

MONOGRAPH
ON
CRATEVA MAGNA (LOUR.) DC
& *FIGUS CUPULATA* HAINES



FOREST BOTANY DIVISION
STATE FOREST RESEARCH INSTITUTE
JABALPUR (M.P.)

**CRATEVA MAGNA (LOUR.) DC
& FICUS CUPULATA HAINES**

BY
O. P. CHAUBEY
Scientist & Head Forest Botany Division

ASSOCIATE
A.K. SHARMA
Research Officer



FOREST BOTANY DIVISION
STATE FOREST RESEARCH INSTITUTE
JABALPUR (M.P.)

FOREWORD

Crateva magna belonging to family *Capparidaceae* occurs throughout in most parts of India and Myanmar. It is often found along streams, but sometimes occurs almost gregariously on dry deep boulder formations in the sub – Himalayan tract. The tree is useful in vitiated conditions of *vata* and *kapha* (Ayurveda), dyspepsia, colic, flatulence, helminthiasis, strangury, renal, and vesical calculi, cough, asthma, bronchitis, pruritus, skin diseases, intermittent, fevers, visceromegaly, scrofula, inflammations and hepatopathy.

Ficus cupulata Haines, an endemic and rare plant in Madhya Pradesh. Its occasional distribution has been found on sand stones of Bori Wild Life Sanctuary of Hoshangabad district. The tree is of high medicinal value growing on the sand stone rocks. It is useful in *vitiated* conditions of *vata* and *kapha*, and in colic pains (Ayurveda).

This monograph of two species provides useful information on their distribution and habitats, morphology, flowering and fruiting, natural regeneration, pest and pathogens, artificial regeneration, utilization, chemical constituents, threat status, conservation measures etc., for promoting their conservation and for the benefit of interested medicinal practitioners and overall development of medicinal plant sector.

Financial assistance from the Ministry of Environment and Forests, Govt. of India, New Delhi for printing this educational material is gratefully acknowledged. Thanks are due to Shri Koushal Tiwari, Computer Operator for neatly typing of manuscript.

(C.P. Rai, IFS)
Director

CONTENTS

FOREWORD	(i)
1. <i>CRATEVA MAGNA</i> (LOUR.) DC	
I. KNOWING THE SPECIES	01
II. DISTRIBUTION AND HABITAT	01
III. MORPHOLOGY	01
IV. SILVICS	02
V. NATURAL REGENERATION	02
VI. ARTIFICIAL REGENERATION	02
VII. PEST AND PATHOGENS	04
VIII. UTILIZATION	04
IX. CHEMICAL CONSTITUENTS	05
X. THREAT STATUS AND CONSERVATION MEASURES	05
XI. SOURCE INSTITUTIONS FOR DETAILED INFORMATION	05
2. <i>FICUS CUPULATA</i> HAINES	
I. KNOWING THE SPECIES	06
II. DISTRIBUTION AND HABITAT	06
III. MORPHOLOGY	06
IV. SILVICS	06
V. NATURAL REGENERATION	06
VI. ARTIFICIAL REGENERATION	06
VII. PEST AND PATHOGENS	07
VIII. UTILIZATION	07
IX. THREAT STATUS AND CONSERVATION MEASURES	07
X. SOURCE INSTITUTIONS FOR DETAILED INFORMATION	08

1. VARUN TREE (*CRATEVA MAGNA* (LOUR.) DC)

I. KNOWING THE SPECIES

Syn. *C. nurvala* Buch.- Ham. ; *C. religiosa* Hook. f. & Thoms. non Forst. f.

Regional names:

English:	Three-leaved caper
Tamil:	Maralingam
Kannad:	Kadat, Kadet
Hindi:	Varna, Balasi
Sanskrit:	Varunah, Setu vrksha, Marutapaha
Bengali:	Barun
Marathi:	Vayavarna, Hara - varna

II. DISTRIBUTION AND HABITAT

Crateva magna belonging to family *Capparidaceae* occurs throughout in most parts of India and Myanmar, wild or cultivated. It is often found along streams, but sometimes occurs almost gregariously on dry deep boulder formations in the sub - Himalayan tract.

III. MORPHOLOGY

A medium-sized tree, up to 10 m tall, with lenticellate, greyish-brown, smooth branchlets, digitately 3-foliolate, central leaflet elliptic-lanceolate or oblanceolate, laterals ovate-elliptic or rhomboidal, many-flowered terminal corymbs, pale yellow to creamy, polygamous, faintly fragrant flowers, in terminal corymbs, oblong-ellipsoid or oblong-ovate, yellowish-grey fruits, turning red when ripe containing many dark brown, dorsally crested, tubercled, reniform seeds embedded in creamy-yellow pulp.

