



MICROBIOLOGY

IMPACT OF TEMPERATURE AND RELATIVE HUMIDITY ON DEVELOPMENT OF *ASPERGILLUS FLAVUS* ROT OF MANGO FRUIT

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Abstract

Effect of temperature and relative humidity on severity of disease, spore germination, Cellulase and pectinase enzyme activity of *Aspergillus flavus* rot was studied. It was found that low temperature and low relative humidity inhibits severity of disease, spore germination, cellulase and pectinase enzyme activity of *A. flavus*.

Key Words: Mango fruits, Temperature, Relative humidity, *Aspergillus flavus* rot

Introduction

In post-harvest conditions mango get infected by several fungal diseases like *Rhizopus* rot, Anthracnose, stem end rot, *Aspergillus niger* rot, *Penicillium* rot, *Aspergillus fumigatus*, *A. flavus* rot etc. (Dasgupta and Bhatt, 1946). Temperature and Relative humidity (R.H.) play vital role in the development and spread of post-harvest fungal diseases (Gadgile *et al.*, 2009, Gadgile *et al.*, 2009a). However there is very little information about the effect of temperature and R.H. in respect to *A. flavus* rot of mango fruit. Due to this reason attempts were made to determine the impact of these physical factors on *A. flavus* rot.

Materials and Methods

Fresh, healthy and mature mango fruits of Kesar variety were collected from Aurangabad fruit market. Mango fruits were surface sterilized with 0.1 % HgCl₂, Pricked to a depth of 2mm and washed with sterile distilled water. The injured fruits were dipped in spore suspension (10⁶ spore/ml) of *A. flavus* for 2min. Then the fruits were placed in sterilized polythene bags as one fruit per bags. These polythene bags containing mango fruits were incubated to different level of temperature and RH percentage. Adjusted level was maintained by the method recommended by Buxton and Mellanby (1934). Severity of rot was recorded on 8th day of incubation on the basis of percent fruit area infected.

Impact of temperature and R.H. on spore germination of *A. flavus* was examined by placing spores on glass-slide placed to different levels of temperature and R.H. Effect of temperature and R.H. on activity of cellulase and pectinase enzyme

of the *A. flavus* was investigated by incubating inoculated fruits at different temperature and R.H. at 25°C. On 8th day of inoculation 5g of rotted tissue was macerated with distilled water and 0.5N NaCl. The extract was filtered and filtrate was centrifuged at 4000 rpm for 25min. The supernatant was used as enzyme sample. Pectinase was assayed gives in 2ml of enzyme sample, 5ml of 1% pectin dissolved in buffer solution (pH- 4.5), 1.8ml of phosphate citrate buffer solution (pH-4.0) and 1.5ml of distilled water. The cellulolytic were assayed using 2ml of enzyme sample, 5ml of 1% CMC (Carboxy Methyl Cellulose), dissolved in buffer solution (pH-4.5), 1.8ml of sodium citrate buffer (pH-4.8) and 1.8ml of distilled water.

The enzyme activity was assayed by determining loss in viscosity of the reaction mixture after 120 min at 30° C following the method of Bell *et al.* (1955). The data were statistically analyzed for C.D. following Panse and Sukhatme (1978).

Results and Discussion

At 35°C and 100% R.H *A. flavus* rot severity was maximum. Severity was absent at 10°C and at 30% R.H. showed very less rotting of mango fruits. Severity was increased from 30 to 100% R.H. (Table 1 and 2). The spore germination of *A. flavus* was increased with temperature and R.H. level. The spore germination did not occur at 10°C up to 24 hours of incubation. Maximum spore germination was at 35°C and 100% R.H. and Minimum at 45°C and 30% R.H. Cellulase and pectinase activities were highest at 35°C and 100% R.H. and lowest at 10°C and 30% R.H. (Table 1 and 2).

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Table 1. Impact of temperature on disease severity, spore germination, cellulase and pectinase enzyme activity of *A.flavus* rot of mango fruits.

Temp. (°C)	Disease severity %	Spore germination % after 24 hours	Enzyme Activity	
			Cellulase	Pectinase
10	0.0	0.0	9.1	7.6
25	40.3	59.3	14.7	13.6
35	52.4	79.1	46.6	43.2
45	40.1	65.3	40.2	37.9

Enzyme activity values are expressed in viscosity loss % after 120 minutes

Table 2. Impact of Relative humidity on disease severity, spore germination, cellulase and pectinase enzyme activity of *A.flavus* rot of mango fruits.

R.H. (%)	Disease severity %	Spore germination % after 24 hours	Enzyme Activity	
			Cellulase	Pectinase
30	21.13	22.5	11.3	9.2
50	33.5	31.6	15.8	15.7
80	51.8	67.5	54.9	47.3
100	62.7	80.1	68.1	66.1

Enzyme activity values are expressed in viscosity loss % after 120 minutes

The present research findings reveals that optimum temperature and R.H. for *A. flavus* rot was 35°C and 100% respectively and the pathogen did not show any symptoms at 10°C. Hence it can be concluded at low temperature (10°C) and low humidity (30%), *A. flavus* rot is not developed in mango fruits while at room temperature (35°C) and high humidity (100%), *A. flavus* rot is sever. The finding suggests that storage of mango fruits at low R.H. and low temperature reduces *A. flavus* rot of mango fruit.

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