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## RESEARCH ARTICLE

### BIOCHEMICAL, NUTRITIVE AND COOKING QUALITY OF EDIBLE GREEN LEAF – *SESBANIA GRANDIFLORA* (L.) PERS

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#### ABSTRACT

Green leafy vegetables are valuable in maintaining alkaline reserve in the body is valued mainly for their high vitamin, dietary fiber and mineral contents. Dry leaf extract of *Sesbania grandiflora* (L.) Pers was evaluated for biochemical compositions like total carbohydrate, starch, proteins, aminoacids, Vitamin B1 and Vitamin B2. The cooking qualities were also analyzed for total carbohydrate, starch and proteins at different intervals of time. The biochemical compositions obtained suggest that the leaves, as a cheap source and can be incorporated into human diet to meet the recommended daily allowances.

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#### INTRODUCTION

Most developing countries depend on starch-based food as the main staple food for the supply of both energy and protein. India being blessed with a variety of natural surrounding and varying climates and seasons has a number of edible green leafy vegetables. Green leafy vegetables are an important component of the human diet, providing fiber, minerals and vitamins (Acikgoz, 2011; Emebu and Anyika, 2011). Green leafy vegetables are rich sources of vitamins such as  $\beta$ -carotene, ascorbic acid, riboflavin and folic acid as well as minerals such as iron, calcium and phosphorous. They are also recognized for their characteristic color, flavor and therapeutic value. Green leafy vegetables are important protective foods and highly beneficial for the maintenance of health and prevention of diseases. Recognizing the need for identification of such green leafy vegetables, which are believed to be nutritious, may help in achieving nutritional security. The diet and the food based approach in combating micronutrient malnutrition is essential for its role in increasing the availability and consumption of micronutrient rich foods. Green leafy vegetables are important component of the dietary regime of humans because they provide the necessary vitamins and minerals (Fasuyi, 2006). The awareness of the popularity on the significance of nutrition in health has resulted to an increasing quest for biochemical knowledge of composition of foods.

#### Taxonomic Position of *Sesbania grandiflora* (L.) Pers

Division : Magnoliophyta  
Class : Magnoliopsida  
Order : Fabales  
Family : Fabaceae  
Genus : Sesbania  
Species : *Sesbania grandiflora* (L.) Pers

*Sesbania grandiflora* (L.) Pers (Plate 1) is an open branching tree upto 15 m tall and 30 cm in diameter. Roots are normally heavily nodulated with large nodules. Stems tomentose, unarmed. Leaf pinnately compound, up to 30 cm long including a petiole 7-15 mm long, the rachis is slightly pubescent or glabrous. The are 20-50 leaflets in pairs opposite to alternate on the same leaf, oblong to elliptical, 12-44 mm x 5-15 mm, rounded to obtuse to slightly emarginate at the apex, glabrous or sparsely pubescent on both surfaces. Stipels are filiform, 0.75-1 mm long, pubescent, persistent, stipules broadly lanceolate, 8 mm long and early deciduous.

Raceme are in axillary, 2-4 flowered, rachis up to 65 mm long. The peduncles are 15-35 mm long, tomentose and the pedicels are 15-18 mm long, pubescent. The bracts are lanceolate, 3-6 mm long, early deciduous. The flowers are white, yellowish, rose-pink or red, the calyx is 15-22 mm long, closed in young buds, splitting or breaking at anthesis and the basal parts are persistent in the fruit. The ovary and style are glabrous. Pods are linear to slightly falcate, 20-60 x 6-9 mm with broad sutures, 15-50 seeded, septa 7.5-10 mm apart, glabrous,

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hanging vertically, indehiscent. Seed are subreniform, 6.5 x 5 mm x 2.5-3 mm, dark brown. It is native to Tropical Asia including, India, Indonesia, Malaysia, Myanmar and Philippines, with possibly Indonesia as the centre of diversity.

Leaves used as tonic, diuretic, laxative, antipyretic, chewed to disinfect mouth and throat. Valued as a fodder throughout Indonesia, particularly for dry season feeding of cattle and goats. Commonly grown on paddy bunds, and around gardens or cropping fields for its nitrogen contribution. *Sesbania grandiflora* (L.) Pers grows fast enough to be used as an annual green manure crop. The leaves, seed pods and flowers are used as human food in southeast Asia. The light density wood of *Sesbania grandiflora* (L.) Pers makes poor firewood and is not durable as a timber, however it can be used for low quality pulp. Poles are used for light construction but have limited durability. Used as a shade crop and as a support for climbing crops. Also used as a component of windbreaks.

