

INDIA—THE LAND AND THE PEOPLE



MEDICINAL PLANTS

S. K. JAIN

Dr S. K. JAIN, Deputy Director in the Botanical Survey of India, Calcutta, has been working on economic plants for over twenty years. He has done intensive field-work among certain aboriginal tribes of India to study the plants used for food, medicine, etc. Dr Jain's scientific publications number over one hundred, and include works on medicinal herbs, floristic surveys and plant nomenclature; and two major works on *Flora of Rajasthan* and *Grasses of Upper Gangetic Plains*.

Dr Jain writes also in Hindi; he is the author of *Vanaspati Kosh*—a Hindi-Latin bilingual dictionary of economic plants, a booklet on Herbarium, and a book on *Rules of Botanical Nomenclature*.

Rs. 10.75



NATIONAL BOOK TRUST, INDIA

MEDICINAL PLANTS

DR S. K. JAIN

Deputy Director

Botanical Survey of India, Calcutta



NATIONAL BOOK TRUST, INDIA

NEW DELHI

First published 1968 (Saka 1890)

Second revised edition 1975 (Saka 1897)

© DR S. K. JAIN, 1968

Rs. 10.75

Sole Distributors
THOMSON PRESS (INDIA) LTD.
Olympus Building 29, Netaji Subas Marg
Delhi-110006

PUBLISHED BY THE DIRECTOR, NATIONAL BOOK TRUST, INDIA, NEW DELHI-110016
AND PRINTED BY THE NATIONAL PRINTING WORKS, 10, DARYAGANJ, DELHI-110006.

PREFACE

The words Medicinal Herbs often lead to the thought of some miraculous and supernatural cures. Our ancient literature has references not only of plants reputed to cure difficult and incurable diseases, but also of plants related with many magical properties. For example, we read of certain seeds 'treated' with oracles (*Mantras*) and thrown on somebody to entice him, certain roots chewed to increase longevity of life, or a few drops of juice of a plant put in the mouth of the dead to bring him back to life.

In olden days, a medicine prescribed by a hermit (*faqir*) earned more favour and reputation than the one based on some test and experience. It is possible such beliefs suited the conditions and mental attitudes of those times.

As times changed, and man started weighing everything on the scales of reasoning, several of the earlier beliefs seemed unsound, and despite their golden past, the use of medicinal herbs declined. Today, the importance and utility of medicinal herbs are a subject more of argument and speeches, than of actual research or promotional work. Why such a situation?

When developed countries were busy researching on their native plants, and exploring newer uses and newer sources of useful constituents, we only talked of our glorious past, our miracle-herbs, and our wealth of past knowledge; we remained complacent. On the other hand, we welcomed the increasing numbers of allopathic drugs with such enthusiasm that we gradually lost interest in Ayurvedic and Yunani medicines of even proven efficacy. Most of us never tried to know, or even think, if any of our medicinal plants also had real useful properties.

Until about fifty years ago, few of our medicinal plants had been subjected to scientific testing and experimentation, and it was difficult

to state with certainty for or against the claims of their efficacy. Whatever was once said or written was repeated, translated or adapted in subsequent publications. Thus, a large amount of unreliable information crept into our medicinal plant literature, got wide circulation and became perpetuated. Some such problems are discussed in the Introduction to the book.

There are a very large number of big and small publications on medicinal plants of India. Most of them were written for the specialist such as the Ayurvedic practitioner, botanist, pharmacologist or the pharmacist. But, there is so far no book for the kind of readership which the National Book Trust has in mind while presenting this series, INDIA—THE LAND AND THE PEOPLE. On this account the Trust deserves congratulations for considering medicinal plants a suitable subject for that readership. A perusal of the various books published by the Trust in this series soon convinces the reader that each work is unique and so different from earlier literature on that subject.

The present book deals with about 100 medicinal plants, and includes only authentic information based on pharmacological and other experimental work. The literature on medicinal plants is so vast and scattered that there is a possibility of some more recent reference having missed my attention, and I will gratefully welcome any useful suggestions.

The first edition of this book received very complimentary reviews and also some constructive suggestions. These suggestions have been incorporated in this edition. Also, in this second and revised edition two new chapters have been added, and information on uses, import and export, etc. brought up-to-date.

The color, black-and-white and line-drawing illustrations have been procured from a variety of sources; for these I am grateful to the following institutions and individuals:

Director, Botanical Survey of India; Chief Editor, Publications and Information Directorate, C.S.I.R., New Delhi; Departments of

Agriculture and Horticulture, Mysore; Botany Department, Delhi University; Dr K. Subramanyam,; Sri K. Srinivasan; Dr M. A. Rau; Dr H. B. Singh, Dr R. S. Rao; Dr T. A. Rao and Dr A. D. Saini.

The late Dr H. Santapau had kindly gone through a large part of the manuscript and made many useful suggestions. Sri K. Kashyapa, and Sri R. L. Mitra have helped in some reference work. The late Sri P. Lancaster had made some valuable suggestions about uses of plants. I am grateful to all of them.

I will close this brief preface with a sentence read several years ago: Nothing would ever be written if the author would wait to make his work so perfect that no improvement could be made.

—S. K. JAIN

Calcutta
15-8-1973

| | | | | | | |
|-----|--------------------|----|----|----|----|-----|
| 62. | RAUVOLFIA | .. | .. | .. | .. | 120 |
| 63. | RHUBARB | .. | .. | .. | .. | 122 |
| 64. | CASTOR-OIL SEED | .. | .. | .. | .. | 123 |
| 65. | SANDALWOOD | .. | .. | .. | .. | 125 |
| 66. | ASOKA | .. | .. | .. | .. | 126 |
| 67. | SAUSSUREA | .. | .. | .. | .. | 127 |
| 68. | SIDA | .. | .. | .. | .. | 129 |
| 69. | KANTAKARI | .. | .. | .. | .. | 131 |
| 70. | KARAYA | .. | .. | .. | .. | 135 |
| 71. | CHIRAYATA | .. | .. | .. | .. | 137 |
| 72. | LODH | .. | .. | .. | .. | 138 |
| 73. | JAMBOL | .. | .. | .. | .. | 140 |
| 74. | TAMARIND | .. | .. | .. | .. | 143 |
| 75. | BELLERIC MYROBALAN | .. | .. | .. | .. | 145 |
| 76. | TINOSPORA | .. | .. | .. | .. | 148 |
| 77. | BISHKHAPRA | .. | .. | .. | .. | 150 |
| 78. | GOKHRU | .. | .. | .. | .. | 152 |
| 79. | TYLOPHORA | .. | .. | .. | .. | 154 |
| 80. | INDIAN SQUILL | .. | .. | .. | .. | 155 |
| 81. | VALERIAN | .. | .. | .. | .. | 156 |
| 82. | ASHVAGANDHA | .. | .. | .. | .. | 157 |
| | BIBLIOGRAPHY | .. | .. | .. | .. | 160 |
| | INDEX | .. | .. | .. | .. | 163 |

LIST OF ILLUSTRATIONS

COVER: *Rauvolfia serpentina*
BLACK-AND-WHITE PLATES

Plate
No.

1. CALAMUS : *Acorus calamus*
2. BELLADONNA : *Atropa belladonna*
3. CASSIA : *Cassia angustifolia*
4. COLCHICUM : *Colchicum luteum*
5. IPECAC : *Cephaelis ipecacuanha*
6. DATURA : *Datura innoxia*
7. CARDAMOM : *Elettaria cardamomum*
8. EPHEDRA : *Ephedra Gerardiana*
9. EMBELIA : *Embelia tsjeriam-cottam*
10. INDIAN SARSAPARILLA : *Hemidesmus indicus*
11. GARUDPHAL : *Hydnocarpus laurifolia*
12. LOBELIA : *Lobelia nicotianaefolia*
13. INDIAN HENBANE : *Hyoscyamus niger*
14. MADHUCA : *Madhuca indica*
15. CAMPHOR BASIL : *Ocimum kilimandscharicum*
16. PERGULARIA : *Pergularia daemia*
17. JATAMANSI : *Nardostachys jatamansi*
18. HARMAL : *Peganum harmala*
19. PICRORHIZA : *Picrorhiza kurroa*
20. ISHABGUL : *Plantago ovata*
21. RHUBARB : *Rheum emodi*
22. SAUSSUREA : *Saussurea lappa*
23. SANDALWOOD : *Santalum album*

24. RAUVOLFIA : *Rauvolfia tetraphylla*
 25. KARAYA : *Sterculia urens*
 26. SOLANUM : *Solanum khasianum*
 27. CHIRAYATA : *Swertia chirayita*
 28. VALERIAN : *Valeriana jatamansi*
 29. CHEBULIC MYROBALAN : *Terminalia chebula*

COLOURED PLATES

- I. ACONITE : *Aconitum heterophyllum*
 II. CENTELLA : *Centella asiatica*
 III. CENTRATHERUM : *Centratherrum anthelminticum*
 IV. DATURA : *Datura metel*
 V. DIGITALIS : *Digitalis purpurea*
 VI. INDIAN GENTIAN : *Gentiana kurroo*
 VII. KURCHI : *Holarrhena antidysenterica*
 VIII. INDIAN PODOPHYLLUM : *Podophyllum hexandrum*
 IX. RAUVOLFIA : *Rauvolfia serpentina*
 X. BELLERIC MYROBALAN : *Terminalia bellirica*
 XI. TINOSPORA : *Tinospora cordifolia*
 XII. INDIAN SQUILL : *Urginea indica*

LINE DRAWINGS

- Fig. 1. INDIAN ACALYPHA
 Fig. 2. VASAKA
 Fig. 3. CHHATIM

LIST OF ILLUSTRATIONS

- Fig. 4. NIM
 Fig. 5. INDIAN BARBERRY (*Berberis aristata*)
 Fig. 6. INDIAN BARBERRY (*B. lycium*)
 Fig. 7. CASSIA
 Fig. 8. CINNAMON
 Fig. 9. CARDAMOM
 Fig. 10. EMBLICA
 Fig. 11. *Euphorbia hirta*
 Fig. 12. *Euphorbia antiquorum*
 Fig. 13. *Euphorbia neriiifolia*
 Fig. 14. KALADANA (*Ipomoea nil*)
 Fig. 15. *Ipomoea pestigridis*
 Fig. 16. *Ipomoea aquatica*
 Fig. 17. *Ipomoea pescaprae*
 Fig. 18. MADHUCA
 Fig. 19. TURPETH
 Fig. 20. SOLANUM
 Fig. 21. JAMBOL
 Fig. 22. TAMARIND
 Fig. 23. ARJUNA
 Fig. 24. BISHKHAPRA
 Fig. 25. GOKHRU
 Fig. 26. ASHVAGANDHA

INTRODUCTION

THE HISTORY of medicine and surgery dates back perhaps to the origin of the human race. But, as no mode of recording events existed in prehistoric times, there are no data on the methods of treatment practised in that period. In those days, the subject of human suffering and its alleviation was intimately associated with religion, myth and magic. In addition, there must have been certain rational prescriptions. Whenever the curiosity of the present-day man probes into the past and brings to light even fragmentary information on the ingenious methods of our ancestors, it makes a fascinating study.

In India, the references to the curative properties of some herbs in the Rigveda seem to be the earliest records of use of plants in medicine. The identity of several plants referred to in the Suktas of the Rigveda can be fixed with reasonable certainty, e.g. of *Semal*, *Pithvan*, *Palash* and *Pipal*. But references to plants in the Rigveda are very brief. More detailed account is available in the Atharva-Veda. The period of Rigveda is estimated to be between 3500 and 1800 B.C. After the Vedas, there is no information on the development of this science in India for a period of about 1,000 years.

Then appeared the two most important works on Indian system of medicine, the works of Charak and Susruta, namely, the Charak-Samhita and Susruta-Samhita. Susruta-Samhita deals with about 700 drugs, some of these were not indigenous to India. With the passing of time, more and more plants found entry into native medicine, taking the number of Indian medicinal herbs to about 1,500.

Numerous large and small books dealing with medicinal plants of India now exist; some of them run into several volumes of hundreds of pages. The useful properties attributed to one and the same plant in different parts of India sometimes greatly vary; this has resulted in vast literature in regional languages too. Workers like U.C. Dutt, G. Watt, R. N. Chopra (and his associates and

students), K. M. Nadkarni, K. R. Kirtikar, B. D. Basu, B. Mukherjee, Chandraraj Bhandari, K. Biswas, K. P. Trivedi, the Editors of *Wealth of India* (Raw Materials) and others have done very laborious work in bringing much of this information together.

Some authors have compiled information without proper scrutiny of the identity of plants or of their uses and we find that some of the medicinal herbs are believed to cure practically every human disease from head to toe.

References to miracle herbs or wonder drugs are often found in old literature. Voucher specimens of those plants could, of course, not be expected to be preserved by people of those times; even proper descriptions of plants are wanting. Lack of detailed descriptions has made it practically impossible to decide the identity of those plants. The only source of reference in such cases, therefore, is the local name for the herb or drug given in earlier works. The local names are sometimes very misleading. Cases of same local name being used for more than one herb are not infrequent. For example, two or even more than two very different plants are referred to in our literature by the names *Punarnava*, *Brahmi*, *Bala*, *Dudhi*, etc. Some workers in India are now trying to fix the identity of important drugs mentioned in ancient literature; this will eliminate much confusion.

Apart from the written complete or incomplete records about ancient medicinal herbs, some knowledge on the subject has also descended through generations, and has survived through times among the present-day primitive societies, *i.e.* among the aboriginal tribes living in remote forest areas. This knowledge has come through oral folklore. Efforts have sometimes been made, though not in an intensive or exhaustive manner, to record the surviving bits of that oral folklore. These studies are now classed as a specialized branch of botany, *Ethnobotany*. Some years ago, I initiated researches on this subject among the aboriginals of central India. Numerous reports of medicinal uses of plants, so far unknown in literature, were recorded; and interesting observations on certain plants have been included in the present work. They, however, need to be scientifically tested.

The question of subjecting medicinal herbs to modern scientific tests has often been raised. Clinical and pharmacological tests on alkaloids extracted from well-known and reputed medicinal herbs sometimes show distinctly negative results. Whereas, such observations should prompt us to careful and critical reassessment of these herbs, there is yet another aspect of the problem. It is possible that the efficacy of the herb depended on the total effect of the plant contents rather than on the one or few chemical fractions separated from the herb. Moreover, the time of collection, stage of growth of plant (*e.g.* opened or unopened flowers, young or mature leaves, pre- or post-flowering stage), locality of natural occurrence or place of cultivation, all influence the properties of the drug.

It has been estimated that out of about 2000 drugs that have been used in curing human ailments in India, only about 200 are of animal origin and a similar number are of mineral origin. The rest, *i.e.* about 1,500, are of plant origin. This number is not very large considering the vast area of our country, and the wide variety of plant wealth occurring therein. The great range of temperature (about 49°C to -43°C), rainfall (from 100 mm to over 10,000 mm) and altitude (sea-level to over 6000 m) in India account for the occurrence of over 15,000 species of higher plants in India.

To select only about a hundred important ones from over 1500 medicinal herbs posed considerable difficulty. Generally, plants whose efficacy in medicine has now been tested and recognized, for example, plants which have been included in Indian Pharmaceutical Codex and also in the British Pharmaceutical Codex and/or United States Dispensatory have been included. Mostly, only indigenous plants have been taken. Only those few introduced species are included which are very important medicinally or commercially, or which are now regularly cultivated in India. Some such species have even become naturalized now.

The **trade name** or some well-known common name of the drug has been given as the title of the chapter. Sometimes one or more synonymous trade names are also mentioned in parentheses. **The arrangement of the chapters in the book is alphabetical by botanical names of plants.** As far as possible the latest botanical names

have been adopted; however, for the convenience of the readers who may be familiar with some older names, one or two more common synonyms are given.

After the name of the **Family** of the plant, the **Indian names** of the plant are given. The Hindi name is given first, followed by other languages in alphabetical order. Some regional names or English names are given at the end of Indian names.

The basis of the trade name or the scientific name is discussed in most cases.

A short **description** of the plant is provided; those characters are mentioned which should help the reader in visualising the general structure or habit of the plant and its parts. As far as practicable, technical terms and details are avoided. It was realized that certain technical terms could be excluded only at the risk of inaccuracy of statements; these have been retained. It is conventional to use 'telegraphic' language in botanical descriptions; the same has been done here. The descriptions have been based on a fairly wide range of plant specimens in herbaria.

The **distribution** of plants in India, though a very general one, has, as far as possible, been verified from herbarium materials and authentic literature.

The information on **Drug and its Properties** has been taken from very authentic publications, and only those uses of medicinal herbs are described which have been recognised in the British Pharmaceutical Codex and/or United States Dispensatory, or whose properties have been shown experimentally on animals or in clinical tests. For this, the author took the opportunity of screening some important relevant literature of the last thirty years or so. During this literature hunt, one thing that struck him most is that pharmacological experiments or clinical tests have been done on a very small number of medicinal herbs. Intensification of such work should be the first requirement, if we have to exploit and boost up our medicinal plant resources.

To familiarize the reader with other general economic importance of medicinal herbs, few sentences on the timber, food and other value of the plants, under the title **Other Uses**, are added.

In addition to the one most important species of a certain genus, mention has also been made of **Other Species** of that genus valued in medicine.

Data on the annual requirements of various drugs in India is not precisely known; this information about certain drugs is based on the estimates made by the Union Government some years ago.

It should be made clear that the purpose of the present work is not to prepare a book of prescriptions for different diseases, but only to apprise the reader with some of the more reputed medicinal plants of India. Many medicinal preparations based on plants include products from more than one plant, and the proper proportion of different ingredients and processing, administration and doses of the drug are all very important factors in treatment of ailments. It is hoped that no reader would, of his own self, try to use any plant mentioned in the book. Different conditions need specific prescriptions, and they are the business of the specialist.

It is well known that due to the impact of other systems of medicine, particularly, lately by the rapid progress and spread of modern medicine and surgery, faith in, and popularity of, the herbal medicines has been gradually declining. But, there is much to say in favour of the use of native medicinal herbs or the indigenous system of medicine. This is not the place for any detailed analysis of this subject. Suffice it to say that in a country where eighty per cent of the population resides in small and often remote villages, and where per capita income is about 80 to 90 paise per day, expensive, difficult to procure and complicated prescriptions cannot be a thing of the masses.

1. INDIAN ACALYPHA

ACALYPHA INDICA L.

Family: Euphorbiaceae

Indian names: Hindi—*Khokali, Kuppi*;
 Bengali—*Muktajhuri, Muktabarsi*;
 Gujarati—*Vanchi Kanto*;
 Malayalam—*Kuppamani*;
 Marathi—*Khokhali*;
 Oriya—*Indramaris*;
 Sanskrit—*Harittamanjari*;
 Telugu—*Kuppamani*.

The trade name *Acalypha* is based on the scientific name of the plant.

DESCRIPTION

An annual herb, up to about 75 cm high. Leaves 3-8 cm long, ovate, thin, usually 3-nerved; margins of the leaves toothed; leaf-stalks longer than leaves. Flowers in axillary erect spikes; female flowers supported by conspicuous wedge-shaped bracts, male flowers, minute, borne towards the top of the spike. Fruits small, hairy, concealed in the bracts.

DISTRIBUTION

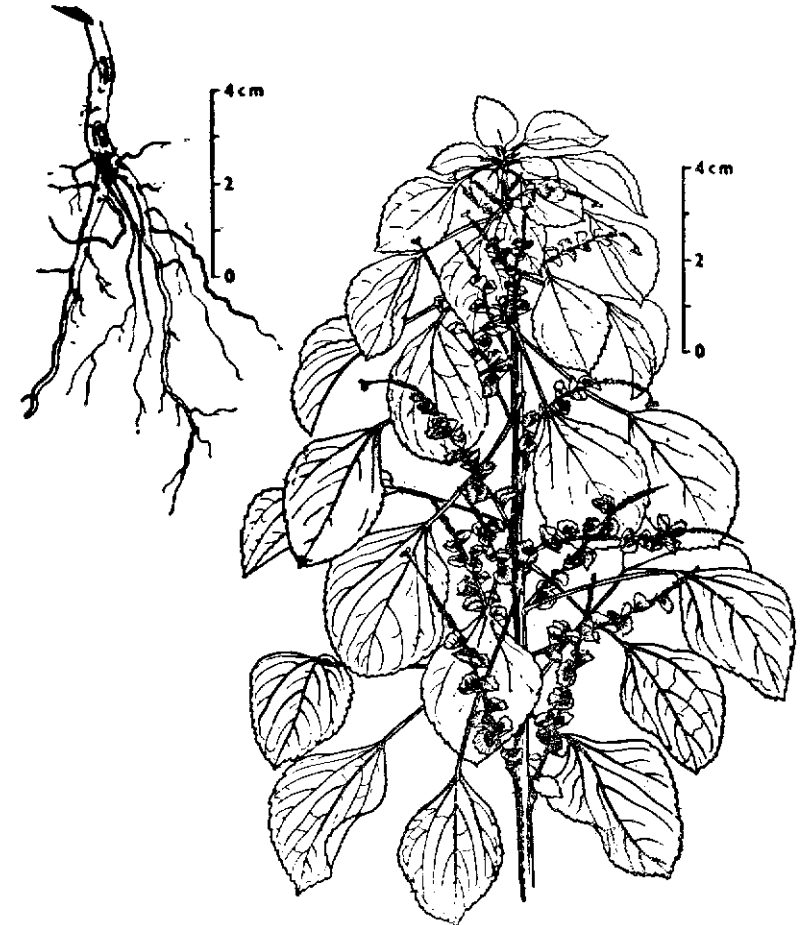
The plant is found almost throughout India in the plains; it grows as a weed in gardens and agricultural fields or as a plant of waste places and road sides.

DRUG AND ITS PROPERTIES

The whole plant of this herb collected in its flowering stage, and dried, constitutes the drug *Acalypha*.

The properties of this drug resemble those of *Ipecac*. It is useful in bronchitis, asthma, pneumonia and rheumatism. Its roots and

Fig. 1.

Fig. 1. INDIAN ACALYPHA (*Acalypha indica*)

leaves have laxative properties. Juice of the leaves is considered an efficient emetic, that is, a medicine for causing vomiting. A poultice of fresh leaves is useful on ulcers.

2. ACONITE

ACONITUM species

Colour Plate I.

Family: Ranunculaceae

Indian names:

Aconitum chasmanthum Stapf ex Holmes:

Kashmiri—*Mohri*;

A. deinorrhizum Holmes ex Stapf:

Kashmiri—*Dudhia-bish*, *Safed-bish Mohra*;

A. heterophyllum Wall.: Kashmiri—*Atis*, *Ativish*, *Patis*.

The trade or common name *Aconite* refers to the scientific name of this group of plants.

The drug *Aconite* comprises tuberous roots of these plants; it has been well-known in medicine as it possesses certain very toxic and poisonous substances. The British Pharmacopoeia recognises the drug obtained from *A. napellus* L. This species is not found in India; but Indian species contain similar substances or are suitable substitutes.

A. heterophyllum (*Atis*) is a herb occurring in higher ranges of north-western Himalayas at altitudes of about 2000 to 4000 m. The drug obtained from this species is least toxic, it is used in fevers and post-fever weakness, diarrhoea and dysentery. Its utility as a tonic has now been recognised but it is not regarded very useful in fevers.

A. chasmanthum (*Banbalmag*) occurs in same regions as *Atis*. The *Aconite* obtained from this plant is considered a suitable substitute for the *Aconite* obtained from *A. napellus*. Though the total

alkaloid content of *Banbalmag* is about ten times that of the European *Aconite*, the potency of the drug is not as good.

A. deinorrhizum and a few other species of *Aconitum* occur in India and are considered to be of restricted medicinal use.

The *Aconite* known in trade as *Indian Aconite* is a mixture of two or three species.

The alkaloids contained in *Aconites* are very toxic, and, unless given in properly controlled doses, can cause dangerous side-effects.

Plants from mountainous regions are more rich in aconitine; the toxicity is due to compounds other than aconitine. Due to the toxic effects, the drug is administered in properly controlled doses. The chief usage of the drug now is only for external application in diseases like neuralgia.

3. CALAMUS

(*Sweet-flag*)

ACORUS CALAMUS L.

Plate 1.

Family: Araceae

Indian names: Hindi—*Bach*, *Ghorabach*, *Safed-bach*;

Assamese—*Themeprii*;

Bengali—*Bach*;

Gujarati—*Gandhilovaj*;

Kannada—*Bajegida*;

Malayalam—*Vashampe*;

Marathi—*Vekhand*;

Sanskrit—*Bhuta-nashini*;

Tamil—*Vasambu*;

Telugu—*Vasa*.

The trade name *Calamus* is based on the scientific name of the herb.

DESCRIPTION

A herbaceous plant with long, creeping and much-branched aromatic rhizomes. Flowering shoots supported by a large leaf-like structure called spathe. Flowers small, pale-green, in 5-10 cm long cylindrical spikes called spadix; fruits yellowish in colour.

DISTRIBUTION

This plant is found almost throughout India upto an altitude of about 200 m, growing chiefly in marshy or moist situations of northern and eastern Himalayas. It has been cultivated in Karnataka and other regions.

DRUG AND ITS PROPERTIES

The dried rhizomes of the plant constitute the drug *Calamus*, and are used in medicine.

Due to presence of a volatile oil, *Calamus* acts as a carminative, that is, it relieves flatulence and feeling of overfulness of stomach, and increases appetite. It is considered a household remedy for flatulent colic. Due to its essential oil contents, it acts as an expectorant, that is, it promotes flow of bronchial secretions and is useful in asthma. It also contains tannins, and is, therefore, useful in diarrhoea and dysentery. *Calamus* also acts as emetic, and larger doses can cause violent vomiting.

The leaves and rhizomes are also used for flavouring drinks, for perfumery and for preparing insecticides.

Its powdered roots are used as vermifuge.

The oil from the rhizomes is a good nerve-stimulant and the essential-oil-free alcoholic extract shows marked sedative and analgesic (*i.e.* pain-relieving) properties; these justify its use in mental diseases.

The antibacterial activity of the rhizomes has recently been shown experimentally.

4. VASAKA

(*Adhatoda, Adusa*)

ADHATODA VASICA NEES

Family: Acanthaceae

Indian names: Hindi—*Adusa, Bansa, Vasika*;
Assamese—*Bahaka, Herbuksha, Teeshae*;
Bengali—*Vasaka*;
Gujarati—*Alduso, Ardusi*;
Kannada—*Adusoge*;
Malayalam—*Atalotakam*;
Marathi—*Adulsa*;
Sanskrit—*Vasaka*;
Tamil—*Adadorai, Arathorai*;
Telugu—*Adasaramu*.
(Delhi—*Piya-bansa*.)

Fig. 2.

The trade name *Vasaka* is based on Sanskrit name of the plant; even the scientific name (species) is based on Sanskrit name.

DESCRIPTION

A tall, much-branched, dense, evergreen shrub, with large, lance-shaped leaves. Flowers in dense, short spikes; stalks of the spikes shorter than leaves. Leaf-like structures, called bracts, present on the spikes; these are conspicuously veined. Corolla (the whorl of petals) of the flowers white with few purplish markings. Fruits capsular, 4-seeded.

DISTRIBUTION

This plant occurs throughout the plains and submontane regions of India; it is common near habitations.



Fig. 2. VASAKA (*Adhatoda vasica*)

DRUG AND ITS PROPERTIES

The drug *Vasaka* comprises the fresh or dried leaves of the plant.

Leaves contain an alkaloid vasicine, and an essential oil. The chief use of *Vasaka* is as an expectorant; it is given in the form of juice, syrup or decoction. It softens the thick sputum, facilitates its coming out and thus brings about quick relief in bronchitis. The expectorant activity is due to stimulation of bronchial glands. Larger doses can, however, cause irritation and vomiting. Recent experiments have confirmed the usefulness of *Vasaka*.

OTHER USES

The leaves of this plant are also utilised as green manure and for yielding a yellow dye. Due to the presence of certain alkaloids, the leaves are not easily attacked by fungi and insects, and are, therefore, used in packing or storing fruits. The leaves emit an unpleasant smell and are spared from browsing; the plant is, therefore, suitable for planting in soil reclamation programmes.

5. BEL

AEGLE MARMELOS (L.) Correa

Family: Rutaceae

Indian names: Hindi—*Bel*;
 Assamese—*Bel*;
 Bengali—*Bel*;
 Gujarati—*Bili*;
 Kannada—*Bilpatre*;
 Malayalam—*Vilvam*;
 Marathi—*Bel*;
 Sanskrit—*Bilva*, *Shriphal*;
 Tamil—*Vilvam*;
 Telugu—*Maredu*.

The trade name is based on the most common Indian name of the plant.

DESCRIPTION

A medium-sized deciduous tree bearing strong axillary thorns. Leaves with 3 or 5 leaflets. Flowers greenish-white, sweet-scented, about 2.5 cm across, in small bunches. Fruit 8-20 cm diameter, globose, green, finally greyish; rind woody; pulp orange-coloured, sweet, aromatic.

DISTRIBUTION

This tree occurs in the submontane regions and plains almost throughout India. It is also planted.

DRUG AND ITS PROPERTIES

The drug called *Bel* (or *Belae fructus*) comprises fresh, ripe or half ripe fruits of the tree.

The *Bel* fruit is valuable chiefly for its mucilage and pectin; it is very useful in chronic diarrhoea and dysentery, particularly for

patients having diarrhoea alternating with spells of constipation. Sweet drinks (*Sharbats*) prepared from the pulp of the fruits are useful as soothing agents for intestines of patients who have just recovered from bacillary dysentery. The unripe or half ripe fruits improve appetite and digestion. The antibiotic activity of the leaf, fruit and root of this plant has been confirmed in some recent experiments.

(The tribals of Bastar take an infusion of root bark in fever.)

OTHER USES

The wood is suitable for making charcoal for producer-gas plants.

The gummy substance, in which the seeds remain embedded, is used as an adhesive, and in varnishes and cementing mixtures. The rind of unripe fruits yields a yellow dye.

6. GREATER GALANGAL

(*Java Galangal*, *Galanga major*)

ALPINIA GALANGA (L.) Willd.

Family: Zingiberaceae

Indian names: Hindi—*Kulinjan*, *Sugandhbach*;
 Bengali—*Kulanjan*;
 Kannada—*Dumparasme*;
 Marathi—*Koshta kulinjan*;
 Sanskrit—*Kulanjan*;
 Tamil—*Perarattai*.

The trade name *Galangal* is based on the scientific name of the plant. It is called *Greater* or *Major Galangal* to distinguish it from the *Lesser Galangal*, which is the trade name of a related species.

DESCRIPTION

A herbaceous plant upto 2 m high; leaves long, narrow, green above, pale beneath, whitish on margins, median nerve very strong. Flowers about 3 cm long, greenish white, in compound dense bunches; lip of corolla white, streaked with red. Fruit orange-red, size of a small cherry. Rhizomes slightly aromatic.

DISTRIBUTION

This plant occurs naturally in the eastern Himalayas and the Western Ghats; it is also cultivated at several places.

DRUG AND ITS PROPERTIES

Greater Galangal is the dried rhizome of this plant.

It is useful in rheumatism, respiratory complaints, specially of children, and in bronchial catarrh. The drug is also considered useful in stomach complaints and as a tonic, deodorant and disinfectant. It is a stimulant aromatic like ginger.

During 1970-71, India imported rhizomes of this plant worth about five lac rupees.

OTHER SPECIES

Another important species of the genus *Alpinia* is *A. officinarum* Hance (*Lesser Galangal*); it is a native of China. The rhizomes obtained from the Chinese species have more strong odour and taste. The plant is extensively cultivated in Bengal and northern India.

