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Review Article

REVIEW OF ETHNO-MEDICINAL AND PHARMACOLOGICAL ACTIVITIES OF

PYGMAEOPREMNA HERBACEA (ROXB.) MOLDNK.: A SOURCE PLANT OF BHARANGI

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Abstract

Lack of Sanskrit knowledge and urbanization or staying away from nature leads difficulty in identifying the plants. In Ayurvedic classics description of plant morphology mentioned in the form of synonyms. The synonyms of the plants are given in the literature which may not provide clear cut idea regarding its complete morphology. Many languages in India made much more difficulty in their identification. Bharangi is commonly used drug in folklore medicine to cure many ailments like rheumatism, respiratory disorders, fever, and toothache etc., *Clerodendrum serratum* (Linn.) Moon. is used as Bharangi in some places and *Pygmaeopremna herbacea* (Roxb.) Moldnk. is considered as true Bharangi by many. W. Ferguson in 1861 identified the source of Gantubharangi of Southern India as *Pygmaeopremna herbacea* and a pamphlet published at Colombo in 1887 has a figure of the plant and its root. Recent researches reported its Antipyretic, Anti-nociceptive, Anti-inflammatory, Anti-cancer, Anti-microbial and other activities proved by many experiments.

Keywords: Bharangi, *Pygmaeopremna herbacea* (Roxb.) Moldnk., *Clerodendrum serratum* (Linn.) Moon., habitat, phytochemical, ethno botany, pharmacology.

INTRODUCTION

Among Triskandhas (three pillars) of Ayurveda, Oushadha (medicine) plays an important role as it serves both the purposes of Ayurveda i.e. maintenance of health and treatment of disease. Classics of Ayurveda quoted plenty of drugs, some of which still not have been identified. Classical drugs are quite often substituted due to the lack of morphological descriptions. Most of these drugs are practiced by the folklore people to cure many diseases. Much more information regarding the identification and uses of the herbs can be obtained from these people. Tribal peoples are using either the drugs not described in Ayurvedic Materia Medica or classical drugs with a novel indication. *Pygmaeopremna herbacea* is one such plant which is used by the folklore practitioners in the name of Bharangi to cure many diseases. In Siddha system of medicine *P. herbacea* is used to cure disorders like respiratory system, cuts and wounds. A preparation of root is given internally for rheumatism by the Santals (Campbell)¹. The author of Nighantu Adarsha considered *Clerodendrum Serratum* - Bharangi as a source drug and mentions four different plants in the name of Bharangi and *P. herbacea* is one among them². Dr. K.C. Chuneekar described that its roots are bitter in taste, devoid of smell and are used for treatment purpose³. Krithikar and Basu in Indian medicinal plants mentioned its Sanskrit name as Bhumjambu¹. The properties of *P. herbacea* agree much more nearly with those attributed to Bharangi in the Nighantus, than to those of *C. serratum*, although the later plant is considered as Bharangi throughout the greater part of India. Bombay was formerly supplied from the Circar area which was *P. herbacea*, but currently they use *C. serratum*, *P. herbacea* was exhibited at the Madras Exhibition in 1855, under the name of Gantubharangi, among several chemical

and pharmaceutical products. It is mentioned in Sir Walter Elliot's Flora Andhrica, published in 1859, and referred to an unknown species of *Clerodendron*, which he says, might be called Acaulis; the plant is there said to grow about Lammasingi to the west of Vizagapatnam, hence it is exported to Madras and Bombay to the amount of several thousand rupees yearly. W. Ferguson in 1861 identified the source of Gantubharangi of Southern India as *P. herbacea* and a pamphlet published at Colombo in 1887 has a figure of the plant and its root⁴. Botanically it is identified as *Pygmaeopremna herbacea* (Roxb.) Moldenke, *Premna herbacea* Roxb., *Pygmaeopremna humilis* Merr., or *Premna timoriana* H. Lam., belongs to Verbenaceae family⁵.

Vernacular Names

Assam: Matiphesua, Matia Jam; Bengal: Bamanhati, Bhuijam; Gujrati: Gheetali; Hindi: Bharangi; Kannada: Nai thega; Kerala: Siru thekku; Marathi: Gantubharangi, Bharangamula; Mundari: Horacalu, Huringcarpandu, Otecalu, Otejo; Sanskrit: Bhumjambu; Santali: Kadamet, Phin jamun; Tamil: Bumisamba, Sirudekku; Telgu: Advinellikura, Gantubharangi, Janna, Kuranelli, nelaneredu; Uttaranchal: Kamraj^{1,6,7}.

