

## BIOCHEMICAL EVALUATION OF THREE MEDICINAL TAXA OF GENUS SESBANIA IN MAHARASHTRA

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### ABSTRACT

The genus *Sesbania* belongs to the family Leguminosae and its subfamily is Papilionoideae. There are four subgenera of which *Sesbania* and *Agati* are of agriculture value. The seasonal variation of proteins and amino acids have been investigated in leaf, bark and wood of *Sesbania rostrata*, *Sesbania exaltata* and *Sesbania sesban* are the medicinal plants in Maharashtra. Comparative account of protein content of leaves of three tree species revealed that *Sesbania exaltata* were rich in protein ( range from 3.34 to 3.81 mg / g dry wt .) than *Sesbania rostrata* ( range from 3.60 to 3.72 mg / g dry wt .) and *Sesbania sesban* ( range from 2.31 to 2.55 mg / g dry wt .). Amino acids content of leaves of three tree species revealed that *Sesbania exaltata* were rich in amino acid ( range from 2.47 to 2.67 mg / g dry wt .) than *Sesbania rostrata* ( range from 2.29 to 2.46 mg / g dry wt .) and *Sesbania sesban* ( range from 1.74 to 1.89 mg / g dry wt .)

**Key words:** Protein, amino acid, endangered medicinal taxa.

### INTRODUCTION

All human beings require a number of complex organic/inorganic compounds in diet to meet the need for their activities. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water<sup>1</sup>. Every constituent plays an important role and deficiency of any one constituent may lead to abnormal development in the body. Plants are the rich source of all the elements essential for human beings. Some elements are essential for growth, for structure formation, reproduction or as components of biological active molecules while others have some other beneficial effects<sup>2</sup>. A plant species grown in different geographical localities also show quantitative variation in their chemical constituent. Many varieties within a species might show variations in histological and phytochemical aspects. These variations might be clinical, altitudinal, geographical or genetically in nature<sup>3</sup>.

Members of the genus *Sesbania* are known for exceptionally fast growth rates as well as a very high affinity for association with several nitrogen fixing Rhizobia in the soil that cause formation of numerous and large nodules in the plant roots. Plant parts contains variable quantities of food in the form of carbohydrates, fats and proteins. Sometimes there is a wide variation in the seed composition of different species within the same genus<sup>4-5</sup>. The occurrence and seasonal variations of protein and amino acids in three endangered medicinally important taxa of Maharashtra. *Sesbania rostrata*, *Sesbania exaltata* and *Sesbania sesban* has been investigated.

*Sesbania rostrata* as an important dietary nutritive source in southeast Asian country's. *Sesbania rostrata* are richest source of amino acid, minerals and antioxidants vitamins. This species is unique because it fixes nitrogen not only in its roots in the soil, but also in its aerial parts including stems and branches<sup>6</sup>. Various parts of this plant are used in Indian traditional medicine for the treatment of diuretic,

emetic, fevers, headaches, anemia, bronchitis, inflammation, leprosy, gout, rheumatism, anxiolytic, anticonvulsive and hepatoprotective<sup>7</sup>. It also has anti-inflammatory, analgesic and antipyretic activity<sup>8</sup>. Primarily used as green manure between rice crops<sup>9</sup>.

*Sesbania exaltata* (Synonyms- *Sesbania herbacea* and *Sesbania macrocarpa*) is a crop generally cultivated for its nutritive value to soil. It is cultivated in monsoon season almost throughout India and grows sandy, loamy and clay soils. It is an ideal green manure crop as it is quick-growing, succulent, and easily decomposable with low moisture requirements and produces maximum amount of organic matter and nitrogen in the soil. Seed flour is used in the treatment of ringworm, skin diseases and wounds. The mature seeds of this species are known to be cooked and eaten by the Indian tribal's<sup>10</sup>.

*Sesbania sesban* seeds considered stimulants and astringent. Leaves considered purgative, anthelmintic and anti-inflammatory. Leaves showed a high crude protein content, 25 to 30% and is a useful source of protein for ruminant diets and a source of supplement fodder for livestock. Study of the effect of *Sesbania sesban* seed powder on female albino rats showed inhibition of ovarian function, change of uterine structure and prevention of implantation with 100 % control of fertility<sup>11</sup>. The aqueous extracts of leaves in STZ-induced diabetic rats showed significant increase in serum insulin and HDL level and decreases in blood glucose, total cholesterol and triglycerides when compared to glibenclamide<sup>12</sup>. *Sesbania sesban* was referred to as milk shrub. Farmers were encouraged to feed *Sesbania* fodder to lactating cows to enhance milk secretion

### MATERIALS AND METHODS

The different plant parts of three species of genus *Sesbania* (*Sesbania rostrata*, *Sesbania exaltata* and

*Sesbania sesban*) under investigation were collected from Maharashtra for the estimation of protein and amino acids during Summer ( April ) , Monsoon ( August ) and Winter ( December ) seasons . The chemical analyses of protein and amino acids in five replicates was carried out in leaf , bark and wood . The protein content was estimated by Lowry <sup>13</sup> and the total amino acid by using 0.4 % alcoholic Ninhydrin reagent by <sup>14</sup> .

