A review on *Adhatoda vasica* Nees- An important and high demanded medicinal plant.


*Molecular Biology and Seed Technology Laboratory, Govt. Motilal Vigyan Mahavidyalaya (MVM), Bhopal-08 (Affiliated with Barkatullah University Bhopal)*

**ARTICLE INFO**

*Article history*
Received 26/01/2013
Available online 03/03/2013

**Keywords**
Adhatoda vasica, Bronchodilator, Anthelmintic, Antiperiodic,

**ABSTRACT**

Medicinal plants have been the subjects of man’s curiosity since time immemorial. Almost every civilization has a history of medicinal plant use. Approximately 80% of the people in the world’s developing countries rely on traditional medicine for their primary health care needs, and about 85% of traditional medicine involves the use of plant extracts. *Adhatoda vasica* Nees. is an evergreen shrub, distributed from the Punjab in the North and Bengal and Assam in the South-East to the Cylon, Malaya and Singapore in the South. It is one of the most important medicinal plants of this region. The plant is valued for containing bronchodilator alkaloids, mainly vasicine. All parts of the plant are used in herbal medicine and particularly the leaves are credited with insecticidal and parasiticidal properties. The root is useful in strangury, leucorrhoea, bronchitis, asthma, bilious vomiting, sore eyes, fever and gonorrhoea. It is a valuable antiseptic, antiperiodic and anthelmintic. It is well-known in *Ayurveda* by its Sanskrit name Vasaka & commonly known as Adusa. This paper has been prepared somehow that most of the studies reported on this medicinal has been touched so that much attention will be focused towards this important medicinal plant.

**Corresponding author**

Shabir Ahmad Lone, Research Scholar of Botany, Govt. Motilal Vigyan Mahavidyalaya, Bhopal, (M.P.)
India. loneshabirahmad@yahoo.com

*Please cite this article in press as Shabir A. Lone. et.al. A review on Adhatoda vasica Nees- An important and high demanded medicinal plant. Indo American Journal of Pharm Research. 2013:3(3).*

Copy right © 2013 This is an Open Access article distributed under the terms of the Indo American journal of Pharmaceutical Research, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
INTRODUCTION

Adhatoda vasica Nees. belongs to the medicinal family Acanthaceae; is an evergreen shrub, distributed from the Punjab in the North and Bengal and Assam in the South-East to the Ceylon, Malaya and Singapore in the South (Rahman et al., 2004). It is well known in Ayurveda by its Sanskrit name Vasaka and commonly known as Adusa. First botanically described as Justicia adhatoda by Linnaeus (Species Plantarum, 1753), redefined as Adhatoda vasica by Nees (1831) the name by which it is generally known today.

The leaves of Adusa have been in use in Indian systems of medicine for last more than 2000 years. The plant is appreciated for containing bronchodilator alkaloids, mainly vasicine. All parts of the plant are used in herbal medicine and particularly the leaves are endorsed with insecticidal and parasiticidal properties. The root is valuable in strangury, leucorrhoea, bronchitis, asthma, bilious vomiting, sore eyes, fever and gonorrhoea. It is a valuable antiseptic, antiperiodic and anathematic (Kirtikar and Basu, 1994).

The shrub is the source of the drug-vasaka, well known in the indigenous systems of medicine for its beneficial effects, predominantly in bronchitis. The leaves, flowers, fruits and roots are extensively used for treating cold, cough, whooping cough and chronic bronchitis and asthma as sedative expectorant, antispasmodic and as anthelmintic (Siddiqui and Husain, 1994).

Adhatoda vasica is an Ayurvedic medicinal plant which is a home remedy for several diseases and human requirements. It is mentioned in Vedas as an herbal remedy for treating cold, cough, whooping cough and chronic bronchitis and asthma, as sedative expectorant, antispasmodic and anthelmintic. It is a licensed drug and is mentioned in the India Pharmacopoeia (Pharmacopoeia of India, 1966). The drug is employed in different forms such as fresh juice, decoction, infusion and powder; also given as alcoholic extract and liquid extract or syrup. The leaf juice is confirmed to cure diarrhoea, dysentery and glandular tumor. The powder is reported to be used as poultice on rheumatic joints as counter-irritant on inflammatory swelling, on fresh wounds, urticaria and in neuralgia (Wealth of India, 1985).