Taxonomical Classification

Scientific name: *Pygmaeopremna herbacea*
Kingdom: Plantae
Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Asteridae
Order: Lamiales

Family: Verbenaceae

Genus: *Premna*⁸

Habitat

Sub tropical Himalaya, 500 - 3,000 ft., from Kumaon to Bhutan, Western Ghats of Madras Presidency¹.

Habit

A small under shrub; stem hardly any; flowering branches 2.5 – 10 cm. springing up after the jungle fires. Leaves 10 by 5 - 7.5 cm, sessile, obovate, obtuse, mature, pubescent on the nerves, microscopically dotted above, minutely deciduously pubescent beneath, nerves 5 pairs. Corymbs 3.8 cm diameter, pubescent, somewhat dense; peduncle 0 - 3.8 cm. calyx 2.5 mm, subequally 5-toothed, closely pubescent; lobes ovate, obtuse. Corolla 4 mm greenish white, hairy in the throat, 4-lobed obscurely 2-lipped. Drupe 6 mm in diameter globose¹.

Controversial Aspects of Bharangi

In classical text of Ayurveda morphological description regarding Bharangi is not found. In various regions different plants are being used in the name of Bharangi. Charaka mentioned drugs Phanji in the context of Shakavarga⁹ (Vegetable group) and Padma under the Pureesha sangrahaneeeya gana¹⁰. Regarding these two drugs Chakrapani has the opinion that they are the synonyms of Brahmanayastika^{11, 12}. Arunadatta opines Phanji as Bharangi¹³. In various Nigantus we can find Brahmanayastika as the synonym of Bharangi¹⁴⁻¹⁶. In Ayurvedic classics and Nighantus verities of Bharangi was not mentioned. However, Vaidyaka Shabda Sindu explains two varieties of it viz., Shwetapushpa and Neelapushpa, the botanical source of former being considered as *Clerodendron indicum* kutze. and the later as *Clerodendrum serratum* Linn¹⁷. Thakur Balavanth Singh is of the opinion that *Clerodendrum indicum* (Linn.) Ktze., may have the same claim as *Clerodendrum serratum* to be called by this name. It is also known as Brahmayasti. Some other species such as *Clerodendrum infortunatum* Linn. is also sometimes used in its place. He also considered that the stem bark of certain tree species such as *Elaeodendron glaucum* Pers, *Gardenia turgida* Roxb. and *Picrosma quaniodes* Benn are being used as Bharangi, however, on their own merits of possessing antispasmodic and febrifuge properties may serve as substitutes of original Bharangi of the texts¹⁸. He also opines that Phanji is *Rivea ornata* Chois or *Premna herbacea*¹⁹. Dr. Koppula Hemadri (retired officer, CCRAS, Vijayawada, India) informs that *Pygmaepremna herbacea* is being used as Bharangi (Gantubharangi in Telugu)¹⁷. Acharya P.V. Sharma opines that *Clerodendrum serratum* (Linn.) Moon. as Bharangi and *Clerodendrum indicum* (Linn.) Kutze; as the substitute for Bharangi¹⁹. Dr. Bapala vaidya describes that *Clerodendrum serratum* (Linn.) Moon and *Clerodendrum siphonanthus* (R.Br) C.B. Clark are used as Bharangi. *Clerodendrum siphonanthus* (R.Br) C.B. Clark is known as Bamanhati in Bengal. In Bombay *Clerodendrum serratum* (Linn.) Moon. is used as Bharangi. Quissa bark is used as Bharangi in some places²⁰. In Nighantu Adarsha, it is mentioned that, in the name of Bharangi one can consider 4 different species viz. *Clerodendrum serratum*, *Clerodendrum sphaenanthus*, *Picrosma quassioides* and *Premna herbacea*². The roots of *Clerodendrum serratum* is the accepted source for the drug Bharangi. Other species from which Bharangi is

derived are *Gardenia latifolia* Ait., *G. Resenifera* Roth., *G. Turgid* Roxb., *Picrosma quassioides* Bonn. and *Premna integrifolia*. However in south Indian Pharmacies it has been observed that the root and root nodules of a tiny plant *Pygmaepremna herbacea* (Roxb.) Moldenke. are used as Bharangi in the preparations²¹. Ayurvedic Pharmacopoeia of India described *C. serratum* (Linn.) Moon. under Bharangi²².

