

Research Paper :

Morphological and aflatoxigenic variation among the isolates of *Aspergillus flavus* isolated from spoiled sweet orange (*Citrus sinensis*)

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SUMMARY

A study was carried out on morphological and aflatoxigenic variability among 19 isolates of *Aspergillus flavus* isolated from spoiled sweet orange (*Citrus sinensis*) fruits. All the 19 isolates varied in colony characters, radial colony growth rate, sporulation, sclerotia formation, size, and number of sclerotia. Colonies of seven isolates were dark parrot green and fast growing with profuse sporulation, whereas eight isolates were dark olive green and slow growing with moderate sporulation in center. Other four isolates showed white fluffy colonies with yellow moderate sporulation and moderately growing. Out of these, six isolates were non-sclerotia producing where as 13 isolates were sclerotia producing. Among the sclerotia producers, three isolates produced large size (1097 to 1247mm) sclerotia but few in number (30 to 50 sclerotia/plate), seven isolates produced medium size (717 to 912mm) sclerotia and number of sclerotia varied from 53 to 110 /plate. Other three isolates produced sclerotia in very large number (150 to 270 sclerotia/plate) but smaller in size (407 to 709mm). Fast growing isolates showed 90 mm colony diameter, moderately growing isolates showed 42.6 to 77.3 mm colony diameter and slowing growing isolates showed 35.1 to 41.7 mm colony diameter after 72 hours of incubation at 28 °C in BOD. Among 19 isolates, only two isolates were non-aflatoxigenic and other 17 isolates were aflatoxigenic. Among aflatoxigenic isolates, three isolates were weakly aflatoxigenic (207.2 to 321.8 mg/liter), four isolates were moderately aflatoxigenic (334.5 to 531.7 mg/liter) and remaining ten isolates were highly aflatoxigenic (1107.3 to 1787.9 mg/liter). This preliminary information generated on aflatoxigenicity revealed that aflatoxin B₁ produced by these isolated in sweet orange juice ranged from 207.2 to 1787.9 µg/liter of sweet orange juice. Results of this study leads to two important conclusions; firstly sweet orange fruits served as a rich source of ascorbic acid which favours aflatoxin B₁ production by toxigenic *A. flavus* strains. Secondly the quantity of aflatoxin B₁ produced by these isolate is very high than the tolerance limit (5 ppb) fixed by World Health Organization, which is a great concern to the health of consumers especially in a country like India where toxicity by aflatoxin has already been recognized.

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Nutritional value of fruits chiefly depends on their quality and concentration of sugars, vitamins and other essential substances. The fungal pathogens, which are responsible for post-harvest fruits spoilage grow mainly at the expense of various nutrients present in fruits and reduce their nutritional and market values considerably. The fungi responsible for such post-harvest rots may originate within the enclosure of storage houses or they may be carried along with the packing materials like leaves, straw and baskets or may get associated with the surface of the fruits in the field (Meredith, 1961; Sullia and Khan, 1980 and Panduranjan and Suryanarayanan, 1985). According to Indian Horticulture Database, average post-harvest loss of lime and lemon in India ranges from 20–90 per cent (Indian

Horticulture Database, 1997). *Aspergillus flavus* not only disfigures or causes rot to fruits but produces aflatoxin which are considered to be potent carcinogens and teratogens to humans and farm animals. Besides causing quantitative loss, *Aspergillus* infections may even increase the health hazards in human beings due to the production of many toxic secondary metabolites known as mycotoxins (Sharma and Sumbali, 1999; Singh and Sinha, 1983; Singh and Sumbali, 2000) whose ingestion by human beings may lead to several disorders (IARC, 1993).

Bamba (2002) isolated five species of *Aspergillus viz.*, *A. niger*, *A. flavus*, *A. nidulans*, *A. terreus* and *A. sulphureous*. Among the various species of *Aspergillus*, those belonging to section Flavi have often