# Research Journal of
# Phytochemistry

ISSN 1819-3471

Academic
Journals Inc.

www.academicjournals.com

Research Journal of Phytochemistry 8 (2): 47-51, 2014
ISSN 1819-3471 / DOI: 10.3923/rjphyto.2014.47.51


# Evaluation of Antioxidant, Vitamins, Phytochemicals and Nutritive Values of *Euphorbia hirta* Linn.

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## ABSTRACT

The leave of *E. hirta* collected from Uttarakhand, India. The plants contained antioxidants such as β-carotene, vitamin C and phenolics (297.44, 91.18 and 336.56 mg 100 $g^{-1}$), respectively. The plants have been reported rich in nutrients such as crude protein, carbohydrate, crude lipids, starch and crude fiber (12.57, 13.92, 3.67, 18.19 and 36.59 g 100 $g^{-1}$), respectively. The plants have also been reported rich in minerals such as Na, K, Ca, S, P, Fe, Mn, Cu and Zn (175.83, 5536.27, 116.94, 1746.11, 241.89, 82.82, 8.71, 2.60 and 5.44 mg 100 $g^{-1}$), respectively. The plants have been found as a good source of nutrients, antioxidants and minerals. Results suggest plants aerial parts could be used as raw materials in drug formulation.

**Key words:** Medicinal plants, nutritive, antioxidant, mineral composition, *Euphorbia hirta*

## INTRODUCTION

The medicinal value of the plants lies in their chemical substances that produce a definite physiological action on human body. Therefore there is need to evaluate the local herbs for mineral and nutrient composition, so as to determine the potential of indigenous source of medicine (Rahila *et al*., 1994). *E. hirta* Linn. an annual herb about 15-20 cm high, erect or ascending often branch from the base and common in waste places, roadside and gardens throughout India. The herbs are used in children in worms and cough. The decoction of the herbs is given in asthma and bronchial affections and their juice is used in dysentery, colic, postnatal complaints, breast pain and skin eruption (Kaushik and Dhiman, 1999; Chopra *et al*., 1956). The latex of plants used as an application to warts and in diseases of urino-genitary (Asolkar *et al*., 1992).

The nutritive value of plants depends on the protein content, essential amino acid, sugar, fat and essential minerals. The present paper reports contents of antioxidants, fat, protein, carbohydrate, fiber and minerals content in the leaves of medicinally important plant *E. hirta* Linn. collected from Pithoragarh, Uttarakhand, India which may be useful to asses their potential usefulness as pharmaceutical raw material in the formulation of drugs.

## MATERIALS AND METHODS

The areal parts of *E. hirta* Linn. were collected from Pithoragarh District, Uttaranchal, India in June 2006 and sample was taken from more then 50 plants. Authentic identification was done in the Botany Department K.U. Nainital and B.S.I. Dehradun. Herbarium deposited at Phytochemistry Lab., D.S.B. Campus, K.U. Nainital. The leaves were air dried in shade after collection. The moisture content was estimated by drying in electrical oven at 80°C for 24 h and expressed on a percentage basis. The dry rhizomes were powdered separately in electric mill to

60-mesh size. The fine rhizomes powder so obtained was used for further nutrients, antioxidants and minerals analysis. The carotenoids in plant sample were extracted, as described (Thimmaiah, 1999; Ranganna, 1976) method. Total phenolic content was estimated by method (Singleton *et al*., 1999). Tannins content was estimated as described by method (Schanderi, 1970). Ascorbic acid content was estimated by method (Ranganna, 1976).

Total carbohydrate content in plant leaves was estimated by the Phenol Sulphuric method (Dubois *et al*., 1956), Starch by method (Hodge and Hofreiter, 1962). Total nitrogen was estimated by Micro-Kjeldahl method, according to AOAC (1995) method. Protein was calculated as Kjeldahl N×6.25 (based on assumption that nitrogen constitutes 16.0% of a protein). The content of fat was estimated by AOAC (1970) method. Ash content was estimated by AOAC (1985) method and ash insoluble content was estimated by method (Peach and Tracy, 1956; Mishra, 1968). Cellulose content was estimated as described by method (Updegroff, 1969). Fiber content was estimated as described by methods (Maynard, 1970).

