

ETHNOBOTANY OF MEDICINAL PLANTS USED BY TRIBES OF KERALA

By

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THESIS

Submitted in partial fulfilment of the
requirements for the degree

Doctor of Philosophy in Horticulture

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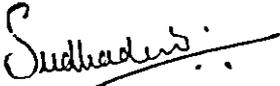
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COLLEGE OF HORTICULTURE
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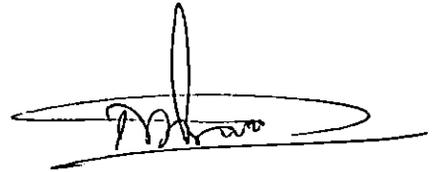
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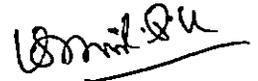


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P.K. SUDHADEVI

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Introduction

INTRODUCTION

Ethnobotany deals with the relationship between human societies and plants. It has been recognized as a multidisciplinary science comprising of many interesting and useful aspects of plant science, history, anthropology, culture and literature. Its importance has been realised chiefly in respect of the varied economic uses of plants among the primitive human societies. It brings to light numerous little known or unknown uses of plants, some of which have potential of wider usage in modern medicine.

India has been famous from ancient times for her wealth of medicinal plants. For many centuries the tribal community had a traditionally self managed system of herbal remedies. This system has certain relevance to the great traditional science of Ayurveda which could be said to have originated through the observations based on the use of herbs by the aborigines and through the experience of the scientifically minded sages. People living in the rural communities mainly depend upon the local flora and fauna for healing their diseases.

Though Allopathy has succeeded in making several drugs synthetically, many of the man-made substitutes for plant substances are not considered fully satisfactory. In fact, there is a revival of interest in natural products as these are biologically more compatible with human system and comparatively less toxic than

the synthetics. Recently several European countries have bestowed much interest in Ayurveda and other oriental practices. According to Shah (1982), 50 per cent of the prescriptions in Europe contained natural products or their constituents. Also, the time and cost involved for the production of a new drug are quite high. In most of the cases, the original source is cheaper, more in abundance and better in quality. Many of the chemicals from plants are unique, produced through complex chemical reactions, which are difficult or impossible to duplicate with.

It seems highly paradoxical that while the flora of India is considered to be a rich emporium of drug plants, systematic treatment is confined to only a limited number of plants. The tribal people who dwell in the forests were much gifted with this treasure of knowledge. However, consequent to various tribal development schemes of the Government, the tribal people are becoming more civilized and knowingly or unknowingly they lose their knowledge on plants which their ancestors gained through centuries. Today the knowledge of herbal medicines is limited only to older people among the tribes. The knowledge of natural resources available with them is a rich potential mine to explore and process for the welfare of man-kind. At a time, when many of the cultural traditions are being lost through changes in living pattern due to technological advancement, the recording of traditional information on the names and uses of plants is important

and urgent. With the availability of reliable data, we can open up a wide spectrum of study in the allied fields.

India is very rich in ethnobotanical information. About 80 per cent of Indias population live in villages and a considerable proportion comprises tribals living in remote forest areas. In Kerala, the scheduled tribes constitute 1.53 per cent of the total population. Though ethnobotanical investigations were done in different parts of India and Kerala, the knowledge available with the tribal population of Thrissur District still remains unexplored. Of the total tribal population of 2.6 lakhs in Kerala, 3.2 thousand reside in Thrissur District. Seventy per cent of this constitute the Malayans (unpublished). Majority of their hamlets are scattered around Chimminty, Marottichal, Vazhachal, Vazhani and Sholayar areas.

With all these points in view, the present study has been undertaken with the objectives of

- a. conducting survey in the selected pockets of tribal dwellings in Thrissur District and collecting information on the ethnobotany of medicinal plants used by the tribes,
- b. describing in detail five rare plants botanically,
- c. testing the feasibility of multiplication of the above five rare plants under Vellanikkara condition using different propagules collected during the survey, and
- d. screening selected plants for antimicrobial activity.

Review of Literature

REVIEW OF LITERATURE

2.1. Ethnobotanical studies

A wealth of information on the properties of plants still exist with aboriginal tribes of our country which is seriously threatened by fast encroaching civilization. It has been evolved by our primitive people over millions of years by trial and error. Of late, the realization that the aboriginal knowledge of plant properties is of both academic and practical value is well established. Various investigators in sundry fields have recognized the need to save native plantlore before it is entombed with the culture that gave its birth.

Thus originated the multidisciplinary science, 'Ethnobotany' comprising of many interesting and useful aspects of plant science, history, anthropology, culture and literature. It brings to light numerous little known or unknown uses of plants, some of which have potential of wider usages. Harshberger (1896) was the first to call this science as 'ethnobotany'. Since then, several scientists (Powers, 1874; Robbins et al., 1916; Vestal and Schultes, 1939; Jones, 1941; Castelter, 1944) attempted to define the term more precisely. Later, Schultes (1962) gave a more reasonable definition as the study of relationship which exists between people of primitive societies and their plant environment or more simply, 'an anthropological approach to botany'.

India is very rich in ethnobotanical information. About 80 per cent of India's population lives in villages, and a considerable proportion comprises of tribal people living in remote forest area. Kirtikar and Basu (1935) referred to the term 'ethnobotany' for the first time in India as they stated that ancient Hindus should be given the credit for cultivating what is now called 'ethnobotany'. Faulks (1958) studied the science further and discussed the field of enquiry in detail. Later, Jain (1978) broadly classified the relationship between man and plants into three categories as (i) the material relationship (ii) the social, cultural and magico-religious relationship and (iii) the impact of man on the plants or plant wealth covering the whole vegetation.

Ethnobotany is sometimes interpreted as medicobotany. Ethno medicine has now been classified into several more specialised disciplines like ethnonarcotics (Schultes, 1941 & 1956), ethno-paediatrics (Schultes, 1963a), ethnopharmacology (Efron, 1967) and ethnogynaecology (Aitschul, 1970).

Though organized studies in the field of ethnobotany is recent, many earlier publications contain valuable materials of ethnobotanical importance. Ethnologies on tribes living in different parts of the world, works on indigenous medicine and botany, and sometimes even forestry and travel accounts contain data of ethnobotanical significance. Some of these uses had stimulated

examination under the searchlight of modern scientific analysis.

2.1.1. Work done abroad

Francisco Hernandez (1570-1575) has been accredited to be the earliest organised worker on this aspect. He surveyed the flora and fauna of Mexico and wrote a comprehensive account in 16 volumes which are considered as the first official record of a purely scientific expedition in history and still a valuable source of study (De, 1968). Ethnobotany has progressed independently in various countries. It is not within the scope of this review to include all the details of investigations. However, the significant studies are mentioned here.

The pioneering work of the Economic Botany Laboratory of the U.S. Department of Agriculture in the establishment of a data base on minor economic plant species ushered a new era of ethnobotanical research all over the world. Among them, the works of Schultes are worth mentioning. In 1937, he studied the ethnobotany of Lophophora williamsii. Schultes (1954 and 1957) surveyed N.W. Amazon and South America respectively. He also described the heritage of ethnobotanical lore (1960); surveyed the native narcotics of new world (1961; 1963b) and specified the role of ethnobotanists (1962). The importance of medical botany in modern science was first described by him (1963a). He also conducted ethnobotanical surveys on hallucinogens (1965) and psychoactive drugs (1967).

The works of Vestal and Schultes (1939) of the Kiwa Indians, Jones (1941) in South America, Schultes and Raffauf (1960) in Amazon, Lipp (1971) of the Chinatic Indians, Nagata (1971) in Hawaii, Weiner (1971) in Tonga, Wong (1976) in Trinidad, Areauas and Azorero (1977) in Paragua, Dólores and Lattore (1977) in Mexico and Wilson and Morian (1979) in Ethiopian Plateau are significant.

Hindman and Frodin (1980) revealed the folk knowledge of the genus Schefflera found in a Papua New Guinea highland. Wiragonda (1980) prepared a detailed list of the traditional medicine in Sri Lanka. A similar study was done by Zoller (1980) about the traditional medicine in Latin America with particular reference to Mexico. Montes and Wilkomirsky (1981) highlighted the different aspects of popular indigenous medicine of the region of Bio-Bio Chile. Maitaili (1981) prepared a bibliography on ancient and contemporary botany and ethnobotany of China. Trotter (1981) cited some examples for folk remedies as indicators of common illness from the Mexico border of United States. Aubaile-Sellenave (1982) reviewed the botanical status, antiquity and diffusion from orient to Islamic and Spanish cultures of henna (Lawsonia inermis). Austin (1982) discussed the medicinal uses of Operculina turpethum by several groups of people in Asia. He also tried to reconstruct probable historic routes of dispersal of the plant in the Indian and Arabic region based on linguistic

evidence used in connection with medicinal philosophies. Holdsworth and Wamoi (1982) listed 28 plants belonging to 22 families, traditionally used in Manus Province of Papua New Guinea. Leterme (1982) identified some of the rare and ancient varieties of fruit plants of Grand Lands and discussed their methods of preservation.

Bocek (1984) identified a great variety of plant species used as food, medicines and raw materials by the Rumsen and Mustsum Costanean people of Central California. Davis and Yost (1984) conducted an extensive ethnobotanical study of the Waorani Indians of Eastern Ecuador. Bye (1985) reexamined the collections from Palmer's, the first ethnobotanical study in Mexico. Anderson (1986) revealed 68 medicinal plants used by the Lahu tribe of Northern Thailand. Hazlett (1986) documented ethnobotanical information regarding native uses of medicinal plants from the Cabecar and Guaymi settlements in Central America. Holdsworth (1987) listed the medicinal plants of the Morobe Province of Papua New Guinea. Mahunnah (1987) discussed the traditional therapeutic uses of the plants by the Hayas of Tanzania in the treatment of malaria and as oral contraceptives. Manandhar (1987) dealt with 81 plant species used by the inhabitants of Manang valley of Nepal. Sanjappa (1987) recognized 18 species and one variety of the genus Indigofera from Sri Lanka. Beaujard (1988) documented the plants used for traditional medicine in South-East Madagascar. Dennis (1988) studied the herbal medicines among

the Miskito of Eastern Nicaragua. Han (1988) conducted survey on the traditional Chinese medicine. Lokar and Poldini (1988) documented the herbal remedies in the traditional medicine of the Venezia Giuhia region of North East Italy. Quanshah (1988) described medicinal uses of 25 plants used by the inhabitants of the Maroantsetra Region of NE Madagascar. Darias et al. (1989) made new contributions to the ethno-pharmacological study of the Canary Islands. Mohsin et al. (1989) screened the plants used in traditional Arab system of medicine for analgesic and antipyretic activity. Thomas (1989) studied the perspective of ethnophytotherapy of the yoruha medicinal herbs and preparations of England.

2.1.2. Work done in India

In ancient India, reference to the curative or healing properties of herbs were documented in the Rig veda, which is considered as the earliest record of the use of plants in medicine and surgery. The period of Rig veda is estimated to be between 3500-1800 BC (Bhandari, 1951). More details of medicinal herbs and their utility are available in the Atharva veda. A far more detailed account of the plants is found in Sushruthasamhita, written between 600 BC - 300 AD (Jain, 1967).

The pre-occupation of Indian scientists and historians of many persuasions with the furtherance of original ethnobotanical research has not gone unnoticed in the world of science. The recent

interest in organized studies in said to have been initiated by The Botanical Survey of India. During the reorganisation of Botanical Survey of India, Janaki Ammal (1954) aptly stressed the need for seeking the help of the aboriginals in the tribal regions of Assam, Himalayas, Andaman and Nicobar Islands and the Western Ghats for ethnobotanical studies. She confidently believed that the plants and the plant products used by these primitive men might throw much light on their possibilities as new introductions. Considering the suggestions of Janaki Ammal (1954), Jain started investigating the plants associated with the aboriginal societies of India. Jain (1963a) explored plants associated with Gonds, who are the tribal people of Madhya Pradesh. He intensified the investigation on the wild edible plants of Gonds of Bastar area in Madhya Pradesh (Jain, 1963b). Jain (1964) described 88 wild plant foods used by them. Since then, he intensified his work on the medicinal plants associated with aboriginals of Madhya Pradesh (Jain, 1965a & b).

Jain and De (1964) studied the tribals of Purulia (West Bengal). This district is inhabited chiefly by Santals, Bhumjias and the Kora (Modi). They reported 14 edible plants associated with them. Jain (1965a) reported the use of wood by Gonds for musical instruments. The following plants were used in making of musical instruments; Caryota urens Linn., Gmelina arborea Roxb., Mangifera indica Linn., Pterocarpus marsupium Roxb., Lagerstroemia

parviflora Roxb., Terminalia alata Heyne., Bachanania lanzan Spr. and Cocos nucifera Linn. Jain (1965b) compiled the studies on medicinal plants of the tribals of Bastar and reported 101 species associated with their life. Jain (1967) tested the plants used by Gonds in healing of bones.

Medicinal plants of Bhagirathi Valley in Uttar Pradesh was studied by Uniyal (1968). Agarwal (1969) described the roots of plants used as medicine in India. Sharma (1969) enlisted 148 botanical drugs that were mentioned in the Atharva veda and Rig veda.

Shah and Joshi (1971) presented ethnobotanical and other pertinent data from the montane and sub-montane regions of the Kumaon, an ethnically distinct area of north eastern India. They reported nearly 80 medicinal plants associated the people of Kumaon. Some of the proven use includes that of the resin of the tree Betula utilis D. Don when mixed with water and butter and administered after menstruation serving as an oral contraceptive.

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Khosha and Singh (1972) collected information on the ancient use of betel nut. Pal (1972) revealed the magico-religious belief about plants among 'adibasis' of Bihar. Singh and Chuneekar (1972) published a glossary of medicinal plants mentioned in Charaka Samhita, Sushruta Samhita and Ashtanga Hridaya. Sharma (1971; 1972 & 1973) reviewed the Nighantus and their treatises and compiled

the medicinal plants mentioned therein. Arora (1973) discussed the ethnobotany of Coix lacryma-jobi Linn. of Meghalaya. It was found that Coix was grown for domestic use only, as a substitute to rice or admixed with it.

Pal (1973) examined the tribal folklore associated with eye treatment. Thothathri et al. (1973) conducted an expedition on the Great Nicobar Island. They recorded 67 species of ethnobotanical importance. The correct name, family, local names, uses, locality, field number and flowering and fruiting time were given for each species. All were original contributions not recorded so far. Uniyal and Billare (1973) collected information on the indigenous use of Tylophora hirsuta for inducing abortion. Viswanathan (1973) recorded that a decoction of leaves and roots of Solanum trilobatum Linn. was prescribed for chronic bronchitis by the tribes of South India, especially of Tamil Nadu.

Ethnobotanical studies on the therapeutic uses of Strychnos Linn. was undertaken by Bisset (1974) and on Embelia ribes Burm. f., by Shah and Kapoor (1974).

Viswanathan (1975) investigated the genus Solanum associated with the tribes of Kerala (Chemma, Paniya, Kurichiya and Malayas) and Tamil Nadu (Ottan and Narikkuruva). Five wild species of Solanum (S. incanum, S. indicum, S. xanthocarpum, S. trilobatum and S. torvum) were studied phytochemically and cytogenetically.

Plants used for adornment in India were reported by Mehra et al. (1975).

Kachroo and Nahvi (1976) reported the ethnobotany of 270 plants associated with the Kashmiris. The Central Council for Research in Indian Medicine and Homoeopathy conducted several medicobotanical surveys in some of the important ethnic regions of India.

Information on the medicinal and other economic plants of the tribals of Nicobar Islands was collected and reported (Raghunathan, 1976a). The Todas, Kotas, Irulas, Paniyas, Kurumbas and Kattunayakas of the Nilgiris were also studied. About 93 species of plants associated with these tribes were collected and reported (Raghunathan, 1976b). Similarly, from the Ladakh region, information on 80 medicinal plants was gathered (Raghunathan, 1976c). Bambusa arundinaceae (Retz.) Willd. was reported to be used as an abortifacient by the Kurumbas of Mavinahalla and the Irulas of Anaikkatty (Raghunathan, 1976b).

Shah and Kapoor (1977) reported the ethnobotany of Acorus calamus.

Abraham (1978) presented ethnobotanical notes on the Todas, Kotas and the Irulas of Nilgiri. Seventy four plants associated with their life in various aspects such as food, hut making, fire making, rituals and other economic importance were

enumerated. Arora (1978) studied the native food plants of the tribals of North Eastern India. Bedi (1978) described the food and medicinal plants restricted to the aboriginal tribes of Ratan Mahal and surrounding hills of Gujarat. Plants in the life and folklore of the Karbis of Assam were studied by Borthakur (1978). Gupta (1978) enumerated the plants in folklore medicine of the Himalayas. Gupta (1978) studied the plants in Munda culture of Bihar. The method and prospects for studying folklife for plants were discussed by Jain (1978). Janaky Ammal and Jebhdas (1978) studied the ethnobotany of the Kanikkars of South India and enumerated sixty plants with their local names and uses. Folklore and medico botany of the Khasia and Jaintia hills were studied by Kharkongor and Joseph (1978). Tarafder (1978a) studied the interesting ethnic uses of the wellknown plant, Vitex negundo Linn. Tarafder (1978b) enumerated plants used for antifertility and conception. Tirupathi et al. (1978) studied the medicinal plants used by tribes of Tirap district of Arunachal Pradesh.

Jain and Dam (1979) described the economic uses of 48 plants from North Eastern India. The information has been collected from specimens deposited in the herbariums of the Botanical Survey of India, Shillong. Koelz (1979) prepared a detailed account of the plants in common use in Lahul province of Punjab, based on plant collections and information gathered from the inhabitants. The native names of plants are given along with the botanical

identification and English equivalents. Tiwari et al. (1979) exploited the folklore medicines of Assam and Arunachal Pradesh.

Hemadry et al. (1980) described the folklore uses of 80 plant species based on a survey conducted in Andhra Pradesh. Singh and Pandey (1980) studied the medicinal plant lore of the tribals of eastern Rajasthan.

Pandey et al. (1981) recorded the medical efficacy of certain plants from Guntour forest circle of Madhya Pradesh. Ramachandran and Nair (1981) made observations on the ethnobotany of the Irulas of Tamil Nadu. Sharma (1981) collected information on the folklore antifertility plant drugs of Bihar. Singh et al. (1981) conducted survey on the biological activity of some medicinal plants of Mannanur forest of Andhra Pradesh. Tiwari et al. (1981) revealed the folklore information from Assam for family planning and birth control.

Ethnobotanical uses of some plant species and superstitions associated with these plants used by the Bhils of Rajasthan have been described by Joshi (1982). Khan and Chaghatai (1982) studied the ethnobotany of some plants used for curing skin afflictions. Studies on the ethnic uses of medicinal plants of Nagaland was conducted by Rao and Jamir (1982). Yoganarasimhan et al. (1982) investigated the Medico-botany of Thumkur district of Karnataka.

Sahu et al. (1983) have listed the plants used by tribes for diarrhoea and dysentery. Tarafder (1983a) studied ethnogynaecology in relation to plants used for abortion. Tarafder (1983b) listed the traditional medicinal plants used by tribals of Ranchi and Hazaribagh districts of Bihar for stomach troubles.

Dagar and Dagar (1984) described the ethnobotanical uses of eight species of Gymnosperms used by the aboriginals of Andaman and Nicobar Islands. Maheswari and Singh (1984) conducted survey on the ethno-medicines of the Kohls of Allahabad and described the use of 60 plant species used by them in the various herbal remedies and recipes. Shekhawat and Anand (1984) conducted ethnobotanic survey amongst the village communities of Jai-Salmer, Jodhpur and Naguar districts of Rajasthan and listed the plants used by local people for various purposes including medicine.

Chandra et al. (1985) studied the ethnobotany of Santhal Pargana District of Gujarat. Rao and Sreeramalu (1985) surveyed the Sreekakulam District of Andhra Pradesh. The collection includes plants like Terminalia bellirica, Tribulus terrestris, Alangium salviifolium etc. which are used by the tribes of our regions also. Shah and Gopal (1985) collected information from the tribal inhabitants in North Gujarat on the medicinal uses of some common plant species.

Anandan and Veluchamy (1986) described ten folklore claims collected from North Arcot district of Tamil Nadu. Treatments

for skin diseases, snake bite, fracture, infective hepatitis, anaemia, conjunctivitis and corneal ulcer with locally available plant preparations are included.

Krishna and Singh (1987) presented observation on 64 plants found in eastern districts of Sikkim along with their uses. Forty plants associated with the herbal remedies are described. The data are compared with information obtained from some other tribal societies like the Santhals and Oraons inhabiting neighbouring regions.

Butch and Navachoo (1988) conducted ethnobotanical exploration of Ladakh. Chauhan and Chauhan (1988) studied the ethnobotany of Trans-Giri area of Sirmour district of Himachal Pradesh. Dagar (1988) gave the importance of the family Euphorbiaceae in folk life of the Nicobarese tribals. Das and Kant (1988) conducted ethnobotanical studies of the tribal belt of Koraput (Orissa). Rare and endangered plants of Gujarat State forests were listed by Joshi (1988). Kalakoti and Pangtey (1988) studied the ethnomedicine of Bhotia tribes of Kumaon Himalaya of Uttar Pradesh. Lakshmanan and Narayanan (1988) presented details of some folklore medicines in the remote hamlets of Dhoomanoor and Chempukarai of Anakkatty hills, Coimbatore. Mandal and Yonzone (1988) conducted ethnobotanical studies on some plants of Darjeeling. Pal and Jain (1988) provided a brief account of 40 plants associated with herbal remedies among the Lodha tribe of Midnapur District. Reddy et al. (1989) collected information of the medicinal plants of Chenchu

tribes of Andhra Pradesh. Uses of 61 plants belonging to 39 families are described. Saklani and Jain (1988) made observation on ethnic uses of plants of North-Eastern India. Sharma (1988) revealed some interesting medicinal folklores from Bihar. Sharma (1988) depicted the uses of Aloe as a safe home remedy. Singh (1988) described the ethnobotanical treatment of piles by the Bhoras of Uttar Pradesh. Tiwari et al. (1988) collected 100 plants of classical Ayurvedic and folk medicinal importance from Garo hills of Meghalaya. Uniyal and Issar (1988) found out the utility of unknown herbal drugs traditionally used in Ladack along with their possible alternative medicines.

