

A MINI REVIEW ON IMPORTANCE OF INDIAN PULSES

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Abstract

This mini review intends to shed light on some important Indian pulses as these are becoming more popular across the world due to their excellent nutritional value, low calorie content, and low glycemic index (GI). People around the world nowadays are moving on to consuming more plant based diets rather than animal based. Pulses have the most dietary fibre and complex carbs, making them low-GI meals. Indian cuisine mainly consists of pulses as its main ingredient in many dishes. Not only pulses help in providing daily protein intake, but also help in providing certain biologically important substances like bio actives and minerals. Apart from having biologically important substances, pulses also have excellent amino acid profile which aids in providing great anabolic support. The importance of Indian pulses has been mentioned in old manuscripts as well. Pulses also play an important role in the Indian economy since they are widely traded throughout numerous states and exported in foreign countries.

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1. INTRODUCTION

Pulses are the edible seeds of Leguminosae plants, and are classified as "Leguminosae crops harvested only for their grain, including dry beans, peas, and lentils" by the United Nations' Food and Agricultural Organization (FAO) (FAO 1994). This definition eliminates oil-producing legumes like soybeans and peanuts, as well as those picked green for food like green beans and green peas. Dry beans (including kidney, pinto, navy, azuki, mung, black gramme, scarletrunner, rice bean, moth, and tepary beans), dry broad beans (including horse, broad, and field beans), dry peas, chickpeas, black-eyed peas, pigeon peas, lentils, bambara groundnut, vetch, lupins, and other "minor" pulses are among (jack, winged, velvet, and yam beans) (Mudryj, Yu, Aukema, 2014). Pulses are the greatest edible seeds because they are high in protein, important vitamins and minerals, dietary fibres, have a low glycemic index, and are gluten-free. Isoflavones, coumestrol, phytate, saponins, lecithin, phytosterols, and vitamin E are only a few of the active phytochemicals found in them. They can be eaten whole or broken into

little pieces (dhals). In the predominantly vegetarian Indian diet, pulses constitute the major source of protein. A variety of pulses have been identified as key dietary components in illness management by Charaka, an ancient Indian physician (Rao B.S, 2002). Tannins, phenolic acids, and flavonoids are the primary polyphenolic chemicals found in pulses. Ferulic acid is the most prevalent phenolic acid in pulses, whereas flavonol glycosides, anththocyanin, and tannins are primarily responsible for the seed coat's appealing colour. There are three different parts recognised in the pulse seeds: cotyledon, seed coat and embryonic axe, which signify, approximately, 89,10 and1%, respectively, of the total seed weight. The cotyledon basically contains proteins and carbohydrates which are the main reserve substances (Parikh, Patel, 2018). Pulses are an important part of the diet in a number of countries. India, for example, consumes the most pulses (15.4 kg per capita per year), followed by Kenya (17.0 kg per capita per year) and Turkey (13.6 g per capita per year) (FAOSTAT, 2016) (Venkidasamy et al., 2019). The consumption volume of pulses was about 22 million metric tons across India

in fiscal year 2019 (India: Consumption Volume of Pulses 2020, Statista). Pulses have been farmed in India for millennia and are an important part of the human diet. Pulses, in addition to cereals, vegetables and fruits, and milk products, were included in a "balanced food" as described over 1000 years ago. Pulses are significant nowadays, according to nutritionists, since they supply needed proteins. Mankind originated (and continues to be) as a carnivorous species, but humans who sought to avoid slaughtering animals for sustenance discovered the value of milk and milk products, and thus acquired protein-rich nourishment. Derived from animals even today, those who

don't consume meat may get all of their protein from lentils and milk (Nene, 2006). The "vegetarian Indian population" still sees pulses as the sole protein source and not the animal derived protein. Hence pulses are of economic importance as well as geographical importance. Indian indigenous pulses have their own benefits. Now we will have a look on some of them one by one while discussing their properties and origins.

