EPIDEMIOLOGY OF MANGO ANTHRACNOSE CAUSED BY *Colletotrichum gloeosporioides*

***BHAGWAT, R. G.; MEHTA, B. P. AND PATIL, V. A.**

DEPATMENT OF PLANT PATHOLOGY
NAVSARI AGRICULTURAL UNIVERSITY
NAVSARI - 396 450, GUJARAT, INDIA

****E-mail: vijay.patilagri@gmail.com***

ABSTRACT

Epidemiology of mango anthracnose caused by Colletotrichum gloeosporioides was studied for two years, 2011-12 and 2012-13 in cv. Keasr at Agricultural Experimental Station, Paria, NAU, Navsari. The first anthracnose incidence was recorded, 45th SMW and reached at its highest peak on 52st SMW (31.95%). The disease was more progressive during 13th to 14th SMW (11.35 to 26.41 %) and the disease progress was slow down during 5th to 10th SMW (26.73 to 9.63%). Hence, 49th to 52nd SMW (30.61 to 31.95 %) can be considered as window period for the anthracnose disease of mango and it is very clear that the disease may start from 45th SMW (November 2nd week) and may progress up to 20th SMW (May 3rd week). But the window period is 47th to 52th SMW, when proper management measures should be taken to avoid the further spread of the disease and avoid losses.

KEY WORDS: Anthracnose, Colletotrichum gloeosporioides, epidemiology, mango

INTRODUCTION

Mango fruit is a potential source of sugar, pectin, vitamin-A, vitamin-C, and minerals like phosphorous, calcium etc. It is also extensively used for medicine and culinary purposes. The availability, acceptability and multipurpose utilization have adorned King's crown on mango. Hence mango has been called as "The First Fruit of India". Mango is grown in tropical and subtropical regions of south-east Asia. In India, it is cultivated in the states of Uttar Pradesh, Andhra Pradesh, Karnataka, Bihar, Gujarat, Tamil Nadu, Orissa, West Bengal, Jharkhand, Kerala and Maharashtra with annual production of 125.4 lakh tones from 2.30 million hectares of area. Anthracnose is the major disease of mango as it occurs at all the growing parts including leaves, twigs, flowers, fruits except root and trunk throughout the year. Anthracnose caused by *Glomerella cingulata* (Stoneman) Spauld and H Schrenk (anamorph: *Colletotrichum gloeosporioides* (Penz.)) appear to be more severe causing devastation of mango fruits during grading, packing, transportation, storage and marketing (Pathak, 1980).

MATERIALS AND METHODS

Epidemiology encompasses the study of all the factors associated with disease development. The three major components of disease i.e. susceptible host, virulent pathogen and favorable weather in time and space causes epidemic plot, was kept unsprayed with fungicide/insecticide. Trees were selected having similar age. Normal agronomic practices were adopted. Ten trees were randomly selected from each field and 10 shoots of similar trees were tagged. The observations were recorded weekly from cv. Kesar at Agricultural Experimental Station, Paria, NAU, Navsari from November to May for two years, i.e. 2011-12 1nd 2012-13. To know the time/stage of initiation, progress of anthracnose disease during the entire crop season in cv. Kesar, susceptible stage of the

crop and window period, the study was carried out. The disease intensity was correlated with the weather parameters *viz,* diurnal temperature, rainfall, wind velocity, sunshine hours and humidity. The per cent disease intensity was calculated by using the formula described in 3.1. Multiple regression equation was also worked out.

RESULTS AND DISCUSSION

Progress of mango anthracnose disease during crop season

The observations of anthracnose incidence were recorded at weekly interval on mango susceptible *cv*. Kesar grown at Agricultural Experimental Station, Paria, Navsari Agricultural University, Navsari during 2011-12 and 2012-13.

During 2011-12, the anthracnose was initiated on 45th Standard Meteorological Week (SMW) and reached at its highest on 52nd SMW (32.84%). The disease was more progressive during 13th SMW to 14th SMW (12.58 to 27.42 %). Hence, 49th to 52nd SMW can be considered as window period for the anthracnose disease of mango. During 2012-13, also the first anthracnose incidence was recorded at 45th SMW and reached at its highest on 51st SMW (31.20%). The disease was more progressive during 13th to 14th (10.12 to 25.40 %). Hence, based on the disease intensity in two years, 49th to 52nd SMW can be considered as window period for the anthracnose disease of mango. From the above results, it is very clear that the disease may start from 45th SMW (November 2nd week) and may progress up to 20th SMW (May 3rd week). But the window period is 49th to 52th SMW when proper management measures should be taken to avoid the further spread of the disease and avoid losses.

