



MINERAL CONTENTS IN THE LEAVES OF *COCHLOSPERMUM RELIGIOSUM* (L) ALSTON, UNDER PATHOGENESIS

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Abstract: The present paper deals with mineral contents in the leaves of *Cochlospermum religiosum* (L) Alston affected by *Alternaria alternata* fungus showing leaf blight symptoms. The mineral content was estimated by digesting healthy and infected leaves in Tri-acid. as prescribed by Toth *et al.*, (1948) method by Atomic Absorption Spectrophotometer (Thermo Fisher Scientific AAS -203 model), Spectrophotometer (Thermo Fischer Scientific UV 2100) and Flame Photometer Systronics-128 model). The element phosphorus was estimated by Sekine *et al.*, (1966) method. Sulphur was estimated by Blanchar *et al.*, (1965) method. The elements Sodium, Potassium and Calcium were estimated by Flame photometer, while Iron, Manganese, Zinc, Magnesium, Copper, Lead. Nickle was estimated by Spectrophotometer. The elements Manganese, Iron, Zinc and Sulphur were enhanced in the infected leaves of *Cochlospermum religiosum* (L) Alston, While Sodium, Potassium, Calcium, Magnesium, Copper, Lead, Nickle and Phosphorus contents were decreased in the infected leaves showing a high metabolic activity during pathogenesis.

Key word's - *Cochlospermum religiosum* (L)., AAS, Spectrophotometer, *Alternaria alternata*

INTRODUCTION

A medium sized deciduous *Cochlospermum religiosum* (L) Alston widely growing in the western ghats of Maharashtra state as well as cultivated as a avenue tree, belongs to family Cochlospermaceae. The tree is commonly called as yellow silk cotton, Buttercup tree etc. because of large, bright golden yellow-coloured seeds covered by large hairs, commonly tree was found in state of Maharashtra, Madhya Pradesh, Telangana, Andhra Pradesh, Bihar, Uttar Pradesh etc with large yellow beautiful flowers.

The plant is traditionally used for several diseases like skin, eczema, Scabies etc even in unani medicine used for tuberculosis, hectic fever, gonorrhoea, antipyretic, phthisis, diuretic etc It possesses good antibacterial, antifungal activity. The plant shows phytochemicals such as flavonoids, steroids, tannins, alkaloid, glycosides, amino acids as metabolites. Thus, such a beautiful medicinal plant having so much importance in the field of Ayurveda and unani, get affected by *Alternaria alternata* fungus during autumn season. Therefore, an attempt was made to study mineral content under infection.

MATERIAL AND METHODS

Fresh healthy and infected leaves of *Cochlospermum religiosum* (L) Alston were harvested from Shivaji University, Kolhapur campus for experimental study during autumn season 2022. The collected samples were brought to the AGPM laboratory, washed initially with tap water followed by distilled water and then blot to dry. These samples were kept in electric oven for a period of 1-2 consecutive days maintained a temperature of 50-60°C. Soon after the samples were powdered in domestic grinder. The dried 500 mg samples of healthy and infected leaves were subjected to digestion as mentioned by Toth *et al.*, (1948). The acid digested samples were filtered and made up to 100 ml using distilled water as used for estimation of minerals by Atomic Absorption Spectrophotometer (Thermo Fischer Scientific AAS-203). The elements Potassium, Sodium and Calcium were estimated by Flame Photometer (Systronics-128 model). The non metal phosphorus was estimated by Sekine *et al.*, (1966) method and Sulphur were estimated by Blanchor *et al.*, (1965) method. The results were expressed in terms of $\text{mg}^{-1} \text{g}^{-1}$ of dried tissue.

RESULT AND DISCUSSION

The results were shown in (Table-1), the element potassium plays important role in transpiration, movement of water, nutrients, even carbohydrates breakdown during respiration, equally important even in fungi as a result potassium content greatly utilized by the pathogen *Alternaria spp.* reflects its importance and essentiality, a parallel report was recorded by Nagaraja. (2005,2007,2008,2020,2022). The element sodium not so essential for most plants, but it involved in electric neutralization of organic and inorganic ions as well as control of membrane electrical potential and osmotic pressure, hence sodium content might be consumed by the fungus for its metabolism or sporulation (Brain and Hearing 1950). An allied condition was recorded by Singh and Verma (1974) Nagaraja (1994) and Nagaraja (2008) in *Punica granatum* under infection. The mineral calcium is the chief constituent of middle lamella in the form of calcium pectate in all plant cell, again as an activator for many enzymes like ATPase, Kinase, Succinate dehydrogenase etc. shows its importance, as result, calcium content gets absorbed in the infected leaves by the pathogen the equivalent type of situation was recorded by Nagaraja (1994,2001,2003) under pathogenesis. The utilization of calcium in fungi helpful for activating enzymes of Krebs's cycle as reported by, Tsai *et al.*, (1971) as well as Nitrogen metabolism (Lerer and Bar-Akiva,1976).

The element magnesium is the constituent of chlorophyll molecule as well as an enzyme activator during phosphate transfer, ATPase synthesis, synthesis of nucleic acid, etc. The metal magnesium is greatly consumed by the pathogens for its metabolism, hence it get reduced in the infected leaves of *Cochlospermum religiosum* (Table-1) a coincidental condition was observed by Nagaraja (2001) and Padmanabhan *et al.*, (1974 b) in infected tissue. While metal iron, manganese and zinc content augmented in the infected leaves (Table-1). The enhanced condition of iron content may be due to its lack of movements at physiological active site as mentioned by Brown (1976). A collateral condition was reported by Nagaraja *et al.*, (2020) and Pratik *et al.*, (2022). Zinc acts as catalyst in synthesis of chlorophyll, growth hormones and activator of enzymes like carbonic anhydrase, alcohol dehydrogenase, pyridine nucleotide dehydrogenase, hexose, kinase, etc. gets accrued in the infected leaves (Table-1). Manganese acts as enzyme activator in plants, such as malic dehydrogenase, oxalosuccinic decarboxylase, nitrate reductase, peroxidase, etc. get accumulated in the infected leaves of *Cochlospermum religiosum* (L) Alston (Table-1). Same conditioned was documented by Nagaraja (2008), Ingavale *et al.*, (2020) and Pratik *et al.*, (2022).

