of injury. Infected fruits show juice leaking and emit strong fermentative odour. Fruit surface show water-soaked brownish areas covered with mycelial mat. Production of pycnidia (sporulation) appear to be sparse. Brown of discoloured spots are also produced in berried in storage caused by Alternaria alternata (Fr.) Keisler or Pseudostemphyllum radicinum (Meier, Drechsler & Eddy) Subram. The Spots become dark and turn hard with the surface showing sporulation of the causal fungi. Affected fruits can be easily removed from the clusters.

(4) Green ball Rot: caused by species of Cladosporium (C. Herbarum (pers.) Link ex Fr. C. oxysporum Berk. & Curt. and C. tenuissimum Cooke. The disease is conspicuous on ripening berries with dark spots covered by typical dark green colonies of the causal fungi. Sporulation is profuse and remain associated with the infected fruit surface. Infected areas are water-soaked, shallow, wrinkled, devoid of any unpleasant odour.

(5) Pimple Rot: Caused by Phomopsis viticola and P. vitis Bon. Infected berries show small irregular pimples or sunken dark spots, which coalesce later on. Such areas show profuse development of punctiform of pin-head like dark pycnidia of the causal fungi. The bunch becomes unsightly and lose market value. Finally the infected tissue becomes pulpy and emit fermented odour.
(6) Pink Rot: Caused by Trichotheclum roseum Link. Black, circular, asymmetric blisters appear on the berries, which enlarge gradually (Sharma et al., 1991, Punjab, in field as First report). They are dry in nature and soon being covered/enveloped by the causal fungus with its typical, powdery, submerged, pinkish colonies. It is a dry rot with profuse sporulation. The fruits give pungent taste. During early summers low temperature and high humidity are more congenial for the development of this rot. Trichotheclum roseum may be evident on harvested fruits in storage, as is common in other fruits but not yet noted, however in case of grapes.

(7) Soft Rot: Caused by Rhizopus stolonifer (Ehrenb. ex Fr.) Lind. Most common and serious disease of grapes, being prominent in injured berries than in the uninjured ones. The infection is characterized as water-soaked areas with stringly mycelial mass and dark sporangia growing profusely from these areas forming nests. The juice of infected berries strong alcoholic odour. High temperature and high humidity favour the disease.

In severe cases, webby growth of the fungus is not uncommon anchoring the berries and thus causing good loss.

(8) Waxy or Yeast Rotting: Caused by Geotrichum candidum Link. Berries show soft tan-coloured areas which soon get covered with dirty white-waxy colonies of the causal fungus. The fungus sporulates profusely on such rotted berries and healthy berries coming in contact also get infected. The rotting is fast and fermentation of the fruit juice is evident by its typical odour. Fruits in tightly packed containers and ill-ventilated crates/storage rooms suffer to a maximum extent.

CONTROL: Post harvest care of the grape (Vitis Vinifera) is necessary in the field by undertaking pre-harvest spraying by chemicals (Fungicides) like: Captan, Aurofungin, Bavistin, Bitox and Dithane-M 45 etc. This minimizes the load of fungi being carried from field to storage places on the harvested fruits. Further control measures should be adopted by exercising precautionary measures like: careful harvesting, scientific packing and cautioned handling so as to avoid berry damage. Quick transport and cold storage of the material are also important considerations. Besides, the bunches are also treated (by dipping for few minutes and air drying) with various dilutions of fungicides including: Dithane-M-45, Dithane-Z-78, Ziride and Foltaf, which have given good and encouraging results in minimizing such storage losses. This has also been confirmed (by the Authors) in In-vitro studies with the above fungicides for the well-known pathogens like: Botryodiplodia theobromae, Geotrichum candidum and Trichotheclum roseum by Poisoned-Food Technique.

The Authors are grateful to the Director, M.A.C.S. Research Institute, Pune 4, for the facilities.

REFERENCE

88 / Drakshavritta Smarnika 1992
Some Recent Press Reports
Big wastage of fruits, vegetables

NEW DELHI, July 21
(PTI & UNI).

FRUITS and vegetables valued at Rs 3,000 crores are wasted every year due to inadequate post-harvest handling as well as absence of linkage with processors and fresh fruits and vegetables market as per an estimate, food processing minister, Mr Jagdish Tytler, told the Rajya Sabha today.

Mr Tytler told Mr Suresh Kalmadi that several measures were taken from time to time by the government to facilitate setting up of more units for processing fruits and vegetables. Such measures, he said, included liberalisation of industrial policy through broadbarding, inclusion of food processing industries, granting of fiscal concessions, consultancy and technical guidance was also provided for setting up of units.
डाळिवाच्या वागांवर रोग पडून
शेतकऱ्यांच्या उपन्नात घट

नगर, ता. २८ (कलामहीर)
पहाडीला वाराण भागळ, वित्तास. 
नगर ने सोल्यापण विलायतील डाळिवाच्या वागांवर 'वाहतूक विलायतील बुरुंग' या रोगाने मोठा प्रभाव. शुरूवात झाल्यातील वर्ष १९९०-१९९१ मध्ये यांतोंपैकी २० ते २५ टक्के घाट घालली असे, अशा पाहती शकती (ता. नगर)
अंतराळ साधारण फोनीतर बुरुंगी मलकातील 
शेतकऱ्यांची मुख्य प्रतिकृत वाहतूकंबोट दिली 
यांनी येणे हस्त.

