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**Talpade NN**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

**Pawar VS**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

**Farooqui AS**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

**Sontakke MD**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

**Syed HM**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

**Correspondence****Talpade NN**

Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

## Evaluation of physicochemical composition of garden cress seed (*Lepidium sativum* L.) and black gram split (*Vigna mungo* L.)

Talpade NN, Pawar VS, Farooqui AS, Sontakke MD and Syed HM

### Abstract

The present investigation was carried out to study physicochemical and mineral composition of garden cress seed and black gram split. The different physicochemical and mineral properties of garden cress seed viz, moisture, fat, protein, carbohydrates, ash and minerals (Ca, K, Fe) were determined. Result obtained for proximate composition of garden cress seed revealed that moisture content was 4.7%, fat 27.12%, protein 19.68%, carbohydrates 35.28%, crude fiber 6.8%, and ash 4.7%. Mineral composition shown that the highest amount of potassium 780, calcium 270, and iron 7.4 (mg/100g) respectively. Similarly, black gram split reported moisture content was 10.7%, fat 1.5%, protein 23.7%, carbohydrates 57.06%, crude fiber 0.7%, and ash 3.3% and minerals like calcium content was 138, phosphorus 370 and iron 3.7 (mg/100g). The nutritional value of garden cress seed and black gram split can have better suitability in value addition of food products.

**Keywords:** Garden cress seed, Black gram split, Mineral composition, chemical composition

### Introduction

A garden cress seed (*Lepidium sativum* L.) belongs to family *Cruciferae* grown in India, North America and parts of Europe. It is also known as common cress, land cress and 'Haliv' in India (Gokavi *et al.*, 2004) [6]. The edible whole seed is known to have health promoting properties as it contains 25-39 per cent of protein. Thirty three percent carbohydrate, 2.4 per cent crude fat, 7.6% crude fiber and 6.4% minerals, iron (100%) (Gopalan *et al.*, 2004) [7].

The crop is mainly cultivated for seeds. Garden cress seeds are small, oval-shaped, pointed and triangular at one end, smooth, about 3-4mm long, 1-2 mm wide, reddish brown in color. A furrow present on both surfaces extending up to two thirds downward, a slight wing like extension present on both the edges of seed. On soaking in water seed coat swells and gets covered with transparent, colorless, mucilage with mucilaginous taste. The seed length and width are  $298 \pm 3.2 \mu\text{m}$  and  $100 \pm 1.9 \mu\text{m}$  respectively (Gigi and Rashmi, 2004).

The garden cress seeds are bitter, thermogenic, depurative, rubefacient, galactagogue, tonic, aphrodisiac, ophthalmic, antiscorbutic, antihistaminic and diuretic. They are useful in the treatment of asthma, coughs with expectoration, poultices for sprains, leprosy, skin disease, dysentery, diarrhoea, splenomegaly, dyspepsia, lumbago, leucorrhoea, scurvy and seminal weakness (Ghada *et al.*, 2014) [5].

In recent years efforts are made to develop human diets in such a way that it acts as medicinal foods in order to exploit several health benefits and to prevent most increased diversity of disease. Isothiocyanates are most important biochemical agents from the human health point of view as they are the major inducers of carcinogen-detoxifying enzyme. The most potent isothiocyanates are benzyl isothiocyanate (BITC) which is present in ample quantity in garden cress (Singh *et al.*, 2015) [13].

Garden cress seed (*Lepidium sativum* L.) is categorized under nuts and oil seeds by ICMR. Nutritive value of the seeds show: protein 25.5g%, fat 24.5g%, carbohydrate 33.0g%, calcium 377 mg%, phosphorous 723 mg%, iron 100 mg%, fibre 7.6 g%, carotene 27 mg%, thiamine 0.59 mg%, riboflavin 0.61mg%, niacin 14.3 mg%. It is the highest iron containing plant source ever known with better bioavailability. Due to its high iron and folic acid content, it helps to prevent iron deficiency anaemia (Sarkar *et al.*, 2014) [11].

