Mycopath (2014) 12(2): 129-131 **Brief Article**

Impact of *Alternaria alternata* on organic components of mango leaves

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Abstract

The organic components such as chlorophyll, carotenoids, ascorbic acid, proteins and sugar of healthy and infected mango (*Mangifera indica* L.) leaves were analyzed. All the organic components in mango leaves were affected greatly due to infection with *Alternaria alternata* (Fr.) Keissl. Chlorophyll, carotenoids, ascorbic acid, proteins and sugar were found to be decreased in the infected mango leaves by 20.27%, 14.06%, 32.86%, 31.73% and 18.02% respectively. Ascorbic acid and proteins contents were found to be highly affected.

Keywords: Ascorbic acid, *Alternaria alternata,* carotenoids, chlorophyll, mango leaf, organic components.

Introduction

Mango (*Mangifera indica* L.) of family Anacardiaceae native of Indo-Pakistan Sub-continent is considered one of the most popular fruits in the tropical areas (Diedhiou *et al.,* 2007; Javaid *et al*., 2012; Al-Najada and Al-Suabey, 2014). Mango, a national fruit of India, Pakistan, and the Philippines, and national tree of Bangladesh has become an important fruit crop in other part of Asia, Southern and Central America and in many parts of Africa as well (Mohsan *et al*., 2011).

Mango suffers from several diseases at all stages of its life (Haggag, 2010). Hardly any plant organ is immune almost every part *viz.* stem, leaf, twig, root, petiole, flower and fruit are attacked by the large number of pathogens (Pandey, 2012). Yet there are few diseases which are of great economic importance. These diseases manifest themselves as several kinds of rot, dieback, mildew, necrosis, scab, leaf spot, wilt, canker and malformation (Haggag, 2010). It has been known that *Alternaira* spp. produce either toxin which are imperative part of pathogenicity (Chung, 2012). The toxin is quickly translocated outward through the vascular system, causing rapid electrolyte leakage and necrotic lesions along the veins. Therefore, infection caused by *Alternaia* may cause lipid peroxidation, generation of hydrogen peroxide (H_2O_2), and thereafter the cell death. Hence during corase of infection the fungal toxin drastically alter plant photosynthic network and associative physiological and biochemical aspects (Prakash, 2004; Mohsan *et al*., 2011; Lin *et al.*, 2011; Chung, 2012).

The information about leaf spot pathogen *A. alternata* in Jhansi was meager. Therefore an attempt has been made to collect in depth information of the disease. So the primary objective of the present study was to quantify the changes of some physiological parameters or organic component in the healthy and infected mango leaves.

Materials and Methods

The survey for the occurrence and severity of mango leaf spot was made during March to June in the crop season of 2013 at the Horticulture Experiment and Training centre, Baruasagar, Jhansi (UP). Observations relevant to disease were recorded under natural conditions. The centre was visited periodically at an interval of 10 days from March to June. The common varieties of mango at this centre were Amarapali, Neelam, Chuansa and Dashehari. The infected leaf samples of variety Amarapali were collected. For the quantitative estimation of organic compoenets different protocols were used. Leaves of mature plant were collected, washed with distilled water and used for analysis of chlorophyll, carotenoids, ascorbic acid, proteins, and sugar. Chlorophyll and carotenoid content was estimated following the method of Bailey (1969), ascorbic acids content was analyzed by the method of Chinoy (1962), protein content was estimated following the method of Lowry *et al*. (1951) and sugar was estimated by following the protocol of Nelson (1944).

To measure the percentage reduction in different studied parameters due to diseased over healthy mango leaf, following formula was used:

$$\text{Percent reduction} = \frac{\text{Healthy} - \text{Infected}}{\text{Healthy}} \times 100$$

Results and Discussion

The chlorophyll, carotenoids, ascorbic acid, proteins and sugar of healthy and infected mango leaves were analyzed and the results are summarized in Table 1. The present investigation revealed the reduction in total chlorophyll contents and carotenoids. The total chlorophyll was 10.11 mg in the infected leaf sample was reduced by 20% as compared to that of healthy leaves (12.68 mg).While carotenoids content was declined by 14% in infected leaves as compared to healthy ones (0.11 mg). Similar findings were observed by Saleem *et al.* (2012) on the diseased leaves of broad bean plant infected by *A. alternata.* Pati *et al.* (2008) also reported the decrease in chlorophyll content of leaves while working on the disease profile of *Withania somnifera* suffering from *A. alternata.* On the basis of reduction percentage in chlorophyll and carotenoids in infected samples, it can be presumed that the pathogen *A. alternata* affect the chlorophyll and carotenoids to maximum extent.

Ascorbic acid content (Table 1) in the mango leaves were found to decreased up to 40% when compared to the healthy leaves (58 mg). Our observation was same as Sutare and Kareppa (2013) as they also observed a decrease in ascorbic acid content of infected leaf of *Adhatoda zeylanica* (Medic) due to fungal contamination as compared to healthy leaf.

The reduction in the protein content of infected leaves in comparison to the healthy leaves was observed (Table 1). The protein content of healthy leaf was 3.12 mg whereas in infected leaf protein content was 2.13 mg with percent reduction 31.73%. Gosh *et al.* (2003) also found reduction in protein content of mulberry due to leaf spot disease of *Cercospora*. However, Pati *et al.* (2008) observed increase in protein content in *Withania somnifera* infected by *A. alternata*. The variation of results may be due to adaptations of host or due to difference in host pathogen interactions. Thus, it can be concluded that the pathogen reduces protein content of mango leaf.

The sugar content in healthy leaf was 0.086mg and in that of infected leaf was 0.0705 mg with the reduction percentage 18.02% (Table 1). Similar results were obtained by Renuka *et al.* (2007). They also reported decrease in the sugar content of the leaves of *Chrysanthemum* infected by *Alternaria chalmydospora* causing leaf blight disease. Waghmare *et al.* (2012) reported decrease in the quantity of total sugar in the infected leaf of rose infected by *A. alternata.*

Considering the results obtained it may be concluded that due to the decrease in the contents of chlorophyll, carotenoids, ascorbic acid, proteins and sugar in the infected leaves, the metabolic processes of infected plant was altered as compared to healthy one which lead to cause reduction in the yield and over all development of the mango plant.

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Table 1: Impact of *Alternaria alternata* on organic components of mango leaves.

S. No	Organic component	Healthy leaf (mg)	Infected leaf (mg)	Reduction (%)
1	Total Chlorophyll	12.68	10.11	20.27
2	Carotenoids	0.128	0.11	14.06
3	Ascorbic acid	58.49	39.27	32.86
4	Protien	3.12	2.13	31.73
5	Sugar	0.086	0.071-	18.02

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