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RESEARCH ARTICLE

Proximate composition of *Lathyrus sativus* (Variety Mahateora)

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ABSTRACT

Lathyrus sativus is one of the most important food legumes in countries like Bangladesh, India and Ethiopia. Pulses play an important role in preventing from several diseases including illness, diabetes, jaundice, cancer and heart disease. In this present study the split dhal, husk and whole seed (*Lathyrus sativus*) seeds were analyzed for proximate composition. The proximate composition of Lathyrus seed (split dhal) was determined and it was observed that the moisture content, protein content, fat content, total ash content, crude fiber and carbohydrate content was found to be 8.4, 22.0, 2.3, 2.90, 3.94 and 60.0% respectively. In husk, the moisture content, protein content, fat content, total ash content, crude fiber and carbohydrate content was found to be 8.6, 25.0, 2.4, 3.09, 2.26 and 59.17% respectively. In whole seed, the moisture content, protein content, fat content, total ash content, crude fiber and carbohydrate content was found to be 8.6, 28.67, 2.2, 2.86, 2.1 and 56.17 %, respectively.

Keywords: *Lathyrus sativus*, proximate composition, crude fiber, husk, split dhal.

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INTRODUCTION

Pulses are the most prominent and economic source of vegetative protein and cheap source of body - building protein as well. The Lathyrus sativus are one of the most commonly using pulses all over the world. Lathyrus sativus belongs to the Fabaceae family (Biswas et al., 1997). Compared to other legumes; it is also resistant to many insect pests (Tiwari et al., 1996a). Usually, pulses are consumed in the form of the dhal. Dhal are the de-husked and splitted form of the any pulse kernel. Pulses are de-husked and broken into two parts to make it consumable as split dhal. All the Pulses are rich source of proteins, fat,

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carbohydrates and several minerals. Also, pulses have low glycemic index and high fiber content (Ramezani et al., 2016). Since, pulses have bundles of nutritional value, it consider as a part for good health and balance diet. And it is one of the essential protein sources for nearly 80 percentage people of all age groups in their daily diet. Moreover, pulses play an important role in preventing from several diseases including illnesses, diabetes, jaundice, cancer and heart disease. India is the largest producer and consumer of pulses in the world. In India it is grown to produce the split dhal. Lathyrus grown in many regions such as West Asia, North Africa, Nepal, Bangladesh, India, Ethiopia, Pakistan and many other countries for the production of human food, fodder, and green manure (Girma et al., 2011; Sammour, 2014).

The Lathyrus sativus is a common crop in many African and Asian countries as well as in the Mediterranean Basin where it is used either for human and animal consumption (Crino et al., 2004). The origin of Lathyrus sativus is not well known. But different authors give different areas of the worlds as the origin of the crop . From the morphological point of view Lathyrus is much - branched, herbaceous annual crop with a well - developed taproot system. Pods that contain seeds are developed in the form of its fruits after flowering. Lathyrus sativus is much - branched, herbaceous annual crop with a well-developed taproot system. Pods are oblong, flat, slightly bulging over the seed, about 2.5-5 cm in length, 0.6-1.0 cm in width and slightly curved and the dorsally part of the pod is 2-winged. Lathyrus is a good source of polyphenol and antioxidant protein. In India the Lathyrus is known as Lakhori, Teora, Khesari, and also in Ethiopia it is known as grass pea and chickling pea and chickling vetch. Globally the area under Lathyrus cultivation is estimated at 1.50 million ha, with the annual production of 1.20 million tonnes, out of which 0.92 million ha is in South Asia and 0.63 million ha is in Sub - Saharan Africa (Lambein et al., 2019).

In India, the major Lathyrus cultivating state are Chhattisgarh, Bihar, Jharkhand, Maharashtra, Odisha, Assam, West Bengal, and Eastern Uttar Pradesh. It is grown as a relay crop and it is one of the best options for extra income from rice fields with minimal cost. In Chhattisgarh Lathyrus is cultivated mostly in districts viz. Raipur, Durg, Ranjandgaon, Kabirdham, Bilaspur, Dhamtari, Raigarh, Mahasamund, Janjgir-Champa, and Jashpur and consumed in the form of dhal. The Lathyrus is a self-pollinated crop and it gives maximum production at 10-25℃ envirnment temperature with average rainfall 400 - 650 mm per year. Usually the Lathyrus is sown in the month of October - November and harvested after maturity of pods in the month of March. Lathyrus crop has high potential producing capacity, drought resistance, salt tolerance and disease resistance (Ramezani et al., 2016). Because of neurotoxin, the government of many countries has banned on the consumption and sale of Lathyrus seeds. Nutritionally, the Lathyrus is an important because of its content protein 26.3-34.3%, ash 2.6-3.9%, fat 5.3%, crude fibre 10%, lignin 0.8-1.5% and starch 41.2%. The Lathyrus seed is a higher source of protein as compared to many other pulses (Ramezani et al., 2016).