IV. SILVICS

The tree is leafless in cold season, the new leaves appearing in February and March. The handsome lax- clustered flowers, white turning yellowish or pale pink, having numerous prominent stamens with purple filament, appear in March May. The fruit ripens in the rains (August – September). The fertility seed is not high and the seed longevity is reported between 8-10 months. The germination is epigeous. The primary root of seedling is about 38cm in length in the first season. The tree is light demander. Its long tape root enables it to grow on deep boulder formations. It is prone to frost in its early stages. It produces root suckers freely.

V. NATURAL REGENERATION

Natural regeneration is favorable on bare ground with sufficient moisture. The growth of regeneration is affected badly due to root competition of weeds and grasses. Seedlings and saplings are moderately light demanders.

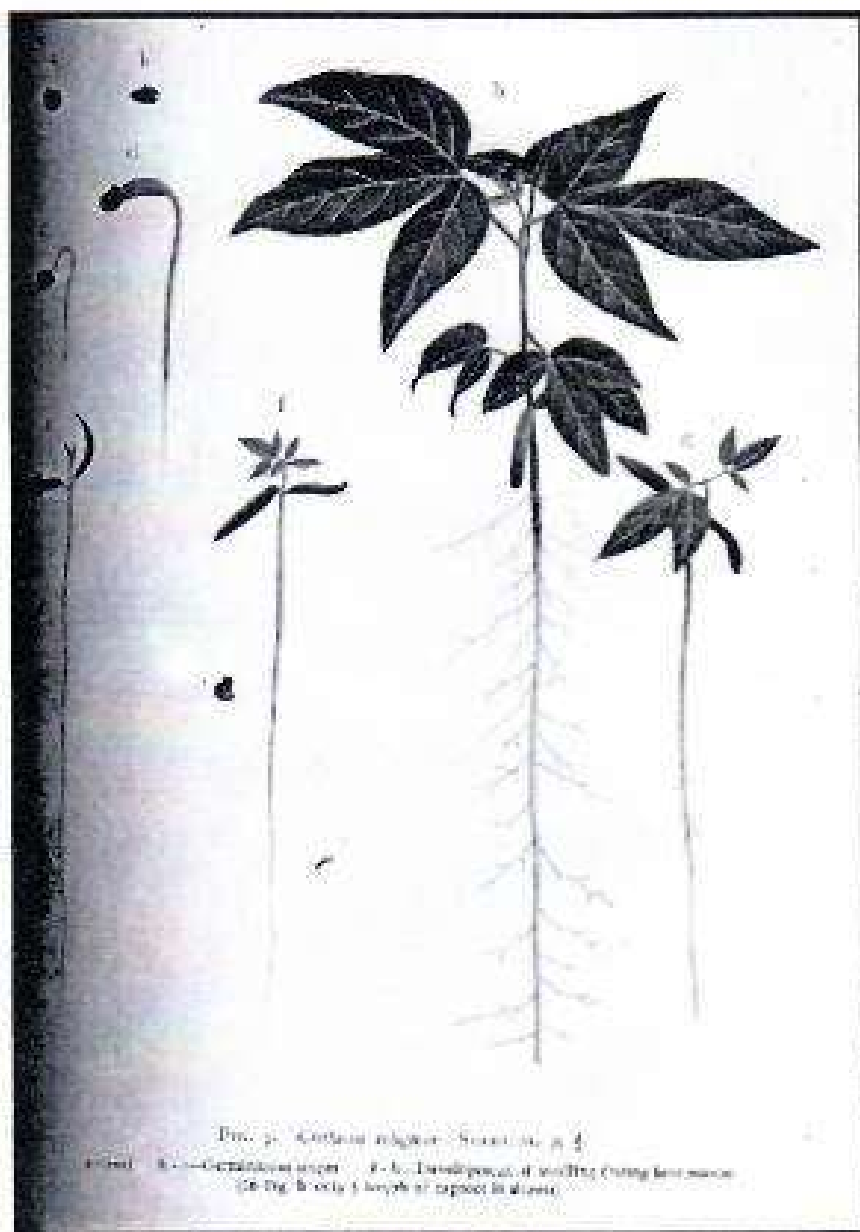
VI. ARTIFICIAL REGENERATION

Propagation through seeds

Artificial regeneration may occur both by seeds and vegetative means. The seeds, however, remain viable for a short period of only three months or less and also germinate poorly, thus, producing few plants. Erratic seed germination combined with destructive harvesting and habitat destruction in the form of deforestation has added to the enormity of the problem. The ripened seeds should be sown in the rains on deep loose soil. The seedlings of 7-15cm height are able to transplant in the field. Owing to the long tape root, care is necessary in transplanting.

