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NUTRITIVE VALUE OF DIFFERENT PARTS OF FIVE TYPES OF SOLENOSTEMON SCUTELLARIOIDES (L.) CODD. FROM LAMIACEAE FAMILY

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Abstract: *Solenostemon scutellarioides* (L.) Codd. from Lamiaceae family are ornamental plants having medicinal value. As some of the Lamiaceae members (*Mentha spp, Ocimum spp.*) are used as vegetable food, the nutritional status of these ornamental plant samples were determined to gets an idea about their food value using standard laboratory methods. All the samples are found to have nutritional value above 300cal/kg. Young leaves of type 5 recorded highest nutritive values (505.55cal/kg) than other tested types of *S. scutellarioides*. The ash, moisture, fat, protein and carbohydrate contents vary from type to type of *S. scutellarioides*. Perhaps all the selected plants are not equally used as food in spite of their importance as medicinal resource.

Key words: *Solenostemon scutellarioides* (L.) Codd., Lamiaceae members

Introduction

Lamiaceae has occupied an important position in the socio-cultural, spiritual, medicinal aspects of rural and tribal peoples of India with their various medicinal properties (Sankar *et al*., 1994; Singh and Majumdar, 1997; Umadevi and Ganasoundari, 1999; Prakash and Gupta, 2000; Mediratta *et al.*, 2002). The fat, ash, moisture, carbohydrate, protein content and nutritive value of Lamiaceae members are also described by some workers (Edeoga *et al.,* 2006; Kavitha *et al.,* 2009; Idris *et al.,* 2011; Khomdram *et al*., 2011; *Koche et al*., 2011; Mlitan *et al.,* 2014; Tomescu *et al.,* 2015).

Solenostemon scutellariodes (L.) Codd. is an ornamental aromatic perennial plant (Garcia and O'Neil, 2000; Prajapati *et al*., 2013) with various colours (De Loureiro, 1970). The plants are rich in phenolic compound and rosmarinic acid (Rasineni *et al*., 2008; Razzaque and Ellis, 1977; De-Eknamkul and Ellis, 1987; Petersen, 1991; Petersen and Simmonds, 2003; Bauer *et al*., 2004). It is a folkloric medicinal plant used to treat malarial fever, hepatopathy, renal and vesicle calculi, cough, chronic asthma, hiccough, bronchitis, helminthiasis, colic, convulsions, diarrhoea, epilepsy, arthritic inflammations (Kirtikar and Basu, 1975; Warrier *et al*., 1995). Some of the plants of Lamiaceae are used as vegetables and therefore, proximate analysis of the samples were done to have an idea about the nutritional status of these plants used as human food in addition to their medicinal importance.

ANALYSIS

Materials and Methods

Samples were collected from Dibrugarh district of Assam at their full bloomed stage. Different parts (young and mature leaves, inflorescence and stem) were separated and cleaned properly. The materials were air dried at room temperature. The stems were sliced before allowed to dry. After removal of surface water, the materials were wrapped with brown paper and allow sundry for complete dryness (less than 1-2 percent moisture content). The materials were grounded to fine powder using mortar and pestle and then in electric grinder. The fine powder was kept in air tight bottles for further analysis.

Photographs of the five types of *Solenostemon scutellariodes* (L.) Codd (a-e) (a-type 1; b-type2, c-type 3, d-type 4 and e-type 5)

(a)

(b)

(c)

(d)

(e)

Determination of Moisture Content

Moisture content was determined by the method described by AOAC, 1990. 3 gm of powdered sample was weighed in flat bottom disc and kept for 24 hrs in a hot air over at + 80°C and finally weighed. The loss weight was regarded as a measure of moisture content.

$$\text{Percent of Moisture} = \frac{Wet.\ wt. - Dry\ Wt.}{Wet\ Wt.} \times 100$$

Determination of Ash Content

Ash content was determined by the method described by AOAC, 1990. 5 gm of powdered sample was weighed in oven dried silica crucible. The crucible was heated first over a low flame till the material completely charred, followed by heating in a muffle furnace for 3 hours at 300^0 C. It was cooled in desiccator and weighted. To ensure completion of ashing, it was heated again in the furnace for half an hour, cooled and weight. This was repeated consequently till the weight become constant wt.

$$\text{Percent of Ash} = \frac{Wt.of\ Ash}{Wt.\ of\ Sample} \times 100$$

Determination of Fat Content

Fat content was determined by the method described by AOAC, (1990). 5 gm of moisture free powdered sample was extracted with petroleum ether in a soxhlet extractor, heating the flask for about 6 hrs till a drop taken from dripping left no greasy stain on filter paper. After boiling with petroleum ether, the residual petroleum ether was filtered using whatman no. 40 filter paper and filtrate was evaporated in a pre-weighed beaker. Increase in weight of beaker gave crude fat.

$$\text{Percent of fat} = \frac{Weight of the Fat}{Weight of the Sample} \times 100$$

Determination of protein content

Protein content was determined by the Lowry method (Lowry *et al.,* 1951)

Determination of carbohydrate content

Carbohydrate content was determined by using the formula as described by Indrayan *et al*., (2005)

Percent of carbohydrate = 100 – (% of ash + % of Moisture + % of fat + % of Protein)

Determination of nutritive value

The nutritive value of the plant parts were determined by the method described by Indrayan *et al.,* (2005).