Lathyrus seed contains the anti - nutritional properties such as phytic acid, tannins, and β-ODAP (β-Oxalyl diaminopropionic acid) (Urga et al.,2005; Ramakrishna et al., 2006). It has been seen from the literature survey, that excess consumption of Lathyrus causes the paralysis of the limb and arises many other health issues (Hillocks et al., 2012). All thought the neurotoxin amino acid (β-ODAP) is water soluble. The effect of neurotoxins can be minimized by soaking of Lathyrus (24 hours) and roasting (180℃ for 15, 30 and 45 minutes), cooking (60℃, 75℃ and 90℃), autoclaving under pressure (15 psi for 15, 30 and 45 minutes) at various temperature for different period of time (Urga et al., 1993; Srivastava et al., 1996). During the treatment of Lathyrus seeds the different media such as acetic acid, NaOH, $NaHCO_3$, Na_2CO_3, NaCl etc. are used for loosening the bond between hull and cotyledons. The Lathyrus crop has adaptive advantages, such as tolerance to moisture stress, salinity and

its resistance to high temperature. The Lathyrus contains good quality of protein and amino acid, except sulphur containing amino acids in its protein and resistance to many biotic stresses (Hailu et al., 2015)

MATERIALS AND METHODS

Sample collection and preparation

Lathyrus seeds were procured from the local market of Raipur (C.G.). Lathyrus Seeds were stored in the gunny bag until used. The samples were screened to eliminate defective and poor quality units so as to obtain uniformity and packed in polyethylene bags. For the analysis, samples were cleaned with portable water.

Chemical Analyses

Lathyrus seed sample were analyzed for proximate composition by A.O.A.C. (2000) methods.

Moisture, ash and crude fibre composition:

Moisture content: 5 g of the sample (pulses powder) was taken in a previously weighted and kept in hot air oven set on 105 for 24 hours. The difference in weight was due to loss of moisture. Repeating the process of drying and cooling and weighted at 30 min interval, until a constant weight was attained then it was transferred to a desiccators after cooling it was the moisture content was calculated using the following Formula:

$$\text{Moisture content, \% (db)} = \frac{W_1 - W_2}{W_2} \times 100$$

Where,

W_1 = Initial weight of the sample, g

W_2 = Final weight of the sample, g

Total ash content: Take 3 gm sample and tare the silica crucibles followed by weighing. The sample was kept into the muffle furnace and the muffle furnace temperature was maintained at 550 for 3 hour until white ash is obtained. The sample was cooled down in the desiccators. The ash with crucible was weighted properly in the weighing balance.

$$\text{Ash Content (\%)} = \frac{W_2 - W_1}{W} \times 100$$

Where,

W_1 = Weight, in g of the empty dish

W_2 = Final weight in g of the dish with the ash

W= Weight in g of the sample

Crude fibre content: 2g of dried and powdered food sample was extracted with ether and the residue.Sulphuric acid and then with NaOH solution (1.25g/100ml).In between these two treatments the sample is filtered and washed in water till the washing are neutral. After the digestion the residue is washed with 10% potassium sulphate solution, filtered with the Gooch crucible, washed with alcohol, dried and then weighed. The losses in weight for the amount of sample taken in grams X 100 gives percentage crude fiber.

$$\text{Crude fiber (\%)} = \frac{W_1 - W_2}{W} \times 100$$

Where,

W = Weight of the sample, g

W_1 = Crucible weight before ashing, g

W_2 = Crucible weight after ashing, g

Macronutrient composition

Protein content: Nitrogen content of Lathyrus was determined by kjeldhal method as given by A.O.A.C (2000) and protein content was calculated using conversion factor 6.25. The procedure is as follows: Take 0.5 g of weighed sample and transfer to the 500 ml kjeldhal digestion flask. Add to it 2 g of digestion mixture (and Cu in the ratio of 5:1). Take 10 ml solution pour in the sample. The sample was felt into all the tube but one tube was blank in which only the 10 ml was fill.

$$\text{Protein (\%)} = \frac{1.4 \times \text{Titrrated value} \times \text{Normality of acid}}{\text{Sample weight}}$$

Fat content

In the thimble, about 3 g of dried Lathyrus powder sample was weighted and transferred into the cellulose thimble. Pour 100 ml petroleum ether into the beaker and each beaker kept in the heating plate. The temperature was set at 75 C for 45 minute and 150°C for 30 minute in soxhlet's apparatus. The water tap was opened and the flow of water through the water condenser

was ensured. The ether is then evaporated and flask with the residue dried in an oven temperature at 60 °C, cooled in a desiccators and weight.

