
LITERATURE REVIEW AND PLANT PROFILE***Ventilago maderaspatana* Gaertn and *Ziziphus xylopyrus* (Retz) Willd.**

1. **Kesava Rao B, et.al., (1983)** have isolated eleven anthraquinones from the root bark of *Ventilago calyculata* of which xanthorin-5-methyl ether and 2-hydroxyislandicin have been new natural products. Eight anthraquinones have been isolated from the root bark of *Ventilago maderaspatana* [46].
2. **Hanumaiah T, et.al., (1984)** have isolated five isofuranonaphthoquinones from the acetone extract of the root bark of *Ventilago maderaspatana*. Ventilone-A was 4, 9-dihydro-5,8-dihydroxy-6,7-methylenedioxy-1-methylnaphtho [2,3-C] furan 4,9-dione and Ventilone-B was the 5-methyl ether. Ventilone-C has the structure 1,3,4,9-tetrahydro-8-hydroxy-5-methoxy-6,7-methylenedioxy-1-methylnaphtho[2,3-c]furan-4,9 dione, D was the isomeric 8-methyl ether, and E was the 5,8-dimethyl ether. Structures were determined by spectroscopic methods, and X-ray crystallographic analysis of ventilone-C [47].
3. **Hanumaiah T, et.al., (1984)** have isolated two new naphthalene derivatives and three naphthoquinones from the acetone extract of the root bark of *Ventilago maderaspatana*. Their structures were determined as 2-acetyl-6,7-dimethoxy-3-methyl-1,8-methylenedioxy-naphthalene (ventilaginone) and 1,3-dihydro-6,9 dihydroxy-7,8-dimethoxy-1-methylnaphtho[2,3-c]furan-3-one (ventilagol), 2(2'-acetoxypropyl)-3-hydroxy-5,7,8-trimethoxy-1,4-naphthoquinone (maderone), cordeauxione and isocordeauxione. The root bark of *V. calyculata* contains 2-methoxystypandrone and 1-hydroxy-6-methoxy-3-methylxanthone-8-carboxylic acid (calyxanthone) [48].
4. **Hanumaiah T, et.al., (1985)** have isolated eight new benzisochromanquinones, ventiloquinones A, B, C, D, E, F, G and H from the acetone extract of the root bark of *Ventilago maderaspatana*. Ventiloquinones I, J, and K were three more new benzisochromanquinones isolated from the root bark of *Ventilago calyculata*. The majority were 3,4,5,10-tetrahydro-cis-1,3-dimethyl-1H-naphtho(2,3-c)pyran-5,10-quinones related to elutherin, but F,H,I,J and K were 6,9-quinones related to ventilagone [49].
5. **B. V. Kharbade and O. P. Agrawal (1986)** reported the chemistry of the red dye principle Ventilagone from the root bark of Ventilago (*Ventilago maderaspatana*) by using TLC, and the solvent system used was benzene: ethyl formate: formic acid (74: 24: 1) [50].

