



Mineral composition in the leaves of Betel vine infected with *Cercospora piperis* Sawada and Katsuki

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Abstract

This paper deals with mineral analysis of Betel vine leaves infected with a fungus *Cercospora piperis* Sawada and Katsuki. The leaf samples of healthy and infected material were air dried and digested by tri acid, according to the method of Toth *et al.*, (1948). The acid digested samples were used for estimation of different minerals by Atomic Absorption Spectrophotometer (AAS) Perkin Elmer A Analyst model 300, while phosphorus element was estimated by the method of Sekine *et al.*, (1966). The elements such as calcium, iron, manganese, zinc, cobalt, magnesium and copper contents were greatly enhanced in young and mature infected leaves of betel vine as compared to healthy. While the non-metal phosphorus found to be decreased in both young and mature infected leaves.

Keywords: betel vine, minerals, *Cercospora piperis*

Introduction

Piper betle Linn. Commonly known as betel vine and Nagavalli in Sanskrit, used along with betel nut (*Areca catechu*) and is lime used as a good masticator. It enhances good digestion, even leaves are used for various ailments as a native of Malaysia and cultivated in hotter and drier parts of India. Betel vine is a perennial dioeciously creeper; it requires a host for support. In state like Maharashtra *Erythrina indica* is used as support, While in State

Karnataka as betel nut tree. The plant leaves contain lot of phytochemicals such as carvacrol, chavicol, α -terpinene, p-cymene allyl catechol, eugenol, oxalic acid, malic acid and amino acids. A large concentration of asparagine, glycine and proline were found in leaves. Hence it is used as a carminative, stimulant, antiseptic aphrodisiac and aromatic. Essential oil from leaves is used in respiratory catarrhs and as anti-septic and used as traditional medicine. Thus such an important creeper get affected by a fungal disease leaf spot caused by *Cercospora piperis*, shows a considerable loss. An attempt has been made to study mineral contents during pathogenesis.

Material and Methods

Fresh healthy and infected leaves of young and mature betel vine were harvested from Miraj during early hours 8 to 9 am. Soon after washed 2 to 3 times with distilled water and dried in laboratory at 60 degree Celsius for 1 to 2 days. The oven dried samples 500 mg were acid digested (tri acid) according to method of Toth *et al.*, (1948) [14]. The acid dried samples were used for estimation of minerals by Atomic Absorption Spectrophotometer (AAS), Perkin Elmer A. Analyst model 300, whereas the phosphorus content was estimated by the method of Sekine *et al.*, (1966) [11].

Results and Discussion

The results were depicted in table-1. The calcium content in

the infected leaves get enhanced 253.4 mg/100g of calcium in young healthy leaves after infection get increased to 373.00 mg there by increased to the extent of 147% over healthy. The increased content of calcium may be due to resistance of Pectic substance and cell wall against enzymatic degradation as reported by Kiraly and Gilley (1976) [3] or infection may causes deviation in calcium translocation which may result in its accumulation at infected site as reported by Panopoulos *et al.*, (1972) [9]. While mature leaves also shows enhanced calcium content. The manganese and iron contents were found to be increased in both young and mature infected leaves (Table-1). The increased content of manganese may be due to its failure to translocate or pathogen might inhibited the uptake of manganese, thereby it may get accumulated at the necrotic site. A similar conditions was recorded by Nagaraja (2008, 2008), Tanaka and Yoshida (1970) [15] reported enhance manganese and iron content in rice senescence leaves. The trove iron content may be due to failure to move at physiological active site as reported by Brown (1976). A parallel condition was documented by Philip and Devadath (1981) in rice infected bacterial disease. Similarly Nagaraja (2008) in *Punica granatum* infection.

The element copper and zinc get hoard in the infected leaves of young and mature infected betel vine (table-1). Copper forms predominantly as constituents by several enzymes and protein, get enhanced in the infected leaves of betel vine, a similar condition was recorded by Nagaraja (2008), Patil *et al.*, (2018) [2, 10], Ghorpade *et al.*, (2018) [2], Mohan (2018). Thus our results share within their findings. The magnesium content in the infected leaves of betel vine get increased (Table.1). The increased content of magnesium indicates the non-utilisation by pathogen, thereby it get accumulated in the necrotic site. A parallel result was reported by Nagaraja (1996) in *Murraya Koenigii* infected leaves. The element cobalt was essential and its participation in respiration and energy was shown by Yagodin (1970) [15] and reflects various

activities of enzymes in plants. The enhanced condition of cobalt is due to its less utilisation by the pathogen. The non metal Phosphorus get reduced in both mature and young infected leaves of Betel vine (Table-1) reduced content may be due to low level of translocation rate in the diseased plant as reported by Sarkar and Joshi (1977) [13]. A similar condition was document by Nagaraja (1994) [7]. The trace element nickel get enhanced in the infected leaves, suggests that pathogen may stimulate more absorption of nickel, hence increased in the infected leaves. A parallel result was reported by Nagaraja (1994, 2001).

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Table 1: Mineral composition in the leaves of Betel vine infected with *Cercospora piperis betel* Sawada and Katsuki

Minerals	Young Healthy	Young infected	Mature healthy	Mature infected
Calcium*	253.4	373.0	324.8	370.6
Manganese*	38.48	82.84	64.66	80.04
Iron*	25.00	30.80	25.40	51.00
Copper*	39.00	73.20	40.80	87.60
Nickel*	0.12	18.60	21.20	19.40
Zinc*	99.80	105.40	94.00	125.80
Cobalt*	6.60	10.80	11.80	13.20
Magnesium**	15.26	21.04	17.54	19.54
Phosphorus*	203.05	183.09	211.26	149.06

*mg 100⁻¹ g of dry tissue

**g 100⁻¹ g of dry tissue

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