2. MATERIALS AND METHODS

Some Indian pulses



Desi chana (Cicer arietinum, chickpea)



Kabuli chana (Cicer arietinum, chickpea)



Masur (Lens culinaris, lentil)



West Asian lentil (Lens culinaris, masur)

Figure 1: Some examples of Indian pulses (Nene, 2006)

Chickpea (*Cicer arietinum*) – Chickpeas are a common component of traditional diets of Asian, Mediterranean, Arab, and South American communities (Asif, Rooney, Ali, Riaz, 2013). Chickpeas are also enriched with carbohydrates (starch, dietary fibre, glucose,

sucrose, and oligosaccharides) and proteins (all essential amino acids excluding sulphur-containing amino acids) (Venkidasamy et al., 2019). These additionally are high in vitamins and minerals and May people lose weight, improve digestion, and lower the risk of illness

upon consumption of chickpea. Furthermore, this bean is high in protein and may be used as a meat substitute in a variety of vegetarian and vegan meals (Brianna, 2021). Chickpea producing states in India are: Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Andhra Pradesh (nipgr.ac.in). Nutritional composition is as follows - Cooked chickpeas are 60% water, 27% carbohydrates, 9% protein and 3% fat (table). 75% of the fat content is unsaturated fatty acids for which linoleic acid comprises 43% of the total fat (Contributors to Wikimedia projects, 2002).

Masur (Lens culinaris, lentil) - Whole lentil seeds are cooked with spices and are a popular dish eaten with rice or bread. Due to the vast vegetarian population on the Indian continent, lentils constitute an important feature of Indian cuisine (Asif, Rooney, Ali, Riaz, 2013). Lentils are considered a very nutritious pulse by Ayurvedic treatises, second only to green gramme or mung bean. It's also been touted as a blood purifier. One of the most prevalent applications has been to use lentil paste to remove existing skin scars (Nene, 2006). Although lentils are rich in carbohydrates and contribute a significant amount of calories per serving indiet, their carbohydrates are slowly digested in the human gut, contributing a lower glycemic index (29 ± 1) (Nasir; Sidhu, 2012).

Tur (Cajanus cajan, pigeonpea, arhar) - Pigeon peas contain high levels of protein and the important amino acids methionine, lysine, and tryptophan (Contributors to Wikimedia projects, 2002). Pigeonpea seed has been split and decorticated for making soup or dhal since ancient times; dilute dhal was prepared to go with rice, while thick dhal was cooked to go with flat bread (chapati) made from grain flour. In comparison to chickpea, pigeon pea has only been utilized in a few cuisines. pigeonpea dhal has been said to have cleansing powers (Nene,2006).

Urd (Vigna mungo, black gram) - Black gram originated in South Asia, where it has been in cultivation from ancient times and is one of the most highly prized pulses of India. The black gram is highly rich in protein with excellent amino acid profile (Asif, Rooney, Ali, Riaz, 2013). It is very widely used in Indian cuisine. In India the black gram is one of the important pulses grown in both Kharif and Rabi seasons. Black gram is very nutritious. When raw it contains high levels of protein (25g/100g), potassium (983 mg/100g), calcium (138 mg/100g), iron (7.57 mg/100g), niacin (1.447 mg/100g), Thiamine (0.273 mg/100g), and riboflavin (0.254 mg/100g). Black gram is also very high in folate (628 μ g/100g raw, 216 μ g/100g cooked) (Contributors to Wikimedia projects, 2004).



Tur (Cajanus cajan, pigeonpea, arhar)



Urd (Vigna mungo, black gram)

Figure 2: Some more Indian pulses (Nene, 2006)



Matar (Pisum sativum, pea)

Figure 3: Matar (*Pisum sativum*, pea) (Nene, 2006)

Matar (*Pisum sativum*, pea)- Peas are part of the plant family, *Fabaceae*, also known as the bean family or pulse family. Peas contain the carotenoids lutein and zeaxanthin. These nutrients help protect your eyes from chronic diseases, such as cataracts and age-related macular degeneration. Lutein and zeaxanthin act as filters from harmful blue light, which contributes to cataracts and macular degeneration. Peas are also rich in coumestrol, a nutrient that plays a role in protecting against stomach cancer (WebMD Editorial Contributors, 9C.E.a).

3. RESULTS AND DISCUSSION

Fulfilling the protein part of the diet

Protein is found in the cotyledon, the embryonic axis of the seed, and minor amounts in the seed coat of pulses. Because they cover a greater amount of pulses, cotyledons have a larger protein content (Venkidasamy et al., 2019). Pulses improve the protein quality of cereal grains, by adding a complimentary essential amino acid profile. They are high in lysine, leucine, aspartic acid, glutamic acid, and arginine, and when combined with cereals and other foods high in Sulphur- containing amino acids and tryptophan, they give well-balanced essential amino acid profiles (Boye, Zare, Pletch, 2010).

