



RESEARCH NOTE

A Report on occurrence of *Lasiodiplodia* fruit rot infecting jackfruit in Odisha state

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ABSTRACT: Jackfruit (*Artocarpus heterophyllus* Lam.) with symptoms new kind of fruit rot was documented during June 2017 and 2018 in germplasm collections maintained at IIHR- Central Horticultural Experiment Station (ICAR-IIHR) located in Bhubaneswar, Odisha. The brown circular lesions were observed on maturing jack fruits in nine germplasm lines IIHR-B-J-17, IIHR-B-J-19, IIHR-B-J-22, IIHR-B-J-28, IIHR-B-J-29, IIHR-B-J-30, IIHR-B-J-31, IIHR-B-J-32 and IIHR-B-J-35 with the incidence level of 1-4%. The causal agent was identified as *Lasiodiplodia theobromae* (Pat.) Griff. & Maubl. (Syn. *Botryodiplodia theobromae* Pat.) based on pathogenicity assay, morphological and spore characters.

Keywords: Jackfruit, fruit rot, *Lasiodiplodia*, Odisha

Jackfruit (*Artocarpus heterophyllus*) is a tropical climacteric fruit belonging to the family Moraceae. It is native to western Ghats of India. Even though jack fruits are used both for culinary and table purpose, it is mainly preferred for culinary purposes in the state of Odisha. It is available in market from the month of February till late summer. Jack fruit seed is a delicacy during the fruit season and relished as nutritional nut majorly in rural part. The timber is valued for its strength hence used for furniture making. In recent days, several products like squash, jam, candy, *halwa etc* are being prepared as a value-added product from ripe jack fruit. Among top ten states producing jack fruit in our country, Odisha tops second in the list with the production of 232.79 metric tonnes next to Tripura (NHB, 2015-16). In districts like Phulbani, Koraput, Ganjam, and Kalahandi, jack fruit is widely cultivated in Odisha, however, in other districts, the crop is found sporadically. Chips making from semi ripened jack fruit is becoming popular in some districts like Koraput and Rayaghada to sent distant markets.

Even though jack is a hardy crop it is being infected by various insect pests and diseases which limits its production in certain locations. There are more than 20 diseases reported on jackfruit and among them, *Rhizopus* rot caused by *R. atrocarpi* Raciborski. is the most predominant disease wherein female flowers and mature fruits escape this disease. But male flowers and sometime small fruits are infected by *Rhizopus*. The infected fruit rot slowly, mummify and fall from the tree (Roy 1983). The *Rhizopus* fruit rot was reported and studied by various workers from parts of our country (Mohanty and Patnaik, 1970; Roy, 1983 and Gupta and

Pandey, 1985). Another fruit rot caused by *Rhizoctonia solani* Kuhn was reported from Kerala by Menon *et al.* (1979) which could infect both mature and immature fruits, however not reported to occur from other parts the country. Likewise, blossom and fruit blight by *Botrytis cinerea* was reported from Dehradun region of Uttarakhand (Pandey *et al.* 1981). In addition, many leaf spot/ blights of jack caused by various organisms like *B. theobromae* (Rao and Deshmukh 1986; Haque *et al.* 2005), *Chaetopyrena hesperidum* (Srivastava, 1974) *Cercospora mehran* (Rao and Subhedar, 1978), *Colletotrichum lagenarium* (Rangaswami, 1972), *Phyllosticta artocarpina* (Tandon and Bilgrami, 1957; Awasthi *et al.* 2005) and tip blight by *Colletotrichum gloeosporioides* (Joshi *et al.* 2015) were reported by different workers in India. *Botryodiplodia theobromae* Pat. was reported to cause seed rot from Hyderabad and Secunderabad (Manoharchary *et al.* 1978). Jackfruit rot cause *L. theobromae* was reported from Taiwan by Ni *et al.* (2008) and by *Aspergillus niger* in Mexico by Ragazzo *et al.* (2011)

At the experimental orchard of IIHR-Central Horticultural Experiment station located in Bhubaneswar, Odisha, a new kind of fruit rotting was observed in jack fruit during June to July 2017 wherein infected portion of matured fruits were covered by thin grey mat of mycelia with extensive rotting. In contrary, *Rhizopus* fruit rot can be characterized by covering of flower (male) and young fruits with fluffy mycelial growth consist of black headed sporangia and sporangiospore. In this new fruit rot, at early stage of infection, small patches of brownish lesions with a diameter ranging from 2.0-8.0 cm were observed