Phytochemistry

Root

It contains an orange-brown acid resin (soluble in ether, alcohol and alkaline solutions), traces of an alkaloid and starch, with an entire absence of astringency.- Study yielded labdanes, clerodens, pimarens, naturally occurring abietans, kaurenes, byrenes, gibrallins and miscellaneous diterpenoid^{23, 24}. Several diterpenoids, sirutekkone (C₂₀H₂₄O₄, m p 214°), bharangin quinonemethide (C₂₀H₂₄O₄, m p 213-214°), bharanginin (C₂₀H₂₄O₄, m p 171-173°), bharangifuran, ferruginol, isobharanginin and the diterpenoid phenalenone derivative, pygmaocone (7-isopropyl 3,3-dimethyl-2,3-dihydro-4,9-di-hydroxyphenalen-1-one, C₁₈H₂₀O₃). A 6-oxygenated coumarin, pygmeoherin (C₁₇H₁₈O₄, mp 198-200°) has also been isolated from the roots.⁷

Root Nodules

It contains the diterpenoid pygmaeocone E (C₂₀H₂₀O₄, mp 192-193°)⁷.

Toxicity Study

Alcoholic extract was found to be safe up to a dose of 8.0 g/kg in mice²³.

Ethno-Botanical Uses

- In Varanasi, Uttar Pradesh, India,
 - The people of tribes administer the paste of whole plant made into pills and is given to cure the conditions like gout and rheumatism²⁵.
 - Root paste heated and applied externally for the treatment of rheumatoid arthritis and gout²⁵.
- In Siddha system of medicine, *Pygmaepremna herbacea* is used to cure disorders of respiratory system, cuts and wounds¹.
- A preparation of root is given internally for rheumatism by the Santals (Campbell)¹.
- In Huniyan and Srilank, folklore peoples are using the juice of the root mixed with juice of ginger and warm water to treat asthma (difficulty in breathing)^{23,26}.
- In Huniyan, folklore practitioners are using its root for stomachache, rheumatism and dropsy; root bark used for toothache; leaves are used for fever, cough and rheumatism; Poulitices applied to boils²³.
- In Srilanka, folks are using medicated oil prepared from the various parts of this plant for treatment of fever and body pains in pregnant women²⁶.
- In Assam, India, folklore people are using its leaves, fruits and young shoots as vegetable during April – May, these are also having medicinal value so used in fever, sleeping sickness and jaundice²⁷.
- In Thai country, folklore peoples are using this drug to treat cancer²⁸.
- In Srilanka, a preparation called “Link Samahan” is prepared by using *Premna herbacea* and other drugs which is indicated in running nose, sneezing, sore throat,

headache, body ache, fevers, cough, and weakness. Additionally, "Link Samahan" is most effective as a prophylactic, and as such may be given in the form of a beverage periodically if epidemics of viral colds and influenza are prevalent²⁹.

10. Chhotanagpur plateau, Jharkhand and Chhatisgarh, India, almost all tribal communities residing in the region know about its important medicinal value and use it in primary healthcare, and it's also used in the treatment of rheumatism, arthritis, gout, atrophy, cholera and sexual disability³⁰.
11. In Mayurbhanj district of Odisha, India, apply the root paste of *Premna herbacea* and *Andrographis paniculata* externally on rheumatic and gout affected parts of the body³¹.
12. The plant is used as a folk remedy in the Yunnan province of China to reduce inflammation and to cure malaria⁷.
13. In Sal forest of Jharkhand, India, tribal peoples are using this herb root for curing many skin problems³².
14. In Gujrat state, India -
 - a) Barada Dongarni, region folklore peoples are using whole plant of *P. herbacea* and is given for increasing the body weight (Bramhanartha) and Vatakaphahara purpose ; A pills are made by using leaves of *P. herbacea* and jaggery given in difficulty in breathing (Asthma), cough (Kasa), fever (Jwara); In swelling of the body (Shotha) juice prepared out of *P. herbacea* leaves, flowers and fruits are given; In headache anointment made from leaves of *P. herbacea* is applied; Smell of leaves of *P. herbacea* is useful in the headache³³.
 - b) Folklore peoples are using its root in toothache and leaves in boils, cough, fever and rheumatism³⁴.
 - c) In Cutch region, folklore peoples are using its leaves paste and honey or dry leaves powder and jaggery are made into pills form and given orally for cough (Kasa) and running nose (Pratishayaya); A paste is made out of leaves and flowers is applied over inflammation condition³⁵.

