



## Some New Post-Harvest Fungal Diseases Of Banana

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**Abstract:** Banana is the most important fruit crop in India, accounts for 31.7 percent of the total fruit production. Banana, commonly known as poor man's fruit is widely cultivated in varying agro-climatic regions under different systems of production. The banana research in India is directed towards increase in production and productivity. In India huge losses are being incurred on account of different types of post-harvest diseases. Post-harvest losses are much higher for highly perishable fruits and vegetables than cereals and field crops due to their high moisture content, softer texture and large unit size. Bananas are transported from localities of production to far off places for marketing and consumption. Banana fruits being succulent are liable to damage and deterioration during harvesting, transportation, marketing, storage and consumption, if not properly handled. Bananas stand in greater peril to disease and insect damage than the majority of other fruits because they are sterile, seedless mutants. However, banana cultivation continued to face several pests and diseases problems which have affected the production and productivity. The post-harvest fungal diseases of banana reported from Warangal have been discussed.

**Keywords:** Post-harvest diseases, Banana, Fruit spoilage fungi.

### Introduction

Fruits at the post-harvest stage are exposed to the unnatural conditions which predispose the fruits for the attack of fungi. Pathogenic fungi establish themselves in the host by secreting extracellular enzymes which break down the host tissues [1]. Banana, one of the most important fruit in many countries has a worldwide economic and nutritive importance. It constitutes the second largest fruit in production in India and globally bananas rank fourth after rice, wheat and maize in human consumption [2]. It contains an energy value of 116 K cal per 100 gms of edible product. Banana is also rich in vitamin -A, B, C, Mg, Ca, K, Zn and phosphorous. There are approximately 1200 seedless banana fruit varieties grown abundantly in many developing countries. Fungi are most commonly responsible for spoilage of these fruits during storage [3, 4].

The banana fruits being succulent are liable to damage and deterioration during harvesting, transportation, marketing, storage and consumption, if they are not handled properly. The deterioration mainly results due to physical injuries and enzymatic action by the attack of microorganisms. There are several reports of post-harvest diseases of banana from different countries [5, 6, 7, 8,

9]. Similarly Roy *et al.* [10], Chandra [11], Rawal and Summanwar [12], Jamaluddin *et al.* [13], Chitra and Arun [3] and Pawar and Papdiwal [4] have reported several post-harvest diseases of banana from India. Chitra and Arun [3] have also discussed the role of store house in relation to diseases associated with banana fruits. In this communication some of the post-harvest fungal diseases of banana which have not been reported earlier from India are described.

### Materials and Methods

A regular survey of fruit godowns of wholesale and retail markets of Warangal, (A.P.) was undertaken for post-harvest diseases of banana (*Musa paradisiaca* L.). The diseased fruits were collected separately in polythene bags to avoid contamination. The symptoms were carefully noted; completely rotten fruits were avoided for isolation as they contained mostly secondary pathogens. If fruit bodies were present on the infected portions, slides were prepared by scraping the diseased portions. Isolations were made from the juncture of healthy and diseased regions on the peel of the infected banana fruits. The diseased tissues were surface sterilized with 90% ethyl alcohol and transferred aseptically to Asthana and Hawker's medium [5g

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glucose, 3.5g KNO<sub>3</sub>, 1.75 g KH<sub>2</sub>PO<sub>4</sub>, 0.75 g MgSO<sub>4</sub>.7H<sub>2</sub>O, 15g agar-agar and 1000 ml of distilled water] slants. After 2 or 3 days the hyphal tips coming out of the infected tissues were transferred to fresh slants. The fungi were identified with the help of standard monographs [14, 15, 16, 17].

### Results

The fruit rot of Banana (*Musa paradisiaca* L.) are discussed below

#### **Alternaria rot:**

The infection starts as brown spots from the stalk end and advances towards the stylar end (Fig: 1). The spots turn to brownish-black with age. Repeated isolations from such spots revealed *Alternaria tenuissima* (Kunze) Wiltshire. in culture.

#### **Corynespora rot:**

The infection starts as water soaked patches and spreads with time, usually develop at the tip of the fruit. These patches progresses towards the base resulting in softening of the fruit. Isolations made from such portions revealed *Corynespora cassiicola* (Berk. and Curt.) Wei. as the pathogen (Fig: 2).

