NUTRITIONAL AND ANTINUTRITIONAL FACTORS OF UNDERUTILIZED
BOERHAVIA DIFFUSA LEAVES GROWN IN NORTHERN INDIA

Alka Gupta* and Neelam Yadav¹

Halina School of Home Science,
SHIATS, Allahabad-211 007, India

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ABSTRACT

The nutritional profile of the underutilized leaves of Boerhavia diffusa was determined using standard methods. Proximate composition and antinutritional factors were determined and found that leaves contain 88.48±0.27 g moisture, 2.4±0.07 g total ash, 1.45±0.09 g crude protein, 1.12±0.009 g fat, 0.97±0.03 g crude fibre per 100g of dry matter. Total carbohydrate content was 5.51±0.56 g while calorific value calculated 38±1.46 kcals per 100g. Mineral contents were found as 20.02±0.31 mg iron, 250.6±2.17 mg calcium per 100g of leaves. Vitamin C and β-carotene were found 38.0 mg and 4400±47.1 μg per 100g of dry leaves. Based on analytical study of underutilized B. diffusa leaves was found to contain good source of Ca, Fe, fibre, protein which can be incorporated in human diet to meet the demand of recommended dietary allowances specially in rural areas where it is obtained abundantly. B. diffusa also contain antinutritional factors like phytate 10.5±0.12mg and oxalate 11.73±1.13 mg/100g which are lesser in amount as per RDA.

Key words: B. diffusa, Chemical composition, Nutritional factors, Proximate principles.

INTRODUCTION

It has been clearly known that vegetables are the cheapest and most available sources of important nutritional factors such as protein, essential amino acids, vitamins, minerals (Okafor, 1983). Underutilized plants which occur abundantly in rural areas of northern India are included in vegetables grown locally. Generally underutilized plants are rich in micronutrients and vitamins and can be used in elevating these nutritional factors. They provide variety to our diet and can be used to control malnutrition and undernutrition. They can be cooked along with normal diet and provide better quality of life (Pradheep et al., 2003). Studies have revealed that vegetarians are less susceptible to diseases, live longer life, healthier and more productive lives with greater immunity.

Boerhavia diffusa (Family, Nyctaginaceae) is a herbal plant, grown commonly in tropics in both dry and rainy seasons such as India, Nigeria and many countries alike. Some of the underutilized grown vegetables are used in the treatments of elephantiasis, night blindness and ulcers (Chude et al., 2001). The leaves of B. diffusa are rich source of protein, carbohydrate, fat, fibre, carotene, vitamin C, riboflavin, niacin and various minerals. Therefore, the present study has been planned to study and highlights the nutritional potential of underutilized Boerhavia diffusa obtained abundantly in local areas.

MATERIALS AND METHODS

The leaves of Boerhavia diffusa were collected from surrounding areas of Allahabad Agriculture Institute-Deemed University, Allahabad. The fresh leaves were washed and air dried at room temperature, kept in paper bags and then oven dried at 60°C for 6-8 hours (Fasakin, 2004). The dried leaves were then powdered in mortar with the help of porcelain pestle and sieved through 20 mesh sieve and stored in plastic bottles. The proximate principles were determined using standard procedures of AOAC (2005). Vitamin C was determined in leaves by (Gupta, 2007). Beta-carotene content was estimated using the method prescribed by Rangana
(2001) with modification in column packing as prescribed by Goodwin (1955). Antinutritional factors such as Phytate was estimated by colorimetric method suggested by Sadasivam (2008) and total Oxalate was estimated in the form of oxalic acid by the method given by Gupta (2007).