6. **Krishnakumari G.N., et al., (2001)** investigated the insect anti-feedant activity of the quinones isolated from *Ventilago maderaspatana* by circular leaf disc dual choice bioassay. Amongst the quinones tested, Ventiloloquinone A was found to be most effective anti-feedant against *Henosepilachna vigintioctopunctata* and *Spodoptera litura* [51].
7. **Gokhale SB, et al., (2004)** reported the natural dye yielding plants in India, including *Ventilago maderaspatana*. Ventilagin was found as a natural dye in the root and bark of *Ventilago maderaspatana*. It was found useful to colour cotton and tassar silk (chocolate colour) [52].
8. **Subhalakshmi Basu et.al., (2005)** reported the antibacterial activity of the extracts prepared with the solvents of different polarity of *Ventilago maderaspatana* Gaertn (stem bark), *Rubia cordifolia* Linn (root). and *Lantana camara* Linn root bark. Twelve bacteria, six each of gram-positive and gram-negative strains, were used in this study. Chloroform and ethanol extracts of *Ventilago maderaspatana* showed broad-spectrum activity against most of the bacteria except *S. aureus*, *E. coli* and *V. cholerae*. In the course of bio-assay guided fractionation, emodin and physcion were isolated for the first time from the stem-bark of *Ventilago maderaspatana*. MIC of emodin was found in the range 0.5–2.0 µg/mL against three *Bacillus sp.* Both the anthraquinonoid compounds inhibited *P. aeruginosa*, emodin being more effective, showing the MIC of 70 µg/ml [53].
9. **Subhalakshmi Basu and Banasri Hazra (2006)** reported the *in vitro* and *ex vivo* nitric oxide scavenging activity of *Ventilago maderaspatana* Gaertn (stem-bark), *Rubia cordifolia* Linn (root), *Lantana camara* Linn (root bark), and *Morinda citrifolia* Linn (stem bark). A significant nitric oxide scavenging activity was exhibited *in vitro* by extracts of *Ventilago maderaspatana*, *Rubia cordifolia* and *Lantana camara* (IC₅₀ < 0.2 mg/mL). Most of them showed marked inhibition (60%–80%), *ex vivo*, at a dose of 80 µg/mL without appreciable cytotoxic effect on the cultured macrophages. Immunoblot analysis confirmed that the modulatory effect of the samples had occurred through suppression of iNOS protein [54].
10. **Tambekar D.H., et al., (2006)** reported antibacterial potentials of some medicinal plants from Melghat forest in India including *Ventilago maderaspatana* Gaertn. (Stem-bark). Antibacterial potential of *Ventilago maderaspatana* at 10 mg/disc concentration was found against *S. aureus*, *K. pneumoniae*, *P. vulgaris*, *S. flexneri* and *E. aerogene* [55].
11. **Yi He Guo Shu and Yin Du Yi He Guo, (2007)** reported botanical features of *Ventilago maderaspatana* Gaertn [56].

12. **Subhalakshmi Ghosh, et al. (2009)** rationalized the ethnomedical reports on traditional medicinal plants viz. *Ventilago maderaspatana* Gaertn. *Rubia cordifolia* Linn. and *Lantana camara* Linn. through an insight into the antiinflammatory as well as anticancer potential of four constituents isolated from them, characterized to be prospective candidates for designing novel therapeutic agents. Bioassay-guided fractionation of the chloroform extract of *V. maderaspatana* stem-bark led to the isolation and spectroscopic characterization of two structurally related anthraquinonoids, namely physcion (1, 8-dihydroxy- 3-methoxy- 6-methyl- 9, 10-anthraquinone; and emodin (1,3,8-trihydroxy-6-methyl-9,10-anthraquinone. In this study, emodin and physcion isolated from *V. maderaspatana* exhibited prospective iNOS inhibitory activity, in corroboration of some earlier reports on these anthraquinonoids^[57].
13. **Duganath N., et.al. (2010)** reported antidenaturation property and antioxidant activity of traditionally used medicinal plants viz. *Ventilago maderaspatana* Gaertn, *Acacia nilotica* linn, and *Polyalthia longifolia*. The ethanolic extracts of all the plants have shown mild to moderate antidenaturation and antioxidant activity. Among them *Acacia nilotica* showed potent antidenaturation property^[58].
14. **Syeda Sanobar, et.al. (2010)** reported the pharmacognostical studies on the leaf of *Ventilago maderaspatana* Gaertn. The results obtained from the microscopical studies like T.S, powder analysis, leaf constants and fiber length and width measurements were set as parameters to compare and authenticate the plant material^[59].
15. **Vinothkumar D., et.al. (2011)** reported phytosociological and ethnobotanical studies of Sacred Groves in Pudukottai District, TamilNadu, India. It was observed that traditionally the residents around the groove use *Ventilago maderaspatana* bark powder to itches^[60].
16. **Reddy K. N., et.al. (2008)** reported ethnobotanical studies of medicinal plants used by ethnic people of Medak district, Andhra Pradesh, India. It was found that traditionally *Ventilago maderaspatana* (Stem Bark paste) has been useful in gout when applied externally and to increase the potency the stem bark decoction was administered daily twice for 1-2 months.^[61]
17. **In Wealth of India- Vol-11 (X-Z)** mentioned the plant profile of *Ziziphus xylopyrus*, its description, ecology and chemical constituents. The leaves contain quercetin and quercitrin and are used in Gujarat and Maharashtra for tanning hides and skins. The fruit contains catechol type of tannins (8-12%). The bark contains tannin (7.2%) and it also contains d-7, 3', 4'-trihydroxy flavan-3,4-diol and oleanolic acid^[62].

