

Effect of processing on Nutrient Content of *Pisum Sativum* and *Cicer Arientinum*

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Abstract

Pisum sativum (pea) and *Cicer arientinum* (chickpea) are two legumes with a good source of protein, vitamins, minerals dietary fibre and energy. These legumes are the powerhouse of the minerals due to which it helps in prevention of various diseases like diabetes, heart diseases, cancer and cardiovascular diseases. Drying and germination of legumes enhances the bioavailability and digestibility of nutrients and therefore plays an important role in human nutrition. Improved varieties of pea (G-10) and chickpea (BSW) were examined for the effect of drying and germination on their nutritional quality. Fresh seeds were dried in shadow for 6 days at 25°C and then the nutrient estimation was done. For the germination, dried seeds were soaked in water for 12 hours and allowed to germinating for 48 hours at 25°C. Nutrient analysis was carried out to estimate the proximate values. The result revealed that the moisture, ash, protein, fibre and the minerals. calcium, iron, magnesium and phosphorus were increased after the germination of 48 hours and the amount of fat and carbohydrate decreased. All the estimation was done by using standard method and the observations were done in triplicate to find out the most appropriate results.

Key words: Legumes, *Pisum sativum*, *Cicer arientinum*, Drying, Germination

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Introduction

Pisum sativum also known as pea or garden pea, is an important legume in our diet due its content of high amount of protein, fibre, starch and other minerals. It is a winter producing legume, which is grown on a large commercial scale. India is the second largest producer of pea in the world. It is a powerhouse of many essential minerals due to which it prevents us from many diseases like diabetes, heart disease and cardiovascular diseases. The fresh peas are used as a vegetable and it can mixed with vegetables also to enhance the taste. *Cicer arientinum* also known as chickpea is consumed by majority of the Indian population as a substitute of protein in vegetarian diet. It also has a good amount of protein, fibre, carbohydrate and other trace elements which are very beneficial for our health. Chickpea is the world's most cultivated grain legume all over the world. Chickpea is of two types, *kabuli* chickpea and *desi* chickpea. *Kabuli* chickpea is of creamy colour and rounded shaped, whereas the *desi* chickpea is of dark colour and angular shape. It is the most consumed legume in India. The objective of this study was to analyze nutrient content of these two legumes and find out the effect of drying and germination, on their nutritional quality [1].

Material and methods

The fresh pea seeds of G-10 variety and fresh chickpea seeds of BSW variety were procured from the Durgapura Agricultural Research Centre, Jaipur. After procurement, the seeds were carried out from the pods, washed properly and then kept in a

open airy space. For drying, the seeds were kept on a filter paper for 7 days at 25°C in a well ventilated room. For germination, the dried seed were soaked for 12 hours in normal tap water and allowed to germinate for 48 hours. The estimation of the nutrient content i.e. macro nutrients (moisture, ash, protein, fibre, fat and carbohydrate) and micro nutrients (calcium, iron, magnesium, and phosphorus) was carried out using standard methods of AOAC, 2014. The proximate nutrients, i.e. moisture content was analysed using Oven dry method, protein using Micro- Kjeldahl method, fat using Ether – extract method, fibre using Acid – alkali method, ash using Muffle furnace method, carbohydrate using Composite method [2]. The micro nutrients like, calcium using Titration method, iron using Wong's method, magnesium using Titration method and phosphorus using Colorimetric method. All the estimated data was computed in term of mean and Standard Deviation (SD).

Result and Discussion

Germination increases the nutritional quality and bioavailability of legumes. The results revealed an increase in mean moisture, protein, ash, fibre, calcium, iron, magnesium and phosphorus content on germination in both the legumes (Table 1 and Table 2).

Table 1: Mean nutritive value of dried and germinated pea sample, It shows the mean nutritive value and standard deviation (SD) of dried and germinated pea.

Nutrients	Dried samples	Germinated samples	Percent difference
Moisture (g/100g)	10.54 ± 0.55	14.54 ± 0.32	37.64
Ash (g/100 g)	02.81 ± 0.42	03.15 ± 0.62	12.09
Fat (g/100 g)	01.63 ± 0.24	01.01 ± 0.36	-38.03
Protein (g/100 g)	21.88 ± 0.31	23.67 ± 0.23	8.18
Fibre (g/100 g)	18.02 ± 0.36	19.06 ± 0.41	5.77
Carbohydrate (g/100 g)	46.13 ± 0.12	40.32 ± 0.65	-12.05
Calcium (mg/10 g)	73.01 ± 0.32	74.02 ± 0.21	1.38
Iron (mg/100 g)	03.67 ± 0.07	04.31 ± 0.03	17.43

Table 2: Mean nutritive value of dried and germinated chickpea, It shows the mean nutritive values and standard deviation of dried and germinated chickpea seeds.