Chetty and Rao (1989) studied the ethnobotany of Sarakallu and adjescent areas of Chittoor District in Andhra Pradesh. Jha et al. (1989) recorded 33 medicinal plants and by the local inhabitanace of Madhubani District of North Bihar. Nagaraju and Rao (1989) described the folklore uses of 26 antidiabetic plant species occurring in Rayalaseema region of Andhra Pradesh. Among them, plants like Azadirachta indica, Momordica charantia, Gymnema sylvestre and Phyllanthus amarus were already ascribed with such properties. Reddy et al. (1989) surveyed the plant drugs of Chittoor District of Andhra Pradesh. A survey of medicinal plants of the Chenchu tribe of Andhra Pradesh was done by Reddy et al. (1989). Siddique et al. (1989) described 50 plant species used for traditional skin diseases in Uttar Pradesh along with

dosage rate and mode of administration. Folklore medicines for jaundice from Coimbatore District of Tamil Nadu and Palghat district of Kerala were illustrated by Sankaranarayanan (1988). Out of the twenty remedies gathered, two, viz., Alysicarpus vaginalis and Justicia tranquerbariensis were found to be new reports.

2.1.3. Work done in Kerala

Systematic ethnobotanical investigations in Kerala started as early as in 1956 when Sengupta and Biswas (1956) studied the nutritional status of the Kanikkar and Urali tribes of Travancore. Aiyappan (1957) described the primitive medicines used at a Malabar temple. Nair (1965) studied the tree symbol worship among the Nairs of Kerala.

Janaki Ammal (1974) stated that many of our present day vegetables originated as "dung hill" plants, chiefly by the activities of primitive man. Summarising her study on the status of women in tribal society among the Kadars and Paniyars of Kerala, she claimed that both Agriculture and Horticulture were the inventions of women of primitive societies.

Janaki Ammal and Viswanathan (1974) collected a high alkaloid containing species of Solanum incanum Linn. from the Paniyar tribe of Kerala. It was recorded that the berries were used as an oral contraceptive by the women folk of the Paniyar

tribe of Iritty, North Kerala. On chemical examination of the berries, the seeds were found to contain 3.8 to 4.8 per cent of glyco-alkaloid, a raw material for the synthesis of steroidal hormones.

Manilal (1981a and 1981b) studied the ethnobotany of rices of Malabar and the ethnobotanic connections between mushroom and dolmens. Ramachandran and Nair (1981) studied ethnobotany of Cannanore district. John (1984) explored the southern part of Kerala and prepared a selected list of 100 drugs commonly used by the experienced elders of the 'Kani' tribe of Trivandrum forest division. He also evaluated the claims by the tribal people in terms of the known chemical constitution of the plants. Manilal (1984) attempted to identify the medicinal plants mentioned in Hortus malabaricus. Pushpangadan and Atal (1984) conducted investigation among the primitive tribals of Western Ghats, and their herbal medicine. They utilized a wide variety of herbs in treating the physical symptoms. These medicinal herbs were collected, identified and described. A major study conducted in Kerala in the tribal health and medicine is by Nair (1985). Mathur (1987a) conducted a study among the Wynad tribes and presented data on their etiology, treatment and traditional curing techniques. A detailed account of the ethnomedicine of the Irular tribe of Attappady valley along with the etiology of illness and treatment was prepared by Mathur (1987b).

Medicinal uses of 93 plants of the tribal area of Chambakkad was prepared as a part of the scheme for restoration of Degraded Environment in Chambakkad Tribal Colony area (KAU, 1986). Pushpangadan (1986) conducted investigations among the Kani tribes of Agasthyar hills (Kerala) for the plant, Trichopus zeylanicus that induces evergreen health and vitality.

While going through the valuable works done throughout the world, it is evident that ethnopharmacology is not just a science of the past, utilizing an out moded approach. It still constitutes a scientific backbone in the development of active therapeutics based upon traditional medicine of various ethnic groups. Although, not highly esteemed at the moment, it is a challenge to modern pharmacologists.

2.2. Propagation studies on selected rare plants

The five plants selected for this purpose were Alstonia venenata, Coscinium fenestratum, Habenaria latilabris, Rotula aquatica and Woodfordia fruticosa. No work has so far been conducted on the propagation aspect of these crops. The natural method of propagation is through seeds in Alstonia venenata and seeds and root suckers in Coscinium fenestratum (Kirtikar and Basu, 1935). Habenaria naturally multiply through pseudobulbs (CSIR, 1969). Seeds are the normal propagules in Rotula aquatica and Woodfordia fruticosa (Kirtikar and Basu, 1935).

2.3. Antimicrobial activity of plant extracts

Plants and their products have been used in the treatment of infectious diseases from very long time. These plants have a variety of chemical constituents, some of which have the ability to inhibit the growth of pathogenic microorganisms (Ikram and Inamul-Haq, 1984). Phytochemical studies have previously been carried out on many of them. Many of the plant extracts - alkaloids and essential oils, isolated from plants have been used as anti-septics. Some of the major works in this field are summarised below.

Belog et al. (1976) conducted investigations on the antimicrobial activity of 106 Phillipine plants including Alstonia scholaris and Zingiber officinale. All of them exhibited significant activity. Uppalapati and Rao (1979) proved the antifungal activity of the essential oil of Vitex negundo against Trichoderma, Fusarium, Colletotrichum and Helminthosporium. Rhizome of Curcuma amada was found to contain some antifungal substances which inhibited the growth of several test fungi (Ghosh et al., 1980). Pathak et al. (1979) reported the antibacterial activity of the essential oils obtained from Myristica fragrans and leaves of Cymbopogon nardus against selected animal and plant pathogenic bacteria, including Staphylococcus aureus and Salmonella paratyphi. Leaf extract of Lawsonia inermis, Lycopersicon esculentum, Piper betle, Psidium guajava and Tamarindus indica completely inhibit the

spore germination of Ustilago tritici and U. hordei (Misra and Dixit, 1979). Thakare (1980) found that the crude leaf extracts of Eugenia jambolana and Phyllanthus emblica showed remarkable inhibitory activity against eight bacteria. Ethanol extracts of the roots of Glycyrrhiza glabra var. typica was found to possess significant antimicrobial activity against Staphylococcus aureus and Candida albicans (Mitscher et al., 1980). The essential oil obtained from the seeds of Elettaria cardamomum inhibited the growth of eight pathogenic bacteria in vitro (Narayana et al., 1980). Extracts from the seeds of Lawsonia inermis and flower buds of Punica granatum were found to completely inhibit the spore germination of Drechlera rostrata and Curvularia lunata (Charya et al., 1980). Eugenol acetate, geranyl acetate and methyl heptanone isolated from the essential oil of Ocimum americanum exhibited significant antifungal activity (Jain et al., 1980). Wat et al. (1980) examined the ethanolic extracts of 46 plant drugs belonging to the family Asteraceae for antibiotic activity against Escherichia coli and Candida albicans and 20 were found to be effective. Essential oils of Mentha arvensis and Cymbopogon martini var. motia were found to control the leaf spot disease of paddy caused by Helminthosporium oryzae (Dikshit et al., 1980).

Essential oil from the flowers of Azadirachta indica was observed to have antibacterial activity against seven human pathogenic bacteria (Chopra et al., 1981). Catharanthus roseus

leaf extract was used to inhibit the growth of Curvularia lunata successfully (Bhowmick and Vardhan, 1981).

The extracts of ripe and unripe fruits of Carica papaya has been found to inhibit the growth of Staphylococcus aureus and Escherichia coli (Emeruwa, 1982). Pharmacological screening of the alkaloids from the leaves and stem bark of Annona crassiflora showed antibacterial activity against Gram negative bacteria (Hocquemiller et al., 1982). The extracts of Anacardium occidentale exhibited antibacterial activity at high concentrations (Laurens et al., 1982). Allium sativum extract completely inhibited the growth of enterotoxigenic Escherichia coli (Kumar and Sharma, 1982). The essential oil from the leaves of Hyptis suaveolens exhibited strong fungitoxicity against Helminthosporium oryzae (Pandey et al., 1982). Essential oils from the leaves of Citrus aurantifolia, Murraya koenigii and Feronia limonia exhibited anti-fungal activity against eight test fungi (Gupta and Singh, 1982).

The ethanolic extract of the leaves of Sida rhombifolia showed high antibacterial activity against Staphylococcus aureus (inhibition 44 mm) and fairly good activity against Escherichia coli (inhibition 26 mm) (Bhatt et al., 1983). The antibacterial flavanones, sigmoidin A and sigmoidin B, isolated from Erythrina sigmoides inhibited Staphylococcus aureus and Bacillus subtilis at 50 ppm (Fomum et al., 1983). The essential oil from the leaves of Sphaeranthus indicus was found to be effective against many test bacteria (Garg

and Kasera, 1983). Ethanolic extract of P. betle leaf exhibited strongest antimicrobial activity against various bacteria, moulds and yeast tested (Ju and Chou, 1983). The essential oil of Mentha arvensis var. Piperascens exhibited strong fungitoxicity against Helminthosporium oryzae (Singh et al., 1983). Joarder and Khatum (1987) observed that lemongrass oil has pronounced activities against fungal flora including different species of Aspergillus, Penicillium, Rhizopus, Mucor, Botrytis and Circinella and no inhibitory action against bacterial flora. Misra et al. (1988) reported that the essential oil of Cymbopogon martini showed fungitoxicity against three species of Aspergillus (A. flavus, A. fumigatus and A. parasiticus). The essential oil of Xanthium aethiopica fruits, O. gratissimum leaf and flower showed antimicrobial activity against Staphylococcus aureus, Escherichia coli and Candida albicans (Thomas, 1989). The essential oil of Thymus longiflora showed antibacterial activity against Pseudomonas fluorescens and Mycobacterium phlei (Cruz et al., 1989). Juglone isolated from the hulls of walnut (Juglans nigra) showed moderate antifungal activity (Clark et al., 1990).

Materials and Methods

MATERIALS AND METHODS

The present studies on the ethnobotany of medicinal plants used by the tribal people of Kerala was carried out in the Centre for Advanced Studies in Humid Tropical Tree Crops and Environmental Horticulture, College of Horticulture, Kerala Agricultural University, Vellanikkara. There are 37 scheduled tribes in Kerala distributed throughout the State. Ethnobotanical studies of many of these tribal pockets viz., Wynad, Idukky and Palghat (John, 1984; Mathur, 1987a; Sankaranarayanan, 1988) were conducted. Since the flora of Thrissur district and the information available with the Malayans still remain unexplored, the present investigations were confined to the Malayan Tribe on the following aspects.

- i) Ethnobotanical investigations on the medicinal plants used by the Malayan tribe of Thrissur district.
- ii) Botanical description of selected five rare plants among the collection.
- iii) Propagation studies on the selected five plants.
- iv) Screening of selected plants for antimicrobial activity.

3.1. Ethnobotanical investigations

3.1.1. Field work

3.1.1.1. Selection of localities

A preliminary survey for the selection of suitable localities was conducted in the tribal localities of Thrissur district during

1989. The details of the areas surveyed are presented in Table 1. Twenty four tribal pockets distributed in six panchayats were surveyed. In most of the areas they have succumbed to modern civilization. This was clear from the nonavailability of specimens and reliable informants. Considering all these factors, five localities representing diverse vegetation, climate and other environmental factors were identified for the study. They were Chimminy (Palappilly Range), Marottichal (Peechi Range), Sholayar (Sholayar Range), Vazhachal (Vazhachal Range) and Vazhani (Wadakkanchery Range). These localities have been depicted in Fig. 1, and described in Table 2.

3.1.1.2. Selection of tribe

In all the five localities, Malayans were the prominent tribe. They constituted majority of the population and most of the traditional medicine-men were from among them. Hence the Malayan tribe was selected for the study.

3.1.1.3. Selection of informants

Reliable informants were selected in each locality with the help of the headman or herb gatherers. Persons with a thorough knowledge of the therapeutics and identity of the plants were selected for this purpose.

Fig. 1. Localities surveyed in Thrissur District

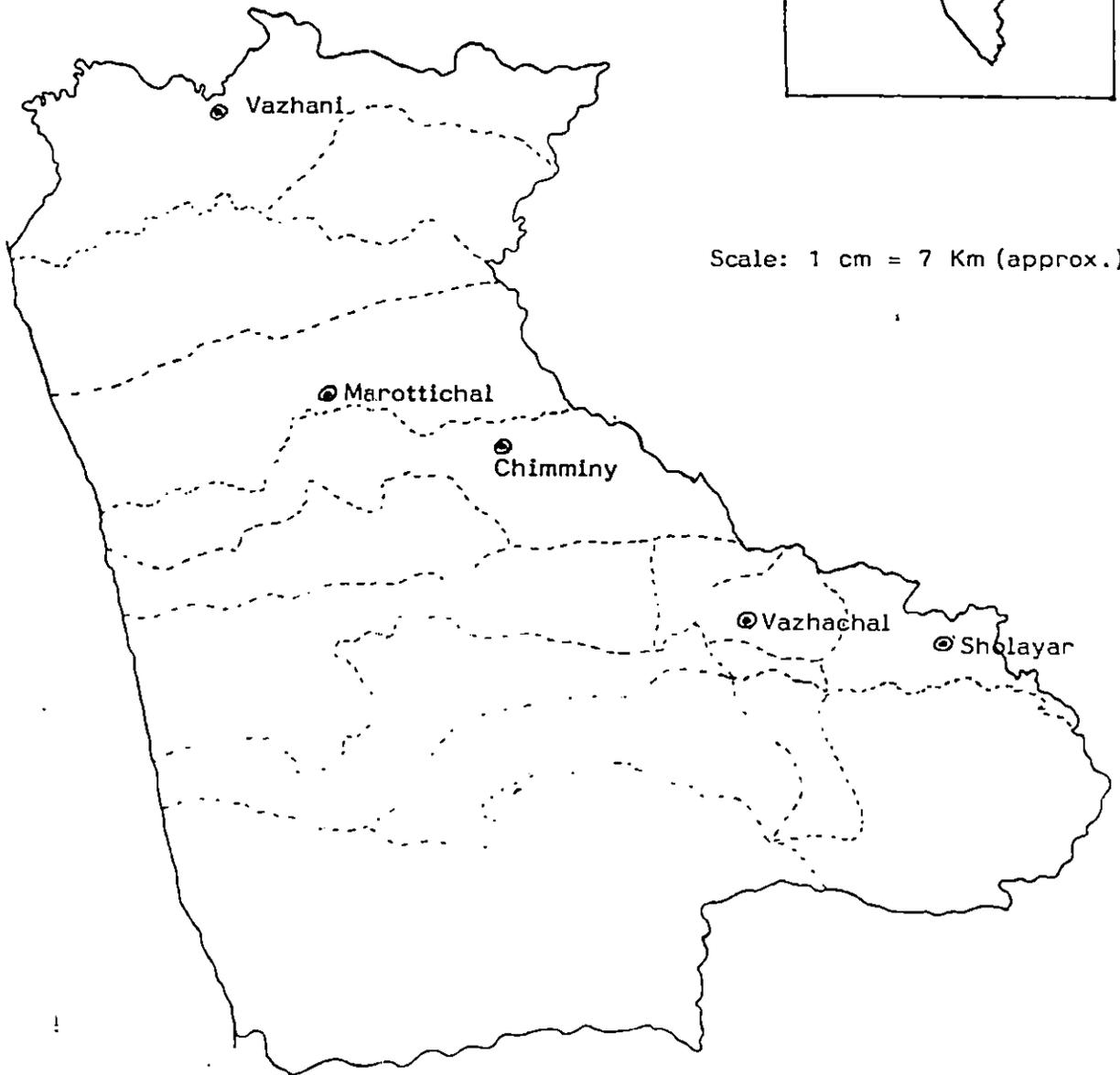
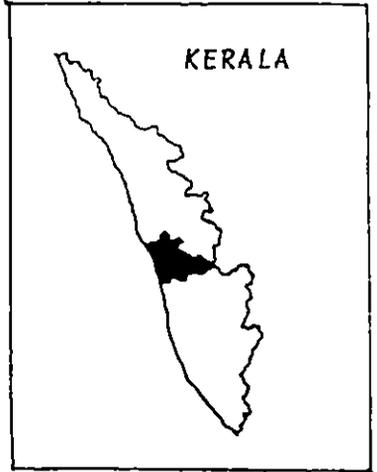


Table 1. Tribal areas of Thrissur included for the preliminary survey

Panchayat	Tribal areas surveyed
Chalakkudy	Malakkappara, Randukai, Sholayar, Vazhachal
Palappilly	Chimminy, Palappilly
Pananchery	Malayan Kulambu, Olakara, Palkulambu, Pathrakandam, Perumthumba, Pottimada, Thamaravellachal, Vilangannur
Puthur	Cheerakundu, Chennaypara, Marottichal, Valloor
Valakkavu	Njarakura, Payyanam, Thalikkundu, Valakkavu
Wadakkanchery	Elanadu, Vazhani

Table 2. Characteristics of the localities surveyed

Forest Range	Locality	Description of the area, type of vegetation
Palappilly	Chimminy	525-800 m above MSL Semi evergreen and evergreen
Peechi	Marottichal	125-400 m above MSL Evergreen
Sholayar	Sholayar	800-1000 m above MSL Evergreen
Vazhachal	Vazhachal	225-400 m above MSL Moist deciduous and semi evergreen
Wadakkanchery	Vazhani	100-150 m above MSL Moist deciduous

3.1.1.4. Collection of information

Information were gathered from the tribal people on plants used by them for medicinal purposes by repeated visits to the selected localities. In order to collect information of the natural medicines used by the Malayan community of different localities in the same depth and dimension, a common exhaustive general guideline was used for collection of data. This was based on the field survey methods standardised by Jain (1967) with necessary modifications.

The foremost and most difficult task was to establish a close rapport with the selected informants. At least three visits to each localities were made for this purpose. During the subsequent visits, collection of information on illness and therapeutic recipes were made. They were taken along for field trips to the nearby forests for the collection of medicinal herbs. The field trips to each locality were done regularly for two years. Information were collected on plant material used, its collection, processing, preparation of drugs, dosage and administration. The local names and a brief description of the habit were also recorded. Voucher specimens were collected for authentic information and future reference. Seeds and other propagules such as cuttings, tubers and rhizomes of the available plants were also collected. However, specimens of common plant species were not preserved.

3.1.2. Collection of specimens

At least two herbarium specimens for each accession were collected, and preserved. Notes about the plants were recorded in the field book.

3.1.2.1. Field number

The specimens were given field numbers. Individual serial numbers were given and was maintained continuously.

3.1.2.2. Field notes

Field notes were maintained with details of vernacular names of plants, locality and habit with relevant information on their therapeutic uses by the Malayan tribe.

3.1.2.3. Pressing and drying

The collected specimens were poisoned using 1% mercuric chloride in 95% ethyl alcohol. They were spread neatly and kept pressed in between blotters with the help of a wooden herbarium press on the same day. The blotters were changed every day for one week till the specimens were completely dried.

3.1.2.4. Mounting

The dried specimens were glued and mounted on herbarium sheets of 42 x 28 cm size. The stiff portions were stitched with

the help of thread and needle at different spots. They were then properly labelled at the bottom on the right hand side corner of the mounting sheet.

3.1.2.5. Identification

Each specimen was botanically identified, and was matched with the specimens from the Calicut University herbarium. Effort was made to label the sheets with the latest accepted nomenclature of the taxon.

3.1.2.6. Incorporation

The identified specimen sheets were incorporated into the Herbarium of the Department.

3.1.2.7. Arrangement of the data

The plants were arranged alphabetically by generic name, followed by specific epithet. The data are presented locality wise in the following order: botanical name/field number/name of the family/local name in single quotation marks/brief description of the habit/medicinal uses among the tribe.

3.2. Botanical description of selected plants

From the collection of plants, five species were selected, considering the rareness of their occurrence and habit i.e., a tree (Alstonia venenata), a woody shrub (Woodfordia fruticosa),

a herbacious shrub (Rotula aquatica), a climber (Coscinium fenestratum) and a herb (Habenaria latilabris). Most of them are on the verge of extinction and it is highly essential to document and multiply them.

The characters of each plant were studied and they were illustrated and described botanically. The floras (CSIR, 1969; Gamble, 1957; Hooker, 1890) of the region were also consulted while preparing this document.

3.3. Propagation studies

The five rare plants selected for the botanical description were used for this study. These plants were propagated under Vellanikkara conditions. Different propagules, viz., seeds, stem and root cuttings collected during the survey were used.

3.3.1. Sowing of seeds

seeds collected were sown in mud pots filled with potting mixture containing sand, soil and cowdung in the ratio 2:1:1. They were observed for the percentage of germination and survival of the seedlings. Seedling characters such as height, girth, number of leaves and length of root were recorded 60 days after sowing.