Pulses contain isoflavones and antioxidants as well

Isoflavones are phytoestrogens with low oestrogen activity that may be found in large concentrations in pulses and legumes. Isoflavones have been shown to protect against

hormone- dependent disorders such breast cancer and cardiovascular disease. Pulses also contain tocopherols, flavonoids and isoflavonoids, all of which can act as antioxidants (Asif, Rooney, Ali, Riaz, 2013).

Reduces risk of getting diabetes

Pulses have a low GI and high fibre content, making them an ideal diet for diabetics. Pulses include resistant starch, which helps to increase glucose tolerance and insulin sensitivity, reducing diabetic consequences (Mudryj, Yu, Aukema, 2014a).

May prevent HIV

Lectins, which are found naturally in pulses, are largely used by plants as a kind of self-defense and are not digestible by humans. In vitro study reveals that lectins (carbohydrate binding proteins) present in legumes may impede HIV-1 reverse transcriptase, the enzyme responsible for producing the viral RNA DNA copy that will be incorporated into human DNA (Mudryj, Yu, Aukema, 2014a).

Essential minerals and vitamins hub

Pulses also are an excellent source of micronutrients. They are a good source of selenium, and are very high in thiamin, niacin, folate, riboflavin, and pyridoxine. Pulses are a rich source of iron and zinc as well (Mudryj, Yu, Aukema, 2014a).

Lowers cholesterol

Pulses help to lower cholesterol and triglycerides as leguminous fibers are hypoglycosuria because of consisting of more amylose than amylopectin (Asif et. al., 2013).

Economic importance of Indian pulses

Pulses hold a very significant position in Indian economy as they are traded widely across many states. Indian pulses are also exported to other countries as well. For e.g. Approximately 228 thousand metric tons of chickpeas were exported from India in fiscal year 2019, while just around nine thousand metric tons of pigeon peas were exported. The largest share of exported pulse was chickpeas amounting to 80 percent that year (India: Export Volume of Major Pulses by Type, Statista).

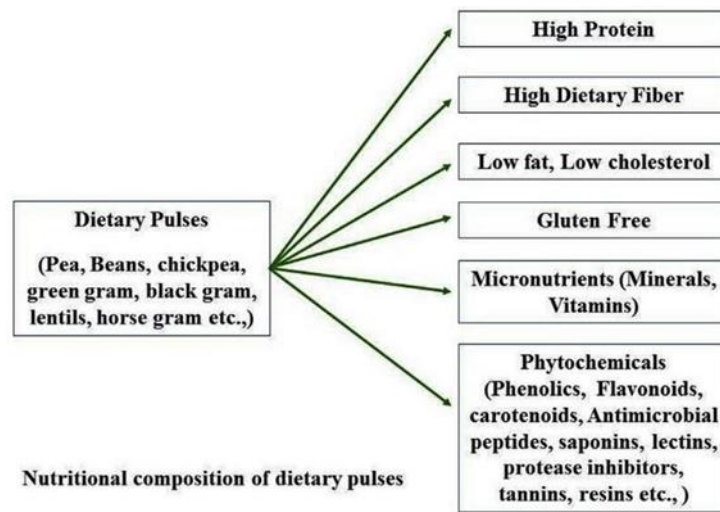


Figure4 : Nutritional composition of pulses (Venkidasamy et. al., 2019)



Figure 5: A shopkeeper with different varieties of pulses (thenewsminute.com, Wednesday, September 23, 2020 - 17:52)

4. CONCLUSION

Final verdict on pulses

Pulses are a daily part of Indian diet trends recently and it is expected to grow more in coming years. It is now known that pulses play an essential role in providing certain obvious health benefits like preventing diabetes and supplying bioactive compounds, phytochemicals, tocopherols and antioxidants upon consumption. Indian pulses have always played an important role in supporting the country economically either by exports or in water sales. The best advantage of consuming pulses is they provide us with proper quantity

of aminoacids required to sustain physically without much muscle wasting.

Conflict of interest

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5. REFERENCES

- [1]. Asif, M., Rooney, L. W., Ali, R., & Riaz, M. N. (2013). Application and Opportunities of Pulses in Food System: A Review. *Critical Reviews in Food Science and Nutrition*, (11), 1168–1179. <https://doi.org/10.1080/10408398.2011.574804>.