Nutrients	Dried seed	Germinated seed	Percent difference
Moisture (g/100g)	10.36 ± 0.42	14.26 ± 0.32	37.64
Ash (g/100g)	02.96 ± 0.31	03.12 ± 0.11	5.4
Protein (g/100g)	19.23 ± 0.29	22.34 ± 0.16	16.17
Fat (g/100g)	06.34 ± 0.61	04.09 ± 0.32	-35.48
Fibre (g/100g)	24.39 ± 0.47	26.11 ± 0.36	7.05
Carbohydrate (g/100g)	44.92 ± 1.31	33.26 ± 1.23	-25.95
Calcium (g/100g)	148.23 ± 0.61	150.23 ± 0.23	1.34
Iron (g/100g)	05.92 ± 0.13	06.21 ± 0.91	4.89
Magnesium (g/100g)	153.24 ± 0.21	155.04 ± 0.32	1.17
Phosphorus (mg/100g)	260.23 ± 0.23	264.03 ± 0.42	1.46

Proximate composition

Effect of processing on proximate composition of pea and chickpea is shown in Table 1 and 2. The results revealed increase in mean moisture content in both the legumes was increased after germination. In pea the moisture content increased from 10.54 to 14.54 g/100g and in chickpea it increased from 10.36 to 14.26 g/100g. It may be due to entry of water in seed coat, due to which seed swells starts and initiates germination. Usually during germination, seeds absorb water by a process called imbibitions. Increase in the mean ash content was also observed after the germination in both the legumes. The ash content of the pea seeds increased by 12.09 per cent and in chickpea increases by 5.40 per cent. The increase in protein was also observed in case of mean content germination also observed. Increased in protein content may be attributed to loss in dry matter, during germination [3]. Higher germination temperature and longer germination time would mean greater loss in dry weight and more increase in crude

protein content. There is reawakening of protein synthesis upon imbibitions which leads to increase in protein content in germinated seeds⁷. The fibre content too increased after germination process. The mean content of fibre in pea seed was increased from 18.02 to 19.06 g/100g and in chickpea it increases from 24.39 to 26.11 g/100g. Increase in fibre content has been considered only as apparent and may be attributed to the disappearance of starch [4].

Contrary to the, fat content of germinated pea and chickpea seeds decreased when compared to dried seeds. The fat content of pea was decreases by 38 per cent and in chickpea it decreased by 35.48 per cent. Decrease in fat may be due to depletion of the fat stored that contributed to the catabolic activities of the seeds during germination [5]. The carbohydrate content in both the legumes, decreased after germination. In pea it decreases from 46.13 to 40.32 g/100g and in chickpea it decreased from 44.39 to 33.26 g/100g, the reason attributed for the same could be carbohydrate utilization as a source of energy for embryonic growth which explains the changes in its content after germination. The estimation of micro nutrients revealed increase calcium content of the legumes after the germination. In pea sample it increased from 73.01 to 74.02 mg/100 g and in chickpea it increased from 148.02 to 150.23 mg/100 g [6]. It may be attributed to presence of calcium salts in water used during germination process. The iron content in pea was increased by 17.43 per cent and in chickpea it increases by 4.89 per cent. Magnesium and phosphorus content also increased in both the legumes on germination. These minerals might have increased during due to dry weight of the seeds [7].

Conclusion

The study was conducted to investigate the effect of processing on nutrient content of Pisum sativum and *Cicer arietinum*. The fresh seed were dried, and then the dried seed were germinated and analysed for nutrient content. Increased in almost all the macro nutrient, except carbohydrate and fat was observed on germination in both the legumes seeds. Micro nutrients too increased.

Therefore, it can be concluded that germination improved the nutritional quality and bioavailability of the legumes. except crude fat and carbohydrate. These two legumes are rich in protein, fibre and essential minerals and thus very beneficial for our health.

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