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RESEARCH ARTICLE

STUDY OF BIOCHEMICAL PARAMETERS OF TWO MEDICINAL PLANTS – *SOLANUM NIGRUM* L. AND *LEUCAS ASPERA* (WILLD.) LINN.

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ABSTRACT

Solanum nigrum is a common herb or short-lived perennial shrub. It is an important ingredient in traditional Indian medicines. *Leucas aspera* is an annual, branched herb. It is commonly used as an insecticide and in addition, the plant is also used in witchcraft. The present investigation on the biochemical aspect of the two medicinal plants has revealed the presence of various biochemical compounds such as chlorophyll, protein and carbohydrate in both the medicinal plants taken for the study. Among the two medicinal plants studied, the protein, chlorophyll 'a' and total chlorophyll were significantly higher in *L. aspera*. The carbohydrate and chlorophyll 'b' content was found to be higher in *S. nigrum*.

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INTRODUCTION

The World Health Organization (WHO) approximated that around 80% of earth's inhabitants rely on traditional medicine for their primary health care needs, and most of this therapy involves the use of plant extracts or their active components (Brunton and Hussain, 2001). The people of rural area are mainly depending on the traditional medicine for curing their ailments because of the non-availability of modern medicines and hospitals. In developing countries, 80 % of the population still use traditional folk medicines obtained from natural resources. In India, with more than 75 % of the population residing in rural areas close to the natural resources, rich traditions of utilizing medicinal plants have existed among indigenous people for age. Chlorophyll, proteins and common sugars are the primary constituents present in a plant. *Solanum nigrum* commonly known as "Black night shade" belongs to Solanacae family. It is called as Manathakkali in Tamil. This family consists of 90 genera and approximately 2000-3000 species. *Solanum nigrum* is found mainly around waste land, old fields, ditches and roadside, fence rows, or edges of woods and cultivated lands (Atunu *et al*., 2011). *Leucas aspera* is a medicinal herb that belongs to the family Lamiaceae (Labiatae). It is popular as "Thumbai" throughout the Indian sub-continent. *Leucas aspera* is a common aromatic herb and grows abundantly in Bangladesh and also in the wide area of South Asia. The main objective of the present study is to analyze the biochemical parameters in the freshly collected leaf sample of *Solanum nigrum* and *Leucas aspera*.

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MATERIALS AND METHODS

Collection of plant samples

The fresh leaves of *Solanum nigrum* and *Leucas aspera* were obtained from Nelliyalam village in Nilagiri District of Tamil Nadu, India.

Biochemical parameters

The following biochemical parameters were observed in the leaves of the two medicinal plants taken for the present study.

- Chlorophyll
- Protein
- Carbohydrate

Chlorophyll ' a', ' b ' and total chlorophyll were analyzed following the method of Arnon (1949). Protein and Carbohydrate were estimated according to Lowry *et al*. (1951) and Hedge and Hofreiter (1962) respectively.

Statistical analysis

The data obtained from various biochemical observations were subjected to statistical analysis as per the procedure of Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

The present investigation on the biochemical parameters of the leaf of the two medicinal plants, *Solanum nigrum* and *Leucas aspera* showed the following results.

Biochemical analysis of the leaves of *Solanum nigrum* and *Leucas aspera*

The biochemical parameters were analyzed using fresh leaf samples.

Table 1. Chlorophyll 'a ', Chlorophyll 'b' and Total Chlorophyll contents of the two medicinal plants

Chlorophyll contents (mg /gm of leaf sample)	Medicinal plants	
	Leucas aspera	*Solanum nigrum*
Chlorophyll 'a'	0.477±0.15	0.21±0.01
Chlorophyll 'b'	0.023±0.16	0.076±0.03
Total chlorophyll	0.450±0.04	0.275±0.04

Values are mean ±SD of triplicates

Table 2. Protein content of the two medicinal plants

Plant	Protein (mg/gm of leaf sample)	
	0.1 ml	0.2 ml
Leucas aspera	10.8± 1.70	8.6 ±0.51
Solanum nigrum	7.4± 3.11	3.62± 0.54

Values are mean ±SD of triplicates

Table 3. Carbohydrate content of the two medicinal plants

Plant	Carbohydrate (mg/gm of leaf sample)	
	0.1 ml	0.2 ml
Leucas aspera	1.4± 0.21	1.50 ±0.20
Solanum nigrum	1.4±0.14	1.57± 0.19

Values are mean ±SD of triplicates

Estimation of Chloropyll "a", Chlorophyll "b" and Total Chlorophyll Content

Chlorophyll 'a', chlorophyll 'b' and total chlorophyll content was calculated for the medicinal plants. The chlorophyll 'a' content of *S. nigrum* and *L. aspera* was estimated to be 0.21± 0.01mg and 0.477 ± 0.15 mg respectively (Table-1). The chlorophyll 'b' content was estimated to be minimum in *L. aspera* (0.023± 0.16mg), when compared to *S. nigrum* (0.076 ± 0.03mg). The total chlorophyll content was higher in *L. aspera* and the value was 0.450± 0.04 mg (Table-1). *S. nigrum* showed a total chlorophyll content of 0.275 ± 0.04 mg (Table-1). Faisal and Anis (2006) have reported higher amount of chlorophyll a and chlorophyll b in plants when compared to seedlings of *Psoralea corylifolia*. The amount of chlorophyll a and chlorophyll b in normal leaf was less when compared to the regenerated leaf. The increased content of chlorophyll in *S. nigrum* may increase the efficiency of photosynthesis by the plants (Salisbury and Ross, 1991).

Estimation of protein

The protein content estimated in the two medicinal plants taken for the study are presented in Table -2. The protein content was found to be 7.4± 3.11 mg in *S. nigrum* and 10.8 ± 1.70 mg in *L. aspera* in 0.1ml of the extract. Nupo *et al*. (2013) have studied the effect of squeezing, blanching and drying on the nutritional value of leafy vegetables such as *S. nigrum*. The result of the analysis of the samples showed that the protein content of the dried sample had the highest vitamin A, E and D content. This study indicates that *S. nigrum* is a good source of diet especially when processed.

Estimation of carbohydrate

The carbohydrate content was estimated to be 1.57 ± 0.19 mg in *S. nigrum* and 1.50 ± 0.20 mg in *L. aspera* in 0.2 ml concentration. In 0.1ml of the extract, the values were found to be almost similar (1.4 ± 0.21 and 1.4 ± 0.14 in *L. aspera* and *S. nigrum* respectively) (Table - 3). Carbohydrates are the primary source of energy for the body and are often referred to as 'fuel of life'. Each gram of carbohydrate yields 4 calories in the process of its metabolism. They help to provide energy for muscular work and nutritive processes, maintenance of body temperature, besides their role in oxidation of fats, and as spare protein for growth and repair. Therefore, daily consumption of such a leafy vegetable can significantly contribute to the recommended daily intake of total carbohydrate, which is about 130 g (Chau andCheung, 1997). The use of nutraceuticals as attempts to accomplish desirable therapeutic outcomes with reduced side effects, as compared with other therapeutic agents has met with great success. So, we may utilize *S. nigrum* for the processing of nutraceuticals by way of giving proper resource management. The wealth of this weed can be capitalized for the benefit of human beings. However, eco-friendly utilization of this species is also possible in those countries where this weed already exists.

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