Pharmacological Activities

In vitro cytotoxicity and *in vivo* antitumor activity

A research study showed two extracts of *P. herbacea*, aqueous and alcoholic; two fractions of alcoholic extract, ethyl acetate and butanol fractions were screened for their *in vitro* cytotoxicity by brine shrimp lethality (BSL) assay, trypan blue exclusion assay and MTT assay. Alcoholic extract and its ethyl acetate fraction were found to be the most effective in BSL assay, trypan blue exclusion assay. *In vivo* antitumor activity was screened in the Ehrlich ascites carcinoma (EAC) model and the Dalton lymphoma ascites (DLA) model. In the Dalton lymphoma ascites (DLA) model, solid tumor was developed by i.m. injection of 1 million DLA cells. Both the extracts and the fractions possessed potent antitumor activity against solid tumor models by significantly reducing the solid tumor weight and volume³⁶.

Antitumor Activity

A recent research activity showed alcoholic extract of *Premna herbacea* Roxb root showed significant ($P < 0.05$) anticancer activity in Ehrlich Ascitic Carcinoma model in Swiss albino mice at different doses, in that it reduced the body weight, prolonged the life span of the tumor bearing

animal. Besides, it also reversed the cancer associated hematological changes in tumor-bearing animal³⁷.

Antipyretic, Anti-nociceptive and Anti-inflammatory activities

A research study showed the alcoholic extract of the roots of *Premna herbacea* was investigated for its antipyretic, antinociceptive and anti-inflammatory potential in animal models. The extract, when administered orally to mice has been found to be safe up to a dose of 8.0 g/kg. A significant antipyretic effect has been observed in rabbits while mild antinociceptive effects were evidenced in mice when tested by chemical as well as thermal methods. The extract did not exhibit any anti-inflammatory activity in acute but significantly reduced the chronic inflammation³⁸.

Anticancer activity and Antimicrobial activity

Recent study showed, *P. herbacea* extract has exhibited anticancer activity *in vitro* and in tumor-bearing mouse models. Bharangin, a diterpenoid quinonemethide, chiefly present in *P. herbacea*, exhibited strong antimicrobial activity and reversed a drug-resistant phenotype of *Escherichia coli* cells carrying multidrug-resistant plasmids. In addition, the mono-acetylated derivative of Bharangin showed greater antimicrobial activity than that of bharangin³⁹.

Antifungal, Antibacterial, Anti-amoebic and Blood sugar lowering properties

Research study showed the crude hexane, chloroform and aqueous extracts of this plant have been subjected to screening for different medicinal properties. The crude hexane extract was found to be exhibiting antifungal, antibacterial, anti-amoebic and blood sugar lowering properties. It is interesting to note that the major component bharangin exhibited all the biological properties of the crude hexane extract as well as cytotoxic properties against P-338 tumor cell line. Bharangin exhibit higher efficiency in curing of plasmids belonging to IncF, H2 and X-groups⁴⁰.

CONCLUSION

Pygmaopremna herbacea is a well known drug by the tribal people and is being used by them as vegetable and also for medicinal purpose. In south India this drug is used in the name of Bharangi. Phytochemically it contains sirutekkone, a diterpenoid, labdanes, clerodens, pimarens, naturally occurring abietans, kaurenes, byrenes, gibrallins and miscellaneous diterpenoid. Research studies with *P. herbacea* have provided scientific validation for the activities like Anti-cancer, Antipyretic, Anti-nociceptive Anti-inflammatory, Anti- microbial, Antifungal, Anti-amoebic, blood sugar lowering properties.

REFERENCES

1. E Blatter and JF Caius editor, Indian Medicinal Plants, Vol III, Dehradun: Prashanth Gahlot at Valley offset printers and publishers; 2008; plate 738 A. p.1931.
2. Bapalala G. Vaidya - Nighantu Adarsha, 1st Edition, Varnasi: Chukhambha Bharati Academy; Reprint; 2007. p. 255-256.
3. Chunekar KC. Bhavaprakash Nighantu, 10th edition, Varanasi: Chaukhamba Bharati Academy; 2002. p.100-101.
4. Willam Dymock *et.al.* Pharmacographia Indica, A History of The Principal Drugs vol. 3; New Delhi: Srishti book distributors; 2005. p. 68-69.
5. The Plant List, A working list of all plant species, 2010, Kew, Missouri Botanical Garden, <http://www.theplantlist.org/tpl/record/kew-164968>. Cited on 19.08.2013.