Mineral content in plant was estimated by wet digestion method. The 1.0 g plant material was first digested with conc. $HNO_3$ (5 mL each), followed by application of 15 mL of tri-acid mixture ($HNO_3$, $HClO_4$ and $H_2SO_4$ 10:4:1, v/v) heated at 200°C and reduce to 1 mL. The residue after digestion was dissolved in double distilled water, filtered and diluted to 100 mL. This solution was used for the estimation of minerals. Macro minerals viz., Na, K, Ca and Li were estimated by AIMIL, Flame Photometer while micro elements viz., Fe, Cu, Mn, Zn and Co were estimated by Atomic Absorption Spectrophotometer, model 4129, Electronic Corporation of India Ltd. Phosphorous and sulpher content was estimated by method (Allen, 1974). Amylose content in plant leave was estimated, as described method (McCready *et al*., 1950; Juliano, 1971).

## RESULTS AND DISCUSSION

Antioxidant content in aerial parts of *E. hirta* plants is presented in Table 1. β-carotene in aerial parts of plants was found to be 297.44±0.91 mg 100 $g^{-1}$ on a dry weight basis with range a 296.16-298.18 mg 100 $g^{-1}$. The content of vitamin C in aerial parts of plants was found to be 91.18±0.49 mg 100 $g^{-1}$ on dry weight basis with a range of vitamin C was 90.67-91.84 mg 100 $g^{-1}$.

The content of chlorophyll a and b in aerial parts of plants were found to be 105.74±0.55 and 88.37±0.78 mg 100 $g^{-1}$ on dry weight basis. The content of phenolics and tannins in plant was found to be 336.56±0.39 and 2586.57±0.39 mg 100 $g^{-1}$ with a range of 336.04-336.97 for phenolics and 2586.04-2586.99 mg 100 $g^{-1}$ for tannins.

The amounts of certain nutrients in aerial parts of plants are presented in Table 2. Lipid, protein and total carbohydrate content in aerial parts of plants were found to be 3.67±0.01,

Table 1: Phytochemicals composition in aerial parts of *Euphorbia hirta* Linn.

| Phytochemicals | Composition (mg 100 $g^{-1}$) | Range (mg 100 $g^{-1}$) |
|---|---|---|
| β-carotene | 297.44±0.91 | 296.16-298.18 |
| Vitamin C | 91.18±0.49 | 90.67-910.84 |
| Chlorophyll a | 105.74±0.55 | 105.30-106.53 |
| Chlorophyll b | 88.37±0.78 | 87.40-89.030 |
| Phenolics | 336.56±0.39 | 336.04-336.97 |
| Tannins | 2586.57±0.39 | 2586.04-2586.99 |

All values are mean of triplicate determinations expressed on dry weight basis, ±: Denotes the standard error

Table 2: Nutrients composition investigated in aerial parts of *Euphorbia hirta* Linn.

| Biochemical parameter | Composition (g 100 $g^{-1}$) | Range (g 100 $g^{-1}$) |
|---|---|---|
| Moisture | 75.18±0.51 | 74.50-75.72 |
| Protein (Kjeldhal N×6.25) | 12.57±0.30 | 12.34-12.99 |
| Fat | 3.67±0.01 | 3.66-30.69 |
| Total carbohydrate | 13.92±0.76 | 13.01-14.87 |
| Starch | 18.19±0.47 | 17.82-18.86 |
| Amylose | 3.30±1.11 | 2.42-40.87 |
| Amylopectin | 14.89±1.37 | 13.02-16.25 |
| Cellulose | 1.40±0.25 | 1.01-10.66 |
| Fiber | 36.59±0.40 | 36.05-36.99 |
| Ash | 12.84±0.60 | 12.04-13.49 |
| Acid soluble ash | 8.67±0.63 | 8.05-90.53 |
| Acid insoluble ash | 4.17±0.28 | 3.96-40.56 |
| Calorific value (kcal 100 $g^{-1}$ DM) | 141 | - |

