



# A REVIEW ON AYURVEDIC, AND PHARMACOLOGICAL PROPERTIES OF KUBERAKSH (*CAESALPINIA BONDUCELLA FLEMING.*)

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**Abstract :** Background: Kuberaksha (*Caesalpinia bonducella Fleming.*) a member of Caesalpiniaceae family which is also known as Latakaranj. In Brihatrayi (Charak, Sushrut and Vagbhatta) there is no direct reference about the drug Kuberaksha. But Putikaranja, Prakirya, Putik and can be equated with Kuberaksha. Vagbhatta mentions "Karanj dravya" in Prameha chikitsa as one of the ingredients of "Dhanvantari Ghrita". But he does not use the term Kuberaksha. In the Nighantus, Karanja is indicated in Prameha. In Siddha system of medicine leaves of this plant are used in Diabetes Mellitus. In some tribal areas of Sabarkantha of North Gujarat, it is used in Madhumeha. In today's research era, there is lot of work being done on '*Caesalpinia bonducella*' about its hypoglycemic activity. Ayurveda this plant is having Guna-Laghu, Ruksha, Ras Katu, Veerya-Ushna, Vipaka-Katu, Vaatahar and Kaphahar and Sheet. Many pharmacological studies have been conducted to investigate the properties of Kuberaksha (*Caesalpinia bonducella Fleming.*) in an attempt to authenticate its use as a multi-purpose medicinal agent. The main aim of this article is to collect and analyze the scientific information related to traditional uses, bioactive chemical constituents and pharmacological activities. Methods: Scientific information on Kuberaksha (*Caesalpinia bonducella Fleming.*) was retrieved from the online bibliographic databases (e.g. MEDLINE/PubMed, SciFinder, Web of Science, Google Scholar and Scopus) and books from central library as well as library of Dravyaguna department of Sai Ayurved College, Hospital and Research Centre Sasure-Vairag-Solapur. Results: According to Ayurveda Kuberaksha (*Caesalpinia bonducella Fleming.*) it is effective in diabetes pharmacologically it act as analgesic, anti-inflammatory, anti-oxidant, anti-cataract, anti-cancer, spermatogenic, it is very effective in pyrexia. Bonducine Alkaloids like Bonducine, Steroidal Saponin, Fatty Acids, Hydrocarbons, Phytosterols, Isoflavones, Amino acids and Phenolics, Phytosterols- Sitosterol, Heptacosane Noncrystalline Bitter Glycoside Bonducin Neutral Saponin were reported from whole plant or different plant parts. Conclusion: The mechanisms of action for these properties are not fully understood. Preliminary studies have found various constituents of Kuberaksha (*Caesalpinia bonducella Fleming.*) exhibiting a variety of therapeutic effects. These results are very encouraging and indicate this herb should be studied more extensively to confirm these results and reveal other potential therapeutic effects.

**IndexTerms** - Kuberaksha, Latakaranj, *Caesalpinia bonducella Fleming.*: Ayurvedic uses; alkaloids; pharmacological activity

## 1. INTRODUCTION

Nature has endowed India with unique gift of as many as 35,000 plants varieties India accounts for two third of the flowering plants of the world of which about 7,500 are reported to possess medicinal properties In India, there are about 6,780 pharmacies in the Indian system of medicines and annual herbal drug production has been estimated to be around Rs. 3,000 crores and is expected to reach Rs.8,000 Cr. by the year 2007. Major research organizations of the country also evincing keenly interest in scientific research on herbal drugs. The Indian Council for Medical Research (ICMR), Council of Scientific and Industrial Research in herbs. Acharya Charaka has mentioned the research of Dravya in Vimana Sthana 8/87. Kuberaksh is one of the most popular drug because of its easily availability and uses. The seeds kernels have a bitter taste and are valued in indigenous medicine as a tonic. They are ingredient of 'Ayush - 64' in Ayurvedic compound preparation used as antimalarial drugs. It one of the ingredient in many Ayurvedic formulations like Vishamjwaraghna vati.