- [2]. Mudryj, A.N., Yu, N., & Aukema, H.M. (2014a). Nutritional and health benefits of pulses. *Applied Physiology, Nutrition, and Metabolism*, (11), 1197–1204. <https://doi.org/10.1139/apnm-2013-0557>.
- [3]. Rao, B.S., (2002). Pulses And Legumes As Functional Foods. Bulletin of The Nutrition Foundation of India, Vol. 23, Number 1.
- [4]. Parikh, B., & Patel, V. H. (2018). Total phenolic content and total antioxidant capacity of common Indian pulses and split pulses. *Journal of Food Science and Technology*, (4), 1499–1507. <https://doi.org/10.1007/s13197-018-3066-5>.
- [5]. Venkidasamy, B., Selvaraj, D., Nile, A. S., Ramalingam, S., Kai, G., & Nile, S. H. (2019). Indian pulses: A review on nutritional, functional and biochemical properties with future perspectives. *Trends in Food Science & Technology*, 228–242. <https://doi.org/10.1016/j.tifs.2019.03.012>.
- [6]. WebMD Editorial Contributors. (9 C.E.a). Peas: Health Benefits, Nutrients per Serving, Preparation Information, and More. Retrieved February 20, 2022, from WebMD website: <https://www.webmd.com/diet/health-benefits-peas#:~:text=high%20blood%20pressure,-.Nutrition,%2C%20heart%20disease%2C%20and%20arthritis>.
- [7]. Brianna. (2021a, October 21). 10 Health and Nutrition Benefits of Chickpeas. Retrieved February 20, 2022, from Healthline website: <https://www.healthline.com/nutrition/chickpeas-nutrition-benefits#:~:text=As%20a%20rich%20source%20of,many%20vegetarian%20and%20vegan%20dishes>.
- [8]. <https://nipgr.ac.in/NGCPCG/Breedings%20of%20Chickpea.html>.
- [9]. Contributors to Wikimedia projects. (2002b, June 15). Chickpea - Wikipedia. Retrieved February 20, 2022, from Wikipedia, the free encyclopedia website: <https://en.wikipedia.org/wiki/Chickpea#:~:text=Cooked%20chickpeas%20are%2060%25%20water,43%25%20of%20the%20total%20fat>.
- [10]. Nene, Y.L., (2006). Asian Agri-History Vol. 10, No. 3, (179–202).
- [11]. Nasir, M., & Sidhu, J. S. (2012). Common Pulses: Chickpea, Lentil, Mungbean, Black Gram, Pigeon Pea and Indian Vetch. In *Dry Beans and Pulses Production, Processing and Nutrition* (pp. 283–309). Blackwell Publishing Ltd. Retrieved from <http://dx.doi.org/10.1002/9781118448298.ch12>.
- [12]. Nasir, M., & Sidhu, J. S. (2012). Common Pulses: Chickpea, Lentil, Mungbean, Black Gram, Pigeon Pea and Indian Vetch. In *Dry Beans and Pulses Production, Processing and Nutrition* (pp. 283–309). Blackwell Publishing Ltd. Retrieved from <http://dx.doi.org/10.1002/9781118448298.ch12>.
- [13]. Contributors to Wikimedia projects. (2004, March 11). Vigna mungo - Wikipedia. Retrieved February 20, 2022, from Wikipedia, the free encyclopedia website: https://en.wikipedia.org/wiki/Vigna_mungo.
- [14]. Boye, J., Zare, F., & Pletch, A. (2010). Pulse proteins: Processing, characterization, functional properties and applications in food and feed. *Food Research International*, (2), 414–431, <https://doi.org/10.1016/j.foodres.2009.09.003>.
- [15]. India: export volume of major pulses by type, Statista. (n.d.). Retrieved February 20, 2022, from Statista website: <https://www.statista.com/statistics/713905/india-export-volume-of-major-pulses-by-type/#:~:text=Approximately%20228%20thousand%20metric%20tons,to%2080%20percent%20that%20year>.
- [16]. India: Export Volume of Major Pulses by Type, Statista. Statista, <https://www.statista.com/statistics/713905/india-export-volume-of-major-pulses-by-type/#:~:text=Approximately%20228%20thousand%20metric%20tons,to%2080%20percent%20that%20year> Accessed 20 Feb. 2022.
- [17]. Staff. “Explained: What the Law Removing Onions, Rice from Essential Commodities Means for You | The News Minute.” *The News Minute*, The News Minute, 23 Sept. 2020, <https://www.thenewsminute.com/article/explained-what-law-removing-onions-rice-essential-commodities-means-you-133749>.