7. CHHATIM

(*Dita-bark*)

ALSTONIA SCHOLARIS (L.) R. Br.

Fig. 3.

Family: Apocynaceae

Indian names: Hindi—*Chhatin*;
Assamese—*Chhaiten*;
Bengali—*Chhattim*;
Kannada—*Maddale*;
Malayalam—*Pala*;
Marathi—*Satvin*, *Shaitan*;
Oriya—*Chatiana*;
Sanskrit—*Saptaparna*;
Tamil—*Pala*;
Telugu—*Palaigh*.

English name: Devil's tree.

The trade name is based on the more common Indian name for the plant. The Sanskrit name refers to 7 leaves in a whorl.

DESCRIPTION

A large evergreen tree reaching up to about 25 m high; having bitter milky juice; bark rough, dark grey; branches whorled; base of the tree often fluted or buttressed. Leaves leathery, 10-20 cm long, 4-7 in a whorl. Flowers small, greenish white, spice-scented in many-flowered clusters. Fruits very long, 30-60 cm, narrow and slender, hanging in pairs and forming dense clusters.

DISTRIBUTION

This tree is found in the moister regions throughout the country.

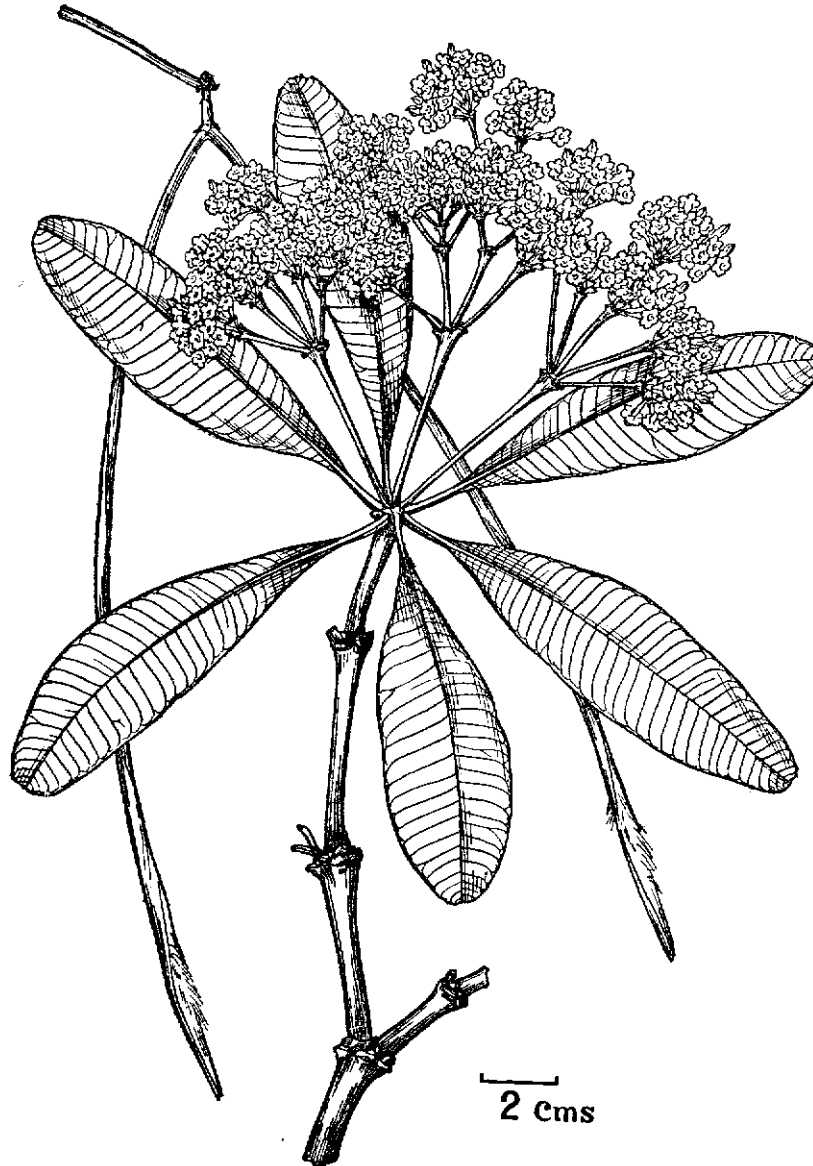


Fig. 3. CHHATIM (*Alstonia scholaris*)

DRUG AND ITS PROPERTIES

Chhatim is the dried bark of the tree.

This drug is considered very efficacious in chronic diarrhoea and dysentery. It is useful in malarial fever and brings down the temperature gradually and without causing perspiration or exhaustion, which usually follow other medicines for malaria. *Chhatim* is useful also in skin diseases.

The drug is reported to cause paralysing effect on the motor nerves and consequently fall in blood pressure. Some experiments have contradicted antibiotic and physiological activity of the drug.

OTHER USES

The wood of the tree is used for inferior quality furniture, packing cases, tea boxes, pencils and match-sticks. The timber of the tree was used in olden times for making wooden slates (*takhti*) for school children; this was the origin of the specific name *scholaris* for the plant.

8. KALMEGH

(Andrographis)

ANDROGRAPHIS PANICULATA (Burm.f.) Wall. ex Nees

Family: Acanthaceae

Indian names: Hindi—*Kirayat, Kulufnath*;
 Bengali—*Alui, Kalmegh*;
 Gujarati—*Lilun Kariyatu*;
 Kannada—*Nelabevu*;
 Malayalam—*Nelavepu*;
 Marathi—*Olikiryata*;
 Sanskrit—*Kirata*;
 Tamil—*Nelavemu*;
 Telugu—*Nelavemu*.

(Madhya Pradesh—*Chiretta*.)

The trade name *Kalmegh* is taken from Bangali local name of the plant; and *Andrographis* from the scientific name.

DESCRIPTION

An erect branched annual herb, branches sharply four-angled. Leaves lance-shaped. Flowers small, in large, spreading and sparse bunches. Flowers rose-coloured, about 1 cm long. Fruit capsular, 1.5-2 cm.

DISTRIBUTION

The plant occurs throughout India, chiefly in the plains.

DRUG AND ITS PROPERTIES

The drug *Kalmegh* consists of all parts of the plant above ground; *i.e.* excluding only the roots.

Kalmegh is a bitter tonic; it is useful in curing fevers, worms, dysentery, general weakness and excessive gas formation in stomach.

It is also reported to be useful for children suffering from liver and digestion complaints.

In Bengal, a household medicine, called 'Alui' is prepared from its leaves, it is given to babies suffering from stomach complaints.

There had been a belief that this plant was useful also in snakebite; experiments found this claim to be unfounded. Recent experiments have shown that the plant has antityphoid and antibiotic activity.

[The tribals of Bastar pound the plant in mustard (*Sarson*) oil and apply on itching].

9. INDIAN BIRTHWORT

(Aristolochia)

ARISTOLOCHIA INDICA L.

Family: Aristolochiaceae

Indian names: Hindi—*Isharmul, Ishwari*;
 Bengali—*Isumul*;
 Gujarati—*Arkmul*;
 Marathi—*Sapasan*;
 Sanskrit—*Ishwarimul*;
 Tamil—*Utamanielaye*;
 Telugu—*Guntaganjeera*.

The trade names are based on the common English name and the scientific name of the plant.

DESCRIPTION

A twining shrub. Stems woody below, slender and soft above. Main rootstock woody. Leaves variable in size and shape from linear, that is, very narrow, to obovate, that is, broader towards tip. Flowers small, greenish-white, in small bunches arising from

the axils of the leaves. Flowers purple, characteristically trumpet-shaped. Fruit about 5 cm long, longer than broad, opening from below upwards into six valves.

DISTRIBUTION

It is found throughout India in lower hilly regions and in plains; it is more common in southern and eastern India.

DRUG AND ITS PROPERTIES

Aristolochia consists of the dried stems and roots of the plant.

This drug is useful only in very controlled doses; in small doses it promotes digestion and regulates menstruation; it is a tonic. In larger doses it causes dangerous irritations in the digestive system and in kidneys and leads to violent vomiting, nausea, even abortion and other disorders.

In regulated doses, *Aristolochia* is used also as a stimulant and for curing fevers; it also has some activity on blood pressure.

OTHER SPECIES

Another species of this genus, *Aristolochia bracteolata* Lamk. (Gujarati and Hindi—*Kiramar*, Sanskrit—*Dhumrapatra*, Kannada—*Kalagurki*, Tamil—*Gariore-gurpa-arku*) occurs in plains throughout India, particularly in the regions of black-cotton or 'regur' soils, and is considered useful in worms and on foul ulcers.

10. WORMSEED

(*Artemisia*)

ARTEMISIA MARITIMA L.

Family: Compositae

Indian names: Hindi—*Kirmani ajvain*, *Chhuhri ajmud*, *Kirmala*;
Kashmiri—*Murni*;
Marathi—*Kirmani ova*;
Punjabi—*Phillaur*;
Sanskrit—*Gadadhar*.

This drug is also called *Santonina*; this refers to the active principles contained in the plants of the genus *Artemisia*.

DESCRIPTION

A stout, much-branched, perennial, aromatic shrub, about 1 m high. Leaves 2-5 cm long, whitish in colour, divided into numerous fine, linear segments; upper leaves simple, undivided, linear. Flower heads small, in short spikes.

DISTRIBUTION

The plant occurs in northern India from Kashmir to Kumaon at about 2000 to 3000 m altitude.

DRUG AND ITS PROPERTIES

The drug consists of the dried immature leaves and flower-heads of the plant. It has been recommended that the drug should be collected in early summer or late spring, by which time the flower-heads have not fully matured.

The medicinal properties of this plant are based chiefly on Santonin, contained in the young leaves and flower-heads; the proportion of Santonin is reported to be maximum just before the flowers begin to open; it diminishes soon after.

The chief use of the drug is for expulsion of worms (chiefly Threadworms and Roundworms) from stomach. The worms are pushed to large bowels, from where they are removed by a purgative. The drug is also useful in fevers and dropsy, and as a stimulant.

OTHER SPECIES

Several other species of the genus *Artemisia* are used in medicine. *Artemisia nilagirica* (Cl.) Pamp. (Bengali and Hindi—*Nagdona*, Sanskrit—*Nagdhamni*, Tamil—*Machipatri*) occurs in hilly regions of India and is used for worms, asthma, etc. *A. absinthium* L. (*Afsanthin*) occurs in Kashmir and is useful as a tonic and digestive.

The need for expanding cultivation of Santonin-yielding species of *Artemisia* in India has been suggested from time to time. It has been estimated that our annual demand of this drug is over 1000 quintals.

Artemisia species can be grown in the inner ranges of the Himalayas in Kashmir, Punjab, Himachal Pradesh, and Uttar Pradesh, at altitudes of about 2000 to 3000 m.



Plate 1
CALAMUS
(*Acorus calamus*)
(See page 9)

11. BELLADONNA

ATROPA ACUMINATA Royle ex Lindley

Plate 2.

Family: Solanaceae

Indian names: Hindi—*Angurshafa*, *Sagangur*;
Kashmiri—*Sagangur*.

The trade name *Belladonna* (or *Indian Belladonna*) is derived from the scientific name of another species of *Atropa*, namely *A. belladonna* L., which occurs in Europe, and is found in India only under cultivation.



Plate 2
BELLADONNA
(*Atropa belladonna*)



Plate 3
CASSIA
(*Cassia angustifolia*)
(See page 37)



Plate 5. *Cassia* (See page 37)

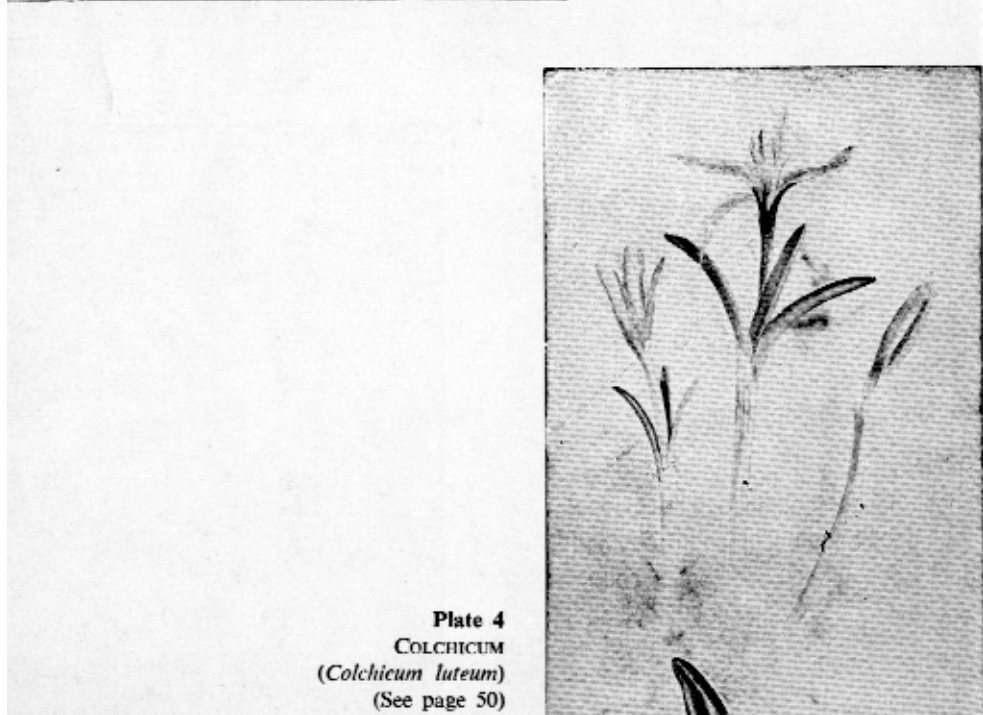


Plate 4
COLCHICUM
(*Colchicum luteum*)
(See page 50)



Plate 6—DATURA (*Datura innoxia*)

(See page 54)

Plate 7—CARDAMOM (*Elettaria cardamomum*)

(See page 58)



DESCRIPTION

An erect, branched perennial herb, 60-90 cm high. Leaves brownish green, 7-15 cm long, narrowed at both ends. Flowers in axils of leaves, solitary or in pairs, about 2.5 cm long, bell-shaped, yellowish brown. Berry roundish, about 1.5 cm across, purple-black.

DISTRIBUTION

It is found in Kashmir at altitudes of 2000 to 3500 m. It is also cultivated.

DRUG AND ITS PROPERTIES

The drug *Belladonna* consists of the dried leaves and other aerial parts of the plant; roots are also included.

Total alkaloid content depends upon stage of development of plant, low during flowering and very high when bearing green berries.

The drug obtained from the leaves and other aerial parts brings about a decrease in secretion of sweat and salivary and gastric glands; it acts as strong anti-spasmodic in intestinal colic and other spasmodic indications. It is also useful in asthma and whooping cough.

The drug obtained from the root of the plant has similar properties as the one obtained from leaves and twigs. Roots, are however, believed to have certain poisonous substances and are employed chiefly in preparations prescribed for external applications on rheumatism, neuralgia, inflammations, etc.

OTHER SPECIES

Another important species of this genus, namely *Atropa belladonna* L. (Deadly Nightshade) is a native of Europe and is cultivated in hilly regions of India. Its roots (called *Belladonna radix* in commerce) and leaves (called *Belladonna folium*) are of medicinal importance, chiefly as tonic, anti-spasmodic and sedative, the precise use depending on dosage. It has the property of dilating pupils of eyes, and its preparations (like Atropine) have been

largely employed as eye-drops or ointments used at the time of testing the eyes and other ophthalmic treatments. It is useful as an antidote in certain types of poisoning cases.

Alkaloids of this plant worth about one lac rupees were imported during 1970-71.

12. NIM

(*Margosa tree*)

AZADIRACHTA INDICA A. JUSS.

Family: Meliaceae

Indian names: Hindi—*Nim*;
 Bengali—*Nim*;
 Gujarati—*Limbro*;
 Kannada—*Bevu*;
 Malayalam—*Vepa*;
 Marathi—*Nimba, Limba*;
 Oriya—*Nim*;
 Sanskrit—*Nimba*;
 Tamil—*Vepa*;
 Telugu—*Vepa*.

The trade name is based on the most common Indian name of the tree.

DESCRIPTION

Nim is a very well known tree of India. The tree has pinnate leaves, *i.e.* its leaves are divided into numerous smaller segments called leaflets, each leaflet looking like an ordinary leaf. Flowers small, white, in short axillary bunches. Fruits 1.2-1.8 cm long, green or yellow, seed one in each fruit.



Fig. 4. NIM (*Azadirachta indica*)

DISTRIBUTION

The tree occurs naturally in Deccan peninsula, but is cultivated all over India near habitations and on road sides, etc.

DRUG AND ITS PROPERTIES

The drug consists of dried stem bark, leaves, and root bark.

The bark is a bitter tonic, astringent and antiperiodic. That is, it is useful in fevers, it breaks the periodic sequence of fevers (like malaria) and is useful in skin diseases.

The leaves are bitter and are largely applied on skin diseases and boils, a decoction of leaves is also taken internally.

The antibiotic activity of leaves and roots of the tree and their utility in skin diseases have been confirmed experimentally.

OTHER USES

The timber of *Nim* tree is very durable and is useful for house building, agricultural implements and miscellaneous carpentry work. The oil cake and gum exudate from bark are also useful products. Dried leaves are placed among clothes to keep moths away.

13. BRAHMI

(*Bacopa*)

BACOPA MONNIERI (L.) Wettst. syn. *Herpestis monniera* (L.) H.B.K.,
Monniera cuneifolia Mich.

Family: Scrophulariaceae

Indian names: Hindi—*Brahmi*, *Safed Chamni*;
Gujarati—*Jalbrahmi*, *Jalnevri*;
Malayalam—*Barna*, *Nirbrahmi*;
Marathi—*Ghola*;
Sanskrit—*Saumyalata*;
Tamil—*Sambra ne elaye*;
Telugu—*Sambra ne akhlu*.

English name: Thyme-leaved Gratiola.

The trade names *Brahmi* and *Bacopa* are based on the local Indian and scientific names of the plant respectively.

DESCRIPTION

This herb spreads on ground and its stems and small leaves are succulent, *i.e.* fleshy. Roots arise on the nodes of the stem also. Flowers arise in the axils of the leaves and are borne on short pedicels. One of the five sepals is larger than others. The corolla is bluish-white in colour and about 1 cm across.

DISTRIBUTION

This herb is found in moist or wet places, such as on borders of water channels, wells, irrigated fields, etc. in all parts of India.

DRUG AND ITS PROPERTIES

The drug *Brahmi* consists of the whole plant.

It is valued in medicine as a tonic for nerves and is prescribed in nervous disorders (accompanied by convulsions or unconsciousness), mental diseases, constipation and as a diuretic, *i.e.* to promote

urination. Leaf juice is given to infants in bronchitis; the relief is due to the vomiting and purging brought about by the drug. Leaf juice, mixed with petroleum, is applied on rheumatism. A poultice made of the boiled plant is placed on the chest of children suffering from cough. The plant is considered a blood purifier.

The tranquillising effect of the alcoholic extract of this plant has been successfully tested on experimental animals. The plant contains an alkaloid Bramhine, which is a cardiac tonic, *i.e.* provides strength and tone to heart.

14. INDIAN BARBERRY

(*Berberis*)

BERBERIS ARISTATA DC.

Fig. 5.

Family: Berberidaceae

Indian names: Hindi—*Rasaut*, *Daru-haldi*, *Kingora*, *Kilmora*;
 Bengali—*Daru haldi*;
 Kashmiri—*Rasyat*;
 Malayalam—*Mara darisina*;
 Marathi—*Daruhald*;
 Punjabi—*Kashmal*;
 Sanskrit—*Daru haridra*;
 Tamil—*Maramanjal*.

DESCRIPTION

A large thorny shrub; wood yellow; branches whitish or pale grey. Leaves characteristic, fasciated in axils of branched or simple spines, coriaceous, usually sharp-toothed, veins very fine. Flowers yellow, in short bunches. Fruit ovoid, bluish purple; seeds few.

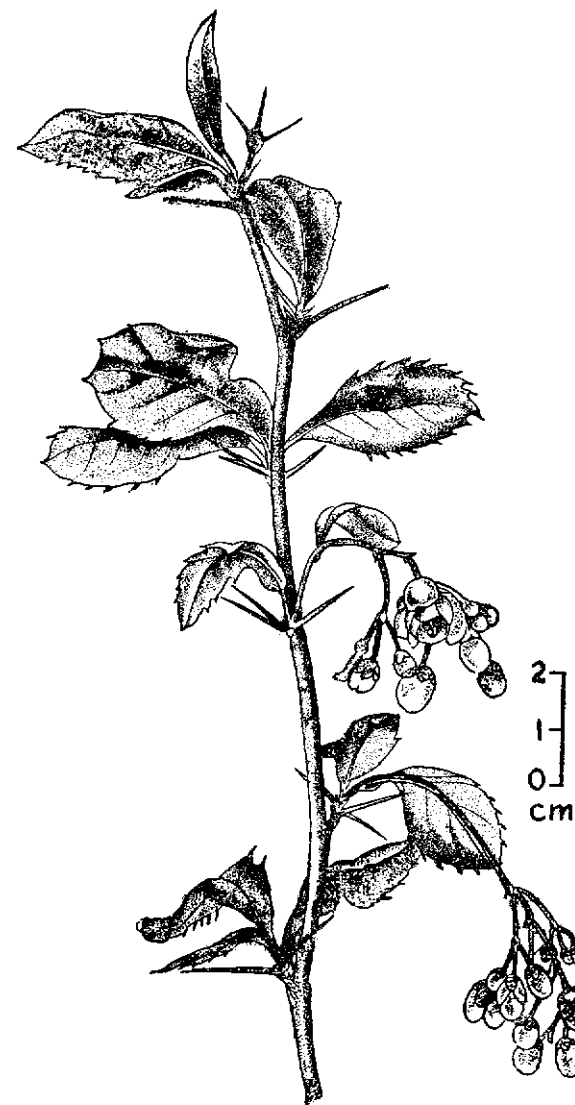


Fig. 5. INDIAN BARBERRY (*Berberis aristata*)

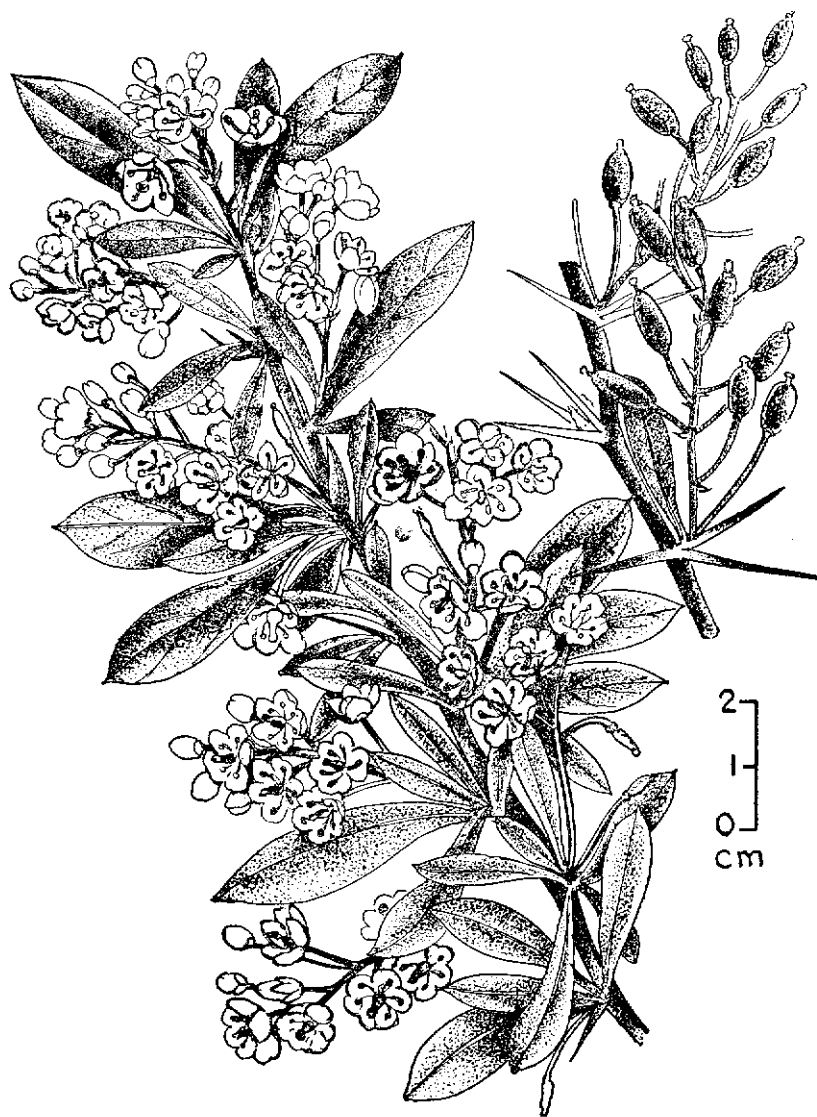


Fig. 6. INDIAN BARBERRY (*Berberis lycium*)

DISTRIBUTION

The plant occurs in the Himalayas between 2000 and 3000 m; it also grows in the Nilgiri hills in south India.

DRUG AND ITS PROPERTIES

Berberis consists of dried roots of this plant and also of certain other closely related plants belonging to the same genus, e.g. *B. asiatica* Roxb. and *B. lycium* Royle (Fig. 6).

The chief constituent of the drug is the alkaloid Berberine.

Root bark, roots and lower stems are boiled in water, strained and evaporated till a semi-solid mass is obtained; this is called *Rasaut*, it is fairly soluble in water.

Mixed with butter and alum, or with opium and lime juice, *Rasaut* is applied externally on eye lids to cure ophthalmia and other eye diseases. The use of *Rasaut* in curing ulcers has been shown experimentally. It is also administered through injections near the margins of the sores.

Rasaut is used in curing fevers, and as mild laxative and tonic. It is useful in stomach disorders and its use in cholera and acute diarrhoea in experimental rabbits has been confirmed.

The drug was also, for some time, used in malarial fever, but its curative effect has been disproved; it does, however, help in early detection of malarial fever.

The depressant action of the drug on respiration and heart has also been shown experimentally. Antitubercular activity has also been attributed to this drug.

OTHER USES

The root and stem of *B. aristata* yield a yellow dye, which is used for tanning and colouring leather.

15. PUNARNAVA

BOERHAVIA DIFFUSA L.

Family: Nyctaginaceae

Indian names: Hindi—*Punarnava*, *Santhi*, *Bishkhopra*, *Sant*,
Survari;Bengali—*Punarnaba*;Gujarati—*Moto satodo*, *Nahno vasero*;Marathi—*Tambadi vasu*;Sanskrit—*Raktakanda*, *Punarnava*;Tamil—*Mukkarattei*;Telugu—*Ataki*, *Atika mamidi*.(Madhya Pradesh—*Patharchatta*, *Khroriya*.)

English name: Horse-purslane, Hogweed.

The trade name is based on the Sanskrit name of the plant. In old Indian literature it is referred to as 'Sothagha', i.e. destroyer of dropsy.

DESCRIPTION

A much-branched herb, generally spreading on ground or partly ascending. Leaves two on each node, one smaller than the other, base of the leaves cordate; lower surface of leaves whitish, upper green. Flowers very small, reddish, in short clusters on long axillary stalks. Fruit with five ridges, glandular.

DISTRIBUTION

The plant is found in all parts of India.

DRUG AND ITS PROPERTIES

The whole plant, particularly the roots, leaves and seeds constitute the drug *Punarnava*.

The drug contains the alkaloid, Punarnavine. The main use of the drug is as a diuretic, i.e. to promote urination in dropsy, and in

jaundice and gonorrhoea. It is also laxative. In moderate doses, it is recommended for asthma. Large doses can bring about vomiting.

The diuretic activity of the drug has been experimentally confirmed on animals.

16. BUTEA

(Palas, Flame of the Forest)

BUTEA MONOSPERMA (Lamk.) Taub. syn. *B.froncosa* Koen. ex Roxb.

Family: Papilionaceae

Indian names: Hindi—*Palas*, *Tesu*, *Dhak*;Bengali—*Palas*;Gujarati—*Khakro*;Sanskrit—*Palasha*;Tamil—*Palasu*;Telugu—*Palasamu*;Urdu—*Palash papra*.(Ajmer-Merwara—*Chaura*.)

The trade name *Butea* is based on the scientific name of the plant; *Palas* and *Flame of the Forest* are based on local Indian and English names of the tree respectively.

DESCRIPTION

Palas is a well known tree of India. Its scarlet and orange flowers come in such profusion that the tree has been very aptly named *The Flame of the Forest*. It is a medium-sized tree with compound leaves, each leaf comprising three leaflets; leaflets silky tomentose and strongly veined on lower surface; the leaves fall off in winter. Flowers appear in about February to March in small but dense clusters generally on leafless branches, and the tree appears to be

loaded with a mass of orange colour. The fruit is a flat pod having a single seed. The name *monosperma* refers to the single seed.

DISTRIBUTION

The tree is found all over India, chiefly in the mixed or dry deciduous forests of central and western India. It is more common in the plains or lower regions of hills.

DRUG AND ITS PROPERTIES

The red coloured gum, called *Bengal Kino* or *Butea Gum*, obtained from this tree and the seeds of the tree are medicinal.

The gum contains tannins and is valuable for treatment of diarrhoea.

The seeds are used as anthelmintic in treatment of Roundworms and Tapeworms. Their usefulness in treatment of Roundworms has been confirmed through some recent experiments. Seeds of *Butea* are a suitable substitute for *Santonina*. The seeds, pounded with lemon juice, are applied on Dhobi's itch. Seeds are also useful on ringworm. The root bark has been found to have some action on blood pressure.

OTHER USES

This tree is highly valued as a host tree for the lac insect. The flowers yield a yellow dye. The wood lasts well under water and is used for well curbs and water scoops. It is also used for miscellaneous construction work and as fuel. Leaves are largely used for making bowls (*dauna*) and 'plates' (*pattals*) for serving food, and as fodder.

OTHER SPECIES

Butea superba Roxb. (Hindi—*Palas lata*) is a robust woody climber occurring almost throughout India. Its leaf juice is useful in heat eruptions in children.

17. CASSIA

(*Indian Laburnum*)

CASSIA FISTULA L.

Fig. 7.

Family: Caesalpiniaceae

Indian names: Hindi—*Amaltas, Kilvali, Kirala, Sinar*;
Assamese—*Sonaru*;
Bengali—*Sonali, Bandarlati*;
Gujarati—*Garmala*;
Kannada—*Kakke*;
Malayalam—*Kritamalam*;
Marathi—*Bahava, Jamba*;
Sanskrit—*Suvarnaka*;
Tamil—*Konnei, Alas*;
Telugu—*Rela*.

The trade name is based on the scientific name; the specific name *fistula*, which means a shepherd's pipe, refers to the shape of fruit of the tree.

DESCRIPTION

It is a small or medium-sized tree with compound leaves and large, shining, dark green leaflets. Flowers bright yellow, in very large, hanging bunches. Fruits 50-60 cm long, black or shining dark brown, almost cylindrical. The tree is a conspicuous sight in flowers as well as in fruits and can be spotted in a forest even from long distance. The tree sheds its leaves during early summer (March-May), and is in full bloom during this period.

DISTRIBUTION

This tree is found throughout India up to an altitude of about 1500 m, and is more common in moist or evergreen forests. The tree is much favoured for planting in road-side avenues and in gardens.