The element copper content gets reduced in the infected leaves (Table-1) as the pathogen utilized for activation of enzymes required for protein, lignin, carbohydrate metabolism, boosts its essentiality, as a result it gets utilized by the pathogen (Table-1). A parallel diminished condition of copper content was recorded by Nagaraja (2001) under pathogenesis.

The non-metallic elements such as phosphorus and sulphur content were greatly denounced in the infected leaves (Table-1). Element phosphorus a vital component of ATP, need for growth, maintenance, and repair of all tissue of cells and synthesis of nucleic acids, get consumed in the infected tissue. A supplement report was published by Nagaraja(1994) in *Strychnos nux-vomica* under pathogenesis. Even non-metal sulphur is essential for bio-synthesis of amino acids, secondary metabolites, and sulfo-flavonoids, hence Sulphur content greatly cartailed in the infected leaves (Table-1). and may be used for its metabolism, a adjunct condition was recorded by Pratik *et al.*, (2022) under pathogenesis. Whereas element Nickel get reduced in the infected leaves, shows its essentiality for progression to pathogens, as it acts as a co-factor for uride metabolism. A similar condition was reported by Nagaraja (1994), while metal lead content also greatly condensed in the infected leaves (Table-1). The metal lead is not essential for plants, but it get absorbed in plants as well as in fungi for regulating pH, cation exchange capacity (CEC) of soil and other physio-chemical changes, thereby it gets consumed in the infected leaves of *Cochlospermum religiosum* (L) Alston (Table-1). A blooming report was documented by Nagaraja (2001,2003). Thus, role of these elements, brings a major shift in disclosing the physiological significance of plant under pathogenesis.

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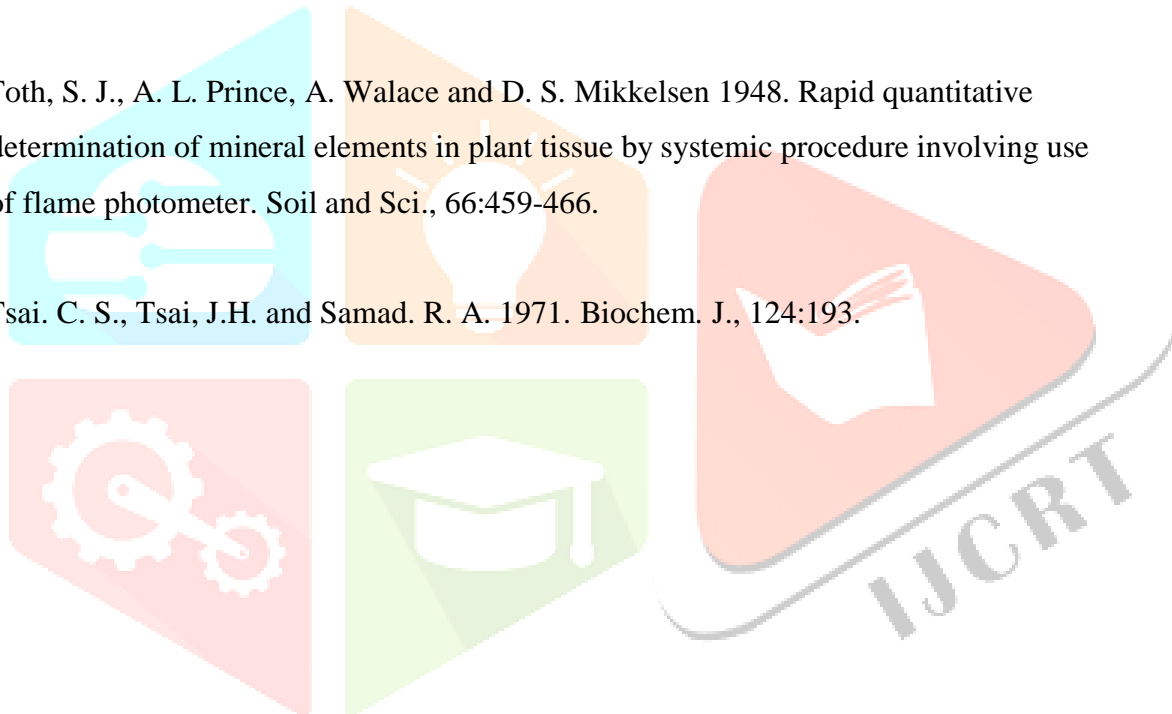


Table-1: Mineral Content in the leaves of *Cochlospermum religiosum* (L)

Alston under pathogenesis.

Sr. No.	Mineral Elements*	Healthy leaves	Infected leaves
1.	Potassium	0.70	0.50
2.	Sodium	29.80	29.20
3.	Calcium	45.00	34.01
4.	Magnesium	193.90	127.20
5.	Iron	00.539	00.845
6.	Zinc	0.026	0.032
7.	Copper	0.00075	0.00062
8.	Manganese	0.075	0.080
9.	Lead	0.00182	0.00087
10.	Nickel	0.0023	0.0011
11.	Phosphorus	0.46	0.40
12.	Sulphur	101.50	102.20

*Expressed $\text{mg}^{-1}\text{g}^{-1}$ of dried tissue.