## 2 AYURVEDIC REVIEW

Kuberaksha which is also known as Latakaranj is not mentioned in Brihatrayi but used the term Putik, Putikaranja which can be said equal to Kuberaksh. Rasapanchaka is Guna-Laghu, Tikshna, Rasa-Tikt, Virya-Ushna, Vipak-Katu, Doshaghata-Vaat, Kaph Karma (Therapeutic uses) of Kuberaksha are as Charaka Samhita-Stransan, Shothaghna, Sushruta Samhita- Arshi, Shool, Adhman, Vran, Krimi, Ashtanga Samgraha- Arsha, Krimi, Shwitra, Ashtanga Hridaya- Shwitra, Prameha, Gulma, Medorogs,

Kustha, Dhanvantari Nighantu- Krimi, Kushtha, Arsha, Vrana, Raktaja- Vyadhi, Madanpal Nighantu-Kushtha, Udavarta, Prameha, Arsha, Yonidosha, Kaiyadeva Nighantu-Sopha, Arsa, Sula, Adhamana, Vrana, Krimi, Raj Nighantu- Jwaraghna, Shothaghna, Krimighna, Vedana Sthapana, Stambhaka, Sodhal Nighantu- Shopha, Vran, Yakrit-Plihaghna, Bhavaprakasa Nighatntu -Prameha, Arsha, Kushtha, Krimi, Saligram Nighantu-Prameha, Kustha, Arsha, Vrana, Krmihara, Ausadhi Guna Darshan- Shotha, Raktarsha, Vrana, Prameha, Kustha, Chhardi, Krimi, Karsha Vistambha, In Unani system of medicine it is also indicated for Madhumeha. Brihatnighantu Ratnakara mentions the seeds as useful in snake bite internally but they are not an antidote to snake venom.<sup>1,2,3</sup>

### 3 BOTANICAL DESCRIPTION

Habit: A wood climber, stem cylindrical, slender, pubescent, more or less beset with short, straight conical, sharp, unequal prickles, sparingly branched with a large white pith. Leaves: Leaves very large, 30-60 cm long, widely spreading. bipinnate. Stipules large, composed of 2 or 3 rounded segments; rachis stout, cylindrical, pubescent, with scattered backwardly hooked prickles usually in pairs on the under surface, pinnae in about 5-9 opposite pairs without an odd one, coming off from the upper surface of the rachis, leaflets in about 7 to 9 opposite pairs, with two hooked prickles at the base of each pair, very shortly stalked 2.5 to 4.5 cm long. Oblong-ovate, rounded at the base, bluntly pointed and with a sharp mucro at the apex, entire, pubescent at the margin and on the midrib or all over beneath. Flowers: Flowers rather small, numerous on spreading pedicels nearly 1.5 cm long, rather densely arranged in pyramidal, long-stalked racemes; bracts linear their long points recurved over the unopened buds, early caducous; rachis pubescent. Calyx: Calyx large, deeply divided in 5 oblong, blunt strongly rufous-pubescent imbricate lobes, the two lower somewhat larger. Corolla: Petals 5, about half as long again as the calyx, spreading, oblong, blunt, yellow, the upper spatulate one rather the shorter and spotted with red. Androecium: Stamens 10, quite free, inserted at the base of calyx and about equaling it in length the upper one shorter, filaments dilated and hairy below. Gynoecium Ovary sessile, hairy, style short, stigma truncate, hollowed. Pods about 6-7 cm long, shortly stalked, very broadly oval, rounded at both ends, tipped with the persistent style, laterally compressed, bright orange brown, covered with numerous, straight, sharp, erect spines 5-8 mm long, 2-valved, valves lathery, white internally. Seeds: 2 or 1 in the pod, sub-globular, slightly compressed 15-20 mm in diameter, smooth, but ringed with faint parallel lines, pale greenish gray, shining, testa hard, rather thick with flinty fracture on breaking; embryo with two large Plano-convex cotyledons, no endosperm.

### 4 TAXONOMIC POSITION

Kingdom : Plantae  
Phylum : Magnoliophyta  
Division : Magnoliopsida  
Class : Angiospermae  
Order : Fabales  
Family : Fabaceae / Caesalpinaceae  
Genus : *Caesalpinia*  
Species : *bonducella*

### 5 DISTRIBUTION

*Caesalpinia bonducella* is a viny perennial shrub growing in shade as well as in open condition. Generally found up to an altitude of 1,000 m in Himalaya and wild throughout the plains on waste lands or coastal areas of India. It is also found in deltaic region of western, eastern and southern India. Found particularly in the seacoast throughout the hotter parts of India, Burma and Sri Lanka.<sup>4</sup>

### 6 REGIONAL NAMES<sup>1,2,3</sup>

Sanskrit : Latakaranj, Naktmal, prakirya, Putikaranja, Guccchapushpak, Guccchaphala  
Hindi : Kantakaranj, Katkauja, Katkaliya  
Marathi : Sagargota, Gajaga  
Kannada : Gajakai  
Tamil : Kalichi, Kalishikkay  
Telugu : Gachcha  
Bengali : Nata, Natakaranj  
English : Fever nut, Banduc nut, Physic nut