6. Dr Diman Anil K - Medicinal plants of Uttaranchal state; 1st edition, Varanasi- Chowkhambha Sanskrit series office; 2004. p.364-365.
7. The Wealth of India First Supplement series (raw materials) vol- 4: J-Q; published by National Institute of Science Communication and Information Resources, New Delhi; 2003. p. 397.
8. Botanica sistematica, http://www.homolaiacus.com/scienza/erbario/utility/botanica_sistematica/hypertext/1587.htm. Cited on 17.08.2013
9. Vaidya Jadavaji Trikamaji Acharya, editor, Charaka samhita, Sutrasthana, chapter 27 shloka 98, 1st edition, Varanasi: Chaukambha Orientalia; 2009. p.189.
10. Vaidya Jadavaji Trikamaji Acharya, editor, Charaka samhita, Sutrasthana chapter 4 shloka 15, 1st edition, Varanasi: Chaukambha Orientalia; 2009. p. 34.
11. Vaidya Jadavaji Trikamaji Acharya, editor, Charaka Samhita, Sutrasthana with Ayurveda Dipika commentary of Chakrapanidatta, chapter 4 shloka 15, 1st edition, Varanasi: Chaukambha Orientalia; 2009. p. 34.
12. Vaidya Jadavaji Trikamaji Acharya, editor, Charaka Samhita, Sutrasthana with Ayurveda Dipika commentary of Chakrapanidatta, chapter 27 shloka 98, 1st edition, Varanasi: Chaukambha Orientalia; 2009. p. 159.
13. Pt Hari Sadasiva Sastri Paradakara, editor, Astangahrdaya of Vagbhata with Sarvangasundara commentary of Aruanadatta, Sutrasthana 15th chapter, shloka 28-29, 1st edition, Varanasi-Chaukhamba Surbharati Prakashan; 2010. p. 8237.
14. Sharma PV editor, Dhanvantari Nighantu, Guduchyadi varga, shloka 67-68, 4th edition, Varanasi: Chaukamba Orientalia; 2005. p. 28.
15. Sharma PV, editor, Kaiyadeva Nighantu, Aushadhi varga, shloka 1134-1136, 2nd edition, Varanasi: Chaukamba orientalia; 2006. p. 210.
16. Dr Tripathy Indradev, editor, Raja Nighantu, Pippaladi varga, shloka 149-151. 4th edition, Varanasi: Chowkhamba Krishnadas academy; 2006. p. 165.
17. Shastri JLN. Illustrated Dravyaguna Vijnana, Vol II, 1st edition, Varanasi: Chukamba Orientalia; 2004. p. 422-423.
18. Thakur Singh Balwant. Glossary of vegetable drugs in Brhatrayi, 2nd edition, Varanasi- Chaukhamba Amarabharati Prakashan; 1999. p. 284-285.
19. Sharma PV. Dravyaguna vijnana, vol-5, 1st edition, Varanasi- Chaukhambha Bharati Academy; 2006. p. 218.
20. Bapalal Vaidya. Some Contraversial Drugs in Indian Medicine, 2nd edition, Varanasi: Chukamba Orientalia; Varanasi: Chaukhambha orientalia; 2005. p. 252- 254.
21. K Vasudevan Nair *et. al.*, Studies on Some South Indian Market Samples of Ayurvedic Drugs - I, Ancient Science of Life 1982; 2(2): 71-78. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3336713/>. cited on 16.08.2013.
22. The Ayurvedic pharmacopoeia of India, part I, vol 3rd, 1st ed. New Delhi: Ministry of health and family welfare, Govt. of India; 1999. p. 26.
23. Philippin medicinal plants, Huniyan, *Premna herbacea* Roxb. <http://www.stuartxchange.com/Huniyan.html>. Cited on 15.08.2013.
24. Rina H Gokani *et al.* Development of physic-chemical parameters for indigenous drug, Bharangi: *Clerodendrum serratum* and *Premna herbacea*, Journal of Natural Remedies 2007; 7(1): 50-57. <http://www.jnronline.com/index.php/jnr/article/view/28880>. Cited on 16.08.2013.
25. Anand Prakash. Uses of some threatened and potential ethnomedicinal plants among the tribals of Uttar Pradesh and Uttrakhand in India, National Conference on Forest Biodiversity: Earth's Living Treasure 22May; 2011. p. 93-99. www.upsbdb.org/pdf/Souvenir2011/12.pdf. Cited on 10.08.2013.
26. APCTT - ITI [Sri Lanka] - Traditional Medicine Resource, <http://192.248.98.7/apctt/vplants.php?sname=pemna+herbacea&submit=Search>. Cited on 12.08.2013.
