

Bauhinia as a Bioactive Source and Health Potential

Shivani Jaswal* and Manisha Kaushal

Department of Food Science and Technology, Dr. YS Parmar University of Horticulture & Forestry, Nauni, Solan.

ARTICLE ID: 06

Abstract:

Bauhinia variegata also known as Kachnar is a medicinal tree, native to tropical and temperate regions of India. Kachnar is well practiced in Indian indigenous health sciences; Ayurveda. Various parts of plants i.e., flowers, buds, stems, roots, barks, seeds, and leaves have been used since ancient times for the treatment of diseases. Kachnar bark is used in disorders such as lymphadenopathy, goiter, tumor disorders, while flowers have pittaghna cures dysfunctional uterine bleeding, curing cough, and antitubercular properties. Kachnar leaves are beneficial in managing diabetes by reducing blood glucose levels and improving the lipid profile due to the presence of antioxidants. It has fat 12%, protein 2.53%, fibre 11.2% and carbohydrate as 3.45%. The present study is to evaluate the bioactive constituents and health potentials of Kachnar in the previous studies done. The plants contribute a variety of bioactive compounds such as tannins, phenolic compounds, phytosterols, flavonoids, lysine, oleic acid, glycosides, linoleic acid, saponins, etc. Besides this, the plant and its parts are used for many conventional activities, such as mosquito control, dying industry, and agricultural operation. Different review and research papers are collected for the present study evaluation to know about bioactive and health status of the crop. Findings done on Kachnar crop was identified and the present study highlights the nutritional, bioactive and health benefits of crop among consumers. Kachnar has bundle of bioactive compounds which highlight the health status of crop. Kachnar helps in wound healing by inducing the formation of new skin cells due to its anti-inflammatory and antioxidant properties. In Ayurveda, applying Kachnar powder mixed with honey helps manage skin problems such as acne, and pimples due to its Sita (cold) and Kashaya (astringent) properties. Kachnar improves the digestive fire which corrects the metabolism and also helps to balance tridosha due to its appetizer and Tridosha balancing property.

Keywords: *Bauhinia, kachnar, Bioactive constituents, saponins, tannins, Health benefits*

Introduction

Mother nature has provided us generously with everything as we require in for good health. Majority of us use plants because these are good source of nutrients and many other constituents that are good source of nutrition and help fight against various diseases and pharmacological importance. Not only medicinal properties these plants have ornamental usage and have Ayurvedic importance in Indian culture (Sawhney et al., 2011; Arain et al., 2010). Regular consumption of plant parts dried or raw (buds, stem, flower, bark, seeds etc.) in diet to claims us to have beneficial effects on human health and helps in protecting the body from chronic diseases like cancer, arthritis, ulcer and diabetes. Still wide ranges of plants are unexplored for the human consumption and are known in only particular area. These plants can be used for various medicinal properties. Among such trees Kachnar i.e., *Bauhinia Variegata* is one, which is native to tropical and temperate regions of India, and belongs to the family Leguminosae includes more than 200 species (Rojas-Sandoval and Acevedo-Rodríguez, 2015). These all are found in different parts of the country. Kachnar is well practiced in Indian indigenous health sciences; Ayurveda. It is small to medium sized deciduous tree with simple leaves alternate stalked cleft at the apex into two rounded lobes resembling a camel's foot. It is grown in the Himalayas up to 1900m of altitude. Kachnar tree possesses various biological and therapeutic properties (anti-inflammatory, anticarcinogenic, antihyperlipidemic, anti-ulcer, anti- cancer, anti-diabetic, antimicrobial activity (Sawhney et al., 2011). The flower of *Bauhinia variegata* contains carbohydrates and significant amount of protein and fat content and also have high energy value and are used in dried and raw form. Flower is used for chutney, pickle, curry and for juice (Ready to serve beverages, squash, appetizers, wine, vinegar). Whereas dried flowers are used for pharmaceutical industry, instant food products mix (chutney, pakora mix) flavouring agents. Buds of *Bauhinia variegata* are used on commercial level because of its unique antioxidant properties and contains significant amount of moisture and ash content that's why is used for curry preparation. *Bauhinia variegata* seeds are rich in amino acids and proteins and is used as pulses by various tribal regions of Central and North-eastern India (Kumar et al., 2020). Leaves of plant can be used as fodder for animals. Besides its traditional uses, health benefits, pharmaceutical properties the crop is still underutilized. The demand of the current era is to explore and make people aware about such plants for their value addition. Therefore, current review is based on explore the plants on the term of its composition, methodology, utilization (traditional and therapeutic) and future perspective. The