#### **Drechslera soft rot:**

The infection manifests as small circular, black to brown coloured spots near the stalk-end of the fruit. In advanced stages of infection bad odour along with plenty of mycelial mass covers the infected surface of the fruit. Repeated isolations from such infected portions revealed *Drechslera halodes* (Drechsler.) in culture (Fig: 3).

#### **Brown-blotch:**

The infection starts initially as dark-brown spots, which later coalesce to form bigger spots. Repeated isolations yielded *Fusarium chlamydosporum* (Wollenweber and Reinking) in culture (Fig.4).

#### **Fusarial rot:**

The infected fruits show brown, sunken spots that slowly spreads along the surface and the fruit pulp turns soft and watery with the advancement of the infection. The tissue bit isolations and microscopic examination revealed *Fusarium pallidroseum* (Cooke) Saccardo in culture (Fig.5).

#### **Brown rot:**

The infection manifests as brown coloured spots on the fruit surface. These spots coalesce and spread along the surface of the fruit with age. Isolations made from such diseased tissues yielded *Fusarium poae* (Peck) WollenW. in culture (Fig: 6).

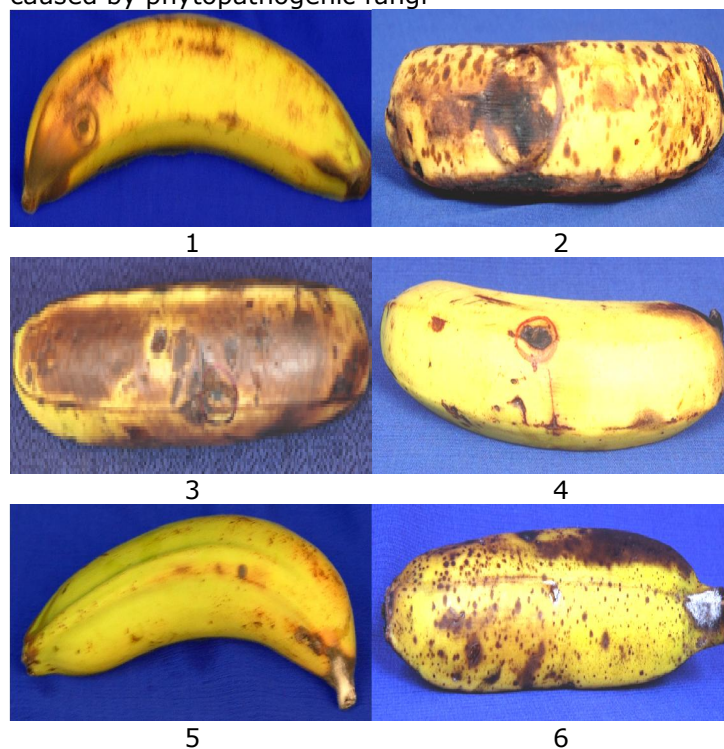
#### **Macrophoma rot:**

Infection starts as small, round, brown scattered spots on the fruit surface. These spots usually turn to dark-brown in colour and results in tissue disintegration. Isolation from such spots revealed *Macrophoma musae* (Cooke.) Berl.et Vogl. in culture (Fig: 7).

#### **Charcoal rot:**

Infection appears in the form of patches near the tip of the finger. The surface becomes slightly softened and blackened, extending towards the other part of the fruit. On severe infection dark colouration on the surface of the fruit appears with black to brown margin. Isolations made from such diseased portions revealed *Macrophomina phaseolina* (Tassi) Goid. in culture (Fig: 8).

**Fig.I:** Symptoms of fruit rot of Banana caused by phytopathogenic fungi





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### Banana disease development:

In Warangal, these pathogens are found wherever bananas are grown, more prevalent in areas, where growers do not follow good field and packinghouse sanitation practices. The general conditions favoring post-harvest banana disease development are:

- Poor disease management and cultural practices in banana fields for fungal diseases of leaves and fruits - poor weed control, no regular pruning to thin out plant population density and poor soil fertility management).
- High rainfall and high relative humidity.
- Poor fruit storehouse practices (poor sanitation in banana storehouses, use of unclean knives or ragged cuts during de-handing of banana hands from stalks).
- Not enclosing banana bunches on plants in fields with perforated polyethylene bags.
- Fruits are not harvested on time.

