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Nutritional, Nutraceutical and Pharmacological properties of Buckwheat (*Fagopyrum esculentum*): A Review

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ABSTRACT

*Buckwheat is a multipurpose crop, gluten-free, pseudo-cereal. It is cultivated at a high altitude in different regions of the world and in India. In India, It is considered as a neglected crop in due to its required climatic conditions to for cultivation, low productivity, low economic value and also lack of awareness of important properties of the plant. Buckwheat has high nutritional, Nutraceutical properties due to its high composition of amount 67-75% starch, 7-21% protein, 1.2-4.3% lipids, 5-11% dietary fibers and 1.8-4.2% minerals. Its show anti-oxidant, anti-inflammatory, anti-diabetic, antit-umeric, anti-stress effect and also renal and wound healing properties. These reviews show the history, distribution, nutritional, nutraceutical and pharmacological properties of Buckwheat (*Fagopyrum esculentum*).*

Keywords— *Buckwheat, Nutritional, Nutraceuticals, Pharmacological, Rutin*

1. INTRODUCTION

Buckwheat name is derived from Anglo-Saxon bucwhoet which is comprised of the word, “boc” (beech) and “whoet” (wheat) i.e. bucwhoet which means small beech nut because Buckwheat seed resembles a small beech nut. Buckwheat belongs to temperate East Asia where it was grown in China before 1000 AD and has diffused to other countries from different routes. In India, Buckwheat cultivation ranges from Jammu and Kashmir in the north to Arunachal Pradesh in the east and Tamil Nadu in the South. Indian Himalayan region is the main region where Buckwheat is cultivated as monocrop as well a mixed crop which depends upon the altitude of the geographical area. In India, out of 14 species reported only two species of buckwheat i.e. *Fagopyrum esculentum* Monech (Common Buckwheat) and *Fagopyrum esculentum tataricum* (bitter buckwheat) are now cultivated.

Buckwheat provides livelihood and household nutritional security to thousands of poor farmer residing in remote and inaccessible mountain and hilly areas. Buckwheat can with sand cold temperature and acidic soil condition. Buckwheat is commonly called “Kuttu” in the Himalayan region whereas it is called “Tau” in Mainpat, Surguja district, Chhattisgarh, India. Buckwheat is eaten on brata or fasting days, being one of the lawful foods for such occasion. Buckwheat flour is used to make various food items such as chhapati pakoras, chillare, jalebi, puwa and halwa. It is gluten-free crops which are best for the person having an allergy to gluten. Buckwheat is also used to cure Coleic disease. It contains rutin which is very effective in reducing cholesterol counts in the blood. Rutin prevents high blood pressure and makes capillaries and arteries stronger and flexible.

2. DESCRIPTION

Buckwheat is a pseudocereal, herbaceous annual plant with weak tap roots, green to the reddish-brown erect stem, 2-3 ft in height, multiple rounds and hollow lateral branches with the alternate opposite pattern, heart (triangular) shaped leaves, and terminal inflorescences having white flowers with pink anthers.

3. CLASSIFICATION

Kingdom: plantae, Division: Angiosperm, Class: Mangoliopsida, Order: Cryophyllales, Family: Polygonaceae, genus: *Fagopyrum*, Species: *Esculentum*

4. DISTRIBUTION

Buckwheat species are naturally distributed in Southern Europe, Central Asia, and Himalayan hills, Bhutan, Korea, Mongolia, Nepal, Russia, Australia and North America. In India Buckwheat genetic diversity exist in valley Jammu and Kashmir, the valley of Himachal Pradesh, the valley of Uttrakhand, the valley of West Bengal, the valley of Sikkim, at a higher elevation of Arunachal Pradesh, Meghalaya, and Manipur and in hills of Nilgiri and Palani in Tamil Nadu. It is also cultivated in Mainpat region of Surguja district in Chhattisgarh India.

5. NUTRITIONAL PROPERTIES

Buckwheat is considered an important human diet for centuries and consumed in different forms such as flour, whole grain, leaves, roots, shoots and honey.