Bauhinia variegata is a deciduous tree, native to the Southeast Asian countries of India, Sri Lanka and China, among others. It is generally medium in size, growing up to a height of 10 to 12 meters, with thick barks and lengthy stems (Kumar et al., 2020; Rojas-Sandoval and Acevedo-Rodríguez, 2015). These branches hold leaves that stretch up to 10 to 20 centimetres in size, being rather broad, having two rounded lobes each at the base and tip. Kachnar flowers are initially present as stuffed buds and upon blooming, appear in striking shades of vivid pink and dazzling white, bearing five petals. These flowers, upon developing, bud into fruits that are basically seedpods, housing numerous seeds (Sawhney et al., 2011). The present review described the origin, nutritional benefits and health status of *Bauhinia variegata*.

Origin and Distribution

Origin of *Bauhinia variegata* is reported in East Indies and was first naturalized in Jamaica, and then spread to many other countries like Texas and Luisiminia. *B. variegata* is native to the tropical and temperate regions of Indian subcontinent (Nepal, India, Pakistan and Bhutan), South-eastern Asia (e.g., Vietnam, Myanmar, Thailand and Laos), and China. The plant is well described in ancient times of Indian science of Ayurveda and its stem bark and flowers are used as medicines in various ayurvedic formulations (Kansal et al., 2020). The bark of *Bauhinia variegata* is used for treatment of various diseases like galaganda (goiter), gandamala (Lymphadenopathy), ashthila (Benign prostatic hyperplasia, BPH), kappa pitta disorders, and arbuda (tumor). Whereas flower of *Bauhinia variegata* are used for treatment of rakta pradaraghna (cures dysfunctional uterine bleeding), pittaghna (pacify pitta dosha), kaasghna (cures cough and cold), kshyaghna (antitubercular). However various parts of *Bauhinia variegata* play different role in curing disease. The dried bulbs of plant are used for carcinogenic properties. However, it is also practiced in treatment of various carcinomas. Kachnar (*B. variegata*) is eminent and most health beneficial tree in Himachal Pradesh, India (Bodakhe et al., 2010).

Table 1. defined the common names of *Bauhinia variegata* crop.

Table 1. Common names of *Bauhinia variegata* crop Source

Latin name	<i>Bauhinia variegata</i>
English name	Butterfly ash, Camel's foot tree
Hindi name	Kachnar
Bengali name	Kachnar

Kannada name	Basavanpada
--------------	-------------

General Information

Kachnar is closely related to peacock flower and Kachnar tree is considered as a beautiful tree in the world when it blooms. Orchid tree, camel's foot tree, mountain ebony, butterfly ash, poor man's orchid, the ebony tree are all common names of Kachnar. It is an ornamental tree with beautiful and scented flowers. This tree is used to attract hummingbirds in parks and gardens. Leaves, flower buds of Kachnar tree are eaten as vegetable (Verma et al., 2012). Table 2. described the classification of *Bauhinia variegata* crop.