In 2007 survey cum study on Demand and Supply of Medicinal plants in India by National Medicinal Plants Board, New Delhithrough Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore listed Adathoda vasica Nees. under top 36 Medicinal Plant Species in High Trade & consumed in volumes exceeding 100 MT per year. It is also listed under Major medicinal plant species exported from India (Handa, 1992). The demand of this important plant is mostly met from the natural habitat. This plant show low seed germination and conventional propagation through cutting is slow (Wealth of India, 1985). This leads to rapid depletion of plant material due to over exploitation.
SCIENTIFIC CLASSIFICATION

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Plantae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division</td>
<td>Angiosperms</td>
</tr>
<tr>
<td>Class</td>
<td>Eudicots</td>
</tr>
<tr>
<td>Order</td>
<td>Lamiales</td>
</tr>
<tr>
<td>Family</td>
<td>Acanthaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Justicia</td>
</tr>
<tr>
<td>Species</td>
<td>J. adhatoda</td>
</tr>
</tbody>
</table>

(Source: Myanmar Medicinal Plant Database)

**Plant description**

*Adhatoda vasica* Nees. belongs to the medicinal family Acanthaceae. It is an evergreen shrub of 1-3 feet in height with many long opposite branches. Leaves are large and lance-shaped. Stem herbaceous above and woody below. Leaves opposite and exstipulate. Flower spikes or panicles, small irregular zygomorphic, bisexual, and hypogynous. K₄₅, C₅, imbricate, A, didynamous, epipetalous, G (2), two celled. Style simple, stigma two of unequal size (Shinwari and Shah, 1995). It has capsular four seeded fruits. The flowers are either white or purple in colour. Its trade name Vasaka is based on Sanskrit name. (Kumar et al., 2010).

Inflorescences in axillary spicate cymes, densely flowered; peduncles short; bracts broadly ovate, foliaceous. The leaves, flowers, fruit and roots are extensively used for treating cold cough, whooping cough, chronic bronchitis and asthma, as sedative, expectorant and antispasmodic (Pandita, 1983).

**Vernacular names of Adhatoda vasica Nees.**

This important medicinal plant is known by various local names which are presented in (Table 1.)

**History**

*Adhatoda vasica* commonly called as Vasaka or Arusha. It is an important medicinal plant found in India and utilized in rural areas for several ailments. It has been in use for over 2000 years (Chopra, 1982; Singh, 2008). The plant has been recommended by Ayurvedic physicians for the management of various types of respiratory disorders. The leaf extract has been used for the treatment of bronchitis and asthma for many centuries. It relieves cough and breathlessness (Chihara, 1997).

**Origin and distribution**

*Adhatoda vasica* Nees. is native to India. It is distributed all over the plains of India & in lower Himalayan ranges, ascending to a height of 1,300 m. It is a small evergreen, sub-herbaceous bush which grows universally in open plains, especially in the lower Himalayas up to 1300 meters above sea level (Global Herbal Supplies).
Spread from the Punjab in the North, and Bengal and Assam in the South-East to the Ceylon, Malaysia and Singapore in the South. It is one of the very important medicinal plants in this area (Rahman et al., 2004).

**Phytochemical studies of *Adhatoda vasica* Nees.**

Chemical compounds found in leaves and roots of *Adhatoda vasica* Nees. also includes essential oils, fats, resins, sugar, gum, amino acids, proteins and vitamin‘C’etc. (Dymock, 1972). The main constituents of *Adhatoda vasica* Nees. are pyrroquinazoline alkaloids viz. Vasicine and Vasicinone (Chihara, 1997). Vasicine, at low concentrations, induced relaxation of the tracheal muscle. At high concentrations, vasicine offered significant protection against histamine induced bronchospasm in guinea pigs. Vasicinone, the auto oxidation product of vasicine (Brain and Thapa, 1983; Chowdhuri and Hirani, 1987) has been reported to cause bronchodilatory effects both *in vitro* and *in vivo*. Of the two alkaloids, vasicinone was found to be more potent than vasicine, with potential antiasthmatic activity comparable to that of disodium cromoglycate (Atal, 1980).

Vasicine is a major bioactive pyrroquinazoline alkaloid of *vasaka* which is present in the concentration of 1.3%. In minor alkaloids there are adhatonine, vasicinol and vasicinolone. Four quinazoline alkaloids: vasicoline, adhatodine, casicolinone and anisoline have been obtained from the leaves and vasicinone and vasicol have been secluded from inflorescence. Sitosterol, β-glucoside-galactose and deoxyvasicine have been isolated from the roots of the plant (Jain et al., 1980). 2’-4- dihydroxychalcone- 4-glucoside has also been recognized in the flowers (Bhartiya and Gupta, 1982). It is also studied that leaves also yielded a quinazoline alkaloid identified as 1, 2, 3, 9-tetrahydro-5-methoxypyrrolo [2, 1-b]quinazoline-3-ol (Chowdhury and Bhattacharyya, 1985).