3.3.2. Planting of cuttings

Stem and root cuttings were planted in polythene bags filled

with potting mixture containing equal proportion of sand, soil and cowdung in a slightly slanting position with proximal end facing upward. Observations consisted of the number of cuttings sprouted, days taken for sprouting and the percentage of cuttings sprouted.

3.3.3. Alstonia venenata

The plant was located in the forest of Sholayar region. Seeds could not be collected during the survey. Hence propagation was attempted with stem cuttings only.

3.3.4. Coscinium fenestratum

Fully ripe fruits were collected from Vazhachal region during October-November. The seeds were extracted after removing the pulp and sown on the second day. Observations were taken on the germination and seedling characters.

Since the plant produces root suckers, possibility of propagation through root cuttings was also tried along with stem cuttings.

3.3.5. Habenaria latilabris

The pseudostems were collected and planted in different media. The media used were charcoal, bricks, charcoal + bricks in the ratio 1:1 and potting mixture with sand + soil + cowdung in the ratio 2:1:1.

3.3.6. Rotula aquatica

Cuttings taken from the basal, middle and tip portions were used for the study.

3.3.7. Woodfordia fruticosa

Seeds were collected from Sholayar region and sown.

Three types of cuttings, viz., softwood, semihardwood and hardwood were used for the trial.

3.4. Antimicrobial activity of plant extracts

3.4.1. Sampling

Fresh samples were used for the extraction of essential oil. For the preparation of ether and alcohol extracts, dried and powdered plant samples were used.

3.4.2. Extraction

3.4.2.1. Ether extract

The plant samples were dried, powdered and extracted with petroleum ether (40-60°) in a soxhlet apparatus for 8 hours. From the extract, the ether was distilled off and the residue containing the neutral substances, pigments, fats, oils and resins was employed for studying its antimicrobial activity.

3.4.2.2. Alcohol extract

The ether extracted powder is again extracted with ethyl alcohol in a soxhlet apparatus for 8 hours. The alcohol was distilled off and the residue containing both acidic and basic substances was collected for testing the antimicrobial property.

3.4.2.3. Essential oil

The essential oil was extracted from the fresh plant samples by water and steam distillation method in a clevenger trap.

3.4.3. Test microorganisms

Seven bacteria and two fungi were selected to carry out antibiogram using ether extract, alcoholic extract and essential oil from medicinal plants (Table 3). As a comparative study, the sensitivity of the test organisms was also tested in vitro for their antibiotic susceptibility pattern using commonly available antibiotic and antifungal discs.

Stock cultures of all the microorganisms were obtained from the Department of Microbiology, College of Veterinary and Animal Sciences, Mannuthy. Gram positive as well as Gram negative bacteria were subcultured in Muller Hinton agar whereas fungi were subcultured in Sabouraud's dextrose agar. For the antibiogram 24 h old bacterial culture and 48-72 h old fungal culture were employed.

Table 3. Pathogenic test microorganisms selected for conducting the antibiogram

I. Bacteria

a) Gram negative bacteria

1. *Salmonella typhimurium*
2. *Salmonella pullorum*
3. *Escherichia coli*

b) Gram positive bacteria

1. *Bacillus anthracis*
2. *Streptococcus agalactiae*
3. *Streptococcus pyogenes*
4. *Staphylococcus aureus*

II. Fungi

1. *Candida guilliermondi*
 2. *Trichosporon cutaneum*
-

3.4.4. Plant extract/Essential oil

3.4.4.1. Ether and alcoholic extracts

Ether and alcoholic extracts collected from 10 plant species (Table 4) were used to test their antimicrobial properties.

3.4.4.2. Essential oil

Essential oils distilled from four plant species (Table 5) were used for testing their antimicrobial activity.

3.4.5. Standard antimicrobial agents

In order to compare the antimicrobial activity the following standard antimicrobial agents were used. Eight antibiotics and two fungicides were screened (Table 6). Discs manufactured by Span Diagnostics, Surrat (India) were used in the present study. Clotrimazole and Miconazole discs were not available so they were prepared in the laboratory.

3.4.6. Disc preparation

Discs of 6 mm diameter were punched from Whatman No.1 filter paper and were sterilized by dry heat at 140°C for one hour in petridishes. One drop of the plant extract/essential oil was absorbed to each disc using a tuberculin syringe fitted with 22 G needle. The plant extract absorbed discs were stored after drying in sterile vials at 4°C until use.

Table 4. Ether and alcoholic extracts screened against pathogenic microorganisms

Sl.No.	Plant species	Part used for extraction
1	<i>Alstonia venenata</i>	leaf, root bark
2	<i>Aristolochia indica</i>	root
3	<i>Coscinium fenestratum</i>	stem
4	<i>Cynodon dactylon</i>	aerial part
5	<i>Gmelina arborea</i>	bark, leaf
6	<i>Holoptelia integrifolia</i>	leaf
7	<i>Macaranga peltata</i>	leaf
8	<i>Melia dubia</i>	bark, leaf
9	<i>Pterocarpus marsupium</i>	bark, leaf
10	<i>Wrightia tinctoria</i>	bark, leaf

Table 5. Essential oils screened against pathogenic microorganisms

Sl.No.	Plant species	Part used for distillation
1	<i>Alstonia venenata</i>	leaf
2	<i>Cinnamomum verum</i>	leaf
3	<i>Coscinium fenestratum</i>	stem
4	<i>Syzygium aromaticum</i>	leaf

Table 6. Standard antimicrobial agents screened against test microorganisms

Sl.No.	Antimicrobial agents	Disc content
<u>Antibiotics</u>		
1	Ampicillin	10 μ g
2	Chloramphenicol	30 μ g
3	Erythromycin	15 μ g
4	Gentamycin	10 μ g
5	Nitrofurantoin	300 μ g
6	Penicillin	10 units
7	Streptomycin	10 μ g
8	Tetracycline	30 μ g
<u>Fungicides</u>		
9	Clotrimazole	15 μ g
10	Miconazole	10 μ g

3.4.7. Disc diffusion technique

3.4.7.1. Agar medium

Muller-Hinton agar was used to carry out antimicrobial susceptibility testing. pH of the medium was adjusted to 7.2 to 7.4 and the thickness of the medium was 4 mm. After sterility testing the plates were stored in refrigerator and were used within 5 to 7 days.

3.4.7.2. Inoculation of test plates

From the subcultured plates 4 or 5 well isolated colonies of the same morphological type were inoculated into 5 ml of peptone water and incubated for 1 h at 37°C. The turbidity of actively growing culture is then adjusted with sterile saline so as to obtain a turbidity visually comparable to that of the turbidity standard prepared by adding 0.5 ml of 0.048 N BaCl_2 to 99.5 ml of 0.36 N H_2SO_4 . The inoculum suspension was not allowed to stand more than 15-20 mts before the plates were inoculated.

A sterile cotton swab was dipped into the standardized culture and then spread over the entire surface of the agar plate to obtain a uniform inoculum.

Within 15 mts after the plates are inoculated, standard antibiotic discs or plant extract/essential oil impregnated discs were applied to the surface of the inoculated plates, with sterile

forceps. All discs were gently pressed on to the agar with forceps. The spatial arrangement of the discs were in a way that they were not closer than 15 mm from the edge of the plate and far enough apart to prevent overlapping of zones of inhibition. The inoculated plates were inverted and incubated at 37°C.

3.4.7.3. Reading and interpretation

The plates were read after overnight incubation in the case of bacteria and 48-72 hours in the case of fungi. The diameter of the zone around each disc in which no growth was macroscopically discernable was measured with a pair of calipers. The diameter of the zone of inhibition of growth of microbial agent was taken into account to declare the susceptibility/resistance of the test organism.

Results

RESULTS

The results of investigations conducted on the common medicinal plantlore used by the tribal people of Thrissur District are presented in this chapter. Information on 212 plant species of 184 genera distributed in 73 families and their therapeutic applications and manner of use were documented and described. Selected plants among them were screened for their anti microbial activity. Botanical descriptions of five rare plants were done. Attempts were also made to multiply these five plants.

4.1. Ethnobotany of medicinal plants

4.1.1. Folk use

Field studies on ethnobotany of medicinal plants including collection of information and voucher specimens were made among the Malayan tribe of the selected localities of Thrissur District.

The Malaysians, formerly food gatherers, hunters and semi-nomads, were settled now-a-days (Viswambharan and Aravindakshan, 1987). Majority of them are cultivators and agricultural labourers. The knowledge of medicinal plants and their uses are limited to a few members of the tribe. The principal sources of information were the older women, especially the midwives and the older man or headman (Moopan). They have fairly good knowledge of the medicinal values of the surrounding plants.

Women talked freely about the common ailments like cold, cough, fever, toothache, headache, etc. But they were reluctant to disclose certain disorders among women like matters of fertility, contraception and venereal diseases. Taboos on sharing this knowledge also restricted them. Men freely accompanied to the forests for collection of medicinal plants. They had no hesitation in giving information about the problems of both men and women. Diagnosis was based on narrations of the symptoms.

The number of uses for which the medicinal plants were put to by the tribe in different localities were in the following order Sholayar > Vazhachal > Marottichal > Chimminy / Vazhani (Table 7). Information on the folk use of medicinal plants collected from the selected localities is presented in detail in Table 8.

4.1.2. Ailments and connected plants

4.1.2.1. Human ailments

The plants used for the various diseases of tribal people along with the part used are presented in Table 9. Some species have restricted use, while others have wider use in medicine. It was observed that the maximum number of plants, either alone or in combination, were used for eye diseases (28), followed by diarrhoea/dysentery (21), loss of hair (16), snake bite (15), intestinal worms (14) and for common cold (14). Use of a single plant could be observed in disorders like bad taste in mouth,

Table 7. Medicinal plants reported in the survey

Sl. No.	Localities	Number of medicinal plants obtained
1	Chimminy	73
2	Marottichal	93
3	Sholayar	125
4	Vazhachal	108
5	Vazhani	73

Table 8. Folk use of medicinal plants in the selected locations

i) Chimminy

Achyranthes aspera Linn. (Amaranthaceae) 41

'Kadaladi'

Herb or under-shrub

Root of a single plant boiled with one glass of milk, reduced to half and taken as a single dose in mental disorders.

Adhatoda beddomei C.B. Clarke (Acanthaceae) 07

'Adalodakam'

Shrub

The root decoction is used as a diuretic.

Albizia lebbek Benth. (Fabaceae) 68

'Nenmenivakai' (Fig. '4)

Tree

Bark powder mixed with honey is taken for relief in asthma. Powdered bark paste is used as a salve in eye diseases.

Allium sativum Linn. (Liliaceae) 76

'Vellully'

Biennial herb

A slightly warm decoction of 4-5 cloves with a piece of dry ginger and few seeds of pepper is taken for throat ache.

Amorphophallus dubius Blume (Araceae) 77

'Kadukkachena'

Perennial stemless herb

The corm is cut into small pieces with the skin, boiled in butter milk, roasted in ghee and taken daily to cure bleeding piles.

Annona squamosa Linn. (Annonaceae) 64

'Aatha'

Shrub or small tree

Macerated leaf pulp is locally applied over painful swelling of the joints.

Asparagus racemosus Willd. (Liliaceae) 73

'Sathavarikizhangu'

Straggling or scandent, much branched, spinous shrub

Root juice is given for purifying the blood after dog bite.

Azadirachta indica A. Juss. (Meliaceae) 43

'Aryaveppu'/'Kaikkumveppu' (Fig. 7)

Evergreen tree

Decoction of the inner bark with honey is taken for jaundice.

Leaf paste prepared with the leaves of *Sida cordifolia* is applied as poultice to promote suppuration of boils.

Biophytum sensitivum (Linn.) DC (Oxalidaceae) 19

'Mukkutty' (Fig. 8)

Small herb

Paste made out of the whole plant with water is applied over the forehead for sinusitis.

Butea monosperma (Lam.) Kuntze (Fabaceae) 33

'Palasam' (Plate 1)

Small deciduous tree

Bark decoction is used for cleaning an open boil or other wounds. The juice that naturally exudes from the roots is applied around the eyes in night blindness.

Caesalpinia crista Linn. (Fabaceae) 31

'Kazhanchy'

Prickly tree

Oil expressed from the seeds is locally applied over pimples.

Calotropis gigantea (Linn.) R.Br. ex Ait. 05

(Asclepiadaceae)

'Erukku'

Perennial under-shrub

Paste prepared with the milky juice of the plant along with gingelly oil and red chillies is applied over the wounds in dog bite.

Capsicum annum Linn. (Solanaceae) 67

'Cherukanthari'

Herb

Leaf paste mixed with salt is applied over the wounds in dog bite.

Cassia fistula Linn. (Fabaceae) 24

'Manjanikonna'

Tree

Leaf paste applied over the affected parts in leprosy.

Centella asiatica (Linn.) Urban (Umbelliferae) 53

'Kudagapullu'/'Kodengal'

Prostrate herb, rooting at nodes

Infusion of the roasted leaves is given to children for diarrhoea.

Centratherum anthelminticum Kuntze (Asteraceae) 54

'Jeerkachedi'/'Kattujeerakam'

Hot infusion of the seeds given to children as anthelmintic.

Citrus aurantifolia (Christm.) Swingle (Rutaceae) 78

'Cherunaranga'

Bushy tree

Fruit juice is used for preparing the leaf paste of *Leucas aspera* used for healing of wounds.

Cleome icosandra Linn. (Cleomaceae) 44

'Vela'

Herb

Poultice of the boiled leaves applied over the eyes for painful swelling.

Clitoria ternatea Linn. (Fabaceae) 79

'Thumbichedi'/'Sankupushpam'

Rambling climber

Root paste applied over the wounds in dog bite.

Cocos nucifera Linn. (Arecaceae) 80

'Thengu'

Tall palm

Paste of charcoal with turmeric is applied over skin eruptions caused by centipedes.

Coriandrum sativum Linn. (Asteraceae) 81

'Malli'

Aromatic herb

Powdered seeds added to tamarind leaves cooked in curd along with pomegranate leaves and ginger is taken to cure piles.

Cucurbita moschata Duchesne ex Poir (Cucurbitaceae) 55

Trailing or climbing annual

Leaf juice with turmeric and curd is given for jaundice.

Poultice of the inner core of the fruit is applied over burns.

Curculigo orchioides Gaertn. (Liliaceae) 82

'Nilappana'

Herb

Dried slices of the tubers of ten plants is beaten in 250 ml raw cow's milk and the thick mucilage is taken for jaundice.

Curcuma longa Linn. (Zingiberaceae). 83

'Manjal'

Herb

Rhizome paste made with the fruit pulp of bael is locally applied for hydrocele.

(Also see under *Cucurbita moschata*)

Cyperus rotundus Linn. (Poaceae) 06

'Muthangapullu'

Perennial sedge

Tuber decoction taken with honey for diarrhoea.

Datura stramonium Linn. (Solanaceae) 12

'Ummathu'

Perennial under-shrub

Juice of 5-6 leaves with butter milk is taken for expelling worms.

Paste of the leaves prepared with the leaves of *Nyctanthes arbor-tristis* is applied as poultice over boils.

Three to five pinches of the leaf powder is taken three times a day for leprosy.

Dolichos trilobatus Linn. (Fabaceae) 84

'Kattavara'

Climbing herb

Decoction of the whole plant with the powder of two grains of black pepper is taken for swelling of glands in any part of the body.

Eclipta alba (Linn.) Hassk. (Asteraceae) 42

'Kaithonni' (Fig. 10)

Herb

Leaf juice applied to infection in between toes.

Emilia sonchifolia DC. (Asteraceae) 85

'Muyalcheviyan'

Herb

Leaf juice applied to eyes for conjunctivitis and night blindness.

Entada phaseoloides Merrill (Fabaceae) 86

'Kakkumvally'

Large, climbing shrub

Endosperm is crushed and dispersed in water and allowed to settle. Rice gruel prepared out of the supernatant liquid is taken daily in the morning with coconut gratings for rheumatic pains.

Euphorbia antiquorum Linn. (Euphorbiaceae) 87

Shrub

Warm pulp of the macerated stem is applied as poultice for bringing a whitlow to a head.

Ficus religiosa Linn. (Moraceae) 01

Milky juice is externally applied over the swelling in goitre.

Heliotropium indicum Linn. (Boraginaceae) 88

'Thekkadai'

Small undershrub or herb

Leaf juice taken to induce sweating and lowering the temperature in fevers.

Hemidesmus indicus R. Br. (Asclepiadaceae) 03

'Nanari'/'Narunandi'

Twining shrub

Root infusion taken as a febrifuge.

Hibiscus rosasinensis Linn. (Malvaceae) 89

'Chemparathy'

Evergreen shrub

Twelve flower buds are macerated in a glass of milk and taken as an effective remedy for menorrhagia.

Holarrhena antidysenterica (Linn.) Wall. (Apocynaceae) 36

'Kudakapala' (Fig. 12)

Small tree

A handful of crushed seeds boiled with two glasses of water, reduced to half the quantity and the decoction is taken thrice a day for a week along with honey for amoebiasis.

Hydnocarpus laurifolia (Dennst.) Sleumer (Flacourtiaceae) 90

'Marotty'

Seed paste is applied over skin infections and used for dressing of wounds.

Ixora coccinea Linn. (Rubiaceae) 91

'Chethi'

Shrub

Decoction of flowers taken for menorrhagia.

Lawsonia inermis Linn. (Lythraceae) 97

'Mayilanchi'

Cold infusion of leaves or leaf juice mixed with milk is taken for venereal diseases.

Leucas aspera Spreng. (Lamiaceae) 93

'Thumba'

Herb

Leaf paste with lime or cobweb is used for healing of wounds.

Mangifera indica Linn. (Anacardiaceae) 10

'Mavu'

Large evergreen tree

Powder of shelled seeds used as anthelmintic. Dried tender leaf powder or their ash is stirred in water and taken for diabetes.

Michelia champaca Linn. (Magnoliaceae) 136

'Champakam'

Large evergreen tree

The root (1" long) is made into a paste with 21 black pepper grains and taken after menstruation for three consecutive days as a contraceptive.

Murraya koenigii (Linn.) Spreng. (Rutaceae) 95

'Kariveppila'

Large Shrub

Leaf paste with a little salt is applied over the wounds in dog bite.

Murraya paniculata (Linn.) Jack (Rutaceae) 96

'Karanchi'

Small tree

Leaf powder applied to cuts and wounds.

Musa sp. Linn. (Musaceae) 16

'Vazha'

Perennial herbaceous plant

Male flowers eaten as a pot herb for diabetes.

Nyctanthes arbor-tristis Linn. (Oleaceae) 23

'Pavizhamalli'

Large shrub or small tree

Seed powder rubbed to the scalp of the head for alopecia.

Oldenlandia auricularia K.schum (Rubiaceae) 92

'Murikoody'

Herb

Seven drops of the fresh leaf juice is mixed with one drop of fowl's blood and given three times a day to children for relief in chest congestion.

Physalis peruviana Linn. (Solanaceae) 98

'Kuranganchedy'

Small shrub

Paste made out of the whole plant is applied over the wound in rat bite. The leaf juice is also taken orally.

Piper betle Linn. (Piperaceae) 57

'Vettila'

Climbing shrub

Juice extracted from 10 leaves mixed with one glass of goat's milk and taken for three consecutive days as a remedy for skin eruptions caused by unknown poisonous plants.

Piper longum Linn. (Piperaceae) 40

'Thippali'

Climbing evergreen shrub

Powder of four berries churned with 250 ml water and taken now and then for belching. Berry powder is sprinkled over the leaf juice of *Sesbania grandiflora* and given daily to children having fainting fits.

Plumbago rosea Linn. (Plumbaginaceae) 99

'Koduvelli'

Small shrub

A cup of fresh cow's milk is stirred with a piece of the root and taken internally to terminate pregnancy.

Pongamia glabra Vent. (Fabaceae) 100

'Ungu' (Fig. 18)

Large evergreen tree

Root bark applied as poultice over rheumatic swelling.

Psidium guajava Linn. (Myrtaceae) 15

'Pera'

Small tree

Leaf decoction used in gargling for boils in the mouth.

Rosa multiflora Thunb. (Rosaceae) 101

'Katturosa'

Thorny shrub

Powder of few buds taken with sugar followed by a glass of water as a laxative.

Rubia cordifolia Linn. Sensus Hook. f. (Rubiaceae) 102

'Manchatty'

Shrub or small tree

Bark paste mixed with honey and butter is used as an ointment in leprosy.

Ruta graveolens Linn. (Rutaceae) 22

'Arutha' (Fig. 20)

Herb

Hot infusion of leaves taken as a remedy for constipation.

Saccharum officinarum Linn. (Poaceae) 103

'Karimbu'

Tall perennial grass

Sugar is beaten with equal quantity of the tuber powder of *Curculigo orchoides* in a glass of milk to form a thick mucilage and taken as a remedy for asthma.

Santalum album Linn. (Santalaceae) 28

'Vella chandanam'

Partially parasitic tree

Paste made with rice water is applied to the forehead for headache.

Sesamum indicum Linn. (Pedaliaceae) 104

'Ellu'

Herb

(See under *Calotropis gigantea*)

Sesbania grandiflora Pers. (Fabaceae) 72

'Agathi Keerai'

Quick growing tree

Leaf juice with black pepper is given to children suffering from fainting fits.

Sida cordifolia Linn. (Malvaceae) 29

'Kurumthotty' (Fig. 22)

Shrub

Decoction of root bark taken with sugar for venereal diseases.