Table 2. Scientific classification of *Bauhinia variegata* crop

Kingdom	Plantae
Class	Dicotyledon
Family	Caesalpiniaceae
Genus	<i>Bauhinia</i>
Species	<i>Ariegatal</i>

Habitat

Kachnar is native to India and China. It is distributed throughout India at ascending altitude of 1300mt in Himalayan tract extending eastward to Assam, eastern, central and south India. It is also found in Burma, Nepal, Pakistan, and Sri Lanka. The *Bauhinia variegata* is a deciduous tree, native to the Southeast Asian countries of India, Sri Lanka and China, among others. It is generally medium in size, growing up to a height of 10 to 12 meters, with thick barks and lengthy stems (Rojas-Sandoval and Acevedo-Rodríguez, 2015). These branches hold leaves that stretch up to 10 to 20 centimetres in size, being rather broad, having two rounded lobes each at the base and tip. Kachnar flowers are initially present as stuffed buds and upon blooming, appear in striking shades of vivid pink and dazzling white, bearing five petals. These flowers, upon developing, bud into fruits that are basically seedpods, housing numerous seeds. All parts of the kachnar tree, namely the roots, bark, stems, leaves, flowers and seeds are packed with beneficial nutrients and medicinal compounds that confer astounding merits for overall wellbeing (Verma et al., 2012).

Nutritional Value of Kachnar

Kachnar Nutrition Values: Kachnar is rich in vital essential nutrients of vitamin C, B vitamins, key minerals of calcium, phosphorous, magnesium, iron, zinc, besides requisite

macronutrients of reducing-sugar carbohydrates, dietary fibres, proteins and healthy unsaturated fats (Naeem and Ugur, 2019). In many regions of India, curries and pickles are prepared, by cooking, frying kachnar buds, seasoned with onions and spices, as a customary food, which is then eaten as vegetables or side dishes as part of the regular diet. Besides containing ample amounts of several pivotal vitamins, minerals, proteins, carbs, fats, kachnar also showcases an impressive profile of bioactive phytonutrients with anti-inflammatory, antimicrobial, antihyperglycemic, anti-arthritic and cytotoxic i.e., cancer-reducing properties (Sharma et al., 2021). These potent components are very useful in the prevention, management and treatment of a host of disorders, including hypothyroidism, irregular periods and amenorrhea, high blood sugar levels in diabetes, mouth ulcers and digestive complications (Naeem and Ugur, 2019).

Table 3. Nutritional characterization of different parts of *Bauhinia variegata* crop

Constituents	Dried leaves	Flowers	Seeds	Buds	References
Protein	15.19	3.24-5	41.9	3.7	Ramadan et al., 2006
Carbohydrate	66.82	16.01	28.4	6.4	Sharma et al., 2021; Verma et al., 2012
Fats	4.15	0.15-2.5	0.1	2.44	Sharma et al., 2021
Fibres	4.26	8.66	6.9	6.8	Verma et al., 2012
Moisture	8.83	77.80	6.7	84.51	Verma et al., 2012
Ash	4.9	2.81	4.8	4.33	Naeem and Ugur, 2019; Ramadan et al., 2006

Health Benefits of *Bauhinia Variegata*

In Ayurveda, Kachnar is designated as “Rakta Kanchan” in Sanskrit and it known by many other ancient names including “Kanchanara”, “Gandari”, “Yugapatraka”. The time-

tested scriptures of Charaka Samhita, Sushruta Samhita classify this miraculous plant as “Vamanopaga” meaning utilised in emesis or expulsion of toxins from the body, besides “Kashayavarga” implying it holds an inherent astringent flavour (Parekh et al., 2006) Being rather bitter in nature, kachnar comprises a kashaya rasa i.e., astringent taste. This highly useful herb is famed for its laghu guna, since it is easy to assimilate in the system and also has a rather dry quality i.e., rooksha guna. Having an intrinsic sheeta veerya i.e., cooling attribute, kachnar also displays a prabhava or special curative feature, in the form of “Gandamala Nashana”, meaning it effectively rectifies all thyroid problems (Mishra et al., 2013) Kachnar is also beneficial in balancing elevated kapha and pitta doshas, soothing aggravated symptoms and instilling tridoshic harmony of vata, pitta and kapha in the human body. As per Ayurveda, consuming Kachnar powder along with honey or lukewarm water helps manage the thyroid due to its Tridosha balancing and Deepan (appetizer) properties. Kachnar helps in wound-healing by inducing the formation of new skin cells due to its anti-inflammatory and antioxidant properties (Singh et al., 2016; Mishra et al., 2013). In Ayurveda, applying Kachnar powder mixed with honey helps manage skin problems such as acne, pimples due to its Sita (cold) and Kashaya (astringent) properties. One of the most popular therapeutic concoctions prepared with kachnar, blended with resin from Mukul plants and various spices, is Kanchanar Guggulu, famed for mending instances of thyroid problems, PCOS, joint aches, hormonal imbalance and impurities in the blood. Possessing abundant quantities of vitamin C, vital trace minerals, besides potent antioxidants, kachnar is a panacea for curing a spectrum of health anomalies, ranging from haemorrhoids, indigestion, cough, to slowing progression of cancer and controlling blood sugar in diabetes (Singh et al., 2019; Rajani and Ashok, 2009).

