

RESEARCH ARTICLE

Epidemiology of post-harvest black mould fruit rot of pomegranate (*Punica granatum* L.) caused by *Aspergillus niger*

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ABSTRACT

Lab experiment was conducted at Dept. of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, during 2008-09 and it was found that all the fruits exhibited symptoms of the rot when fruits were inoculated by cork borer wounding method at unripe, semi-ripe and ripe stage. Severity of the rot was maximum in fruit inoculated at ripe stage. Temperature had a profound effect on development of rot, incidence and severity were lowest in fruits pre-disposed at 0°C. The maximum severity was found on fruits pre-disposed to 30°C. Lowest severity of the rot occurred when fruits were pre-disposed at 50 per cent relative humidity. The severity of the rot increased with increasing levels of relative humidity. Maximum severity of the rot was observed on fruits pre-disposed to 100 per cent relative humidity.

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INTRODUCTION

Pomegranate (*Punica granatum* L.) is an important favourite fruit of tropical, sub-tropical and arid regions. It belongs to the family Punicaceae and is believed to native of the middle East (Iran and adjoining countries) and spread to most tropical and subtropical countries of the world. It is extensively cultivated in Iran, Egypt, Pakistan, Spain, Morocco, Afghanistan and in some place of Myanmar, China, Japan, California, South Italy and Bulgaria (Mitra *et al.*, 1999). Pomegranate fruits are the good sources of carbohydrates and mineral such as Ca, Fe and S and a moderate source of pectin (Waskar, 2006). The pomegranate fruit suffered from several fruit rot diseases (Kanwar and Thakur, 1973). The incidence was found to be 10-20 per cent on pomegranate fruits.

MATERIALS AND METHODS

Mature pomegranate fruits were inoculated with the uniform amount of inoculum by cork-borer wounding method (A hole of 2 mm diameter and 2 mm depth was made with the help of a sterilized cork borer). The inoculum was placed in the hole and the host tissue was replaced on the hole and effect of fruits ripeness (unripe fruits, semi-ripe fruits and ripe fruits stage of maturity), temperature (0, 5, 10, 15, 20, 25, 30, 35 and 40°C) and relative humidity (40, 50, 60, 70, 80, 90 and 100 per cent) were tested on disease development. Solution of sulphur acid (H₂SO₄) was used to produce different levels of relative humidity according to the procedure described by Buxton and Mellanby (1934). The inoculated fruits were placed in polythene bags (fruit ripeness) and desiccator (relative humidity) inoculated at 25±1°C in BOD incubators. The experiment was arranged in Completely Randomized Design. Data on incidence and severity of the rot were recorded after

3rd and 6th day inoculation.

RESULTS AND DISCUSSION

In all the stages of ripeness, cent per cent incidence of the rot was recorded on both 3rd and 6th days after inoculation (Table 1). Among the three stages the ripe stage, was found to be significantly (P=0.05) most susceptible to the fungus. The

difference was highly significant (P=0.05) at unripe, semi-ripe and ripe stage at 3rd and 6th days after inoculation. Symptoms of various rots in different fruits did not appear when inoculated at the immature stage as have been reported by other workers (Hasija and Batra, 1979 and Blancard *et al.*, 1984). However, in the present study, *Aspergillus niger* was found to exhibit symptoms in all the stages and maximum severity was found at ripe stage of fruits. Temperature had a

Table 1 : Incidence and severity of black mould fruit rot in pomegranate fruits inoculated at different stages of ripeness and incubated after 3rd and 6th days at 25±1°C

Stage of fruits at the time of inoculation	<i>Aspergillus niger</i>		
	Incidence* (%)		Severity* (%)
	3 rd days after inoculation	6 th days after inoculation	6 th days after inoculation
Unripe	100	4.00	5.00
Semi-ripe	100	6.00	7.50
Ripe	100	9.00	20.00
S.E.±	-	0.10	0.14
C.D. at 5%	-	0.31	0.45

*Average of four replications

Table 2 : Effect of temperature on incidence and severity of black mould fruit rot of pomegranate fruits incubated after 3rd and 6th days at 100 per cent relative humidity

Temperature (°C)	<i>Aspergillus niger</i>		
	Incidence* (%)		Severity* (%)
	3 rd days after inoculation	3 rd days after inoculation	6 th days after inoculation
0-5°C	0.00	0.00	0.00
10°C	100	2.40	4.50
15°C	100	3.50	6.00
20°C	100	6.50	8.50
25°C	100	7.50	13.50
30°C	100	9.75	19.50
35°C	100	8.50	13.75
40°C	100	6.00	9.50
S.E.±	-	1.24	1.97
C.D. at 5%	-	3.61	5.74

*Average of four replications

Table 3 : Effect of different levels of relative humidity on incidence and severity of black mould fruit rot of pomegranate fruits incubated after 3rd and 6th days at 25±1°C

Relative humidity (per cent)	<i>Aspergillus niger</i>		
	Incidence* (%)		Severity* (%)
	3 rd days after inoculation	3 rd days after inoculation	6 th days after inoculation
40	100	0.00	0.00
50	100	0.00	4.00
60	100	2.50	6.50
70	100	5.50	9.50
80	100	7.50	16.50
90	100	8.50	20.50
100	100	9.50	21.00
S.E.±	-	0.14	0.31
C.D. at 5%	-	0.41	0.92

*Average of four replications

profound effect on the symptoms of the rot appeared at a temperature range from 10°C to 40°C on both 3rd and 6th days of inoculation (Table 2). The severity was maximum at 30°C followed by 35°C, 25°C, 40°C, 20°C, 15°C and 10°C. At temperature 0-5°C, no disease was observed. Maximum decay of different fruits by various pathogens have been recorded at 15-30°C (Pathak, 1980; Bhargava, 1972; and Leong *et al.* (2006). In the present study, severity of black mould rot was also observed to be maximum at 30°C. Symptoms of the rot did not appear upto 6th day of inoculation in fruits kept at 0°C. Probably the temperature suppressed the activity of the pathogen and favoured host tissue resistance.

Relative humidity plays an important role in disease development. All the fruits inoculated with the pathogen showed symptoms of the rot at all the levels of relative humidity tried (Table 3). At 40 and 50 per cent relative humidity, the rot did not appear even after three days of inoculation. The severity of the rot increased with the increasing level of relative humidity and maximum severity of the rot was observed at 100 per cent relative humidity on both 3rd and 6th days after inoculation. Although, severity of rot did not differ significantly (P=0.05) at 90 and 100 per cent R.H. on both 3rd and 6th days after inoculation. High relative humidity is known to enhance fruit rot of different kinds (Pathak, 1980 and Moreau, 1960). In the present study, the rot increased in severity with the increase in levels of relative humidity.

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