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### Determination of alkaloid and lipid content in some medicinal plants of Genus *Sesbania*

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#### Abstract

The seasonal variation of alkaloids has been investigated in leaf, bark and wood of *Sesbania rostrata*, *Sesbania exaltata* and *Sesbania sesban*, which are medicinally important. The leaves of *Sesbania rostrata* showed high level of lipid content (range 29.14 to 31.86 mg/g dry wt.) than *Sesbania exaltata* and *Sesbania sesban* (26.53 to 28.45 mg/g dry wt. and 22.78 to 24.60 mg/g dry wt.) respectively. The leaves of *Sesbania rostrata* showed high level of alkaloid (1.90 to 2.69 mg/g dry wt.) than *Sesbania exaltata* and *Sesbania sesban* (1.78 to 2.40 mg/g dry wt. and 1.34 to 1.92 mg/g dry wt.) respectively.

**Key words:** Lipid, Alkaloid, Medicinal plant and genus *Sesbania*

#### Introduction

Nature has bestowed upon us a very rich botanical wealth and a large number of diverse type of plants grow wild in different parts of our country. In India, the use of different parts of several medicinal plants to cure specific ailments has been vogue from ancient times. Though at present Indian health care delivery consists of both traditional and modern systems of medicines, both organized traditional systems of medicine like Ayurveda, Siddha and Unani and unorganized systems like folk medicine have been flourishing well. These two systems of medicine use plants, minerals, metals and animals as source of drugs, plants being the major source. It is estimated that roughly 1500 plant species in Ayurveda and 1200 plant species in Siddha have been used for drug preparation (Jain, 1987). In Indian folk medicine use, about 7500 plant species are recorded as medicinal plants (Anonymous, 1996). A plant species grown in different geographical localities also show quantitative variation in their chemical constituent (Mallavarapuet, *et.al.*, 1995).

The genres *Sesbania* belong to the family Leguminosae. Member of the genus *Sesbania* are known for exceptionally fast growing rates as well as a very high affinity for association with several nitrogen fixing Rhizobia in the soil. 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 (Indrayan *et al.*, 2005). Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body. Plants are the rich source of all the elements essential for human beings. (New Wall *et.al.*, 1996). Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years. Today is a renewed interest in traditional medicine and an increasing demand for more drugs from plant sources. Lipids are organic compounds that include fats, waxes, phospholipids, glyco lipids and sterols. All of them are present in almost every living cell. Lipids are insoluble in water but soluble in organic solvents like alcohol and chloroform. Alkaloids represent group of secondary metabolites produced in plants. About 2500 alkaloids contain nitrogen in heterocyclic ring and these are basic in nature. They are usually found in plants as salts of organic acid and exhibit important pharmacological properties.

*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 (Dutt *et.al.*, 1983). 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 (Pari and Uma, 2003). It also has anti inflammatory, analgesic and antipyretic activity. Primarily used as green manure between rice crops (Shahjalal and Topps, 2000).

*Sesbania exaltata* 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 (Brown, 1954). *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 are a useful source of protein for ruminant diets and a source of supplement fodder for livestock. The decoction of *Sesbania sesban* leaves, bark and roots are used as an antihelminthic against tapeworms and roundworms in humans and they use to a wide range of diseases including sore throat, gonorrhoea, syphilis, yaws and jaundice. 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 (Shiv Pal Singh, 1990). Farmers were encouraged to feed *Sesbania* fodder to lactating cows to enhance milk secretion (Brown, 1954).

### Materials and Methods

The plant material of *Sesbania rostrata*, *Sesbania exaltata* and *Sesbania* collected from different part of Maharashtra during different season viz. summer, monsoon and winter. The leaves, bark, and wood sample are collected and kept separately. Dried in sun light and make a powder with grinder.

#### Determination of lipid (oil)

Agrawal *et al.*, (1987) method was followed for the estimation of lipid. The material was dried for 12-17 hours at 60-70 °C and ground to a coarse powder. 5 gm of weighed sample was taken in a cellulose thimble (The quantity of material would depend on oil content). The thimble was fixed in the soxhlet funnel and about 150 -200 ml of petroleum ether was taken in the flat bottom flask (FBF). The funnel over the flask was fixed and attached to the water condenser. Refluxed for at least 4 hours and the heater were switched off to let the apparatus cool (maintaining the water flow as such). Condenser and funnel were detached, petroleum ether was evaporated in FBF over hot plate at 80 °C. When a small quantity (about 10ml) of ether was left in the flask, transferred it in weighed beaker (W1) of 50 or 100 ml. Rinsed the FBF twice with small quantities of ether and transferred the washing in the beaker. The beaker was transferred in an oven at 70±10 °C till ether evaporated (presence of ether can be detected by its smell). The beaker was cooled in a desiccator and weight (W2). Difference of (W1-W2) would give the oil content. The oil percentage was calculated on the basis of the weight of plant material.