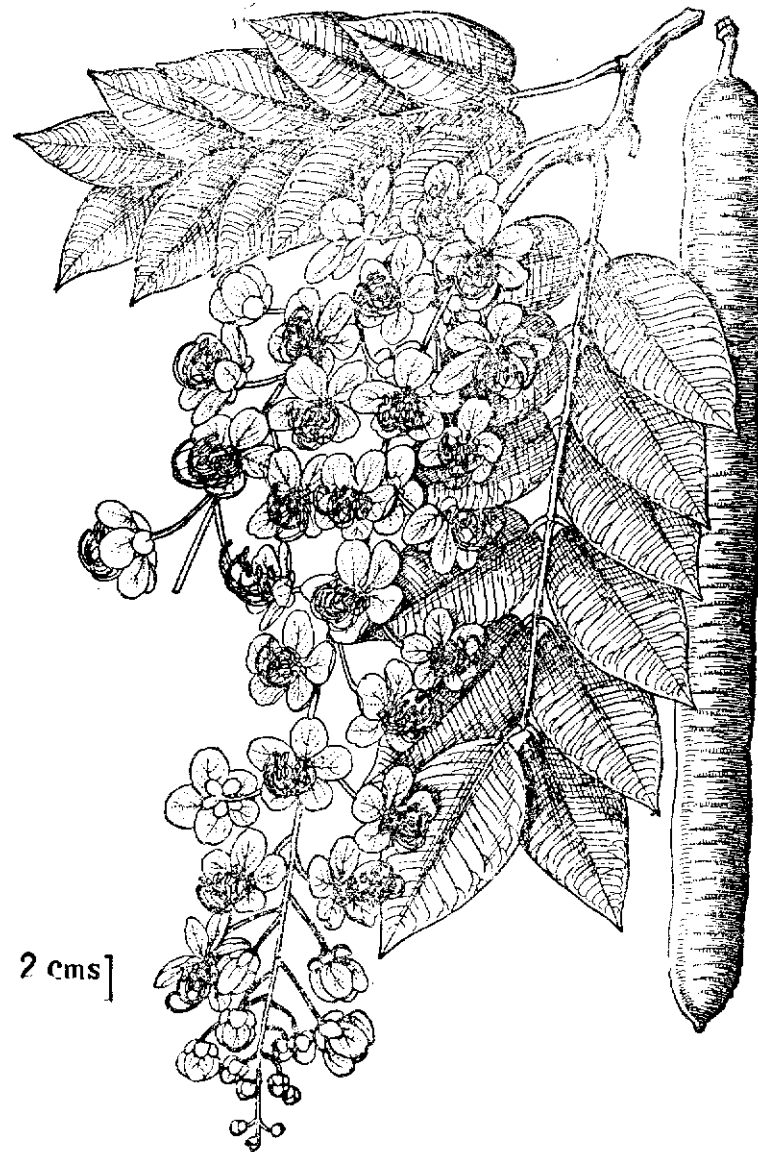


Fig. 7. CASSIA (*Cassia fistula*)

DRUG AND ITS PROPERTIES

Though medicinal properties have been attributed to nearly all parts of the tree, the fruits are most important and are included in the Indian Pharmaceutical Codex. The pulp from the fruits, called *Cassia pulp*, is a well known laxative. In larger quantities, it causes purging, nausea and griping. It is not used singly, but in admixture with *Senna* (*C. angustifolia*) leaves etc.

OTHER USES

The bark of this tree is known as 'Sumari' and is rich in tannins. The timber of the tree is strong and tough and is suitable for house and bridge posts and agricultural implements.

OTHER SPECIES

Cassia angustifolia Vahl (**Plate 3**—*Indian Senna*, *Tinnevely Senna*, Hindi—*Sana*, Sanskrit—*Bhupadma*; Malayalam—*Nilavaka*) is a small shrub of Arabia and Somaliland and has been successfully cultivated in south India. Leaves and fruits of this plant are cathartic and are useful in habitual costiveness. It is reported that if nursing women take this drug, their milk acquires purgative properties.

Several other species of *Cassia* are of restricted medicinal value.

Senna leaves and pods worth Rs 5.4 million were exported from India during 1970-71.

8. CATHARANTHUS

(*Sadabahar*)

CATHARANTHUS ROSEUS G. Don syn. *Vinca rosea* L., *Lochnera rosea* (L.) Reichb.

Family: Apocynaceae

Indian names: Hindi—*Sadabahar*;
Bengali—*Nayantara*, *Gul feringi*;
Malayalam—*Ushamalari*;
Marathi—*Sadaphal*;
Oriya—*Ainskati*;
Tamil—*Sudukadu mallikai*;
Telugu—*Billaganneru*.
(Punjabi—*Rattan jot*).

DESCRIPTION

An erect herb upto about 1 m high; leaves ovate, opposite; flowers in axillary clusters of 2 or 3; petals white or rose-pink, in one variety petals white with pink or reddish tinge at base; fruits many-seeded, follicles.

DISTRIBUTION

The plant is a native of Madagascar, but has become naturalised throughout the tropics of both hemispheres. It is often cultivated, and soon becomes escape.

DRUG AND ITS PROPERTIES

The roots of the plant constitute the drug. They were known to possess toxic and stomachic properties, but recently they have gained repute as a source of valuable alkaloids resembling those from *Rauvolfia* species. Roots of *Catharanthus* have more ajmalicine and serpentine than even *Rauvolfia serpentina*; they also possess reserpine.



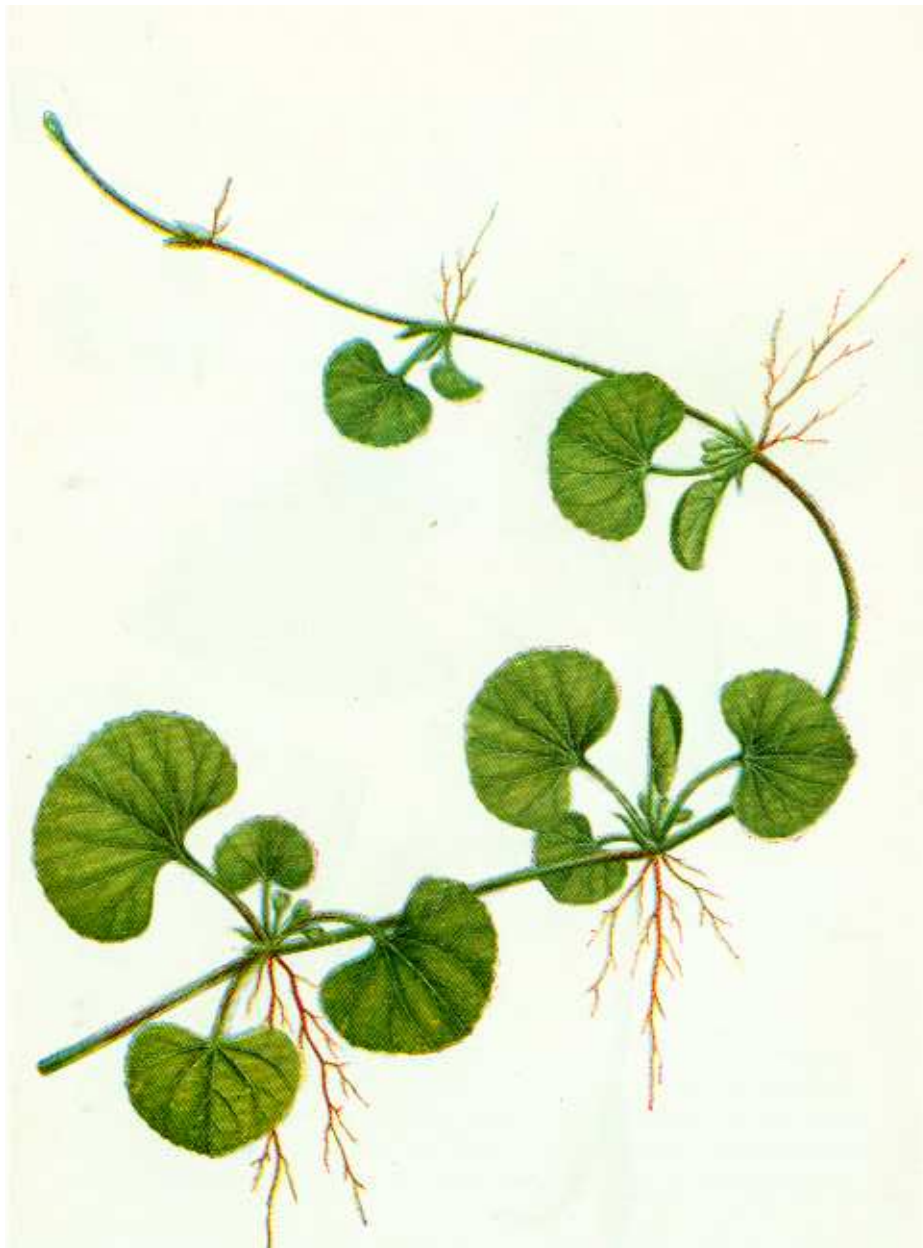


Plate III - CENTRATHERUM (*Centratherum anthelminticum*) (See page 43)

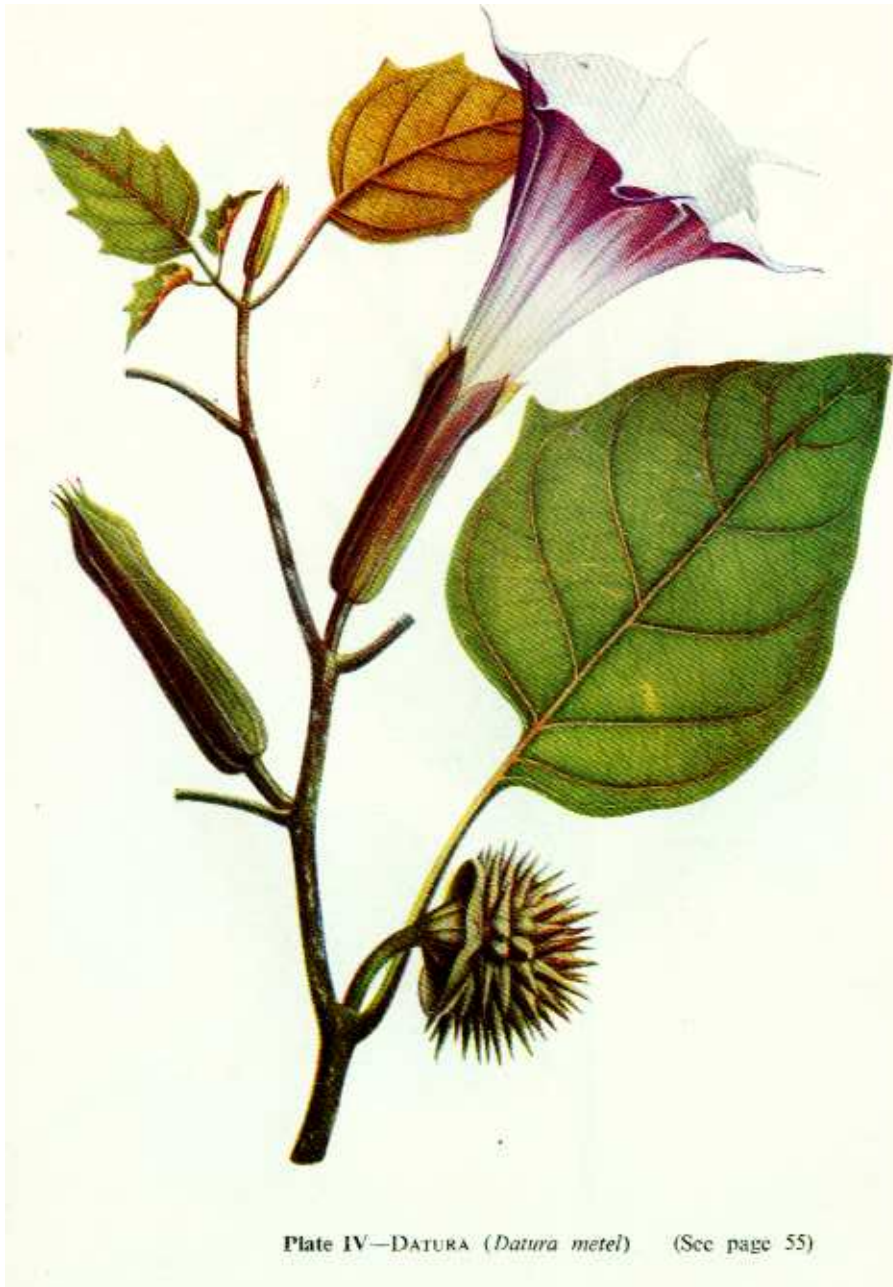


Plate IV—DATURA (*Datura metel*) (See page 55)

The alkaloids possess hypotensive, sedative and tranquillising properties.

Experiments on animals have shown that certain extracts of *Catharanthus* are useful in leukaemia.

OTHER USES

The plant is a handsome garden plant and flowers throughout the year; this gives the plant the name 'Sadabahar'. The plant is quite hardy and is popular for ornamental planting.

OTHER SPECIES

Catharanthus pusillus G. Don [syn. *Vinca pusilla* Murr., *Lochnera pusilla* (Murr.) K. Schum. Sanskrit—*Sangkhaphuli*, Tamil—*Milagai poondu*] occurs as a weed, and is reported to be useful in lumbago.

19. CENTELLA

(*Indian Pennywort*)

CENTELLA ASIATICA (L.) Urban syn. *Hydrocotyle asiatica* L.
Colour Plate II.

Family: Umbelliferae

Indian names: Hindi—*Brihmi*, *Brahmmanduki*, *Budhbrahmani*;
 Bengali—*Thankhuria*;
 Gujarati—*Barmi*;
 Kannada—*Vondelaga*;
 Marathi—*Brahmi*;
 Punjabi—*Brahmi buti*;
 Sanskrit—*Mandukparni*;
 Tamil—*Vollarei elaye*;
 Telugu—*Bokkudu*, *Naeley Tangru Akhlu*.
 (Naga Hills, Assam—*Aghinya*;

Silchar—*Toonimankoni*;
Sikkim—*Gortapri*.)

The Sanskrit name *Mandukparni* refers to the leaves of the plant which resemble the claw of a frog.

DESCRIPTION

The plant trails on ground and its creeping stems bear roots on their nodes. Leaves small, 2-4 cm diameter, sometimes more, rounded or broad kidney-shaped, their margins toothed. Flowers minute, pinkish red, 3-6 in a cluster. Fruits small, like a grain of barley, 7-9-ridged.

DISTRIBUTION

This plant grows in moist places throughout India, it is commonly seen in marshy banks of rivers, streams and ponds and in irrigated lawns, fields, etc.

DRUG AND ITS PROPERTIES

The drug comprises fresh and dried leaves and stems of this plant. Roots and seeds are also used in medicine.

The leaves or the entire plant parts are boiled in water and this decoction is given in treatment of leprosy.

The plant contains, asiaticoside, which is considered responsible for its use in leprosy. Experiments on animals have confirmed its property of inducing fast growth of skin, hairs, and nails.

The plant is also considered useful in certain kinds of tuberculosis and as an alternative and tonic for brain.

20. CENTRATHERUM

(*Somraj*)

CENTRATHERUM ANTHELMINTICUM (Willd.) Kuntze,
syn. *Vernonia anthelmintica* Willd. **Colour Plate III.**

Family: Compositae

Indian names: Hindi—*Somraj, Somraji, Banjira*;
Bengali—*Somraj*;
Gujarati—*Kalijiri*;
Kannada—*Kadu jirage*;
Malayalam—*Kattujirakam*;
Marathi—*Kalen jiri*;
Punjabi—*Somraj*;
Sanskrit—*Somaraji*;
Tamil—*Kattukshiragam*;
Telugu—*Adavijilakara*;
Urdu—*Jangli jiri*.
(Garhwal—*Kala zira*.)

The trade names *Centratherum* and *Somraj* are based on scientific and Sanskrit names of the plant respectively. The word *anthelminticum* in the scientific name suggests the medicinal usage of this plant in treatment of worms.

DESCRIPTION

An erect tall herb; stems and leaves covered with minute hairs. Leaves 6-10 cm long, their margins toothed, base tapering into a petiole. Flower heads 1.5-2.5 cm diameter, in small clusters, each head with 30-40 minute purplish flowers. Fruits, which are scientifically called achenes, 4.5-6 mm long, cylindric, hairy, with 10 narrow ridges; the tuft of hairs on top of achenes reddish.

DISTRIBUTION

This plant is found throughout India upto an altitude of about 1500 m, and is more common in waste places near habitations.

DRUG AND ITS PROPERTIES

The drug comprises fresh (as fresh as possible) dried seeds of the plant.

As the scientific name of the plant indicates, it is a valuable medicine as anthelmintic, that is, to destroy worms. It is useful in Threadworm infections.

In old literature, the plant has been reported to be useful also as a stimulant and antiseptic and for promoting urination, but experiments have shown it to be almost ineffective in these respects. Its utility in Threadworm infections has been confirmed in trials in hospitals.

21. IPECAC

(*Ipecacuanha*)

CEPHAELIS IPECACUANHA (Brot.) A. Rich.

Plate 4.

Family: Rubiaceae

DESCRIPTION

A small trailing herb. Roots slender, spreading horizontally. Mature roots moniliform, in bunches. Leaves in opposite pairs, their tips pointed, margins entire. Flowers white, small, in small bunches.

DISTRIBUTION

This plant is a native of Brazil in South America and is cultivated in India in Assam, Bengal and on an experimental scale in south India.

DRUG AND ITS PROPERTIES

The rhizomes of the plant constitute the drug *Ipecac*.

This drug is useful in amoebic dysentery and loss of appetite; given in larger doses, it brings about vomiting and this property is utilised for bringing relief in cough. It also acts as a diaphoretic, *i.e.* brings about sweating.

The Ipecac plantation in West Bengal has been developed as the largest in the world, and India's internal requirement is now amply met from this plantation. The target of the West Bengal plantation is reported to be about 50,000 kg of dried root per annum. The Ipecac root has great export potential, and expansion of its cultivation has been recommended.

22. CINCHONA

CINCHONA species

Family: Rubiaceae

Indian names: The commonest local name is *Kunam*; it is based on *quinine*, the main active principle in the bark of *Cinchona* trees.

The trade name is based on the scientific name *Cinchona*.

The genus *Cinchona* is not indigenous to India, and none of its species occur here in natural state. Several species are, however, now cultivated in India; four of them are more important. These are:

1. *Cinchona calisaya* Wedd. (Trade name : *Calisaya Bark*, *Peruvian Bark*). It is cultivated in Nilgiris and Sikkim.
2. *C. ledgeriana* Moens (Trade name: *Ledger Bark*). It is grown in Bengal, Assam and south India, and is the commonest *Cinchona* grown in India.
3. *C. officinalis* L. (Trade name: *Crown Bark*, *Loxa Bark*). It is grown in Nilgiris.

4. *C. succirubra* Pav. ex Klotzsch (Trade name: *Red Bark*). It is grown in Satpura hills, Sikkim and south India.

Cinchona species grown in India are usually large or medium-sized trees; *C. ledgeriana* is a straggling tree.

DRUG AND ITS PROPERTIES

The dried bark of the above mentioned species constitutes the drug *Cinchona*.

Cinchona bark yields several active principles, of which quinine is most important; it is well known for its effective use in malarial fevers. The drug causes quick remission of fever and with repeated or regulated doses, checks relapse of malarial fevers. Quinine also destroys certain bacterial infections, and in certain preparations has been found useful in pneumonia, amoebic dysentery and for eye lotions.

Preparations of quinine are also useful as local applications on certain rheumatic pains and as gargles.

Higher doses of quinine preparations can cause temporary (or even permanent) deafness, blindness, giddiness and nausea. Pregnant women and persons with heart ailments are not given quinine preparations.

Cinchona bark and alkaloids worth about Rs. 8 lacs were exported during 1970-71.

OTHER USES

Preparations based on quinine and on other active principles of *Cinchona* bark have been used as insecticides for preservation of feathers, furs, clothes, etc., as moth repellants, and even as hair lotions.

The *Cinchona* bark, from which quinine has been extracted, serves as a tanning material.

23. CINNAMON

CINNAMOMUM ZEYLANICUM Blume

Fig. 8.

Family: Lauraceae

Indian names: Hindi—*Dalchini*;
Bengali—*Dalchini*;
Gujarati—*Dalchini*;
Kannada—*Lavangpatti*;
Marathi—*Dalchini*;
Oriya—*Dalchini*;
Punjabi—*Dalchini*;
Sanskrit—*Darushila*;
Tamil—*Kannalavangapatti*.

The scientific name *zeylanicum* refers to Ceylon, where the tree is found growing naturally.

DESCRIPTION

It is an evergreen tree, *i.e.*, it does not become totally leafless at any time of the year; about 6-8 m high. Leaves large, ovate, thick, leathery, pointed at tip, shining green, lighter coloured beneath; main nerves on the leaves 3 or 5, running from base of leaf to middle or tip. Flowers minute, in large hairy clusters. Fruit oblong or ovate, about 1.5-2 cm long, dark purple, seed one.

DISTRIBUTION

This tree occurs in south India up to an altitude of about 1500 m, is more common at lower altitudes, even below 200 m. It is also cultivated in certain parts of India.

DRUG AND ITS PROPERTIES

The branches of the trees are lopped and their bark removed; the dried inner bark constitutes the drug *Cinnamon*.

The drug is used in diarrhoea, nausea, and vomiting. It is commonly used as a condiment.

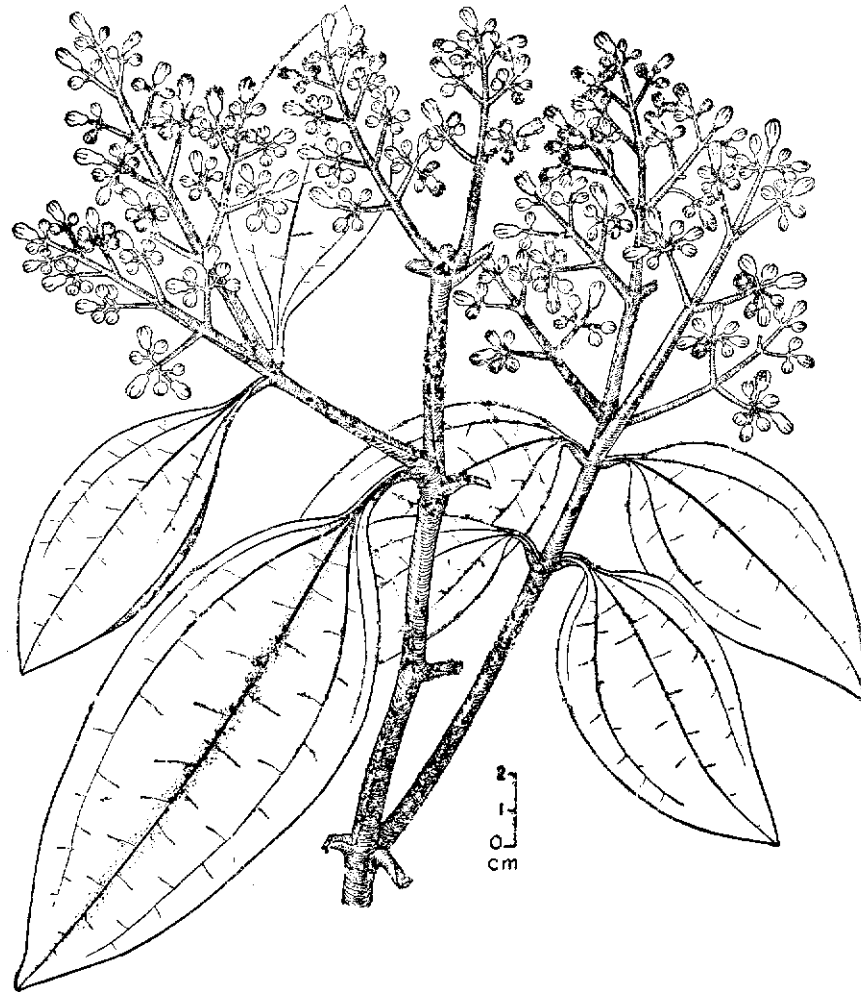


Fig. 8. CINNAMON (*Cinnamomum zeylanicum*)

The oil obtained from the bark, called Cinnamon bark oil has similar properties, and even has certain advantages over the bark.

It is used as a stomachic and carminative, it cures gastric debility and flatulence; and also has the property of destroying certain germs and fungi.

OTHER USES

The oil obtained from leaves is used as a flavouring agent and preservative for sweets, soaps, etc., and for local application on certain rheumatic pains.

The annual demand of *Cinnamon* bark in India has been estimated at about 40,000 quintals. South India, Bengal, Assam and Andamans are considered more suitable areas for its cultivation.

OTHER SPECIES

The genus *Cinnamomum* has several other useful species.

C. camphora; (L.) Sieb. (Camphor tree, *Kapur*) is cultivated in India in Nilgiris and also in some botanical gardens of northern India. *Camphor* is obtained by distillation of its wood and leaves. *Camphor* is used chiefly for local application on sprains, inflammations and rheumatic pains. It is also given internally in certain types of diarrhoea or as cardiac stimulant.

Camphor is used in many other ways and more than 5,000 quintals of *camphor* is imported into India each year. (*Camphor* is now being obtained also from certain species of *Ocimum*, the genus of the well known *Tulsi* plant).

C. tamala Nees & Eberm. (Hindi—*Tejpat*, Sanskrit—*Tamalpatra*, Tamil—*Talishpattiri*) or *Indian Cassia* occurs in outer and middle Himalayas, in parts of Assam and Bengal. The leaves are chiefly used as a spice, but also as a carminative and in colic and diarrhoea.

During 1970-71 leaf, bark and flowers of *C. zeylanicum* and *C. tamala* worth over Rs 2.5 million were exported from India, but leaf-oil and Cinnamic alcohol worth about six lac rupees were imported.

24. COLCHICUM

COLCHICUM LUTEUM Baker

Plate 5.

Family: Liliaceae

Indian names: Hindi—*Hirantutiya*;
 Kashmiri—*Irkim, Moond*;
 Punjabi—*Suranjam-karvi*;
 Sanskrit—*Hiranyatuth*.

The trade name is derived from the scientific name. Two articles from this plant, viz., seeds and corms (fleshy underground stems), are articles of commerce and are called *Colchicum seed* and *Colchicum corm* respectively.

DESCRIPTION

An annual herb; corms brownish in colour, almost conical in shape, with one side flat, the other roundish. Leaves very narrow but broader towards the tip, increasing in size as the plant approaches fruiting stage, 15-30 cm long, .8-1.5 cm broad. Flowers large, 2.5-4 cm diameter, 7-10 cm long, yellow. Fruits 2.5-4 cm long, their beaks recurved.

DISTRIBUTION

The plant is found in northwestern Himalayas from about 700 to 2800 m altitude, usually in outskirts of forests or in open grassy places.

DRUG AND ITS PROPERTIES

The fresh corms of the plant collected before its flowering constitute the drug *Colchicum corm*, and the ripe dried seeds, the drug *Colchicum seed*.

The corms contain the active principle Colchicine. It is useful in pains and inflammations of gout. Clinical experiments with *Colchicum* in small doses over a long period have shown success in about sixty per cent of patients. The use of the drug can, however, cause

severe irritation in intestines and to counteract this, the use of the drug with *Belladonna* or *Hyoscyamus* is recommended.

The seeds, chiefly the seed coat (rind), also contain Colchicine. The drug is useful in the same manner as the corms.

The effect of Colchicine on cancerous tissues has also been tested and it has been shown that the drug arrests division of cells of the cancerous tissues and also makes them more susceptible to X-ray treatments. Experiments on these prospects are still continuing in certain research institutes, and the drug has not yet been put in actual use.

The annual demand of *Colchicum* in India is estimated at 25 quintals. The plant can be grown at higher altitudes (1500-3000 m) in the Himalayas.

OTHER USES

Colchicine has been largely used in scientific research in plant breeding; it induces polyploidy, that is, multiplication of basic chromosome numbers.

25. COSCINIUM

COSCINIUM FENESTRATUM (Gaertn.) Colebr.

Family: Menispermaceae

Indian names: Hindi—*Jharihaldi*;
Bengali—*Haldigach*;
Kannada—*Maramanjali*;
Marathi—*Venivel*;
Sanskrit—*Daruharidra*;
Tamil—*Maramanjali*;
Telugu—*Manu pasupu*.

DESCRIPTION

A robust woody climbing shrub, bark yellowish, densely hairy when young; leaves leathery, shining, smooth on upper surface, slightly hairy on lower surface, roundish, with tapering tip, main nerves 5-7. Flowers minute, in small heads.

DISTRIBUTION

The plant occurs in south India, chiefly in western Ghats.

DRUG AND ITS PROPERTIES

The dried stems of the plant constitute the drug, the stems contain Berberine.

This drug is useful in fevers, general weakness or debility and certain types of dyspepsia. It is also considered antiseptic and is, therefore, used for external application on wounds.

Roots of the plant are reported to show antibiotic activity.

OTHER USES

The stems yield a yellow dye which is used singly or in combination with turmeric.

26. CYMBOPOGON

CYMBOPOGON species

Family: Gramineae

Several species of the genus *Cymbopogon* grow in India, some are cultivated. Though medicinal properties have been attributed to some of these species, none of them is of much importance.

Grasses of the genus *Cymbopogon* are usually tall herbs and are aromatic. They yield oils which are largely used as flavouring agents. The important ones in this respect and in medicine are the following:

Cymbopogon citratus (DC.) Stapf is grown in several parts of India. It yields an oil called West Indian Lemon-grass oil. An infusion of its leaves is sometimes taken as a substitute for tea, as a refreshing beverage.

C. flexuosus (Nees ex Steud.) Watson occurs in south India, Uttar Pradesh and Sikkim. It yields Lemon-grass oil. This oil is a source of Vitamin A. There are plantations of this grass in Kerala. It is also used in perfumery.

C. maritimi (Roxb.) Watson (Hindi—*Rosha*, *Rohisha*, *Mirciagandh*, *Gandhvel*) occurs rather in all drier regions of India; it yields the Rosha oil which is useful on lumbago, baldness and on skin diseases; it is taken internally in bilious complaints. This oil is used also for mosquito repellent ointments.

C. nardus (L.) Rendle grows in several parts of India, chiefly south India. It yields the well known Citronella oil, which is used (like Rosha oil) in insect repellent ointments. The annual demand of citronella oil in India has been estimated at 200 quintals.

During 1970-71 Citronella oil worth about Rs 1.2 million was imported into India, but Lemongrass oil and Rosha oil worth over Rs 10 million were exported.

27. DATURA

(Stramonium)

DATURA STRAMONIUM L.

Colour Plate IV.

Family: Solanaceae

Indian names: Hindi—*Dhatura*;
 Bengali—*Shet Dhatura*;
 Gujarati—*Dholo Dhaturo*;
 Malayalam—*Ummattai*;
 Punjabi—*Dhatura*;
 Sanskrit—*Dhatura*;
 Tamil—*Ummathai*;
 Telugu—*Datturamu*.

The trade names *Datura* and *Stramonium* are based on the scientific name of the plant. In old Indian literature, the plant is referred as 'Shivashekhara', because the flower is believed to be associated with Lord Shiva.

DESCRIPTION

A bushy plant up to about 1 m high; leaves large, ovate, toothed. Flowers very large, white. Fruit ovoid, deeply divided into four, covered with long or short prickles.

DISTRIBUTION

This plant occurs in temperate Himalayas up to 2500 m and in hilly regions of central and southern India.

DRUG AND ITS PROPERTIES

The drug consists of dried leaves, flowering tops and seeds of the plant.

The chief active principle in the leaves is hyoscyamine; the drug is, therefore, useful in the same manner as *Belladonna* or *Hyoscyamus*.

