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## Influence of physical factors on the incidence of anthracnose and malformation of mango under nursery condition

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Received : 24.12.2009

Accepted : 30.12.2010

Published : 25.04.2011

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Three years observation under natural nursery condition revealed that incidence of both anthracnose and malformation varied from year to year, where anthracnose was significantly higher during 2004 as compared to 2003 and 2005, and malformation was highest during 2003 and 2005 as compared to 2004. This variation of disease incidence in different years was due to the variation of temperature, relative humidity and rainfall during the period of disease incidence. Accordingly, incidence of anthracnose was favoured by temperatures between 24.6°C to 29.6°C and comparatively very low rainfall between 0.0 to 6.8 mm. While, that of malformation was influenced by temperatures between 21.6°C and 29.6°C and relative humidity between 63.18 to 76.40 per cent under nursery condition.

**Key words:** Incidence, anthracnose, malformation, mango, nursery condition, physical factors.

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### INTRODUCTION

Mango anthracnose caused by *Colletotrichum gloeosporioides* Penz. and malformation caused by *Fusarium moniliforme* Sheld. var. *subglutinans* Wollenw and Reink are the most serious diseases of mango (*Mangifera indica* L.) as the diseases are widely prevalent over different mango growing tracts of India including North-East, North-West and South. The diseases have gained importance due to regular occurrence during every year from mild to severe form. Heavy infection due to anthracnose reduces the photosynthetic area of leaves, causes defoliation and sometimes produces die back symptoms. The affected cultivar reduces its fruit quality and market value. It may be understood that the symptoms of malformation is qualitative one and once a seedling is infected it never recovers.

Although, reports on the influence of atmospheric temperature, relative humidity and rainfall on the incidence of both anthracnose and malformation under nursery condition are, however, scanty (Banik *et al.*, 1998). *In vivo* study on ripened mango fruits during June-July shows that incidence of *C.*

*gloeosporioides* is favoured by 33.5°C to 36.2°C and relative humidity levels between 84.32 to 86.60 per cent. Chakraborty *et al.* (1997) have determined the correlation between seasonal fluctuations of *F. moniliforme* inoculum density on the host tissue. As the information on this aspect is lacking from Indo-gangetic plains, the study has been undertaken to find out the influence of important physical factors on the incidence of anthracnose and malformation of mango under nursery condition.

### MATERIALS AND METHODS

The study was undertaken during the year 2003, 2004 and 2005 under natural condition at Agri-Horticultural nursery, (22.43°N and 88.34°E) Chowgacha (Dist. North 24 Parganas) located in the Gangetic plains of West Bengal during the months from January to May on the occurrence and incidence of these two diseases. A total number of 18 susceptible cultivars were included in the nursery raised during the month of July to August. Prior to varietal grafting of scion the stock seedlings were planted during the previous years (2000 to 2001) in 4 rows bed. Each row represented a single replica-



tion and it was 5.5 to 11.0 m long and it contained about 25 to 50 seedlings. The distance between seedlings to seedlings was 22.5 cm, while row to row distance was kept at 45.0 cm. Before planting of seedling fertilizers were applied (NPK, 10: 26 : 26) during September and October. Varietal grafting of scion was undertaken in the next year during the month of June to July. Each row in a bed contained a single grafted cultivar and for each cultivar 4 such rows were kept. Plant protection measure was undertaken by applying the insecticide Metasystox (0.15%). Normal irrigation practice was followed and no other plant protection measures were undertaken during the entire experimental period. The incidence of the diseases on the infected grafted seedlings were recorded following I (very slight to slight infection) to 5 (very heavy infection) scale as described by Sarkar *et al.* (2003).

The incidence of anthracnose and malformation diseases for the three consecutive years 2003, 2004 and 2005 were studied. Daily weather parameters such as maximum and minimum temperature ( $^{\circ}\text{C}$ ), relative humidity (%) and total monthly rainfall (mm) of 2003, 2004 and 2005 were recorded from the time of occurrence to the maximum disease development (Table 1) and were correlated with the disease incidence.

Data were also statistically analysed to find out the significant of difference in disease incidence in different years.

## RESULTS AND DISCUSSION

The result showed that anthracnose disease was different in different years and their differences were statistically significant. Among the three years, maxi-

mum anthracnose incidence was found in 2004 as compared in 2003 and 2005 (Table. 2) where as, the incidence of malformation was highest during both 2003 and 2005 as compared to 2004 (Table. 3).