Macro and micro propagation

Also, the vegetative propagation through cutting is not efficient under varied climatic conditions and rooting behavior is erratic. Plant tissue culture offers an effective alternative method for rapid multiplication to overcome the natural impediments in propagation of this species. Nodal culture is the efficient way of rapid multiplication. Culturing of nodal segments on Murashige and Skoog's (MS) medium supplemented with sucrose (3%) and different concentrations of



BAP proved promising. Shoot multiplication can be achieved by culturing single node segments derived from a field grown tree on Murashige and Skoog's (MS) medium supplemented with 2.66 iM N6-benzyladenine, 1.39 iM Kinetin (Kn), 0.57 iM indole-3-acetic acid (IAA), 3% sucrose and 0.2% gelrite. 96% rooting can be achieved within 22 days by culturing the *in vitro* formed shoots on half strength MS medium with 11.42 iM IAA, 9.8 iM indole-3-butyric acid, 0.46 iM Kn and 198.25 iM phloroglucinol. Following a simple hardening procedure involving sequential transfer of plants to a greenhouse, polyhouse,

and shade net, the tissue-cultured plants gave the survival rate of 100% in field.

VII. PESTS AND PATHOGENS

Following pests and pathogens are reported in *Crataeva magna*:

Fungi: *Aecidium crataevae*, *Cercospora pulchra*, *Cercospora crataevae*.

Diptera: *Cecidomyiella crataevae*, *Neolasioptera crataevae*.

Ephemeroptera: *Povilla corporaali*.

Lepidoptera: *Crocidelomia binotalis*, *Hebommoia glaucippe*.

VIII. UTILIZATION

1. Use as fuel wood/ match sticks

The wood is shiny, yellowish white, moderately hard, smooth and close grained. It is liable to insect attack. It is used for making combs and other small articles and match sticks. It can also be used as fuel wood.

2. Use as medicine

The tree is of high medicinal value growing along the streams and rivers, constituting riparian vegetation. Fungal endophytes were isolated from fresh bark and twigs of *Crataeva magna*. Mitosporic fungi represented as a major group (85%) followed by zygomycetes (10%) and ascomycetes (5%). Bark samples contained more endophytes than twig samples. *Verticillium*, *Nigrospora oryzae* and *Fusarium verticilloides* were the dominant fungal endophytes. Its bark and leaves are astringent, bitter, acrid, diuretic, lithotriptic, stimulant, detergent, expectorant, demulcent, depepurative, astiperiodic and tonic, and are useful in vitiated conditions of vata and kapha (Ayurveda), dyspepsia, colic, flatulence, helminthiasis, strangury, renal, and vesical calculi, cough, asthma, bronchitis, pruritus, skin diseases, intermittent fevers, visceromegaly, scrofula, inflammations and hepatopathy. The leaf paste is applied externally on piles and the juice is drunk to get relief from bleeding piles, urinary disorders, worm infestations, cough, asthma, bronchitis, skin diseases, tubercular glands, pectoral diseases, intermittent fevers, inflammation liver diseases, diarrhoea,

dysentery, antidote

IX. CHEMICAL CONSTITUENTS

Major chemical constituents are lupeol, lupen-3-one, α -sitosterol, rutin, quercetin, verunol, lauric, stearic, undecyclic, oleic and linoleic acids, triterpene alcohol-lupa-21, 20 (29) dien-3 α -ol, 3-epilupeol, psi-taraxasterol, pentacyclic and triterpene alcohol, ceryl alcohol, friedelin, betulinic acid, diosgenin, lupeol, (-) epiafzelechin-5-O- β -D-glucoside, 2 hexenal, 3-hexen-1-ol, p-cymene, limonene, linalool and α - & β -ionones, 1-stachydrine, cetyl alcohol, triacontane, triacontanol, glucocapparin, varunol, lupenone, 4-taraxasterol, cadabicine

X. THREAT STATUS AND CONSERVATION MEASURES

Crataeva magna (Lour.) DC (synonym *C. nurvala*) is a high-value Indian medicinal tree. The multiple uses of *C. magna* have resulted in its over-exploitation. The *ex-situ* conservation and promotion of *in-situ* conservation is the only viable solution to conserve the species.