Correlation of anthracnose of mango disease intensity with weather parameters

Correlation matrix (2011-12) worked out (Table 1) showed that minimum temperature (0.442) was showed significantly positive correlation with person disease index (PDI), while maximum temperature (0.040), morning relative humidity (0.108), evening RH (0.177), average RH (0.202) and wind velocity (0.120) expressed non- significant positive correlation. However, sunshine hours (-0.070) recorded significantly negative correlation with PDI. During 2012-13, the PDI was found significant positive correlation with evening RH (0.421) and average RH (0.550), while minimum temperature (0.212), morning RH (0.368) and wind velocity (0.090) recorded non-significant positive correlation. Maximum temperature (-0.232) and sunshine hours (-0.100) found non-significant. Looking towards the correlation pooled data of year 2011-12 and 2012-13, the PDI was found significant positive correlation with minimum temperature (0.329), evening RH (0.308) and average RH (0.380), while morning RH (0.232) and wind velocity (0.104) recorded non-significant positive correlation. Maximum temperature (-0.083) and sunshine hours (-0.102) manifested non-significant negative correlation (Table 2).

Temperature, relative humidity, wind velocity and sunshine hours are important factors for geographical distribution of the fungus. In the present study, maximum anthracnose incidence was found at 52nd SMW. The disease was more progressive during 13th SMW to 14th SMW which indicated that it was the optimum period for growth of the fungus. This is in agreement with the findings of Dodd *et al.* (1991), who showed that conidia were observed to germinate and formed appressoria at R.H. between 95% and 100% even though free surface moisture was only visible at 100% R.H., whereas Fitzell and Peak (1984) noticed disease initiated under field conditions during the first week of March in both the years when the average maximum temperature was 24-26^{0}C and average R.H. was 82-96 per cent. Further increase in average maximum temperature and sporadic rainfall in April resulted in increase in average maximum and minimum R.H., which coincided with the emergence of new flushes which were more prone to disease. Sharma and Verma (2007) found correlation coefficient between different parameters *viz*., average maximum and minimum temperature, average minimum and maximum relative humidity and average rainfall. Disease index showed significant

positive correlation with average maximum relative humidity (Brown, 1974). A significant and positive correlation was observed between disease index and average minimum RH. Average rainfall also showed significant positive correlation with disease index.

This is the new information in the cultivation of mango in parts of Gujarat where anthracnose is very severe problem. The information will be very useful to formulate control measures and for forecasting of the disease to avoid more losses.

Multiple linear regression

The regression coefficient based on multiple linear regression analysis for per cent anthracnose disease intensity of mango with respect to weather parameters have been worked out. The regression coefficient for maximum relative humidity, minimum relative humidity, average relative humidity, minimum temperature and wind velocity were found to be positive and significant.

$$\overline{Y} = 55.684 + (-2.049)X1 + (2.137)X2 + (8.278)X3 + (7.952)X4 + (-16.044)X5 + (-0.533)X6 + (-2.732)X7 + 6.098$$

Where, ***Y=Predicted per cent disease index of mango anthracnose***
X1=Maximum temperature,
X2=Minimum temperature
X3==Morning relative humidity,
X4==Evening relative humidity
X5==Average relative humidity,
X6==Sunshine hours
X7==Wind velocity

CONCLUSION

From the above findings, observed anthracnose disease intensity and predicted anthracnose disease intensity were found closely related and regression equation established may be most reliable and useful for forecasting of the anthracnose of mango. The loss caused by the anthracnose disease can be saved by forewarning the farmers of the region and there by managing the same at proper time.

REFERENCES

Brown, G. E. (1974). Factors affecting post-harvest development of *C. gloeosporioedes* in citrus fruits. *Phytopath*, **65**: 404-409.

Dodd, J. C.; Estrada, A. B.; Matcham, J.; Jeffries, P. and Jeger, M. J. (1991). The effect of climatic factors on Colletotrichum gloeosporioides causal agent of mango anthracnose in the phillippines. *Pl. Path*., **40**(4): 568-575.

Fitzell, R. D. and Peak, C. M. (1984). The epidemiology of anthracnose disease of mango; incoulum sources, spore production and dispersal. *Ann. Appl. Biol.*, **104**: 53-59.

Pathak, V. N. (1980). Diseases of Fruit Crops. Oxford and IBH publication Co. Ltd. New Delhi PP.5-37.

Sharma, A. and Verma, K. S. (2007). Epidemiology of colletotrichum gloeosporioides causing anthracnose of mango. *Indian J. Mycol. Pl. Path*., **37**(2): 248-250.

Table 1: Correlation matrix of the relationship between weather parameters and Per cent disease index of mango anthracnose

PDI	Temperature (^{o}C)		Relative Humidity (%)			Sunshine Hours	Wind Velocity (Km/hr)
	Max.	Min.	Morning	Evening	Av.		
2011-12	0.040	0.442*	0.108	0.177	0.202	-0.070	0.120
2012-13	-0.232	0.212	0.368	0.421*	0.550**	-0.100	0.090

significant at 5 % level of significant(r=±0.3739)
****significant at 1 % level of significant(r=±0.4785)***

Table 2: Correlation matrix of the relationship between weather parameters and Per cent disease index of mango anthracnose

PDI	Temperature (^{o}C)		Relative Humidity (%)			Sunshine Hours	Wind Velocity (Km/hr)
	Max.	Min.	Morning	Evening	Av.		
Pooled of two years	-0.083	0.329*	0.232	0.308*	0.380**	-0.102	0.104

significant at 5 % level of significant(r=±0.2632)
****significant at 1 % level of significant(r=±0.3415)***

[MS received: May 24, 2015] *[MS accepted: June 12, 2015]*