The drug is useful in bronchitis or asthma, and controls salivation in mouth; it is antispasmodic and narcotic. The inhalation of smoke from the burning leaves is also good for relieving asthma. The seeds also contain hyoscyamine and have similar properties as the leaves.

OTHER SPECIES

Two other species of the genus *Datura* are useful in medicine. *D. metel* L. (Color plate IV. *Kala Dhatura*) occurs throughout India in waste places. Its flowers are white to yellowish, often violet coloured outside. Fruits have short prickles. In cultivation, the flowers often have double corolla whorls.

A poultice of its leaves checks inflammation of breasts caused by excessive formation of milk. The leaves and seeds have similar properties as *Stramonium*.

D. innoxia Mill. (Plate 6) is an exotic plant, but has run wild in several parts of India. The corolla of its flowers is 10-angled (not 5-angled as in *D. metel*). Fruits have very slender prickles and brown seeds. Its leaves have similar properties as *Stramonium*. Expansion of this plant through cultivation has been recommended. Its annual demand in India is estimated at about 40 quintals.

28. DIGITALIS

(Foxglove)

DIGITALIS PURPUREA L.

Colour Plate V.

Family: Scrophulariaceae

Indian name: Hindi—*Tilpushpi*

The trade name refers to the scientific name of the plant. The Hindi name *Tilpushpi* refers to the flowers of the plant which somewhat resemble the flowers of *Til* plant, *Sesamum indicum* L.

DESCRIPTION

A biennial or perennial herb upto about 1.2 m high; lower basal leaves long-stalked, hairy, ovate, 15-30 cm long, the upper leaves

almost without stalks, becoming smaller in size upwards. Flowers 5-8 cm long, white or purple, with ciliate lobes, borne in 30-60 cm long, one-sided bunches. Fruit ovoid.

DISTRIBUTION

This plant is not indigenous to India, it is cultivated chiefly in hilly regions in northern India, such as in Kashmir; it was grown in Darjeeling and in Nilgiri hills also but these cultivations are now abandoned. The plants have escaped from cultivation and have become naturalised in some places.

DRUG AND ITS PROPERTIES

The dried leaves of the plant constitute the drug. The leaves must be dried at about 60°C temperature and as soon after collection as possible.

The main use of this drug is in heart diseases. The drug promotes and stimulates the activity of all muscle tissues. It is used in cases of congested heart failure.

Digitalis forces more blood into the coronaries and improves the nutrition of the heart. When blood circulation gets impaired and dropsy sets in, *Digitalis* helps in restoration and regulation of the function of the heart.

It improves the blood supply to the kidney and thus promotes urination, and removes obstructions in kidney.

Digitalis is used in some ointments for local application on wounds and burns. This drug, however, has some cumulative toxic effects and causes headache, giddiness, etc. These side effects must be watched.

OTHER SPECIES

Another species of the genus *Digitalis*, viz. *D. lanata* Ehrh. (Woolly Foxglove), occurs wild and is also being cultivated in Kashmir. Its flowers are smaller, hairy, and cream-, yellow- or purple-coloured. This plant has stronger medicinal properties, and its side effects are not so toxic as of *D. purpurea*.

The total annual demand of the drug Foxglove in India is estimated at 30 quintals.

29. DIOSCOREA

DIOSCOREA species

Family: Dioscoreaceae

This is a large genus of twining herbs. In some species the stems twine to the right, and in others to the left. Leaves are simple or compound; mostly the nerves are prominent. The tubers in most species have tuberous roots, and also tuber-like round or variously-shaped structure (bulbils) in axil of leaves.

About 50 species are found in India; several are cultivated for edible tubers, the Yams.

The genus has recently gained much repute as a source of steroidal sapogenins, like diosgenin. These are promising starting material for synthesis of cortisone, which is useful in treatment of rheumatic arthritis, and in preparation of sex hormones.

Dioscorea deltoidea Wall. (Punjab—*Kriss, Kitra*; Kashmir—*Kins, Kithi, Kildri*) is an extensive climber occurring in north-western Himalayas, and extending to central Himalayas. Its tubers are rich in diosgenin.

D. prazari Prain & Burkill (syn. *D. deltoidea* Wall. var. *sikkimensis* Prain, *D. sikkimensis* Prain & Burkill) occurs in eastern Himalayas, in northern parts of Bihar, Bengal, Nepal, Sikkim, Bhutan and Assam. It has now been successfully grown in other parts of India. The tubers are rich in diosgenin.

OTHER USES

Yams are a common article of food particularly among the hill tribes and the poor.

D. alata L. (Hindi & Bengali—*Khamalu, Chupri alu*; Kanarese—*Onthaligasu, Turg-genasu*; Malayalam—*Kaavathu*; Tamil—*Perumvalli kizhangu*; Telugu—*Pandakema*) is a large climber and is grown for its edible tubers. *D. bulbifera* L., *D. hispida* Dennst. and *D. pentaphylla* L. occur almost throughout India; their tubers are also edible, and are consumed after proper processing.

Some species of *Dioscorea* yield industrial starch.

30. CARDAMOM

ELETTARIA CARDAMOMUM (L.) Maton

Plate 7; Fig. 9.

Family: Zingiberaceae

Indian names: Hindi—*Chhoti Ilachi*;
 Bengali—*Elachi*;
 Malayalam—*Yelam*;
 Marathi—*Veldode*;
 Sanskrit—*El*, *Upkunchika*;
 Tamil—*Elam*, *Yelakkai*;
 Telugu—*Elaki*.

DESCRIPTION

A herb with thick, fleshy branched rhizome and several erect stems, going sometimes up to 3 m high. Leaves very large, 30-90 cm long, narrow, with one strong median nerve and numerous faint side nerves. Flowering stock arises near the base of the stem and lies on the ground; flowers about 4 cm long, white or pale green, borne in 30-90 cm long bunches. Fruits about 1.5 cm long, pale green to yellow, ovoid, 3-celled, many-seeded. Seeds triangular, brownish-black. The size of the plant and of its parts varies in different localities and with different cultivated races. The fruits and seeds, however, do not vary much. Often, the fruits offered in market are bleached with sulphur fumes and made white.

DISTRIBUTION

It occurs wild in southern India, particularly in the moist forests of hilly regions in Mysore and Kerala. It is also cultivated elsewhere in India.

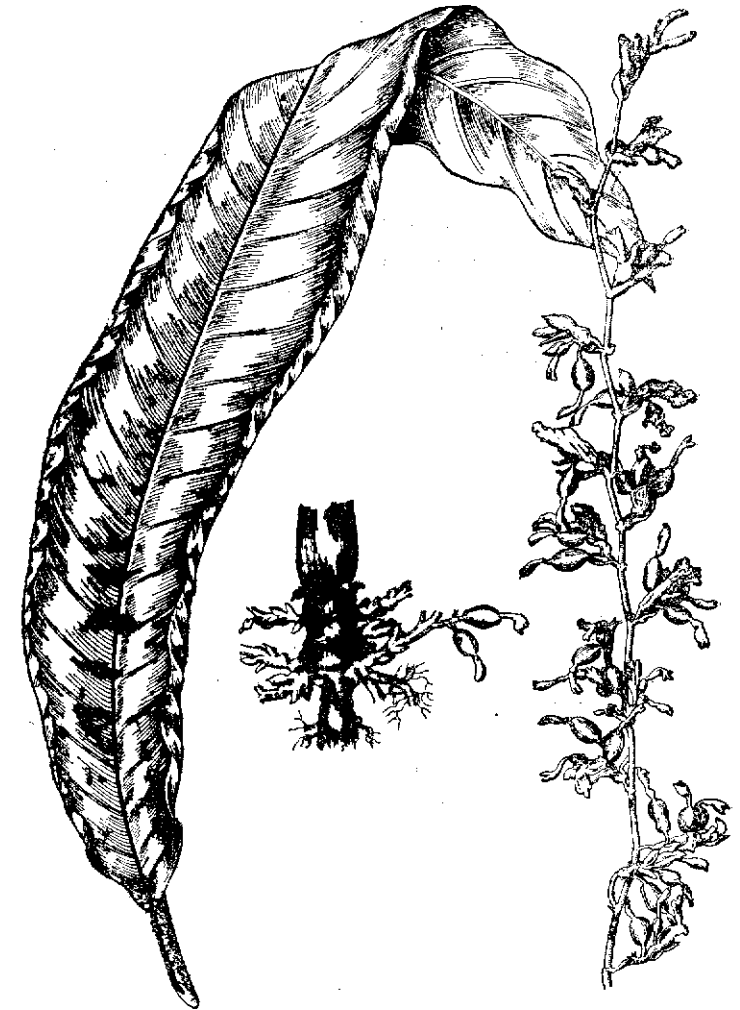


Fig. 9. CARDAMOM (*Elettaria cardamomum*)

DRUG AND ITS PROPERTIES

The dried fruits of the plant constitute the drug. The seeds are actually used, but they are taken out from the fruits just when required.

Cardamom is used chiefly for relieving flatulence or feeling of overfulness of stomach, *i.e.* to promote digestion. It is administered with purgatives, and as a flavouring agent. Powdered with cloves, ginger and caraway, it is good in indigestion, etc.

OTHER USES

Cardamoms are largely used in cooking and in making cakes and confectionery. The oil obtained from seeds is used for flavouring beverages.

31. EMBELIA

EMBELIA TSJERIAM-COTTAM A. DC.

Plate 9.

Family: Myrsinaceae

Indian names: Hindi—*Baibirang, Bhungi, Gaiya;*

Bengali—*Dhadki Jhanti;*

Marathi—*Vaivarung, Ambati;*

Oriya—*Numuniya.*

(Santali name—*Bhabri.*)

The trade name is based on the scientific name of the plant.

DESCRIPTION

A shrub or small tree; young branches covered with brownish hairs, mature branches glabrous; branches specked with white glands. Leaves upto 12 cm long, narrowed at both ends, dotted all over with glands, margins simpler or toothed, leaves sometimes reddish on lower surface, hairy on nerves. Flowers minute, pale green, in

short, axillary, densely hairy clusters. Fruit small, globose, pointed, red when ripe.

DISTRIBUTION

This plant occurs chiefly in eastern India and the Deccan peninsula.

DRUGS AND ITS PROPERTIES

The dried fruit of the plant constitutes the drug. The main use of this drug is in treatment of Tapeworms. Given in suitable doses, the drug kills the Tapeworms; they are then expelled with the help of a purgative. *Embelia* itself has mild laxative property. Recent experiments have shown that the drug is effective only against Tapeworms, not Hookworms and Roundworms. It also destroys earthworms and should be useful in ascariasis. The drug also showed some antibacterial and antitubercular activity.

OTHER SPECIES

An allied species, *Embelia ribes* Burm.f., is found throughout India. This plant is also known generally by same local names as *E. tsjeriam-cottam*. Its fruits have similar properties too, and are also accepted to constitute the official drug *Embelia*.

32. EMBLICA

*(Emblie Myrobalan)*EMBLICA OFFICINALIS Gaertn. syn. *Phyllanthus emblica* L. Fig. 10.

Family: Euphorbiaceae

Indian names: Hindi—*Aonla*;
 Assamese—*Chukna Amlaki*;
 Bengali—*Amloki*;
 Gujarati—*Amran*;
 Malayalam—*Amlakam*;
 Marathi—*Amla*;
 Oriya—*Aora*;
 Sanskrit—*Amlika*;
 Tamil—*Nellikkal*.

The trade name *Emblie* is based on scientific name. It is also called *Emblie Myrobalan* as it is one of the three well-known Myrobalans.

DESCRIPTION

A small or middle-sized deciduous tree. Leaves small, 10-13 mm long, 2-3 mm broad, very closely set in pinnate fashion, branchlets look rather feathery in general appearance. Male and female flowers borne on same tree, flowers pale green, usually in small dense clusters below the leaves; male flowers small, numerous, on short stalks; female flowers also small, fewer. Fruit 1.5-2.5 cm diameter, fleshy, roundish, rather indistinctly marked into 6 lobes, pale green or yellowish; seeds 6. Fruits of cultivated forms are larger.

DISTRIBUTION

The plant occurs throughout tropical and subtropical India; it was found to be abundant (and practically unexploited) in deciduous forests of Madhya Pradesh.

Fig. 10. EMBLICA (*Emblie officinalis*)

DRUG AND ITS PROPERTIES

The fresh or dried fruits of this tree constitute the drug.

The fruits are one of the three constituents of the well-known Indian preparation *Triphala* (the other two constituents being *Bahera*—*Terminalia bellirica* and *Harra*—*T. chebula*). *Triphala* is used as laxative and in treatment of enlarged liver, piles, stomach complaints, pain in eyes, etc.

Emblica fruits are a good liver tonic; raw fruits are cooling and mild laxative. A fermented liquor made from the fruits is considered useful in indigestion, anaemia, jaundice, certain heart complaints, cold in nose and for promoting urination. It is a very rich source of Vitamin C, and is valuable in diseases caused by deficiency of Vitamin C, like scurvy. Certain experiments on patients of pulmonary tuberculosis showed that Vitamin C of *Emblica* fruits is more quickly assimilated in human system than synthetic Vitamin C; perhaps there are certain unknown factors in the fruits responsible for this advantage. Dried fruits are useful in diarrhoea and dysentery. Even pickled fruits are prescribed in Indian medicine.

Flowers, roots and bark of the tree are also medicinal, seeds are reported to cure asthma and stomach disorders.

OTHER USES

Fruits are largely used in inks and dyes and for hair shampoos; fruits along with twig bark are employed for tanning and dyeing.

The timber is useful for miscellaneous domestic purposes; it stands well under water and is used in making wells etc.

Leaves are used as manure in *Cardamom* plantations; they also help in improvement of alkali soils.

33. EPHEDRA

EPHEDRA GERARDIANA Wallich

Plate 8.

Family: Gnetaceae

Indian names: Hindi—*Asmania*, *Phok*, *Khanda*;
Punjabi—*Budshur*;
(Jaunsar—*Tutgantha*.)

The trade name is based on the scientific name.

DESCRIPTION

A small shrub up to about 1 m high. Stems woody below, much branched; branches almost whorled, erect or initially a little spreading and then ascending upwards. Leaves reduced to minute 2-toothed sheaths. Male flowers few together in ovate spikes. Female flowers 1-2, in short spikes. Fruit 7-10 mm long, ovoid, red, surrounded by succulent bracts.

DISTRIBUTION

This plant occurs in the drier regions of higher Himalayan ranges, at about 2000-4000 m. It is also cultivated.

DRUG AND ITS PROPERTIES

The dried stems of *Ephedra gerardiana*, collected in autumn, constitute the drug *Ephedra*.

The main use of this drug, which yields Ephedrine, is in treatment of asthma, particularly bronchial asthma. For relieving bronchial spasms, the drug is administered orally or through injections. The drug is useful as a stimulant for heart. In cases where heart was affected by infections of pneumonia, diphtheria, etc., *Ephedra* proved very effective cardiac stimulant.

It has also been used in hay-fever, rashes, etc. of allergic origin. Several preparations based on Ephedrine are in use in medicine now a days. Nasal sprays are used in sinusitis, asthmatic attacks, inflammation of mucous membrane, etc.

As the drug has some effect on the urinary bladders also, it is used to control night wetting (urinating while sleeping) in children.

Overdose of Ephedrine can cause nausea, sweating, certain skin diseases, etc.

OTHER SPECIES

Another species of the genus *Ephedra*, namely *E. major* Host, occurs in Lahul; it has more alkaloids than *E. gerardiana*, and branches of both these species, are, therefore, accepted as the drug *Ephedra*.

Regular supplies of the drug can be ascertained only if these two plants, or the Chinese species, *E. equisetina* Bunge and *E. sinica* Stapf, which are better source of Ephedrine, are cultivated.

Several areas in northern Himalayas, such as higher altitudes in Kashmir, Punjab, Himachal Pradesh and Uttar Praesh, are suitable for cultivation of *Ephedra* species.

Alkaloids of *Ephedra* species worth about Rs 4.3 million were imported during 1970-71.

34. EUPHORBIA

EUPHORBIA HIRTA L.

syn. *E. pilulifera* (of Indian floras, not of Linneaus). **Fig. 11.**

Family: Euphorbiaceae

Indian names: Hindi—*Lal Dudhi*;
Bengali—*Barakeru*;
Gujarati—*Dudheli*;
Malayalam—*Nelapalai*;
Marathi—*Moti Dudhi*;
Sanskrit—*Nagarjuni, Pusitoo*;
Tamil—*Amampachai arissi*;
Telugu—*Nanabala*.

The trade name is based on the scientific name of the plant.

DESCRIPTION

An annual herb ascending or erect up to 50 cm high; stems round, covered with yellowish hairs. Leaves in opposite pairs, small, upto about 4 cm long, dark green on upper side, pale on lower side, margins faintly toothed. Flowers whitish, minute, in small, axillary, stalked clusters. Fruit small, 1-2 mm diameter, hairy; seeds 3-angled, wrinkled, light reddish brown.

DISTRIBUTION

The plant occurs in waste places throughout the warmer regions of India, and in a variety of soil and moisture conditions.

DRUG AND ITS PROPERTIES

The entire plant, collected in flowering and fruiting stage and dried, constitutes the drug.

Euphorbia causes relaxation of bronchioles, and has a depressant action on heart and respiration. It is useful in removing worms in children, in bowel complaints, asthma and cough. The plant promotes formation and flow of milk in women, it is also useful in

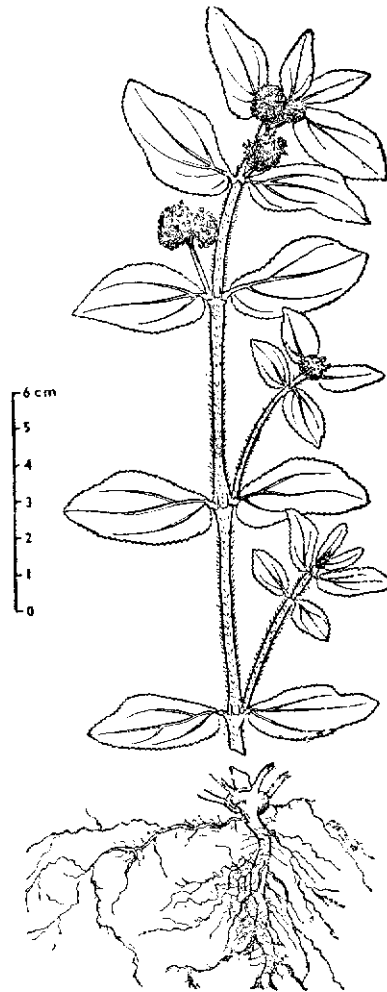


Fig. 11. EUPHORBIA (*Euphorbia hirta*)

gonorrhoea and other urinogenital complaints. The roots of the plant stop vomiting. Large doses of the drug, however, cause irritation in stomach and result in vomiting and nausea.

The milky juice of the plant is applied on warts. The antibacterial and antitubercular activity of the plant has been shown experimentally.

OTHER USES

The leaves of *Euphorbia hirta* are eaten as vegetable.

OTHER SPECIES

A few other herbaceous species of the genus have been reported to have similar medicinal properties as *E. hirta*.

The genus *Euphorbia* includes some large shrubby species easily recognised by their thick, succulent, very thorny (Cactus-like) round or characteristically angled and spirally twisted stems and branches. The white milky juice of such plants is acrid and poisonous. Careless handling of the juice of these plants can cause skin and other diseases. Only in restricted doses they are used as purgatives, etc. The juice of some of the species is applied externally to kill maggots in wounds and on skin diseases and warts.

E. antiquorum L. (Fig. 12. Hindi—*Tridhari Sehund*, Sanskrit—*Vajrakantaka*) has 3-5 angled branches and grows throughout India in warmer regions. Its juice is used in dropsy and as nervine tonic.

E. barnhartii Croizat syn. *E. trigona* Roxb. (Telugu—*Kattimandu*) occurs in dry rocky hills of Deccan and in Andamans. Powdered leaves are used as poultice on boils.

E. nerifolia L. (Fig. 13. Hindi—*Sehund*, *Thuhar*; Sanskrit—*Snuhi*) has 5-angled branches; it grows wild in Deccan peninsula, but is cultivated in hedges throughout India. Its juice is used in earache and asthma.

E. nivulia Buch.-Ham.—(Hindi—*Katathuhar*, Sanskrit—*Patrasnuhi*) has cylindrical branches and occurs almost throughout India in drier regions. This too is grown in hedges. Its juice is believed to be diuretic.

(The tribals of Bastar use the white juice for treating wounds of cattle).

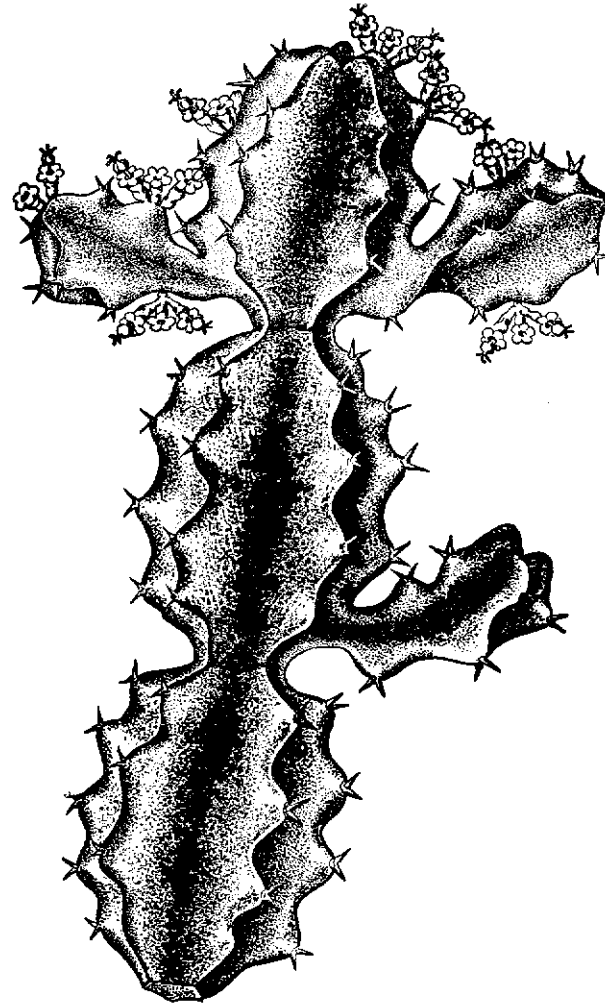


Fig. 12. EUPHORBIA (*Euphorbia antiquorum*)

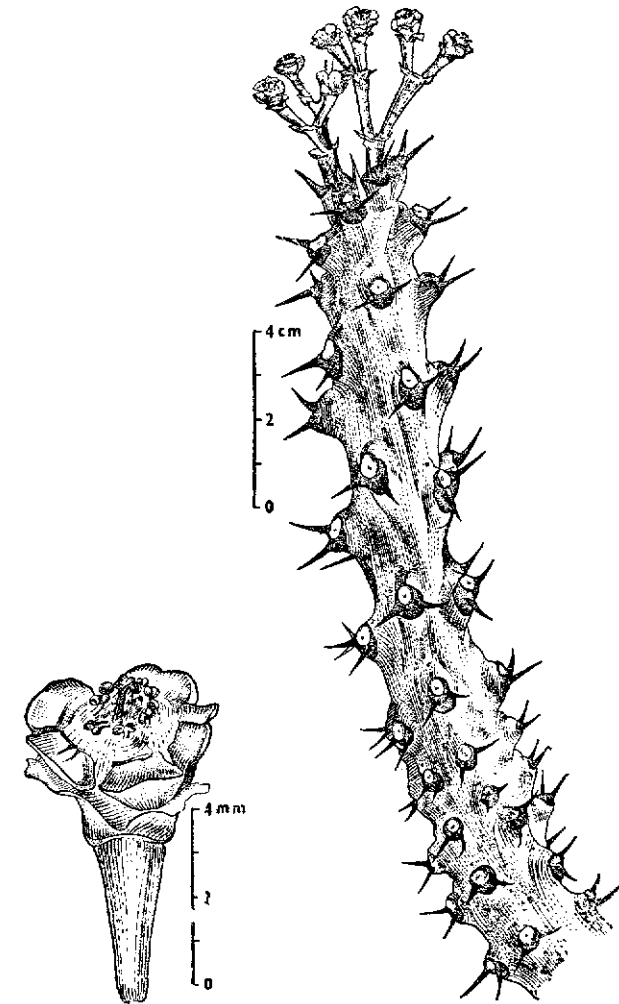


Fig. 13. EUPHORBIA (*Euphorbia nerifolia*)

E. royleana Boiss. (Punjabi—*Danda Thor*) has 5-7 angled branches and occurs on outer dry slopes of western Himalayas, usually between 1000-1500 m altitude.

E. tirucalli L. (Hindi—*Sehund*, Sanskrit—*Vajradruma*) is a shrub or small tree with much-branched cylindric branches; branches much narrower than other species. It is an African species but largely planted in hedges and on roadsides throughout drier parts of India, chiefly in Deccan and eastern India. The white juice of the plant is considered useful for local application in rheumatic pains, toothache etc. In small doses, it is also given internally.

35. ASAFOETIDA

FERULA NARTIEX Boiss.

Family: Umbelliferae

Indian names: Hindi—*Hing*;
Bengali, Gujarati, Kannada—*Hing*;
Kashmiri—*Yang, Sap*;
Malayalam—*Perungayam*;
Marathi—*Hing*;
Oriya—*Hengu*;
Sanskrit—*Balhika, Agudagandha*;
Tamil—*Perungayam*;
Telugu—*Ingumo*.

The trade name is based on the scientific name of a related species *Ferula asafoetida* L., which yields similar drug.

DESCRIPTION

A tall perennial herb with robust carrot-shaped roots. Leaves of two kinds; lower simple, 30-60 cm long, ovate; upper much divided into numerous segments. Young leaves densely hairy. Flowers



Plate 8
EPHEDRA
(*Ephedra gerardiana*)
(See page 65)





Plate 10
INDIAN SARSAPARILLA
(*Hemidesmus indicus*)
(See page 78)



Plate 12
LOBELIA
(*Lobelia nicotianaeifolia*)
(See page 93)



Plate 11
GARUDPHAL
(*Hydnocarpus laurifolia*)
(See page 82)



Plate 13
INDIAN HENBANE
(*Hyoscyamus niger*)
(See page 83)



Plate 14—MADHUCA (*Modhuca indica*) Adivasi women bring seeds from forests and sell to traders in weekly markets. (See page 95)

Plate 15—CAMPHOR BASIL (*Ocimum kilimandscharicum*) (See page 104)



small, yellow, in large terminal clusters. Fruit 8 mm long, about half as broad or broader.

DISTRIBUTION

This plant grows in Kashmir.

DRUG AND ITS PROPERTIES

Asafoetida is the resinous and scented substance obtained by incision in the living rhizomes or roots of this plant and its allied species.

It is a very useful remedy for relieving spasms and in indigestion, flatulent colic, cholera and whooping cough. It is a stimulant for respiratory and nervous system and is very effective in pneumonia and bronchitis in children. It is applied externally on stomach to stimulate the intestines, even its enema is recommended in intestinal flatulence.

Experiments have shown that *Asafoetida* has some sedative properties and its possible use in heart diseases has been suggested.

OTHER USES

Asafoetida is largely used as a spice; it is an essential ingredient in most pulse and vegetable curry preparations, pickles, etc.

OTHER SPECIES

Several species of this genus occurring in Central Asian region (Afghanistan, etc.) such as *F. foetida* Regel and *F. asafoetida* L. yield similar products as *F. narthex*.

The total annual demand of *Asafoetida* in India for medicinal purposes and other uses is estimated at over 6000 quintals, and cultivation of the plant in inner Himalayas is necessary to assure regular supply.

36. WINTERGREEN

GAULTHERIA FRAGRANTISSIMA Wallich

Family: Ericaceae

Indian names: Hindi—*Gandhpura-ka-tel*;
Sanskrit—*Hemant-harit*;
Assamese—*Jirhap*.

The trade name is based on the volatile oil, called *Wintergreen Oil*, obtained from this plant.

DESCRIPTION

An evergreen shrub about 3 m high. Stems much branched, bark orange brown. Leaves up to 13 cm long, rather broad, leathery, dotted with glands, margins toothed. Flowers small, greenish white, in short axillary bunches. Fruit roundish, enclosed in blue sepals.

DISTRIBUTION

This plant occurs in the hilly regions of northern, eastern and southern India, between 1500 and 2500 m altitude.

DRUG AND ITS PROPERTIES

The *Wintergreen Oil* is the volatile oil obtained from fresh plants of this species.

This oil is used in treatment of various forms of rheumatism. It is applied locally; it is also added to certain ointments and liniments to counteract their irritating effects. It is useful in destroying Hookworms and also has stimulant and carminative properties.

It is interesting to mention that when small quantities of this oil are administered to experimental mice, development of cancer is delayed. The drug has also prevented or cured certain types of tumor formation in experimental animals.

OTHER USES

The oil is used as a flavouring agent in soft drinks, lemon drops, tooth-pastes, etc. The oil is also used in many preparations for

killing or repelling mosquitoes, flies and other insects. The plant is grown for ornament in hill stations of India.

37. INDIAN GENTIAN

GENTIANA KURROO Royle

Colour Plate VI.

Family: Gentianaceae

Indian names: Hindi—*Kamalphul, Nilkanth, Kutki*;
Bengali—*Karu, Kutki*;
Gujarati—*Pakhanbhed*;
Kashmiri—*Nilkanthi*.
(Jaunsar—*Karu*.)

The trade name indicates that it is the Indian substitute of true *Gentian*.

DESCRIPTION

A small perennial herb with tufted decumbent stems, 10-30 cm high. Rootstock thick. Lower basal leaves 7-13 cm long, tufted; upper leaves up to 2.5 cm long, narrow. Flowers blue, with white spots, 4-5 cm long, 2-2.5 cm diameter, arising singly or in small bunches of 2-4 flowers. Fruit about 2 cm long.

DISTRIBUTION

This plant occurs in northwestern Himalayas, between 1500 and 3500 m altitude, in Kashmir and adjoining hills.

DRUG AND ITS PROPERTIES

The dried rhizomes of the plant constitute the drug.

Gentian is used for improving appetite and stimulating gastric secretion. It is an ingredient of many tonic and stomachic preparations. It has pleasant flavour and is agreeable to taste. In large doses it causes purging.

OTHER SPECIES

Gentiana lutea. L. (Yellow Gentian) is a foreign species, its roots are much valued in medicine and are largely imported into India. It has been suggested that the climate of northwestern Himalayas at altitudes of about 3000 m should be suitable for its cultivation.

One or two more species of *Gentiana* occur wild in the Himalayas; they can also be used as substitute for *Gentiana kurroo*.

An Indian plant *Picrorhiza kurroa* is considered suitable substitute for *G. lutea*.

The annual requirement of *Gentian* in India is estimated at about 10 quintals.

38. LIQUORICE

GLYCYRRHIZA GLABRA L.

Family: Papilionaceae

Indian names: Hindi—*Mulethi, Mulahti*;
Bengali—*Jashtimadhu*;
Kannada—*Yashtimadhukam*;
Malayalam—*Iratimadhuram*;
Sanskrit—*Madhuyashti*;
Tamil—*Atimadhuram*;
Telugu—*Yashtimadhukam*.

The trade name *Liquorice* should not be mixed with the drug called *Indian Liquorice*, which comes from an entirely different plant *Abrus precatorius* L. (Gunja).