(Also see under *Datura stramonium*)

Solanum nigrum Linn. (Solanaceae) 52

'Manathakkali' (Fig. 24)

Herb

Leaf paste with salt is applied over corns. The ripe fruits are roasted in ghee and taken in empty stomach for boils in the mouth.

Spilanthes calva DC. (Asteraceae) 105

'Eripacha'

Herb

Flower buds chewed for toothache.

Syzygium cumini (Linn.) skeels (Myrtaceae) 106

'Njaval'

Tree

Mixture of fruit juice and powder of inner bark taken as an antidote for vegetable poisoning.

Tamarindus indica Linn. (Fabaceae) 63

'Valampuli' (Fig. 26)

Large evergreen tree

(See under *Coriandrum sativum*)

Tectona grandis Linn. f. (Verbenaceae) 35

'Thekkku'

Large woody deciduous tree

Oil expressed from the seeds massaged into the scalp to check loss of hair.

Terminalia chebula Retz. (Combretaceae) 30

'Kadukka' (Fig. 27)

Deciduous tree

Powder of the fruit is taken mixed with cow's urine for elephantiasis.

Zingiber officinale Rosc. (Zingiberaceae) 02

'Inchi'

Perennial stem tuber

(See under *Piper nigrum* and *Coriandrum sativum*)

ii) Marottichal

Acalypha indica Linn. (Euphorbiaceae) 108

'Kuppathali'

Herb

Leaf juice used as an emetic, especially when some poisonous substances are taken.

Achyranthes aspera

Description given under location (i)

Mixture of the powder of root bark and black pepper is given for fever.

Adhatoda beddomei

Description given under location (i)

Juice of 10 leaves mixed with one hen's egg and one or two pinches of black pepper powder is taken in empty stomach in early morning for relief from any type of cough.

Agaricus campestris (Linn.) Fr. (Agaricaceae) 109

'Koonmula'

Dried and powdered mushroom is externally applied to skin diseases.

Albizia lebbek

Description given under location (i)

Pulverised root bark is used as a dentrifice for the cure of spongy gums.

Allium cepa Linn. (Liliaceae) 110

'Cheriyā ulli'

Biennial herb

Few drops of the juice applied to eyes for conjunctivitis.

Allium sativum

Description given under location (i)

Two teaspoonfuls of the juice mixed with equal quantity of the leaf juice of *Ocimum sanctum* is given to boys for seven days as a preventive for mumps.

Aloe barbadensis Mill. (Liliaceae) 59

'Kallivazhai'

Stoloniferous succulent shrub

Leaf pulp or juice is applied over burns.

Alstonia scholaris R. Br. (Apocynaceae) 62

'Ezhilampalai' (Fig. 6)

Evergreen tree

Bark decoction given to nursing mothers to increase breast milk.

Anacardium occidentale Linn. (Anacardiaceae) 69

'Kappalumavu'

Evergreen tree

Shell oil applied over corns and warts.

Andrographis paniculata Wall. ex Nees 38

(Acanthaceae) (Fig. 5)

'Kiriath'

Branched annual herb

Whole plant decoction taken to cure fever.

Aristolochia indica Linn. (Aristolochiaceae) 66

'Karalakam'

Twining shrub

Root paste prepared with the berries of *Piper longum* applied over the afflicted parts in injury caused by centipedes.

Azadirachta indica

Description given under location (i)

Inner bark decoction given in diabetes.

Bacopa monnieri (Linn.) Penn. (Scrophulariaceae) 111

'Brahmi'

Prostrate herb

Leaves used to foment the pubic and abdominal regions to cause a free flow of urine.

Boerhaavia diffusa Linn. (Nyctaginaceae) 112

'Thamizhama'

Herb

A decoction of one whole plant in two glasses of water is taken thrice a day for one week, 14 days or 21 days depending upon the intensity for Kidney stones.

Butea monosperma

Description given under location (i)

Seven pinches of the seed powder mixed with rice water is given to children 3 times a day for 3 consecutive days for expelling worms.

Paste of a single seed mixed with honey is applied inside the vagina for seven days starting from the 5th day of menstruation to act as a contraceptive for one month.

Calotropis gigantea

Description given under location (i)

The milky juice of the tender leaves mixed with rice and dried in the sun repeatedly. This is taken as gruel for asthma. Leaves are used to foment the painful swellings due to rheumatism.

Carica papaya Linn. (Caricaceae) 08

'Omakkai'/'Papakkai'

Rapidly growing small tree

Latex exuding from the wounds on the unripe fruits is applied locally to remove pimples.

Leaf juice is taken with a little musk in dog bite.

Catharanthus roseus G. Don (Apocynaceae) 113

'Savannari'

Decoction of white flowers and leaves is taken for diarrhoea.

Centella asiatica

Description given under location (i)

Infusion of the roasted leaves is given to children for diarrhoea.

Paste of 10 leaves with a bit of raw turmeric and one grain of black pepper is swallowed in empty stomach followed by a glass of curd for ulceration of mouth.

Centratherum anthelminticum

Description given under location (i)

Hot infusion of seeds is given to children as an anthelmintic.

Use also as under location (i)

Cissus quadrangularis Linn. (Vitaceae) 114

'Changalavally'

Succulent twiner

Small stem pieces roasted in ghee and taken along with the ghee at bed time as a cure for piles.

Citrullus vulgaris schrad (Cucurbitaceae) 115

'Thanneermathanga'/'Kummatty'

Climbing or trailing, hispid annual.

Fruit juice taken with sugar and cumin seeds for mitchurition.

Fruit juice is used to prepare a paste of the roots of *Naregamia alata* which is taken as a remedy for cough.

Cocos nucifera

Description given under location (i)

Paste of the charcoal of coconut shell and oil is applied over burns.

Oil is boiled with the juice of *Elephantopus scaber* and applied to the head for sinusitis.

An oil is prepared by boiling equal quantities of the leaf juice of *Murraya koenigii*, coconut milk, coconut oil and applied to the scalp one hour before taking bath to prevent loss of hair.

Cuminum cyminum Linn. (Umbelliferae) 169

'Jeerakam'

Herb

Seeds are crushed with the leaves of *Piper betle*, strained through Banyan leaf veins and applied to eyes to induce lacrimation to remove foreign particles from the eyes.

Powdered seeds along with the juice of *Citrullus vulgaris* and a little sugar powder acts as a diuretic.

Curculigo orchioides

Description and use as given under location (i)

Curcuma longa

Description given under location (i)

Rhizome powder is mixed with equal quantity of tamarind seed powder and six pinches of this is mixed with one glass of milk and given to children in measles.

Cyclea peltata Hook. f. & Thoms. (Menispermaceae) 117

'Padakkizhangu'

Climbing shrub

Juice of the leaves and stem is taken with an equal quantity of gingelly oil for an easy child birth.

Cynodon dactylon Pers. (Poaceae) 34

'Karukapacha'

Perennial grass

Leaf paste made with pomegranate flowers is applied to the nose to stop bleeding.

Datura stramonium

Description given under location (i)

Leaves are soaked in hot water and used to foment the swollen glands in mumps. The leaves as hot as can be comfortably borne are applied over the swelling and a thick paste of the leaves applied over this.

Four powdered seeds are taken along with rice gruel for mental disorders.

Fomentation of the pubic region with leaves soaked in boiling water relieves menstrual pain.

Desmodium gangeticum D.C. (Fabaceae) 18

'Orila'

Shrub

Ash of the whole plant is mixed with water and applied over burns and scalds from hot oil.

Dioscorea floribunda Mart. & Gal. (Dioscoreaceae) 118

'Kattukachilkizhangu'

Climbing herbaceous perennial with tuberous roots

Leaf paste applied over skin eruptions caused by centipedes.

Dolichos biflorus Linn. (Fabaceae) 147

'Muthira'

Trailing herb

Roasted seeds immersed in hot honey, which is then filtered off and 2-3 drops applied to the ears for ear ache.

Elaphantopus scaber Linn. (Asteraceae) 120

'Anaipacha'

Herb

Use as given under *Cocos nucifera* under the same location.

Entada phaseoloides

Description given under location (i)

Endosperm of the seeds is made into a paste and applied over the swellings on the throat of cattle.

Ficus glomerata Roxb. (Moraceae) 121

'Athi'

Deciduous tree

Juice from stem and roots is applied over all types of swelling of glands.

Ficus religiosa

Description given under location (i)

Tender aerial roots macerated in rice water is taken with buttermilk to check diarrhoea.

Leaves are boiled in water, macerated in the decoction, strained through cloth, and again boiled to make the content thick.

This is stored in earthen containers in pits dug in soil for one year and used for external application over sprains.

Gmelina arborea Roxb. (Verbenaceae) 122

'Kumil'

Tree

Root decoction mixed with equal quantity of honey is taken daily in the morning for one month to reduce over weight.

Helicteres isora Linn. (Sterculiaceae) 123

'Piripirichedi' (Plate 2)

Perennial shrub or small tree

Decoction of root bark stops diarrhoea.

Hibiscus rosasinensis

Description given under location (i)

Petals of 100 flowers are boiled with 4 l of water and reduced to half. This is strained through cloth and again boiled with 2 kg jaggery to form a thick syrup which is used for cough.

Holarrhena antidysenterica

Description given under location (i)

Bark paste applied over the scalp for dandruff.

Also see under location (i)

Holoptelea integrifolia Planch. (Ulmaceae) 124

'Aval'

Tree

Leaf paste applied over wounds.

Holostemma ada-kodien schult (Asclepiadaceae) 127

'Adapathiyankizhangu'

Root paste with milk is taken for diabetes.

Jasminum pubescens Linn. (Oleaceae) 171

'Kattukurukkuthy'

Shrub

Flower paste bandaged over breasts to suppress lactation.

Leaf juice applied over corns between toes.

Kalanchoe laciniata (Linn.) DC (Crassulaceae) 126

'Ilamulachi'

Succulent herb

Leaf juice taken internally with double its quantity of ghee acts as a haemostatic.

Lantana camara Linn. (Verbenaceae) 172

'Konginichedy'

Straggling or climbing aromatic shrub

Leaf paste applied over the forehead for head-ache.

Leucas aspera

Description given under location (i)

Leaves are boiled with water and the steam is inhaled to remove blocking of the nose.

Luffa acutangula (Linn.) Roxb. (Cucurbitaceae) 129

'Peechil'

Extensively trailing annual

Flowers boiled in milk and given to expectant mothers to hasten child birth by 15 days.

Macaranga peltata Muell.-Arg. (Euphorbiaceae) 130

'Vatta'

Large tree

Gum exuding from the bark is applied over wounds.

Mangifera indica

Description given under location (i)

The powder of the dry leaves or shelled seeds is very efficacious for jaundice of long standing.

Michelia champaca

Description given under location (i)

Poultice of the paste of yellow flowers in sesame oil is applied over the eyes in conjunctivitis.

Mimusops elengi Linn. (Sapotaceae) 131

'Elengi'

Medium sized tree

Dry flower powder used as snuff for headache.

Momordica charantia Linn. (Cucurbitaceae) 132

'Kaipavally'

Extensively climbing or trailing herb

Fruit juice applied locally in leprosy.

Moringa oleifera Lam. (Moringaceae) 133

'Muringa'

Shrub or small tree

Inhalation of the smoke produced by burning the ghee soaked root bark given for quick relief in 'cough.

Murraya koenigii

Description given under location (i)

Use as given under *Cocos nucifera* under the same location.

Myristica malabarica (Myristicaceae) 134

'Pathiri'

Tree

Gum from the fruit is applied for sour mouth.

Myristica fragrans Houtt. (Myristicaceae) 135

'Jathi'

Tree

Seed paste in milk is applied over the face for pimple.

Musa sp.

Description given under location (i)

Rhizome paste applied over burns.

Naregamia alata Wight & Arn. (Meliaceae) 94

'Nilanarakam'

Perennial herb

Dry root paste in lime juice is taken early in the morning as a remedy for cough.

Ocimum basilicum Linn. (Lamiaceae) 13

'Ramanthulasi'

Aromatic herb

Leaves dried under shade, powdered and used as snuff to destroy maggots.

Oldenlandia auricularia

Description given under location (i)

Leaf paste applied over the swollen glands and forehead in mumps.

Oryza sativa Linn. (Poaceae) 39

'Nellu'

Herb

Uses as given under '*Butea monosperma*, *Calotropis gigantea* and *Ficus religiosa* under the same locality.

Phaseolus trilobatus (Linn.) Schreb (Fabaceae) 137

'Kattukadangar'

Herb

Hen's egg beaten in the soup of the seed is taken to stop bleeding from the nose.

Phyllanthus fraternus Webster (Euphorbiaceae) 47

'Puthranchary'/'Manjapithachedy'

Herb

A whole plant is made into a paste, mixed with cow's milk and taken in the morning for 15 consecutive days in jaundice.

Piper betle

Description given under location (i)

Use as given under *Cuminum cyminum*.

Piper longum

Description given under location (i)

Use as given under *Aristolochia indica*.

Piper nigrum Linn. (Piperaceae) 61

'Kurumulagu'

Climbing evergreen shrub

Seed powder mixed with curd is applied around the eyes for night blindness.

Uses also as given under *Achyranthes aspera* and *Tamarindus indica*.

Polyalthia cerasoides Bedd. (Annonaceae) 138

'Aranamaram'

Large tree

Decoction of the bark in equal quantity of milk and water is taken in menorrhagia.

Pongamia glabra

Description given under location (i)

Boiled seeds taken with jaggery for headache.

Punica granatum Linn. (Punicaceae) 32

'Mathalam'

Small tree or shrub

Use as given under *Cynodon dactylon*.

Ricinus communis Linn. (Euphorbiaceae) 26

'Avanakku' (Fig. 19)

Small tree

Leaves used to foment the abdominal and pubic regions to promote menses in amenorrhoea.

Rosa multiflora

Description given under location (i)

Overnight infusion of flower buds taken in the morning as a laxative.

Saccharum officinarum

Description and use as under location (i)

Scoparia dulcis Linn. (Scrophulariaceae) 139

'Kummattipullu'

Herb

Leaf paste made into small pills of the size of a rice grain and taken three times a day for sexual weakness.

Sesamum indicum

Description given under location (i)

Seeds along with ginger is taken daily for rheumatism.

Oil is boiled with equal quantity of goat's urine and applied to the ears for improving hearing.

Uses also as given under *Cyclea peltata* and *Michelia champaca* under the same locality.

Sesbania grandiflora

Description given under location (i)

Flower juice applied to nostrils to stop copious discharge and headache.

Sida cordifolia

Description given under location (i)

Root decoction taken with ginger for fever. Leaf juice applied to wounds for hastening healing.

Solanum indicum Linn. (Solanaceae) 140

'Arichunda' (Fig. 23)

Small shrub

Overnight mucilaginous infusion of 50 flowers in water is taken in the morning with raw cow's milk and honey for a week for gonorrhoea.

Symplocos racemosa Roxb. (Symplocaceae) 71

'Pachotty' (Fig. 25)

Evergreen shrub or tree

Root paste applied over the breast for pain and inflammation.

Tabernaemontana coronaria R. Br. (Apocynaceae) 141

'Nandyarvattam'

Small, much branched shrub

Flower juice mixed with breast milk is applied to the eyes for mild injuries.

Tamarindus indica

Description given under location (i)

Root paste with a pinch of powdered black pepper and honey is taken for diarrhoea.

Use also as given under *Curcuma longa*.

Tectona grandis

Description given under location (i)

Bark decoction mixed with cow's urine is taken for elephantiasis.

Terminalia bellirica Roxb. (Combretaceae) 51

'Thani'

Deciduous tree

A preserve is made with the fruits as a remedy for cough. One part of the fruit is boiled with eight parts of water till the water just covers the fruit. It is again cooked with sugar and the powder of 10 long pepper and kept for a long period for ageing.

Thespesia populnea Soland. ex Correa (Malvaceae) 142

'Poovarasu'

Small tree

Three drops of flower juice taken with jaggery to loosen phlegm from the chest of children.

Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thoms
(Menispermaceae) 17

'Amruthavally'

Climbing shrub

Stem decoction taken to bring about appetite.

Vernonia cinerea Less. (Asteraceae) 143

'Krishnachedy'

Herb

Leaf juice mixed with honey is applied to the eyes for cataract.

Wrightia tinctoria (Roxb.) R. Br. (Apocynaceae) 144

'Dantapala' (Plate 10)

Tree

Bark, root and fruit are ground in equal proportion and about 10 g of the paste is given to nursing mothers twice a day to expel worms from breast fed infants.

Zingiber officinale

Description given under location (i)

Rhizome juice taken with sesamum seeds for rheumatism.
Use also as given under *Sida cordifolia* under the same locality.

iii) **Sholayar**

Abrus precatorius Linn. (Fabaceae) 74

'Kunni' (Fig. 3)

Woody climbing shrub

One seed of the red type is made into two halves and one part taken with jaggery for 3 consecutive days starting from the 4th day of menstruation to act as a contraceptive for one month.

Two seeds are ground well, mixed with jaggery and taken for two consecutive days to terminate pregnancy.

Achyranthes aspera

Description given under location (i)

Root paste applied around the eyes for improving the sight in night blindness. Fresh roots as such is also eaten for this purpose.

Adhatoda beddomei

Description given under location (i)

Root decoction along with the tops of *Ruta graveolens* is prepared and taken three times daily for 7 days for relief in common cold.

Aerva lanata Juss. ex Schult. (Amaranthaceae) 145

'Kurunthapacha'

Herbaceous plant

The root decoction in milk is taken with butter to hasten child birth.

Agaricus campestris

Description given under location (i)

Those arise from the excreta of elephants is made into a paste in the whole plant juice of *Sphaeranthus indicus* and pills made out of this is used for external application to scorpion sting.

Alangium salviifolium (Linn.) f. Wang. (Alangiaceae) 146

'Ankolam'

Small tree

The root decoction along with ghee is taken for dog bite. This will act as an emetic and is believed to remove the toxins.

Allium cepa

Description given under location (ii)

Onion is chewed with the leaves of *Piper betle* and *Piper*

nigrum and blown into the ears and head by 3 persons simultaneously, 101 times to prevent spreading of poison in snake bite.

An onion is cut into half, rubbed after sprinkling some salt, on a floor plastered with cowdung and the paste applied to the forehead for headache.

Bambusa arundinacea Willd. (Poaceae) 119

'Kallumula'

Tall, woody grass

Decoction of leaf buds/tender leaves/joints of the stem is given to contract the uterus after child-birth.

Boerhaavia diffusa

Description given under location (ii)

Whole plant decoction prepared along with equal quantity of the barks of *Crataeva nurvala* is taken to cure hydrocele.

Butea monosperma

Description given under location (i)

Root paste is bandaged over the wounds in snake bite.

Caesalpinia crista

Description given under location (i)

Leaf juice is taken internally for elephantiasis.

Caesalpinia sappan Linn. (Fabaceae) 148

'Chappanga'

Tree

Wood decoction taken for dysentery.

Cajanus cajan (Linn.) Mill. (Fabaceae) 149

'Kadala'

Shrub

The powder of the gram is used to wash hair after applying the juice of *Phyllanthus fraternus* to prevent excessive loss of hair.

Calamus rotang (Arecaceae) 150

'Arichooral'

Short palm

The root is burnt after dipping in coconut oil and the drops of oil dripping out of this is collected and 2-3 drops applied to the ears for ear infection.

Calotropis gigantea

Description given under location (i)

Root bark paste is taken with rice gruel for elephantiasis of the legs.

Carica papaya

Description given under location (ii)

Fresh unripe fruits taken with the seeds to cause abortion in the early stages of pregnancy.

Cassia fistula

Description given under location (i)

Inhaling the smoke produced by burning the roots give quick relief in colds.

Cassia tora Linn. (Fabaceae) 151

'Thakarachappu'

Herb or under shrub

Leaf paste with raw turmeric is applied as poultice in honeybee or wasp sting.

Centella asiatica

Description given under location (i)

Three leaves are chewed with 3 grains of black pepper daily in the morning for 41 days to prevent sneezing.

Leaf juice is applied to the nostril to prevent sneezing.

Leaf paste with goosberry is taken in the size of a goosberry in empty stomach, daily in the morning for 41 days for a complete cure of tuberculosis.

Citrullus colocynthis Forsk. (Cucurbitaceae) 37

'Andakkai'/'Kattu vellari' (Fig. 9)

Perennial trailing herb

Leaf juice with salt is applied over the swollen glands in mumps.

Citrus aurantifolia

Description given under location (i)

A paste of henna leaves and egg yolk in lime juice is applied to the scalp before taking bath to prevent loss of hair.

Clitoria ternatea

Description given under location (i)

Root paste is applied as poultice in leucoderma.

Cocos nucifera

Description given under location (i)

A piece of turmeric dipped in coconut oil is burnt and taken in a rolled jack leaf and the smoke is inhaled to reduce the pain in sinusitis.

Leaf juice of *Datura stramonium* is boiled with $\frac{1}{4}$ its volume of coconut oil, and applied to the scalp before taking bath to prevent the loss of hair.

A paste of jaggery in lime water is applied externally for honeybee/wasp sting.

Uses also as given under *Entada phaseoloides* in location (i), *Areca catechu* and *Calamus rotang* under the same location.

Colocasia esculenta (Linn.) Schott (Araceae) 27

'Maranchembu'

Rhizomatous herb

The petiole juice of the black variety is mixed with salt and applied over the swollen glands in mumps.

Coscinium fenestratum Colebr. (Menispermaceae) 48

'Vallimanjal' (Fig. 32)

Woody climbing shrub

Root decoction² is taken as a diaphoretic in high temperature.