The present study was undertaken with the aim to evaluate the biochemical, nutritive and cooking quality of dark green leafy vegetable, *Sesbania grandiflora* (L.) Pers. The result of our study can be used as a fundamental data for dietary recommendation to help the consumer to select appropriate cooking time to meet their nutrient and health needs.

## MATERIALS AND METHODS

### Collection and preparation of sample

The green leaves of *Sesbania grandiflora* was harvested. The leaves were destalked, washed and shade dried to avoid destroying active compounds. The dried leaves were then ground to homogenous powder using willey mill grinder and then stored in a air tight container for further analysis. The sample was then subject to biochemical analysis.

### Biochemical Analysis

Biochemical analysis were carried out to find Total Carbohydrate, Starch, Protein, Aminoacid, Vitamin B1 and Vitamin B2 according to the procedure of Association of Official Analytical Chemist (Sadasivam and Manickam, 1992). The cooking quality was analyzed for Total Carbohydrate, Starch and Proteins.

## RESULTS AND DISCUSSION

Total Carbohydrate and starch was found to be 6mg/100g and 5.40mg/100g (Table 1) in *Sesbania* leaves. It has been recommended that carbohydrate in the diet be 55-65% of total energy with emphasis on complex carbohydrate. 40gm of dietary fibre in the daily adult diet is recommended (FAO/WHO, 1998). Protein is the most important constituent of food since it is required for general growth, maintenance and repair of body tissues. Protein and aminoacid was found to be 0.715mg/100g and 0.225mg/100g (Table 1) in *Sesbania* leaves. For maintenance of nitrogen balance, the minimum protein requirement is 0.51- 0.66g per kg body weight. ICMR has recommended an allowance of 1.0 g per Kg for adults. The requirement for infants and children is 1.5-2.0g/Kg. During

pregnancy and lactation an additional 10-20g-protein is recommended.

### *Sesbania grandiflora* (L.) Pers (Plate 1)

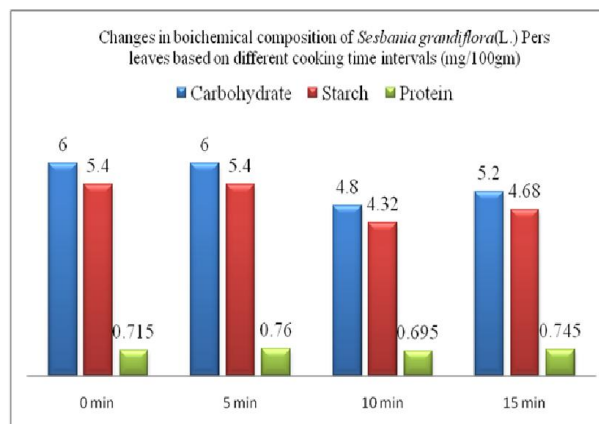


**Table 1. Biochemical composition of *Sesbania grandiflora* (L.) Pers leaves (mg/100g)**

Parameters	Composition mg/100g
Carbohydrate	6.00
Starch	5.40
Protein	0.715
Amino acids	0.225
Vitamin B1	3.43
Vitamin B2	10.04

**Table 2. Change in biochemical composition of *Sesbania grandiflora* (L.) Pers leaves based on different cooking time intervals. (mg/100gm)**

Parameters	0 min	5 min	10 min	15 min
Carbohydrate	6.00	6.00	4.80	5.20
Starch	5.40	5.40	4.32	4.68
Protein	0.715	0.760	0.695	0.745



**Chart 1**

The amount of Vitamin B1 (Thiamin) was found to be 3.43mg/100gm (Table 1) in *Sesbania* leaf. It acts as a co-

enzyme in the carboxylation and transamination reactions in carbohydrate, protein and fat metabolism. The requirement is based on the total energy requirement, composition of diet and cooking losses. The recommended dietary allowances is 0.5 mg thiamin per 1000 kcal of diet. Vitamin B2 (Riboflavin) was found to be 10.04mg/100g (Table 1) in *Sesbania* leaves. It is a constituent of enzymes and amino acid oxidases that is required for oxidation of purines and amino acids. Intake of 0.6 mg of riboflavin per 1000 kcal is recommended for adults.

The biochemical composition of *Sesbania grandiflora* leaves based on cooking time of 0 min, 5min, 10min and 15min (Table 2 and Chart 1) revealed that there was a gradual decrease in the composition of Carbohydrate and Starch. The composition of proteins remained approximately the same. Hence *Sesbania* leaves can be recommended to be cooked in an average of 5 – 10 mins.

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