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Research Article
Biochemical and Nutritional Evaluation of Some Pulses, Vegetables, Greens and Mushrooms

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Abstract

The current worldwide interest in plant crops and mushrooms has been stimulated due to high protein content, favourable nutrient storage and processing qualities. The legumes, greens and mushrooms are nutritionally complementary to that of cereal proteins for man and monogastric animals. Hence the present investigation of pulses, vegetables, greens and mushrooms have been carried out. The nutritional assessment includes total content of protein, fat, free amino acids and free sugars. These parameters have been used in the overall nutritional assessment of crops. So as to alleviate the malnutrition prevailing in third world countries, the consumption of pulses and vegetables were recommended.

Introduction

In general, fresh and unprocessed foods were favourable than the processed foods. Eating of whole-plant foods slows digestion, allows better absorption and gives more favourable nutritional diet. This kind of diet gives better cell growth, maintenance and better regulation of appetite and blood sugar level. Proteins are organic compounds that consist of amino acids joined by peptide bonds. Essential amino acids are group of amino acids which cannot manufacture by human body. In the process of digestion, proteins are broken down into free amino acids by the activity of proteases enzyme. Fats are very essentials for proper function of cell membranes and useful to prevent the negative effects of shock, to maintaining body temperature. Current worldwide interest in plant crops and mushrooms to improve the content of protein, favourable storage of nutrition and processing qualities. Nowadays, the proteins of legumes are nutritionally complementary to the cereal proteins for man and monogastric animals. The present investigation was carried out to find out the basic nutritional and biochemical potential of commonly used pulses, vegetables, greens and mushrooms.

Materials and Methods

The seeds of pulses, vegetables, greens and mushrooms were purchased from Tamil Nadu Agricultural University, Coimbatore and local farmers. The following methods were used to find out biochemical content of plant materials and mushrooms. Proximate analysis (AOAC, 1970) used to the estimation of crude fibre, ash and nitrogen free extractives. Crude proteins and crude lipids were estimated by Microkjeldhal method (Miller and Houghton, 1945) and Soxhlet method (Sukhija and Palmquist, 1988) respectively. The buffer soluble proteins, free amino acids and free sugars have been estimated by Lowry's method (Lowry et.al, 1951), Ninhydrin method (Moore and Stein, 1954) and Anthrone reagent method (Yemm and Willis, 1954) respectively.

Results and Discussion

The results of various biochemical methods were collected and tabulated (Table 1)

The crude protein content recorded in present study (Table.No.1.) seems to be closer or higher than that of commonly cultivated pulses (Gupta and Wagle, 1978; Jambunathan and Singh, 1981) and some of the alternative source of pulses or tribal pulses (Rajaram and Janardhanan, 1991) mentioned in Table.No.2.

Table.No.1. Proximate analysis of pulses, vegetables, greens and mushrooms

S.no.	Materials (100g of dried matter)	Moisture (%)	Crude protein (%)	Crude fat (%)	Crude fiber (%)	Ash (%)	NFE (%)	Energy (Kcal)
1	*Vigna mungo* (L.) Hepper	5.4	21.5	7.0	2.82	1.5	67.18	417.72
2	*V. unguiculata* (L.) Walp.	5.6	24.0	6.5	2.85	1.87	64.78	413.62
3	*V. radiata* (L.) R.Wilczek	5.3	21.0	5.25	2.91	1.83	69.01	407.29
4	*Cicer arietinum* L.	3.6	22.0	5.5	3.51	2.61	66.38	403.02
5	*Glycine max* (L.) Merr.	6.5	36.5	5.5	3.62	2.85	51.53	401.62
6	*Brassica oleracea* var. botrytis L.	8.6	4.38	5.0	4.80	3.4	82.42	392.20
7	*B. oleracea* var. capitata L.	8.8	3.1	8.2	4.72	3.6	80.38	407.72
8	*Solanum melongena* L.	7.8	3.5	5.2	4.50	3.5	83.30	394.00
9	*Lablab purpureus* (L.) Sweet	4.5	14.5	6.8	3.1	2.5	73.10	411.60
10	*Cyamopsis tetragonoloba* (L.) Taub.	7.5	13.7	4.5	4.81	2.8	74.19	392.06
11	*Moringa oleifera* Lam.	5.5	9.5	2.5	3.41	4.5	80.09	380.86
12	*Alternanthera sessilis* (L.) R.Br. ex DC.	7.8	8.5	3.5	3.50	3.52	80.98	389.42
13	*Celosia argentea* L.	7.0	6.5	2.5	3.80	3.67	83.53	382.62
14	*Sesbania grandiflora* (L.) Pers.	6.5	10.5	5.6	3.52	3.8	76.58	398.72
15	*Pleurotus ostreatus* (Jacq. ex Fr.) P.Kumm.	9.8	6.2	4.3	2.5	1.67	85.33	404.82
16	*Volvariella volvacea* (Bul. ex Fr.) Singer	8.7	6.7	5.9	2.8	1.90	82.70	410.70
17	*Calocybe indica* (Fr.) Donk	11.5	6.5	5.5	2.9	2.12	82.98	407.42
18	*Agaricus bisporus* (J.E.Lange) Emil J. Imbach	9.5	6.8	4.5	2.0	1.52	85.18	408.42

Table.No.2. The crude protein, crude fat and NFE content of some pulses.