(a) CARBOHYDRATE

Starch is the major carbohydrates which vary from 67-75%. In starch granules, 15-52% amylose contents are present and its degree of polymerization varies from 12-45 glucose units.

(b) PROTEIN

The buckwheat protein is a high biological protein in the plant kingdom having 92.3% of the value of nonfat milk solids and 81.4% of the whole egg solids. Buckwheat protein is the highest contents among the cereals and rich in lysine, methionine, histidine and tryptophan. Buckwheat proteins contain 18.2% albumin, 43.3% globulin, 0.8% prolamin, 22.7% glutelin and 5% other nitrogen-containing compounds.

(c) LIPIDS

Buckwheat total lipid contents range from 1.2-4.3%. The lipid contents vary in seeds parts usually in the embryo 9.6-19.7%, the endosperm 2.0-3.0% and the hulls 0.4-0.7%. Buckwheat oil contains 16-25% of saturated and 74-79% of unsaturated fatty acids. Palmitic acid 15-20%, oleic acid 30-45% and linoleic acid 31-41% are the main fatty acid present in the buckwheat.

6. NUTRACEUTICAL PROPERTIES

Buckwheat is considered as Nutraceutical food. A Nutraceutical is food or parts of food which provide medical or health benefits including the prevention and treatment of diseases.

(a) DIETARY FIBER

The dietary fibers range from 5.0-11.0%. Dietary fiber is a part of a plant or analogous carbohydrates that is resistant to digestion and absorption in the human intestine but is partially or completely fermented by microflora in the large intestine. Buckwheat fiber induces low digestibility and improves intestinal function thus protecting against constipation and colon carcinogenesis.

(b) VITAMINS

Buckwheat contains a higher level of niacin, pyridoxine and vitamin K and carotenoids lutein and zexanthin are present at a similar level as other cereals.

(c) MINERALS

Minerals are cofactors in antioxidative enzymes. Buckwheat Whole grains ,kernel, dehulled grain, flour, hulls, contains 2.0-2.5%, 1.8-2.0%, 2.2-3.5%, 0.8-0.9%, 3.44.2% minerals respectively. The highest amount of Zinc, Copper and manganese are present in buckwheat than rice, wheat and corn. Organic compounds such as seleno-methionine, methyl-selenocystine and gamma-glutamyl, selenocysteine are compound are antioxidative which reduces the risk of cancer.

(d) FLAVONOIDS

Flavonoids are phenolic compound, are a large group of components produced mainly plants. Buckwheat hulls contain 0.7% and groats contain 0.8% phenolic compound. Buckwheat hulls and grains also contain other flavonoids such as rutin, orientin, vitexin, quercetin, isovitexin, quercetrin and isoorientin. Rutin displays anti-inflammatory, antimutagenic, anti-tumoral, anti-carcinogenic, smooth muscle relation. Flavonoids are strong antioxidants thus protect protein, lipids, lipoprotein and DNA.

7. PHARMACOLOGICAL PROPERTIES

Traditionally, different parts of buckwheat used to treat and cure various diseases such as cooked leaves are used to cure anaemia and constipation. The normal leaves are used to cure choking ulcer, homeostasis, for bathing wounds. It is also used to treat hypertension, diabetes and gum bleeding. The fresh and dried stem is used to treat fragile blood capillaries and to protect them from rupturing. It normalizes capillary function and reduces odema and inflammation.

Today, research shows that buckwheat has various pharmacological effects such as antioxidant activity, antiinflammatory effect, cardiovascular and hypolipidemic effects, antigenotoxic effect, renal effect, anti-diabetic effect, anticancer effect, antimicrobial effect. It also shows wound healing properties, antistress properties, and photo protective effect.

8. CONCLUSION

This review is designed to show the important nutritional, Nutraceutical and pharmacological properties of buckwheat and to create awareness about its economical and pharmacological value in Mainpat region of Surguja district, Chhattisgarh, India.

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