International Journal of Food Science and Nutrition
ISSN: 2455-4898
Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 3; Issue 1; January 2018; Page No. 65-67

Nutritional evaluation of pea peel and pea peel extracted byproducts

[*1] Upasana, [2] Deepa Vinay
[1] Research Scholar, Department of Family Resource Management, College of Home Science, GB Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India
[2] Professor, Department of Family Resource Management, College of Home Science, GB Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India

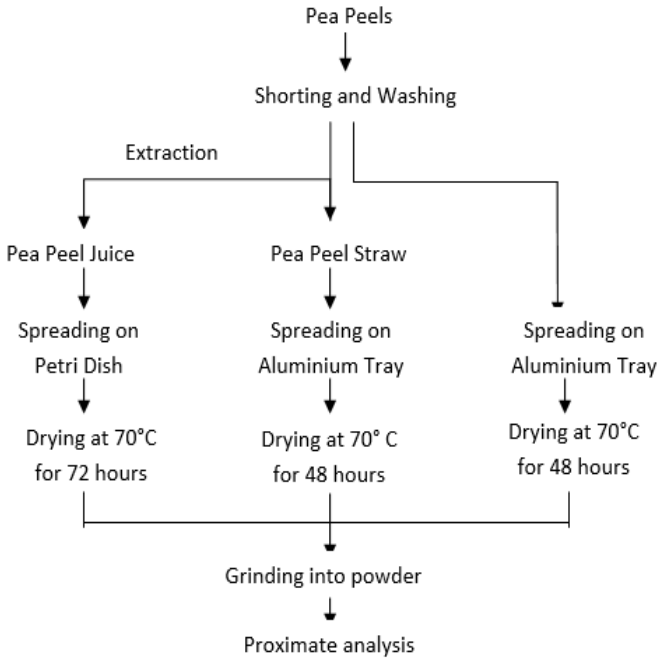
Abstract
Pea processing industries involve preserving peas by freezing and marketing them for seasonal limitation and producing a large volume of pea peels as solid waste. In present study, pea peels were further extracted and separated into peel juice and peel straw. These three byproducts were dried and grounded into powder for performing proximate analysis. The result of analysis indicates that pea peels and two extracted byproducts have high nutritive values that can be used as an alternative source of animal feed and also solve the waste disposal problem by preserving valuable biomass and nutrients.

Keywords: pea peel, pea processing, byproducts, proximate analysis

Introduction
India is the second largest producer of green peas next to China (Adeyeye, 2002). Established upon assumption, 30% of the total pea weight is owing to pea pods (fresh weight basis). Thus based on India's yearly production of pea, more than 1 million ton of pea peel waste is generated annually alone in India, of which sizeable extent is discarded as waste.
Pea (*Pisum sativum*) is a cool season crop and one of the most important legumes, grows either alone or in combination with small grains, in the temperate climatic regions and it has been widely consumed as a legume or vegetable throughout the world for satisfying the purpose of both human consumption and animal feeding.
Due to seasonal and perishable nature of peas, its availability is limited only to some part of the year, which creates the need for its preservation (Garg, *et al*., 2014). With the invention of canning, freezing, and cold storage, various pea processing industries make efforts to preserve and marketing them, so that seasonal crops became available year-round. Besides the benefits, these industries produce very large amount of pea peel wastes as by-product. Such a great amount of pea peel waste could become a serious environmental problem and represent a loss of valuable biomass and nutrients. Beside their pollution and hazard aspects, in many cases, this was significant for the reason that the pea peels wastes are available in bulk at zero cost, can be used without much quality degradation and convert into useful products of higher value as compared to conventional green fodder, after biological treatment. This study was, therefore, taken up to assess the proximate analysis of pea peels and its extracted by products.

Material and methods
Sample collection – Fresh pea peels were collected from KLA pea industry and were sorted for further experiment.

Preparation of extraction- The sorted pea peels were then washed and weighed with the help of a digital electronic balance. The grinding of selected peels was done in electric grinder and mixture. In 250 gm pea peels, extracted peel straw and peel juice weighed 90.5gms and 147.3gms. The extracted peel juice and peel straw was collected in separate jars.



Preparation of proximate analysis- For proximate analysis, all three samples were drying in hot air oven and grounded in powder form. Weende's system of analysis (Hanneburg and Stohmann, 1860) [5] was used for proximate analysis of pea peels, extracted peel juice and peel straw.