DESCRIPTION

A tall erect herb or undershrub up to about 1.5 m high. Leaves compound, leaflets 4-7 pairs. Flowers lilac or light violet, small, in slender axillary spikes which are equal to, or slightly longer than the leaves. Fruits 1-3 cm long, flat, densely covered all over with

small spinous outgrowths. The rootstock throws numerous additional roots, or in some forms, there are several branched stems near the rootstock remaining underground.

DISTRIBUTION

The plant occurs in northern parts of Kashmir; it is now being cultivated in India in Kashmir, Dehra Dun, Delhi, etc.

DRUG AND ITS PROPERTIES

The dried roots and underground stems of this plant constitute the drug.

Liquorice is believed to be useful in cough, sore-throat, bronchitis, abdominal pains, consumption and epilepsy. For sore-throat and cough, a small piece of raw *Liquorice* is just chewed or sucked.

Liquorice promotes urination, and its diuretic activity, as also anti-biotic and antibacterial activity, have been experimentally shown.

Due to its sweet taste and demulcent property, *Liquorice* is largely used in making syrups and for masking bitter taste of medicines in mixtures or pills; it is useful in gastric and duodenal ulcers.

Liquorice powder, mixed with butter (Ghee) and honey, is applied on cuts and wounds.

The leaves of the plant, if applied as a poultice, are believed to be useful in scalds of the head.

OTHER USES

The powder or small pieces of the drug are commonly taken with betel leaves (*Pan*).

The requirement of this drug in India is not met from local produce and dried roots worth about three lac rupees were imported during 1970-71.

Kashmir, Punjab, Himachal Pradesh, Uttar Pradesh and Madras have been suggested as suitable areas for cultivation of this plant.

During a discussion on this plant, Dr H. Santapau, Director, Botanical Survey of India (who was born in Spain and is now an Indian national) recalled that *Glycyrrhiza* is a very widespread weed in rice fields in Spain and Italy. Young boys would rather pick up fresh pieces of its roots and suck, than buy toffees.

39. INDIAN SARSAPARILLA

(Hemidesmus, Anantmul)

HEMIDESMUS INDICUS (L.) Schult.

Plate 10.

Family: Periplocaceae

Indian names: Hindi—*Hindi Salsa, Anantmul*;
 Bengali—*Anantmul*;
 Gujarati—*Durivel*;
 Kannada—*Sogdeberingida*;
 Malayalam—*Nannari*;
 Marathi, Oriya—*Anantmul*;
 Sanskrit—*Nagajihya*;
 Tamil—*Nannari*;
 Telugu—*Muttavapulagamu*.

(Central India—*Kali Dudhi, Chhoti Dudhi*.)

As the drug obtained from this plant serves as a substitute for the true *Sarsaparilla* (which is the product of the genus *Smilax*), it is called *Indian Sarsaparilla*.

DESCRIPTION

A perennial twiner or creeper, rootstock woody, fragrant; stems slender, hairless; leaves vary greatly in shape and size, they are 5-10 cm long, but their breadth varies from 5 to about 4 cm, dark green, often with whitish blotches, pale or whitish, hairy on lower surface. Flowers very small, greenish, in small, compact cluster. Fruits 10-15 cm long, green, narrow, cylindric, pointed at tip, in pairs. Seeds small, black, with a tuft of white hairs at top. All parts of the plant have white milky juice.

DISTRIBUTION

The plant occurs almost throughout India.

DRUG AND ITS PROPERTIES

The dried roots of the plants constitute the drug.

The drug is useful in fever, skin diseases, loss of appetite, syphilis, leucorrhoea and other urinary complaints. The diuretic action of the drug has been shown experimentally. The drug is largely used as a blood purifier and in rheumatism. Tests in hospitals have confirmed the utility of *Indian Sarsaparilla* as a substitute for true *Sarsaparilla*, which is obtained from plants of the genus *Smilax*.

OTHER USES

The leaves of the narrow-leaved form of the plant are chewed and are refreshing.

40. KURCHI

HOLARRHENA ANTIDYSENTERICA (L.) Wallich ex G. Don

Colour Plate VII.

Family: Apocynaceae

Indian names: Hindi—*Indrajau, Korai, Kurchi*;
 Assamese—*Dutkhuri*;
 Bengali—*Kurchi*;
 Gujarati—*Kuda*;
 Kannada—*Hale*;
 Malayalam—*Kodagapala*;
 Marathi—*Gal, Dudhari, Kodaya*;
 Oriya—*Khurni, Kherwa*;
 Punjabi—*Kewar*;
 Sanskrit—*Kutaja, Kalinga*;
 Tamil—*Indraban*;
 Telugu—*Pala kodsā*.
 (Nainital—*Keora*.)

The trade name is based on local Indian name of the plant;

the word *antidysenterica* in scientific name indicates its chief usage. The Sanskrit name 'Kutaja' denotes, it grows on peaks (*Kut*: peak).

DESCRIPTION

A tall shrub or small tree, sometimes up to 10 m tall. Leaves 10-30 cm long, ovate, thin, nerves on the leaves conspicuous. Leaf-stalks very small. Flowers white, fragrant, 1-1.5 cm diameter, in large terminal bunches. Fruits slender, cylindric, 20-45 cm long, 6-8 mm thick, dark grey with white specks all over. Seeds about 1 cm long, having a tuft of long (2-2.5 cm), brown hairs at top. All parts of the plant, on incision, give out white milky juice.

DISTRIBUTION

The plant occurs throughout India up to an altitude of about 1200 m. It was found to be very common on forest fringes in Madhya Pradesh and Maharashtra.

DRUG AND ITS PROPERTIES

The dried bark of the plant constitutes the drug *Kurchi*.

The chief use of this drug is in amoebic dysentery. Either an extract of the bark is used singly or several other preparations in combination with chemical compounds are used. The bark of the plant also has tonic and febrifuge properties.

The alkaloid Conessine present in this bark has been found to retard growth of tubercular bacilli.

Seeds also possess alkaloids which are effective in dysentery.

Certain medicinal properties have been attributed to leaves also.

OTHER USES

This plant is good for afforestation of poor soils; it is a pioneer

in newly cleared forest areas. The wood is good for making miscellaneous domestic articles such as paper knives, toys, small boxes pen holders, combs, printing blocks, tobacco pouchs, picture frames, etc.

41. CHALMOGRA

HYDNOCARPUS KURZII (King) Warb.

Family: Flacourtiaceae

Indian names: Hindi—*Chalmogra*;

Assamese—*Lamtani*;

Bengali—*Chalmogra*, *Dalmugri*;

Malayalam—*Maravetti*.

The trade name is based on local names of the tree.

DESCRIPTION

A tree about 15 m high, sometimes more, with a tall trunk and a crown of drooping branches. Leaves about 20 cm long, pointed at tip, leathery. Flowers small, yellow, in small axillary clusters. Fruit 6-7 cm diameter, round, brown; seeds many.

DISTRIBUTION

The tree is found in evergreen forests of Assam and Tripura; at certain spots it is very abundant.

DRUG AND ITS PROPERTIES

The oil obtained from the fresh ripe seeds of the tree is medicinal.

The oil is used in treatment of leprosy. Formerly the oil was given orally, now certain preparations based on the oil are injected. The bark of the tree contains certain tannins and is considered useful in fever.

OTHER USES

The seed cake of *Hydnocarpus kurzii* is used as manure. Some animals eat the fruits of this tree; it has been recommended that the flesh of such animals should not be eaten. Even fish stupefied or killed by *Chalmogra* fruits are considered unsuitable for human consumption.

OTHER SPECIES

Hydnocarpus laurifolia (Dennst) Sleummer (Plate 11) syn. *H. wightiana* Blume (Marathi—*Katu kavath*; Sanskrit—*Garudphal*; Tamil—*Maravetti*) occurs in the Western Ghats. The oil from the seeds is medicinal. It has similar properties as the oil from *H. Kurzii*. It is applied locally on leprosy and reduces the nodules. The oil is useful also on rheumatic pains, sprains, tubercular laryngitis, inflammations, etc. Some experiments have shown its effect in destroying certain bacteria.

42. TALMAKHANA

HYGROPHILA AURICULATA (Schum.) Heine
syn. *H. spinosa* And., *Asteracantha longifolia* Nees

Family: Acanthaceae

Indian names: Hindi—*Talmakhana*, *Kuliakanta*;
Bengali—*Kuliakhara*, *Kulpokata*;
Gujarati—*Ekhro*;
Kannada—*Kodvanke*;
Malayalam—*Vayelchulli*;
Marathi—*Talimakhana*;
Sanskrit—*Kokilaksha*;
Tamil—*Nirmulli*;
Telugu—*Nirugubbi*.

The trade name is based on local names of the plant.

DESCRIPTION

A stout erect herb, 60-150 cm high; stems unbranched, erect, straight, four-angled, hairy, more so below the swollen nodes. Leaves whorled, 6 at a node, each having a sharp, yellow spine in its axil. Flowers 8 in a whorl, purple blue, about 3 cm long, 2-lipped; lower lip characteristically folded.

DISTRIBUTION

The plant occurs in marshes and other moist spots throughout India, often filling the shallow, partially dried ditches and roadside water channels.

DRUG AND ITS PROPERTIES

The drug consists of the entire plant including the roots.

It is useful in dropsy, jaundice, rheumatism and diseases of urinogenital system; seeds are considered useful also in veneral diseases. The diuretic activity of the drug is believed to be due to a combination of both inorganic and organic contents of the plants. Seeds and roots, singly also, have diuretic property. Leaves are useful in cough and urethral discharges.

43. HYOSCYAMUS

(*Indian Henbane*)

HYOSCYAMUS NIGER L.

Plate 13.

Family: Solanaceae

Indian names: Hindi—*Khurasani Ajvain*;
Bengali—*Khurasani Ajvain*;
Gujarati—*Khurasani Ajvain*;
Marathi—*Khurasani Ova*;
Sanskrit—*Parasikaya*.

The trade name is based on scientific name.

DESCRIPTION

An annual or biennial bad smelling herb, densely covered with glandular hairs; stem upto 1 m high. Lower basal leaves 15-20 cm, margins toothed. Upper leaves smaller and divided into many segments. Flowers 2-3 cm diameter, pale green, streaked with purple, some borne solitary at the place of branching of stems, others in long, terminal spikes. Fruit 1.3 cm diameter, globose.

DISTRIBUTION

The plant occurs in the western Himalayas from Kashmir to Garhwal at altitudes of about 1,500 to 3,000 m, commonly in waste places near habitations. It has been cultivated in several regions of India, such as Kashmir, Punjab, Uttar Pradesh, Maharashtra and Nilgiri hills.

DRUG AND ITS PROPERTIES

The dried leaves and flowering tops collected soon after flowering of the plant constitute the drug.

The drug has similar properties as *Belladonna* (*Atropa belladonna*). It is useful for relieving certain painful spasmodic conditions of muscles, and in nervous irritations as in hysteria, cough, etc. It also dilates the pupil of the eye.

Seeds of the plant also have medicinal properties, they are usually pasted and applied locally on pains.

The annual requirement of this drug in India has been estimated at 40 quintals. It can be grown in the Himalayan region in Kashmir, Punjab, Himachal Pradesh and Uttar Pradesh.

OTHER SPECIES

Hyoscyamus muticus L. (*Egyptian Henbane*) is being cultivated in Kashmir etc. The alkaloid content of this plant is more than *Indian Henbane*; it also has more intense narcotic property. The leaves of *Egyptian Henbane* are smoked for intoxication. As indicated above, the total Indian requirement of *Henbane* is about 40 quintals and it can be met by expanding the cultivation of either of the two species.

44. KALADANA

IPOMOEA NIL (L.) Roth syn. *I. hederacea* auct. non Jacq. **Fig. 14.**

Family: Convolvulaceae

Indian names: Hindi—*Kaladana*, *Nilkalmi*;
Bengali, Gujarati—*Kaladana*;
Gujarati—*Kana Kumpan*;
Marathi—*Nilpushpi*;
Oriya—*Kanikhondo*;
Sanskrit—*Krishnabij*;
Tamil—*Sirikki*;
Telugu—*Jiriki*.

(Nainital—*Bhorada*.)

The trade name is based on Indian local names. The species name *nil* refers to the blue colour of flowers. (Blue—*Nila*).

DESCRIPTION

An annual twining plant, stems sparsely covered with hairs. Leaves 5-12 cm diameter, ovate, shallowly or deeply 3-lobed. Flowers 4-5 cm long, funnel-shaped, blue, slightly orange-coloured below, few growing together in small stalked clusters. Fruit 8 mm diameter, almost roundish or ovoid. Seeds small, glabrous. There is an interesting thing about colour of flowers. Flowers are blue as long as they are on the plants; within minutes of plucking they become purplish; this is why many books mention colour of flowers as purple.

DISTRIBUTION

This plant occurs throughout India up to an altitude of about 1,800 m; it is truly wild in India; at times it is cultivated.

DRUG AND ITS PROPERTIES

The dried seeds of the plant constitute the drug.

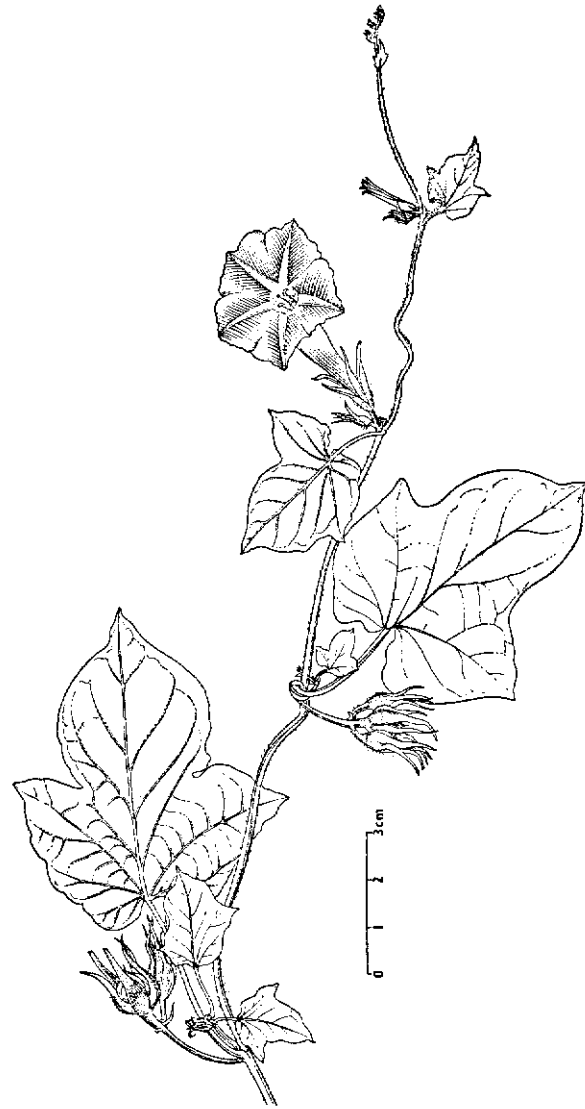


Fig. 14. KALADANA (*Ipomoea nil*)

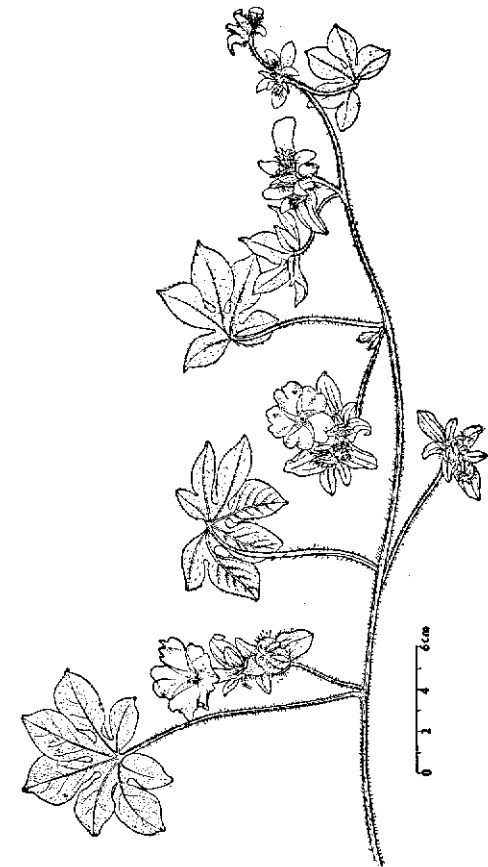


Fig. 15. IPOMOEA (*Ipomoea pestigridis*)

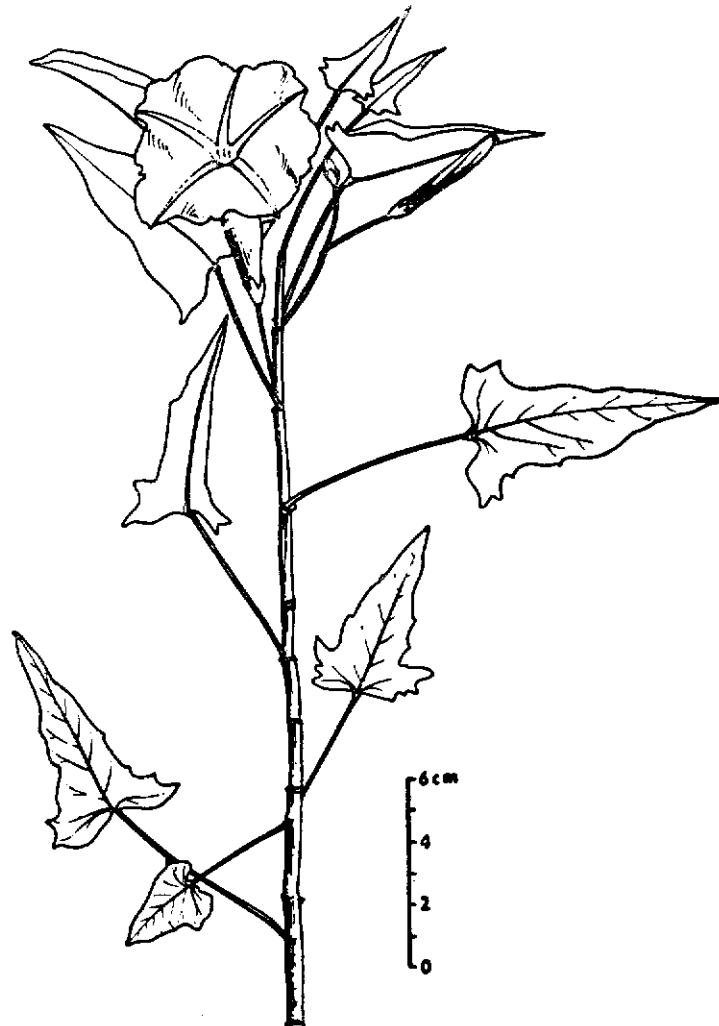


Fig. 16. SWAMP CABBAGE (*Ipomoea aquatica*)

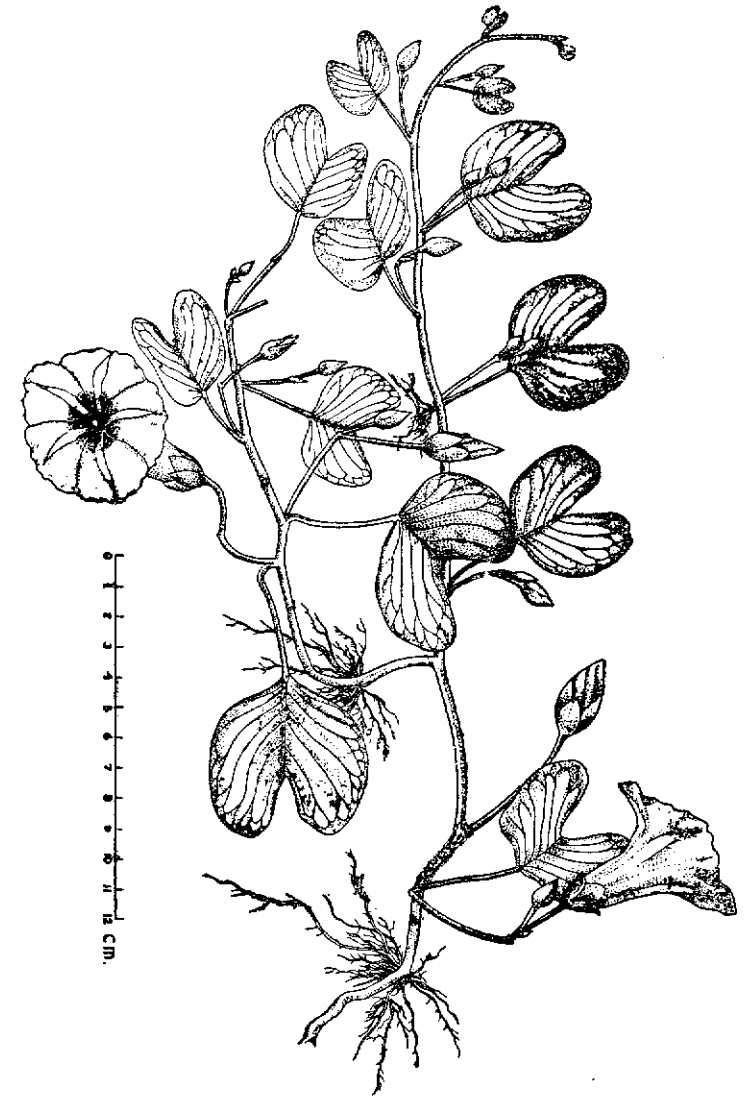


Fig. 17. IPOMOEA (*Ipomoea pescapare*)

Kaladana is used as a purgative. Overdoses of the drug cause irritation.

OTHER USES

Fresh fruits of the plant are eaten as vegetable. The plant is often grown for its beautiful flowers.

OTHER SPECIES

Several other species of the genus *Ipomoea* are of medicinal value. Many of them have laxative or purgative properties. For example, roots of *Ipomoea pestigridis* L. (Fig. 15. Hindi—*Ghiabati*, *Kaladana*, *Panchpatri*, Madhya Pradesh—*Badi Pasvi*), juice of whole plant of *I. aquatica* Forsk. (Fig. 16. Swamp cabbage, Hindi—*Kalmishak*, Punjabi—*Sornalika-sag*), *I. pescaprae* (L.) Sweet (Fig. 17. Hindi—*Dopatilata*), *I. purpurea* (L.) Roth (Morning glory), *I. quamoclit* L. (Indian Pink, Hindi—*Kamlata*, Bengali—*Torulata*) and *I. uniflora* Roem. & Schult., and seeds of *I. cairica* (L.) Sweet (Railway Creeper) are considered to be laxative or purgative.

(The tribals of Bastar crush the flowers of *I. aquatica* and put the juice into inflamed eyes).

The tuberous roots of *Ipomoea purga* Heyne (which is now named as *Exogonium purga* Benth.) are laxative. This plant is a native of America; it has been cultivated in gardens for ornament or otherwise, in several places particularly in southern and eastern India. Its annual requirement in India is only about 6 quintals. Indian species are, however, its satisfactory substitutes.

45. HENNA

LAWSONIA INERMIS L. syn. *L. alba* L.

Family: Lythraceae

Indian names: Hindi—*Mehndi*;
 Bengali—*Mehndi*;
 Gujarati—*Mehndi*;
 Kannada—*Mailanchi*, *Goranti*;
 Kashmiri—*Mohuz*;
 Malayalam—*Mailanchi*;
 Marathi—*Mehndi*;
 Oriya—*Benjati*;
 Punjabi—*Hinah*;
 Sanskrit—*Mendika*, *Raktagarbha*;
 Tamil—*Marithondi*, *Mullugorantla*;
 Telugu—*Goranti*.

The trade name is based on the word Hina which is the Arabic name of the drug.

DESCRIPTION

A middle-sized or large, much-branched shrub, sometimes tree-like; branches 4-angled, usually ending in a sharp point. Leaves opposite, 2-3 cm long, often acute and sharp-pointed. Flowers small, white or pinkish, fragrant, in terminal large bunches. Fruit small, size of a pea, round; seeds many.

DISTRIBUTION

The plant occurs in several parts of India, chiefly in the drier parts of peninsula, but is usually cultivated in hedges. It is also cultivated for commerce in Punjab, Gujarat, Madhya Pradesh and Rajasthan.

DRUG AND ITS PROPERTIES

The leaves of the plant have certain medicinal properties. -

They are astringent and are used as a prophylactic against skin diseases. They are applied locally on boils, burns and skin diseases. A decoction of leaves is used as gargle in sore throat. The paste of leaves is largely used in Indian homes in headache, burning sensation in feet, etc.

The leaves have also been shown to have some action against tubercular and other bacteria, and in typhoid and haemorrhagia. The plant has not, however, so far been put to much use in this manner.

The bark and seeds of the plant are also reported to be used in Ayurvedic and Unani medicine.

OTHER USES

The chief use of the *Henna* plant is as a pleasant orange dye for colouring palms, nails, feet, hair, beard, even tails and limbs of animals. *Henna*, mixed with other natural dyes, is largely used as hairdye and even for textiles.

The oil obtained from its flowers is used in perfumery.

46. LOBELIA

(*Wild Tobacco*)

LOBELIA NICOTIANAEOFOLIA Heyne ex Roth

Plate 12.

Family: Lobeliaceae

Indian names: Hindi—*Narasal*;
Bengali—*Bantamaku*;
Gujarati—*Nali*;
Kannada—*Koduhogesoppele*;
Malayalam—*Kattupukayila*;
Marathi—*Devanala*;
Sanskrit—*Bibhishana*, *Devanala*;
Tamil—*Kattupukayila*;
Telugu—*Adavipogaku*.

The trade name is based on generic name of the plant. The specific name *nicotianaefolia* means leaves like tobacco plant.

DESCRIPTION

A larg herb; stem stout, hollow, 3-5 m high, occasionally branched in the upper part. Leaves very large, up to 45 cm long in lower part of stem, smaller upwards, margins not entire; the main nerve of the leaves whitish. Flowers large, white, in very large terminal bunches. Fruit 8 mm, roundish. Seeds many, small, yellowish, brown.

DISTRIBUTION

The plant occurs in the hilly regions of the Deccan peninsula, also in adjoining plains.

DRUG AND ITS PROPERTIES

The drug consists of aerial parts of the plant collected in October to November and dried in shade.

The properties of this drug are somewhat similar to nicotine. It is used in bronchitis and asthma; the drug causes sweating, nausea and consequently vomiting, thereby causing general relaxation. The drug is sometimes dangerous in the sense that if it is not vomited out, it is toxic to system, and even death may occur.

Lobeline, the alkaloid contained in this drug, stimulates respiration and is used for reviving respiration in cases of failures of respiration caused by excessive narcotics, anesthetics, gases, etc.

Aerial parts of *L. nicotianaefolia* exude a white juice; this juice causes blisters on skin.

The dried plants seem to cause irritation of mucous membranes (such as in nose and throat) even from some distance. Coolies engaged for plant collection work avoid approaching areas inhabited by this plant.

OTHER SPECIES

Lobelia inflata is a plant of America and efforts are being made to cultivate it in India. Deccan peninsula and Assam are considered to be better area for its cultivation. The drug *Lobelia*, which yields Lobeline, is imported into India. However, *Lobelia* drug obtained from Indian species described above is used as substitute.

The total Indian requirement of *Lobelia* drug is estimated at 50 quintals per year.

A few other less important species of *Lobelia* grow wild in India but are not of much use.

47. MADHUCA

MADHUCA INDICA Gmel. syn. *Bassia latifolia* Roxb. Fig. 18.

Family: Sapotaceae

Indian names: Hindi—*Mahuva, Mahua*;
 Bengali—*Mahua*;
 Gujarati—*Mahudo*;
 Kannada—*Hippe*;
 Malayalam—*Poonam*;
 Marathi—*Mahua*;
 Oriya—*Mohuka*;
 Sanskrit—*Madhuka, Vanaprastha*;
 Tamil—*Elluppai*;
 Telugu—*Ippa*.
 (Santal—*Matkom*.)

The trade name is based on the Sanskrit name of the plant. The name *Vanaprastha* found in some early literature means that the tree grows in woodlands (*Vana*).

DESCRIPTION

A large deciduous tree with rather shorter bole, but larger crown. Leaves 12-25 cm long, thick leathery, pointed at tip; nerves quite prominent. Flowers small, fleshy, pale or dull white, in clusters near the ends of branches, stalks of flowers bent downwards, covered with brownish hair. Flowers strongly musk-scented, falling at dawn. Fruit 2.5-5 cm long, fleshy, greenish, seeds 1-4; brown, shining, 2.5-3.5 cm long.

DISTRIBUTION

The tree occurs in all the plains and lower hills of India up to 1200 m; it is very common in submontane regions of the Himalayas, and is, at certain places, a chief constituent of the forest vegetation.

DRUG AND ITS PROPERTIES

The bark, leaves, flowers and seeds of the tree constitute the drug.

Decoction of the bark is applied in curing itch, bleeding gums and ulcers; it is given internally in diabetes.

Leaves are astringent, their ash, mixed with butter (ghee), is applied on burns and scalds.

Flowers are used in cough and bronchitis, they are cooling and nutritive. A spirit prepared from flowers is considered to be tonic and nutritive. Flowers possess some antibacterial property.

Seeds promote formation and flow of milk. Oil from seeds is good on skin diseases and as laxative. (Plate 14).

OTHER USES

Mahua flowers are eaten raw or cooked; their excessive use is harmful. Flowers are largely employed for making alcohol, vinegar, syrups, jams, etc.

Mahua oil is largely used in manufacture of soaps, in cooking, etc.

Mahua cake is used as manure; sometimes it is fed to cattle. It is also applied to tennis courts to evict earthworms. The timber is used for several miscellaneous purposes.

OTHER SPECIES

Another very closely allied species of the genus, namely *Madhuca longifolia* (Koenig) Macb. (syn. *Bassia longifolia* Koenig) occurs in Deccan peninsula and goes under same local names as *M. indica*. The properties of all the plant parts are also similar, and the Indian Pharmaceutical Codex recognises products from both trees as constituents of official drug.



Fig. 18. MADHUCA (*Madhuca indica*)

48. KAMELA

MALLOTUS PHILIPPENSIS Muell.-Arg.

Family: Euphorbiaceae

Indian names: Hindi—*Kamela*, *Senduri*, *Rohini*;
 Assamese—*Gangai*;
 Bengali—*Kamala*, *Raini*;
 Gujarati—*Kapila*;
 Kannada—*Kesalai*, *Ronati*;
 Malayalam—*Kapila*;
 Marathi—*Shendri*;
 Oriya—*Kamalagundi*;
 Sanskrit—*Senduri*, *Kamela*;
 Tamil—*Kopila podi*;
 Telugu—*Kunkuma*.
 (Bihar, Singbhum—*Gasarba*;
 Tinnevely—*Kalupatti*.)

The trade name is based on Indian local names.

DESCRIPTION

A small or middle-sized evergreen tree, sometimes only a much branched large shrub; young parts densely covered with minute red hairs. Leaves alternate, borne on long stalks, variable in shape, 7-20 cm long, their lower side dotted with reddish glands, prominently veined. Flowers minute, male and female on separate plants. Female flowers in erect 5-8 cm long spikes; male flowers yellow, in 8-15 cm long, drooping bunches. Fruit 8-13 mm, roundish, 3-lobed, densely covered with a reddish brown, powdery substance, and minute hairs, which are easily rubbed out.

DISTRIBUTION

The tree is found throughout tropical regions of India from an altitude of 1,500 m in the Himalayas, southwards up to Kerala,

DRUG AND ITS PROPERTIES

The red glandular and hairy substance separated from the fruits forms the drug.

Kamela is chiefly used for destroying tapeworms. The *Kamela* powder is taken with milk or curd etc. If one dose of *Kamela* does not expel the worm, the dose is repeated. Sometimes a dose of castor oil is necessary to expel the dead worm.