Flowers of *Adhatoda vasica* Nees. mainly contain kaempferol and quercetin (Rawat et al., 1994). A new triterpenoid, 3α-hydroxy-D-friedoolean-5-ene, along with the known compounds, epitaraxerol and peganidine have been isolated from the aerial parts of *Adhatoda vasica* Nees. (Atta-Ur-Rahman et al., 1997).

For the quantitation of vasicine, spectrophotometreic (Srivastava et al., 1999), titrimetric (Singh et al., 2000), and HPTLC (Singh et al., 2000) methods are available, but they lack precision and accuracy because of low sensitivity and due to interference by other compounds. The analytical method HPLC method has been developed for quantitation of vasicine and vasicinone in *A. vasica* plant extract that is suitable for the rapid screening purpose of different genetical and agronomical field experiments (Srivastava et al., 2001). Different methods were used for extraction of juice from *Adhatoda vasica* Nees. But the traditional method (TLC densitometric method) was found to give the best quality juice with highest amount of total alkaloids and vasicine content (Soni et al., 2008).

A new method of capillary electrophoresis was developed (Avula et al., 2008) for the quantitative determination of vasicine and vasicinone from *Adhatoda vasica* Nees. The method was validated in terms of reproducibility, linearity, accuracy and applied for the quantitative determination of vasicine and vasicinone in *Adhatoda vasica* Nees. Plant samples/extracts. (Sunita and Dhananjay, 2010) performed the Aluminium chloride colorimetric method for quantitative determination of flavonoid (flavonols) contents in different *Adhatoda vasica* extracts.
A crude plant drug derived from *Adhatoda vasica* is highly valuable in clearing phlegm and lung problems, was infested with seasonal pests. Infested leaves showed high ash value out of which sulphated ash content was almost 80% and more. This possibly interfered with the curative value of the green drug leading to allergy (Emimal, 2010). Application of organic manures viz. cowdung, Farm Yard Manure (FYM), compost and vermicompost affected the total phenol and total flavonoid content in *A. vasica* leaves (Upadhyaya et al., 2010). The plant shows wide seasonal variation in vasicine content in its leaves. It exhibited higher levels of vasicine twice in a year i.e. 3.0% in March and 1.4% in September. Interestingly, it coincided with the flowering of the plant. In March, it was full bloom condition and in September, it was partial flowering. During the vegetative stage, the plant contained very low concentration of vasicine (Bagachi et al., 2003).

**Structure of major chemical constituents**
The structure of major chemical constituents of *Adhatoda vasica* Nees. has been shown in (Fig. 1)

**Pharmacological activities of Adhatoda vasica Nees.**
Methanolic, ethanolic and water extracts of *Adhatoda vasica* Nees. exerts significant pharmacological actions due to presence of important active constituents like vasicine and vasicinone. Various activities that are reported can be summarized as:

**Antimicrobial activity**
Alcoholic extracts of leaves and roots of *Adhatoda vasica* Nees. showed antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*, whereas water extracts showed activity against *S. aureus* only (George et al., 1947). The *in vitro* antimicrobial activity of *Adhatoda vasica* Nees. extracts were also studied against *Bacillus subtiliss*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhimurium* and *Staphylococcus aureus* by using agar well diffusion assay. The study indicates that *Adhatoda vasica* Nees. present a remarkable potential of antibacterial activities (Zabta et al., 2009).

**Insecticidal properties**
*Adhatoda vasica* Nees. is an insecticidal plant (Martin Rathi et al., 2008), leaf extract has shown anti-feedant activity against *Spodoptera littoralis* (Sadek, 2003).

**Antipyretic Activity**
JU-RU-01, a poly herbal formulation was prepared that contains *Adhatoda vasica* Nees, *Andrographis paniculata* Nees. and *Moringa oliefera* Lam. The formulation (JU-RU-01) was verified for its anti pyretic activity in animal models. It was concluded that the antipyretic activity of JU-RU-01 is due the combined effect of the active constituents of these important medicinal plants (Chandra et al., 2010). *A. vasica* leaf (Vasaka), known as *Vasa* in Ayurveda, is an important drug prescribed for malarial fever, fever caused by *pitta* and *kapha*, chronic fever, (Sharma, 1996)
HIV-Protease inhibitor activity

The crude extracts of *Adhatoda vasica* Nees. exhibited powerful inhibitory activity of enzyme Pepsin thus according to the study it might be a effective inhibitor of HIV-Protease which belongs to same aspartate family of enzyme and sharing same signature group at the active site (Singh et al., 2010).