- 18. Vimal Kant Sharma *et al.*, (2009)** published anti depressant activity of *Ziziphus xylopyrus*. The study was undertaken to investigate the effect of ethanolic extract, ethyl acetate fraction and precipitate fraction of total ethanolic extract of *Ziziphus xylopyrus* on depression in rats. The anti-depressant effect was examined by using two behavioral models, the forced swimming test (FST) and tail suspension test (TST) in rats. It was observed that all the extracts and fractions were found to reduce the immobility time and the precipitate fraction was showing the best activity. The study demonstrates the effect may be due to the presence of flavonoids^[63].
- 19. Washid K. *et al.*, (March, 2011)** reported the chromatographic screening of the ethanolic extract fractions of *Ziziphus xylopyrus* (Retz.) Willd. Root. In the preliminary phytochemical studies the extract showed the presence of flavonoids, tannins, and phenol. The chromatographic investigation has been carried out and found that the best resolution in TLC plate was obtained in methanol: HCl (9:1). The study was undertaken to evaluate the anti-ulcer activity of ethanolic extract of *Ziziphus xylopyrus* and to prove the tribal claim scientifically^[64].
- 20. Mahima Yadav *et al.*, (feb,2011)** published review article on *Ziziphus xylopyrus*: A potential traditional drug and mentioned the tradition of using *Ziziphus xylopyrus* for the alleviation of various diseases and ailments. *Ziziphus xylopyrus* is known for its antimicrobial, antiprotozoal and antiinflammatory, puerperal fevers and affections of the brain. The paper deals with the phytochemistry and pharmacological action of the plant *Ziziphus xylopyrus*. The phytochemistry of leaves has revealed the presence of quercetin and quercitrin. The fruit contains catechol type of tannins (8-12%). The bark contains tannins (7.2%), 7, 3', 4'-trihydroxy flavan-3, 4-diol and oleanic acid. The major chemical constituents found were lupeol, betulinic acid and isoceanothic acid. The structure of the triterpenoids have been determined by physical and spectral data. The bark and leaf powder or paste of them, when applied, externally used to relieve the chest pain due to cough^[65].
- 21. Singh, Ashok Kumar *et al.*, (Oct,2007)** isolated the two new 13-membered cyclopeptide alkaloids, xylopyrine-A and xylopyrine-B from *Ziziphus xylopyrus*, and their structures were established by spectral and chemical evidences^[66].
- 22. Jagadeesh *et al.*, (2000)** reported a new triterpenoids from *Ziziphus xylopyrus* stem wood. The chemical examination of *Ziziphus xylopyrus*, indigenous to India, furnishes three triterpenoids lupeol, betulinic acid and a new triterpenoids designated as

isoceanothic acid. The structure of the triterpenoids has been determined by physical and spectral data^[67].