Kamela itself is a purgative. It is also used externally in treatment of skin diseases like ringworm and scabies, etc.

The hairs on the fruits have been tried (on animals) as oral contraceptives; they have been found to reduce fertility in female rats and guinea-pigs.

OTHER USES

The tree is a well known source of Kamela dye and used in colouring textiles.

The oil extracted from seeds is being used in paints and varnishes, and in several other ways. Due to excellent drying properties the oil is much valued in painting work and is in great demand.

The wood of the tree is used for minor domestic articles and fuel; it is suitable for match boxes. The leaves provide good fodder. The seed cake is used as manure. The bark of the tree contains tannins and is used for tanning leather.

As the local name in certain languages indicates, the red *Kamela* powder is used by women as *Sendur* (Vermillion).

49. MINT

(Podina)

MENTHA species

Family: Labiatae

Indian names: Most of the Indian local names of *Mentha* species are based on the word *Podina*.

The plants belonging to the genus *Mentha* are aromatic herbs. Several species grow wild; some are cultivated. The chief constituents for which these plants are valued are Menthol and Peppermint oil.

Mentha arvensis L. (English—Field Mint, Corn Mint; Indian name—*Podina*) is an erect branched herb up to about 60 cm high. Leaves up to 5 cm long; leafstalk small or none, margins toothed. Flowers small, lilac, in small bunches, borne in axils of leaves.

This herb occurs in Kashmir at an altitude of about 1,500-3,000 m; it is also cultivated.

Infusion of its leaves is used in rheumatic pains and indigestion.

A Japanese variety of this plant (named *M. arvensis* L. subsp. *haplocalyx* Briq. var. *piperascens* Holmes) has been cultivated in Jammu and Kashmir. This yields an oil; its trade name is Japanese Mint Oil or Japanese Peppermint Oil. It is used as a substitute for true Peppermint Oil (obtained from *M. Piperita*).

Mentha longifolia (L.) Huds. (Syn. *M. sylvestris* L., English—Horsemint, Hindi—*Jangli Podina*, Punjabi—*Koshu*) is a larger herb and occurs in Kashmir and northern parts of Punjab and Uttar Pradesh. This plant is considered antiseptic, stimulant, and useful in digestive complaints and fever.

TRUE PEPPERMINT

The most important plant of this group is *Mentha piperita* L. (English—Peppermint, Punjabi—*Vilayati Podina*). This plant is

cultivated in several parts of India, e.g. in Kashmir, Uttar Pradesh, Mysore, Madras, etc.

The dried leaves and flowering tops of the plant constitute the drug *Peppermint*. The drug is used in treatment of flatulence, vomiting, diarrhoea and nausea. Bruised leaves are applied in headache and other pains.

The main use of this drug is for extraction of Peppermint oil (which contains Menthol) and is largely used in medicine for stomach disorders, in ointments for headaches, rheumatic and other pains and in cough drops, inhalations, mouth washes, etc. The oil is also antiseptic.

Peppermint oil and Menthol worth over ten million rupees are imported in India every year. The need to expand cultivation of these herbs has, therefore, been greatly emphasized.

50. JATAMANSI

(Spikenard)

NARDOSTACHYS JATAMANSI DC.

Plate 17.

Family: Valerianaceae

Indian names: Hindi—*Jatamansi*;
Bengali, Gujarati—*Jatamansi*;
Kashmiri—*Bhutijatt*;
Sanskrit, Tamil, Telugu—*Jatamansi*.

The trade name is based on the Indian name of the plant i.e., *Jatamansi*, which refers to the bearded appearance of rhizomes.

DESCRIPTION

A perennial herb up to about 60 cm tall, rhizomes woody, long, covered with fibres from petioles of withered leaves. Lower basal

leaves up to about 20 cm long, narrowed into the petiole; upper leaves much smaller, almost ovate. Flowers small, several in small bunches. Fruit small, covered with minute hairs.

DISTRIBUTION

The plant occurs in the alpine Himalayas between 3,000 and 4,500 m altitude, eastwards to Bhutan.

DRUG AND ITS PROPERTIES

The dried rhizomes and roots of this plant are medicinal.

Jatamansi has tonic, antispasmodic and stimulant properties; it is, therefore, useful in treatment of certain types of fits, convulsions and palpitation of heart. It is used also as laxative and for improving urination, menstruation and digestion.

It is used as a substitute for the drug *Valerian* (*Valeriana officinalis* L.)

The total Indian requirement of this drug is estimated to be about 20 quintals. Higher altitudes in Himalayas are considered suitable for its cultivation.

51. TULSI

(*Sacred Basil, Holy Basil*)

OCIMUM SANCTUM L.

Family: Labiatae

Indian names: Hindi—*Tulsi*;
Bengali, Gujarati—*Tulsi*;
Kannada—*Vishnu Tulsi*;
Malayalam—*Trittavu*;
Marathi—*Tulshi*;
Sanskrit—*Manjari, Krishna Tulsi*;
Tamil, Telugu—*Thulasi*.

DESCRIPTION

This is a well known sacred plant of the Indians. It is a much-branched erect herb, up to about 75 cm high, hairy all over. Leaves opposite, about 5 cm long, margins entire or toothed; hairy on upper as well as lower surface, dotted with minute glands, aromatic. Flowers small, purplish or reddish, in small compact clusters on slender spikes. Fruits small; seeds yellowish or reddish.

DISTRIBUTION

This plant is grown in houses, gardens, and temples all over India and is often found as escape.

DRUG AND ITS PROPERTIES

The leaves and seeds of the plant are medicinal.

The oil obtained from leaves has the property of destroying bacteria and insects. The juice or infusion of the leaves is useful in bronchitis, catarrh, digestive complaints; it is applied locally on ringworm and other skin diseases; it is dropped in ears to relieve earache. A decoction of leaves is used in Indian homes to cure common colds. Seeds are useful in complaints of urinary system.

Decoction of root is given in malarial fever to bring about sweating.

OTHER USES

The plant is rather an essential article in the worship of Hindu gods and goddesses.

OTHER SPECIES

Ocimum canum Sims (English—Hoary Basil, Hindi—*Kali Tulsi*, *Ram Tulsi*, *Bharbhari*) is found almost throughout India, generally near habitations, agricultural fields and in waste places. Its seeds are black. Seeds are considered to be tonic and diuretic. The oil from its leaves has similar properties as the oil from *O. sanctum*.

O. basilicum L. (English—Sweet Basil, Hindi—*Bubai Tulsi*, *Sabzah*, Sanskrit—*Munjariki*, Tamil—*Karpura Tulsi*) occurs naturally in northwestern India and is cultivated in other parts of India. This plant is useful in fever, cough, worms, stomach complaints and gout. Juice of leaves is used as a nasal douche and is applied on skin diseases. Seeds, given internally, relieve constipation and piles.

An exotic East African species of this genus, namely, *O. kilmanschaticum* Guerke (Camphor Basil) has recently gained much importance as a source of *Camphor*. It has been cultivated in India in Kashmir, Uttar Pradesh, West Bengal, Maharashtra, Mysore, Madras and Kerala (Plate 16). Areas up to an altitude of about 1000 m are considered suitable for its cultivation. The *Terai* region of U.P. is very suitable for it. *Camphor* is largely used in medicine, chiefly in preparations for local application on pains, sprains, etc. (See *Cinnamomum camphora*).

Camphor is put to several miscellaneous uses and the annual requirement of *Camphor* in India is estimated at about 400,000 quintals. It is met partly from our own resources and partly from imports.



Plate V—DIGITALIS (*Digitalis purpurea*) (See page 55)



Plate VI—INDIAN GENTIAN (*Gentiana kurroo*) (See page 75)



Plate VII—KURCHI (*Holarrhena antidysenterica*) (See page 79)

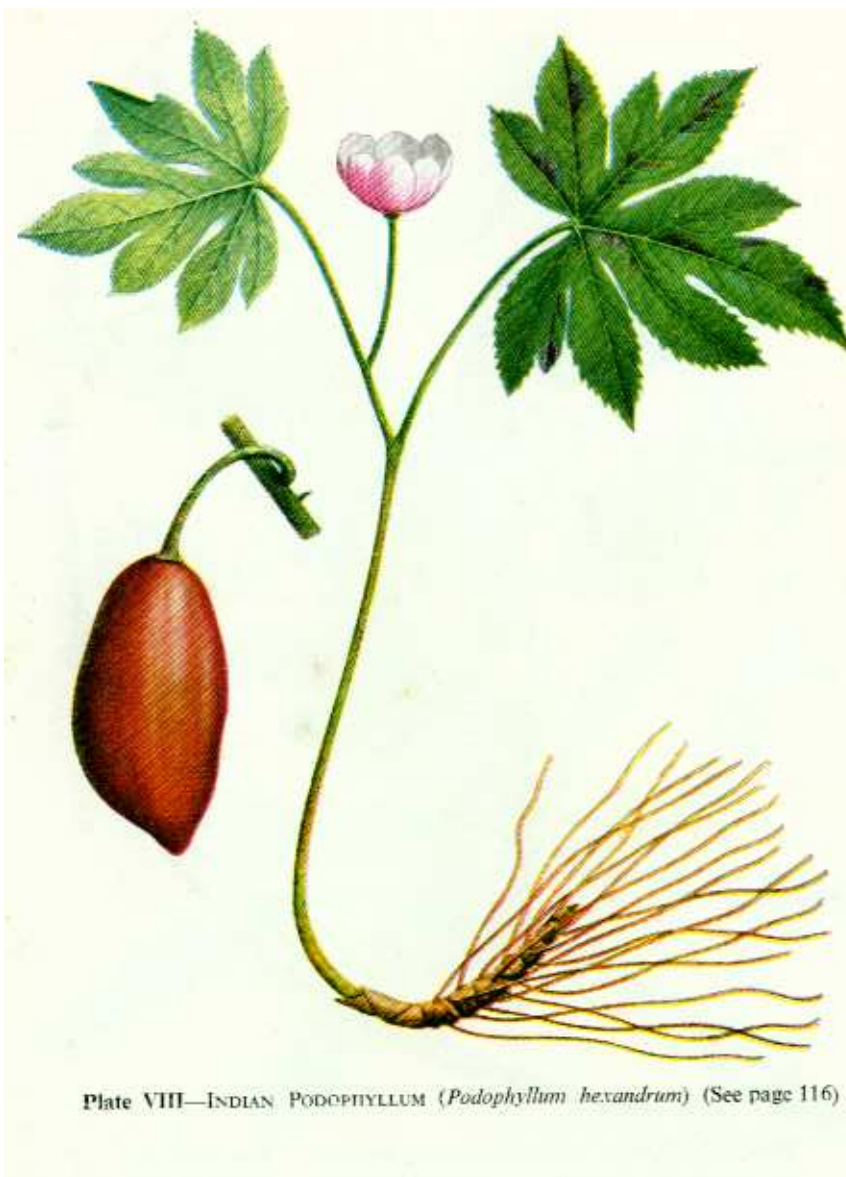


Plate VIII—INDIAN PODOPHYLLUM (*Podophyllum hexandrum*) (See page 116)

52. TURPETH

(*Indian Jalap*)

OPERCULINA TURPETHUM (L.) Silva Manso

Fig. 19.

Family: Convolvulaceae

Indian names: Hindi—*Nisoth, Pithori*;
 Bengali—*Dudiya Kalmi*;
 Gujarati—*Nashatar*;
 Kannada—*Bilialutigadde*;
 Marathi—*Nishottara*;
 Punjabi—*Nisor*;
 Sanskrit—*Kalaparni, Triputi*;
 Tamil—*Shivadai*;
 Telugu—*Tellategada*.

The trade name is based on the scientific name.

DESCRIPTION

A large twining herb with milky juice; root long, branched, fleshy; stems winged. Leaves 4-10 by 1.5-7 cm, ovate, cordate. Flowers white, 4-5 cm long, funnel-shaped, in few-flowered bunches. Sepals about 2 cm long, but when plant is in fruit, they become much larger and brittle and enclose the fruits.

DISTRIBUTION

The plant occurs almost throughout India up to an altitude of about 1000 m; it is sometimes grown in gardens for its beautiful flowers.

DRUG AND ITS PROPERTIES

The dried roots of the plant constitute the drug; the roots should be taken from white variety only, and they should have their bark intact.

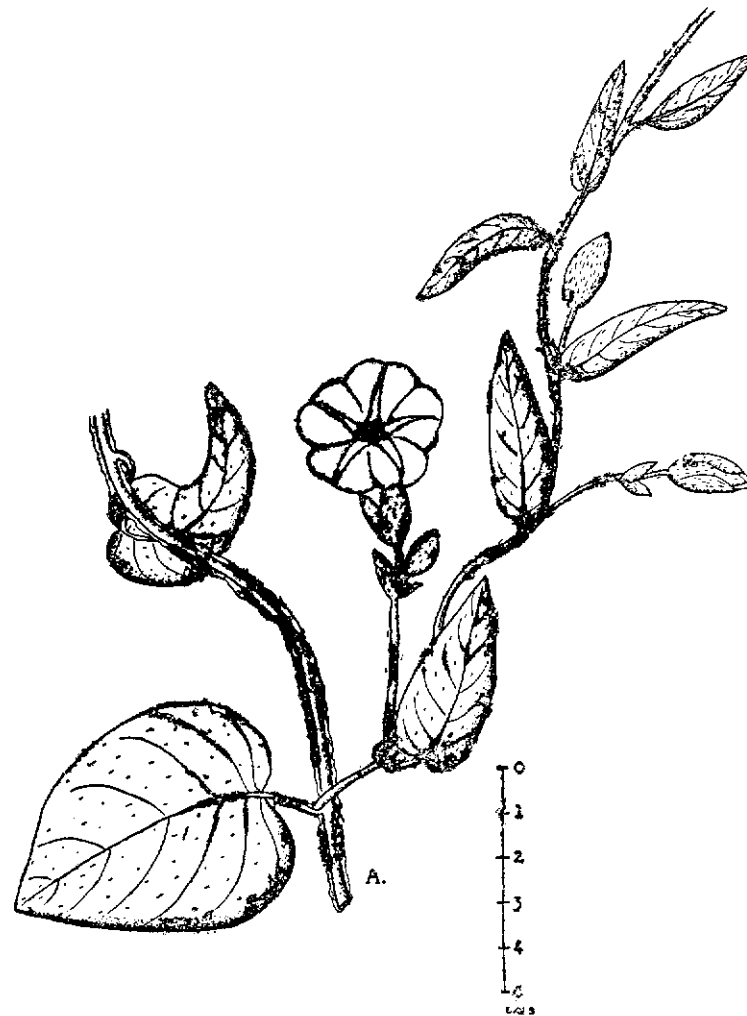


Fig. 19. TURPETH (*Operculina turpethum*)

The drug contains Turpethin. The *Turpeth* has almost same properties as the true *Jalap*, obtained from *Exogonium purga* and is a suitable substitute for it. It is used as a purgative. Powdered roots are suitable for this. The samples of *Turpeth* commonly available in markets have stems and twigs of the plant mixed with the roots.

53. HARMAL

PEGANUM HARMALA L.

Plate 18.

Family: Rutaceae

Indian names: Hindi—*Gandhya*, *Harmal*;
 Bengali—*Isband*;
 Gujarati—*Harmar*;
 Malayalam, Punjabi—*Harmal*;
 Tamil—*Simaiyaravandi*;
 Telugu—*Simagoranti*.

English name: *Wild Rue*.

The trade name is based on the Indian local names of the plant.

DESCRIPTION

A shrub about 30-90 cm high, leaves 5-8 cm long, divided into numerous narrow segmets. Flowers 2-3 cm diameter, white, single in axils of leaves. Fruits capsular, globose, 5-8 mm diameter, deeply lobed. Seeds 2.5-4 mm long, brownish, of various shapes and with reticulated seed coat.

DISTRIBUTION

The plant is found almost throughout the northern and north-western India, and in drier regions of Deccan.

DRUG AND ITS PROPERTIES

The dried seeds of the plant constitute the drug Harmal.

The seeds contain several alkaloids and are useful in asthma, hysteria, rheumatism, gallstones, colic pains, fever, jaundice and complaints of difficult and painful menstruation. They are used also as narcotic, anthelmintic and emetic.

The alkaloids Harmaline, Yageine and Harmine, obtained from this drug, are all psychomimetics, *i.e.*, act as hallucinogens. The drug stimulates motor tracts of cerebrum and central nervous system. Higher doses are poisonous and bring about severe depressant action on the nervous system.

Experiments have confirmed bactericidal action of the drug, but tests in hospitals did not show any useful effect of the drug in malaria.

OTHER USES

The seeds yield a red dye. Powdered roots mixed in mustard oil kill lice in hair. The plant, kept in room, repels mosquitoes.

54. PERGULARIA

PERGULARIA DAEMIA (Forsk.) Chiov
syn. *P. extensa* N.E.Br., *Daemia extensa* R. Br.

Family: Asclepiadaceae

Indian names: Hindi—*Utran, Utarni; Sadovani;*
Bengali—*Chagulbati;*
Gujarati—*Chamardudhi, Nagladudki;*
Marathi—*Utaran;*
Punjabi—*Karial;*
Sanskrit—*Yugaphala;*
Tamil—*Uttamani;*
Telugu—*Dushtupatige.*

(Madhya Pradesh—*Ghol-Lakadi, Kadwa-dod.*)

Plate 16.

DESCRIPTION

A twining herb; stems hairy and with milky juice. Leaves 4-6 cm long, sometimes more, ovate or round, hairy on lower surface, deeply cordate at base. Flowers pale or white, small, in short clusters. Fruits reflexed in pairs, 5-8 cm long, 1.3 cm broad, covered with spinous outgrowths.

DISTRIBUTION

The plant is found almost throughout India up to 1000 m.

DRUG AND ITS PROPERTIES

The entire plant is used in medicine.

The juice of the leaves is given in catarrhal affection and infantile diarrhoea. It forms a constituent of a purgative preparation given in rheumatism and amenorrhoea. It is used as a uterine tonic, expectorant and emetic. Its action as a uterine tonic has been confirmed experimentally; it is useful in curing gynaecological conditions, such as excessive bleeding, etc. The active principles of *Pergularia* resemble Pituitrin in their action.

55. PICRORHIZA

(*Kutki*)

PICRORHIZA KURROA Royle ex Benth.

Plate 19.

Family: Scrophulariaceae

Indian names: Hindi—*Kutki, Kuru;*
Bengali—*Kataki;*
Gujarati—*Kadu;*
Kashmiri—*Karu;*
Malayalam—*Katukhrubani;*
Marathi—*Kutaki;*
Punjabi—*Kali Kutki;*
Sanskrit—*Katuka;*
Tamil—*Katuku-rovani;*
Telugu—*Katuku-roni.*

The trade name *Picrorhiza* is based on the scientific name of the plant.

DESCRIPTION

It is a small herb with spatula-shaped, 5-10 cm long leaves. Rhizomes of the plant are 15-25 cm long and woody. Flowers small, in cylindric spikes; spikes borne on almost leafless erect stems. Flowers are of two kinds, some are with 8 mm long filaments, others with 2 cm long filaments, Fruits 1.3 cm long.

DISTRIBUTION

The plant occurs only in higher mountains, *i.e.* at about 3,000-4,000 m altitude in the Himalayas from Kashmir to Sikkim.

DRUG AND ITS PROPERTIES

The drug comprises the dried rhizomes of the plant.

It is a bitter tonic and is useful as antiperiodic and promotes secretion of bile. It is believed to have same properties as *Gentian*, *i.e.* improves appetite and stimulates gastric secretion. It is also used in dropsy.

The antibiotic activity of the drug *Picrorhiza* has been shown experimentally.

The annual requirement of this drug in India is estimated to be 40 quintals. The Himalayan mountains between the altitudes of 3000 and 4000 m are considered to be suitable for its cultivation. The plant is important as it can be used as a substitute for true *Gentian*, *Gentiana lutea* L.

56. PINE

(*Chil*)

PINUS ROXBURGHII Sargent syn. *P. longifolia* Roxb.

Family: Coniferae

Indian names: Hindi—*Chir*;
Assamese—*Tellia*;
Bengali—*Saralagach*;
Punjabi—*Chil*;
Tamil—*Simaidevadari*.

The specific name *roxburghii* is in honour of the well known botanist Roxburgh, who is called 'Father of Indian Botany'.

DESCRIPTION

It is a large tree with typical needle leaves; leaves 25-30 cm long, in clusters of three. Male cones small, female fruiting cones 10-20 cm long, conical.

DISTRIBUTION

The tree is found in the lower Himalayas and other hills of India; it is commonly planted for ornament.

DRUG AND ITS PROPERTIES

The drug, *Oil of Turpentine*, is obtained by purification from turpentine, an oleoresin obtained from *P. roxburghii* and certain other species of this genus.

The oil has local irritant action and most of its medicinal uses are due to that property. In controlled small doses it acts as a stimulant expectorant and is useful in chronic bronchitis. It cures flatulent colic. It has limited use also in typhoid, minor haemorrhages (such as from gums, nose, etc.). Given as an enema, it cures consti-

pation. Its commonest use, however, is as a liniment in rheumatic pains. Inhaling the vapours of turpentine is useful in bronchitis.

OTHER USES

The timber of the tree is largely used for various purposes *e.g.* housebuilding, furniture, tea chests, match industry, sports goods, musical instruments, etc.

Its resin *Biroja* is used for bangles. The bark has tannins and colouring matter.

57. LONG PEPPER

PIPER LONGUM L.

Family: Piperaceae

Indian names: Hindi—*Pipal*. *Pipali*;
Assamese—*Piplu*;
Bengali—*Jatya*. *Pipul*;
Gujarati—*Pipli*;
Sanskrit—*Pippali*. *Magadhi*;
Tamil, Telugu—*Pipili*.

(Jaipauri—*Shawppa*.)

The trade name *Long Pepper* is based on the common English name Pepper. It is called *Long Pepper* as its spikes are long and distinguish it from the other important species of the genus, *P. nigrum L.*, whose fruits are round.

In some early literature *Long Pepper* is referred to by the name 'Magadhi' which denotes that the plant is indigenous to the region of Magadh (*i.e.* North Bihar).

DESCRIPTION

A small aromatic plant trailing on ground also climbing. Lower leaves 6-10 cm long, broadly ovate, deeply cordate with big lobes at base; upper leaves oblong-ovate, cordate; all dark green and shining above, pale on lower surface, stipules conspicuous, 1.3 cm long, but soon falling. Spikes of flowers solitary, bracts of male spikes narrow, of female circular. Fruit small ovoid, sunk in fleshy spike which is 2.5-4 cm, ovoid, oblong, blackish green, shining.

DISTRIBUTION

The plant grows in warmer regions of India and is also cultivated.

DRUG AND ITS PROPERTIES

Long Pepper consists of the dried fruits of the plant.

It is used as a tonic, and in making irritating snuffs. It is also used in liniments for rheumatic pains and paralysis. A decoction made from the dried immature fruits is useful in chronic bronchitis. Ripe fruits are aromatic, stomachic and carminative.

The antibiotic activity of the leaves and fruits has been shown experimentally.

OTHER SPECIES

Another very important species of the genus is *Piper nigrum L.* or *Black Pepper* (Bengali, Hindi—*Gol Mirch*, *Kali Mirch*, *Dakhni-mirch*; Sanskrit—*Kaphvirodhi*; Madras—*Kalluvalli*). Most of the vernacular names of the plant describe the shape (*Gol*—round) or colour (*Kali*—Black) of the fruits. The Sanskrit name indicates the use of the plant.

P. nigrum is a robust woody climber with large, broad-ovate or round leaves. Flowers borne in long spikes; fruits small, globose, 6-7 mm diameter, yellow, turning red when ripe.

The dried unripe fruits constitute the drug *Black Pepper*. It is stimulant, carminative and stomachic; taken in larger quantities, it gives a feeling of warmth and causes sweating. It is also diuretic but can cause irritation in urinary tract. Certain experiments on seeds have shown antibiotic activity of seeds.

The *Black Pepper* is used in many culinary preparations as a condiment and carminative.

Piper cubeba L.f. (*Cubeb*, *Shitalchini*, *Sugandhmaricha*, *Kababchini*) is a native of South-East Asia; its fruits yield an oil which is useful in complaints of urinary system. The annual demand of this drug in India is estimated at 200 quintals. Eastern and southern India are considered suitable for its cultivation.

58. ISHABGUL

PLANTAGO OVATA Forsk.

Plate 20.

Family: Plantaginaceae

Indian names: The local names of this plant in different regions and languages of India are only minor variations of the Sanskrit word *Ishapgola* or *Isapgol*.

The trade name is also based on that word.

DESCRIPTION

An almost stemless small herb, covered with dense or soft hairy growth. Leaves 8-25 cm long, very narrow. Flowers minute, in oval or cylindrical spikes. 1.5-4 cm long. Fruit 8 mm long, its upper half separates like a lid. Seeds boat-shaped.

DISTRIBUTION

The plant grows naturally in only restricted area in northwestern India, but is largely cultivated elsewhere.

DRUG AND ITS PROPERTIES

The seeds of this plant (as also of certain other species of the genus) constitute the drug.

The useful properties of the seeds are due chiefly to the large amount of mucilage and albuminous matter present in them.

Ishabgul is very useful in several kinds of chronic dysentery, such as of amoebic and bacillary origin and chronic diarrhoeas. It is useful as a soothing agent for mucous membranes, and is useful in constipation. Seeds should be soaked in water before use, so that they soon get disintegrated in the alimentary canal; else the whole seeds can cause irritation or even mechanical obstruction in intestines. The large amount of mucilage in the seeds 'binds' and increases the mass of the stool, and smoothens its passing out. The action is, however, chiefly mechanical, rather than physiological.

Ishabgul husk (Hindi—*Ishabgul-ki-bhusi*) is the dry seed-coat of *Plantago ovata*; obtained by crushing the seeds and separating the husk by winnowing.

The husk has same properties as the seeds; rather it has the advantage that there is no risk of mechanical obstruction or irritation in alimentary canal by the husk. The husk, therefore, is taken without any presoaking and is more easy to use than the whole seeds.

The embryo oil of seeds having 50% linoleic acid prevents arteriosclerosis. Oil is more active than safflower oil, and was found to reduce the serum cholesterol level in rabbits.

India exports dried seed husk of *P. ovata* worth over Rs 20 million annually.

59. INDIAN PODOPHYLLUM

PODOPHYLLUM HEXANDRUM Royle syn. *P. emodi* Wallich ex Hook f. & Th. **Colour Plate VIII.**

Family: Berberidaceae

Indian names: Hindi—*Banbaigan, Papri*;
Gujarati—*Venivel*;
Kashmiri—*Banwagan*;
Marathi—*Padwal*;
Punjabi—*Bankakri, Gulkakri*.

The trade name is based on the scientific name of the plant.

DESCRIPTION

A succulent erect herb with a creeping rootstock. The flower-bearing branch is erect, leafy at top; leaves two, 15-25 cm diameter, deeply divided in 3-5 lobes, toothed, purple spotted. Flowers 2.5-5 cm diameter, white or pinkish, cup-shaped, usually solitary. Fruit ovoid, 2.5-5 cm, scarlet.

DISTRIBUTION

This plant occurs at high altitudes in the inner ranges of Himalayas, usually at about 3,000-4,000 m. In Kashmir, it comes down to about 1,800 m.

DRUG AND ITS PROPERTIES

The dried rhizomes of the plant are used in medicine.

The rhizomes contain a resin Podophyllin. It is purgative, its action is slow but severe, and large doses can cause acute irritation and griping. The drug is usually administered in mixture with *Belladonna* or aloes, etc.

Podophyllum is reported to be useful in many skin diseases and tumorous growths; its use in curing cancerous tissues is now in experimental stages.

The total annual demand of the drug in India is estimated at 40 quintals.

An American species of the genus, namely *Podophyllum peltatum* L. is sometimes cultivated. The Himalayan mountain regions at an altitude of 1,500 to 3,000 m in Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh and Sikkim are considered suitable for cultivation of this species.

60. PSORALEA

(*Babchi*)

PSORALEA CORYLIFOLIA L.

Family: Papilionaceae

Indian names: Hindi—*Babchi*;
Bengali—*Latakasturi*;
Gujarati—*Bavachi*;
Marathi, Punjabi—*Babchi*;
Sanskrit—*Sugandh Kantak*;
Tamil—*Karpokarishi*;
Telugu—*Kala gija*;
Urdu—*Bakuchi*.

The trade names *Psoralea* and *Babchi* are based on scientific and local Indian names respectively.

DESCRIPTION

It is an erect herb, with densely gland-dotted branches. Leaves round, dotted with black glands on both surfaces. Flowers small, bluish purple, 10-30 in a bunch, arising in axils of leaves. Fruits black, roundish or oblong, closely pitted; seed one, smooth.

DISTRIBUTION

This plant is found throughout India as a weed in waste places; it is also cultivated in some places.

DRUG AND ITS PROPERTIES

The seeds of the plant constitute the drug.

The seeds contain an essential oil which is very effective on certain bacteria causing skin diseases. The drug is, therefore, useful on leucoderma and leprosy as an external application in the form of ointment, as well as for taking internally. The seeds are also useful for promoting urination and as anthelmintic. The anthelmintic and antibacterial activity of the seeds has been shown experimentally.

The oleoresinous extracts of the seeds are useful for local application on leucoderma of nonsyphilitic origin.

Due to its use in leprosy, the drug has been called in our indigenous system as *Kushtha nashini*.

Roots of the plant are reported to be useful in caries of teeth; and the leaves in diarrhoea.

61. INDIAN KINO

(*Bija Sal*)

PTEROCARPUS MARSUPIUM Roxb.

Family: Papilionaceae

Indian names: Hindi—*Piasal, Bijasal*;
Gujarati—*Bibla*;
Kannada—*Honne*;
Malayalam—*Kino*;
Marathi—*Honi*;
Sanskrit—*Mahakutaj*.

The trade name is based on the gum called *Kino*, contained in the bark of the tree.

DESCRIPTION

A large handsome tree. Leaves compound, having 5-7 leaflets; leaflets 8-13 cm long, oblong or elliptic. Flowers about 1.5 cm long, yellow, scented, in very large, dense bunches. Fruit 2-5 cm long, roundish, winged, with one seed.

DISTRIBUTION

The tree is common in central and peninsular India, chiefly in mixed deciduous forests. It ascends to about 1,100 m in Gujarat, Madhya Pradesh, and sub-Himalayan tracts, etc. The tree in flower is a beautiful sight.

DRUG AND ITS PROPERTIES

Leaves, flowers and gum of the tree are medicinal.

The gum called *Kino* exudes from incisions in bark. It is astringent and useful in diarrhoea. Its action is milder than *Catechu* (*Katha*); it is also used for toothache. The gum is considered to be useful in fevers and urinary discharges. Bruised leaves are applied on boils, sores and other skin diseases.

The tree has been widely regarded as useful in diabetes. The water, in which a block of wood of this tree has been soaked overnight, is believed to be useful for the diabetic patient. These claims have, so far, been found to be without much foundation.

In a clinical experiment, it was shown that only 7 per cent of the diabetic patients treated with this drug showed improvement.

OTHER USES

The timber of the tree is valued for high class furniture, construction work, etc.

OTHER SPECIES

Another species of this genus, namely *Pterocarpus santalinus* L.f. (English—Red Sanders Wood, Hindi—*Lalchandani*, Sanskrit—*Raktachandan*) is also considered useful in medicine. The heartwood of the tree is used as a cooling external application for

headache and inflammation. This tree is valuable also for timber; it occurs in south India.

