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BIOCHEMICAL ESTIMATION OF PRIMARY METABOLITES IN *OCIMUM TENUIFLORUM*

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ABSTRACT
Ocimum tenuiflorum is an important medicinal herb belonging to family Lamiaceae. It is commonly known as 'Shyama tulsi'. In the present investigation, various *in vivo* plant parts (leaves, stem and root) and in vitro (callus)of *ocimum tenuiflorum* was carried out for biochemical estimation of primary metabolites viz. total soluble sugar, starch, lipid, protein and phenol. The plant parts varied in composition of their primary metabolites.Results showed that the maximum content of total soluble sugar (3.5±0.08 mg/gfw), lipid (2.6±011 mg/gfw), protein (3.6±0.65 mg/gfw) and phenol (1.8±0.456 mg/gfw) and maximum starch found in root (2.1±.014 mg/gfw).

INTRODUCTION

Ocimum tenuiflorum commonly known as holy basil (English), or Shyama Tulsi (local language), is a herbaceous sacred plant found throughout India. Indian material medica describes the use the plant in a verity of ailments. In Indian mythology the plant is considered to extirpate all sins and purify the body when touched. It is often grown outside dwellings and worshipped daily. It is said to daunt Yama, the god of death, but has a close affinity with Lord Krishna who is reputed to have grown the herb. If offered to Lord Krishna it is said to have mystical powers of protection from death, disease and misfortune. (Williamson, 2002) Different parts of plant like stem, flower, seed, leaves, root etc are known to possess therapeutic potential and have been used, by traditional medicinal practitioners, as analgesic, antibacterial (Khanna and Bhatia, 2003), anticancer (Karthikeyan *et al*., 1999) and hypoglycemic agent (Rai *et al*., 1997) etc. early studies have been reported its wound-healing activity (Shetty *et al*., 2006), Anti oxidant activity (Samjon *et al.,* 2007).

Primary metabolites directly involved in growth and development of plants. Primary metabolites viz, chlorophyll, amino acid, nucleotides and carbohydrates have a key role in metabolic process such as photosynthesis, respiration and nutrient assimilation. They are used as raw material and food additives. Many plant such as *Gloriosa superba*, *Ricinus communis Euphorbia hirta* and *Moringa oleifera* Lam have been evaluated for their composition of primary metabolites (Rishi and Sarin, 2009; Vijayvergia *et al*., 2009 and Sharma *et al.,* 2010). The present study was conducted to investigate biochemical estimation of primary metabolites viz, total soluble sugar, starch, lipid, protein and phenol in *ocimum tenuiflorum*.

MATERIALS AND METHODS

Plant parts (stem, leaves and root) of *Ocimum tenuiflorum* were collected from the campus of university of Rajasthan, Jaipur and callus developed by tissue culture technique. The *in vivo* plant material were separately washed with running water to remove dust and powdered with motor and pestle.

The quantitative estimation of primary metabolites was carried out using different protocols. The powdered *in vivo* plant parts (leaves, stem and root) and in vitro callus of *ocimum tenuiflorum* was used for estimation of carbohydrate (Dubois *et al*., 1956), protein (Lowry *et al*., 1951, lipid (Jayaraman,1981), starch, (Dubois *et al*., 1956) and Phenol (Bray and Thorpe, 1954) respectively. All experiment repeated in triplicate and means (± SD) were calculated.

RESULTS AND DISCUSSION

In the present investigation, various *in vivo* plant parts (leaves, stem and root) and in vitro (callus) of *Ocimum tenuiflorum* was carried out for biochemical estimation of primary metabolites viz, total soluble sugar, starch, lipid, protein and phenol (Table 1). The various plant parts (stem, leaves and root) and in vitro callus of *Ocimum tenuiflorum* varied in composition of primary metabolites studied. Maximum content of total soluble sugar was observed in leaf of *Ocimum tenuiflorum* (3.5±0.08 mg/gfw) and minimum in callus (Fig.

Table 1: Estimation of primary metabolites (mg/gfw) in *Ocimum tenuiflorum*

Plant parts	Total soluble sugar	Starch	Lipid	Protein	Phenol
Leaf	3.5± 0.08	0.56± 0.33	2.6± 0.11	3.6±0.65	1.8±0.46
Stem	3.0±0.01	1.98±0.26	2.1 ± 0.45	2.5±0.33	1.02±0.03
Root	2.6±0.40	2.1±0.14	1.07 ± 0.21	2.8±0.34	0.92±0.11
Callus	1.5± 0.22	0.34±0.05	0.6 ± 0.02	1.6±0.22	0.62±0.02