- a. **Rectifies Thyroid Problems:** Hypothyroidism occurs when the thyroid gland does not synthesize adequate quantities of thyroid hormones, which play a crucial role in conserving metabolism and immunity in the body. Since an imbalance in the three doshas of vata, pitta, kapha, besides overweight, obesity conditions and hampered digestion processes prompt thyroid problems, taking kachnar decoctions and powders assists in treating hypothyroidism. Kachnar formulations significantly ease the assimilation of foodstuffs in the body, as well as regulate the three doshas, improve metabolism and promote weight loss (Vadivel and Biesalski, 2011).

- b. Lowers Blood Sugar:** Kachnar is blessed with profuse anti-diabetic and antihyperglycemic plant compounds. These control insulin mechanisms in the body, as well as bring down rising blood glucose levels. In this manner, kachnar assists in mitigating diabetes symptoms and keeping blood sugar levels in check.
- c. Effectively Treats Haemorrhoids:** Kachnar is imbued with agni-activating matter i.e., compounds that stimulate the digestive juices. Since rampant indigestion and constipation trigger inflammation in the veins in the rectum, resulting in itching, pain, bleeding during the elimination of wastes as urine, stools, kachnar relieves pain, swelling in the rectum and ceases the occurrence of piles or haemorrhoids (Verma et al., 2012).
- d. Regulates Menstrual Cycles:** Erratic occurrences of monthly periods or the total lack of menstruation i.e. amenorrhea, which happen due to imbalance in pitta dosha and an overheated body, can be alleviated by taking kachnar decoctions. This is because kachnar is packed with sheeta or cooling traits, besides an inherent ability to control pitta dosha, thereby assuring timely, normal menstrual cycles.
- e. Treat Hypothyroidism:** Hypothyroidism is a condition in which the thyroid gland does not produce a sufficient number of thyroid hormones. According to Ayurveda, the initial causes of Hypothyroidism are diet and lifestyle factors that imbalance the digestive fire and metabolism and disrupt the balance of the Tridoshas (Vata/Pitta/Kapha). Kachnar improves the digestive fire which corrects the metabolism and also helps to balance Tridosha due to its Deepan (appetizer) and Tridosha balancing property.
- f. Treatment to Piles:** Piles, known as Arsh in Ayurveda, is caused by an unhealthy diet and a sedentary lifestyle. This leads to the impairment of all the three doshas, mainly Vata. An aggravated Vata leads to low digestive fire, leading to constipation. If ignored or left untreated, this causes swelling in the veins in the rectum area leading to formation of Piles mass. Kachnar helps to improve the digestive fire because of its Deepan (appetizer) property, thereby preventing constipation and also helps to reduce swelling of the Piles mass.
- g. Treatment to Menorrhagia:** Menorrhagia or heavy menstrual bleeding is known as Raktapradar (or excessive secretion of menstrual blood) in Ayurveda and is caused due

to an aggravated Pitta dosha. Kachnar balances an aggravated Pitta and controls heavy menstrual bleeding or Menorrhagia as it has Sita (cold) and Kashaya (astringent) properties.