62. RAUVOLFIA

(*Sarpagandha*)

RAUVOLFIA SERPENTINA (L.) Bentham ex Kurz **Colour Plate IX,
and Cover**

Family: Apocynaceae

Indian names: Hindi—*Chotachand*;
Bengali—*Chandra*;
Malayalam—*Chuvannayilpuri*;
Marathi—*Harkaya*;
Sanskrit—*Sarpagandha, Chandrika*;
Tamil—*Chavanda-avalpori*;
Telugu—*Patala-gandhi*;
Urdu—*Dhanbarua*.

(Sharanpur (U.P.)—*Moonga*.)

The trade name *Rauvolfia* is based on the scientific name of the plant. The word *Rauvolfia* refers to a 16th century German botanist and physician Leonard Rauwolf.

DESCRIPTION

An erect glabrous shrub, 30-75 cm high; leaves whorled; 8-20 cm long, gradually tapering into a short petiole. Flowers about 1.5 cm long, petals white or pinkish, peduncle deep red, in small clusters. Fruits small, round, dark purple or blackish when ripe.

DISTRIBUTION

The plant is found in almost all parts of India up to an altitude of about 1000 m; it is more common in submontane regions of Himalayas and in lower ranges of eastern and western ghats; also



Plate 16

PERGULARIA
(*Pergularia daemia*)
(See page 108)



Plate 17

JATAMANSI
(*Nardostachys jatamansi*)
(See page 101)



Plate 18
HARMAL
(*Peganum harmala*)
(See page 107)



Plate 19
PICORRHEZA
(*Picrothiza kurroa*)
(See page 109)

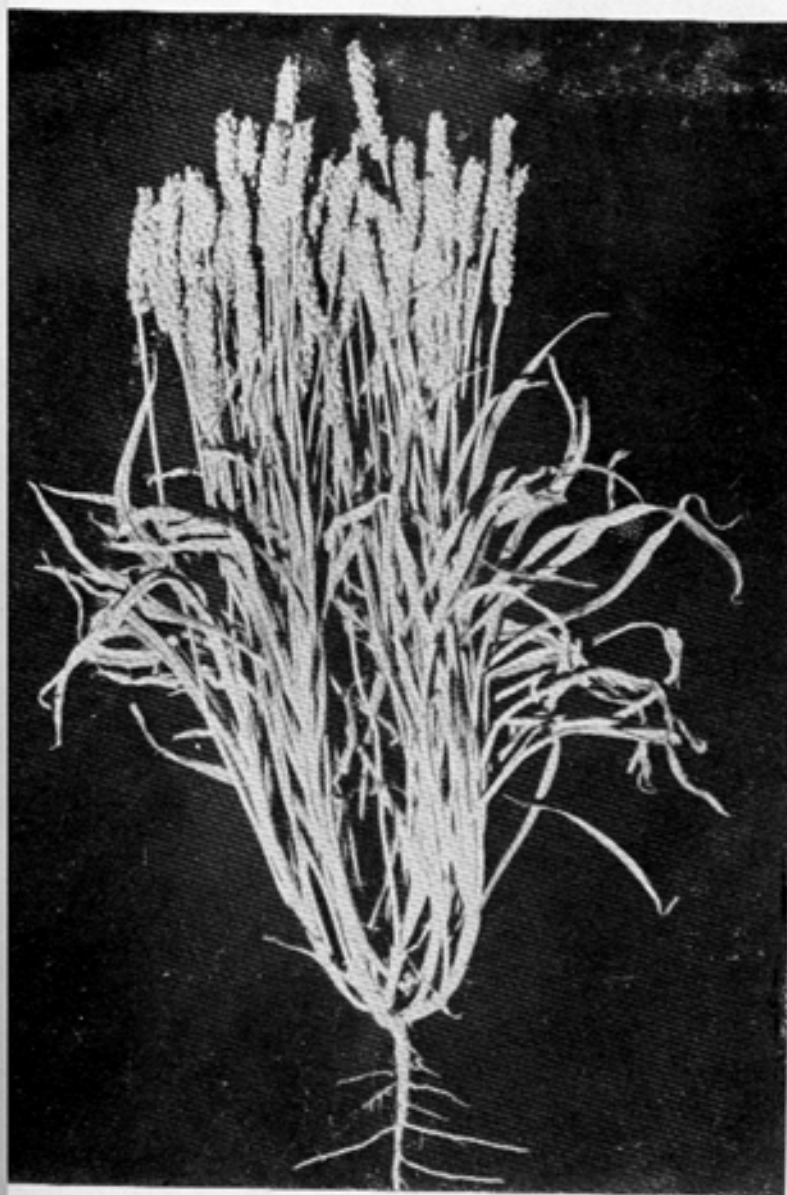


Plate 20—ISHARGUL (*Plantago ovata*)
(See page 114)



Plate 21
RHUBARB
(*Rheum emodi*)
(See page 122)



Plate 22
SAUSSUREA
(*Saussurea lappa*)
(See page 127)

collected from several places in plains of Bengal, Bihar, Uttar Pradesh, Maharashtra, etc. The plant is now being cultivated at several places.

DRUG AND ITS PROPERTIES

The drug consists of the dried roots with bark intact, preferably collected in autumn and from plants of about 3-4 years age. It is believed that this plant has been known in Indian medicine for about 4,000 years. A mention of the plant is found in Charak's work.

The roots contain several alkaloids. The chief use of the drug is as a sedative and hypnotic and for reducing blood pressure. The drug is now largely used in insanity and high blood pressure. The sedative action of the drug is slow, and therefore, the drug is not useful in acute cases; it is more suitable for mild anxiety cases or patients of chronic mental illness. The drug has tranquillising effect. This drug should not be given to persons suffering from bronchitis, asthma or gastric ulcers.

The roots of the plant are useful also in diseases of bowels and in fever.

Other species of the genus such as *R. tetraphylla* L. (syn.) *R. canescens* L.) are also useful in medicine (Plate 21.).

Much research work has been done, and is being done on this group of plants, and India holds a place of pride in this regard. Now, however, some countries are developing synthetic products to bring about same effects as *Rauvolfia*.

The total annual requirement of *Rauvolfia* drug in India is estimated at about 12,000 quintals and its cultivation needs to be greatly expanded. The plant can be cultivated almost anywhere in the plains, in evergreen forests and sub-Himalayan tracts.

The plants are best raised from root cuttings, they are also raised from seed and stem cuttings. 6-7 quintals of drug have been obtained from one acre of land; yields even higher than this have been reported from Forest Research Institute, Dehra Dun, from only two-year old fields.

The export of this drug has now fallen, and during 1970-71 drug worth only about two lac rupees was exported.

63. RHUBARB

RHEUM EMODI Wallich ex. Meissn.

Plate 22.

Family: Polygonaceae

Indian names: Hindi—*Revandchini*;
 Bengali—*Kokima, Revandchini*;
 Gujarati—*Gamnirevanchini*;
 Sanskrit—*Revat-chini*;
 Tamil, Telugu—*Nattuirevalchini*.

DESCRIPTION

A tall herb with very stout stems and roots. Lower leaves very large, about 60 cm diameter, round, on very stout, 30-45 cm long petioles. Flowers minute, dark purple, in a very large bunch. Fruit 1.3 cm long, purple.

DISTRIBUTION

The plant occurs in the Himalayas at about 3,000-4,000 m altitude, in the States of Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh and also Nepal.

DRUG AND ITS PROPERTIES

The dried rhizomes of *Rheum emodi* constitute the drug. The rhizomes of *R. webbianum* Royle (*Archu*) are also accepted. The rhizomes should be collected from 6-7 years old plants just before the flowering season; they should not be decorticated.

Rhubarb is used as purgative. The drug also has tannins and therefore after purgation it creates astringent effect, which causes constipation. *Rhubarb* is not suitable in cases of chronic constipation, but only in mild ones. Due to astringent action, *Rhubarb* is also given in certain types of diarrhoea; e.g. those caused by presence of any irritating substances in intestines.

The annual requirement of this drug in India is estimated at about

40 quintals. Areas of high altitudes in the Himalayas are suitable for its cultivation.

OTHER SPECIES

The British Pharmacopoeias recognise the drug obtained from *Rheum palmatum* L. The Indian plants, however, are satisfactory substitutes.

64. CASTOR-OIL SEED

RICINUS COMMUNIS L.

Family: Euphorbiaceae

Indian names: Hindi—*Arandi*;
 Assamese, Bengali—*Bherenda*;
 Bengali—*Eri*;
 Gujarati—*Diveli*;
 Malayalam—*Avanakka*;
 Marathi—*Arandi*;
 Oriya—*Jada*;
 Sanskrit—*Eranda*;
 Tamil—*Amanakkam*;
 Telugu—*Erandamu*.

(Kistna Dist., Andhra—*Amadam, Pedda Amadam*.)

Sometimes the various varieties of the plant have different local names; e.g. *Bhat-rendi*—for the variety having white seeds, *Jogiar-endi*—for the variety having pale seeds.

In early literature, the tree has been referred to by the names *Chitravija*, *Panchangula* and *Vatari*; these refer to the shape or properties of the plant and its parts. *Chitravija* refers to the ornamentations on seeds; and *Panchangula* to the 5-nerved, palmate leaves; *Vatari* means enemy of rheumatism (*Vata*).

The trade name is based on the common English name of the plant.

DESCRIPTION

It is a tall shrub, sometimes becoming tree-like. Leaves very large, broad, roundish in outline but partly divided into 7 (sometimes 9) lobes, margins toothed. Flowers large, in big terminal bunches. Fruit a prickly capsule, rather marked into six parts. Seeds oblong, seed-coat crustaceous. One form of this plant is almost perennial with woody stems and large red seeds. This is said to yield an oil suitable only for illumination and lubrication. The other form, which is grown as an annual crop, has grey and brown mottled seeds; these yield oil suitable for medicinal uses. There is still another form with purple bronze leaves; it is grown only for ornament.

DISTRIBUTION

The plant is largely cultivated on borders of agricultural fields, gardens, etc., and is also found wild in fields, gardens, near habitations and in waste places.

DRUG AND ITS PROPERTIES

The seeds of the plant are used in medicine.

The seeds are poisonous and even 2 or 3 seeds can be fatal. The oil obtained from the seeds, called *Castor-Oil*, is used as a purgative. The *Castor-Oil* is best administered with milk or fruit juice. *Castor-Oil* is also used in ointments as a soothing agent and as an oil vehicle in eye-drops.

The use of *Castor-Oil* for facilitating child-birth is doubtful, rather it should be sparingly used even as purgative for pregnant women and during menses.

Castor-Oil is used in making contraceptive jellies and creams. (The tribals of Bastar rub the leaves of the plant on joints to relieve pain. They also pound young leaves and use them as purgative.)

A gel prepared from *Castor-oil* is useful in dermatosis and is a good protective in occupational eczemas and dermatitis.

65. SANDALWOOD

SANTALUM ALBUM L.

Plate 23.

Family: Santalaceae

Indian names: Hindi—*Chandan, Sandal*;
Bengali, Gujarati—*Sukhad*;
Kannada—*Agarugandha*;
Marathi, Sanskrit—*Chandan*;
Sanskrit—*Malayaja, Bhogivallabha*;
Tamil, Telugu—*Chandan, Sandal*.

The trade name is based on Indian names of the tree.

DESCRIPTION

A middle-sized evergreen tree, branches almost drooping; bark dark, rough, with vertical cracks; mature wood scented. Leaves 4-7 cm long, opposite, shining on upper surface. Flowers small, dull, purplish, in small bunches. Fruits roundish, 6 mm diameter, purple black succulent.

DISTRIBUTION

The tree grows wild in Deccan Peninsula, particularly in the southern region.

DRUG AND ITS PROPERTIES

The oil obtained from heartwood of this tree is medicinal.

The oil is used in treatment of dysuria *i.e.* to promote and facilitate urination, cystitis (inflammation of bladder), gonorrhoea and cough. The drug is useful in tuberculosis of gall bladder.

The wood, ground up with water into a paste, is applied on local inflammations, on forehead in fever, and on skin diseases.

Oil from the seed is used on skin diseases.

OTHER USES

The wood is largely used for making small domestic items; it retains its pleasant perfume for long time. The wood powder is used for making Agarbatti and as incense powder. The oil is largely used as perfume in toilet preparations and in insecticides.

66. ASOKA

SARACA ASOKA (Roxb.) DeWilde syn. *S. Indica* auct. non L.

Family: Caesalpiniaceae

Indian names: Hindi, Bengali—*Ashoka*;
Gujarati—*Ashopalava*;
Malayalam, Marathi, Oriya—*Ashoka*;
Tamil—*Asogam*.

The trade name Asoka is based on the local Indian names which have their origin from the legendary Ashok-Vatika, where Sita was confined.

DESCRIPTION

A small tree, leaves compound, evergreen, forming a dense crown; leaflets 7-25 cm long, slightly leathery. Flowers bright orange-coloured due to coloured bracts, in small dense bunches. Fruits 15-25 cm long, flat; seeds many.

DISTRIBUTION

The tree occurs in central and eastern Himalayas, eastern India and in south; it is often cultivated for its showy flowers.

DRUG AND ITS PROPERTIES

The dried bark of the tree is of medicinal value.

It is used as an astringent in treatment of excessive menstruation as a uterine sedative. It can be used as a substitute for *Ergot* in treatment of uterine haemorrhages.

Various fractions isolated from the bark of the tree have been tested for their utility in uterine disorders, but the results were negative. The use of the drug may, however be due to some undetected fraction or combined action of the fractions.

Flowers pounded and mixed with water are useful in haemorrhagic dysentery. Seeds are reported to be useful in urinary discharges.

67. SAUSSUREA

(*Kuth*)

SAUSSUREA LAPPA Clarke

Plate 22.

Family: Compositae

Indian names: Hindi—*Kuth*;
Bengali—*Kur*;
Gujarati—*Kuth*;
Malayalam—*Sepuddy*;
Sanskrit—*Agada, Kushta*;
Tamil, Telugu—*Koshtam*.

The trade names are based on the scientific and the Hindi name of the plant.

DESCRIPTION

A tall perennial herb up to 2 m high. Leaves very large; the lower basal ones up to 1.2 m long, borne on winged stalks; upper leaves smaller, sometimes with stalks; two small lobes at the base of these leaves almost clasping the stems. Flowers about 2 cm long, bluish purple or almost black, borne on round flower heads; few flower heads clustered together in axils of leaves or at tops of stems.

The hairs on fruits (pappus) about 1.7 cm long, feathery, giving a curious fluffy appearance to the fruiting flower heads.

DISTRIBUTION

The plant occurs in Kashmir and adjoining areas between 2,500-4,000 m altitude.

DRUG AND ITS PROPERTIES

The dried roots of the plant constitute the drug.

This drug is antiseptic and disinfectant. It is useful in bronchitis, asthma, flatulence and certain cardiac complaints. It also promotes urination. It has the property of relaxing involuntary muscles and this is responsible for its beneficial effects in bronchial asthma and cough; the effect, however, is temporary.

The drug is reported to be useful also on skin diseases and rheumatism.

Experiments have shown that tinctures prepared from defatted roots (*i.e.* those from which petroleum-ether-soluble fractions have been removed) are more beneficial in bronchitis.

Kuth roots worth about one million rupees were exported from India during 1970-71.

OTHER SPECIES

A few other species of the genus are found in the Himalayas; they have some restricted medicinal value.

Higher altitudes in the Himalayas, from Himachal Pradesh to Sikkim, are considered suitable for cultivation of *Kuth*.



Plate IX—RAUVOLFIA (*Rauvolfia serpentina*) (See page 120)



Plate X—BELLERIC MYROBALAN (*Terminalia bellirica*) (See page 145)



Plate XI—TINOSPORA (*Tinospora cordifolia*) (See page 148)



68. SIDA

SIDA CORDIFOLIA L.

Family: Malvaceae

Indian names: Hindi—*Kharenti, Kungi*;
 Bengali—*Bala*;
 Gujarati—*Baladana*;
 Malayalam—*Katturam*;
 Marathi—*Chikana*;
 Oriya—*Badiananla*;
 Sanskrit—*Jayanti*;
 Tamil—*Arival-manaippundu*;
 Telugu—*Chirubenda*.

The trade name is based on the scientific name of the plant. The scientific name *cordifolia* denotes the shape of leaves *i.e.* cordate or heart-shaped.

DESCRIPTION

A small, much-branched shrub; minute star-shaped hairs present all over the plant; leaves 2-5 cm, ovate or roundish, thick, margins toothed; petioles shorter than leaves. Flowers, yellow small, one or a few together; fruits 6-8 mm diameter, divided into 7-10 parts, each strongly reticulated, and with two awns (spiny projections) on tip.

DISTRIBUTION

The plant occurs throughout India is a common weed, usually in waste places and open scrub forests.

DRUG AND ITS PROPERTIES

The entire plant is used in medicine. It is used as a general tonic and for improving sexual strength. Seeds of the plant are particularly credited with this property.

Decoction of root with ginger is considered useful in certain fevers. The powder of root bark (with milk and sugar, or singly) is given in certain diseases of women, such as leucorrhoea, and in nervous diseases. Root juice is used for promoting healing of wounds. The bark of the root, with Sesamum oil and milk, is efficacious in curing certain types of facial paralysis.

Seeds of the plant are considered useful in gonorrhoea and colic pains.

OTHER SPECIES

Other important medicinal plants of this genus are:

Sida acuta Burm. f. (Bengali, Hindi—*Banmethi*, Sanskrit—*Bala*). Its roots are useful in nervous and urinary diseases, fever and stomach complaints; leaves are also considered to have medicinal properties.

S. rhombifolia L. (Hindi—*Svetbarela*, Sanskrit—*Atibala*). The plant is useful in rheumatic pains and pulmonary tuberculosis and as a demulcent.

S. spinosa L. (Hindi—*Gulsakri*, Sanskrit—*Nagbala*). The roots and root bark are used as demulcent in irritations of bladder, in gonorrhoea, fever and as tonic. Leaves of the plant also have similar properties.

69. KANTAKARI

SOLANUM SURATTENSE Burm. f.

syn. *S. xanthocarpum* Schrad. & Wendl.

Family: Solanaceae

Indian names: Hindi—*Kateri*, *Ringni*;
Assamese—*Katsareya*;
Bengali, Kannada and Sanskrit—*Kentakari*;
Gujarati—*Bhoyaringani*;
Oriya—*Brihatibengani*;
Punjabi—*Kandiyari*, *Mokryan*;
Tamil—*Kandangattari*;
Telugu—*Challanmulaga*, *Nelamulaka*.

The trade name *Kentakari* is based on Indian names of the plant.

DESCRIPTION

A prickly, much-branched herb, usually spreading or diffuse; young branches densely covered with minute star-shaped hairs; prickles yellow, shining, about 1.5 cm long. Leaves up to 10 cm long, their midribs and other nerves with sharp yellow prickles. Flowers purple, about 2 cm long, few together in small bunches opposite the leaves. Fruit 1.5-2 cm, round, yellow or pale with green veins.

DISTRIBUTION

This plant occurs throughout India, often in waste places, on roadsides and in open scrublands.

DRUG AND ITS PROPERTIES

The dried roots of the plant constitute the drug.

The drug is used in cough, asthma, pain in chest, and certain kinds of fevers. It is diuretic, and is considered useful in concretions or stones in bladders.

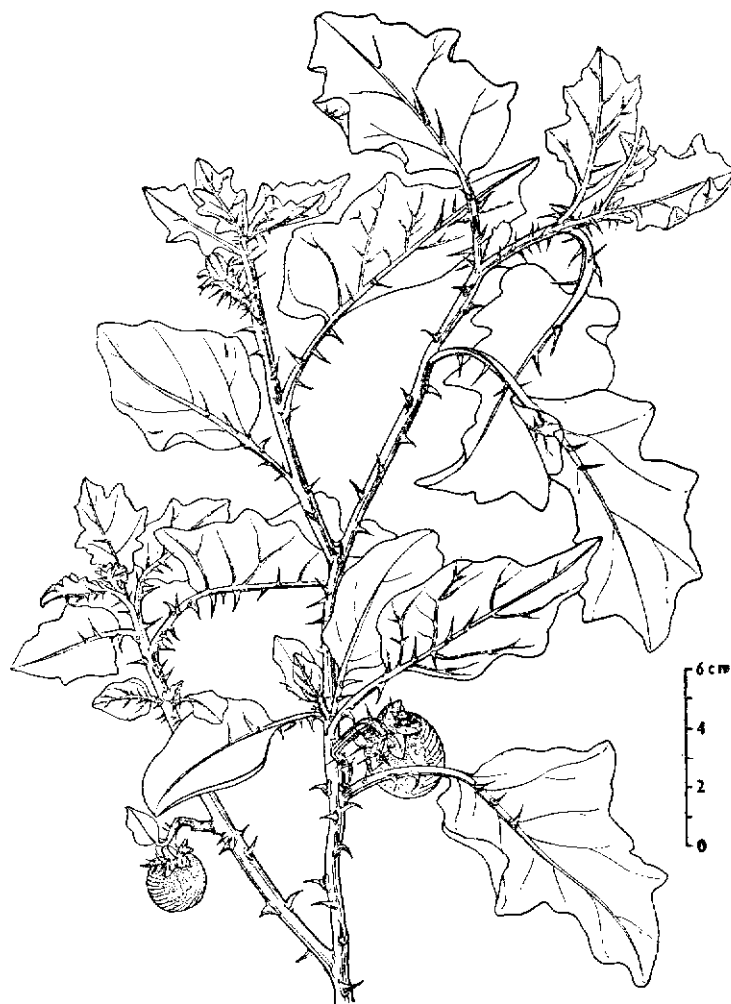


Fig. 20. SOLANUM (*Solanum incanum*)

Some antibacterial property in fruits and shoots has been shown experimentally.

The fruits of the plant are considered useful in a number of diseases, such as sorethroat, bronchitis, muscular pains, fevers etc. There is no mention of medicinal value of fruits in the Indian Pharmaceutical Codex or in Pharmacopoeia of United States.

The stems and leaves of the plant have been tested on experimental animals for any antifertility properties; they did not show promise as contraceptives. Several parts of the plant were believed to be useful in snakebite, but experiments have contradicted such use of the plant.

(The tribals of Bastar put the juice of crushed fruits into aching ears.)

OTHER USES

Tender leaves and fruits are eaten in vegetables after proper processing.

OTHER SPECIES

Solanum nigrum L. (Black Night-shade; Bengali—*Gurkamai*, *Kakmachi*; Hindi—*Ghamai*, *Makoi*; Kannada—*Kachigida*; Punjabi—*Pilak*) is an important ingredient in several Indian medicines. The infusion of the plant is useful in dysentery, other stomach complaints and fevers; it promotes urination. The juice of the plant is useful on ulcers and other skin diseases. Its fruits are more important. They are tonic and laxative, improve appetite, and are useful in asthma, skin diseases, urinary discharges, excessive thirst etc. Green fruits are pounded and applied locally on ringworm.

Other important species of the genus, which are believed to have medicinal properties, are, *S. dulcamara* L. (Bitter Night-shade, Sanskrit—*Kakmachi*); *S. ferox* L. (Bengali, Hindi—*Rambegun*; Sanskrit—*Chandra-pushpa*); *S. incanum* L. (Fig. 20. Hindi—*Gaglibhata*, *Asind*) and *S. indicum* L. (Bengali—*Tita-bhekuri*, Sanskrit—*Brihatika*).

Recently, *S. viarum* Dunal (Plate 25) has gained much publicity

as a source of Solasodine. The plant is still under investigations at Calcutta and other places.

CULTIVATED SPECIES

Mention may be made here of Brinjal (*Solanum melongena* L.) which belongs to this genus and has some medicinal properties. Its unripe fruits are cardiogenic, improve appetite, and enrich the blood. Ripe fruits are laxative, but cause biliousness. A paste of its leaves is applied on syphilis wounds; decoction of roots is also given in this disease.

Potato (*S. tuberosum* L.) also has some medicinal uses. The water in which tubers have been boiled is useful on pimples, skin eruptions and burns. Potato starch is used in some skin ointments, tablets, etc.

NEW INTRODUCTION

Efforts are being made to grow a foreign species of the genus, namely, *S. aviculare* Forst. f. in Kashmir. This yields Solasodine, which is a good source of sex hormones.

70. KARAYA

Plate 26.

STERCULIAURENS Roxb.

Family: Sterculiaceae

Indian names: Hindi—*Kulu, Gulu, Karai*;
Gujarati—*Kandol, Karayo*;
Kannada—*Bhutali*;
Malayalam—*Tonti*;
Marathi, Punjabi—*Kulu*;
Oriya—*Grindola*;
Tamil—*Vellaiputtali*;
Telugu—*Ponaku*.

(Santal Parganas—*Telhech*.)

The trade name *Karaya* is based on Indian local names.

DESCRIPTION

A middle-sized deciduous tree, conspicuous in the forest by its white or greenish white, shining, smooth papery bark. Leaves crowded at the ends of branches, large, 20-40 cm diameter, shallowly 5-lobed, very densely hairy on under surface. Flowers yellowish brown, small, in large, very densely hairy erect bunches. Fruit of 4-5 large, thick, red carpels, densely covered with stinging hairs.

DISTRIBUTION

The tree occurs in the tropical Himalayas and in eastern, central and southern India, usually in dry or mixed deciduous forests.

DRUG AND ITS PROPERTIES

The gum exudate from the stem of the tree has medicinal properties; it is called *Karaya gum* or *Kadira gum*.

The gum is used as a mechanical laxative. The *Karaya* mucilage, when applied to skin, has a softer action than even *Tragacanth gum*.

Karaya gum is used as a substitute for *Tragacanth gum* in throat affection and in dental fixture powders, lozenges and pastes.

(The tribals of Bastar pound the bark of the tree and give it to women before childbirth; this is believed to facilitate delivery.)

OTHER USES

The wood of this tree is used for miscellaneous domestic purposes, such as doors, boats, carvings, packing cases, etc.

The bark yields a very strong fibre and is largely used for ropes, coarse cloth, etc. The seeds of the plant are edible. The gum is eaten in curries.

OTHER SPECIES

Two other species of this genus, namely *Sterculia villosa* Roxb. (Hindi—*Udal*, Oriya—*Kodalo*) occurring almost throughout India, and *S. foetida* L. (*Jangli Badam*) occurring in south India yield products of medicinal value.

The gum exudate from the bark of the former species is used as a substitute for *Tragacanth gum*. The oil extracted from seeds of *S. foetida* is laxative.

71. CHIRAYATA

SWERTIA CHIRAYITA (Roxb.) Karst.

Plate 27.

Family: Gentianaceae

Indian names: Hindi—*Chirayata*;
Bengali—*Chirata*;
Kannada—*Nelabevu*;
Marathi—*Chiragita*;
Sanskrit—*Kirata-tikta*;
Tamil and Telugu—*Nila vembu*.

The trade name is based on Indian local names of the plant.

DESCRIPTION

An annual herb up to about 1.5 m high. Leaves in opposite pairs, about 10 cm long, without stalks, pointed at tip. Flowers pale green, tinged with purple, each petal-lobe having a pair of green glands. Fruit 6 mm or more long, ovoid.

DISTRIBUTION

The plant occurs in the temperate Himalayas, between 1,200 and 3,000 m from Kashmir to Assam.

DRUG AND ITS PROPERTIES

The whole plant, collected in flowering stage and dried, constitutes the drug.

Chirayata is well-known for its bitter, stomachic, febrifuge and anthelmintic properties. It possesses similar properties as the *Gentian* (*Gentiana kurroa*). It is given in fever, diarrhoea and weakness. It is given in malarial fever also; certain experiments conducted recently, however, did not confirm the febrifuge properties of this plant.

OTHER SPECIES

Several (7-8) species of the genus *Swertia* occur in the hilly regions of India and are used in similar manner as the *Chirayata*.

The total annual requirement of *Chirayata* in India has been estimated at 400 quintals. Expansion of cultivation of this plant has been recommended. Higher mountain regions in the Himalayas in the States of Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh and up to Assam are recommended as suitable areas for cultivation of *Swertia chirayita*.

72. LODH

SYMPLOCOS RACEMOSA Roxb.

Family: Symplocaceae

Indian names: Hindi—*Lodh*;
Assamese—*Lapong-dang*, *Dieng Lamaki*;
Bengali—*Lodh*;
Gujarati—*Lodra*;
Marathi, Sanskrit—*Lodhra*;
Telugu—*Loddugu*.
(Singbhum—*Ludam-daru*.)

The Sanskrit name *Lodhra* denotes that it stops ocular discharges.

DESCRIPTION

A small tree, about 6 m high. Leaves 8-20 cm long, dark green, leathery, usually pointed at tip, margins entire or toothed. Leaf-stalk small, about 8-20 mm long. Flowers small, about 1.2 cm diameter, white or pale yellow, in small axillary clusters. Fruit 1-1.3 cm long, purplish black.

DISTRIBUTION

The tree occurs in plains and lower hills of eastern and central India.

DRUG AND ITS PROPERTIES

The fresh air-dried bark of the tree constitutes the drug.

The drug is useful in digestive disorders, eye diseases and ulcers. A decoction of the bark is used as a gargle in bleeding gums. It is used in plasters and applied on wounds for promoting maturation of wounds. It is astringent and is used in excessive bleeding during menstruation. The astringent properties are utilised also for curing loose motions. It is considered useful in elephantiasis and in fat in urine.

OTHER SPECIES

Another species of the genus, *Symplocos paniculata* Wall. (going under same local names as *Lodh*) occurs in Himalayas from Punjab to Assam; its bark has same uses as the *Lodh*, and is considered a tonic.

73. JAMBOL

SYZGIUM CUMINI (L.) Skeels syn. *Eugenia jambolana* Lam. Fig. 21.

Family: Myrtaceae

Indian names: Hindi—*Jomun*;
Assamese—*Jamu*;
Bengali—*Jam, Kala Jam, Bada Jam*;
Gujarati—*Jambu*;
Malayalam—*Yavel*;
Marathi—*Jambhul*;
Oriya—*Jamkuk*;
Sanskrit—*Jambul*;
Tamil—*Nagai, Sambal*.
(Lalitpur, U.P.—*Kath Jamun*.)

The trade name is based on the common Indian name of the tree.

DESCRIPTION

A large evergreen tree; leaves opposite, 8-20 cm long, leathery, smooth, shining. Flowers small, dull white, in large bunches. Fruit 1.5-4 cm long, void, purplish when young, almost black when ripe, juicy. Seed usually one. The fruits are largely eaten raw; the purplish coloured flesh of the fruit leaves the tongue (and lips) dark purple-tinged for several hours.

DISTRIBUTION

The tree grows chiefly in moist deciduous forests, being more common along water channels; it is not found wild in very arid regions. Its planted trees, however, exist in protected places even in the heart of Rajasthan desert.