- 23. Shweta Jain *et al.*, (Jan, 2011)** reported the pharmacognostical and phytochemical investigations of the leaves of *Ziziphus xylopyrus* (Retz) Wild. The paper deals with the estimation of the fresh, powdered and anatomical sections of the leaves of *Ziziphus xylopyrus* to establish the macromorphological, micromorphological, chemomicroscopical, physiochemical, phytochemical and florescence analysis of the drug. The phytochemical parameters revealed the presence of alkaloids, tannins, cardiac glycosides, saponins and terpenoids. The results of the study subsist positive in surroundings and several diagnostic indices designed for the discovery and research of a monograph of the plant^[68].
- 24. K.N. Reddy *et al.*, (June, 2006)** reported ethnobotanical survey on respiratory disorders in Eastern Ghats of Andhra Pradesh, India and mentioned *Ziziphus xylopyrus* (Family Rhamnaceae) as a folk medicine being used as a remedy for respiratory disorders by the rural people and forest ethnic people (Chenchus, Erukulas, Koyas.Etc). The scientific, vernacular and family name alongwith part used and the mode of their administration are enumerated. The local tribal inhabitants used *Ziziphus xylopyrus* for treatment of respiratory disorders i.e. cough by using one to two inches of the fresh stem bark, chewed with pepper and the sap is swallowed once daily for five days^[69].
- 25. Naidu K. A. *et al.*, (2010)** reported the contribution of plants to the floristic diversity and ethno botany of plants of - Eastern Ghats in Andhra Pradesh, India. The traditional knowledge has been carried out for ethnobotanical inquiry of *Ziziphus xylopyrus*, tribal medicine system also have a scientific establishment namely tribalopathy. In this paper, the territorial rights of indigenous people have been elaborately discussed. Savara and Jatapu tribes used leaf paste of *Ziziphus xylopyrus* (Retz) Wild. (Local name Gottichettu) and applied on pimples; leaves are ground along with latex of *Ipomea carnea* and applied on boils^[70].
- 26. Ajay Kumar Meena *et al.*, (2010)** published folk herbal medicines used by the Meena community in Rajasthan. A floristic survey of ethno medicinal plant *Ziziphus xylopyrus* occurring in the tribal areas of Rajasthan was conducted to assess the potential of plant resources for use in modern treatments. The plant part reported to be effective for the treatment of various ailments as used by the Meena Community of Rajasthan. Root powder of *Ziziphus xylopyrus* (local name Ghat-bor) used in Pyorrhoea and to check oogenesis^[71].

27. Missouri Botanical database. www.tropics.org mentioned scientific classification of *Zizyphus xylopyrus*, its description, ecology, uses, mythology and images of *Zizyphus xylopyrus* ^[72].
28. **Www. Ayurvedaconsultants.com** mentioned description of fruit of *Zizyphus xylopyrus*, its distribution throughout India, chemical constituents, physical constituents. ayurvedic properties and therapeutic uses. The chemical constituents present are reducing sugars, sucrose, citric acid, carotene, tannins and Vit-c. Ayurvedic formulations are Abhrak bhasma and Aragvadhadi kvath churna^[73].
29. www.itis.gov mentioned the basic information about *Zizyphus xylopyrus*, its images, plant description and taxonomical classification^[74].

PLANT PROFILE

Plant Name: *Ventilago maderaspatana* Gaertn.



Figure 9 Leaf and stem of the Plant *Ventilago maderaspatana* Gaertn.

Common name ^[75]

English	:	Red creeper
Sanskrit	:	Raktavalli, Dinesavalli
Hindi	:	Pitti, Kenwti, kalibel
Marathi	:	Sakalvel, Khandvel, Lokhandi
Tamil	:	Surulbattaikkoti, Vempadam Tam
Kannada	:	Haruge, Kanvel

Classification ^[76, 77]

Domain	:	<i>Eukaryota</i>
Kingdom	:	<i>Plantae</i> – Plants
Sub-kingdom	:	<i>Tracheobionta</i> – Vascular plants
Super-division	:	<i>Spermatophyta</i> – Seed plants
Division	:	<i>Magnoliophyta</i> – Flowering plants
Sub-division	:	<i>Radiatopses</i>
Class	:	<i>Magnoliopsida</i> – Dicotyledons
Sub-class	:	<i>Rosidae</i>
Super-order	:	<i>Rhamnanae</i>
Order	:	<i>Rhamnales</i>
Family	:	<i>Rhamnaceae</i> – Buckthorn family
Genus	:	<i>Ventilago</i>
Species	:	<i>Ventilago maderaspatana</i> Gaertn – Red creeper

Description [78, 79]

Despite its name, there is nothing red about the Red creeper. The name probably comes from the use of this plant in blood and heart related diseases. Red creeper is a climbing shrub large, much branched, woody climber with branches hanging down and dark grey bark, branchlets brownish, pubescent.