#### Total Alkaloids

Quantitative estimations of alkaloids were carried out following the method of Sairam and khanna (1971). Each sample was ground to fine powder. To each one gram powder, 0.75ml 25% ammonium hydroxide, 1ml 95% ethyl alcohol and 2 ml ethyl ether were added. The material was allowed to macerate for 12 hours and dried. The dried material was extracted with chloroform for 24 hours in a soxhlet apparatus, and the extract obtained was evaporated to dryness, and the residue was mixed with 2.5 ml 0.1 Methanol (90%) hydro chloric acid. The extracted, thus obtained was centrifuged to take supernatant and discard pellet. The solution was evaporated and the total alkaloids were weight after drying at 100 °C.

### Results and Discussion

The estimation of lipid and alkaloid content was carried out in different parts like leaves, bark and wood of three taxa during summer, monsoon and winter for two consecutive years.

***Sesbania rostrata***- The lipid concentration of leaves was higher in summer (31.86 mg/gm) over that of monsoon (29.14 mg/gm) and winter (30.42 mg/gm). The bark of lipid concentration was ranging from (9.45 to 10.73 mg/gm) and significantly higher in summer (10.73 mg/gm) (Table). The lipid content of wood was comparatively low (7.12 to 8.45 mg/gm). The alkaloids content of leaves was ranging from (1.90 to 2.69 mg/gm) and attained its peak concentration (2.69 mg/gm) during summer season. Alkaloids content was range from (1.52 to 1.91 mg/gm) in bark and from (1.23 to 1.80 mg/gm) in wood during the three seasons tested. Highest concentration observed in summer season i.e. 1.91 mg/gm and 1.80 mg/gm in bark and wood respectively. The lipid and alkaloids content were in increasing order from wood < bark < leaves (Table 1).

***Sesbania exaltata***- The *Sesbania exaltata* has stored more lipid in summer (28.45 mg/gm) in leaves over that of winter (27.11 mg/gm) and monsoon (26.53 mg/gm). In bark highest concentration was observed in summer (9.25 mg/gm) over than monsoon (8.37 mg/gm) and winter (8.71 mg/gm). Wood show very low concentration range from (6.23 to 7.01 mg/gm). The alkaloids content of leaves was higher in summer (2.40 mg/gm) than winter (2.12 mg/gm) and monsoon (1.78 mg/gm). Similarly, the alkaloids content of bark was higher in summer (1.98 mg/gm) over that of monsoon (1.53 mg/gm) and winter (1.64 mg/gm). The wood witnessed very low alkaloids contents, it

ranging from 1.21 to 1.57 mg/gm. The lipid and alkaloids content were in increasing order from wood < bark < leaves (Table 1).

**Sesbania sesban**- Lipid content of leaves was higher in summer (24.60 mg/gm) over than winter (23.17 mg/gm) and monsoon (22.78 mg/gm) (Table 1). The range of lipid content of bark was from (6.61 to 7.45 mg/gm). Highest level in bark was being observed during summer (7.45 mg/gm). The wood was poor in having lipid content (range from 4.98 to 5.63 mg/gm). Alkaloid content of leaves was higher in summer (1.92 mg/gm) over than winter (1.75 mg/gm) and monsoon (1.34 mg/gm) (Table 1). The range of alkaloid content of bark was from (0.76 to 1.41 mg/gm). Highest level in bark was being observed during summer (1.41 mg/gm). The wood was poor in having alkaloid content (range from 0.56 to 0.87 mg/gm) *Sesbania sesban* accumulated highest level of alkaloids in its leaves over than bark and wood, and these trends of observation were similar to *Sesbania exaltata* and *Sesbania rostrata* throughout the course. The lipid and alkaloids content were in increasing order from wood < bark < leaves. (Table 1).

**Table.1: Seasonal variation of Lipid and Alkaloid levels of different plant parts of *Sesbania rostrata*, *Sesbania exaltata* and *Sesbania sesban***

Plant parts	Season	Lipid (mg/g dry wt)			Alkaloid (mg/g dry wt)		
		<i>S.rostrata</i>	<i>S.exaltata</i>	<i>S.sesban</i>	<i>S.rostrata</i>	<i>S.exaltata</i>	<i>S.sesban</i>
Leaves	Summer	31.86	28.45	24.60	2.69	2.40	1.92
	Monsoon	29.14	26.53	22.78	1.90	1.78	1.34
	Winter	30.42	27.11	23.17	2.13	2.12	1.75
Wood	Summer	8.45	7.01	5.63	1.80	1.57	0.87
	Monsoon	7.12	6.23	4.98	1.23	1.21	0.56
	Winter	7.90	6.80	5.22	1.64	1.36	0.73
Bark	Summer	10.73	9.25	7.45	1.91	1.98	1.41
	Monsoon	9.45	8.37	6.61	1.52	1.53	0.76
	Winter	10.03	8.71	7.04	1.70	1.64	0.94

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