

NUTRITIONAL POTENTIAL OF THE WINGED BEAN

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Introduction

The winged bean [*Psophocarpus tetragonolobus* (L) D. C.] has aroused great interest in recent years¹ as an exceptionally prospective legume suitable for meeting protein needs in areas of food scarcity and widespread malnutrition. The primary reason behind the potential of this species stems from its ready adaptability to varying soil and climatic conditions, its extraordinary capacity to fix large amounts of nitrogen and the presence of a variety of edible plant parts with appreciable quantities of dietary proteins in them².

In India, the winged bean is occasionally grown in the southern half of the country. It is known as 'chopati seam' in Maharashtra; 'rakki or kattu avarai' in Karnataka; 'boondi or perandai avarai' in Tamilnadu; 'choughla sem' in Madhya Pradesh and 'charpatti sem' in Bengal³. The consumption of the winged bean which at present, is limited to certain pockets only should be encouraged as its contribution to the diet could be of immense value. Considering its nutritional potential, this study was undertaken to procure information on the proximate composition of the different edible plant parts of the winged bean.

Materials and Methods

Winged bean seeds obtained from the National Botanic Gardens, Lucknow, were grown in experimental plots in the fields of the Indian Statistical Institute. The seeds were sown in July 1982. The first flowering was observed in October.

Sampling of the plants were conducted at three stages where they could be best utilised i.e. the tender green pod stage (I), the mature green pod stage (II) and the ripened seed stage (III). These corresponded to the months of November, December and January.

Samples of leaves, pods, seeds and tubers were taken from four plants at each stage. Dry matter estimation was done by oven drying at 105°C for six hours to constant weight. The samples were analysed for crude protein, ether extract, crude fibre and ash by the methods of AOAC⁴.

Results and Discussion

The proximate analysis of the different plant parts of the winged bean at three harvesting stages are given in Table I.

The young leaves exhibited their highest protein (30.25 per cent) and lowest fibre (18.09 per cent) values at the green pod stage, after which they accumulated dry

TABLE I Proximate Composition of the Winged Bean Plant Parts at Three Stages on Dry Matter Basis
(All values are mean \pm standard deviation)

Stage	Plant parts	Dry matter %	Crude protein %	Ether extract %	Crude fibre %	Ash %
Green pod stage (I)	Leaves	17.75 \pm 0.500	30.25 \pm 0.342	6.85 \pm 0.275	18.09 \pm 0.261	9.78 \pm 0.263
	Pods	9.98 \pm 0.050	27.68 \pm 0.250	1.89 \pm 0.204	8.15 \pm 0.419	8.15 \pm 0.173
	Seeds	16.95 \pm 0.173	31.35 \pm 0.370	6.91 \pm 0.466	8.29 \pm 0.340	5.73 \pm 0.185
	Tubers	14.50 \pm 1.915	15.73 \pm 0.888	0.86 \pm 0.187	9.01 \pm 0.190	4.50 \pm 0.258
Mature green pod stage (II)	Leaves	18.75 \pm 0.957	28.33 \pm 0.403	5.77 \pm 0.534	19.68 \pm 0.127	9.23 \pm 0.126
	Pods	18.00 \pm 0.516	26.00 \pm 0.283	1.76 \pm 0.186	16.58 \pm 0.331	7.21 \pm 0.165
	Seeds	21.58 \pm 0.591	30.58 \pm 0.457	15.57 \pm 0.289	7.13 \pm 0.132	5.25 \pm 0.173
	Tubers	17.25 \pm 0.957	16.73 \pm 0.263	1.50 \pm 0.197	14.11 \pm 0.442	5.30 \pm 0.163
Ripened seed stage (III)	Leaves	18.25 \pm 0.500	27.33 \pm 0.479	5.04 \pm 0.154	20.28 \pm 0.287	10.15 \pm 0.192
	Pods	28.50 \pm 0.469	24.03 \pm 0.171	1.22 \pm 0.152	19.27 \pm 0.228	6.03 \pm 0.171
	Seeds	44.88 \pm 0.359	37.28 \pm 0.655	16.82 \pm 0.309	6.88 \pm 0.158	4.15 \pm 0.129
	Tubers	24.50 \pm 1.915	17.38 \pm 0.403	1.08 \pm 0.215	14.44 \pm 0.181	3.70 \pm 0.216

matter. Claydon⁴ obtained 30 per cent protein with 76 per cent digestibility in the top vegetative portions. According to him, the leaves are popular additions to meals either raw or cooked and can be added to soups and salads. The fat content of the leaves ranged from 5.04 to 6.85 per cent between the three stages. The leaves had the highest ash values (9.23 to 10.15 per cent) when compared to the other plant parts making them an excellent source of minerals. The high carotene content of the leaves¹ can be regarded of special importance in the prevention of vitamin A deficiency which is widely prevalent in our country.

The tender green pods containing the young seeds which snap readily (stage I) had

the highest protein (27.68 per cent) and ash (8.15 per cent) values. The low fibre content (8.15 per cent) at this stage adds to its palatability. All reports on the use of winged bean as food^{1,5} agree that it is the young green pods that are the most realised part of the plant. They make an excellent vegetable similar to French beans. At the mature pod stage (II), the pods become fibrous (16.58 per cent) making it difficult to consume the entire pod. Here, the seeds, which taste very much like peas⁵ have comparatively less fibre (7.13 per cent) and its high protein (30.58 per cent) and fat (15.51 per cent) contents makes them valuable as a food item. At the ripened seed stage (III), the pods start drying up and thus the increase in dry matter.

The seeds which become dry and hard (stage III) are the most nutritious and the only stable part of the plant. Amongst other plant parts, the seeds at this stage exhibited the highest protein (37.28 per cent) and fat (16.82 per cent) values which are comparable to soyabean¹ thus making it a subject of particular interest. However the ripe seeds contain a number of anti-nutritional factors which can be eliminated by common processing methods. In south-east Asia, the ripe seeds are often roasted for several hours and eaten like peanuts and in parts of Indonesia, they are used to make a cheese like substance similar to 'tofu' made from soyabean². The consumption of seeds, however, is not so popular here as eating the immature pods.

The winged bean plant develops vegetable tubers like those of sweet potato. Burkill³ reported the use of tubers as food in Burma where they are usually consumed after boiling and peeling as snacks or made into chips. Though the tubers showed lower protein values (15.73 to 17.38 per cent) than the other plant parts, they are the richest in protein

among other known tubers. Not only is the protein content high, but the tubers are also rich in carbohydrates¹. This rare combination makes it unique among tropical root crops. With advancing growth, the tubers accumulated more dry matter and fibre. Their highest fat (1.50 per cent) and ash (5.30 per cent) content were observed at the mature green pod stage (II).

Thus, the results indicate that the winged bean is a crop capable of producing virtually all types of food from salad greens to a pulse high in protein and to an unusually nourishing tuber and seed crop. In view of its nutritional potential, concentrated efforts are needed to popularise this economical, protein rich legume as a vegetable and to bring it under extensive cultivation all over the country.

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