Leaf is simple, alternate, oblong-lanceolate or elliptic-ovate, obtuse or acute, entire or crenate, base rounded or acute. Leaf is variable - they can be circular to egg-shaped with an acute tip. Margins can be entire or serrated, and the surface can be smooth or finely velvety.

Flower is Small greenish-yellow coloured with an offensive odour in drooping terminal panicles are fascicled on leafless branches. It flowers in winters.

Fruit is 5-6 cm, yellowish, globular nuts, supported by the persistent calyx, wing linear-oblong, densely velvety, a pea-sized part and an oblong wing, 0.9-1.1 cm wide, surrounded by sepal tube at base. Some fishermen used the long climbing stems as ropes.

Distribution [80-81]

Red creeper is found in Indonesia, Malaysia, Sri Lanka, Bhutan and Throughout India evergreen forests. In India it is chiefly found in the western ghats, from Konkan southwards, also in Orissa, Central India Bihar, West Bengal, Assam. It is widely distributed in the scrub jungles of Papavinasanam at Tirumala, Horsely hills & Nalamalai hills.

Properties [82]

The Bark is bitter astringent, thermogenic, digestive, carminative, stomachic, alexeteric, vulnerary, depurative, stimulant, tonic and dyeing property.

Medicinal uses [82]

The powdered bark is used in South India as an external application for itch and other skin diseases.

Other uses [80]

The root bark is a valuable source of reddish dye (Ventilagin), used for colouring mordanted cotton, wool and tasar silk.

In combination with the root of *Hedyotis umbellate*, the root bark yields a beautiful chocolate colour.

The bark also yields a fibre, used for cordage.

The pale yellow wood may be used as fuel.

The long climbing stems are sometimes used by fishermen as substitute for ropes.

The seeds are eaten when cooked, and the oil from them is used for cooking.

Chemical constituents ^[83, 84]

The root bark contains Anthraquinones (Ventinone-A & B, chrysophanol, physcion, emodin, islandicin, xanthorin, and xanthorin-5-methyl ether), Naphthalene derivatives & Naphthoquinones (ventilaginone, ventilagol, maderona, cordeauxione and isocordeauxone)

Fruits contain lupeol, β -sitosterol, and Leaf and stem contains its glycosides.

Stem bark contains friedelin.

Ayurvedic uses ^[85].

Whole plant is used in treatment of bronchial asthma, jaundice, abdominal disorders, piles, aphrodisiac.

Plant name: *Ziziphus xylopyrus* (Retz) Willd



Figure 10. Leaf, stem and stem bark of the Plant *Ziziphus xylopyrus* (Retz) Willd

Synonyms^[86] : *Ziziphus xylopyra*.

Vernacular names^[62]

Hindi : Kat-ber, gote, kakor, ghont
 Tamil : Kottei
 Kannada : Challe,
 Marathi : Ghoti

Classification^[72, 74]

Botanical Name : *Ziziphus xylopyrus*
 Division : Magnoliophyta
 Class : Magnoliophyta
 Subclass : Rosidae
 Superorder : Rhamnanae
 Order : Rhamnales
 Family : Rhamnaceae
 Tribe : Paliureae
 Genus : *Ziziphus*
 Species : *xylopyrus*

Geographical source ^[62, 68]

Asia Temperate	:	Pakistan and China
Asia tropical	:	North-Western India, Uttar Pradesh, Bihar, central and south India.
Others	:	Turkey

Description ^[62]

It is a large, straggling shrub or a small tree, armed with spines, upto 4 m in height. Branches are having inflorescence and fruits covered queorbicular, serrulate, glabrous, dark above and covered with soft and pale tomentum beneath, oblique. Fruits are globose, 3- rarely 2- or 4-celled, with usually a seed in each cell, very hard and woody.