$$\text{Fat content (\%)} = \frac{W_1 - W_2}{W} \times 100$$

Where,

W = Weight of sample taken, g

W_1 = weight of beaker containing fat

W_2 = weight of empty beaker

Carbohydrate content

The carbohydrate content was determined by subtracting the sum of percentage of moisture content, crude fiber content, protein content, fat content, and total ash content from the 100

Energy value

The total energy in kilocalories/100 g was determined by following formula:

Kcal/100 g = 4 % protein 9 % fat 4 % carbohydrate

RESULTS AND DISCUSSION

The moisture content of Lathyrus seed was found to be 8.4, 8.6, and 8.6 percent on dry basis in split dhal, husk, and whole grain respectively. The fat content in split dhal, husk and whole grain of Lathyrus seed was found to be 2.3, 2.4 and 2.2 percent respectively. The protein content of Lathyrus seed was found to be 22, 25.08, and 28.67 percent, in split dhal, husk, and whole grain respectively. The crude fiber content of Lathyrus seeds was found to be 3.94, 2.26 and 2.1 percent, in split dhal, husk and whole grain respectively. The total ash content in split dhal, husk and whole grain was found to be 2.90, 3.09 and 2.86 percent, respectively. The carbohydrate content was recorded to be 60.00, 59.17 and 56.07 percent, in split dhal, husk and whole grain respectively. The energy value in a food item is of utmost importance. The energy value is expressed in terms of kcal/100 g. It was found to be 352.14 kcal, 358.6 kcal and 359.16 kcal, in split dhal, husk, and whole grain, respectively.

The results of proximate analysis are presented in Table 1.

Table 1: Proximate compositions of Lathyrus seeds (dhal, husk, whole grain)

Parameter	Split Dhal	Husk	Whole grain
Moisture content	8.4%	8.6%	8.6%
Fat	2.3%	2.4%	2.2%
Protein	22%	25.08%	28.67%
Crude fiber	3.94%	2.26%	2.1%
Total ash	2.90%	3.09%	2.86%
Carbohydrate	60.00%	59.17%	56.17%
Energy kcal/100g	352.14 kcal/100g	358.6kcal/100g	359.16kcal/100g

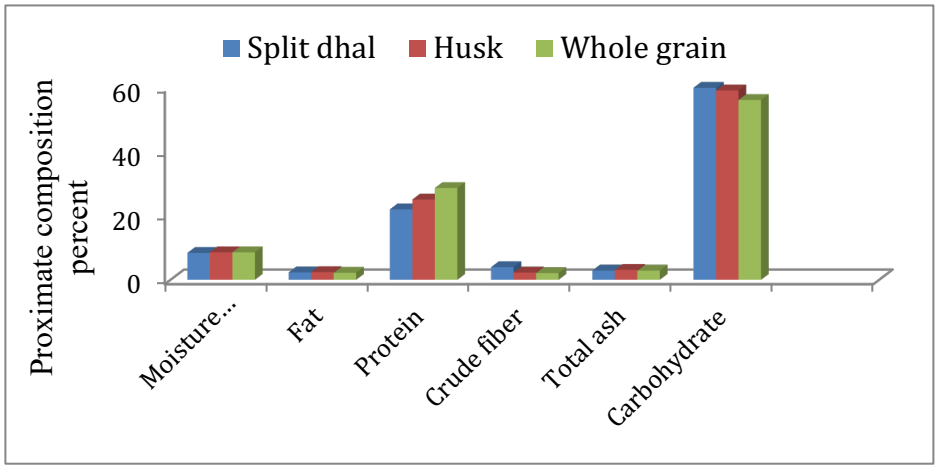

Fig.1 proximate compositions of Lathyrus seeds

The outcomes of this research have provided valuable information of the proximate composition of *Lathyrus sativus*, commonly known as grass pea, includes various components such as moisture content, protein, carbohydrates, fats, fiber and ash. It is a good source of protein, particularly for regions where other protein sources may be scarce.

CONCLUSION

Although the seeds of *L. sativus* have been consumed for centuries as a pulse, this rich crop should be intensively cultivated in India. There is little information on the nutritional value of this pulse seed as well. The data obtained from this study is a clear indicator to show the high potential of L. sativus in the provision of high protein, carbohydrates and minerals for human consumption. This pulse can be consumed in limited quantity without much effect on human health. Thus, it is high time we unveil the richness of this crop for both environmental as well as human welfare.

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