Activity against gastrointestinal nematodes

The ethanolic extract of *Adhatoda vasica* Nees. has been found effective in inhibiting egg hatching and larval development of gastrointestinal nematodes. It was thus suggested that *Adhatoda vasica* extracts may be useful in the control of gastrointestinal nematodes of sheep (Al-Shaibani et al., 2008).

Mild steel corrosion inhibitor activity

*Adhatoda vasica* Nees. acted as good inhibitor for mild steel corrosion in 1N HCl, 1N H$_2$SO$_4$ and 1N H$_3$PO$_4$ acid solutions (Matheswaran and Ramasamy, 2010).

Hepatoprotective activity

Biologically active phytoconstituents such as Alkaloids-Quinazoline, Flavonoids, Tannins, Vasicinone, Essential oil which are present in the various extracts of *Adhatoda vasica* plant are accountable for the significant hepatoprotective activity (Vinothapooshan and Sundar, 2010).

Antitussive, bronchodilatory, anticough and activity against upper respiratory infections

The leaves of *A. vasica* Nees. are mostly used in the treatment of respiratory disorders in Ayurveda. The alkaloids, vasicine and vasicinone present in the leaves, possess respiratory stimulant activity (Baquar, 1997). Vasicine, at low concentrations induces bronchodilation and relaxation of the tracheal muscle. However, at high concentrations, vasicine presented a significant protection against histamine-induced broncho-spasm in guinea pigs. Leaf of *Adhatoda vasica* (Vasaka) is an important drug of Ayurveda, prescribed as an expectorant. *Adhatoda vasica* Nees. extract shows the Antitussive activity against guinea-pig similar to that of codeine against coughing induced by irritant aerosols (Dhuley, 1999).

An herbal tea of an expectorant action was prepared with *Adhatoda vasica* leaves. The prepared herbal basak tea is proposed as a good expectorant (Ashish et al., 2009).

KanJang oral solution, a fixed combination of standardized extracts of *Echinacea purpurea*, *Adhatoda vasica* and *Eleutherococcus senticosus*. Its clinical effectiveness was compared with the combined extracts of *Echinacea purpurea* and *Eleutherococcus senticosus* alone (Echinacea mixture). The effectiveness was considerably greater in patients treated with KanJang compared with those receiving the standard treatment. The only clarification was that the lack of extract of *Adhatoda vasica* Nees. in the Echinacea mixture reduces its effectiveness compared with the complete KanJang oral solution (Narimanian et al., 2005).

Anti-diabetic activity

The extract of roots and leaves of *Adhatoda vasica* Nees. are commonly used by rural population against diabetes, cough and certain liver disorders (Sivarajan and Balachandran, 1994).
Anti-ulcer activity

*Adhatoda vasica* Nees. in addition to its classically established pharmacological activities, also has immense potential as an anti-ulcer agent of great therapeutic relevance (Shrivastava *et al.*, 2006).

Antioxidant and anti-clastogenic activity

*Adhatoda vasica* Nees. also shows the antioxidant and anti-clastogenic efficacy against cadmium chloride (CdCl\(_2\))-induced renal oxidative stress and genotoxicity in Swiss albino mice supports its anti-mutagenic efficacy (Jahangir *et al.*, 2006).

Anti tubercular activity

It was found that bromhexine and ambroxol, the semi-synthetic derivatives of vasicine, from the Indian shrub *Adhatoda vasica* Nees. have activity against Mycobacterium tuberculosis *in vitro*. The herb is known to contain one of the most potent anti T.B. drug (Grang and Snell, 1996).

Anti-cancer and radio-protector activity

Methanolic extracts of *Adhatoda vasica* with both low and high drug doses have shown its potentiality as a radio-protector against the therapeutically induced mutations which can prove to be a contributor in cancer management in future. Such indigenous Indian, herbal, cost effective, poor man friendly drug will definitely be a potential adjuvant to cancer treatments like radiotherapy and chemotherapy since Amifostine a well known radioprotector given to the patients at the time of cancer therapy is expensive and has its own side effects (Poonam *et al.*, 2009).