- h. Cure of Diarrhoea:** Diarrhoea, known as Atisar in Ayurveda occurs due to improper food, impure water, toxins, mental stress and Agnimandya (weak digestive fire). All these factors are responsible for aggravating Vata. Aggravated Vata brings fluid to the intestines from various tissues of the body and mixes with the stool. This leads to loosen, watery motions or Diarrhoea. Kachnar helps to control Diarrhoea by improving the digestive fire due to its Deepan (appetizer) properties. It also makes the stool thick and controls water loss due to its Grahi (absorbent) and Kashaya (astringent) properties.

Table 4. Health benefits of *Bauhinia variegata* crop

Shapes	Pods long narrow and pointed at the ends, hard, flat, glabrous, 13-25cm long, 15-18mm wide.
Taste	Sour, astringent, sweet
Health benefits	Treatment of Haemorrhoids, Regulating of Blood Flow during Menstruation, Purification of Blood, Treatment of Digestive System Problems, Healing Internal Wounds, Treatment for Cough, Anti-cancerous properties, Antidote for snake bites, Cures diuresis, treats oral disorders, Useful for rectal prolapse, Cure diarrhoea due to indigestion, Ease burning sensation, Controls blood sugar, Menorrhagia haemolysis, Treat hypothyroidism, Anti-tumor activity.

Source: Naeem and Ugur, 2019; Sunkar et al., 2018; Verma et al., 2012

Aesthetic Value of *Bauhinia Variegata*

To reduce air pollution and make urban areas more attractive; the concerned authorities should take essential measures from environmentalists. Health of environment will be improved and urban areas also become pollution free through planting of native species of trees including Kachnar. Due to its versatility, helping to reduce allergy problems in the future, provide animal fodder, adding beauty to the highways. It is a multipurpose tree that is planted along highways for the atmosphere and soil pollution safety in Pakistan (Sunkar et al., 2018). Most of the people in Pakistan are familiar with Kachnar tree especially those who live in sub-mountainous areas including Islamabad. It adds to the beauty of the cities because of its

attractive colors. The type of Kachnar tree found in Islamabad are light violet flowers. Apart from these some complete white flowers look like orchid flowers which bloom in February to March. The flower buds are regarded as a delicacy, despite its aesthetic value. Due to its limited availability in spring, they are expensive. In Pakistan there is need to plant more of these indigenous species like kachnar trees to combat environmental pollution and to improve urban areas due to industrialization and urbanization as Kachnar is a multi-purpose plant tree (Verma et al., 2012).

Products Made from *Bauhinia Variegata*

- **Kanchanar Guggulu** is an effective Ayurvedic remedy for treating hypothyroidism, hormonal imbalance, PCOS and joint pains. The word Guggul originated from the Sanskrit word Guggulu means 'protection from the disease'. It also promotes the functioning of the lymphatic system and in getting rid of toxins (Ramadan et al., 2006).
- **Key Ingredients** Kanchanar Guggulu comprises Kanchanar (*bauhinia variegata*) bark, ginger, black pepper, long pepper, Haritaki, bibhitaki, amlaki (the combination of triphala), Varuna (*crataeva nurvala* bark), cardamom, cinnamon, and Guggulu resin in equal amounts. Kanchanar bark is brewed into a decoction and gets mixed with guggulu and other items to make it into a tablet (Naeem and Ugur, 2019).

Conclusion

Kachnar is truly a magical wonder from Mother Nature, that supplies tremendous quantities of essential nutrients, carbs, proteins, fats, vitamins, minerals, besides powerful antioxidants and advantageous plant-based biochemical. Kachnar is indeed a versatile herb. It can be consumed as food in measured amounts by incorporating it into the routine diet, as staple Indian dishes of curry, achar. Besides, it delivers magnificent curative traits as a medicinal aid for thyroid complications, indigestion, irregular menstrual cycles and healing a host of health woes, to ensure optimal wellbeing.