Costus speciosus (Koenig) Smith (Zingiberaceae) 152

'Channa'

Rhizomatous herb

Rhizome decoction prepared along with the tubers of *Cyperus rotundus* and bark of *Azadirachta indica* is given in jaundice.

Crataeva nurvala Buch.-Ham: (Capparidaceae) 46

'Neermathalam'

Tree

Leaves eaten as a pot-herb to reduce body weight.

Cucurbita moschata

Description given under location (i)

Fruit juice mixed with equal quantity of honey is given for mental disorders.

Cuminum cyminum

Description given under location (ii)

Seeds along with the leaves of *Pedaliium murex* and sugar is taken for venereal diseases.

Use also as under *Allium sativum* under the same locality.

Curcuma longa

Description given under location (i)

Rhizome powder is blown into the eyes after making them run by applying a few drops of castor oil in conjunctivitis.

Rhizome paste is applied over the wound either alone or in combination with the leaves of *Vitex negundo* for animal bite.

A piece of dried turmeric with two fruits of *Terminalia chebula* is made into a paste and taken as remedy for piles.

Uses also as given under *Cassia tora*, *Centella asiatica* and *Cocos nucifera* under the same locality.

Cymbopogon flexuosus (Steud.) Wats. (Poaceae) 75

'Inchi pullu'

Tufted perennial grass

Leaf paste applied around the naval for stomach ache.

Cynodon dactylon

Description given under location (ii)

An overnight infusion of leaves is taken regularly in the morning for relief from piles.

Cyperus rotundus

Description given under location (i)

Use as given under *Costus speciosus* under the same locality.

Datura stramonium

Description given under location (i)

Seed paste is applied over pimples.

Poultice of fresh leaves with equal quantity of rice flour is applied over rheumatic swellings.

Dioscorea floribunda

Description and use as under location (ii)

Desmodium motorium Merrill (Fabaceae) 153

'Azhukanni'

Herb

Boiled leaves applied as poultice over the eyes for painfull swelling.

Dolichos trilobatus

Description and use as under location (i)

Eclipta alba

Description given under location (i)

Paste of the fresh plant with gingelly oil is applied for elephantiasis.

Paste of the leaves with root of *Plumbago zeylanica* is applied locally for leucoderma.

Entada phaseoloides

Description and use as under location (i)

Erythrina variegata (Linn.) var. *Orientalis* (Linn.) Merril
(Lythraceae) 11

'Mulumurikku'

Small tree

Leaves taken with coconut gratings after child birth as a galactagogue.

Eupatorium odoratum Linn. (Asteraceae) 154

'Nattapacha'

Shrub

Young leaf paste applied to cuts and wounds.

Ficus religiosa

Description given under location (1)

Decoction of fresh roots along with the roots of *Sterculia urens* and *Ricinus communis* in equal proportions is taken as an abortifacient in the first three months of pregnancy.

Garcinia cambogia Desr. (Guttiferae) 170

'Kudampuli'

Evergreen tree

Roasted fruit mixed with salt and one or two grains of powdered black pepper is used for cleaning the tooth and massaging the gums to remove foul smell from the mouth.

Gardenia gummiifera Linn. f. (Rubiaceae) 156

'Kattukayam'

Large shrub

Resinous exudate collected from the nodes and tips of leaves is applied to wounds of cattle to ward off flies.

Use also as under *Allium sativum* under the same locality.

Gloriosa superba Linn. (Liliaceae) 60

'Kalappakkizhangu'

Climbing herb

Paste of the tuberous root that grows downward is applied to the hands and foot to hasten childbirth.

Glycosmis pentaphylla (Retz.) Correa (Rutaceae) 157

'Narumpanal'

Shrub

Leaves rubbed on stones and smeared over the body to repel honey bees.

Gmelina arborea

Description given under location (ii)

Leaf juice applied to the head in severe headache.

Gossypium hirsutum Linn. (Malvaceae) 186

'Paruthy'

Coarse, much branched, bush

Seed poultice applied over burns.

Gymnema sylvestre R. Br. (Asclepladaceae) 159

'Chakkarakolly' (Fig. 11)

Perennial climbing herb

Root used as an antidote for snake poison.

Habenaria latilabris Wall ex Lindl. (Orchidaceae) 160

'Jeevakam' (Fig. 33; Plate 15)

Terrestrial orchid

Spheres taken as a tonic as decoction in water.

Helicteres isora

Description given under location (ii)

Fruits are soaked in hot oil for sometime, which is then strained and used for external application in the case of stomach complaints of children.

Hemidesmus indicus

Description given under location (i)

Leaf decoction along with honey is applied to the eyes for a cooling effect in conjunctivitis.

Hibiscus rosasinensis

Description given under location (i)

Root paste macerated with the leaves of *Mucuna prurita* is externally applied for hydrocele.

Indigofera tinctoria Linn. (Fabaceae) 161

'Neelachedi'

Small shrub

Root paste mixed with milk is taken as an antidote for spider poisoning.

Ipomoea pes-tigridis Linn. (Convolvulaceae) 58

'Pulikkalchedi' (Fig. 13)

Spreading or twining annual

Tuber paste applied as poultice over the effected parts in spider poisoning.

Jasminum pubescens

Description given under location (ii)

Flower juice applied to eyes for conjunctivitis.

Justicia gendarussa Burm. f. (Acanthaceae) 162

'Vathamkolli' (Plate 3)

Perennial shrub

Leaf paste applied as poultice and tied over fractures and dislocated bones.

Lagenaria siceraria (Mol.) Standl. (Cucurbitaceae) 163

'Peechil'

Climbing or trailing herb

Roots macerated in water and a few drops applied to the nostril as a deconjestant.

Laportea crenulata Gaudich. (Utricaceae) 164

'Anavazhangi'/'Anavanangi' (Fig. 14)

Large stout shrub or small tree

Used to cause enlargement of glands and high fever to enemies. Elephants stay well clear of it.

Lawsonia inermis

Description given under location (i)

Leaf paste applied over the forehead to allay headache.

Use also as under *Citrus aurantifolia*.

Mangifera indica

Description given under location (i)

Bark decoction used to take enema for rectifying the prolapse of rectum.

Maranta arundinacea Linn. (Marantaceae) 165

'Koova'

Perennial stem tuber

Leaf paste applied as poultice over burns.

Melia dubia (Hiern.) non cav. (Meliaceae) 166

'Malaveppu'

Large evergreen tree

Root juice taken as an antidote for dog bite.

Mesua ferrea Linn. (Guttiferae) 167

'Nagakesaram' (Fig. 15)

Tree

Flower paste applied to bleeding piles.

Michelia champaca

Description given under location (i)

Flower paste in combination with tamarind flowers in pomegranate fruit juice is applied over eyes in conjunctivitis.

Momordica charantia

Description given under location (ii)

Fruit juice with powdered sugar used as dressing for burns.

Moringa oleifera

Description given under location (ii)

Leaves eaten as a potherb along with the leaves of *Solanum nigrum* for boils in the mouth.

Mucuna pruriata Hook. (Fabaceae) 116

'Nayakoranakkai'

Perennial climber

Use as under *Allium sativum* under the same locality.

Murraya paniculata

Description given under location (i)

Five to ten fruits taken to hasten childbirth and reduce labour pain.

Myristica fragrans

Description given under location (ii)

Seed paste with ginger and honey is taken to cure diarrhoea due to chill.

Musa sp.

Description given under location (i)

Pseudostem juice along with honey is applied over burns.

Nyctanthes arbor-tristis

Description given under location (i)

Leaf juice taken with jaggery to expel worms.

Ocimum gratissimum Linn. (Lamiaceae) 125

'Bhasmathulasi'

Small shrub

Leaf juice mixed with equal quantity of gingelly oil is taken to make still birth safe and fast.

Ocimum sanctum Linn. (Lamiaceae) 25

'Thulasi'

Erect herb

A paste is prepared with 180 leaves of *Ocimum*, 140 black pepper grains, divided into small pills, each having the size of a pea. One pill is taken twice a day to allay fever.

Slightly warm leaf decoction used for drinking and gargling for throat infections.

Oryza sativa

Description given under location (ii)

For *Cannabis* poisoning warm rice water is taken mixed with curd or butter.

Finely powdered wood of *Santalum album* in rice water along with honey is taken for dysentery.

Uses also as under *Calotropis gigantea*, *Datura stramonium* and *Entada phaseoloides* under the same locality.

Pedaliium murex Linn. (Pedaliaceae) 128

'KattunjerInjil' (Plate 6)

Herb

The leaves along with the leaves of *Tribulus terrestris* is agitated with water and the mucilage formed is taken with sugar and powdered cumin seeds for venereal diseases.



Phaseolus trilobatus

Description and use as under location (ii)

Phyllanthus fraternus

Description as under location (ii)

Use as under *Cajanus cajan* under the same locality.

Physalis peruviana

Description as under location (i)

Seven drops of the whole plant juice is applied to the head for seven days to get relief from sinusitis.

Piper betle

Description given under location (i)

Juice extracted from 200 g leaf stalk is taken for 3 days as an antidote for nux vomica poisoning.

Use also as under *Allium cepa* under the same locality.

Piper nigrum

Description given under location (ii)

Powder of white and black pepper in equal proportions is given to children at doses of 10-15 pinches 3 times a day for malarial fever.

A snuff prepared with the powdered seeds along with dry ginger and long pepper is used in fainting fits.

Leaf paste mixed with cow's urine is introduced into the nose of an adult during fainting fits.

Uses also as under *Allium sativum*, *Centella asiatica*, *Dolichos trilobatus*, *Garcinia cambogia* and *Ocimum sanctum*.

Plumbago rosea

Description given under location (i)

Root bark is introduced into the uterus to cause abortion within hours.

Plumbago zeylanica Linn. (Plumbaginaceae) 173

'Vellakoduveli' (Fig. 17)

Small shrub

Use as under *Eclipta alba* under the same locality.

Pongamia glabra

Description given under location (i)

Bark paste along with the bark of *Holarrhena antidysenterica* is applied over the affected parts in leprosy.

Pterocarpus marsupium Roxb. (Fabaceae) 174

'Venga'

Medium sized tree

Gum exuding from the bark is applied over wounds.

Pterocarpus santalinus Linn. f. (Fabaceae) 175

'Raktha chandanam'

Medium sized tree

Wood paste applied over the swellings due to rheumatism.

Punica granatum

Description given under location (i)

Rind along with the leaves of tamarind, ginger and coriander seeds is taken as vegetable for piles.

Rauvolfia serpentina Benth. ex Kurze (Apocynaceae) 176

'Sarpagandhi'

Small, much branched woody shrub

Leaf juice mixed with 5-6 times its volume of water is taken immediately after snake bite.

Rauvolfia tetraphylla Linn. (Apocynaceae) 177

'Sarpagandhi'

Small woody shrub

Root used as substitute for *R. serpentina* roots.

Ricinus communis

Description given under location (ii)

Leaf juice mixed with 4 times its volume of water is used as an emetic to remove the effect of toxic substance from the body.

Root decoction prepared with equal quantity of the roots of *Ficus religiosa* and *Sterculia urens* is taken as an abortifacient in the first two months of pregnancy.

Rotula aquatica Lour. (Boraginaceae) 45

'Kalloorvanchi' (Fig. 34; Plate 16)

Shrub

Paste of the aerial parts applied around the naval to remove obstructions in urination.

Ruta graveolens

Description given under location (i)

Leaf juice used for smelling in fainting fits.

Saccharum officinarum

Description given under location (i)

Finely powdered sugar is blown into the eyes after making them run by applying castor oil in conjunctivitis.

Goat's milk boiled with the roots of *Tectona grandis* is taken with sugar for urinary disorders.

Sansevieria roxburghiana Schult. f. (Liliaceae) 178

'Pambuchedi'

Herb

Rhizome juice is mixed with double its quantity of water and one glass is taken on empty stomach to terminate pregnancy.

Santalum album

Description given under location (i)

Finely powdered wood with honey and rice water is taken for dysentery.

Sapindus laurifolius Vahl. (Sapindaceae) 192

'Urulinchi'/'Urupuli'

Large tree

Fruit emulsion given orally immediately after snake bite and applied as salve to the eyes.

Semicarpus anacardium Linn. f. (Anacardiaceae) 180

'Cheru' (Fig. 21)

Large, evergreen tree

Seed oil used to cure foot sores of cattle.

Sesamum indicum

Description given under location (i)

Uses as under *Eclipta alba* and *Ocimum gratissimum* under the same locality.

Solanum melongena Linn. (Solanaceae) 181

'Vazhuthininga'

Spreading herb or under shrub

Fruit juice taken as an antidote for *Datura* poisoning.

Solanum nigrum

Description given under location (i)

Use as under *Moringa oleifera* under the same locality.

Solanum xanthocarpum Schrad. & Wendl. (Solanaceae) 195

'Kandakari'

Spiny, diffused herb

Leaf juice mixed with honey is applied to the scalp as a hair tonic for preventing loss of hair.

Leaf and fruit decoction taken to reduce fever in jaundice.

Sphaeranthus indicus

Description given under location (ii)

Use as under *Agaricus campestris*.

Sterculia urens Roxb. (Sterculiaceae) 183

'Thondi'

Tree

Use as under *Ficus religiosa* under the same locality.

Stereospermum colais Cham. (Bignoniaceae) 70

'Pathiri'

Large evergreen tree

Root and fruit pulp boiled in ghee and the ghee is used for external application to wounds caused by burns.

Strychnos nux-vomica Linn. (Loganiaceae) 184

'Kanjiram'

Large evergreen tree

Leaf paste with the fruit of *Citrulus colocynthis* applied over pimples to hasten suppuration.

Tabernaemontana divaricata (Linn.) Aston (Apocynaceae) 185

'Nakhamkuthichedi'/'Irattappala'

Small tree

Fruit pulp applied to itch in between toes.

Tamarindus indica

Description given under location (1)

Leaf paste applied over injured parts for fever due to injuries.

Use also as under *Michelia champaca*.

Tectona grandis

Description and use as under location (1)

Tephrosia purpurea Pers. (Fabaceae) 158

'Kozhinjil'

Herb

Root paste in water taken in the size of gooseberry for expelling worms.

Use also as under *Allium sativum*.

Terminalia chebula

Description given under location (i)

Use as under *Curcuma longa*.

Thevetia neriifolia Juss. ex steud. (Apocynaceae) 187

'Karaveeram'

Shrub or small tree

Ten to twelve leaves chewed and the juice taken to reduce labour pain.

Tinospora cordifolia

Description given under location (ii)

Half a cup of the stem juice taken twice a day in empty stomach for diabetes.

Tragia involucrata Linn. (Euphorbiaceae) 196

'Choriyanam' (Fig. 28)

Herb

Leaves used for pregnancy test. If the woman is pregnant the hairs on leaves immersed in urine will turn reddish after one hour.

Tribulus terrestris Linn. (Zygophyllaceae) 189

'Nerinjil' (Fig. 29; Plate 7)

Prostrate herb

Leaf infusion taken for urinary disorders and to promote urination.

Use also as under *Pedaliium murex*.

Vitex negundo Linn. (Verbanaceae) 190

'Karinochi' (Plate 8)

Shrub or small tree

Leaf paste with turmeric applied to wounds of animal bite.

Withania somnifera Dunal (Solanaceae) 191

'Ashwagandham' (Fig. 30; Plate 9)

Herb

Whole plant decoction taken as tonic.

Woodfordia fruticosa Salisb. (Lythraceae) 179

'Thathiri' (Fig. 35)

Ornamental shrub

Crushed roots given to cattle for limbness due to rheumatism.

Zingiber zerumbet Rosc. ex Sm. (Zingiberaceae) 193

'Malayinchi'

Perennial stem tuber

Rhizome given with black pepper for cholera.

Zingiber officinale

Description given under location (i)

Uses as under *Allium sativum* and *Piper nigrum*.

iv) Vazhachal*Abrus precatorius*

Description given under location (iii)

Leaf juice mixed with same quantity of gingelly oil is applied over the scalp and washed off after one hour to prevent the loss of hair.

Acacia rugata (Lamk.) Merr. (Fabaceae) 194

'Cheenikkai'

Large tree

A decoction of immature pods is applied to the hair to kill lice and clean the scalp.

Achyranthes aspera

Description given under location (i)

Use as under location (iii)

Adhatoda beddomei

Description given under location (i)

Use as under location (ii)

Fomenting the rheumatic areas with the leaves gives relief from pain.

Aegle marmelos Correa ex. Roxb. (Rutaceae) 182

'Koovalam'

Medium sized, thorny, deciduous tree

Powder of dry fruit pulp is given in fevers.

Aerva lanata

Description and use as under location (iii)

Agaricus campestris

Description as under location (ii)

Mushroom arising from the bark of jack tree is made into a paste with turmeric and applied over the enlarged glands in mumps.

Ailanthus excelsa Roxb. (Simaroubaceae) 188

'Mattimaram'

Medium sized tree

Water stored overnight in a cup made of the wood of this plant is taken in the morning daily as a prophylactic for malarial fever.

Albizia lebbek

Description given under location (i)

Macerated bark is applied as poultice on the affected parts of the skin in leprosy.

Allium cepa

Description given under location (iii)

An oil is prepared by boiling two small crushed onions, 10 leaves of *Ocimum sanctum* and three grains of black pepper in coconut oil. 2-3 drops of this oil is applied to the ears for ear-ache.

Two cloves of onion is crushed with *Ocimum sanctum* leaves and 1-2 drops of the juice is applied to the nostrils to remove block.

Aloe barbadensis

Description given under location (iii)

Leaf infusion is applied frequently to the eyes for painful swelling.

Pulp of two mature leaves is scooped out after removing the skin, mixed with few drops of ginger juice, honey and salt and taken in the morning for a week in jaundice.

Alstonia scholaris

Description given under location (iii)

Powder of the flower with long pepper and honey is taken in severe asthma.

Amaranthus paniculatus Linn. (Amaranthaceae) 197

'Kattukeerai'

Low spreading herb

Leaf paste applied locally and taken internally for wasp sting.

Anacardium occidentale

Description given under location (iii)

Bark decoction used for gargling in tooth ache.

Annona squamosa

Description and use as under location (i)

Andrographis paniculata

Description given under location (ii)

Use as under location (ii) and (iii)

Aristolochia indica

Description given under location (ii)

To avoid spreading of poison in snake bite, the leaves and fruits of the plant are rubbed together with hands and blown to the nose and mouth of the patient. Leaf paste is also applied

to the centre of the head. If the patient faints due to spreading of the poison or fear, the leaf is rubbed in between fingers and made to inhale.

Asparagus racemosus

Description given under location (i)

Fresh root paste taken with milk twice a day continuously for 6 days in cases of epilepsy.

Use also as under location (i)

Azadirachta indica

Description given under location (i)

Root bark powder given to children for expelling worms.

Leaf decoction used as hip-bath in venereal diseaes.

Leaf paste applied as poultice to promote suppuration of boils.

Bambusa arundinacea

Description given under location (iii)

One and a half ounce of leaf juice is taken with one teaspoonful of sugar as an antidote for mercury poisoning.

Boerhaavia diffusa

Description given under location (ii)

Whole plant powder is taken with honey daily in empty stomach for a week to cure jaundice.

Butea monosperma

Description given under location (i)

A salve is prepared by mixing the flower juice with the seed powder of *Pongamia glabra* and applied to the eyes in conjunctivitis.

Caesalpinia crista

Description given under location (i)

Leaves roasted in ghee taken as an anthelmintic.

Cajanus cajan

Description and use as under location (iii)

Calotropis gigantea

Description given under location (i)

Root bark powder mixed with honey is given to children for expelling worms.

Hot leaves applied as poultice on any type of swelling on the legs of cattle.

Carica papaya

Description given under location (ii)

Latex used to remove thorns that accidentally get into the skin. It will loosen the skin and the thorn will emerge out.

Cassia fistula

Description given under location (i)

Tender leaves are rubbed into the paralysed parts.

Centella asiatica

Description given under location (i)

Three to ten pinches of the whole plant powder is given to children daily as a blood purifier.

Use also as under location (iii)

Centrathium anthelminticum

Description given under location (i)

Root paste applied over the wound in animal bites.

Cinnamomum verum Breyn. (Lauraceae) 107

'Karuvappatta'

Large perennial tree

Bark decoction is given to cure cough.

Citrullus colocynthis

Description given under location (i)

Root or fruit paste prepared along with the leaves of *nux-vomica* is applied over pimples to hasten suppuration.

Citrus aurantifolia

Description given under location (i)

Fruit juice strained through fine cloth, kept in the sun for a day after covering with banana leaves and 2-3 drops applied to the ears for infection.

Clerodendrum paniculata Linn. (Fabaceae) 201

'Aarumasachedi'

Shrub

Young leaves taken as a vegetable as anthelmintic.

Cocos nucifera

Description given under location (i)

Dry ginger paste prepared in tender coconut water and breast milk is applied to the forehead for headache.

Ten leaves of *Ocimum sanctum* is boiled in coconut oil with two crushed small onions and 3 grains of black pepper till the pepper grains crack. When cold, 2-3 drops are applied to the ear for earache.

Oil prepared by boiling tender leaves of *Pandanus odoratissimus* in coconut oil is applied to the wounds.

The red tender leaves of *Strychnos nux-vomica* are fried in coconut oil, made into a paste and applied to the centre of the head to check bleeding from the nose.

Coleus aromaticus Benth. (Lamiaceae) 199

'Panichedy'/'Panikoorka'

Herb

Leaf paste applied as poultice over the chest and forehead of a child in chest congestion. The leaf juice is also administered to the tongue.

Coriandrum sativum

Description given under location (i)

Seed decoction applied to the eyes in conjunctivitis.