27. Sri Brahmananda Patiri and Sri Ananta Borah. The Wild Edible Plants of Assam, First Edition: March, Tiniali, Guwahati - Geetakhi Printers and Publishers; 2007. p. 99-100.
28. A Itharat and B Ooraikul. Research on Thai medicinal plants for cancer treatment; Editors: Surya N Acharya and James E Thomas; Advances in Medicinal Plant Research; 2007. p. 287-317. [http://www.med.tu.ac.th/uploads/articlePDFbkv09\(1\).pdf](http://www.med.tu.ac.th/uploads/articlePDFbkv09(1).pdf). Cited on 12.08.2013.
29. Product data sheet, Product Name: Link Samahan, Available at: samahan.linknaturalproducts.com/downloads/pds-samahan.pdf. Cited on 16.08.2013.
30. Kumar Kaushal *et. al.*, Agia Vaital: the people's belief about natural fire in forest and its link with *Pygmaeopremna herbacea* (Roxb.) Mold. In Chhotanagpur plateau, India, ethnobotanical leaflets 2006; 10(2): 39-242. www.ethnoleaflets.com/leaflets/agia.htm. Cited on 11.08.2013.
31. Singh Singh Harish, G Krishna and PK Baske. Plants used in the treatment of joint diseases (rheumatism, arthritis, gout and lumbago) in Mayurbhanj district of Odisha, India, Report and Opinion 2010; 2(9): 22-26. www.sciencepub.net/report/report0209/04_3677report0209_22_26.pdf. Cited on 14.08.2013.
32. Kumar Kaushal and SG Abbas. Ethnomedicinal composition depends on floristic composition: A case studied in Sal forests of Jharkhand; International journal of pharmacy and life sciences 2012; 3(5): 1710-1719. <http://www.ijplsjournal.com/issues%20PDF%20files/may%202012/11.pdf> cited on 18.08.2013.
33. Jayaprakash Indrajai Thakur. Vanaspathi shastra – Barada Dongarni Jadbutiya, 2nd edition, Rajkot-Pravin prakashan; 1998. p. 570-571.
34. Pandey CN *et. al.*, Medicinal plants of Gujarat; Gandhinagar- Gujarat ecological education and research (GEER) foundation; 2005. p. 240 and 330.
35. Jayaprakash Indrajai Thakur. Plants of Cutch and their utility, 2nd edition, Rajkot-Pravin prakashan; 2003. p. 281.
36. Pai KSR, Dhamija Isha, Setty MM, Manjula SN. Antitumor activity of ethyl acetate extracts of *Premna herbacea* roxb in ehrlich.s ascitic carcinoma model, Indian Journal of Pharmacology 2008; 40 (Suppl 2): S67. <http://www.bioline.org.br/pdf/ph08088> cited on 22.08.2013.
37. Kumar Ravishankar *et. al.*, An appraisal of the antitumor activity of alcoholic extract of *Premna herbacea* roxb in Ehrlich.s ascetic carcinoma model, Indian Journal of Pharmacology 2008; 40 (Supple2): S67. <http://www.bioline.org.br/pdf/ph08088> cited on 22.08.2013.
38. Narayanan N *et. al.* Antipyretic, antinociceptive and anti-inflammatory activity of *Premna herbacea* roots. www.ncbi.nlm.nih.gov/pubmed/10727811. Cited on 14.08.2013.
39. Gupta Subash C *et al.*, Bharangin, a Diterpenoid Quinonemethide, Abolishes Constitutive and Inducible Nuclear Factor- κ B (NF- κ B) Activation by Modifying, 65, on Cysteine 38 Residue and Reducing Inhibitor of Nuclear Factor- κ B Kinase Activation, Leading to Suppression of NF- κ B-Regulated Gene Expression and Sensitization of Tumor Cells to Chemotherapeutic Agents; Molecular Pharmacology 2011; 80(5): 769 –781. www.ncbi.nlm.nih.gov/pubmed/21795584. Cited on 14.08.2013.
40. Thadikamala Sathish *et. al.* A Novel RP-HPLC Method for the Determination of Bharangi in Ghantu Bharangi Crude Extracts, Pakistan Journal of Pharmaceutical Sciences 2009; 22(1): 68-73. http://www.academia.edu/201893/A_novel_RPHPLC_method_for_the_determination_of_bharangin_in_ghantu_bharangi_crude_extract. Cited on 15/08/2013.

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