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BIOCHEMICAL ESTIMATION OF PRIMARY METABOLITES FROM *SEMECARPUS ANACARDIUM*

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ABSTRACT
Plants have formed the basis of sophisticated traditional medicine systems that are still in use due to recognition of natural compounds being non-narcotic, with no side effect and easy availability. Screening of metabolites obtained from plants for their pharmacological assay has indeed been the vast source of innumerable therapeutic agents representing molecular diversity engineered by nature. In the present study the primary metabolites (total soluble sugar, starch, lipids, proteins and phenol) of *S.anacardium* has been estimated from different plant parts *viz*., stem, roots, leaves and nuts. The observation showed maximum amount of total soluble sugar (56.33 mg/gdw) and proteins (66.34 mg/gdw) in leaves, starch (44.66mg/gdw) in stems and lipids (75.67 mg/gdw) and phenol (117.33 mg/gdw) in nuts, of *S.anacardium* as compared to other parts investigated.

INTRODUCTION

Medicinal plants since ancient time have been virtually used in all cultures as a source of medicine. The wide spread use of herbal remedies and health care preparation as those described in ayurveda, Chinese and European system of medicines (Kapoor, 1990; Chopra, 2000; Gurib-Fakim, 2006). The beneficial effect can be judged from the WHO estimation that around 80% of the world population uses medicinal plants in primary health care in some form or the other.

Semecarpus anacardium (L), a medicinally important plant, belongs to the family Anacardiaceae. Commonly known as marking nut, bhallataka and bhilawa, it is distributed in the Himalayan and sub-Himalayan region of India. *S.anacardium* is highly valued for being caustic, astringent, antirheumatiic, vesicant and used in anorexia, cough, asthma, indigestion, ulcer, piles and various nervous diseases (Chandra, 1989). Phytochemical studies revealed the presence of phenolic compounds, bhilawanols (Lamture *et al*., 1982), biflavonoids (Murthy, 1985; 1986) sterols, glycosides and anacardic acid. The nut milk extract have been extensively studied for its anti-arthritis and mutagenic properties (Vijayalakshmi *et al*., 1996; Premalatha *et al*., 1997).

Plants synthesize and preserve a variety of biochemical products, many of which are extractable and used for various scientific investigations. These phytochemicals that include primary and secondary metabolites have countless benefits to humans, which are exploited as natural pesticides, flavoring, fragrances, medicinal coumponds, fibers and beverages. While secondary metabolites have restricted distribution, which is to one plant species or a taxonomically related group of species, primary metabolites are found throughout the plant kingdom (Taiz and Zeiger, 2006). Primary metabolite acts as a precursor for bioactive compounds used as therapeutic drugs (Tatsuta and Hosokawa, 2006). Therefore, in the present study primary metabolites from leaves, stems, roots and nuts of *S.anacardium* have been evaluated.

MATERIALS AND METHODS

Each of the experimental material *viz,* leaves, stems, roots and nuts of *Semecarpus anacardium* were collected from Midnapore region of West Bengal, and authenticated from National Institute of Ayurveda (NIA), Jaipur, Rajasthan. A voucher specimen (RUBL 20625) was submitted in the herbarium, Department of Botany, University of Rajasthan. The experimental materials were washed in distilled water, shade dried and powdered with motar and pestle. These powdered materials were further used for the quantitative estimation of carbohydrate and starch (Dubois *et al*., 1956), protein (Lowry *et al*., 1951), lipid (Jayaraman, 1981) and phenol (Bray and Thorpe, 1954) respectively. The experiments were carried out in triplicate extract and the data were presented as mean $\pm$ standard deviation.

RESULTS AND DISCUSSION

Table 1 shows the results of primary metabolites from various parts (leaves, stems, roots and nuts) of *S.anacardium*. Carbohydrates possess a vital position in plant biochemistry and morphology. Various studies have suggested that increase

Table 1: Yield content of primary metabolites in *S.anacardium* (mg/ gdw)

Experiments	Leaves	Stem	Roots	Nuts
Sugar	56.33 ±0.47	46.33 ± 1.69	38 ±0.81	49.66 ±0.47
Starch	23 ±0.81	44.66 ± 0.47	31.66 ±1.24	20 ±0.87
Lipid	33.33 ±0.94	64.67 ±0.47	48.33 ±1.24	75.67 ±1.24
Protein	66.33 ±0.47	46 ±1.63	29.66 ±1.24	58.67 ±0.47
Phenol	65 ±0.82	100.67 ±0.94	88 ±0.81	117.33 ±1.69

in the level of sugar during winters may be a factor in freeze resistance of plants (Ashworth *et al*., 1993). Polysaccharides from Chinese medicinal herbs possess immunomodulatory and antimicrobial activity (Wong *et al*., 1994). Bioactivity of carbohydrates derivatives have also been reported (Nobmann *et al*., 2009).

Starch, one of the most important plant products to man, is a polysaccharide produced by green plants as an energy store.

