Nutritional Properties of Yard Long Bean Cultivars in Bangladesh

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ABSTRACT

The purpose of the study was to compare the nutritional composition [carbohydrate, protein, moisture content, fat, ash, sugar, crude fiber] of four yard long bean cultivars in Bangladesh between 2020 and 21. Consumption of foods high in nutritional value offers a variety of anti-diabetic, anti-heart disease, and anti-cancer effects. The cultivars were high in different proximate composition, the cultivars evaluated had an energy content of 45.86 to 37.21 Kcal/100 g, a carbohydrate content of 6.20 to 8.33 g/100 g, a protein content of 2.72 to 3.22 g/100 g, a fat content of 0.10 to 0.18 g/100 g, a sugar content of 1.52 to 2.37 g/100 g, and a crude fiber content of 1.17 to 1.79 g/100 g. As a result, the cultivars under investigation could be recommended as a nutritional source in daily diets and could be used to treat coronary heart disease, diabetes, intestinal disorders, prostate, stomach ailments, and some cancer kinds.

Keywords: Nutritional Content, Proximate Composition, Yard Long Bean (Vigna Unguiculata Sub Sp. Sesquipedalis L.).

I. INTRODUCTION

Yard-long bean (Vigna unguiculata sub sp. sesquipedalis L.) is a fast-growing annual that thrives with the help of trellis support. There are dwarf and tall climbing types. After around 6-10 weeks of seedling growth, it bears blue to violet flowers, depending on the cultivar type. After two to four weeks after flowering, numerous pencil-thin, fragile, light-green, flexible-textured pods develop. These thick, pendulous pods are typically plucked when immature and consumed as green vegetables. The length of the pods varies from 30 to 80 cm [3]. In Southeast Asia, the yard long bean is an important leguminous vegetable. It’s a summertime crop. Temperatures of 27-30 °C are ideal for growth. It is more resistant to heat and drought than typical fields or lima beans. It is a year-round crop that may be cultivated in any section of the country [18]. During the pod development period, nutrient buildup, particularly protein and carbohydrate accumulation, occurs in seed tissues [10]. Dry beans have a protein content of 15–25 percent and a carbohydrate content of 55–65 percent [6], [7], [9], [17].

Legumes are a wonderful source of minerals and vitamins in addition to providing enough protein [1]. They have a lot of iron and zinc in them. Beans also provide a good amount of folic acid, providing 90–95 percent of daily needs. The intake of folic acid and the risk of colon cancer are inversely related [11]. Cooked beans retain about 70–75 percent of water-soluble vitamins, while dry beans contain thiamine, riboflavin, niacin, vitamin B12, and folic acid [5]. In Bangladesh, farmers’ fields include a variety of cultivars, including short and long varieties, deep green, light green, and violet colored cultivars. These several varieties of yard long beans have diverse nutritional and physiological features. As a result, it is vital to investigate the nutritional status of individual yard long bean cultivars. The goal of this study was to examine the nutritional composition of the popular yard long bean cultivar in Bangladesh, as well as the proximate composition, mineral content, and antioxidant bioactive chemicals.

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II. RESEARCH METHODS

A. Experimental Site and Plant Materials

During the summer season of 2021, fresh fruits of four yard long cultivars, BARI Barboti-1, VS-21, VS-32, and VS-49, were collected from the Olericulture Division of Horticulture Research Centre, Bangladesh Agricultural Research Institute (BARI), and laboratory work was done at the Vegetable Research Technology Section, Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh. The experimental field was located at 23.9920°N latitude and 90.4125°E longitude, with a height of 8.2 m above sea level, in AEZ 28 [2].

B. Sample Preparation

During the summer season of 2021, yard long bean fruits were gathered at commercial maturity from the Olericulture Division, Horticulture Research Centre, Bangladesh Agricultural Research Institute (BARI) experimental farm, cleaned, and sorted by color and size.

C. Proximate Composition

The quantities of moisture, ash, protein (N × 6.25), crude fiber, fat, and carbs (by difference) were measured using AOAC techniques [4].

D. Statistical Analysis

The mean values of the several biological assays were examined using a one-way Analysis of Variance in this study (ANOVA). The least significant difference test was used to calculate significant differences between mean values at p 0.05 [22].

III. RESULTS

A. Energy (Kcal/ 100 g Fresh Weight)

The energy content of all cultivars ranged from 37.62 to 45.94 Kcal/100 g, with the highest amount coming from BARI Barboti-1 (45.94 Kcal/100 g), followed by VS-49 (41.04 Kcal/100 g), VS-32 (40.33 Kcal/100 g), and the lowest amount coming from VS-21 (37.62 Kcal/100 g) (Fig. 1), while [19] found an energy range of 317 to 378 Kcal in commonly consumed dried pulses and brown beans.