Nutritive value = 4x percentage of protein + 9x Percentage of fat + 4x Percentage of carbohydrate.

Nutritive value was expressed in Cal/ Kg of powder

Results

Ash content (percent) was recorded highest (5.70±0.50 percent) in mature leaves of type 1. Moisture content (percent) was recorded highest (14.67±0.29 percent) in stem of type1. Fat content (percent) was recorded higher (34.00±0.04%) in young leaves of type 5. Protein content of different parts of five types ranges from 0.010 percent to 0.080 percent. Young leaves of type 1 recorded highest protein content as 0.080 percent. Highest carbohydrate content was recorded by stem of type 4 (92.84 percent). Kavitha *et al.,* (2009) recorded protein content as 61.4 to 90.5mg/g in 37 genotype of *S. scutellariodes*. All the samples are found to have nutritional value above 300cal/kg. Perhaps all the selected plants are not equally used as food in spite of their importance as medicinal resource. The study of Khomdram *et al.* (2011) provides information on nutritive value of some selected plants of Lamiaceae collected from Manipur. Carbohydrate, soluble amino acid and protein were recorded in variable quantities in their samples. Perhaps these plants may contain some anti-nutritional factor as reported by Vasconcelos and Oliveira (2004); Mattila *et al.,* (2018). Gemede and Ratta, (2014) explained that the presence of cyanogenic glycosides, protease inhibitors, lectins, tannins, alkaloids and sapiens in the plants in higher quantities may cause anti-nutritional effect.

Table 01: Nutritive value of different parts of *Solenostemon scutellarioides* (L.) Codd. Type1

Sample ↓	Ash (%)	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Nutritive value (cal/Kg)
Young leaf	1.81±0.03	14.60±1.09	2.60±2.00	0.080±0.01	80.91	347.36
Mature leaf	5.70±0.50	10.10±0.03	2.35±0.09	0.012±0.03	81.83	348.52
Inflorescence	3.00±0.22	10.00±0.00	1.67±0.46	0.034±0.11	83.84	350.53
Stem	1.09±0.04	14.67±0.29	0.87±0.01	0.012±0.90	83.35	341.27

Table 02:Nutritive value of different parts of *Solenostemon scutellarioides* (L.) Codd. Type 2

Sample ↓	Ash (%)	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Nutritive value (cal/Kg)
Young leaf	1.43±0.01	9.00±0.27	2.90±0.00	0.012±0.22	86.65	372.77
Mature leaf	2.33±1.11	6.83±0.09	3.30±0.01	0.018±1.00	87.52	379.85
Inflorescence	1.70±0.99	12.23±1.09	2.00±0.38	0.023±0.98	74.04	354.27
Stem	0.98±0.01	12.78±1.12	0.89±0.02	0.013±0.22	85.33	349.41

Table 03: Nutritive value of different parts of *Solenostemon scutellarioides* (L.) Codd. Type 3

Sample ↓	Ash (%)	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Nutritive value (cal/Kg)
Young leaf	2.84±0.00	6.60±0.02	4.60±0.02	0.013±0.02	85.95	385.23
Mature leaf	1.96±0.07	7.20±0.33	5.81±1.00	0.014±0.11	85.02	392.42
Inflorescence	1.75±1.00	8.07±0.19	2.48±0.11	0.016±0.09	87.69	373.12
Stem	0.40±0.01	8.72±0.23	1.00±0.00	0.010±0.09	89.87	368.52

Table 04: Nutritive value of different parts of *Solenostemon scutellarioides* (L.) Codd. Type 4

Sample ↓	Ash (%)	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Nutritive value (cal/Kg)
Young leaf	3.01±1.00	12.75±0.03	3.89±1.11	0.029±0.03	80.32	356.42
Mature leaf	2.00±0.44	14.10±1.00	4.00±0.03	0.030±0.32	79.87	355.60
Inflorescence	1.89±0.00	10.01±0.03	2.01±0.99	0.031±0.09	86.05	362.44
Stem	0.56±0.01	5.50±0.01	1.09±0.20	0.014±1.00	92.84	381.21

Table 05: Nutritive value of different parts of *Solenostemon scutellarioides* (L.) Codd. Type 5

Sample ↓	Ash (%)	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Nutritive value (cal/Kg)
Young leaf	2.36±0.04	13.75±2.01	34.00±0.04	0.018±0.01	49.87	505.55
Mature leaf	2.76±0.01	13.98±1.07	10.00±1.01	0.021±0.02	73.24	383.04
Inflorescence	2.09±1.11	10.40±0.22	8.57±0.99	0.035±0.77	78.91	392.89
Stem	1.00±0.03	6.50±0.01	3.12±0.09	0.012±0.09	89.36	385.59

Conclusion

This kind of study provides information about the nutritional quality of these plants and some of them can be used as supplementary source of human food. The plants may have nutritional value but they are still not considered as 'functional food' and are not well experimented.

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