In the year 2003, the average maximum temperature was  $24.65^{\circ}$  to  $29.75^{\circ}\text{C}$  during the period of disease development (March to April) but frequent rainfall (31.8 to 59.4 mm) during the period did not favour disease development probably due to washing out of inoculums from the leaf surface thereby reducing the expansion of lesion and inoculums density ultimately arresting the subsequent spread of this disease. In 2005 although, the average maximum temperatures  $26.94^{\circ}$  to  $29.68^{\circ}\text{C}$  were prevailed during the period of disease development but high rainfall (128.60 mm) during March resulted less disease incidence as compared to 2004. On the other hand in the year 2004 the average maximum temperature  $26.78^{\circ}\text{C}$  to  $29.16^{\circ}\text{C}$  and low rainfall (6.8 mm) during March might be the main attributing factors for the high disease development. The relative humidity was found to have less influence in disease development in all the three years. In respect of malformation in the year 2004, the average maximum temperatures  $20.67^{\circ}$  to  $26.78^{\circ}\text{C}$  during the period of disease development as compared to the years 2003 and 2005. On the other hand, in the years 2003 and 2005 due to prevalence of temperatures between  $21.6^{\circ}$  to  $26.9^{\circ}\text{C}$  and relative humidity levels between 63.18 to 76.40 per cent possibly favoured higher disease incidence. Rainfall had, however, a less influence on disease development.

The results also confirmed the earlier results of Banik *et al.* (1998) that linear growth of anthracnose pathogen *C. gloeosporioides* was maximum at  $28^{\circ}\text{C}$  and a good mycelial growth of this pathogen was

**Table 1 :** Daily average temperature, relative humidity (RH) and total monthly rainfall of nursery during the susceptible period of mango seedlings against anthracnose (*C. gloeosporioides*) and malformation (*F. moniliforme* var. *subglutinans*) of different years.

Location	Months	2003			2004			2005		
		Temp. ( $^{\circ}\text{C}$ )	RH (%)	Rainfall (mm)	Temp. ( $^{\circ}\text{C}$ )	RH (%)	Rainfall (mm)	Temp. ( $^{\circ}\text{C}$ )	RH (%)	Rainfall (mm)
(i) Agri-Hort. nursery, Chowgacha, (Dist. North 24 Parganas)	January	15.43	75.69	00.00	17.16	78.84	2.40	17.94	77.31	45.40
	February	21.61	63.18	00.30	20.67	71.05	00.00	22.73	73.41	00.60
	March	24.65	73.38	59.40	26.78	71.0	6.80	26.94	76.40	128.60
	April	29.72	74.36	31.80	29.16	79.23	7.20	29.68	76.83	13.50

**Table 2** : Incidence of anthracnose (*C. gloeosporioides*) of mango on cultivar Himsagar in different years.

Location	Year	Disease Index		
		Maximum	Minimum	Average
(i) Agri-Hort. nursery, Chowgacha, (Dist. N. 24 Pgs.)	2003	5.0	4.6	4.7
	2004	5.0	4.8	4.8
	2005	5.0	4.6	4.9
S.E. (mean) = $\pm$ 0.010				
CD at P = 0.05 = 0.039				
and at P = 0.01 = 0.065				

recorded at all RH levels between 60.0 to 100.0 per cent under *in vitro* condition. *In vivo* study on ripened mango fruits during June and July showed that the incidence of *C. gloeosporioides* was favoured by temperatures between 33.5° to 32.2°C and relative humidity levels between 84.32 to 86.60 per cent. Similar mango malformation was influenced by both of the temperatures and relative humidity positively (Setty and Uthaiyah, 1988).

Therefore, the present study concluded that incidence of anthracnose was favoured by temperatures between 24.65° to 29.68°C and comparatively very low rainfall between 0.0 mm to 6.8 mm, while that of malformation was influenced by temperatures between 21.61°C to 26.94°C and RH levels between 63.18 to 76.40 per cent under nursery condition.

**Table 3** : Incidence of malformation (*F. moniliforme* var. *subglutinans*) of mango on cultivar Bombay green in different year.

Location	Year	Disease Index		
		Maximum	Minimum	Average
(i) Agri-Hort. nursery, Chowgacha, (Dist. N. 24 Pgs.)	2003	5.0	4.6	4.9
	2004	5.0	4.6	4.7
	2005	5.0	4.6	4.9
S.E. (mean) = $\pm$ 0.007				
CD at P = 0.05 = 0.029				
and at P = 0.01 = 0.046				

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