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Analysis of Biochemical Parameters of *Chromolaena odorata* (L.)

R. M. King & H. Rob. and *Adhatoda vasica* Nees



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ABSTRACT

Plants with one or more of its organ having substances that can be used for curative purpose are called medicinal plants. India has a rich source of medicinal plants. In the present study, two important medicinal plants namely, *Chromolaena odorata* and *Adhatoda vasica* have been selected and biochemical constituents such as chlorophyll, protein and carbohydrate have been analyzed. The result showed significantly higher chlorophyll 'a', chlorophyll 'b', total chlorophyll and carbohydrate content in *Chromolaena odorata*. The protein content was found to be significantly higher in *Adhatoda vasica*.



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INTRODUCTION

Plants that are used for therapeutic purpose are termed as medicinal plants or herbs. Medicinal plants can be simply classified as trees, shrubs, woody perennials, annuals, biennials and climbers (Anubha Arora, 2013). India recognizes more than 3000 plant species which have medicinal values. Herbal medicines have become more popular in the treatment of many diseases due to popular confidence that green medicines are safe, easily available and have less side effects. Use of traditional medicine cures a wide range of diseases in developing countries (Bhumi and Savithamma, 2014). The World Health Organization (WHO) has predicted that 80% of the earth's inhabitant relied on traditional medicine for their primary healthcare needs and most of these therapies involved the use of plant extract or their active compounds (Bruneton, 1995).

Chromolaena odorata

Chromolaena odorata is a perennial herb belonging to the family Asteraceae. The plant has the ability to rejuvenate from the roots (Shetonde Mihigo *et al.*, 2015). It is native to Central and South America, but it has become established pantropically (Zachariades *et al.*, 2009). This weed was probably introduced into Nigeria about 50 years ago and found along road- sides, waste and fallow lands. Egunjobi (1969) reported that the plant *Chromolaena odorata* is locally called “*bienqua*” among the Ijaws in the Niger Delta region of Nigeria where it is believed to possess healing potentials for wounds and treatment of pile ailment.

Adhatoda vasica

Adhatoda vasica is a small evergreen plant belonging to the family Acanthaceae. *Adhatoda vasica* grows in plains of India and in the lower Himalayas, up to a range of 1000 meter above sea level. This plant is also cultivated in other tropical areas. It grows well in low moisture areas and dry soils. The Vasaka plant is perennial, evergreen and highly branched with unpleasant smell and bitter taste. The plant lives in multiple seasons and retains its leaves throughout the year. It is a shrub that grows up to a height of 2.5 m (Jayapriya and Gricilda, 2015). *Adhatoda vasica* is commonly known as Malabar nut, and locally known as Adulsa, is found in many regions of India and throughout the world. This plant has several uses in traditional Ayurveda.

The leaves, flowers, fruits and roots are widely used for treating cold, cough, whooping cough, chronic bronchitis and asthma. It is used as sedative and expectorant. It is an anti-spasmodic herb. Boiled with sesame oil, it can be used to heal ear infections and arrest bleeding. The main objective of the present study was to analyze the biochemical parameters in the freshly collected leaf samples of *Chromolaena odorata* and *Adhatoda vasica*.



Plate -1. Morphology of the plant - *Chromolaena odorata*



Plate – 2. Morphology of the plant - *Adhatoda vasica*

MATERIALS AND METHODS

In the present study, fresh leaf sample of two different medicinal plants were used. The medicinal plants were *Chromolaena odorata* and *Adhatoda vasica*. A study was carried out on the various biochemical parameters of the two plants.

Collection of Plant Samples

The fresh leaves of *Chromolaena odorata* and *Adhatoda vasica* were obtained from Elembulassery Village in Palakkad district of Kerala.

Estimation of Biochemical parameters

The following biochemical parameters were observed in the leaves of both the medicinal plants

- Chlorophyll
- Protein
- Carbohydrate

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

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 biochemical parameters carried out in the two medicinal plants showed the following results.

CHLOROPHYLL

Chlorophyll 'a', chlorophyll 'b', and total chlorophyll content were calculated for the two medicinal plants. The chlorophyll 'a' content was estimated to be 0.182 ± 0.20 mg and 0.124 ± 0.10 mg in the two medicinal plants *Chromolaena odorata* and *Adhatoda vasica* respectively

(Table 1). The chlorophyll 'b' content was estimated to be 0.108 ± 0.05 mg and 0.046 ± 0.03 mg in *Chromolaena odorata* and *Adhatoda vasica* respectively (Table 1). The total chlorophyll content was higher in *Chromolaena odorata* and the value was 0.290 ± 0.25 mg (Table 1). The other medicinal plant studied showed total chlorophyll content of 0.170 ± 0.12 mg (Table 1). Chlorophyll 'a', 'b' and total chlorophyll content were found to be significantly higher in *Chromolaena odorata* when compared to *Adhatoda vasica*.

PROTEIN

The protein content of the two medicinal plants were observed and presented in Table 2. The highest protein content was estimated in *Adhatoda vasica* (21.4 ± 0.84 mg). *Chromolaena odorata* showed a protein content of 19.6 ± 1.414 mg (Table 2). According to Bhumi *et al.* (2014), the biochemical studies on *Abrus precatorius* leaves, showed relatively high level of protein, which are the primary components of living organisms. Proteins are essential to maintain the structure and function of all life and vital for growth and development. The presence of higher protein level in the plants points towards their possible increase in food value or that a protein based bioactive compound could also be isolated in future. According to Sunitha singh *et al.* (2012), leaf extracts of *Adhatoda* were analyzed for their biochemical composition. Result of their work indicated the presence of higher concentration of glycoside, saponin, proteins and amino acids.

CARBOHYDRATE

Among the medicinal plants chosen for the study, the carbohydrate content was estimated to be higher in *Chromolaena odorata* (2.53 ± 0.11 mg) in 0.1 ml concentration and the lower value was observed in *Adhatoda vasica* (1.55 ± 0.15 mg) in the same concentration (Table 3). Watal *et al.* (2014) have evaluated the presence of carbohydrates, glycosides and coumarins in the plant parts that are known to exert a beneficial action on immune system by increasing the body strength and hence are valuable as dietary supplements.

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Table – 1. Chlorophyll ‘a’, Chlorophyll ‘b’ and Total Chlorophyll contents of the two medicinal plants

Chlorophyll contents (mg /gm of leaf sample)	Medicinal plants	
	<i>Adhatoda vasica</i>	<i>Chromolaena odorata</i>
Chlorophyll ‘a’	0.124±0.10	0.182±0.20
Chlorophyll ‘b’	0.046±0.03	0.108±0.05
Total chlorophyll	0.170±0.12	0.290±0.25

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
<i>Adhatoda vasica</i>	18.6± 0.49	21.4 ±0.84
<i>Chromolaena odorata</i>	17.6± 5.09	19.6± 1.414

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
<i>Adhatoda vasica</i>	1.55± 0.14	1.57 ±0.15
<i>Chromolaena odorata</i>	2.53±0.11	1.65± 0.21

Values are mean ±SD of triplicates

CONCLUSION

The result of the present study revealed that the leaves of the two medicinal plants viz., *Chromolaena odorata* and *Adhatoda vasica* contain the important primary constituents that can play a crucial role in providing nutritional significance and health effects in human. The two medicinal plants taken for the present study possess medicinal property. The biochemical

parameters studied showed significantly higher chlorophyll 'a', chlorophyll 'b', total chlorophyll and carbohydrate content in *Chromolaena odorata*. The protein content was found to be significantly higher in *Adhatoda vasica*.

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