Antimutagenic activity

*Adhatoda vasica* Nees. shows protective effect against radiation-induced damage at cellular, biochemical and chromosomal levels in Swiss albino mice (Kumar *et al.*, 2007).

Oxytocic/abortifacient activity

Studies have been carried out which indicated that vasicine, the alkaloid of *Adhatoda vasica* Nees. holds promise for its use as an Oxytocic/abortifacient in therapeutics. After treating patients with vasicine various hematological and biochemical investigations and kidney and liver function tests were carried out before, during and after vasicine treatment. It was found that uterus became firm and contracted after vasicine treatment which indicated its effectiveness as an Oxytocic (Wakhloo *et al.*, 1980).

Anti-inflammatory activity

Anti-inflammatory activity of methanolic extracts of *Adhatoda vasica* Nees. were evaluated by using modified hens egg chorioallantoic membrane (Chakraborty and Brantner, 2001).

Anti-feedant activity

*Adhatoda vasica* Nees. extracts have also shown anti-feedant activity against *Spodoptera litura*(Fab.) larvae (Anuradha *et al.*, 2010).

Activity against bacterial leaf blight disease in rice
*Adhatoda vasica* Nees. has been recommended to use in order to control seed borne bacteria, *Xanthomonas oryzae* pv. *Oryzae* (Xoo) and development of disease, therefore, we can say that *Adhatoda vasica* leaf extract is environmentally safe in the management of seed-borne bacterial leaf blight disease in rice (Govindappa et al., 2011).

**Prevention of Swine Flu by Adhatoda vasica Nees.**

A study from Dr. Krishnendu Maity in the recent days when H1N1 Flu was prevalent, and its prevention & treatment was a burning topic in the medical practice, showed that *Adhatoda vasica* Nees. As ‘preventive’ against Swine Flu (Maity, 2010).

**Other activities**

The volatile oils (heptanone) and alkaloids from *A. vasica* Nees. have great medicinal importance. The leaves are also used against intrinsic hemorrhage, leprosy, skin diseases and piles (Sharma, 1996)

**Genetic variability**

Huge variability has been found among the genotypes of *Adhatoda vasica* Nees. in plant height, number of sub-branches per plant, number of spikes per plant, number of leaves per plant and the leaf area. The genotypes compared using SDS-PAGE showing differences also in the protein components. This genetic variability will have important role to breed better varieties of the plant for commercial cultivation and economic benefit of the farmer’s community with small land holdings (Dilnawaz and Irfan, 2003).

**Adhatoda vasica Nees. in Ayurvedic preparations**

The herb is used in 110 preparations and some of the important ones are Kafouli, Kasabin, Terpvasaka, Thiomix, Azmosal etc. (Agarwal, 1997). In Ayurvedic preparations, *Vasaka* leaf juice (*Vasaswarasa*) is incorporated in more than 20 formulations including *Vasarishta, Mahatiktakaghrita, Tripalaghrita, Vasavaleha, Vasakasava, Mahatriphalaghrita, Panchatiktaghrita guggulu* and *Panchatiktaghrita* (Ministry of Health and Family Welfare, Govt. of India, 2000)

**Herbal drugs**

The drug is utilized in the following commercial products available in the Indian market:

| 1. Diakof | 2. Lukol | 3. Styplon Vet |

(Source: Copyright © International Centre for Science and High Technology)

**Patents granted in which Adhatoda vasica is used as ingredient.**


**Micropropagational studies in Adhatoda vasica**
In 1976 wood pieces from young branches of *Adhatoda vasica* Nees. were cultured in Agar SH-media (Schenk & Hildebrandt, 1972) containing IAA, NAA, GA3 and Kinetin for 45 days. And it was found that tangential diameter of procumbent cells and the number of the vessels and fibres in tangential direction increased noticeably. (Maity et al., 1976). After this the first successful effort for regeneration of *Adatadora vasica* Nees. through tissue culture was attempted by (Chomchalow and Sahavacharin, 1981). Later on (Jaiswal et al., 1989) reported regeneration of *Adathoda vasica* Nees. plantlets in-vitro by culturing nodal explants in MS medium.

An efficient regeneration schedule of *Adhatoda vasica* Nees. through synthetic seeds provides an efficient plantlet formation of Vasaka in vitro (Yogeeta and Bansal, 2002). Since then different protocols were developed for regeneration of plants by culturing different types of explants in different types of medias (Azad et al., 2003; Sangeeta and Alak, 2005; Abhyankar and Reddy, 2007; Khalekuzzaman et al., 2008; Sunita and Dhananjay, 2010.)