Leaves are simple, petiolate, alternate or opposite, pinnately veined or 3-5 veined, entire to serrate, sometimes may reduced; stipules are small, caducous or persistent, sometimes transformed into spines.

Flowers are yellowish – greenish, rarely brightly in colour, small, some may be bisexual or unisexual, rarely polygamous,(4 or) 5-merous, hypogynous to epigynous. Calyx is tube patelliform or hemispherical to tubular, sometimes absent, at rim with calyx, corolla, and stamens; sepals 4 or 5, valvate in bud, triangular, erect or recurved during anthesis adaxially often distinctly keeled, alternate with petals 4 or 5, rarely absent, usually smaller than sepals, concave or hooded, rarely nearly flat, often shortly clawed. Stamens are 4 or 5, ante petalous and often \pm enclosed by petals; filaments thin, adnate to bases of petals; anthers minute, versatile not, 2(or 4) celled. Seeds are with thin, oily albumen sometimes ex - albuminous; embryo large, oily, straight or rarely bent.

Ecology/ Cultivation ^[62].

The tree is quite common in certain types of dry, open deciduous or scrub forests and grasslands, often forming impenetrable thickets when young, and in the sub-Himalayan tracts it springs up in the blanks in the Sal forest. In its natural habitat, the absolute maximum shade-temperature varies from 38^o- 48^o, the absolute minimum from 4-15, and the rainfall from 50-190 cm.

Tree: The tree is light demander, growing typically in open situations, but is capable of standing a light degree of shade. It withstands drought well. The old leaves begin to fall in February and the new leaves appear during April-May, followed by flowers during April-June.

Fruit: The young fruits begin to form soon after flowering and in North India they become fully ripe during January- April of the following year.

Seed: The seed within the stone retains its viability for 30 months from the time of ripening. The rate of growth of seedling trees is slow, but that of coppice shoots is fairly rapid.

Chemical constituents ^[65,66]

The chemical composition of *Ziziphus xylopyrus* are lupeol, betulinic acid and isoceanothic acid, quercetin, kempferol-4-methylether and kempferol, cyclo peptide alkaloids Amphibine-H and Nummularine-k.

Leaves- The leaves contain quercetin and quecitrin.

Fruit- The fruit contains catechol type of tannins (8-12%). It also contains oleanolic acid epicatechin and leucocyanidin, 3, 3, 4-tri-o-methyl ellagic acid.

Bark- The bark contains tannins (7.2%), 7, 3, 4-trihydroxy flavan-3, 4-diol and oleanic acid. Xylopyrine-A and Xylopyrine-B, the two new 13-membered cyclopeptide alkaloids are also present in *Ziziphus Xylopyrus*.

Ethnobotnical uses

1. Bark and leaf powder paste applied externally for chest pain due to cough^[65].
2. Fruit powder with milk taken orally for 5 days ^[65]
3. Stomach ache, indigestion: Fruit powder (3-4 gms) administered with pinch ginger powder thrice in a day^[65]
4. 50 gms of the fresh stem bark of this species is soaked in 200 ml water for 12 hours and filtered. This filtrate is taken orally on an empty stomach for a period of three days in a single dose to relieve stomach-ache^[65]
5. Used in Pyorrhoea and to check oogenesis^[71]
6. Leaf paste is applied on pimples; leaves are ground along with latex of *Ipomea carnea* applied on boils^[70]
7. One to two inches of the fresh stem bark of this species are chewed with 1-2 peppers, and the sap swallowed once daily for five days^[69].

8. Ayurvedic formulations^[73]

- a. Abhrak bhasma
- b. Aragvadhadi kvath churna

9. Ayurvedic uses ^[87]

Root bark, fruit used for treatment of bronchial asthma, diarrhoea, aphrodisiac, emetic, carminative and digestive.