Banana fruits should be handled carefully at all times to avoid bruising or other injuries. To prevent the post-harvest diseases, growers and marketers should adopt certain practices. An integrated management practice plays an important role in preventing the post-harvest diseases of banana which includes: field sanitation, pruning, weed control, soil fertility and water, field drainage, bunch management, use of pre-harvest fungicides, proper harvesting and proper store house practices.

### Conclusion

The potential and production constraints due to biotic and abiotic stresses have warranted systematic research in banana. The complexity of problems needs basic, strategic and adaptive research to attain maximum production and productivity in banana with an interdisciplinary and holistic approach without affecting the existing ecosystem.

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### References

1. Ajayi AA, Adejuwon AO, Olutiola PO, Partial purification of polygalacturonase from tomato fruits infected by *Rhizopus arrhizus* Fisher, Journal of Plant Sciences, 2007, 2, 216-221.
2. Arias P, Dankers C, Liu P, Pilkauskas P, La economia mundial del banana 1985-2002, FAO, Rome,2004.
3. Chitra A, Arun A, Aeromycoflora of fruit markets of Baroda, India and associated diseases of certain fruits. Aerobiologia. Int. J. of Aerobiology, 2007, 23, 283-289.
4. Pawar BT, Papdiwal PB. Studies on some fungal post-harvest diseases of fruits from Aurangabad district, Bioinfolet, 2008, 5, 37-39.
5. Cordeiro ZJM, Matos APD, Diseases of banana, Doencas da banana. Informe Agropecuario, 2005, 26,12-16.
6. Jones DR, Stover RH, Fungal Diseases of Banana Fruit, Pre-harvest Diseases, In: Diseases of Banana, Abaca, D.R.Enset, Jones (Ed.), Wallingford, UK, CABI Publishing, 2000, 173-190.
7. Llyas MB, Ghazanfar MU, Khan MA, Khan CA, Bhatti MAR, Post-harvest losses in apple and banana during transport and storage, Pak.J.Agri.Sci, 2007, 44, 534-539.
8. Sulali Anthony, Krishanthi Abeywickrama, Ranjith Dayananada, Shant Wijeratnam, Luxshmi Arambewela, Fungal pathogens associated with banana, Mycopathologia, 2004,157, 91-97.
9. Sadhu BP, De AB, Gupta K, A new post-harvest disease of banana. Indian Phytopathology, 1992, 45, 473.
10. Roy AK, Singh CP, Singh DK, Some new unrecorded fruit rot disease of banana, Indian Phytopathology, 1989, 42, 202-203.
11. Chandra KJ, Status of Banana Diseases in India., In Banana diseases in Asia and the Pacific, Proc.Tech.Meet, Diseases Affecting Banana and Plantain in Asia and Pacific Brisbane, Australia, R.V.Valmayor, B.E.Umali, P.C.Bejosano, Eds.; INIBAP, Montpellier, France, 1991, 38-43.
12. Rawal RD, Summanwar AS, Diseases of banana and their management In: Diseases of

- fruits and vegetables and their management (ed: T.S. Thind), Kalyani publishers, 2001, 111-127.
13. Jamaluddin MG, Goswami, Ojha BM, Fungi of India, 1989-2001, M/S Scientific Publ., Jodhpur, India, 2004.
  14. Barnett HL, Hunter BB, Illustrated genera of important fungi. Burgess Publishing Company, U.S.A, 1972.
  15. Ellis MB, 1976. "More dematiaceous hyphomycetes". Commonwealth Mycological Institute, Kew, Surrey, England.
  16. Sutton, B.C., 1980. The coelomyces fungi imperfecti with pycnidia, acervuli and stomata, Commonwealth Mycological Institute, Kew, England.
  17. Samson RA, Moekstra E, Van CN, Introduction to food-borne fungi. Institute of the Royal Netherlands, Academy of Arts and Science, 1984.

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