



Mineral metabolism under pathogenesis in *Adensonia digitata* Linn

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Abstract

The present paper deals with mineral metabolism in *Adensonia digitata* Linn under pathogenesis. The dried healthy and infected samples were digested with tri acid according to the method of Toth *et.al.* (1948). The minerals were estimated by Atomic Absorption Spectrophotometer model nov. AA 350. The elements such as chromium, zinc, lead, cadmium and nickel were enhanced in the infected leaves, whereas cobalt, magnesium and iron contents were considerably reduced in the infected leaves, results into metabolic shift.

Keywords: *Adensonia digitata*, atomic absorption spectrophotometer, minerals

Introduction

Adensonia digitata Linn a medium sized deciduous tree, is also called Baobab tree or monkey breed tree, native of tropical Africa but occasionally cultivated in some parts of Maharashtra, Bihar, Uttar Pradesh and Tamil nadu. The plant is used as Tribal medicine, Ayurvedic and Pharmaceutical industries, as the plant contains a huge amount of phytochemicals that is pulp contains Phlobaphenes, glucose, tartrate, acetate of potash, mucilage and gum. It contain vitamin C, hence it is called as “cream of tartar”. While the leaves and bark contain soluble and insoluble tannins, glucoside adensonin, and the seeds contain stigmasterol, cholesterol, B- sitosterole etc. Hence it is used as diaphoretic anti-inflammatory and as a prophylactic against fever and rheumatic affections of limbs etc. the fruits shows demulcent, astringent and aperient properties, such a medicinal tree containing lots of phytochemicals get affected by a leaf spot disease caused by *Cercospora sp.* Hence, an attempt has been made to study mineral nutrition under pathogenesis.

Materials and methods

Leaves of *Adansonia digitata* Linn. healthy and infected with *Cercospora sp.* were harvested from University campus (Lead botanical garden-Shivaji University, Kolhapur) during morning hours in November 2019. The healthy and infected leaves were brought to Laboratory and were washed with tap water followed by distilled water. Later leaves were dried in oven for 52-55°C for consecutive four days. The dried leaves were powdered with the help of domestic grinder. The healthy and infected leaves of 500mg were acid digested as mentioned, according to method of Toth *et.al.* The triacid digested material were filtered and diluted to 100 ml with distilled water. The filtered solution was subjected to Atomic Absorption Spectrophotometer Model nov AA 350 for mineral analysis. The result were expressed in mg./g. of dried tissue.

Result and discussion

The results were depicted in table 1. The element magnesium forms the integral part of pigment chlorophyll

and its essentiality in fungal metabolism, influenced over various enzymes and fermentation process. Many workers reported contradictory results during pathogenesis. The present investigation shows, magnesium content get reduced in the infected leaves. 77.21 mg dried tissue get reduced to 75.65mg/g of dried tissue. Hence decreased amount of magnesium in the infected leaves suggest that rapid translocation of magnesium or pathogen may be utilized for its metabolism as reported by Padmanabham *et.al.* (1974). A similar result was documented by Nagaraja (1988, 1994, 1998, 2001 and 2005) in *Mallotus philippinesis*, *Strycnos nux vomica*, *Discoria bulbiferae*, *Woodfordia floribunda* and *Holarrhena antidysentrica* under infection.

The element iron acts as an integral part of fungal protoplasm, it is associated with various enzymes including cytochrome, cytochrome oxidase, catalase etc. The iron content in the infected leaves of *Adensonia digitata* Linn get decreased 1.292 mg/g dry tissue as comparable of healthy leaves. A parallel result was reported by Nagaraja (1996, 1995, 2001, 2007 and 2018) in several medicinal plants affected by fungal diseases. The decreased amount of iron may be utilized by the pathogen for its metabolism. The trace and toxic element Cobalt held a role in fungal respiration and energy metabolism (Yagdin 1970). It is responsible for various enzyme activity such as phosphoglucoumutase which catalyses, the mutual conversion of glucose-1-phosphate and glucose-6-phosphate, even the process of glycolysis can be enhanced by element Cobalt (Niebroj and Kozebhsks, 1964), such cobalt element studied by several workers under pathogenesis. The present investigation shows that in *Adensonia digitata*, Linn element cobalt content get lowered in the diseased leaves. The 0.1347mg/g of cobalt get reduced to 0.0646 mg/g in dry tissue after infection, reflects its essentiality for pathogen. Nagaraja (1996, 2001, 2003, 2005, 2007, and 2018). Naranville (1970) [3] reported element Nickel positively influence the activity of nitrate reductase as important enzymes both in the reduction of nitrates and nitrogen fixation. Again Cherhavina (1970) presented evidence to show that nickel acts as a stabilizer for anthocyanin pigment. The nickel content in the leaves of

Adensonia digitata Linn (Table.1) get accumulated in the infected leaves under pathogenesis. Asimilar findings was reported by Nagaraja (1998, 2001, 2003, 2007 and 2018) in different medicinal plants under infection. The element zinc favours the activity of several enzymes in plants as well as in fungi, a scanty information is available regarding the role of zinc under pathogenesis. Ghorpade *et.al.* (2018) ^[2], Mohan kumar and Nagaraja (2018) reported decreased amount of zinc under pathogenesis, whereas worker Nagaraja (1994, 1995, 1998 and 2001) reported enhanced content of zinc under pathogenesis in *Strychnos nux-vouica* L, *Caryota ures* L, *Discoria bulbifera* and *Woodfordia floribunda* leaves. The tree elements such as cadmium and lead shows a negligible enhanced condition in infected leaves of *Adensonia digitata* L. Therefore, elements play an important role in metabolism of plant and fungi.

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Table 1: Mineral metabolism in *Adensonia digitata* under pathogenesis mg/g of dry tissue.

Sr.	Minerals	Healthy leaves	Infected leaves
1	Cobalt	0.1347	0.0646
2	Chromium	0.1024	0.1482
3	Magnesium	77.21	75.65
4	Iron	2.081	1.292
5	Zinc	0.0566	0.0697
6	Nickel	0.5294	0.5561
7	Cadmium	0.0075	0.0090
8	Lead	0.0043	0.0046

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