Dry matter (DM) and Moisture content (M) – 10g of each sample were taken in a pre-weighed petri dish/aluminium tray. The tray was placed in hot air oven at 70 ± 2^0C for 48 hours for pea peel and peel straw, 72 hours for peel juice. The drying was repeated until a constant weight was obtained. The loss in moisture content after drying was estimated and DM was calculated as follows:

$$\text{Dry matter (\%)} = \frac{\text{Wt. of tray with dried sample – Wt. of empty tray}}{\text{Wt. of tray with fresh sample – Wt. of empty tray}} \text{ X 100}$$

Moisture content (%) = 100 – dry matter (%)

Crude Protein (CP)– The protein nitrogen in 1 gm of each dried samples were taken in Kjeldhal flask and digested with 20-30 ml concentrated H_2SO_4 and 2-3 g of digestion mixture till the solution became colourless. After digestion, the contents were cooled and volume was made to 100 ml. 10ml of aliquot was distilled in Kjeldhal distillation apparatus after adding 10-15 ml of 40% NaOH solution. About 60-75 ml of distillate was collected into an Erlenmeyer flask containing 10 ml of 2% boric acid indicator solution. The distillate was then titrated against standard N/100 H_2SO_4 solution and the end point was recorded when the colour changed to slight pinkish. Volume of N/100 H_2SO_4 solution used in titration was recorded. Crude protein was calculated by multiplying the value of the deduced nitrogen by the factor 6.25mg.

$$\text{N (\%)} = \frac{\text{0.00014 x Volume of N/100 } H_2SO_4 \text{ used x Volume made (ml)}}{\text{Aliquot taken (ml) x wt. of sample (g)}} \text{ X 100}$$

CP (%) = Nitrogen (%) X 6.25

Total ash (TA) – 2 g of each oven dried sample were taken in pre-weighed silica crucible. After charring the sample on heater, the crucible was kept in muffle furnace for ignition at 550°C for 2-3 h. The crucible was removed on cooling and kept in a dessicator and weighed again to find out weight of ash. The ash content was calculated as given below:

$$\text{TA (\%)} = \frac{\text{(Wt. of crucible along with ash after cooling - Wt. of empty crucible)}}{\text{(Wt. of crucible with ash before burning - Wt. of empty crucible)}} \text{ X 100}$$

Acid insoluble ash (AIA) – 5 ml of conc. HCL added to the crucible containing the ash which was saved from the ash determination process. 20 ml distilled water was added and placed on 10°C hot plate, then evaporate the sample to about 10 ml and heated to around 90°C. After cooling, the sample was filtered in 100ml flask. The filter paper with residue was removed carefully, put in same crucible, dried in hot air oven and ignite in muffle furnace at 55°C for 1 hour. After this crucible was kept in dessicator weighed.

$$\text{AIA (\%)} = \frac{\text{(Wt. of crucible with Ash – Wt. of empty crucible)}}{\text{(Wt. of crucible before burning – Wt. of empty crucible)}} \text{ X100}$$

Ether extract (EE) – 2 g of each sample were taken in a cellulose thimble and extracted for 6-8 hours with petroleum ether in Soxhlet's extraction apparatus attached to a pre weighed oil flask. The oil flask was removed and after evaporating the excess of ether, it was dried overnight in a hot air oven (100±2°C). The flask was cooled in a dessicator and weighed to a constant weight. The difference between two weights gave the amount of ether extract in the sample.

$$\text{EE (\%)} = \frac{\text{(Wt. of oil flask with ether extract – Wt. of empty oil flask)}}{\text{Wt. of sample on dry basis}} \text{ X 100}$$

Crude Fibre (CF) – The residue left after ether extract determination was used for CF estimation. 2.0g of each sample was weighed into separate beakers, and then extracted with petroleum ether about 8 hours. The samples were then air dried and transferred into a dried 1litre capacity spoutless beaker. 200ml of sulphuric acid solution (1.25%) was added into the beaker. The beaker was placed on preheated extraction heater and cover with round bottom flask having an arrangement for continuous circulation of running cold water and 25ml of 10% sulphuric acid (2.04N) was added, and then boiled for 30 minutes. The contents were filtered to remove insoluble materials, which was then washed with distilled water, then with 1.25% NaOH. Residue were then transferred to silica crucible and dried at 105°C in oven for overnight. Finally the oven-dried residue was ignited in a furnace at 550°C. The fibre contents were measured by the weight of the left after ignition and were expressed in term of the weight of the sample before ignition.

$$\text{CF (\%)} = \frac{\text{Loss of wt. on ignition}}{\text{Wt. of sample after drying in oven}} \text{ X 100}$$

Organic matter (OM) - OM was determined by subtracting the total ash content from 100.