**TABLE: 1Vernacular names of AdhatodavasicaNees.**

<table>
<thead>
<tr>
<th>Vernacular Name</th>
<th>Vernacular Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assamese (1)</td>
<td>bahaka</td>
</tr>
<tr>
<td>Bengali (1)</td>
<td>basak</td>
</tr>
<tr>
<td>Hindi (20)</td>
<td>adalsa, adosa, adulasa, adulaso, arusha, arusu, bansa, bashing, rus, rusa, vasaka, adarsa, arusa, basuti, basinga, bans, basute, basauti, basa, basingu</td>
</tr>
<tr>
<td>Homeopathy (1)</td>
<td>justiciaadhadotha</td>
</tr>
<tr>
<td>Kannada (17)</td>
<td>adasoge-sappu, adsale, adumuttada, adusogae, adusoge, atarusha, adusege, aadsoge, addalasa, addasara, aduthoda, alasoge, atusoge, byalada, edmutanditappu, edumutanditappu, yedumutanditappu</td>
</tr>
<tr>
<td>Malayalam (5)</td>
<td>ata-lotakam, ataloetakam, attalomtakam, adalodagam, atalotakam</td>
</tr>
<tr>
<td>Manipuri (1)</td>
<td>nongmangkhaangouba</td>
</tr>
<tr>
<td>Marathi (7)</td>
<td>adulsa, adusi, adusa, baksa, vasuka, adaso, adulso</td>
</tr>
<tr>
<td>Sanskrit (52)</td>
<td>adarushah, amalaka, arusak, atarsah, atarsak, atarsah, bashika, bhishakhmata, bhishagmata, bhishangmata, kanthiravi, kasanotpatana, matrisinhi, mrigendrani, nasa, panchamukhi, raktappitaghn, raktavasa, ramrupaka, rasadani, simamukhi, simhasya, simhavadana, simhi, simhika, simhamukhi, sinhanana, sinharpurni, sinhapatri, sinhasya, sinhi, sinhiba, sitakarni, vaidyamata, vaidyamatrurvikshah, vaidyasinhi, vaji, vajidanta, vajidantaka, vajidanti, vansa, vasa, vasaka, vasakah, vasha, visika, vrisha, vrishasimhamukhi, vrsa, vrsah, vrsaka</td>
</tr>
<tr>
<td>Tamil (16)</td>
<td>adadodi, kattumurungai, vachai, atatotai, atatodai, adatodai, adathodai, atatotiver, antaratitamari, akacattamari, atatotalcaci, attacaram, atatotailai, adhatodai, aadaathoda, aadaathoda, aadaathodai</td>
</tr>
<tr>
<td>Telugu (7)</td>
<td>adakabu, adapaka, adasaram, addasaram, addasaramu, atarushamu, aadasare</td>
</tr>
<tr>
<td>Tibetan (4)</td>
<td>basaka, ba-sa, ba-sa-ka, bri-sa</td>
</tr>
<tr>
<td>Urdu (7)</td>
<td>adoosa, arusa (bansa), burg-i-arusa, burg arusa, bansakepattay, burg bansa, arusa</td>
</tr>
</tbody>
</table>

Source: FRLHT;  [http://envis.frlht.org/](http://envis.frlht.org/)
CONCLUSION

In the present paper most of the studies reported on Adhatoda vasica have been covered so that attention can be given on this important medicinal plant. Due to its high medicinal value, high demand and short supply resulted...
in haphazard collection of the whole plant as a source of the drug has threatened the survival of this important medicinal plant. This paper can be useful for understanding the importance of this important medicinal plant and people may take this medicinal plant under their cultivation which can be helpful in its conservation strategy.

ACKNOWLEDGEMENTS
We are very thankful to the Principal Govt. Motilalal Vigyan Mahavidyalaya, Bhopal (M.P.) for providing us lab facility. Thanks are also due to Department of Higher Education, Govt. of M.P.
REFERENCES


55. Singh, A.P., 2008; C:\Papers in press\Adhatoda\Adhatoda Internet\ Adhatoda vasica-Therapeutic Monograph.htm.


57. Sivarjan, V. and Balachandran, V. 1994. Ayurvedic Drugs and their plant sources, Int. Sciences Publ., 503. PP,


Other References Cited
1. Checklist of Plants of Myanmar, U.S. National Herbarium
2. Copyright © International Centre for Science and High Technology