Black gram (*Vigna mungo* L.) belongs to family *Fabaceae* sub family *papilionaceae*, is being grown as one of the principle pulse crop.

Pulses are known to form the important of protein and other dietary constituents in Indian diet. Black gram (*Vigna mung. L.*) has occupied an important place in human nutrition as rich source of protein in the diet of consumers of India and Western diet. Proteins of black gram are more easily digestible and are almost as good as meat and very good source of phosphoric acid and vitamins. It also consists of satisfactory amount of sulfure containing amino acids [4]. In India black gram consumed in the form of dhal. It is used as source for microorganisms in fermented foods. It is also preferred in the preparation of many fermented foods like idli, dosa, wada etc. This crop is extensively grown in the states of Maharashtra (23.36%), Andhra Pradesh (18.50%), Uttar Pradesh (12.29%), Madhya Pradesh (11.86%), Tamil Nadu (8.64%) and Rajasthan (4.29%).

### Material and Methods

Garden cress seeds were purchased from Parbhani local market and were analyzed for the nutrients namely moisture, protein, fat, ash, crude fibre and minerals viz., calcium, phosphorus, iron and zinc (AOAC, 2005) [1]. Carbohydrate content of samples was computed by difference method (Ranganna, 1986) [10]. Nutrients were analyzed in duplicate and results were expressed on dry weight basis.

### Proximate Analysis

Different chemical properties of samples were analyzed for moisture content, ash, fat, protein and total carbohydrate. All the determinations were done in triplicate and the results were expressed as the average value.

### Moisture content

Moisture content was determined adopting [1] method as following:

$$\% \text{ Moisture content} = \frac{\text{Loss in weight}}{\text{Weight of sample}} \times 100$$

### Fat

(AOAC, 2005) [1] Method using soxhlet apparatus was used to determined crude fat content of the sample. The percent of crude fat was expressed as follows:

$$\% \text{ Crude Fat} = \frac{\text{Weight of dried ether soluble material}}{\text{Weight of sample}} \times 100$$

### Protein

Protein content was determined using (AOAC, 2005) [1] method. Percentage of nitrogen and protein calculated by the following equation:

$$\% \text{ Nitrogen} = \frac{T_s - T_B \times \text{Normality of acid} \times 0.014}{\text{Weight of sample}} \times 100$$

Where,  $T_s$  = Titre volume of the sample (ml),  $T_B$  = Titre volume of Blank (ml), 0.014= M eq. of  $N_2$ .

$$\% \text{ Protein} = \text{Nitrogen} \times 6.25$$

### Total carbohydrate

Total carbohydrate content of the samples were determine as total carbohydrate by difference, that is by subtracting the

measured protein, fat, ash and moisture from 100 phenol sulphuric acid method as given by (AOAC, 2005) [1].

### Ash

Drying the sample at 100<sup>0</sup> C and churned over an electric heater. It was then ashes in muffle furnace at 550<sup>0</sup> C for 5 hrs. It was calculated using the following formula:

$$\% \text{ Ash content} = \frac{\text{AW}}{\text{IW}} \times 100$$

Where, AW = Weight of Ash and IW= Initial weight of dry matter

## Results and Discussion

### Physical properties of Garden cress seed

Various physical properties of garden cress seed were determined and results obtained are presented in Table 1.

**Table 1:** Physical Parameters of Garden cress seed

Physical Parameters	Observation
Colour	Reddish brown
Shape	Oval
Wt. of 1000 seeds (g)	1.96
True Density (kg/m <sup>3</sup> )	1182
Bulk density (g/ml)	0.76
Porosity (%)	36
Length (mm)	2.6
Width (mm)	1.2
Thickness (mm)	0.947
Angle of repose (o)	25.17

\*Each value represents the average of three determinations

The data given in Table 1 revealed various physical characteristics of garden cress seed. Colour is an important characteristics for determining the visual acceptance. The colour of garden cress seed was found reddish brown whereas oval in shape. The 1000 kernel weight was reported to 1.96 (g), true density 1182 (kg/ m<sup>3</sup>), bulk density 0.76 (g/ml), porosity 36 (%), angle of repose 25.17 (o). Different dimensional properties like length, width and thickness was measured and found 2.6, 1.2 and 0.94 (mm) respectively. The results obtained are more or less similar with results given by Behrouzian *et al.*, (2013) [2].