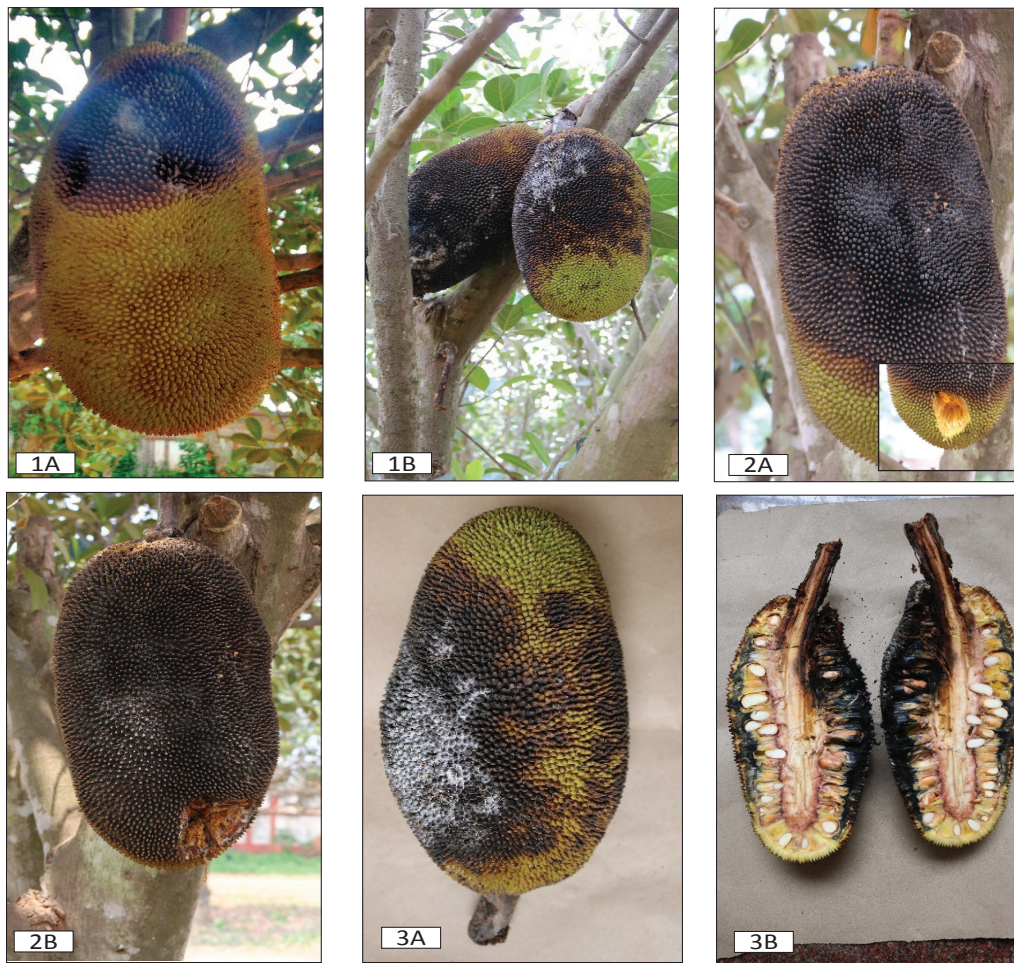


Fig 1A to 3B. *Lasiodiplodia* fruit rot infecting Jack fruit

on the peel either singly or in a group in scattered way (1A, 1B). The lesions could expand rapidly within few days to week and could cover half of the fruit and cause collapse of fruits in short time (2A and 2B). Further the rotting spreads quickly and extends to the pulp and cause pulp to rot in short span of time. The rotten pulp including flakes become brown to black, liquid and unfit for consumption or for any purpose (Fig 3A and 3B). Further it was found that the fungus infects the half maturing fruit to fruit of ripening stage and caused complete loss of fruits.

One to four percent disease incidence was recorded in nine out of 30 germplasm collections of jack fruit. With the above information, study was initiated with the objective to identify the causative agent of fruit rot of jack fruit. The fungus was isolated from the margin of lesions along with some healthy portion and cultured on Potato Dextrose Agar medium. The resulting fungus was sub cultured by single hyphal tip method. Pure culture of the fungus was obtained and maintained at 4°C for further use.

For pathogenicity evaluation, six healthy matured

jack fruits free from any physical injury/disease were collected from the field and washed with running tap water and cleaned with 0.1 per cent sodium hypochlorite and washed with sterile distilled water. Then the fruits were allowed to dry and after one hour, three fruits were wounded with sterile needle and inoculated with 6.00 mm mycelial disc of the fungus. On control group, a sterile PDA agar plugs were placed on wounded site. In both control and treatment, the agar disc was covered with sterile absorbent cotton and sprayed with sterile distilled water. The inoculated and uninoculated control fruits were kept inside a big poly covers separately to maintain humidity at room temperature for 48hours. A week after inoculation, brownish lesions were started appearing at the site of pathogen inoculated fruits but no lesions were observed on fruits inoculated with sterile agar disc. Further on fruits inoculated with fungi, the lesions started increasing its size which lead to collapse of fruit tissues underneath the rind of fruit. From the advancing margin of the lesions, the pathogen was re-isolated and confirmed thus fulfilling the Koch's postulates. The above experiment was repeated twice and confirmed the results.

The microscopic observation revealed the presence of pycnidia, the asexual fruiting body of the fungus. The conidia were ovate, but when young, they appeared hyaline without septation but when matured and become dark brown with one median septation. The matured conidia measured 20.0 -27.5 x 12-16 µm in size. The morphology of the fungus was similar to *Lasiodiplodia theobromae*(Pat.) Griff. & Maubl. (Syn *Botryodiplodia theobromae* Pat.) causing stem end rot of mango as well as crown rot of banana. The spore descriptions were in agreement with Manoharchary *et al.* (1978) and Sutton, (1980). Hence, on the basis of morphological and cultural characters and pathogenicity test, the fungus was identified as *L. theobromae*. Earlier from Taiwan, *L. theobromae* was reported to cause fruit rot in Jack with similar symptoms as described above under humid conditions (Ni *et al.*, 2008). Even though, on jack fruit, *L. theobromae* was reported to cause seed rot (Manoharchary *et al.* 1978) and leaf blight disease (Rao and Deshmukh, 1986) and our report seems to be the first report of fruit rot infection in India.

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