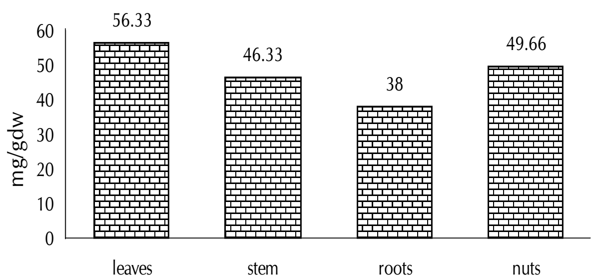

Figure 1: Yield content of sugar from various parts of *S. anacardium*

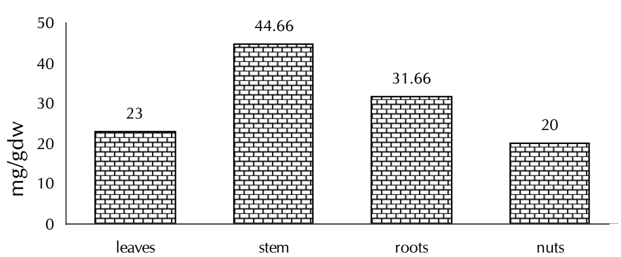

Figure 2: Yield content of starch from various parts of *S. anacardium*

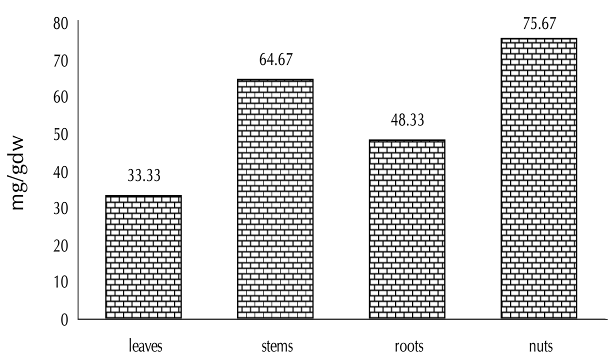

Figure 3: Yield content of lipid from various parts of *S. anacardium*

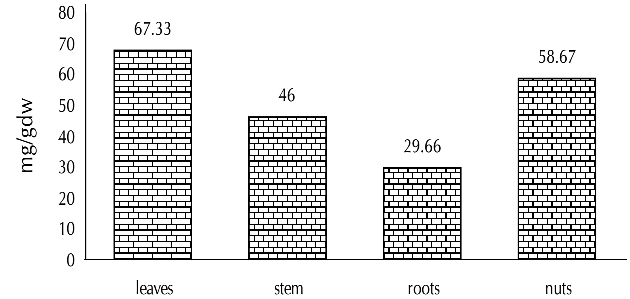

Figure 4: Yield content of protein from various parts of *S. anacardium*

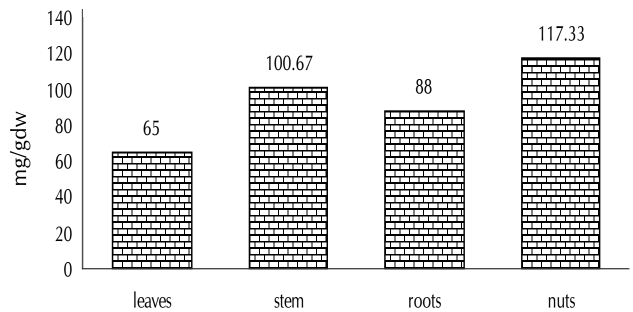

Figure 5: Yield content of phenol from various parts of *S. anacardium*

In ancient Egyptian era it was used as an adhesive and for medicinal purposes in Greeks (Tester and Karkalas, 2001). Patel and Hopponen (1966) reported its use as a diluents and disintegrant.

In the present investigation, higher amount of sugar was found in leaves (56.33 mg/gdw) as compared to other parts taken (Table 1; Fig. 1). And starch content was maximum in stems (44.66mg/gdw) of *S.anacardium* (Table 1; Fig. 2). This is in agreement with the observations made by Vijayvergia and Shekhawat (2009) where sugar (126 mg/gdw) and starch (54 mg/gdw) were higher in leaves and stems of *M.indica* respectively.

Studies have revealed that lipids are active as antimicrobial (Ashour *et al*., 2009; Barra *et al*., 2007), insecticidal and repellents of herbivores (Powell, 2009). In recent times, as solid lipid nanoparticles, lipoproteins and liposomes, lipids are playing a vital role in the field of medicines (Khurana *et al*., 2009). In *S.anacardium*, lipids were maximum in nuts (75.67 mg/gdw) than other parts studied (Table 1; Fig. 3). Powell (2009) reported that lipids are often found higher in seeds. Higher content of lipid was reported in roots of *E.alba* (42 mg/gdw) and *C.quadrangularis* (39 mg/gdw) respectively (Viyay and Vijayvergia, 2007).

Proteins are complex nitrogenous organic substances that include very important group of therapeutically active compounds such as hormones, enzymes, antitoxins etc. In *S.anacardium*, the protein content was maximum in leaves (66.34 mg/gdw) followed by nuts (Table 1; Fig. 4). In earlier study, the amount of protein was higher in roots of *A.indica* (26.6mg/gdw) and *R.communis* (33.4mg/gdw) (Vijayvergia *et al*., 2009).

Nuts of *S.anacardium* possessed maximum amount of phenols (117.33mg/gdw) than stem, leaves and roots (Table 1; Fig. 5).

Plant phenols have been extensively studied because of their chemical nature and their extended occurrence in plant materials. Antioxidant phenols have potential applications in the promotion of health and prevention against damages caused by radicals. In similar studies done by Vijayvergia and Viyay (2007), phenols were higher (45 mg/gdw) in roots of *B.aegyptiaca*.

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