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Research article

IMPACT OF MEALEY BUG (Maconellicoccus hirsutus) INFECTION ON BIOCHEMICAL COMPONENTS OF HIBISCUS ROSA SINENSIS

D.Sailaja¹, V.Lakshmi¹*, P.Srilakshmi, A.C.P.Chowdhury, C.Srikanth, B.B.Sangameshwaran and M.Venkata Praveen

Department of Biotechnology, Gokaraju Rangaraju Institute of Engineering and Technology, Bachupally, Kuatpally, Hyderabad, Andhra Pradesh-500090.

*Corresponding author: Mobile No: +91- 9866950998, Email: <u>lakshmi.velide@gmail.com</u>

ABSTRACT: Mealey bug (*Maconellicoccus hirsutus*) causes dreadful infection in *Hibiscus rosa sinensis*. Infections are highly virulent and alters biochemical components of the species. Therefore an attempt has been made to evaluate the alteration of biochemical components in Hibiscus stem at various stages of infection. The results reveal that partial infected stem had shown 78% decrease in its aminoacids whereas highly infected had shown 64% decrease. The results also show that proteins had increased significantly(72%) in highly infected stem and noticeable increase (63%) in partial infected.

Key words: Mealey bug, Hibiscus rosa sinensis, infection, aminoacids, proteins.

INTRODUCTION

It has long been recognized that levels of proteins and carbohydrates in plants have significantly influenced by infection and metabolism alters accordingly by rate of infection (Hwang *et al.*,1983 and Salt *et al.*, 1986). The pink hibiscus mealybug, *Maconellicoccus hirsutus* (Hemiptera: Sternorrhyncha:Pseudococcidae) is a serious and invasive pest of cotton and Hibiscus rosasinensis in Pakisthan and India (Hodgson *et al.*,2008 and Akintola and Ande,2008). Increase in protein concenteration was noted in the various tissues infected with root knot nematodes(Owens and Spects,1966). An elevated protein levels was also observed in giant cells of okra infected with *M.incognita acrita* (Littrell,1966). The galled roots of marigold infected with *L.africanus* contains more than 70% proteins than uninfected (Epstein and kohn 1971). Increase in protein content was also identified in plants infected with parasitic nematodes(Roy,1980). The level of crude protein found decreased in alfalfa with the increase in infection severeity(Mainer and Leath,1978). Total amino acids were increased in shoots of tomato infected with nematodes(Ahmed Farahat *et al.*, 2012). Significant increase in amino acid content was also recorded in the virus infected tomato plants(Sutha *et al.*, 1998). So, the present experiment has taken up to estimate the levels of free aminoacids and proteins in mealey bug (*Maconellicoccus hirsutus*) infected pink Hibiscus stem at various stages of infection.

MATERIALS AND METHODS:

The present experiment was conducted in Department of Biotechnology ,GokarajuRangaraju Institute of Engineering And Technology ,Bachupally,Hyderabad ,Andhra Pradesh by collecting Mealey bug(*Maconellicoccus hirsutus*) infected pink Hibiscus stem from the garden of Envirotec industry ,IDA ,Uppal ,Hyderabad.Total proteins were estimated according to Lowry *et al.*,(1951) and free aminoacids were determined by Ninhydrin method (Moore and Stein, 1948).

Estimation of Proteins: 500 mg of freshly cut healthy, partial infected and highly infected Hibiscus stem was separately homogenized with 10 ml of 80% ethanol .After centrifugation at 2000 rpm for 15-20 min by using Remicentrifuze the supernatant was collected .

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To this 1ml of alcoholic extract 5 ml of alkaline copper reagent (1% $CuSO_4 + 1\%$ Na-K-tartarate + 2% Na₂CO₃ in 1 N NaOH) was added and incubated at room temperature for 10 min. For this, 0.5 ml of folin-phenol reagent was added and allowed to stand for 30 min. The OD was measured at 750 nm by Systemics spectrophotometer.

Estimation of aminoacids: 500 mg of freshly cut healthy, partial infected and highly infected Hibiscus stem was separately homogenized with 10 ml of 80% methanol .After centrifugation at 2000 rpm for 15-20 min by using Remicentrifuze, the supernatant was collected in a test tube and 1ml of ninhydrin reagent (4% ninhydrin in methyl cellosolve and 0.2 M acetate buffer in the ratio of (1:1)) was added to it. The samples were boiled for 20 min and cooled; the volume was made up to 10 ml with distilled water. The absorbance was recorded by using Systronics spectrophotometer at 570nm.

RESULTS AND DISCUSSION

Table 1 explains the impact of mealy bug infection on biochemical components like free aminoacids and proteins in pink hibiscus. In comparison with the healthy control the partially infected Hibiscus stem had shown 78% decrease in its free aminoacids whereas the highly infected had shown 64% decrease(fig:2).Susanne Rasmussen *et al.*,(2008) observed reduction in aminoacids in the plants infected with endophytes.The results also shows that the highly infected Hibiscus stem had shown 39% low value of free aminoacids in comparison with partially infected stem.Decrease of aminoacids in a highly nematode infected tissue of goats is reported by Bahrami *et al.*(2011).The amount of free aminoacids also decreased with time with grown gall infection in sunflower (Behki and Lesley,1968).

Biochemical componenet	Healthy(Control)	Partial infected	Highly infected
Free aminoacids (mg/g)	0.064	0.014	0.023
Proteins (mg/g)	0.56	1.987	1.522

Table 1: Impact of Mealey bug infection on biochemical components in Pink Hibiscus

When compared with healthy control the partial infected Hibiscus stem had shown significant increase (72%) in protein content whereas the highly infected had shown 63% increase (fig:1). High protein content correlates with activation of several lines of defence mechanism and release of disease resistant proteins in fungal infected plants (Horsfall and Dimond, 1957; Ashraf El-kereamy *et al.*, 2011). Increased rate of synthesis of proteins can be correlated with the increase in metabolic activities in infected tissues (Roy 1979, 1980). Increase of total proteins in the infected CMV leaves was due to the addition of viral proteins (Charitha devi and Radha, 2012).



H : Healthy, PI : Partial infected, HI : Highly infected



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Mesta plants infected with yellow vein mosaic disease have shown increase of disease related proteins because plant pathogens elicit the synthesis of host proteins which prevents the multiplication of pathogens in the host (Datta *et al.*, 1999). The results also show that highly infected Hibiscus stem had shown 23.5% decrease in protein content over the partial infected. Low protein content in diseased samples can be correlated with protein denaturation (Arpita chatterjee and Subrata Ghosh, 2008).



H: Healthy, PI: Partial infected, HI: Highly infected

Fig 2: Free aminoacid levels in healthy, partial and highly infected hibiscus stem.

CONCLUSION

Thus in conclusion, mealey bug infection on pink Hibiscus decreases aminoacids significantly in partially infected in comparison with highly infected whereas proteins were increased profoundly in highly infected with a least increase in partial.

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