Abbreviation: mg/gfw = mili g per g fresh weight of tissues

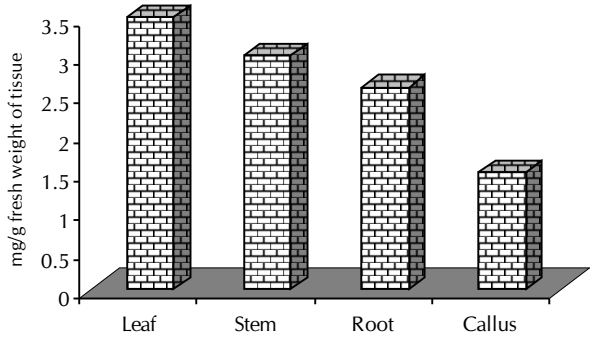

Figure 1: Estimationn of total soluble sugar in *Ocimun tenuiflorum*

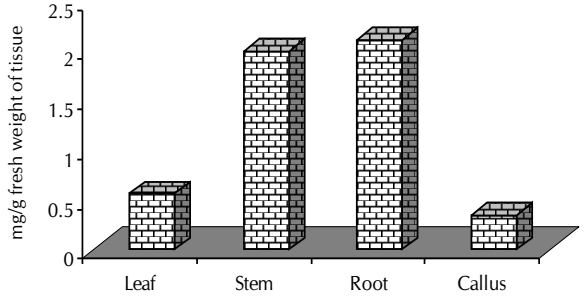

Figure 2: Estimation of starch in *Ocimun tenuiflorum*

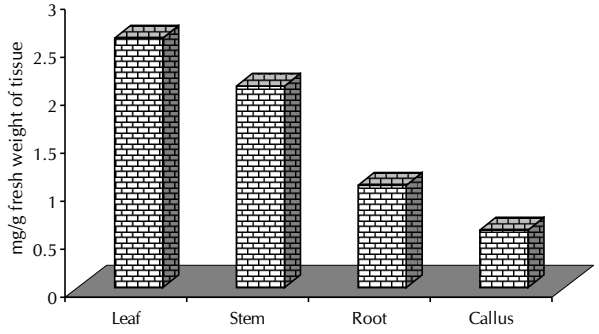

Figure 3: Estmation of lipid in *Ocimum tenuiflorm*

1). Higher content of total soluble sugar was reported in leaves of *M.indica* (Vijayvergia and Shekhawat, 2009). Plant sugars can be used as artificial sweeter and they can even help in diabetes by supporting the body in its rebuilding (Freeze, 1998).

Among all *in vivo* plant parts root had higher starch level (2.1±.014 mg/gfw) as compared to stem and leaf. *In vitro* callus sowed minimum starch (0.34 ± 0.05) (Fig. 2). According to Sharma *et al*. (2006), the presence of higher levels of starch in intact plant part might be due to more storing capacity to

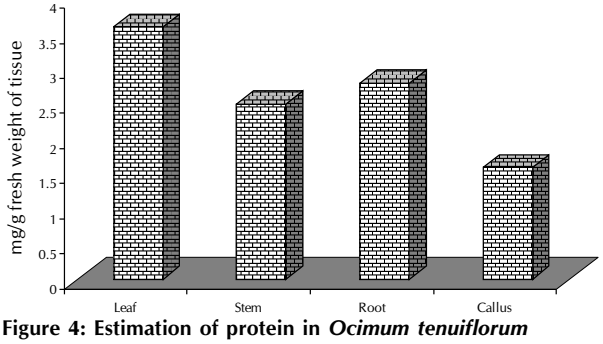

Figure 4: Estimation of protein in *Ocimum tenuiflorum*

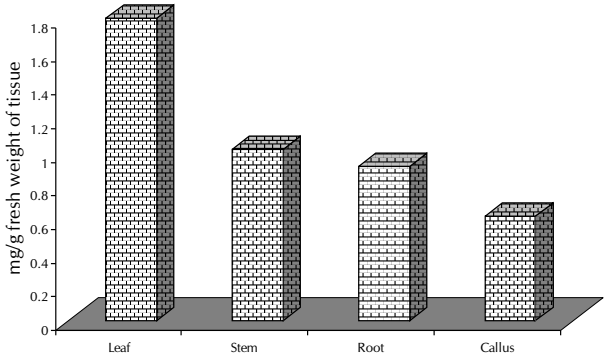

Figure 5: Estimation of total phenol in *Ocimun tenuiflorum*

escape the drought conditions.

The highest amount of lipid (2.6±011 mg/gfw) protein (3.6±0.65 mg/gfw) and phenol (1.8±0.456 mg/gfw) was also recorded in the leaf of *Ocimum tenuiflorum*, and minimum in callus (Figs. 3, 4 and 5).

Lipid a diverse group of primary metabolites, include reserve plant material such as fats, essential oils, waxes terpnoids and oleoresin. Plant lipid have developed products that work with diverse requirements, be it culinary, medicinal or cosmetic (Yadav and Tyagi, 2006).

In the present studies, among all the samples (*in vivo* and *in vitro*) tested, leaf showed higher protein level protein (3.6±0.65 mg/gfw) followed by, root, stem, and callus (Fig. 4). In similar studies carried out protein content was in leaves of M.indica (Vijayvergia and Shekhawat, 2009). The presence of higher protein level in the plant parts towards their possible increase in food value or that a protein based bioactive compounds could also be isolated in future (Thomsen *et al*., 1991).

The total phenolic contents was also recorded maximum (1.8±0.456 mg/gfw) in the leaf of *Ocimum tenuiflorum*) and minimum in callus (Fig. 5). The higher amount of phenols is

important in regulation of plant growth, development and disease resistance. Plant phenol may interfere with all stages of cancer process, potentially resulting in a reduction of cancer risk (Hollman, 2001) Phenolic compounds have been studied in different plant species like *Arachis hypogaea* and *Simmondsia chinensis* (Ali, 2000); *Chlorophytum borivilianum* (Singh, 2005), *Balanites aegyptica* L. (Vijayvergiya and Vijay, 2006); *Terminalia catappa* (Nagesh *et al*., 2007).

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