References

Arain, S., Sherazi, S. T., Bhangar, M. I., Mahesar, S. A., & Memon, N. (2010). Physiochemical characterization of *Bauhinia purpurea* seed oil and meal for nutritional exploration. *Polish journal of food and nutrition sciences*, 60(4).

- Bodakhe, S. H., Alpana, R., Bodakhe, K. S., & Pandey, D. P. (2010). New polyphenolic aromatic glycoside from *Bauhinia variegata* L. stem bark. *Asian Journal of Chemistry*, 22(5), 3549-3553.
- Kansal, M., Shukla, P., & Shukla, P. (2020). a Boon To Human Health-Bauhinia Variegata. *Int J Pharmacogn*, 7, 155-61.
- Kumar, S., Baniwal, P., Kaur, J., & Kumar, H. (2020). Kachnar (*Bauhinia variegata*). In *Antioxidants in Fruits: Properties and Health Benefits* (pp. 365-377). Springer, Singapore.
- Mishra, A., Sharma, A. K., Kumar, S., Saxena, A. K., & Pandey, A. K. (2013). *Bauhinia variegata* leaf extracts exhibit considerable antibacterial, antioxidant, and anticancer activities. *BioMed Research International*, 2013.
- Naeem, M. Y., & Ugur, S. (2019). Nutritional and health consequences of *Bauhinia variegata*. *Turkish Journal of Agriculture-Food Science and Technology*, 7(sp3), 27-30.
- Parekh, J., Karathia, N., & Chanda, S. (2006). Evaluation of antibacterial activity and phytochemical analysis of *Bauhinia variegata* L. bark. *African Journal of Biomedical Research*, 9(1).
- Rajani, G. P., & Ashok, P. (2009). In vitro antioxidant and antihyperlipidemic activities of *Bauhinia variegata* Linn. *Indian journal of pharmacology*, 41(5), 227.
- Ramadan, M. F., Sharanabasappa, G., Seetharam, Y. N., Seshagiri, M., & Moersel, J. T. (2006). Characterisation of fatty acids and bioactive compounds of kachnar (*Bauhinia purpurea* L.) seed oil. *Food chemistry*, 98(2), 359-365.
- Rojas-Sandoval, J., & Acevedo-Rodríguez, P. (2015). *Bauhinia variegata* (mountain ebony). *Forestry Compendium*, (8656).
- Sawhney, S. S., Mir, M. A., & Kumar, S. (2011). Phytochemical screening and antioxidant properties of *Bauhinia variegata* (bark). *Journal of Pharmaceutical Science and Technology*, 3(8), 645-650.
- Sharma, K., Kumar, V., Kumar, S., Sharma, R., & Mehta, C. M. (2021). *Bauhinia variegata*: a comprehensive review on bioactive compounds, health benefits and utilization. *Advances in Traditional Medicine*, 21(4), 645-653.
- Singh, K. L., Singh, D. K., & Singh, V. K. (2016). Multidimensional uses of medicinal plant kachnar (*Bauhinia variegata* Linn.). *Am J Phytomed Clin Ther*, 4(2), 58-72.

- Singh, N., Singh, A., & Pabla, D. (2019). A review on medicinal uses of Bauhinia Variegata Linn. *PharmaTutor*, 7(6), 12-17.
- Sunkar, S., Akshaya, A., Aarthi, B., Nachiyar, C. V., & Prakash, P. (2018). Phytochemical analysis and isolation of endophytic bacteria from Bauhinia purpurea. *Research Journal of Pharmacy and Technology*, 11(5), 1867-1876.
- Vadivel, V., & Biesalski, H. K. (2011). Role of Purple Camel's Foot (Bauhinia purpurea L.) Seeds in Nutrition and Medicine. In *Nuts and seeds in health and disease prevention* (pp. 941-949). Academic Press.
- Verma, R., Awasthi, M., Modgil, R., & Dhaliwal, Y. S. (2012). Effect of maturity on the physico-chemical and nutritional characteristics of Kachnar (Bauhinia variegata Linn.) green buds and flowers.