### Chemical and mineral composition of Garden cress seed:

The data pertaining to various chemical and mineral composition such as moisture, fat, carbohydrates, protein, ash and crude fiber were determined and results obtained are illustrated in Table. 2 and Table. 3

**Table 2:** Proximate composition of Garden cress seeds

Chemical Parameters	Mean Value*
Moisture (%)	4.7 ± 0.01
Total Fat (%)	27.12 ± 0.13
Total carbohydrates	35.28 ± 0.10
Total Protein (%)	19.68 ± 0.07
Ash	4.7 ± 0.01
Crude Fibre	6.8 ± 0.03

\*Each value represents the average of three determinations

Results given in above table. 2 indicated that the moisture content was 4.7%, fat 27.12%, protein 19.68%, carbohydrates 35.28%, crude fiber 6.8%, and ash 4.7%.

**Table 3:** Mineral content of Garden cress seeds

Minerals	Available quantity (mg/100g)
Calcium	270
Phosphorus	520
Potassium	780
Iron	7.4
Zinc	4.9

The mineral composition of garden cress seed were analyzed and results revealed that calcium was 270, phosphorus 520, potassium 780, iron 7.4 and zinc 4.9 (mg/100g) respectively. Results reported are in close agreement with Doke and Guha, (2014) [3].

### Physical properties of black gram

Various physical properties such as density, bulk density, porosity, angle of repose of black gram were evaluated and results obtained are presented in Table 4.

**Table 4:** Physical Parameters of Black gram

Physical Parameters	Observation
Wt. of 1000 seeds (g)	52
True Density (kg/m <sup>3</sup> )	1330
Bulk density (g/ml)	0.82
Porosity (%)	39.70
Length (mm)	5.20
Width (mm)	4.10
Thickness (mm)	3.54
Angle of repose (o)	26.56

\*Each value represents the average of three determinations

The physical properties of black gram was measured and results reported that 1000 kernel weight was found 52 (g), true density 1330 (kg/m<sup>3</sup>), bulk density 0.82 (g/ml), porosity 39.70 (%), angle of repose 26.56 (°). properties like length, width and thickness was noted as 5.20, 4.10 and 3.54 (mm) respectively. The results obtained are more or less similar with results given by Sharon, (2015).

### Chemical and mineral composition of black gram Split

#### Chemical composition

The data pertaining to various chemical properties such as moisture, fat, carbohydrates, protein, ash and crude fiber were determined and results obtained are illustrated in below Tables.

**Table 5:** Proximate composition of Black gram split

Chemical Parameters	Mean Value*
Moisture (%)	10.7 ± 0.01
Total Fat (%)	1.5 ± 0.02
Total carbohydrates	57.06 ± 0.21
Total Protein (%)	23.7 ± 0.12
Ash	3.3 ± 0.6
Crude Fibre	0.7 ± 0.01

\*Each value represents the average of three determinations

The results stated with respect to proximate and mineral composition of black gram split were evaluated. It was observed that moisture content was 10.7%, fat 1.5%, protein 23.7%, carbohydrates 57.06%, crude fiber 0.7%, and ash 3.3%.

### Mineral composition

**Table 6:** Mineral content of Black gram split

Minerals	Available quantity (mg/100g)
Calcium	138
Phosphorus	370
Iron	3.7

Results reported for mineral composition indicated that calcium content was 138, phosphorus 370 and iron 3.7 (mg/100g) respectively. The listed in above table are in accordance with NIN, (2016) [9].

### Conclusion

It could be concluded that garden cress seed is rich source of proteins, dietary fiber and various essential minerals such as potassium. Black gram split is good source of proteins, carbohydrates, calcium and iron. The high nutritional value of garden cress seed indicates good potential for exploration and value addition in food products in combination with black gram split.

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