B. Carbohydrate (G/100g Fresh Weight)

Carbohydrate content ranged from 6.28 to 8.41 g/100 g, with BARI Barboti-1 (8.41 g/100 g), VS-49 (7.35 g/100 g), and VS-32 (6.67 g/100 g) having the highest content (Fig. 2). VS-21 has the lowest carbohydrate content (6.28 g/100 g). The findings of [16], who studied the carbohydrate content of different beans and found 38.41 g/100 g, backed this conclusion. According to [19], the carbohydrate content of regularly consumed dried pulses and brown beans ranged from 41.9 to 63.35 grams.

C. Protein (G/100 g Fresh Weight)

According to [19], the protein content of commonly consumed dried pulses and brown beans ranged from 20.47 to 25.0 g. In our research, VS-32 (3.30 g/100 g) had the greatest value, followed by VS-21 (2.89 g/100 g), and VS-49 (2.80 g/100 g) had the lowest (Fig. 3).

D. Moisture Content (G/100g Fresh Weight)

All yard long bean cultivars exhibited moisture content less than 91 percent, ranging from 88.10 to 90.34 g/100 g, with VS-21 (90.34 g/100 g), VS-32 (89.50 g/100 g), and BARI Barboti-1 (88.10 g/100 g) having the highest moisture content (Fig. 4).
E. Fat (G/100 g Fresh Weight)

The fat content of a yard long bean cultivar ranged from 0.10 to 0.19 g/100 g in our study, with BARI Barboti-1 (0.19 g/100 g) having the greatest fat content, moderate values in VS-21 (0.14 g/100g), VS-32 (0.11 g/100 g), and the lowest value in VS-49 (0.10 g/100 g) (Fig. 5).

F. Ash (Total) (g/100g Fresh Weight)

The highest ash concentration was found in BARI Barboti-1 (0.75 g/100 g), followed by intermediate amounts in VS-32 (0.74 g/100 g), VS-21 (0.68 g/100 g), and the lowest value in VS-49 (0.67 g/100 g) (Fig. 6).

G. Sugar (Total) Content g/100 g Fresh Weight)

Sugar content in yard long bean cultivars ranged from 1.49 to 2.34 g/100 g, with the greatest being VS-21 (2.34 g/100 g), followed by BARI Barboti-1 (2.23 g/100 g), and the lowest being VS-49 (1.52 g/100 g) (Fig 7).

H. Crude Fiber (g/100g Fresh Weight)

There are a lot of soluble and insoluble fibers in the pods. A suitable amount of fiber is obtained in the diet since the full green pod is consumed as in green beans. Dietary fiber protects the colon mucosa by decreasing the amount of time it is exposed to hazardous substances and binding to cancer-causing compounds in the colon. All cultivars had crude fiber amounts ranging from 1.23 to 1.85 g/100 g in our study, with BARI Barboti-1 (1.85 g/100 g) having the highest amount, VS-32 (1.65 g/100 g) and VS-21 (1.24 g/100 g) having a moderate amount, and VS-49 (1.23 g/100 g) having the lowest amount (Fig. 8).

IV. DISCUSSION

Some chemical components were found to be abundant in the cultivars studied, while others were found to be less abundant than stated levels in the literature. Differences in chemical components could have been caused by cultivars, ecological circumstances, growth conditions, and altitude. Several previous researchers have reported on the dependence of protein, ash, energy, lipids, and moisture components primarily on cultivars, growing site, growing season, light intensity, day length, temperature, plant nutrition, and irrigation practices [12]–[15], [20], [21]. [8] found that after a precipitation period, heat and dry circumstances enhanced protein content. Consuming more beans in a diet could enhance general health and reduce the risk of acquiring certain diseases, such as heart disease, obesity, and many types of cancer, thanks to their high concentration of health-promoting elements.

V. CONCLUSION

Yard long beans are frequently the primary source of protein, dietary fiber, and minerals in the diet, occupying a critical position in human nutrition and providing health benefits. As a result, determining the nutritious content of yard long beans is necessary for health benefits. The significant content of several human-promoting health components, such as proximate composition, was assessed in the four yard long bean varieties. The cultivars were high in different proximate compositions. As a result, these cultivars can be grown and consumed for better human health. The findings of this study show that yard long bean, a generally recognized and popular legume among Southeast Asians, can be consumed in a moderate amount on a daily basis to offer adequate nutrition.
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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES


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