Name of the plant	Crude protein (%)	Crude fat (%)	NFE (%)
Glycine max (L.) Merr.	37.00	17.00	26.00
Arachis hypogaea L.	31.00	48.00	12.00
Pisum sativum L.	25.00	06.00	52.00
Cajanus cajan (L.) Millsp.	21.25	1.3 - 2	52 - 59
Mucuna utilis Wight	26.25	14.00	45.15
M. hirsuta Wight & Arn.	30.80	14.87	42.29
M. atropurpurea (Roxb.) Wight & Arn.	23.80	02.55	62.16

Among the vegetables studied *Lablab* and cluster bean contain more proteins. The oil content of *Brassica oleracea* is extremely high. The food energy value of *Vigna sp. a*nd the mushrooms used in present investigation are more or less equal to that of *Pisum sativum* (Meiners et.al, 1976); this high energy because of either crude carbohydrates or crude fat content provided the major respiratory substance

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Table.No.3. The content of buffer soluble proteins, free amino acids and free sugars of pulses, vegetables, greens and mushrooms

S.No.	Materials (100g of dried matter)	Buffer soluble protein (%)	Free amino acids (%)	Free sugars (%)
1	*Vigna mungo* (L.) Hepper	14.5	2.12	2.50
2	*V. unguiculata* (L.) Walp.	14.3	1.85	2.75
3	*V. radiata* (L.) R.Wilczek	14.6	1.93	2.40
4	*Cicer arietinum* L.	14.2	2.05	2.80
5	*Glycine max* (L.) Merr.	30.5	5.0	3.20
6	*Brassica oleracea* var. botrytis L.	4.2	1.28	2.50
7	*B. oleracea* var. capitata L.	3.0	0.80	2.30
8	*Solanum melongena* L.	3.1	1.50	2.00
9	*Lablab purpureus* (L.) Sweet	4.3	1.15	2.50
10	*Cyamopsis tetragonoloba* (L.) Taub.	10.5	1.10	2.30
11	*Moringa oleifera* Lam.	8.5	3.00	1.30
12	*Alternanthera sessilis* (L.) R.Br. ex DC.	7.5	2.25	1.30
13	*Celosia argentea* L.	5.5	2.40	1.40
14	*Sesbania grandiflora* (L.) Pers.	7.5	2.13	1.40
15	*Pleurotus ostreatus* (Jacq. ex Fr.) P.Kumm.	5.5	2.55	5.50
16	*Volvariella volvacea* (Bul. ex Fr.) Singer	5.5	2.75	4.90
17	*Calocybe indica* (Fr.) Donk	6.3	2.65	4.50
18	*Agaricus bisporus* (J.E.Lange) Emil J. Imbach	6.4	2.91	5.30

Among the pulses studied the soluble protein content extremely high in *Glycine max* (Table.No.3). Some studies on rats have indicated that the biological value of soy protein isolates is comparable to animal proteins such as casein if enriched with the sulfur-containing amino acid methionine. The vegetables crops contain more amounts of buffer soluble proteins. The free amino acid content of pulses, greens and mushrooms are relatively higher comparing to vegetables (Table.No.3.). The free sugar content of mushrooms nearly double the amount of pulses, vegetables and greens (Table.No.3.). So as to alleviate the malnutrition prevailing in the third world countries, pulses and vegetables were recommended as the best dietary resources.

References

AOAC. 1970. Official Methods of Analysis. Association of Official Analytical Chemists, Washington, DC.

Gupta and Wagle B.S. 1978. Proximate composition and nutrition value of *Phaseolus mungoreous. J.Food.Sci.Technol.*,15: 34 – 35

Jambunathan R. and Singh U. 1980. Studies on Desi and Kabuli chick pea cultivator 1. Chemical composition in proceeding of international institute on chick pea improvement. ICRISAT Hyderabad, India. Feb: 28 – Mar: 2

Janardhanan and Lakshmanan. 1985. Studies on *M. utilis* chemical composition and anti nutritional factor. *J.Food.Sci.Technol., 22:* 369 – 371

Lowry O.H., Rosenbrough N.J., Farr A.L. and Randall R.J. 1951. Protein measurement with folin phenol reagent. *J.Biol.Chem.93:* 265 – 275

Miller L. and Houghton J.A. 1945. The micro-Kjeldahl determination of the nitrogen content of amino acids and proteins. *Journal of Biological Chemistry, 159(2):* 373 – 383

Meiners C.R., Derise N.L., Lau H.C., Crews M.G., Ritchey S.J. and Murphy E.W. 1976. The content of nine mineral elements in raw and cooked mature dry legumes. *Journal of agricultural and food chemistry, 24(6)*: 1126 – 1130

Moore S. and Stein W.H. 1954. A modified ninhydrin reagent for the photometric determination of amino acids and related compounds. *Journal of Biological Chemistry, 211*(2): 907 – 913

Rajaram N. and Janardhanan K., 1991. The biochemical composition and nutritional potential of the tribal pulse *Mucuna gigantea* D.C., *Plant foods for Human Nutrition 41:* 45 – 51

Ravindran V. and Ravindran R. 1988. Nutritional and anti mineral characterization of *Mucuna* seed. *J.Sci.Food.Agric.46:* 71 – 79

Sukhija P.S. and Palmquist D.L. 1988. Rapid method for determination of total fatty acid content and composition of feedstuffs and feces. *Journal of Agricultural and Food Chemistry 36.6:* 1202 – 1206

Yemm E.W. and Willis A.J. 1954. The estimation of carbohydrates in plant extracts by anthrone. *Biochemical Journal, 57*(3): 508