### 7 TRADITIONAL USES

In Malaya, the young leaves are used in intermittent fevers and for expelling intestinal worms. In Ceylon, they are applied for toothache and they are also given for worms in children. The juice of the leaves as anthelmintic; good in elephantiasis and smallpox, destroys the bad odor due to perspiration (W. of L). Leaves after roasting with castor oil are applied externally to inflammatory swelling especially to inflamed piles, hydrocele and orchitis with benefit. Tender leaves boiled with castor oil or ghee, if thickly applied on painful and swollen testicles are found to be very efficacious<sup>5</sup> The seeds and leaves are reported to be used in skin diseases and rheumatism<sup>6</sup> In Katra valley (Jammu and Kashmir), the plant juice is taken to two weeks after meals to cure intermittent fever. In Sri Lanka, in the indigenous system of medicine, the plant is used for treatment of skeletal fracture.<sup>7</sup> The boiled leaves are used as a gargle for sore throat<sup>5</sup> leaves are good emmenagogue. Root: The root and stem-extracts inhibit the growth of "Rhizopus arrhirus" Fischer in Vitro. In Kangra (Himachal Pradesh), the roots are used in intermittent fevers and diabetes. In Jamaica, the bark is used as a rubefacient and as a local application for sores.<sup>8</sup> Bark of the root possesses number of properties like emmenagogue, febrifuge. Decoction useful in calculus and given with honey to cure leucorrhoea.<sup>9</sup> Extract of root and stem antiviral.<sup>10</sup> Extract is antifungal.<sup>10</sup> The bark is used in tumors and for removing placenta. The bark powder with honey is taken in cases of hernia. In Madagascar, the roots are considered febrifuge and anthelmintic and are much used as an astringent in leucorrhoea and menorrhagia. The root has diuretic properties and is useful in gravel and stone in bladder. Stem: The stem and roasted fruits are used in eye disease. Fruit: In Philippines, fresh fruit powdered with garlic and mixed with lukewarm water is rubbed on the body to mitigate fever.<sup>11</sup> In Hawaii Islands, the pulp of the pod is used for purifying the blood, in congestion and as a laxative. The pulp is reported to possess pesticidal properties also.<sup>12</sup> They are also made into an ointment for treating hydrocele. As an infusion they are used for curing cerebral hemorrhage. They have also been found useful in some cases of asthma. In Madras an ointment is made from the powdered seeds with castor oil and applied externally in hydrocele and orchitis. The oil

from the seed is used in convulsions and paralysis. The powdered seed with equal part of pepper powder is useful in malaria but they did not do any good.<sup>5</sup> The fruit is astringent to the bowels, aphrodisiac anthelmintic, cures urinary discharges leucorrhoea, piles and wounds. The oil of the fruit is good for purifying blood and in indolent ulcers. Roasted fruits are used in eye diseases, hyper-acidity and as fish poison. In Siddha system of medicine, the leaves are used in Madhumeha.<sup>13</sup>

## 8 PHYTOCHEMISTRY

Whole plant contains Steroidal Saponin, Fatty Acids, Hydrocarbons, Phytosterols, Isoflavones, Amino acids and Phenolics.<sup>14</sup> Seed Kernel Alkaloids present.<sup>15</sup> Bonducin (a homoisoflavone)<sup>16</sup> Phytosterols- Sitosterol, Heptacosane Noncrystalline Bitter Glycoside Bonducin.<sup>17</sup> Neutral Saponin<sup>18</sup> also contains reserved food material like Fatty Oil, Starch, Sucrose.<sup>14</sup> Fatty Acid- Stearic, Palmitic, Oleic, Linoleic, Linolenic, and a Mixture of Unsaturated Acids of low Molecular Weights<sup>19</sup> Aminoacid- Aspartic Acid, Lysine, Glycine, Leucine, Histidine, Isoleucine, Serine, R-Amino-Butyric Acid, Tyrosine, Citrulline, Glutamic Acid, Threonine, Arginine, Proline, L-Alanine, Methionine, Phenyl Alanine, Cystine, Valine, Tryptophan Seed Noncrystalline Bitter Glycoside Bonducin, Neutral Saponin l.<sup>20</sup> Neutral Saponin Patwardhan et al.<sup>21</sup> Terpenoids, Caesalpin,  $\beta$ -Caesalpin and  $\alpha$ -Caesalpin.<sup>22,23</sup> also contains Pentoan, Starch, Water Soluble Mucilage, 4-O-Methyl Myoinositol Hydrate.<sup>24</sup>

