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Nutritional evaluation of selected varieties of peas (*Pisum sativum*) of Himachal Pradesh

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Abstract

In India, pea is grown as winter vegetable in the northern plains and as summer vegetable in the high hills. Five different varieties of green peas of Himachal Pradesh namely, *Palam Priya, Lincoln, Arkel, Azad P 1 and Mater Ageta* were procured and studied. The *Lincolin, Arkel and Azad P1* varieties of peas had the ash, crude fat, protein as 2.92, 2.81 and 20.47 per cent and 3.18, 2.85 and 18.81 per cent and 3.13, 2.62 and 16.99 per cent, respectively. The peas of *Lincoln* variety had the highest ascorbic acid (50.52mg/100g) while the lowest was in *Arkel* variety (45.34mg/100g). The β – carotene differed significantly amongst five varieties and found to be the highest in peas of Lincoln variety with the value of 1.31mg/100g, while the *Azad P*, *Arkel* and *Matar Ageta* and *Palam Priya* varieties had 1.15, 0.89, 0.82 and 0.75 mg/100g, respectively. Being good source of proteins, their inclusion in the diets, depending upon the availability can prove to be combating Protein Energy Malnutrition.

Key words: Peas, variety, nutrient content, proteins.

Introduction

Pea (*Pisum sativum* L.) is one of the most popular food crops in the world and also an easy to grow. Pea is a leguminous vegetable of immense importance consumed in several form such as fresh green, dehydrated, frozen and processed canned peas. It is widely grown in the temperate and subtropical areas of the world. Around 30-35% of the world production of dry peas is traded in the world market, making it up to a quantity of around 2.5 million tons (www.crnindia.com). In India, it is grown as winter vegetable in the northern plains and as summer vegetable in the high hills and has production of peas as 8,00,000 metric tons while in Himachal Pradesh it was 1,62,144 MT during 2005.

In India, peas are consumed principally as green immature seeds. However, in recent years dry peas have also gained importance in human nutrition and is an alternative to soybean, being good source of proteins (Hedley, 2001). In addition to proteins, peas contain carbohydrates and other vitamins which are useful for human as well as livestock consumption. The seed contains high level of digestible carbohydrates and low concentration of fibre and fat (Savage and Deo, 1989). Keeping in mind the nutritional importance of peas in human diet, its perishability and short life, the present study was carried out to assess the nutritional quality of peas with the objectives to assess the physico- chemical characteristics, proximate composition and organoleptic quality of selected samples of peas.

Materials and Methods

Five different varieties of green peas namely, *Palampriya, Lincoln, Arkel, Azad P1 and Mater Ageta* were procured from the

Department of Vegetable Science and Floriculture, College of Agriculture, CSK HPKV, Palampur. The procured samples of green peas were shelled from pods and collected in different polyethylene bags. The samples were evaluated organoleptically for colour, flavour, texture, taste and overall acceptability by a panel of judges on the basis of 9 point hedonic scale.

Physical parameters: The numbers of 1000 seeds of each variety of peas was counted randomly in triplicate and their weight recorded separately. The 1000 kernel weight was presented as an average of these determinations. Bulk density of different samples of peas was determined by using the method given by Narain *et al.* (1978) by using a calibrated graduated cylinder. Seed size included seed diameter. Diameter was measured using vernier caliper and mean of the three readings was recorded. The seeds of the peas were observed for their shape.

Chemical Analysis: Moisture, crude protein, ash, fat, crude fiber and ascorbic acid were analyzed by AOAC (1990) methods. Carbohydrate was calculated by adding the moisture, protein, ash, crude fat and crude fiber and then subtracting from 100. The difference obtained gives the value of carbohydrates. β- carotene content of the samples was estimated by using method given by Ranganna (1986).

Statistical analysis: Data obtained were subjected to statistical analysis of variance in a completely randomized design (Sendecor and Cocharn, 1968).