DRUG AND ITS PROPERTIES

The bark, fruits and seeds of the tree are medicinal.
The bark is very astringent and is used in sore throats, bronchitis,

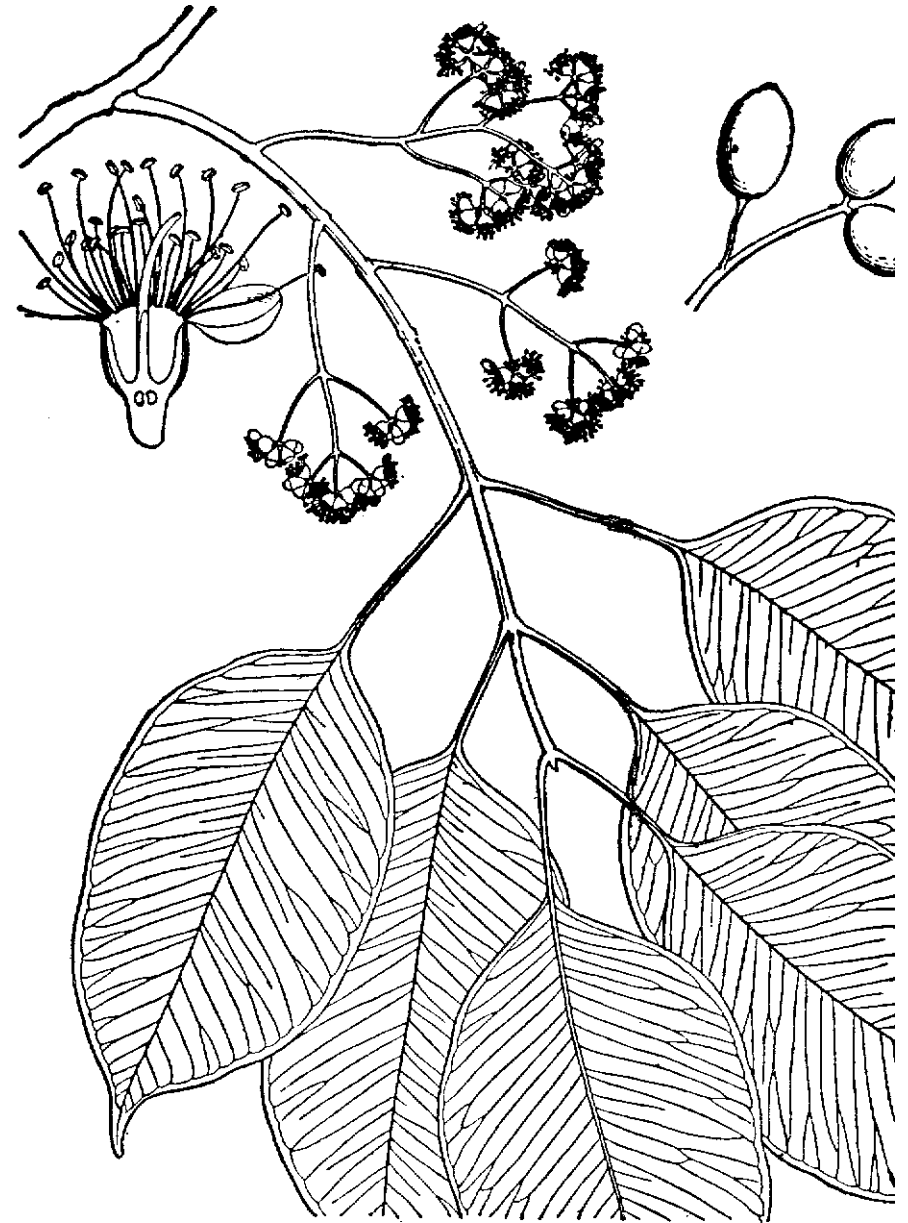


Fig. 21. JAMBOL (*Syzygium cumini*)

asthma, ulcers and dysentery; it is also given for purifying blood, and as a gargle. The fresh juice of bark with goat's milk is given in diarrhoea.

The seeds are very useful in diabetes. The fruit juice also has that property, but the effect of preparations from seeds is more marked. The drug administered through injections only showed effect, not through oral administration.

The antidiabetic activity of this drug is more marked than that of *Bijasal* (Indian Kino tree).

OTHER USES

The fruit is largely eaten raw. The wood is used for miscellaneous purposes.

OTHER SPECIES

Another very important plant of this genus, which is useful in medicine, is *Syzygium aromaticum* (L.) Merr. & Perry (syn. *Eugenia caryophyllata* Thunb., *Clove*, Hindi—*Lavang*, *Laung*).

Cloves, which are the dried flower buds of the tree, are strongly aromatic, stimulant and carminative. They are useful in flatulence and indigestion, and stop nausea and vomiting.

Clove oil is used as antiseptic and preservative. Taken internally, it is carminative and antispasmodic.

Clove oil worth one million rupees was imported during 1970-71.

74. TAMARIND

TAMARINDUS INDICA L.

Fig. 22.

Family: Caesalpinaceae

Indian names: Hindi—*Imli*;
Bengali, Gujarati—*Ambli*;
Kannada—*Chinch*;
Malayalam—*Amlam*;
Marathi—*Ambli*, *Chinch*;
Oriya—*Tentuli*;
Sanskrit—*Amlika*;
Tamil—*Puli*;
Telugu—*Amlika*.

The trade name is based on the English name of the tree.

DESCRIPTION

A large tree, leaves compound, leaflets 10-20 pairs, about 1 cm long. Flowers yellowish with reddish streaks, in small erect clusters among the leaves. Fruits 8-20 cm long, 2-3 cm broad, fleshy, pendulous, brown in color; seeds 3-12, dark brown, shining, embedded in the fleshy, fibrous mass, which is the well-known acid pulp of *Tamarind*.

DISTRIBUTION

The tree occurs commonly in the central and southern regions of India, and is planted throughout India on roadsides and in gardens.

DRUG AND ITS PROPERTIES

The pulp of the fruits is medicinal.

Tamarind pulp has laxative properties; its infusion in water is a very refreshing drink; it is useful in fevers. As a laxative it is taken singly or in mixture with other purgative drugs. When mixed with other purgative drugs it reduces their laxative property.

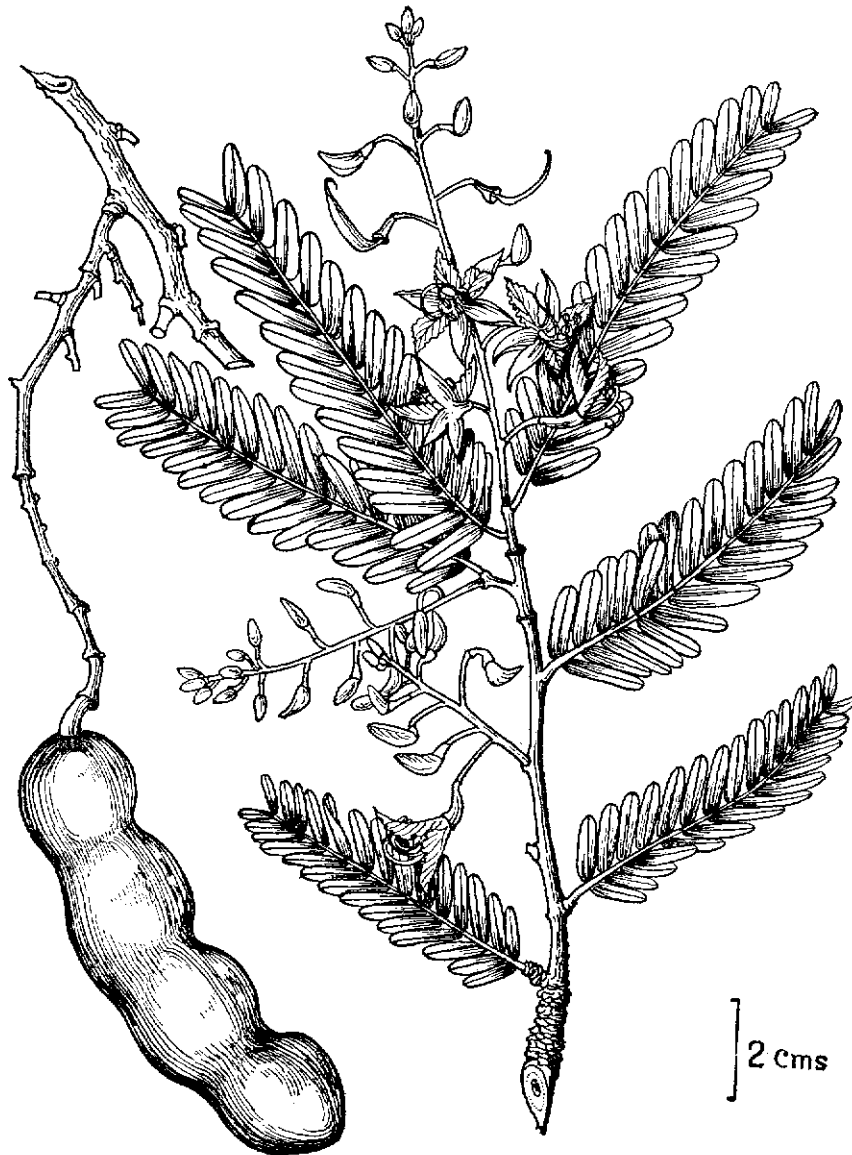


Fig. 22. TAMARIND (*Tamarindus indica*)

OTHER USES

The timber of this tree is resistant to insect attacks and is largely used for agricultural tools, domestic articles, furniture, etc. It makes very good charcoal and is used for gunpowder. Leaves yield a yellow dye. The acid pulp of the fruits is used for cleaning silver and brassware and other utensils. Seeds are used in jam and jelly industry; seed powder is used for sizing certain types of cloth and as wood cement.

75. BELLERIC MYROBALAN

(*Bahera*)

TERMINALIA BELLIRICA (Gaertn.) Roxb.

Colour Plate X.

Family: Combretaceae

Indian names: Hindi—*Bahera*;

Assamese—*Bhovian*, *Hulluch*;

Bengali, Gujarati, Marathi, Punjabi—*Bahera*;

Sanskrit—*Telaphala*;

Tamil—*Akkam*, *Tanri*;

Telugu—*Tadi*, *Tandra*.

(Chittagong—*Boara gota*, Santal—*Lopon*.)

The trade name *Bahera* is based on Indian name of the tree. The word *Belleric* is taken from the scientific name of the tree and distinguishes this *myrobalan* from the other one, i.e. *Chebulic myrobalan*.

DESCRIPTION

A large tree, often with buttresses. Leaves large, 10-25 cm long, clustered near ends of branches. Flowers small, pale green, bad-smelling, in simple spikes. Fruit 2-3 cm long, ovoid, brownish, densely covered with hairs.



Fig. 23. ARJUNA (*Terminalia arjuna*)

DISTRIBUTION

This tree occurs almost throughout India up to about 1,000 m, excepting the dry regions of western India; it is more common in mixed deciduous forests.

DRUG AND ITS PROPERTIES

The dried fruits of the tree constitute the drug *Bahera*.

The fruits are useful in stomach disorders such as indigestion, diarrhoea. It is given also as a brain tonic and is applied on eyes as a soothing lotion. *Bahera* is useful also in piles, leprosy, dropsy and fever. The half-ripe fruit is considered to be purgative but the ripe and dried fruit has the opposite property.

The *Bahera* fruit is one of the three constituents of the famous Indian preparation *Triphala*, the other two being *Amloki* (or *Aonla*) and *Harra* (see below).

OTHER USES

The timber of this tree keeps well under water and is used for boats etc., also for miscellaneous agricultural tools.

The fruits yield tanning which is used for tanning leather and for dyeing cloth and leather; also for making inks.

OTHER SPECIES

The genus *Terminalia* has several other species of medicinal value.

Terminalia chebula Retz. (Plate 28. Chebolic Myrobalan, Hindi—*Har*, *Harad*, *Harra*, *Haritaki*; Tamil—*Harakkaj*) has similar distribution as *T. bellirica*. In some early literature it has been called *Abyatha*, which denotes, it takes away pain (*Byatha*). It is a middle-sized or large tree. Leaves 10-20 cm, ovate, acute, not crowded at ends of branches, but in almost opposite pairs. There are two small glands near leaf-base. Flowers dull white in spikes at the ends of branches. Fruit 2-4 cm long, the 5 ribs on its body usually distinct.

The dried fruits of the tree constitute the drug commonly known as *Chebolic Myrobalan* or *Harra*. This Myrobalan can be applied externally on chronic ulcers, wounds and scalds or used as a gargle in inflammation of mucous membrane of mouth. *Myrobalans*

are used as laxative; they have also been found to have some effect on blood pressure as cardiac tonics.

The powder of the fruit is used as a dentrifice for strength of gums.

The fruit is an ingredient of the well-known preparation 'Triphala'.

Sweets and pickles based on *Harra* are commonly used in Indian homes; they are believed to be digestive and mild laxative.

Terminalia arjuna Wight & Arnott (Fig. 23. Hindi—*Arjun*, *Kahu*, *Kovha*; Sanskrit—*Indradrum*) occurs almost throughout India, chiefly along water channels and in moist places. Its bark is astringent and is used in fevers and in fractures and contusions; it is also taken as a cardiac tonic.

In early Sanskrit works, this tree has been named *Nadisarjja*, which denotes that the tree grows on banks of rivers.

76. TINOSPORA

(*Gilo*)

TINOSPORA CORDIFOLIA (Willd.) Hook. f. & Th. . Colour Plate XI.

Family: Menispermaceae

Indian names: Hindi—*Giloya*, *Gilo*;
Bengali—*Gulancho*;
Gujarati—*Gulvel*;
Kannada—*Anebule*;
Malayalam—*Amrytu*;
Marathi—*Gulvel*;
Sanskrit, Tamil—*Amritavalli*;
Telugu—*Guduchi*.

(Madras—*Thippa Thega*.)

The trade name *Tinospora* is based on scientific name of the plant; *Gilo* is based on Indian local names.

DESCRIPTION

A large climber with succulent stems, throwing aerial roots like the common Banyan (*Ficus*) tree. Stems and branches specked with white glands. Leaves 5-10 cm, ovate or roundish, 7-9 nerved; petioles slightly shorter than leaves. Flowers minute, male and female separate; male flowers grouped in axils of bracts; female solitary. Fruits, size of a pea, red.

DISTRIBUTION

The plant occurs throughout tropical regions of India.

DRUG AND ITS PROPERTIES

The stems of the plant collected in hot season and dried, with bark intact, constitute the drug.

The drug is believed to be useful as a tonic and antiperiodic; it is also considered *aphrodisiac*.

The starch obtained from the roots and stems of the plant is useful in diarrhoea and dysentery; it is also a nutrient.

77. BISHKHAPRA

TRIANTHEMA PORTULACASTRUM L. syn. *T. monogyna* L. Fig. 24.

Family: Ficoideae

Indian names: Hindi—*Lalsabuni*;
 Bengali—*Sabuni*;
 Gujarati—*Satodo*;
 Kannada—*Muchchujoni*;
 Punjabi—*Bishkapra*;
 Sanskrit—*Punarnavai*;
 Tamil—*Sharunnai*;
 Telugu—*Galijeru*.

DESCRIPTION

A succulent spreading herb, stems much-branched, angular. Leaves broader towards tip. Flowers very small, almost concealed in the base of leafstalk. Fruits small; like flowers, concealed in base

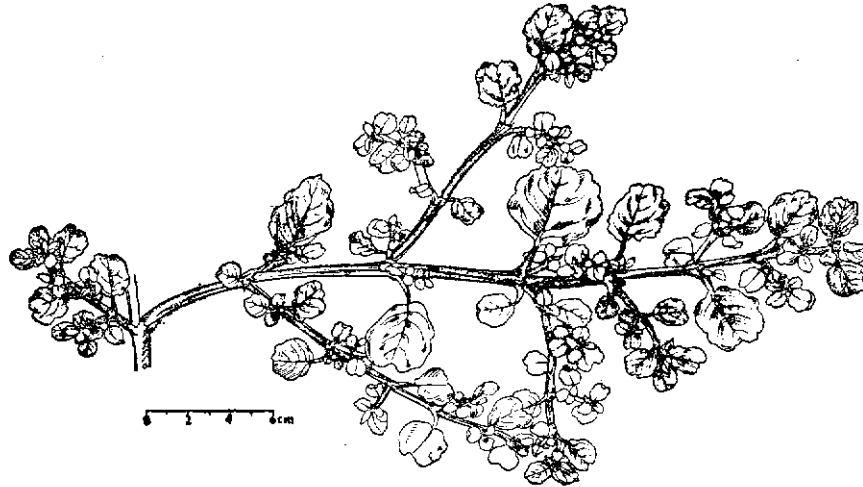


Fig. 24. BISHKHAPRA (*Trianthema portulacastrum*)

of leafstalk. Seeds several, black, kidney-shaped, covered with minute outgrowths.

DISTRIBUTION

The plant is found throughout India.

DRUG AND ITS PROPERTIES

The leaves of the plant are medicinal.

Leaves contain an alkaloid Punarnavine. It is diuretic *i.e.* promotes urination and is, therefore, useful in dropsy. It is beneficial in swellings of body caused by disorders of liver or kidney; it is particularly helpful in early stages of the diseases. In advanced stages too, there is relief, but may not sometimes be a permanent cure.

The whole plant has been tested for abortifacient properties; it does cause mild contraction of uterus.

OTHER SPECIES

Another species of this genus, namely *Trianthema decandra* L., is also medicinal. Roots are believed to be laxative and useful in suppression of menses and in inflammation of testicles. The herb has been tested for abortifacient property, but the results are so far inconclusive.

78. GOKHRU

TRIBULUS TERRESTRIS L.

Fig. 25.

Family: Zygophyllaceae

Indian names: Hindi—*Gokhru*;
Bengali, Gujarati, Marathi, Punjabi—*Gokhru*;
Kannada—*Negalu*;
Malayalam—*Neringil*;
Sanskrit—*Laghu Gokshura*;
Tamil—*Nerunje*;
Telugu—*Palleru*.

(Ajmer-Merwara—*Kanti*.)

The trade name is based on Indian local names of the herb.

DESCRIPTION

A prostrate spreading herb, densely covered with minute hairs. Leaves in opposite pairs, 5-8 cm long, compound; leaflets 4-7 pairs,

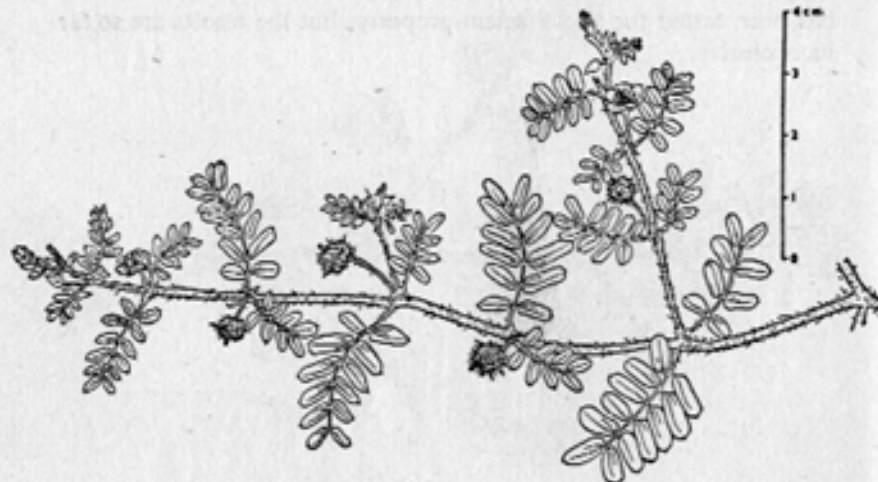


Fig. 25. GOKHRU (*Tribulus terrestris*)





Plate 24
RAUVOLFIA
(*R. tetraphylla*)
(See page 120)



Plate 26
SOLANUM
(*Solanum Abarianum*)
(See page 131)



Plate 25
KARAYA
(*Sterculiaurens*)
(See page 135)



Plate 27
CHIRAYATA
(*Swerfia chirayita*)
(See page 137)



Plate 28
VALERIAN
(*Valeriana jatamansi*)
(See page 157)

Plate 29
CHEDULIC MYROBALAN
(*Terminalia chebula*)
(See page 147)



8-12 mm long. Flowers pale yellow, 1-1.5 cm diameter, growing solitary opposite to the leaves or in axils of leaves. Fruit very characteristic and easily known by numerous spines on it. Fruits often cling to clothes, bodies of animals and wheels of vehicles. Cyclists dread these fruits as these are a common cause of punctures in cycle tubes. Seeds many in each of the five parts of the fruit.

DISTRIBUTION

The plant occurs throughout India almost up to 3,000 m altitude.

DRUG AND ITS PROPERTIES

The fruits of the plant constitute the drug.

The fruit is useful in urinary complaints and sexual weakness. It is cooling. An infusion of the fruits is useful in gout and diseases of kidney; it promotes urination. Clinical tests have confirmed efficacy of the drug in promoting urination.

79. TYLOPHORA

(*Antamul*)

TYLOPHORA INDICA (Burm. f.) Merr. syn. *T. asthmatica* Wt. & Arn.

Family: Asclepiadaceae

Indian names: Hindi, Bengali—*Antamul*;
Malayalam—*Vallipala*;
Marathi—*Pitakari*;
Oriya—*Mendi*;
Tamil—*Kagitam*.

The trade name *Tylophora* is based on scientific name of the plant; the word *Antamul* refers to local name of the plant. The specific name *asthmatica* indicates the use of the plant in asthma.

DESCRIPTION

A twining plant with many, long, fleshy roots. Leaves in opposite pairs, 5-10 cm long, ovate, usually pointed at tip. Flowers large, dull yellow, purple within, in short clusters. Fruits 5-10 cm long, in pairs, pointed at tip, ridged with many fine ridges.

DISTRIBUTION

The plant is found in the eastern, central and southern India, generally in the plains and in hills up to about 1,000 m altitude.

DRUG AND ITS PROPERTIES

The dried roots of the plant constitute the drug.

This drug is a good substitute for *Ipecac*, and is useful in treatment of dysentery. An infusion of the drug is given in asthma and bronchitis. It is good for bringing about vomiting and this explains why it causes relief in asthma.

80. INDIAN SQUILL

URGINEA INDICA (Roxb.) Kunth

Colour Plate XII.

Family: Liliaceae

Indian names: Hindi—*Jangli Piaz*, *Ban Piaz*, *Kolikanda*;
Bengali, Gujarati—Same as in Hindi;
Gujarati—*Jangli Kando*;
Marathi—*Rankanda*;
Sanskrit—*Kolakanda*;
Tamil—*Narivengayam*;
Telugu—*Nakkavalligadda*.

The name *Squill* is assigned to European species of this genus. As the Indian species is a good substitute, the Indian plant is called *Indian Squill*.

DESCRIPTION

A bulbous plant, bulb 5-10 cm, dull white or pale, ovoid. Lower basal leaves almost flat, very long, narrow, pointed. The flowering stem erect, about 45 cm high. Flowers light brown, in slender long bunches. Fruit 1.5-2 cm long, narrowed on both ends; seeds black.

DISTRIBUTION

The plant occurs in the northwestern Himalayas up to 2,000 m, and extends southwards to south India and eastwards to Bihar.

DRUG AND ITS PROPERTIES

The dry outer coats of the bulbs are removed; the bulbs are sliced and dried; this constitutes the drug, *Indian Squill*.

This drug has somewhat similar properties as *Digitalis*, but its action is slow and larger doses are needed. The use of *Indian Squill* is recommended only in those cases which need to be treated with *Digitalis* but are sensitive to that drug. It is used in ailments of heart, and in cough and bronchitis. It promotes urination.

Indian Squill is as efficacious as the European Squill (*Urginea maritima* (L.) Baker). Clinical trials have confirmed efficacy of *Indian Squill* in chronic bronchitis and bronchial catarrh.

The annual requirement of this drug in India is estimated at about 120 quintals. It can be cultivated almost anywhere in Indian plains.

81. VALERIAN

VALERIANA OFFICINALIS L.

Family: Valerianaceae

Indian names: Hindi—*Billilotan*, *Badrangboya*, *Jalakan*;
Marathi—*Kalavala*.

The trade name is based on the scientific name of the plant.

DESCRIPTION

A perennial herb up to 1 m high; rootstock thicker than stem, producing suckers. Stems furrowed, hairy below, smooth above. Lower leaves with long petioles, upper small. Flowers white or dull white, small, in small clusters at top of branches. Fruit small, smooth, without hairs.

DISTRIBUTION

The plant occurs only in certain regions of Kashmir, at about 2,500 m altitude.

DRUG AND ITS PROPERTIES

The rhizomes and roots of the plant constitute the drug. Collection in autumn and slow-drying of the raw drug are recommended.

Valerian has depressant action on central nervous system and is used in treatment of hysterical fits, other nervous disorders and flatulence. The juice of fresh rhizomes and roots is more effective;

the properties of the drug are lost in drying. The fresh juice is used as a narcotic in insomnia and in certain cardiac preparations.

OTHER SPECIES

Another species of the genus, namely *Valeriana jatamansi* Jones (Plate 29. syn. *V. wallichii* DC., Indian Valerian, Hindi—*Mushkbala*, Sanskrit—*Tagara*) occurs more abundantly in the Himalayas from Kashmir to Assam and has similar properties as *V. officinalis*; it has also been used in same diseases.

The annual requirement of *Valerian* in India is estimated at 20 quintals only. It can be cultivated in hilly regions of north India.

82. ASHVAGANDHA

WITHANIA SOMNIFERA Dunal

Fig. 26.

Family: Solanaceae

Indian names: Hindi—*Ashvagandha*;
Gujarati—*Asan*, *Ghoda asor*, *Santhiana-popda*;
Kannada—*Hiremaddinegida*;
Malayalam—*Amukkiram*;
All other Indian languages—*Ashvagandha*.

The trade name is based on Indian local names of the plant.

DESCRIPTION

A small or middle-sized undershrub, up to 1.5 m high; stem and branches covered with minute star-shaped hairs. Leaves up to 10 cm long, ovate, hairy like branches. Flowers pale green, small, about 1 cm long; few flowers borne together in short axillary clusters. Fruit 6 mm diameter, globose, smooth red, enclosed in the inflated and membranous calyx.



Fig. 26. ASHVAGANDHA (*Withania somnifera*)

DISTRIBUTION

The plant occurs in drier regions of India; it is also cultivated.

DRUG AND ITS PROPERTIES

The drug consists of the dried roots of the plant.

Ashvagandha is useful in consumption, sexual and general weakness and rheumatism. It is diuretic, *i.e.* it promotes urination, acts as a narcotic, and removes functional obstructions of body. The root powder is applied locally on ulcers and inflammations.

The antibiotic and antibacterial activity of the roots as well as leaves has recently been shown experimentally.

OTHER SPECIES

Withania coagulans Dunal (Hindi—*Akri*, Punjabi—*Khamjira*) occurs in northwestern India. Its fruits are useful in digestive and liver complaints.

BIBLIOGRAPHY

- AGHARKAR, S.P. 1953. *Gazetteer of Bombay State. General-A, Botany* Pt. I—*Medicinal Plants*, Bombay.
- B.P.C. 1963. *The British Pharmaceutical Codex*, London.
- BHANDARI, CHANDRARAJ. 1951-1957. *Vanaushadhi Chandrodya*, Varanasi, 10 parts (In Hindi).
- BHATNAGAR, S.S., H. SANTAPAU, J.D.H. DESA, A.C. MANIAR, N.C. GHADALLY, M.J. SOLOMON, S. YELLORE AND T.N.S. RAO. 1961. Biological Activity of Indian Medicinal Plants. *Indian J. med. Res.* 49(5): 799-813.
- BHATNAGAR, S.S., H. SANTAPAU, F. FERNANDES, V.N. KAMAT, N.J. DASTOOR AND T.N.S. RAO. 1961. Physiological Activity of Indian Medicinal Plants. *J. sci. & industr. Res. Suppl.* 20A: 1-24.
- BISWAS, K. 1956. *Common Medicinal Plants of Darjeeling and the Sikkim Himalayas*, Calcutta.
- BISWAS, K. AND E. GHOSH. 1950-1952. *Bhartiya Banaushadhi*, Calcutta, 2 Vols. (In Bengali).
- CHOPRA, R.N. 1958. *Chopra's Indigenous Drugs of India*. Revised by R.N. Chopra, I.C. Chopra, K.L. Handa and L.D. Kapur, Calcutta.
- CHOPRA, R.N., R.L. BADHWAR AND S. GHOSH. 1949. *Poisonous Plants of India*, New Delhi.
- CHOPRA, R.N. AND I.C. CHOPRA. 1955. *A Review of Work on Indian Medicinal Plants*, New Delhi.
- CHOPRA, R.N., I.C. CHOPRA AND B.S. VARMA. 1969 *Supplement to Glossary of Indian Medicinal Plants*, New Delhi.
- CHOPRA, R.N., S.L. NAYAR & I.C. CHOPRA. 1956. *Glossary of Indian Medicinal Plants*, New Delhi.
- DASTUR, J.F. 1951. *Medicinal Plants of India and Pakistan*, Bombay.
- DUTT, U.C. 1877. *The Materia Medica of the Hindus*, Calcutta.
- GUPTA, R. 1972. "Vital drugs and essential oil bearing plants as future cash crops in India," *Indian Farming*, p. 33.
- JAIN, S.K. 1963. Studies in Indian Ethnobotany—Plants used in Medicine by the Tribals of Madhya Pradesh. *Bull. Region. Res. Lab. Jammu* 1(2) : 126-128.
- JAIN, S.K. 1965. On the Prospects of Some New or Less-known Medicinal Plant Resources. *Indian Med. J.* 59(12): 270-272.
- JAIN, S.K. 1965. Medicinal Plant Lore of the Tribals of Bastar. *Economic Bot.* 19(3): 236-250.
- JAIN, S.K. 1967. *Vanaspati Kosh—A Hindi-Latin Dictionary of Economic Plants of India*, Delhi.
- JAIN, S.K. & C.R. TARAFDER. 1963. Studies in Indian Ethnobotany—Native Plant Remedies for Snake-bite among the Adivasis of Central India. *Indian Med. J.* 57(12): 307-309.
- JAIN, S.K. & C.R. TARAFDER. 1967. Medicinal Plant Lore of the Santals—a revival of Rev. P.O. Boddington's work, *Economic Bot.* (In Press).
- KIRTIKAR, K.R. & B.D. BASU. 1935. *Indian Medicinal Plants* (2nd Ed. revised by E. Blatter, J.F. Caius and K.S. Mhaskar, Allahabad, 4 Vols.).
- MAHESHWARI, P. & UMRAO SINGH. 1965. *Dictionary of Economic Plants in India*, Delhi.
- MAJUMDAR, G.P. 1927. *Vanaspati. Plants and Plant Life as in Indian Treatises and Traditions*, Calcutta.

- MHASKAR, K.S. & J.F. CAIUS. 1931. Indian Plant Remedies used in Snake-bite. *Indian Med. Res. Mem.* 19.
- MUKERJI, B. 1953. *The Indian Pharmaceutical Codex*, New Delhi.
- NADKARNI, A.K. 1954. *Dr. K.M. Nadkarni's Indian Materia Medica*, Bombay. Revised Ed.
- SANTAPAU, H. 1953. The Flora of Khandala on the Western Ghats of India. *Rec. Bot. Surv. India* 16(1): 1-335.
- SUNDERRAJ, D. & G. BALASUBRAMANYAM. 1959. *Guide to Economic Plants of South India*, Madras.
- THAKAR, JAIKRISHNA INDRAJI. 1926. *Plants of Cutch and their Utility*, Bombay (in Gujarati).
- TRIVEDI, PANDIT KRISHNA PRASAD. 1961-67. *Dhanvantari, Van-aushadhi Visheshank*, Aligarh, Parts 1-4 (in Hindi).
- U. S. D. 1955. *The United States Dispensatory*, Philadelphia.
- UPHOLF, J.C. Th. 1959. *Dictionary of Economic Plants*, New York.
- WATT, G. 1889-1893. *A Dictionary of Economic Products of India*, 6 vols., Calcutta.
- WREN, R.C. 1950. *Potter's Cyclopaedia of Botanical Drugs and Preparations*. Revised by R. W. Wren, London.
- Anonymous 1948-56. *Wealth of India, Raw Materials*, 7 Vols., New Delhi.

Several journals on general science, economic botany, pharmacology, pharmacy and medicine, particularly the following:

Indian Journal of Pharmacy; Indian Journal of Medical Research and Journal of Scientific and Industrial Research.