All values are mean of triplicate determinations expressed on dry weight basis, ±: Denotes the standard error

Table 3: Mineral composition in aerial parts of *Euphorbia hirta* Linn.

| Mineral | Composition (mg 100 $g^{-1}$) | Range (mg 100 $g^{-1}$) |
|---|---|---|
| Sodium (Na) | 175.83±0.79 | 175.05-1760.92 |
| Potassium (K) | 5536.27±0.88 | 5535.04-5536.99 |
| Calcium (Ca) | 116.94±0.71 | 116.05-1170.80 |
| Lithium (Li) | 39.44±0.45 | 38.99-4000.05 |
| Nitrogen (N) | 1981.32±0.44 | 1980.96-1981.94 |
| Phosphorus (P) | 241.89±0.19 | 241.64-2420.10 |
| Sulphur (S) | 1746.11±0.31 | 1745.67-1746.34 |
| Iron (Fe) | 82.82±0.10 | 82.73-8200.96 |
| Copper (Cu) | 2.60±0.40 | 2.04-2000.94 |
| Manganese (Mn) | 8.71±0.16 | 8.56-8000.94 |
| Zinc (Zn) | 5.44±0.37 | 5.04-5000.94 |
| Cobalt (Co) | 0.00 | - |

All values are mean of triplicate determinations expressed on dry weight basis, ±: Denotes the standard error

12.57±0.30 and 13.92±0.76 g 100 $g^{-1}$, respectively on dry weight basis with a range of 3.66-3.69 for lipid, 12.34-12.99 for protein and 13.01-14.87 mg 100 $g^{-1}$ for total carbohydrate. Starch, amylose and anylopeetin content in *E. hirta* were found to be 18.19±0.47, 3.30±1.11 and 14.89±1.37 g 100 $g^{-1}$, respectively.

The cellulose, fiber and moisture content were found to be 1.40±0.25, 36.59±0.40 and 75.18±0.51 g 100 $g^{-1}$, respectively. The ash content was found to be 12.84±0.60 g 100 $g^{-1}$ on dry weight basis. Acid insoluble ash was found to be 4.17±0.28 g 100 $g^{-1}$ and acid soluble ash was found to be 8.67±0.63 g 100 $g^{-1}$. The energy content of plant aerial parts of plants was determined by multiplying the crude protein, crude lipid and total carbohydrate content by the factor 4, 9 and 4, respectively (Watts, 1997). Calorific values of the plant aerial parts of plants were found 141.00 kcal 100 $g^{-1}$.

Minerals are called a "spark plugs of life" because they are required to activate hundred of enzymes reactions within the body. Life is dependent upon the body's ability to maintain balance between the minerals. The mineral content of aerial parts of plants is presented in Table 3. The

contents of sodium, potassium, calcium and lithium in aerial parts of plants were found to be 175.83±0.79, 5536.27±0.88, 116.94±0.71 and 39.44±0.45 mg 100 $g^{-1}$, respectively on dry weight basis with a ranges of 175.05-176.92 for Na, 5535.04-5536.99 for K, 116.05-117.80 for Ca and 38.99-40.05 mg 100 $g^{-1}$ for Li.

The contents of nitrogen, phosphorus and sulphur were found to be 1981.32±0.44, 241.89±0.19 and 1746.11±0.31 mg 100 $g^{-1}$, respectively on dry weight basis. The contents of iron, copper, manganese, zinc and cobalt in aerial parts of plants were found to be 82.82±0.10, 2.60±0.40, 8.71±0.16, 5.44±0.37 and 0.00, respectively on dry weight basis with a ranges of 82.73-82.96 for Fe, 2.04-2.94 for Cu, 8.56-8.94 for Mn, 5.04-5.94 for Zn and 0.0 mg 100 $g^{-1}$ for Co.

## CONCLUSION

It can be concluded that the plant aerial parts contain good amount of antioxidants, nutrients and minerals. Thus, this plant could serve as good source of nutrients when consumed.

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