Results and Discussion

The results pertaining to the physical characteristic of selected varieties of vegetable pea are presented in the table 1. The result showed that the colour of different varieties of vegetable pea varied in tint and shades of green colour whereas the shape of pea seeds was round for all the five varieties. *Das et al.* (1993) observed that the typical pea green colour was changed to light green, light yellow, yellow with green shade during processing while Valverde *et al.* (2003) reported the coat colour of different pea cultivars as yellow, light green and dark green. The pea seeds of *Palampriya* variety were big having the highest diameter i.e. 3.02 cm while the seed of Lincoln variety was the smallest with diameter of 2.23 cm and remaining three varieties namely *Arkel, Azad P1* and *Mater Ageta* were medium having had diameter of 2.46, 2.50 and 2.55 cm, respectively. The seed size of 18 pea lines was observed as small, medium and big by Valverde *et al.* (2003).

The 1000 kernel weight differed significantly amongst all the five varieties. *Palampriya* variety had the highest value of 1000 kernel weight with 380g followed by *Matar Ageta* (375g), *Azad P1* (371 g), *Arkel* (366g) and *Lincoln* (320g) variety. Depending upon cultivars 1000 kernel weight of peas ranged from 209.4 to 280.4g (Zdunczyk *et al.*, 1997), whereas 100 seed weight in yellow field peas ranged between 19.1 to 26.9 g (Wang *et al.*, 2003). There was a significant difference in bulk density of all pea varieties. *Azad P1* variety had the highest bulk density

Table 1. Physical parameters of selected varieties of vegetable pea (*Pisum sativum* L.)

Variety	Colour	Shape	1000-kernel weight (g)	Bulk density (g/ml)	Diameter (cm)
Palampriya	Green	Big & round	380	0.610	3.02
Lincoln	Dark Green	Small & Round	320	0.637	2.23
Arkel	Green	Medium & Round	366	0.652	2.46
Azad P1	Green	Medium & Round	371	0.660	2.50
Matar Ageta	Green	Medium & Round	375	0.658	2.55
CD (P=0.05)	-	-	**1.82**	**0.01**	**0.01**

(0.660g/ml) followed by *Matar Ageta* (0.658g/ml), *Arkel* (0.652g/ml), *Lincoln* (0.637g/ml) and *Palampriya* (0.610g/ml). The bulk density of fresh and dried pea seeds ranged between 0.58 to 0.61g/cm^3, respectively (Pardeshi *et al.*, 2001). The proximate composition of vegetables peas of different varieties is presented in the Table 2. The varieties of peas had a significant effect on the proximate composition. The crude fiber, ash, crude fat, protein and carbohydrate content of all the five varieties of vegetables pea varied significantly. The ash, fat, crude protein and crude fiber were higher in peas of *Palampriya* variety i.e. 3.02, 2.86, 21.01 and 3.77 %, respectively. Geervani and Devi (1988) reported that the ash content in green and mature peas was 9.4 and 10.5g/kg, respectively. While the per cent carbohydrate content of *Matar Ageta* variety was the highest being 66.29 per cent followed by *Azad P1* (64.46 per cent), *Arkel* (61.96 per cent), Lincoln (61.30 per cent) and *Palampriya* (57.82 per cent) respectively. The total carbohydrate content of fresh green peas was reported as 55.8 per cent DM (Kalpalathika *et al.*, 1988), whereas it was reported that the carbohydrate concentration in whole peas ranged from 56.6 to 74.0 per cent (Savage and Deo, 1989). The ash, crude fat and crude

Table 2. Proximate composition of selected varieties of vegetable pea (*Pisum saivum* L.)