OM (%) = 100 – total ash (%)

Results and Discussion

Table 1 shows the proximate analysis of pea peel, peel extracted straw and peel extracted juice.

Proximate composition of pea peel- Nutrient composition of pea peel obtained by the proximate analysis showed that peels contained 16.57 % dry matter, 83.41% moisture content, 19.79% crude protein, 2.27% ether extract, 5.65% ash, 1.83% crude fibre and 2.11% acid insoluble ash**.** The values obtained from this study are comparable to earlier reported findings. Wadhwa, *et al.* (2006) showed pea peel crude protein value is similar to the data given in this present study. No differences are found in fat and ash content value as reported Aparicio, *et al*. (2010) [2]. Wadhwa, *et al.* (2006) reported a value for ash pea peel of 8.5%, greater than the results obtained in the present investigation.

Proximate composition of peel extracted straw- Nutrition composition from the proximate analysis of peel extracted straw revealed that the amount of dry matter was 30.93%, moisture was 69.05%, the amount of crude protein was 13.06%, extract ether was 1.11%, the value of ash was 4.77%, the amount of crude fibre was 1.38% and 1.30 % was acid insoluble ash.

Table 1: Proximate composition of pea peel, peel extracted straw and peel extracted juice.

S. No.	Parameters	Samples		
		Pea Peel	Peel Extracted Straw	Peel Extracted Juice
1.	Dry Matter (%)	16.57	30.93	6.63
2.	Moisture (%)	83.41	69.05	93.35
3.	Crude Protein (%)	19.79	13.06	30.04
4.	Ether Extract (%)	2.27	1.11	0.81
5.	Total Ash (%)	5.65	4.77	7.87
6.	Crude Fibre (%)	1.83	1.38	-
7.	Acid Insoluble Ash (%)	2.11	1.30	0.28

Proximate composition of peel extracted juice - Nutrient composition of peel extracted juice obtained from proximate analysis, the amount of dry matter was 6.63%, moisture was found to be 93.35%, crude protein was found to be 30.04%, the amount of ash was 7.87% and 0.28% was acid insoluble ash. The amount of crude protein was found to be nil in peel extracted juice.

Conclusion

On the basis of findings, it was concluded that the presence of high crude protein and other nutritive compound in these three samples. So, this pea peel waste or pea processing by-product from the industry can be used as animals feed and making value added product.

References

1. Abdulrazak S, Otie D, Oniwapele YA. Proximate analysis and anti-nutritional factors of groundnut and melon husk. Online journal of animal and feed research. 2014; 4(2):25-28.
2. Aparicio IM, Cuenca AD, Suárez MV, Revilla MZ, Sanz T. Pea pod, broad bean pod and okara, potential sources of functional compounds. Food Science and Technology. 2010; 43(14):67-70.
3. Baj AJ. Legumes and Oil seed crops, Leguminosae, and Homo Sapien Econ. Bol. 1990; 36:46-70.
4. Garg M. Nutritional Evaluation and Utilization of Pea Pod Powder for Preparation of Jaggery Biscuits. J Food Process Technol. 2015; 6(12):22-26.
5. Henneberg W, Stohmann F. Beiträge zur Begründung einer rationellen Fütterung der Wiederkäuer, Schwetsehtke u. Sohn, Braunschweig, 1860, 1: 4.
6. Laufenberg G, Kunz B, Nystroem M. Transformation of vegetable waste into value added products: (A) the upgrading concept; (B) practical implementations. Bioresource Technol, 2003; 87:167-198.
7. Wadhwa M, Kaushal S, Bakshi MPS. Nutritive evaluation of vegetable wastes as complete feed for goat bucks. Small Rumin. Res. 2005; 64:279-284.