Coscinium fenestratum

Description given under location (iii)

Stem decoction taken to remove bad taste from mouth during fever.

Cuminum cyminum

Description given under location (iii)

Seed paste applied over pimples.

Curcuma longa

Description given under location (i)

Eyes are washed with rhizome decoction in conjunctivitis.

Rhizome paste with sandal in curd is applied over pimples.

Rhizome powder dispersed in *Momordica dioica* leaf juice is used as an emetic.

Use also as under location (iii)

Cuscuta reflexa Roxb. (Convolvulaceae) 65

'Moodillathali'

Parasitic climber

Whole plant decoction is an efficient remedy for constipation.

Cymbopogon flexuosus

Description and use as under location (iii)

Cynodon dactylon

Description given under location (ii)

Macerated roots taken with curd for gonorrhoea.

Datura stramonium

Description given under location (i)

Equal quantity of the leaf juice, ghee and honey is taken as an antidote for dog bite.

Leaf paste with quick lime is applied over the enlargement in goitre.

Diospyros peregrina (Gaertn.) Gurke (Ebenaceae) 200

'Vananjil'

Small evergreen tree

Bark or fruit decoction with ghee is applied over burns.

Embelia ribes Burm. f. (Myrsinaceae) 198

'Vizhalari'

Shrub

Powder of 5-6 dried berries taken in the morning for expelling worms.

Erythrina variegata var. *Orientalis*

Description given under location (iii)

Bark juice mixed with the paste of a few grains of black pepper is taken for snake bite.

Euphorbia antiquorum

Description given under location (i)

Milky juice is applied over corns.

Ficus hispida Linn. f. (Moraceae) 202

'Parakam'

Shrub or small tree

Leaf decoction taken for dysentery.

Ficus religiosa

Description given under location (i)

Leaf juice applied to the ears for ear infection.

Gardenia gummiifera

Description given under location (iii)

Gum exudate from the bark is powdered and taken with sugar for cholera.

Gloriosa superba

Description given under location (iii)

Tuber juice is dropped into the ear to stop foul smelling discharge from the ear.

Gossypium hirsutum

Description given under location (iii)

Seed and pod decoction is taken as an antidote to *Datura* poisoning:

Hibiscus rosasinensis

Description given under location (ii)

Petals of 10 flowers immersed in castor oil and kept under the sun for one week. This is applied to the scalp to prevent premature greying of hair.

Holostemma ada-kodien

Description given under location (ii)

Leaves eaten as vegetable to cure night blindness.

Indigofera tinctoria

Description given under location (iii)

A mixture of leaf juice or root paste in rice water is taken for snake bite.

Ipomoea pes-tigridis

Description given under location (iii)

Whole plant juice is applied over the swellings in mumps. Half cup of the juice is also taken in the morning for four consecutive days.

Kaempferia galanga Linn. (Zingiberaceae) 203

'Kacholam'

Perennial rhizomatous herb

Rhizome paste applied to remove irritation caused by stinging flies.

Kaempferia rotunda Linn. (Zingiberaceae) 204

'Chengazhineerkizhangu' (Plate 4)

Perennial stem tuber

Rhizome juice used as eye drops for removing conjunctivitis and night blindness.

Lawsonia inermis

Description given under location (i)

Leaf decoction used for fomenting in burns.

Leucas aspera

Description given under location (i)

Leaf paste with black pepper is applied for scorpion sting and rheumatic swellings.

Mangifera indica

Description given under location (i)

A few drops of the mature leaf juice sprinkled with salt applied to the nostrils to stop bleeding from the nose.

Leaf powder is dusted over burns.

Michelia champaca

Description given under location (i)

Bark decoction is taken as a febrifuge.

Mimosa pudica Linn. (Fabaceae) 50

'Thottarvady.'

Spreading under shrub

One glass of the whole plant juice is taken in the morning for seven consecutive days for goitre and treatment repeated thrice at monthly intervals.

Mimusops elengi

Description given under location (ii)

Leaf infusion taken for cough.

Momordica dioica Roxb. ex Willd. (Cucurbitaceae) 205

'Velipaval' (Fig. 16)

Extensively climbing, trailing herb

Leaf juice with turmeric powder is taken to induce vomiting.

Moringa oleifera

Description given under location (iii)

Leaf juice rubbed into the scalp for dandruff.

Murraya koenigii

Description given under location (i)

A poultice of leaf paste with turmeric is applied over the wound in cat bite.

Murraya paniculata

Description given under location (i)

Leaf decoction taken in diarrhoea.

Musa coccinea Andr. (Musaceae)

'Kalluvazhai'

Perennial herbaceous plant

Endosperm of seven seeds mixed with water is taken at a time for seven consecutive days starting from the third day of menstruation as a remedy for leucorrhoea.

Nyctanthes arbor-tristis

Description given under location (iii)

Leaf or bark juice is applied as well as taken over wounds in scorpion sting.

Leaves macerated with the roots of *Sida* is applied to the swelling in goitre.

Oldenlandia auricularia

Description given under location (i)

Leaf paste applied over wounds.

Ocimum sanctum

Description given under location (iii)

One hundred and eighty leaves boiled with half a litre of water, the quantity reduced to one-fourth and taken as a single dose for fever.

Use also as under *Allium cepa* and *Cocos nucifera*.

Oryza sativa

Description given under location (ii)

Use also as under *Indigofera tinctoria*.

The bark of *Polyalthia cerasoides* is made into a paste with rice water and taken with honey for menorrhagia.

A poultice of rice flour with curd comfortably hot is applied over diabetic abscesses.

Oxalis corniculata Linn. (Oxalidaceae) 207

'Nilappuliyila'

Small perennial herb

Leaf juice given to children for diarrhoea.

Pandanus odoratissimus Linn. f. (Pandanaceae) 206

'Kaitha'

Shrub

Use as under *Cocos nucifera*.

Padalium murex

Description given under location (iii)

Fruit infusion used for gargling in cases of ulcerated, swollen gums.

Mucilage obtained by infusing the leaves and stem in water is taken as a remedy for urinary disorders.

Phyllanthus fraternus

Description and use as under location (ii) and (iii)

Piper longum

Description as under location (i)

Paste of the berries applied over bees and wasp stings.

Use also as under *Alstonia scholaris*.

Piper nigrum

Description given under location (ii)

Uses as under *Adhatoda beddomei*, *Erythrina variegata*, *Leucas aspera* and *Ocimum sanctum*.

Pongamia glabra

Description given under location (i)

Use as under *Butea monosperma*.

Psidium guajava

Description and use as under location (i)

Pterocarpus marsupium

Description given under location (iii)

Gum exuding from the bark is applied to wounds.

Rauwolfia serpentina

Description given under location (iii)

Root decoction in milk is given for mental disorders.

Rotula aquatica

Description given under location (iii)

Cold root infusion is taken now and then for urinary disorders.

Ruta graveolens

Description given under location (i)

Use as under location (iii)

Santalum album

Description given under location (i)

Paste with turmeric in butter milk is applied over the face to remove pimples or black patches.

Sapindus laurifolius

Description and use as under location (iii)

Scoparia dulcis

Description given under location (ii)

A cooling drink is prepared by soaking the leaves overnight in water to remove renal and bladder stones.

Sesamum indicum

Description given under location (i)

An overnight infusion of 50 fresh flowers mixed with honey and raw cow's milk is taken as two doses daily for a week for gonorrhoea.

Use also as under *Abrus precatorius*.

Sida cordifolia

Description given under location (i)

Use as under *Nyctanthes arbor-tristis*.

Strychnos nux-vomica

Description given under location (iii)

Seeds fried in ghee and seed coats of 1-2 seeds (depending upon the age) removed, powdered mixed with milk and taken for 14 consecutive days for dog bite. Seed paste is also applied over the wounds.

Syzygium aromaticum Merril & Perry (Myrtaceae) 212

'Karampoo'

Large evergreen tree

A paste is prepared with 180 buds, 180 leaves of *Ocimum sanctum* and 140 black pepper seeds, divided into small pills, dried under shade and one each taken in the morning and evening for fever.

Tamarindus indica

Description given under location (i)

Leaf juice taken internally as a cure for bleeding piles.

Tectona grandis

Description given under location (i)

Bark decoction mixed with cow's urine is taken to reduce overweight.

Terminalia chebula

Description given under location (i)

One fruit taken daily for weakness and anaemia.

Dried fruit boiled in cow's urine, stored for a week and taken twice a day for three weeks as a tonic.

Tinospora cordifolia

Description given under location (ii)

Juice extracted from mature vines is boiled over a low fire and made into a thick paste. This is mixed with honey and applied to the eyes as salve for catarrhact.

Tridax procumbens Linn.

'Murichedy'

Herb

Crushed leaves applied on minor injuries.

Vitex negundo

Description given under location (iii)

Young leaf paste applied locally over sprains as poultice.

Woodfordia fruticosa

Description given under location (iii)

Leaf decoction with sugar is taken as a febrifuge.

Zingiber officinale

Description given under location (i)

Rhizome juice taken with ghee for anaemia.

Uses also as under *Aloe barbadensis* and *Cocos nucifera*.

v) Vazhani

Abutilon indicum Linn. (Malvaceae) 09

'Velluram' (Fig. 2)

Robust, hairy shrub

Tender leaves chewed and the pulp retained in the mouth for a long time for ulceration of the mouth.

Achyranthes aspera

Description given under location (i)

Seed powder applied to the nostrils for quick relief from cold.

Adhatoda beddomei

Description given under location (i)

Dried leaf powder taken at doses of 5-6 pinches mixed with honey now and then for relief in cough.

Aegle marmelos

Description given under location (iv)

Leaf juice is taken for jaundice.

Agaricus campestris

Description given under location (ii)

Use as under location (iv)

Alangium salviifolium

Description and use as under location (iii)

Albizia lebbek

Description given under location (i)

Use as under location (ii)

Allium cepa

Description given under location (ii)

Crushed onions used as smelling salt in fainting fits.

Juice of two onions sprinkled with common salt is applied to nostrils to stop bleeding.

Allium sativum

Description given under location (i)

Crushed garlic is used as smelling salt in fainting fits.

Aloe barbadensis

Description given under location (ii)

Fresh leaf pulp is taken with raw turmeric paste for piles.

Alstonia scholaris

Description given under location (ii)

Use as under location (iv)

Amaranthus paniculatus

Description and use as under location (iv)

Ananas comosus (Linn.) Merrill (Bromeliaceae) 21

'Kaithapazham'

Biennial herb

Abortion in the early stages of pregnancy is brought about by taking the pulp of one green, unripe fruit with salt.

Aristolochia indica

Description and use as under location (ii)

Artocarpus heterophyllus Lam. (Moraceae) 208

'Chakka'

Evergreen tree

Two ripe fingers taken daily in the morning after frying in pig fat for curing piles.

Asparagus racemosus

Description given under location (i)

Use as under location (iv)

Azadirachta indica

Description given under location (i)

Use as under location (ii)

Bauhinia purpurea Linn. (Fabaceae) 49

'Mandaram'

Small tree

Root paste is taken for snake bite.

Caesalpinia crista

Description given under location (i)

Tender leaves taken as a pot-herb for abdominal disorders.

Calotropis gigantea

Description given under location (i)

The stem bark is pounded with double its weight of the tuberous roots of *Momordica dioica*, a few seeds of mustard and a few cloves of garlic. The juice is extracted without adding water. Two or three tablespoons of this juice is taken as an abortifacient. Abortion is claimed to occur within 12 hours.

Use also as under location (iv)

Capsicum annum

Description given under location (i)

A piece of cloth saturated with an infusion of fruits is applied over the rheumatic swellings and covered with banana leaves.

Cassia tora

Description given under location (iii)

Leaf paste mixed with the urine of a child is given in doses of half the size of a goosberry for getting relief from chest conjection.

Use also as under location (iii)

Catharanthus roseus

Description and use as under location (ii)

Centella asiatica

Description given under location (i)

Leaf paste in combination with the leaves of *Murraya koenigii* and *Mangifera indica* in butter milk is used as a gargle for boils and to remove foul smell from the mouth.

Cissus quadrangularis

Description given under location (ii)

Stem paste applied over sprains as poultice.

Citrullus vulgaris

Description and use as under location (ii)

Citrus aurantifolia

Description given under location (i)

Fruit juice mixed with jaggery is applied for honeybee and wasp sting.

Cocos nucifera

Description given under location (i)

Three seeds of black pepper are incorporated into the top of a tender coconut button. A paste is prepared by rubbing this along with water and applied over the forehead for headache.

Use also as under location (iv)

Crataeva nurvala

Description given under location (iii)

A compound decoction of the bark with the roots of *Boerhaavia diffusa* is taken for the cure of hydrocele.

Cucumis sativus Linn. (Cucurbitaceae) 20

'Vellari'

Trailing or climbing annual

Macerated seeds taken with honey for belching.

Cuminum cyminum

Description and use as under location (ii)

Curculigo orchioides

Description given under location (i)

Tuber juice applied as eye drops to cattle to prevent lachrymation.

Curcuma longa

Description given under location (i)

Rhizome powder with honey is applied over boils in the mouth.

Cynodon dactylon

Description given under location (ii)

Leaf juice mixed with honey is taken for cough.

Datura stramonium

Description given under location (i)

Seed paste applied around the naval hastens the delivery of placenta after child birth.

Eclipta alba.

Description given under location (i)

Root powder applied externally for swelling of the ears of cattle.

Eupatorium triplinerve Vahl (Asteraceae)

'Ayyappana'

Small, aromatic under shrub

Whole plant paste applied as a haemostatic over wounds.

Euphorbia antiquorum

Description and use as under location (i)

Ficus religiosa

Description given under location (i)

Juice from fresh tender shoots and aerial roots are taken, two tablespoons at night for 3 consecutive days as an anthelmintic.

Flacourtia cataphracta Roxb. (Flacourtiaceae) 209

'Thaliru'

Small or medium sized tree

Bark paste with mustard is heated in an earthen pot and given with curd twice daily in dysentery.

Glycosmis pentaphylla

Description given under location (iii)

Juice expressed from a handful of seeds is taken in acute diarrhoea.

Grewia tiliaefolia Vahl. (Tiliaceae) 210

'Chadachimaram'

Tree

Leaf juice taken with sugar for gonorrhoea.

Hibiscus rosasinensis

Description and use as under location (i)

Hygrophila auriculata R. Br. (Acanthaceae)

'Vayalchulli'

Perennial herb

Leaf paste applied locally for pain.

Lawsonia inermis

Description and use as under location (iii)

Leucas aspera,

Description given under location (i)

Leaf juice mixed with pepper is taken for snake bite.

Mangifera indica

Description given under location (i)

Bark decoction taken for leucorrhoea.

Use also as under *Centella asiatica*.

Mimosa pudica

Description given under location (iv)

Whole plant decoction taken by women for menorrhagia.

Momordica charantia

Description given under location (ii)

Leaf juice applied around the eyes for night blindness.

Momordica dioica

Description given under location (iv)

Use as under *Calotropis gigantea*.

Moringa oleifera

Description given under location (iii)

A handful of leaves taken daily along with jaggery for improving the eye sight.

Murraya koenigii

Description given under location (i)

Use as under *Centella asiatica*.

Musa sp.

Description given under location (i)

Use as under *Capsicum annum*.

Ocimum basilicum

Description given under location (ii)

Leaves spread under the head while sleeping to repel and remove lice.

Ocimum sanctum

Description and uses as under location (iv)

Oroxylum indicum Vent. (Bignoniaceae) 211

'Palakapayyani' (Plate 5)

Small to medium sized deciduous tree

Bark powder is taken mixed with water thrice a day to act as a diaphoretic.

Oryza sativa

Description given under location (ii)

Rice flour is thickly dusted over the skin in measles.

Phyllanthus fraternus

Description and use as under location (ii)

Phyllanthus emblica Linn. (Euphorbiaceae) 04

'Nelli'

Large tree

The hard outer coat of seeds fried in butter, made into a paste and applied to the head to stop bleeding from the nose.

Piper longum

Description given under location (i)

Uses as under location (ii)

Piper nigrum

Description given under location (ii)

Uses as under *Centella asiatica*, *Cocos nucifera*, *Leucas aspera* and *Ocimum sanctum*.

Pongamia glabra

Description given under location (i)

Finely powdered flowers mixed with curd taken internally for diabetes.

Punica granatum

Description given under location (ii)

Rind decoction used for diarrhoea and dysentery.

Sesamum indicum

Description given under location (i)

Seed paste in cow's urine applied locally on pimples.

Sida cordifolia

Description given under location (i)

Leaf juice is used as shampoo for washing hair.

Strychnos nux-vomica

Description given under location (iii)

Root paste in rice wash mixed in cow's milk is taken to hasten child birth.

Tamarindus indica

Description given under location (i)

Shelled seed macerated in milk is taken to cure leucorrhoea.

Tylophora asthamatica Wight & Arn. (Asclepiadaceae) 155

'Swasavally'

Leaves chewed for an immediate relief from asthmatic spasms.

Vitex negundo

Description given under location (iii)

Leaf powder taken with honey for cough.

Woodfordia fruticosa

Description given under location (iii)

Finely powdered flowers (5-10 pinches, 4-7 times daily)
given with honey for diarrhoea.

Zingiber officinale

Description given under location (i)

Use as under location (iii)

Table 9. Plants used in human ailments

Ailment/property	Name of the plant	Family	Part used	Locality
1	2	3	4	5
Abortifacient	<i>Abrus precatorius</i>	Fabaceae	seed	Sholayar
	<i>Ananas comosus</i>	Bromiliaceae	fruit	Vazhani
	<i>Calotropis gigantea</i>	Asclepiadaceae	stem	Vazhani
	<i>Carica papaya</i>	Caricaceae	fruit	Sholayar
	<i>Cocos nucifera</i>	Arecaceae	jaggary	Sholayar
	<i>Ficus religiosa</i>	Moraceae	root	Sholayar
	<i>Momordica dioica</i>	Cucurbitaceae	root	Vazhani
	<i>Plumbago rosea</i>	Plumbaginaceae	root	Sholayar, Chimminy
	<i>Ricinus communis</i>	Euphorbiaceae	root	Sholayar
	<i>Sansevieria roxburghiana</i>	Liliaceae	rhizome	Sholayar
	<i>Sterculia urens</i>	Sterculiaceae	root	Sholayar
Abscess/Boils/ Blisters	<i>Azadirachta indica</i>	Meliaceae	leaves	Sholayar, Vazhachal, Chimminy
	<i>Butea monosperma</i>	Fabaceae	bark	Chimminy
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Marottichal, Vazhani

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Datura stramonium</i>	Solanaceae	leaf	Chimminy, Vazhani
	<i>Moringa oleifera</i>	Moringaceae	leaf	Sholayar
	<i>Sida cordifolia</i>	Malvaceae	leaf	Chimminy
Alopecia	<i>Nyctanthes arbor-tristis</i>	Oleaceae	seed	Chimminy
Analgesic	<i>Hygrophila auriculata</i>	Acanthaceae	leaf	Vazhani
	<i>Thevetia neriiifolia</i>	Apocynaceae	leaf	Sholayar
Anthelmintic	<i>Azadirachta indica</i>	Meliaceae	root	Vazhachal
	<i>Butea monosperma</i>	Fabaceae	seed	Marottichal
	<i>Caesalpinia crista</i>	Fabaceae	leaves	Vazhachal
	<i>Calotropis gigantea</i>	Asclepiadaceae	root	Vazhachal
	<i>Centratherum anthelminticum</i>	Asteraceae	seed	Marottichal, Chimminy
	<i>Clerodendrum paniculata</i>	Verbenaceae	leaf	Vazhachal
	<i>Datura stramonium</i>	Solanaceae	leaf	Chimminy
	<i>Embelia ribes</i>	Myrsinaceae	seed	Vazhachal
	<i>Ficus religiosa</i>	Moraceae	shoot/ aerial- root	Vazhani
	<i>Mangifera indica</i>	Anacardiaceae	seed	Chimminy