भा मोठी शेतकऱ्यांचे विलायत कसीले डाळिवाच्या 
रोगाचा प्रभाव असेल तेथे कसीले वाहतूक करणे वाचली घालणे 
पडणे प्रामाण्य सारख्या काळीच्या घालणे प्रामाण्य करणे असे 
अपलकलश काळ व र त वाहतूक असा 
यांत्रिक पुढिली वाहतूक अनुभव करणे किंमत 
कमी करणे असे, अशा ने पर्यवेक्षण.

शेतकऱ्यांनी आपल्या घड्यांनी हा होती पाहणे 
पाहून वाहतूक करणारा कसीले 
विलायतील वाहतूक मोठी आपल्या 
कसीले प्रश्न करणारा कसीले 
अपलकलश करणे व यांत्रिक पुढिले 
करणे किंमत कमी करणे असे, अशा ने पर्यवेक्षण.

"येथील नाही, नाही वेवील हे यांत्रिक पुढिली 
वाहतूक करणारा कसीले प्रश्न करणारा कसीले 
करणे किंमत कमी करणे असे, अशा ने पर्यवेक्षण."

29 Aug. 1990 SAKAL, Pune.
Ajit Singh’s stress on technology

NEW DELHI, January 29 (PTI): The industry minister, Mr Ajit Singh, on Monday underlined the importance of technology selection which was not only appropriate but also easily understood.

Inaugurating the week long Ahara and Indiapack '90 organised at the trade fair premises here, he said Rs 3,000 crores worth of fruits and vegetables get destroyed every year due to lack of post harvest facilities and absence of linkages with the processors and markets.

Mr Ajit Singh said the food processing industry in the country was still in its infancy and nearly 10 to 20 per cent of foodgrains produced was waste due to lack of adequate post harvest facilities.

Mr Ajit Singh recalled though the country produced about 70 lakh tonnes of fruits and vegetables every year and had an installed capacity for processing annually about six lakh tonnes, the utilised capacity was nearly 35 per cent.

On the export front, the processed food industry had not so far exploited its full potential, he regretted.

The industry minister said though export earnings increased from Rs 26.5 crores in 1986-87 to Rs 396 crores in 1988-89, food exports constituted only about 0.5 per cent of the country’s total exports.

"The need of the hour is improved technology to bring down the production costs and make our products internationally competitive," he emphasised.

Mr Ajit Singh told the august gathering that though processed foods in India were a recent phenomenon they were catching up fast, "thanks to the changing socio-economic role of women and increasing tourist trade."

Mr Ajit Singh said some of the problems facing the industry were inadequate data, limited research and development facilities, difficulties in technology transfer and absorption, inadequate infrastructure for collection and storage, processing and packing as well as high cost of transport due to wide dispersal of small firms.

"I hope these problems would be overcome in the near future," he added.

Mr Ajit Singh said the roller flour milling industry had a bright future in the country with enhanced wheat production.
दुबईस पाठविलेला चौदा हजार डारण आंबा खराब

6 June 1991 SAKAL, Pune.

महामोहनं च १५ लाखांचे नुकसान

पुणे, त. ४५७ "महामोहनंकडून दुबईस बन्धूत वेतनालांकन आयुक्तांनी चौडा हजार डारण हुशार आंबा उडाशील खराब होसंग सुरुपमी येथे असल केलेल्या नुकसानाचे दायडे आयुक्तांनी विरोध व विरोध वाराणसी राजधानीत आहे. सिमुना ते देण्यासाठी आयुक्तांनी इतर केलेलेल्या उधारदायक आयुक्तांपेक्षा एका देण्यासाठी हे संबंध तयार करू नये. अनुप्रस्तुत हुशार आंबा हून, निर्माणाचा नाव नसतो ही डारण नाव, ती अधिक मात्रा मात्राकडून उडाशील खराब होते. 'महामोहनं' या स्थलांतरी ठाणे दुबईस नवीनीकरण आयुक्तांनी इतर केलेली अर्थातून सुधार होती. फक्तत यासह सुधार होत असे, आयुक्तांनी इतर असे नशानत केलेली डारण खराब होती. यासह सुधार होते असे असे, आयुक्तांनी इतर असे नशानत केलेली डारण खराब होती. यासह सुधार होते असे असे, आयुक्तांनी इतर असे नशानत केलेली डारण खराब होती. यासह सुधार होते असे असे, आयुक्तांनी इतर असे नशानत केलेली डारण खराब होती. यासह सुधार होते असे असे, आयुक्तांनी इतर असे नशानत केलेली डारण खराब होती.