XI. SOURCE INSTITUTIONS FOR DETAILED INFORMATION

1. State Forest Research Institute, Polipathar, Jabalpur 482008 (M.P.)
2. Botanical Survey of India, Central Circle 10 Chatham Lines, Allahabad 211002 (UP)
3. Forest Research Institute, PO – New Forest, Dehradun (Uttaranchal)
4. Forest research and Extension Division, Rewa M.P. Forest Department.
5. Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur M.P.

2. *FICUS CUPULATA* Haines

I. KNOWING THE SPECIES

The tree is belonging to family Moraceae. It is commonly known as Chhota bad or Akai- bat. It is of medicinal importance.

II. DISTRIBUTION AND HABITAT

Ficus cupulata Haines, an endemic and rare plant in Madhya Pradesh. Its occasional distribution has been found on sand stones of Bori Wild Life Sanctuary of Hoshangabad district. It has also been reported as a new record for Uttar Pradesh.

III. MORPHOLOGY

Shrub or tree, 2-4 m high, bark wrinkled, tomentose aerial roots absent. Leaves alternate, ovate, 10-13 x 4-5 cm, cuspidate – obtuse at apex, cordate at base, entire, puberulous, basal nerves 5, petioles 3-4 cm long, stipules up to 2 cm long. Receptacles in clusters, sessile, sub globose, ca 1 cm across, purple on ripening, pubescent when young, basal bracts copular, 2-3 lobed. Male and gall flowers in one receptacle. Tepals 4. Female flowers in separate receptacles. Achenes tuberculate.

IV. SILVICS

The new leaves appearing in February and March. The flowers and fruits appear in February-August. The fertility of seed is not high. The germination is epigeous. The tree is light demander. Its long tap root enables it to grow on deep boulder formations. It is hardy to frost. Seedlings and saplings are light demanders.

V. NATURAL REGENERATION

Natural regeneration is scanty and favorable on ground with sufficient moisture.

VI. ARTIFICIAL REGENERATION

Artificial regeneration may occur both by seeds and vegetative means. The poly-potted seedlings have been transplanted in pits of 45cm³ size, in the botanical garden and the survival percentage was recorded to be 70% .

VII. PESTS AND PATHOGENS

The pests and pathogens attacking different species of *Ficus* are listed below:

Fungi: *Capnodium anonae*, *Cerotelium fici*, *Fomes lignosus*.

Coleoptera: *Apogonia ferruginea*, *Neoptychodes trilineatus*, *Olenecamptus bilobus*, *Paranaleptes reticulata*, *Phryneta spinator*, *Taeniotes scalaris*.

Hemiptera: *Aleurolobus marlatti*, *Aleuroplatus alcocki*, *Anoplocnemis curvipes*, *Chrysomphalus ficus*, *Hemiberlesia lataniae*, *Icerya aegyptiaca*, *Laccifer lacca*, *Phenacapsis dilatata*, *Ptyelus grossus*, *Saissetia nigra*, *Unaspis acuminata*.

Lepidoptera: *Acraea pharsalis*, *Acroclita cheradota*, *Aganais ficus*, *Anthothila aegyptiaca*, *Asota caricae*, *Asura cervicalis*, *Dasychira mendosa*, *Glyphodes stolalis*, *Lithocolletis virgulata*, *Ocinara significa*, *Ocinara varians*, *Perina nuda*, *Phycodes radiata*.

VIII. UTILIZATION

The tree is of high medicinal value growing on the sand stone rocks. It is useful in vitiated conditions of *vata* and *kapha*, and in colic pains (Ayurveda).

IX. THREAT STATUS AND CONSERVATION MEASURES

Ficus cupulata Haines is rare and endemic species and is of high-medicinal value. The *ex-situ* conservation and promotion of *in-situ* conservation is the only viable solution to conserve the species.

X. SOURCE INSTITUTIONS FOR DETAILED INFORMATION

- I. State Forest Research Institute, Polipathar, Jabalpur 482008 (M.P.)
- II. Botanical Survey of India, Central Circle 10 Chatham Lines, Allahabad 211002 (UP).
- III. Forest Research Institute, PO – New Forest, Dehradun (Uttaranchal)
- IV. Forest Research and Extension Division, Rewa M.P. Forest Department.
- V. Government College, Hoshangabad M.P.