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Nyctanthes arbor-tristis</i>	Oleaceae	leaf	Sholayar
	<i>Oryza sativa</i>	Poaceae	seed	Marottichal
	<i>Tephrosea purpurea</i>	Fabaceae	root	Sholayar
	<i>Wrightia tinctoria</i>	Apocynaceae	bark, root, fruit	Marottichal
Antiallergic	<i>Cocos nucifera</i>	Arecaceae	shell	Chimminy
	<i>Dioscorea floribunda</i>	Dioscoreaceae	leaf	Sholayar, Marottichal
	<i>Ipomoea pes-tigridis</i>	Convolvulaceae	tuber	Sholayar
	<i>Kaempferia galanga</i>	Zingiberaceae	rhizome	Vazhachal
	<i>Piper betle</i>	Piperaceae	leaf	Chimminy
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Vazhachal
	<i>Cocos nucifera</i>	Arecaceae	shell	Vazhachal
Antidote	<i>Aristolochia indica</i>	Aristolochiaceae	root, leaf	Vazhachal, Chimminy
	<i>Bambusa arundinacea</i>	Poaceae	leavess	Vazhachal
	<i>Syzygium cuminii</i>	Myrtaceae	fruit, bark	Chimminy
	<i>Indigofera tinctoria</i>	Fabaceae	root	Sholayar
	<i>Oryza sativa</i>	Poaceae	seed	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Piper betle</i>	Piperaceae	leaf petiole	Sholayar
	<i>Solanum melongena</i>	Solanaceae	fruit	Sholayar
Anti-lactogenic	<i>Jasminum pubescens</i>	Oleaceae	flower	Marottichal
Anti-pyretic	<i>Achyranthes aspera</i>	Amaranthaceae	root bark	Marottichal
	<i>Aegle marmelos</i>	Rutaceae	fruit	Vazhachal, Marottichal
	<i>Andrographis paniculata</i>	Acanthaceae	whole plant	Vazhachal, Marottichal, Sholayar,
	<i>Coscinium fenestratum</i>	Menispermaceae	root	Sholayar
	<i>Heliotropium indicum</i>	Boraginaceae	leaf	Chimminy
	<i>Hemidesmus indicus</i>	Asclepiadaceae	root	Chimminy
	<i>Michelia champaca</i>	Magnoliaceae	bark	Vazhachal
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Vazhachal, Vazhani, Sholayar
	<i>Piper nigrum</i>	Piperaceae	fruit	Sholayar, Vazhachal, Marottichal
	<i>Sida cordifolia</i>	Malvaceae	root	Marottichal
	<i>Syzygium aromaticum</i>	Myrtaceae	bud	Vazhachal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Cynodon dactylon</i>	Poaceae	leaf	Marottichal
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Vazhachal
	<i>Phaseolus trilobatus</i>	Fabaceae	seed	Sholayar
	<i>Plyllanthus emblica</i>	Euphorbiaceae	seed	Vazhani
	<i>Punica granatum</i>	Punicaceae	flowers	Marottichal
	<i>Strychnos nux-vomica</i>	Loganiaceae	leaf	Vazhachal
	<i>Kalanchoe laciniata</i>	Crassularaceae	leaf	Vazhachal
Blood purifier	<i>Centella asiatica</i>	Umbelliferae	whole plant	Marottichal, Chimminy
Bone fracture	<i>Justicia gendarussa</i>	Acanthaceae	leaf	Sholayar
Breast inflammation	<i>Symplocos racemosa</i>	Symplocaceae	roots	Marottichal
Burns	<i>Aloe barbadensis</i>	Liliaceae	leaf	Marottichal
	<i>Cocos nucifera</i>	Arecaceae	shell	Marottichal
	<i>Cucurbita moschata</i>	Cucurbitaceae	fruit	Chimminy, Marottichal
	<i>Desmodium gangeticum</i>	Fabaceae	whole plant	Marottichal
	<i>Diospyros perigrina</i>	Ebenaceae	bark, fruit	Vazhachal
	<i>Gossypium hirsutum</i>	Malvaceae	seed	Sholayar
	<i>Lawsonia inermis</i>	Lythraceae	leaf	Vazhachal

Table 19. Continued

1	2	3	4	5
	<i>Woodfordia fruticosa</i>	Lythraceae	leaf	Vazhachal
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Marottichal
Asthma	<i>Albizia lebbek</i>	Fabaceae	bark	Chimminy
	<i>Alstonia scholaris</i>	Apocynaceae	flowers	Vazhachal, Vazhani
	<i>Calotropis gigantea</i>	Asclepiadaceae	leaves	Marottichal
	<i>Datura stramonium</i>	Solanaceae	leaf	Sholayar
	<i>Oryza sativa</i>	Poaceae	seed	Marottichal
	<i>Piper longum</i>	Piperaceae	berries	Vazhachal, Vazhani
	<i>Saccharum officinarum</i>	Poaceae	sugar	Marottichal, Chimminy
	<i>Tylophora asthamatica</i>	Asclepiadaceae	leaf	Vazhani
Athletes foot	<i>Colocasia esculenta</i>	Araceae	leaf petiole	Marottichal
	<i>Tabernaemontana</i> <i>divaricata</i>	Apocynaceae	fruit	Sholayar
Bad taste in mouth	<i>Coscinium fenestratum</i>	Menispermaceae	stem	Vazhachal
Bleeding	<i>Allium cepa</i>	Liliaceae	bulb	Vazhani
	<i>Cocos nucifera</i>	Arecaceae	seed	Vazhachal

Table 9. Continued

1	2	3	4	5
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Vazhachal
	<i>Maranta arundinacea</i>	Marantaceae	leaf	Sholayar
	<i>Momordica charantia</i>	Cucurbitaceae	fruit	Sholayar
	<i>Musa sp.</i>	Musaceae	stem, rhizome	Sholayar, Marottichal
	<i>Stereospermum colais</i>	Bignoniaceae	root	Sholayar
Cataract	<i>Tinospora cordifolia</i>	Menispermaceae	stem	Vazhachal
	<i>Vernonia cineria</i>	Asteraceae	leaf	Marottichal
Cat-bite	<i>Murraya koenigii</i>	Rutaceae	leaf	Vazhachal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Vazhachal
Chest conjection	<i>Cassia tora</i>	Fabaceae	leaf	Vazhani
	<i>Coleus aromaticus</i>	Lamiaceae	leaf	Vazhachal
	<i>Lagenaria siceraria</i>	Cucurbitaceae	root	Sholayar
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Chimminy
	<i>Thespesia populnea</i>	Malvaceae	flower	Marottichal
Chicken-pox	<i>Azadirachta indica</i>	Meliaceae	leaves	Vazhani, Marottichal
Child-birth	<i>Aerva lanata</i>	Amaranthaceae	root	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Bambusa arundinacea</i>	Poaceae	Leaf buds/ tender leaves/ joints of stem	Sholayar
	<i>Cyclea peltata</i>	Menispermaceae	leaf	Marottichal
	<i>Datura stramonium</i>	Solanaceae	seed	Vazhani
	<i>Gloriosa superba</i>	Liliaceae	tuber	Sholayar
	<i>Luffa acutangula</i>	Cucurbitaceae	flower	Marottichal
	<i>Murraya paniculata</i>	Rutaceae	fruit	Sholayar
	<i>Ocimum gratissimum</i>	Lamiaceae	leaf	Sholayar
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Sholayar, Marottichal
Cholera	<i>Gardinia gummiifera</i>	Rubiaceae	root	Vazhachal
	<i>Zingiber zerumbet</i>	Zingiberaceae	rhizome	Sholayar
Cold	<i>Achyranthes aspera</i>	Amaranthaceae	seeds	Vazhani
	<i>Adhatoda beddomei</i>	Acanthaceae	root	Sholayar
	<i>Allium cepa</i>	Liliaceae	bulb	Vazhachal
	<i>Allium sativum</i>	Liliaceae	bulb	Sholayar, Chimminy
	<i>Cassia fistula</i>	Fabaceae	roots	Sholayar
	<i>Cuminum cyminum</i>	Umbelliferae	seed	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Centella asiatica</i>	Umbelliferae	leaf	Sholayar
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Marottichal
	<i>Leucas aspera</i>	Lamiaceae	leaf	Marottichal
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Vazhachal
	<i>Piper nigrum</i>	Piperaceae	fruit	Sholayar, Vazhani
	<i>Ruta graveolens</i>	Rutaceae	leaf	Sholayar
	<i>Sesbania grandiflora</i>	Fabaceae	flower	Marottichal
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Sholayar
Contraceptive	<i>Abrus precatorius</i>	Fabaceae	seed	Sholayar
	<i>Butea monosperma</i>	Fabaceae	seed	Marottichal
	<i>Datura stramonium</i>	Solanaceae	root	Sholayar
	<i>Michelia champaca</i>	Magnoliaceae	root	Chimminy
Corn & warts	<i>Anacardium occidentale</i>	Anacardiaceae	seed	Marottichal
	<i>Carica papaya</i>	Caricaceae	fruit	Sholayar
	<i>Euphorbia antiquorum</i>	Euphorbiaceae	stem	Vazhachal
	<i>Jasminum pubescens</i>	Oleaceae	leaf	Marottichal
	<i>Solanum nigrum</i>	Solanaceae	leaf	Chimminy
Cough	<i>Adhatoda beddomei</i>	Acanthaceae	leaf	Vazhani, Vazhachal, Marottichal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Marottichal
	<i>Cinnamomum verum</i>	Lauraceae	bark	Vazhachal
	<i>Cynodon dactylon</i>	Poaceae	leaf	Vazhani
	<i>Hibiscus rosa-sinensis</i>	Malvaceae	flower	Marottichal
	<i>Mimusops elengi</i>	Sapotaceae	leaf	Vazhachal
	<i>Moringa oleifera</i>	Moringaceae	root	Marottichal
	<i>Naregamia alata</i>	Meliaceae	root	Marottichal
	<i>Piper nigrum</i>	Piperaceae	berries	Vazhachal
	<i>Terminalia bellirica</i>	Combretaceae	fruit	Marottichal
	<i>Vitex negundo</i>	Verbenaceae	leaf	Vazhani
Cuts & wounds	<i>Agaricus campestris</i>	Agaricaceae	whole plant	Marottichal
	<i>Areca catechu</i>	Arecaceae	fruit	Sholayar
	<i>Centratherum anthelminticum</i>	Asteraceae	seed	Vazhachal
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Chimminy
	<i>Cocos nucifera</i>	Arecaceae	seed	Vazhachal, Sholayar
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Sholayar
	<i>Eclipta alba</i>	Asteraceae	leaf	Chimminy
	<i>Eupatorium odoratum</i>	Asteraceae	leaf	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Eupatorium triplinerve</i>	Asteraceae	leaf	Vazhani
	<i>Holoptelia integrifolia</i>	Ulmaceae	leaf	Marottichal
	<i>Hydnocarpus laurifolia</i>	Flacourtiaceae	seed	Chimminy
	<i>Leucas aspera</i>	Lamiaceae	leaf	Chimminy
	<i>Macaranga peltata</i>	Euphorbiaceae	gum	Marottichal
	<i>Murraya paniculata</i>	Rutaceae	leaf	Chimminy
	<i>Pandanus odoratissimus</i>	Pandanaceae	leaf	Vazhachal
	<i>Pterocarpus marsupium</i>	Fabaceae	gum	Vazhachal
	<i>Sida cordifolia</i>	Malvaceae	leaf	Marottichal
	<i>Tamarindus indica</i>	Fabaceae	leaf	Sholayar
	<i>Tridax procumbens</i>	Asteraceae	leaf	Vazhachal
	<i>Vitex negundo</i>	Verbenaceae	leaf	Sholayar
Dendrifice	<i>Albizia lebbek</i>	Fabaceae	root	Vazhani, Marottichal
	<i>Centella asiatica</i>	Umbelliferae	leaf	Vazhani
	<i>Garcinia cambogia</i>	Guttiferae	fruit	Sholayar
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Vazhani
	<i>Murraya koenigii</i>	Rutaceae	leaf	vazhani
	<i>Piper nigrum</i>	Piperaceae	fruit	Sholayar

Table 9. Continued

1	2	3	4	5
Diabetes	<i>Aegle marmelos</i>	Rutaceae	leaf	Sholayar
	<i>Azadirachta indica</i>	Meliaceae	inner bark	Marottichal
	<i>Cocos nucifera</i>	Arecaceae	flowers	Vazhachal
	<i>Holostemma ada-kodien</i>	Asclepiadaceae	tuber	Marottichal
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Chimminy
	<i>Musa sp.</i>	Musaceae	flower	Chimminy
	<i>Pongamia glabra</i>	Fabaceae	flowers	Vazhani
	<i>Tinospora cordifolia</i>	Menispermaceae	stem	Sholayar
	<i>Oryza sativa</i>	Poaceae	flower	Vazhachal
Diaphoretic	<i>Oroxylum indicum</i>	Bignoniaceae	bark	Vazhani
Diarrhoea/Dysentery	<i>Caesalpinia sappan</i>	Fabaceae	wood	Sholayar
	<i>Catharanthus roseus</i>	Apocynaceae	flowers, leaf	Vazhani, Marottichal
	<i>Centella asiatica</i>	Umbelliferae	leaf	Marottichal, Chimminy
	<i>Cyperus rotundus</i>	Poaceae	tuber	Chimminy
	<i>Ficus hispida</i>	Moraceae	leaf	Vazhachal
	<i>Ficus religiosa</i>	Moraceae	areal root	Marottichal
	<i>Flacourtia cataphracta</i>	Flacourtiaceae	bark	Vazhani
	<i>Glycosmis pentaphylla</i>	Rutaceae	seed	Vazhani
	<i>Helecteres isora</i>	Sterculiaceae	fruit	Marottichal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Holarrhena antidysenterica</i>	Apocynaceae	seed	Marottichal, Chimminy
	<i>Maranta arundinacea</i>	Marantaceae	tuber	Marottichal
	<i>Murraya paniculata</i>	Rutaceae	leaf	Vazhachal
	<i>Myristica fragrans</i>	Myristicaceae	seed	Marottichal
	<i>Oryza sativa</i>	Poaceae	seed	Marottichal, Sholayar
	<i>Oxalis corniculata</i>	Oxalidaceae	leaf	Vazhachal, Marottichal
	<i>Piper nigrum</i>	Piperaceae	fruit	Marottichal
	<i>Pterocarpus marsupium</i>	Fabaceae	bark	Sholayar
	<i>Punica granatum</i>	Punicaceae	rind	Vazhani
	<i>Santalum album</i>	Santalaceae	wood	Sholayar
	<i>Tamarindus indica</i>	Fabaceae	root	Marottichal
	<i>Woodfordia fruticosa</i>	Lythraceae	flower	Vazhani
Diuretic	<i>Adhatoda beddomei</i>	Acanthaceae	root	Chimminy
	<i>Ecbolium viride</i>	Acanthaceae	whole plant	Sholayar
	<i>Tribulus terrestris</i>	Zygophyllaceae	leaf	Sholayar
Dog-bite	<i>Alangium salviifolium</i>	Alangiaceae	root	Sholayar, Vazhani

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Asparagus racemosus</i>	Lamiaceae	root tuber	Vazhachal, Chimminy
	<i>Calotropis gigantea</i>			
	<i>Capsicum annuum</i>	Asclepiadaceae	milky juice	Chimminy
	<i>Capsicum annuum</i>	Solanaceae	leaves	Chimminy
	<i>Cassia fistula</i>	Fabaceae	leaf	Marottichal
	<i>Clitoria ternatea</i>	Fabaceae	root	Chimminy
	<i>Datura stramonium</i>	Solanaceae	leaf	Vazhachal
	<i>Melia dubia</i>	Meliaceae	root	Sholayar
	<i>Murraya koenigii</i>	Rutaceae	leaf	Chimminy
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Chimminy
	<i>Strychnos nux-vomica</i>	Loganiaceae	seed	Vazhachal
Ear infections	<i>Allium cepa</i>	Liliaceae	bulb	Vazhachal, Vazhani
	<i>Calamus rotang</i>	Arecaceae	shoot	Sholayar
	<i>Cocos nucifera</i>	Arecaceae	oil	Sholayar, Vazhani, Vazhachal
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Vazhachal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Marottichal
	<i>Dolichos biflorus</i>	Fabaceae	seed	Marottichal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Ficus religiosa</i>	Moraceae	leaf	Vazhachal
	<i>Gloriosa superba</i>	Liliaceae	tuber	Vazhachal
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Vazhachal, Vazhani
	<i>Piper nigrum</i>	Piperaceae	fruit	Vazhachal
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Marottichal
	<i>Solanum xanthocarpum</i>	Solanaceae	fruit	Chimminy
Elephantiasis	<i>Caesalpinia crista</i>	Fabaceae	leaves	Sholayar
	<i>Calotropis gigantea</i>	Asclepiadaceae	root	Sholayar
	<i>Eclipta alba</i>	Asteraceae	whole plant	Sholayar
	<i>Oryza sativa</i>	Poaceae	seed	Sholayar
	<i>Tectona grandis</i>	Verbenaceae	bark	Vazhachal
	<i>Terminalia chebula</i>	Combretaceae	fruit	Chimminy
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Sholayar
Emetic	<i>Acalypha indica</i>	Euphorbiaceae	leaf	Marottichal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Vazhachal
	<i>Momordica dioica</i>	Cucurbitaceae	leaf	Vazhachal
	<i>Ricinus communis</i>	Euphorbiaceae	leaf	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
Epilepsy/Fainting fits	<i>Allium cepa</i>	Liliaceae	bulb	Vazhani
	<i>Allium sativum</i>	Liliaceae	bulb	Vazhani
	<i>Asparagus racemosus</i>	Liliaceae	root	Vazhani, Vazhachal
	<i>Cucurbita moschata</i>	Cucurbitaceae	root	Vazhani
	<i>Piper longum</i>	Piperaceae	fruit	Sholayar Vazhani
	<i>Piper nigrum</i>	Piperaceae	fruit	Vazhani, Sholayar
	<i>Ruta graveolens</i>	Rutaceae	leaf	Sholayar, Vazhachal
	<i>Sesbania grandiflora</i>	Fabaceae	leaf	Chimminy
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Sholayar, Vazhani
Eye diseases	<i>Achyranthes aspera</i>	Amarantheceae	root	Sholayar, Vazhachal
	<i>Albizia lebbek</i>	Fabaceae	bark	Chimminy
	<i>Allium cepa</i>	Liliaceae	bulb	Marottichal
	<i>Aloe barbadensis</i>	Liliaceae	leaf	Vazhachal
	<i>Butea monosperma</i>	Fabaceae	flower roots	Vazachal, Chimmimy

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Cleome icosandra</i>	Cleomaceae	leaf	Chimminy
	<i>Coriandrum sativum</i>	Asteraceae	seed	Vazhachal
	<i>Cuminum cyminum</i>	Umbelliferae	seed	Marottichal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Marottichal, Sholayar
	<i>Desmodium motorium</i>	Fabaceae	leaf	Sholayar
	<i>Emilia sonchifolia</i>	Asteraceae	leaf	Chimminy
	<i>Hemidesmus indicus</i>	Asclepiadaceae	root	Sholayar, Vazhani
	<i>Holostemma ada-kodien</i>	Asclepiadaceae	leaf	Vazhachal
	<i>Jasminum pubescens</i>	Oleaceae	flowers	Vazhachal
	<i>Kaempferia rotunda</i>	Zingiberaceae	rhizome	Vazhachal
	<i>Michelia champaca</i>	Magnoliaceae	flower	Marottichal, Sholayar
	<i>Momordica charantia</i>	Cucurbitaceae	leaf	Vazhani
	<i>Moringa oleifera</i>	Morigaceae	leaf	Vazhani
	<i>Piper betle</i>	Piperaceae	leaf	Marottichal
	<i>Piper nigrum</i>	Piperaceae	fruit	Marottichal
	<i>Pongamia glabra</i>	Fabaceae	seeds	Vazhachal
	<i>Punica granatum</i>	Punicaceae	fruit	Sholayar
	<i>Tabernaemontana coronarea</i>	Apocynaceae	flower	Marottichal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Tamarindus indica</i>	Fabaceae	flower	Sholayar
	<i>Tinospora cordifolia</i>	Menispermaceae	stem	Vazhachal
	<i>Vernonia cineria</i>	Asteraceae	leaf	Marottichal
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Marottichal
Galactagogue	<i>Alstonia scholaris</i>	Apocynaceae	bark	Marottichal
	<i>Erythrina variegata</i>	Lythraceae	leaf	Sholayar
Goitre	<i>Datura stramonium</i>	Solanaceae	leaf	Vazhachal
	<i>Ficus religiosa</i>	Moraceae	latex	Chimminy
	<i>Mimosa pudica</i>	Fabaceae	whole plant	Vazhachal
	<i>Nyctanthes arbor-tristis</i>	Oleaceae	leaf	Sholayar
	<i>Sida cordifolia</i>	Malvaceae	leaf	Vazhachal
Hair tonic	<i>Abrus precatorius</i>	Fabaceae	leaf	Vazhachal
	<i>Acacia canescens</i>	Fabaceae	immature pods	Vazhachal, Vazhani
	<i>Cajanus cajan</i>	Fabaceae	seed	Vazhachal, Sholayar
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Sholayar
	<i>Cocos nucifera</i>	Arecaceae	seed	Sholayar, Marottichal

Table 9. Continued

1	2	3	4	5
	<i>Datura stramonium</i>	Solanaceae	leaf	Sholayar
	<i>Hibiscus rosa-sinensis</i>	Malvaceae	flowerbuds	Vazhachal
	<i>Holarrhena antidysenterica</i>	Apocynaceae	bark	Marottichal
	<i>Lawsonia inermis</i>	Lythraceae	leaf	Vazhani
	<i>Moringa oleifera</i>	Moringaceae	leaf	Vazhachal
	<i>Murraya koenigii</i>	Rutaceae	leaf	Marottichal
	<i>Phyllanthus fraternus</i>	Euphorbiaceae	whole plant	Sholayar, Vazhachal
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Vazhachal
	<i>Sida cordifolia</i>	Malvaceae	leaf	Vazhani
	<i>Solanum xanthocarpum</i>	Solanaceae	leaf	Sholayar
	<i>Tectona grandis</i>	Verbenaceae	seed	Chimminy
Headache	<i>Cocos nucifera</i>	Arecaceae	Button, tender nut water	Vazhani, Vazhachal
	<i>Gmellina arboria</i>	Verbinaceae	leaf	Sholayar
	<i>Lantana camara</i>	Verbanaceae	leaf	Marottichal
	<i>Lawsonia inermis</i>	Lythraceae	leaf	Sholayar
	<i>Mimuspos elengi</i>	Sapotaceae	flower	Marottichal
	<i>Piper nigrum</i>	Piperaceae	fruit	Vazhani
	<i>Pongamia glabra</i>	Fabaceae	seeds	Marottichal