Variety	Ash	Fat	Protein	Crude fibre	Carbohydrate	Ascorbic acid	B-carotene
Palampriya	3.02	2.86	21.01	3.77	57.82	49.21	0.75
Lincoln	2.92	2.81	20.47	3.65	61.30	50.52	1.31
Arkel	3.18	2.85	18.81	3.40	61.96	45.34	0.89
Azad P1	3.13	2.62	16.99	2.57	64.46	46.88	1.15
Matar Ageta	2.38	1.09	16.41	3.02	66.29	49.10	0.82
Mean	2.93	2.45	18.74	3.28	62.37	48.21	0.98
CD (P= 0.05)	0.05	0.01	0.01	0.04	0.18	0.12	3.81

The values are on per cent basis

protein were recorded the lowest in *Matar Ageta* with a mean value of 2.38, 1.09 and 16.41 per cent, respectively. Wang and Daun (2004) reported ash content of different pea varieties ranged from 13.4 to 27.7g/kg. The crude fiber and carbohydrates content were found to be the lowest in *Azad P1* (2.57 per cent) and *Palampriya* (57.82 per cent), respectively. As reported by Savage and Deo (1989) the crude fiber content of pea ranged from 1.1 to 9.9 per cent.

The *Lincolin, Arkel and Azad P1* varieties of peas had the ash, crude fat, protein as 2.92, 2.81 and 20.47 per cent and 3.18, 2.85 and 18.81 per cent and 3.13, 2.62 and 16.99 per cent, respectively, while the crude fibre content in *Lincolin, Arkel and Azad P1* varieties of peas were recorded as 3.65, 3.40 and 3.02 per cent, respectively. Sharma (1995) reported the protein content in *Lincoln* and *Azad P1* varieties of peas at different harvesting stages as ranging from 19.86 to 22.00 per cent and 16.23 to 19.97 per cent, respectively. The protein values reported in the present investigation were within the ranges reported earlier. The ascorbic acid content was found highest (50.52mg/100g) in *Lincoln* variety followed by *Palampriya* (49.21mg/100g), *Matar Ageta* (49.10mg/100g), *Azad P1* (46.88mg/100g) and the lowest in *Arkel* variety i.e. 45.34mg/100g. Fennema (1977) reported vitamin C content in fresh green pea as 37mg/100g, while Das *et. al.* (1993) reported ascorbic acid content in different varieties of raw green peas ranging from 38.8 to 135.2 mg per cent on dry matter basis. The β – carotene content was significantly differed amongst five varieties and found to be the highest in peas of Lincoln (1.31mg/100g), and lowest in *Palampriya* varieties (0.75 mg/100g). The vitamin A content in fresh green peas was found as 1432.8IU by Nair (1983), whereas Kalpalathika *et al.* (1988) reported that the β – carotene content of fresh green peas as 0.4mg/100g DM.

The organoleptic evaluation of the five different varieties of vegetable pea indicating different parameters and overall acceptability is presented in table 3. It was observed that the colour and texture varied significantly while flavour, taste and overall acceptability did not differ significantly amongst the five varieties.

Table 3. Organoleptic evaluation of different varieties of vegetable pea (*Pisum sativum* L.)

Variety	Colour	Flavour	Texture	Taste	Overall acceptability
Palampriya	8.30	8.20	8.70	7.40	8.05
Lincoln	7.50	6.80	7.80	7.50	7.43
Arkel	6.90	7.10	7.20	8.80	7.33
Azad P1	6.90	7.60	6.90	8.00	7.38
Matar Ageta	7.50	7.30	6.90	7.80	7.45
CD (P=0.05)	0.98	NS*	0.90	NS*	NS*

NS= Non significant

According to the result obtained, a higher acceptability for colour was observed for *Palampriya* variety with mean score of 8.3 (on the basis of hedonic scale) followed by *Lincoln, Matar Ageta* (7.5), *Arkel and Azad P1*(6.9). A higher score for flavour (8.2) and texture (8.7) was observed in the *Palampriya* variety while other varieties namely *Lincoln, Arkel, Azad P1* and *Matar Ageta* had the score for flavour was as 6.8, 7.1, 7.6, 7.3 and for texture was as 7.8, 7.2, 6.9 and 6.9 respectively (on the basis of hedonic scale).

Lincoln variety was adjudged the best as per the nutritional contribution i.e. proximate composition and vitamin content as compared to other selected varieties. Since peas are rich source of easily available and protein in terms of several essential amino acids they could be utilized more widely to overcome the Protein Energy Malnutrition affecting the population in developing and under- developed countries.

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