

Detection of green mold rot infection of citrus fruit by X-ray scanning non-destructive technology

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ABSTRACT

Green mold rot is an important post-harvest fungal disease of citrus. It is caused by *Penicillium digitatum*. To study the detection of fungal infection in citrus fruit by X-ray scanning technique, the spore suspension of *P. digitatum* was inoculated by sterilized disposable syringe in citrus fruit in aseptic condition. Healthy citrus without inoculation was treated as control. Infection of green mold rot was detected by X-ray scanning non-destructive technology.

KEY WORDS: Citrus, *Penicillium digitatum*, post-harvest disease, X-ray scanning

INTRODUCTION

Citrus fruit is susceptible to many post-harvest fungal diseases - green mold rot, blue mold rot, *Alternaria* rot, anthracnose, stem end rot, *Aspergillus niger* rot, *Fusarium* rot, etc., among these diseases, green mold is of major concern and causing the major post-harvest losses in citrus.

X-ray scanning non-destructive technology has been applied in detection of spongy tissue of mango fruits (Thomas *et al.*, 1993; Janave, 2007). To date, research on the detection of post-harvest fungal diseases of citrus fruits using X-ray scanning non-destructive technology is practically lacking. The aim of this study was to detect green mold rot infection of citrus fruits using X-ray scanning non-destructive technology.

MATERIALS AND METHODS

The green mold rot infected fruits of citrus were collected from fruit market of Palam District; Parbhani, Maharashtra and brought to laboratory of Department of Botany, Madhavrao Patil College, Palam District; Parbhani, Maharashtra, India. The pieces of diseased fruits were surface disinfected with 2% sodium hypochlorite for 3 min, then rinsed with tap water, and then dried using sterile filter paper. Surface disinfected pieces were separately transferred

to sterilized Petri dishes containing potato dextrose agar medium and incubated at 25°C for 10 days. The isolated fungi were purified using single spore technique. X-ray scanning of citrus fruits was carried out using the method of Gadgile and Chavan (2017). X-ray scanning of fruits was spore suspensions of *Penicillium digitatum* was prepared and inoculated in same sized healthy citrus fruits by sterilized disposable syringes in aseptic condition. Healthy citrus without inoculation was treated as control. After 3-8 days of inoculation, these citrus fruits were scanned by a digital X-ray system. The specifications with which X-ray exposure was taken are as follows: kv = 63; mA = 160 and mAs = 13.

RESULTS

It was found after 5-8 days of inoculation, infection of green mold rot could be detected by X-ray scanning. X-ray scanning of infested citrus showed dark areas in fungal infected portion. While X-ray scanning of uninfected citrus showed a uniform light gray area. After X-ray scanning when infected fruits were cut, infection was seen clearly (Figure 1).

DISCUSSION

To our knowledge, this is the first report on the detection of green mold rot infection of citrus fruits using X-ray scanning non-destructive technology. Gadgile and Chavan (2017)