## 9 PHARMACOLOGY

### 9.1) Antidiabetic activity

It is used as traditional medicine for treatment of diabetics. Indian tribal people use it for blood sugar control. The powder of seed kernel of this plant is used by the local people of Assam for the diabetes treatment. The seed possesses antidiabetic and antihyperlipidemic activity. Both leaf extract and kernel powder group statistically significantly decreased.<sup>3</sup>

### 9.2) Analgesic and anti-inflammatory activities

The activities were studied by hot plate method and acetic induced writhing response to albino mice and different doses of ethanolic extracts were given to them. The consequences observed confirm that *C. bonducella* has analgesic and anti-inflammatory activities. It may be due to the presence of phenols, tannins, oils, glycosides, saponins and flavonoides. It was observed that the action was dependent on proportion of doses. The seed oil of *C. bonducella* is good source for analgesic and anti-inflammatory agent.<sup>25,26</sup>

### 9.3) Antioxidant activity

The chloroform extract of *Caesalpinia bonducella* shows antioxidant activity. The ethanolic extract of *C. bonducella* possesses natural antioxidant activity. The ethanolic and methanol leaves extract of *Caesalpinia bonduc* indicated free radical scavenging activity i.e. antioxidant activity against DPPH (1, 1-Diphenyl-2, Picryl- Hydrazyl). The *C. bonducella* contains flavanoids and phenolic compounds and the antioxidant activity of it may be due to them. *Caesalpinia bonduc* Roxb seed contains noticeable amounts of polyphenolic substances that possess powerful.<sup>27</sup>

### 9.4) Anticataract activity

The ethanolic extract of seed Kernels of *Caesalpinia bonducella*. (L) Fleming has Anticataract and antioxidant activities, which might be useful to prevent or slowing the progress of cataract. The extract reduced opacity and tissue malonaldehyde (MDA) level and raised catalase and superoxide dismutase (SOD) activities. There was increase in water soluble protein levels and total proteins.<sup>28</sup>

### 9.5) Anticancer activity

It has been shown by *in vitro* anticancer assay that the petroleum ether fractions of ethanolic extract of *C. bonducella* seeds possess anticancer activity. It is capable of killing Ehrlich *Ascites carcinoma* (EAC) cell lines by way of induced apoptosis. 78.4% growth inhibition against human breast cancer cells lines (MCF-7) was indicated by the methanol extract of *Caesalpinia bonducella* (L) Roxb seed. *Caesalpinia bonducella* possess phenolics and flavonoids in noticeable amount it may cause the anticancer properties.<sup>29</sup>

### 9.6) Antispermatic activity

The treatment of aqueous seed extract of *C. bonducella* decreases sperm density in male albino rat. It indicates antispermatic activity of *C. bonducella*. Seeds may be secure and effective contraceptive.<sup>30</sup>

### 9.7) Anticonvulsive activity

Traditionally *C. bonducella* seed oil plays very important role in treating convulsions. The petroleum ether extract of seed kernels of *C. bonducella* was analyzed for its anticonvulsant effect in different experimental animal models. To assess anticonvulsant activity, MES (maximal electro shock), PTZ (Pentylenetetrazole), picrotoxin and strychnine -induced convulsions models were used. Diazepam was applied as a standard reference for all models. But in MES phenytoin was utilized as a standard reference. Medium and high doses of petroleum ether extract of *C. bonducella* (600 and 800mg/kg) indicated noticeable anticonvulsant activity. It may be due the presence of proteins, saponins, carbohydrates, homoisoflavone and sterols.<sup>31</sup>

### 9.8) Antibacterial activity

The methanol extracts and chloroform, ethyl acetate and pet. ether fractions of the *C. bonducella* leaves with different concentrations (300, 500, and 800  $\mu$ g/disc) against four gram-positive and five gram-negative bacteria are assessed. It was noticed that the 800  $\mu$ g/disc concentration shows better activity against all bacteria. Only chloroform extract with all concentrations exhibited better antibacterial activity against all bacteria.<sup>32</sup>

### 9.9) Antidiarrhoeal activity

As traditionally the use of this plant is made to treat diarrhea, its antidiarrhoeal activity is also supported by the methanol extract of *C. bonducella* leaves.<sup>32</sup>

**9.10) Fixed Oil:** The oil is emollient and used as a cosmetic preparation and also for stopping discharge from ears. It is anti-rheumatic and compared favorably with pherylbutazone<sup>33</sup>(W. of L),

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