## RESULTS AND DISCUSSION

There was a wide variation in the plant parts composition of three tree species investigated . The protein and amino acid content were measured in leaf , bark and wood of *Sesbania rostrata* , *Sesbania exaltata* and *Sesbania sesban* ( Table 1 ). The protein content of leaves of *Sesbania exaltata* was high in all seasons (range from 3.34 to 3.81 mg /g dry wt.) as compared to *Sesbania rostrata* ( range from 3.60 to 3.72 mg/g dry wt . ) and *Sesbania sesban* ( range from 2.31 to 2.55 mg/g dry wt.). The protein content of wood of *Sesbania rostrata* was higher in summer ( 1.84 mg/g dry wt. ) than monsoon (1.57 mg/g dry wt.) and winter( 1.75 mg/g dry wt.). The protein content of bark of *Sesbania exaltata* was higher (range from 2.47 to 2.84 mg/g dry wt.) than *Sesbania rostrata* (range from 2.34 to 2.57 mg/g dry wt.) and *Sesbania sesban* (range from 2.17 to 2.24 mg/g dry wt.) .The protein content of wood of *Sesbania sesban* was lowest (range from 1.08 to 1.23 mg/g dry wt.) than *Sesbania rostrata* (range from 1.57 to 1.84 mg/g dry wt.)

and *Sesbania exaltata* (range from 1.40 to 1.45 mg/g dry wt. ). The protein content of wood was comparatively low (range from 1.08 to 1.84 mg/g dry wt.) in all the three species examined in various seasons .

The amino acid content of leaves of *Sesbania exaltata* was high in all seasons (range from 2.47 to 2.67 mg/g dry wt.) as compared to *Sesbania rostrata* ( range from 2.29 to 2.46 mg/g dry wt.) and *Sesbania sesban* ( range from 1.83 to 1.89 mg /g dry wt.). The amino acid content of leaves of *Sesbania exaltata* was higher in summer ( 2.67 mg / g dry wt.) than monsoon ( 2.47 mg/g dry wt.) and winter ( 2.53 mg /g dry wt.). The amino acid content of bark of *Sesbania exaltata* was higher (range from 1.51 to 1.60 mg/g dry wt.) than *Sesbania rostrata* (range from 1.19 to 1.34 mg/g dry wt. ) and *Sesbania sesban* (range from 1.24 to 1.33 mg/g dry wt.) . The amino acid content of wood of *Sesbania sesban* was lowest (range from 0.70 to 0.77 mg/g dry wt.) than *Sesbania rostrata* (range from 0.76 to 0.84 mg/g dry wt.) and *Sesbania exaltata* (range from 1.14 to 1.23 mg / g dry wt.). The amino acid content of wood was comparatively low (range from 0.70 to 1.23 mg/g dry wt.) in all the three species examined in various seasons .

Therefore , it is suggested from the present observations that , high amount of protein and amino acid content in leaves of *Sesbania exaltata* and *Sesbania rostrata* in all seasons. The lowest amount of amino acid content in wood of *Sesbania rostrata* and *Sesbania sesban* in all seasons .

**Table 1: Seasonal variations of protein and amino acid levels of *Sesbania rostrata* , *Sesbania exaltata* and *Sesbania sesban***

Plant Parts	Seasons	Protein ( mg/g dry wt . )			Amino Acid ( mg/g dry wt . )		
		Plant 1	Plant 2	Plant 3	Plant 1	Plant 2	Plant 3
Leaves	Summer	3.723	3.813	2.552	2.463	2.671	1.899
	Monsoon	3.600	3.344	2.314	2.298	2.473	1.832
	Winter	3.666	3.764	2.410	2.333	2.530	1.744
Bark	Summer	2.570	2.840	2.246	1.345	1.600	1.331
	Monsoon	2.343	2.473	2.178	1.196	1.511	1.248
	Winter	2.436	2.690	2.200	1.253	1.556	1.284
Wood	Summer	1.847	1.459	1.239	0.840	1.238	0.771
	Monsoon	1.579	1.401	1.088	0.765	1.145	0.705
	Winter	1.758	1.446	1.156	0.799	1.190	0.721

*Plant 1-Sesbania rostrata* , *Plant 2-Sesbania exaltata* and *Plant 3-Sesbania sesban*

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