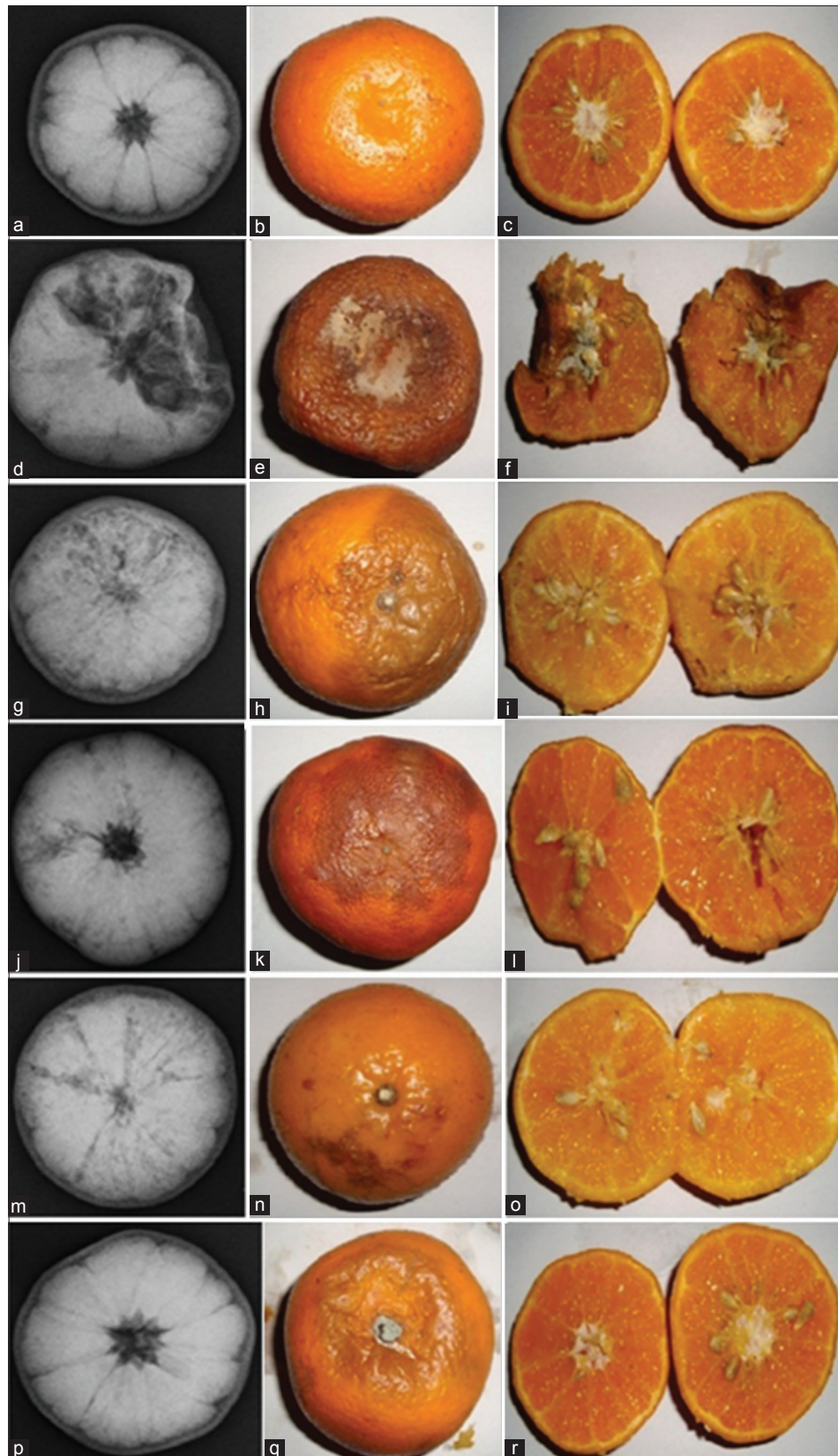


Figure 1: X-ray scanning of green mold of citrus fruit. (a) X-ray image of healthy fruit, (b) healthy uncut fruit, (c) healthy cut fruit, (d) X-ray image of fruit 8 days post-inoculation, (e) uncut fruit 8 days post-inoculation, (f), cut fruit 8 days post-inoculation, (g) X-ray image of fruit 7 days post-inoculation, (h) uncut fruit 7 days post-inoculation, (i) cut fruit 7 days post-inoculation, (j) X-ray image of fruit 6 days post-inoculation, (k) uncut fruit 6 days post-inoculation, (l) cut fruit 6 days post-inoculation, (m) X-ray image of fruit 5 days post-inoculation, (n) uncut fruit 5 days post-inoculation, (o) cut fruit 5 days post-inoculation, (p) X-ray image of fruit 4 days post-inoculation, (q) uncut fruit 4 days post-inoculation, and (r) cut fruit 4 days post-inoculation

observed same results in mango fruit. The result suggested that X-ray scanning non-destructive technology is an efficient method for detection of green mold rot infection of citrus fruits. X-ray scanning for detection of fungal infection may be useful in the X-ray imaging-based citrus sorting system. It may useful for traders exporting bulk quantities of fruits.

CONCLUSION

From present investigations, it can be concluded that green mold rot is sever post-harvest disease of citrus fruit and infection of this disease can be detected by X-ray scanning non-destructive technology.

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