RESULTS AND DISCUSSION

Nutritional factors (proximate composition and macronutrients) are given in Table 1. The fresh leaves of B. diffusa contains 88.48±0.27% moisture which revealed that due to the high level of moisture leafy vegetable could not be stored for longer period of time and susceptible to spoilage. It constitutes fairly good amount of ash i.e.2.4 g per 100g on dry basis exhibiting good source of minerals. B. diffusa contains 1.45 g protein, 1.12 g crude fat, 0.97 g crude fibre per 100g of dry matter. The energy value calculated as 38±1.46 Kcal and total carbohydrate 5.51±0.56g per 100g reveals a good source of energy apart from protein and fat. The data given in Table 1 also revealed that vitamin C was found 38 mg/100g which was greater than in Solanum nigrum as reported by Akubugwo et al. (2007). B. diffusa consists of higher β-carotene as 4400±47.1 µg per 100g which can be exploited as good supplement for vitamin occur in diet of various areas. This leafy vegetable can serve as a potential source of provitamin A and vitamin C to the masses where poverty is predominant. Monsen (2000) recommended daily allowance of vitamin C as 75 mg/day for women and 90 mg/day for men. Therefore B. Diffusa could take care of these allowances by incorporating in regular diet.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>leaves (per 100g)</th>
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<tbody>
<tr>
<td>(Fresh wt basis)</td>
<td>88.48±0.27%</td>
</tr>
<tr>
<td>Moisture</td>
<td>2.4±0.07 g</td>
</tr>
<tr>
<td>Crude fat</td>
<td>1.12±0.009 g</td>
</tr>
<tr>
<td>Crude protein</td>
<td>1.45±0.09 g</td>
</tr>
<tr>
<td>Crude fibre</td>
<td>0.97±0.03g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>5.51±0.56 g</td>
</tr>
<tr>
<td>Energy</td>
<td>38±1.46 Kcal</td>
</tr>
<tr>
<td>Iron</td>
<td>20.02 ±0.31 mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>250.6±2.17 mg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>38 mg</td>
</tr>
<tr>
<td>Beta-carotene</td>
<td>4400± 47.1 µg</td>
</tr>
</tbody>
</table>

Values are mean ± SD of triplicate determination

The mineral constituents of B. diffusa was found fairly good i.e. 20.02±0.31 mg/100g iron and 250.60±2.17mg/100g calcium. According to Vijay et al. (2008) iron and calcium rich green vegetable should be included in one serving of daily diet can fulfill requirement of iron and calcium deficiency. B. diffusa contains some antinutritional factor like phytate and oxalates as given in Table 2.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Dry leaves</th>
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<tbody>
<tr>
<td>Phytate</td>
<td>10.5±0.12 mg</td>
</tr>
<tr>
<td>Oxalate</td>
<td>11.73±1.23 mg</td>
</tr>
</tbody>
</table>

Values are mean ± SD of triplicate determination

The results showed that its leaves contain 10.5 mg/100g phytate and 11.73 mg/100g oxalate. Presence of these antinutritional factors may interfere absorption of calcium and magnesium in system. Dan, (2005), Oberleas, (1983) and Jose, (1996) have highlighted the role of these antinutritional factors. Rao and Vijay (2002) also explain that calcium absorption was impaired by oxalates. Processing and cooking method could overcome these antinutritional factors. The levels of their contents were low and could be easily reduced by deep cooking and drying methods. If these antinutritional factors were minimized in B. diffusa it can be recommended for considering the utilization of this underutilized vegetable in human diet especially in areas where it is widely grown. It can be preserve and grown in kitchen gardening of waste land to generate additional income source for rural women. The dry leaves of B. diffusa could be incorporated in various product developments.

CONCLUSION

It may be concluded that B. diffusa leaves are good source of fibre, vitamins, minerals and carbohydrate. Plant foods contain almost all of the mineral and organic nutrients established as essential for human nutrition, as well as a number of unique organic photochemical that have been linked to the promotion of good health. From the result, B. diffusa leaves are recommended for considering to the amount and diversity of nutrients it contains.
REFERENCES


Akubugwo, I.E., Obasi, A.N., and Ginika, S.C. (2007). Nutritional potential of the leaves and seeds of blank nightshade-