Table 9. Continued

1	2	3	4	5
	<i>Santalum album</i>	Santalaceae	wood	Chimminy
	<i>Sesbania graniflora</i>	Fabaceae	flower	Marottichal
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Vazhachal
Health tonic	<i>Habenaria latilabris</i>	Orchidaceae	sphers	Sholayar
	<i>Terminalia chebula</i>	Combretaceae	fruit	Vazhachal
	<i>Withania somnifera</i>	Solanaceae	whole plant	Sholayar
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Vazhachal
Hydrocele	<i>Boerhaavia diffusa</i>	Nyctaginaceae	whole plant	Sholayar
	<i>Crataeva nurvala</i>	Capparidaceae	root	Vazhani
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Chimminy
	<i>Hibisus rosa-sinensis</i>	Malvaceae	root	Sholayar
Jaundice	<i>Aegle marmelos</i>	Rutaceae	leaf	Vazhani
	<i>Aloe barbadensis</i>	Liliaceae	leaf	Vazhachal
	<i>Azadirachta indica</i>	Meliaceae	inner bark	Chimminy, Sholayar
	<i>Boerhaavia diffusa</i>	Nyctaginaceae	whole plant	Vazhachal
	<i>Costus speciosus</i>	Zingiberaceae	rhizome	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Cucurbita moschata</i>	Cucurbitaceae	leaf	Chimminy
	<i>Curculigo orchioides</i>	Liliaceae	tubers	Chimminy, Marottichal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Chimminy
	<i>Cyperus rotundus</i>	Umbelliferae	tuber	Sholayar
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Marottichal
	<i>Phyllanthus fraternus</i>	Euphorbiaceae	whole plant	Marottichal, Vazhani Vazhachal
	<i>Solanum xanthocarpum</i>	Solanaceae	leaf	Sholayar
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Vazhachal
Laxative	<i>Cuscuta reflexa</i>	Convolvulaceae	whole plant	Vazhachal
	<i>Rosa multiflora</i>	Rosaceae	bud	Chimminy, Marottichal
	<i>Ruta graveolens</i>	Rutaceae	leaf	Chimminy
Leprosy	<i>Albizia lebbek</i>	Fabaceae	bark	Vazhachal
	<i>Cassia fistula</i>	Fabaceae	leaves	Chimminy
	<i>Datura stramonium</i>	Solanaceae	leaf	Chimminy
	<i>Holarrhena antidysenterica</i>	Apocynaceae	bark	Sholayar
	<i>Momordica charantia</i>	Cucurbitaceae	fruit	Marottichal

Contd

Table 9. Continued

1	2	3	4	5
	<i>Pongamia glabra</i>	Fabaceae	pod	Sholayar
	<i>Rubia cordifolia</i>	Rubiaceae	bark	Chimminy
Leucoderma	<i>Clitoria ternatea</i>	Fabaceae	root	Sholayar
Leucorrhoea	<i>Mangifera indica</i>	Anacardiaceae	bark	Vazhani
	<i>Musa coccinea</i>	Musaceae	seed	Vazhachal
	<i>Tamarindus indica</i>	Fabaceae	seed	Vazhani
Lice & Maggots	<i>Acacia canescens</i>	Fabaceae	immature pods	Vazhani, Vazhachal
	<i>Ocimum basilicum</i>	Lamiaceae	leaf	Marottichal, Vazhachal
Malarial fever	<i>Ailanthus excelsa</i>	Simaroubaceae	wood	Vazhachal
	<i>Piper nigrum</i>	Piperaceae	fruit	Sholayar
Measles	<i>Azadirachta indica</i>	Meliaceae	leaves	Vazhani, Marottichal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Marottichal
	<i>Tamarindus indica</i>	Fabaceae	seed	Marottichal
	<i>Oryza sativa</i>	Poaceae	flower	Vazhani
Menstrual disorders	<i>Datura stramonium</i>	Solanaceae	leaf	Marottichal
	<i>Hibicus rosa-sinensis</i>	Malvaceae	flower bud	Chimminy, Vazhani

Contd

Table 9. Continued

1	2	3	4	5
	<i>Ixora coccinea</i>	Rubiaceae	flower	Chimminy
	<i>Mimosa pudica</i>	Fabaceae	whole plant	Vazhani
	<i>Oryza sativa</i>	Poaceae	seed	Vazhachal
	<i>Polyalthia cerasoides</i>	Annonaceae	bark	Marottichal
	<i>Rauvolfia tetraphylla</i>	Apocynaceae	root	Vazhachal
	<i>Rauvolfia serpentina</i>	Apocynaceae	root	Vazhachal
	<i>Ricinus communis</i>	Euphorbiaceae	leaf	Marottichal
Mental disorders	<i>Achyranthes aspera</i>	Amaranthaceae	root	Chimminy
	<i>Cucurbita moschata</i>	Cucurbitaceae	fruit	Sholayar
	<i>Datura stramonium</i>	Solanaceae	seed	Marottichal
Mumps	<i>Agaricus campestris</i>	Agaricaceae	whole plant	Vazhani, Vazhachal
	<i>Allium sativum</i>	Liliaceae	bulb	Marottichal
	<i>Citrullus colocynthis</i>	Cucurbitaceae	leaf	Sholayar
	<i>Colocasia esculenta</i>	Araceae	leaf petiole	Sholayar
	<i>Datura stramonium</i>	Solanaceae	leaf	Marottichal
	<i>Ipomoea pes-tigridis</i>	Convolvulaceae	whole plant	Vazhachal
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Marottichal

Contd

Table 9. Continued

1	2	3	4	5
	<i>Sphaeranthus indicus</i>	Asteraceae	leaf	Marottichal
Obesity	<i>Crataeva nurvala</i>	Capparidaceae	leaf	Sholayar
	<i>Gmelina arborea</i>	Verbenaceae	root	Marottichal
	<i>Tectona grandis</i>	Verbenaceae	bark	Marottichal
Paralysis	<i>Cassia fistula</i>	Fabaceae	leaves	Vazhachal
Piles	<i>Aloe barbadensis</i>	Liliaceae	leaf	Vazhani
	<i>Amorphophallus dubius</i>	Araceae	corm	Chimminy
	<i>Artocarpus heterophyllus</i>	Moraceae	fruit	Vazhani
	<i>Cissus quadrangularis</i>	Vitaceae	stem	Marottichal
	<i>Coriandrum sativum</i>	Asteraceae	seed	Chimminy
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Vazhani
	<i>Cynodon dactylon</i>	Poaceae	leaf	Sholayar
	<i>Mesua ferrea</i>	Guttiferae	flower	sholayar
	<i>Tamarindus indica</i>	Fabaceae	leaf	Vazhani
	<i>Terminalia chebula</i>	Combretaceae	fruit	Sholayar
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Chimminy
	<i>Punica granatum</i>	Punicaceae	rind	Chimminy
Pimples	<i>Caesalpinia crista</i>	Fabaceae	seeds	Chimminy

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Carica papaya</i>	Caricaceae	fruits	Marottichal
	<i>Citrullus colocynthis</i>	Cucurbitaceae	root, fruit	Vazhachal
	<i>Cuminum cyminum</i>	Umbelliferae	seeds	Vazhachal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Vazhachal
	<i>Datura stramonium</i>	Solanaceae	seeds	Sholayar
	<i>Myristica fragrans</i>	Myristicaceae	seed	Marottichal
	<i>Santalum album</i>	Santalaceae	wood	Vazhachal
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Vazhani
	<i>Strychnos nux-vomica</i>	Loganiaceae	leaf	Sholayar
Pregnancy test	<i>Tragia involucrata</i>	Euphorbiaceae	leaf	Sholayar
Prolapse of rectum	<i>Mangifera indica</i>	Anacardiaceae	bark	Sholayar
Rat bite	<i>Physalis peruviana</i>	Solanaceae	whole plant	Chimminy
Renal or Bladder stones	<i>Boerhaavia diffusa</i>	Nyctagonaceae	whole plant	Marottichal
	<i>Scoparia dulcis</i>	Scrophularaceae	leaves	Vazhachal
Rheumatism	<i>Adhatoda beddomei</i>	Acanthaceae	leaf	Vazhachal
	<i>Annona squamosa</i>	Annonaceae	leaf	Vazhachal, Chimminy

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Calotropis gigantea</i>	Asclepidaceae	leaf	Marottichal
	<i>Capsicum annuum</i>	Solanaceae	fruit	Vazhani
	<i>Cocos nucifera</i>	Arecaceae	seed	Sholayar
	<i>Datura stramonium</i>	Solanaceae	leaf	Sholayar
	<i>Entada phaseoloides</i>	Fabaceae	seed	Sholayar, Chimminy
	<i>Leucas aspera</i>	Lamiaceae	whole plant	Vazhachal
	<i>Musa sp.</i>	Musaceae	leaf	Vazhani
	<i>Oryza sativa</i>	Poaceae	seed	Sholayar
	<i>Pongamia glabra</i>	Fabaceae	bark	Chimminy
	<i>Pterocarpus santalinus</i>	Fabaceae	wood	Sholayar
	<i>Ricinus communis</i>	Euphorbiaceae	leaf	Vazhani
	<i>Sesamum indicum</i>	Pedaliaceae	seed	Marottichal
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Marottichal
Sexual disorder	<i>Allium sativum</i>	Liliaceae	bulb	Sholayar
	<i>Gardinia gummifera</i>	Rubiaceae	root	Sholayar
	<i>Mucuna prurita</i>	Fabaceae	leaf	Marottichal
	<i>Scoparia dulcis</i>	Scrophulariaceae	leaf	Marottichal
	<i>Tephrosia purpurea</i>	Fabaceae	root	Sholayar

Contd.

Table 9. Continued

1	2	3	4	5
Sinusitis	<i>Biophytum sensitivum</i>	Oxalidaceae	whole plant	Chimminy
	<i>Cocos nucifera</i>	Arecaceae	seed	Sholayar, Marottichal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Sholayar
	<i>Elephantopus scaber</i>	Asteraceae	whole plant	Marottichal
	<i>Physalis peruviana</i>	Solanaceae	whole plant	Sholayar
Skin diseases	<i>Coscinium fenestratum</i>	Menispermaceae	stem, root	Marottichal
	<i>Eclipta alba</i>	Asteraceae	leaf	Sholayar
	<i>Hydnocarpus laurifolia</i>	Flacourtiaceae	seed	Chimminy
	<i>Plumbago zeylanica</i>	Plumbagenaceae	root	Sholayar
Snake bite	<i>Allium cepa</i>	Liliaceae	bulb	Sholayar
	<i>Alstonia venenata</i>	Apocynaceae	root	Sholayar
	<i>Apama siliquosa</i>	Aristolochiaceae	root	Sholayar
	<i>Bauhinia purpurea</i>	Fabaceae	root	Vazhani
	<i>Butea monosperma</i>	Fabaceae	root	Sholayar
	<i>Erythrina variegata</i>	Lythraceae	bark	Vazhachal
	<i>Gymnema sylvestre</i>	Asclepiadaceae	leaf	Sholayar
	<i>Indigofera tinctoria</i>	Fabaceae	leaf/ root	Vazhachal

Contd.

Table 9. Continued

1	2	3	4	5
	<i>Leucas aspera</i>	Lamiaceae	leaf	Vazhani
	<i>Oryza sativa</i>	Poaceae	seed	Vazhachal
	<i>Piper betle</i>	Piperaceae	leaf	Sholayar
	<i>Piper nigrum</i>	Piperaceae	seed	Sholayar, Vazhachal, Vazhani
	<i>Rauvolfia serpentina</i>	Apocynaceae	leaf	Sholayar
	<i>Sapindus laurifolius</i>	Sapindaceae	fruit	Sholayar, Vazhachal
	<i>Withania somnifera</i>	Solanaceae	root	Vazhachal
Sour mouth	<i>Abutilon indicum</i>	Malvaceae	leaf	Vazhachal, Vazhani
	<i>Centella asiatica</i>	Umbelliferae	leaf	Vazhani, Marottichal
	<i>Mangifera indica</i>	Anacardiaceae	leaf	Vazhani
	<i>Moringa oleifera</i>	Moringaceae	leaf	Sholayar
	<i>Murraya koenigii</i>	Rutaceae	leaf	Sholayar
	<i>Myristica malabarica</i>	Myristicaceae	fruit	Marottichal
	<i>Pedaliium murex</i>	Pedaliaceae	fruit	Vazhachal
	<i>Piper nigrum</i>	Piperaceae	fruit	Vazhani, Marottichal
	<i>Psidium guajava</i>	Myrtaceae	leaf	Chimminy

Table 9. Continued

1	2	3	4	5
	<i>Solanum nigrum</i>	Solanaceae	leaf	Sholayar, Chimminy
Sprains	<i>Cissus quadrangularis</i>	Vitaceae	stem	Vazhani
	<i>Ficus religiosa</i>	Moraceae	leaf	Marottichal
	<i>Vitex negundo</i>	Verbenaceae	leaf	Vazhani
Stings	<i>Agaricus campestris</i>	Agaricaceae	whole plant	Sholayar
	<i>Amaranthus paniculatus</i>	Amaranthaceae	leaf	Vazhachal, Vazhani
	<i>Cassia tora</i>	Fabaceae	leaf	Vazhani, Sholayar
	<i>Citrus aurantifolia</i>	Rutaceae	fruit	Vazhani
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Sholayar
	<i>Leucas aspera</i>	Lamiaceae	leaf	Vazhachal
	<i>Nyctanthes arbor-tristis</i>	Oleaceae	leaf/bark	Vazhachal
	<i>Piper longum</i>	Piperaceae	fruit	Vazhachal
	<i>Piper nigrum</i>	Piperaceae	fruit	Vazhachal
	<i>Sphaeranthus indicus</i>	Asteraceae	leaf	Sholayar
<i>Cocos nucifera</i>	Arecaceae	Jaggery	Sholayar	

Contd.

Table 9. Continued

1	2	3	4	5
Stomach disorders/ Bowel complaints	<i>Ceasalpinia crista</i>	Fabaceae	leaves	Vazhani
	<i>Cucumis sativus</i>	Cucurbitaceae	seed	Vazhani
	<i>Cymbopogon flexuosus</i>	Poaceae	leaf	Vazhachal, Sholayar
	<i>Helicteres isora</i>	Sterculiaceae	fruit	Sholayar
	<i>Piper longum</i>	Piperaceae	fruit	Chimminy
	<i>Tinospora cordifolia</i>	Menispermaceae	stem	Marottichal
Swelling of glands	<i>Dolichos trilobatus</i>	Fabaceae	whole plant	Sholayar, Chimminy
	<i>Ficus glomerata</i>	Moraceae	stem, root	Marottichal
Tooth ache	<i>Anacardium occidentale</i>	Anacardiaceae	bark	Vazhachal
	<i>Spilanthes calva</i>	Asteraceae	flower bud	Chimminy
Thorn pricks	<i>Carica papaya</i>	Caricaceae	latex	Vazhachal
Throat infection	<i>Allium sativum</i>	Liliaceae	bulb	Chimminy
	<i>Ocimum sanctum</i>	Lamiaceae	leaf	Sholayar
	<i>Piper nigrum</i>	Piperaceae	fruit	Chimminy
	<i>Zingiber officinale</i>	Zingiberaceae	rhizome	Chimminy
Tuberculosis	<i>Centella asiatica</i>	Umbelliferae	leaf	Vazhachal
	<i>Curcuma longa</i>	Zingiberaceae	rhizome	Sholayar

Table 9. Continued

1	2	3	4	5
Urinary disorder	<i>Bacopa monnieri</i>	Scrophulariaceae	leaves	Marottichal
	<i>Citrullus vulgaris</i>	Cucurbitaceae	fruit	Vazhani, Marottichal
	<i>Cuminum cyminum</i>	Umbelliferae	seed	Marottichal
	<i>Pedaliium murex</i>	Pedaliaceae	leaf	Vazhachal
	<i>Rotula aquatica</i>	Boraginaceae	root	Vazhachal
	<i>Saccharum officinarum</i>	Poaceae	sugar	Sholayar
	<i>Tectona grandis</i>	Verbenaceae	roots	Sholayar
	<i>Tribulus terrestris</i>	Zygophyllaceae	seeds	Sholayar
Venereal diseases	<i>Azadirachta indica</i>	Meliaceae	leaves	Vazhachal
	<i>Cuminum cyminum</i>	Umbelliferae	seed	Sholayar
	<i>Cynodon dactylon</i>	Poaceae	root	Vazhachal
	<i>Grewia tiliaefolia</i>	Tiliaceae	leaf	Vazhani
	<i>Lawsonia inermis</i>	Lythraceae	leaf	Chimminy
	<i>Pedaliium murex</i>	Pedaliaceae	leaf	Sholayar
	<i>Sesamum indicum</i>	Pedaliaceae	flower	Vazhachal
	<i>Sida cordifolia</i>	Malvaceae	root	Chimminy
	<i>Solanum indicum</i>	Solanaceae	flower	Marottichal
<i>Tribulus terrestris</i>	Zygophyllaceae	seeds	Sholayar	
Whitlow	<i>Euphorbia antiquorum</i>	Euphorbiaceae	stem	Chimminy, Vazhani

bone fracture, chicken pox, alopecia, inflammation of the breast, leucoderma, paralysis, etc.

Occurrence of the diseases was more or less uniform in different localities. Different plant parts were used by the tribe of different localities for curing the same disease.

4.1.2.2. Cattle diseases

Plants were employed for curing the ailments of cattle also. Information collected on such plants are presented in Table 10. External application was the mode of use in almost all the cases studied. The tribe of Chimminy area could not specify any cattle disease or their ethnic treatment.

4.1.3. Insect/Animal repellent plants

Tribal people of Marottichal, Sholayar and Vazhani used plants for repelling insects and animals. Four species are accredited with repellent properties (Table 11). Using Aloe barbadensis for repelling mosquitos, Glycosmis pentaphylla for honey bees and Ocimum basilicum for lice was a common practice. Laportea crenulata was used for repelling elephants in rare cases.

4.1.4. Diagnostic and prophylactic plants

It was quite interesting to observe that the tribal people developed systems for preventing and diagnosing with simple and

Table 10. Plants used in cattle diseases

Plant	Family	Part used	Ailment	Locality
<i>Calotropis gigantea</i>	Asclepiadaceae	Leaf	Swelling of legs	Vazhachal, Vazhani
<i>Curculigo orchioides</i>	Liliaceae	Tuber	Lacrimation	Vazhani
<i>Eclipta alba</i>	Asteraceae	Root	Swelling of ears	Vazhani
<i>Entada phaseoloides</i>	Fabaceae	Seed	Swelling of throat	Marottichal
<i>Gardenia gummifera</i>	Rubiaceae	Resin	Insect repellent	Sholayar
<i>Woodfordia fruticosa</i>	Lythraceae	Roots	Rheumatism	Sholayar

Table 11. Insect/animal repellent plants

Plant	Family	Part used	Insect/Animal	Locality
<i>Aloe barbadensis</i>	Liliaceae	Leaf	Mosquito	Sholayar
<i>Glycosmis pentaphylla</i>	Rutaceae	Leaf	Honey bees	Sholayar
<i>Laportea crenulata</i>	Utricaceae	Whole plant	Elephant	Sholayar
<i>Ocimum basilicum</i>	Lamiaceae	Leaf	Lice	Marottichal, Vazhani

very common raw drugs mostly found in wild condition in and around their habitation (Table 12). The interesting claims include a cold infusion of the wood of Allanthus excelsa as a prophylactic for malarial fever and a preparation with Allium sativum for mumps, which is given to boys only. This was a usual practice among the tribe of Vazhachal and Marottichal respectively. The tribal women of Sholayar used the leaves of Tragfia involucrata for confirming pregnancy in the early stages.

4.1.5. Form and mode of use of medicinal plants

The tribe is very particular about the plant part used in their medicine. The different parts are used either alone or in combination (Table 13). The order in which the parts are used is as follows:

Leaf > Root > Seed > Fruit > Flowers > Bark > Whole plant
Rhizome > Stem > Resin/latex > Pod/Wood > Aerial shoot.

The form of application/consumption of plants varies. The most common and repeatedly effective method of preparing the medicine was to make a decoction by boiling the fresh or dried plant part either singly or in combination. The next in order is the paste form. The quantity of material used was mostly specified. They have both internal as well as external methods of application (Table 14). It is difficult to ascribe any particular plant part, form and mode of application/consumption to any particular locality.

Table 12. Diagnostic/prophylactic plants

Plant	Family	Part used	Mode and locality of use
<i>Ailanthus excelsa</i>	Simaroubaceae	wood	Water stored overnight in a cup made of the wood is taken in the morning, daily as a prophylactic for malarial fever (Vazhachal)
<i>Allium sativum</i> in combination with <i>Ocimum sanctum</i>	Liliaceae	Bulb	Two teaspoonfuls of the juice of garlic mixed with an equal quantity of the leaf juice of <i>Ocimum sanctum</i> given to boys for 7 days as a prophylactic for mumps (Marottichal)
	Lamiaceae	Leaf	
<i>Tragia involucrata</i>	Euphorbiaceae	Leaf	The hairs on the leaf will turn to red after one hour when the leaf is immersed in urine if the women is pregnant (Sholayar)

Table 13. Form of use of medicinal plants

Form	Localities				
	Chimminy	Marottichal	Sholayar	Vazhachal	Vazhani
1	2	3	4	5	6
<u>Aerial shoot</u>	-	1	2	2	1
As such	-	-	-	-	1
Decoction	-	1	-	2	-
In some combination	-	-	2	-	-
<u>Bark</u>	5	5	5	10	6
As such	-	1	-	-	-
Decoction	1	1	1	3	2
Infusion	-	-	-	-	1
Juice	-	-	1	1	-
Paste	1	1	-	-	-
Powder	1	-	-	1	-
In some combination	2	2	3	5	3
<u>Bulb</u>	2	2	6	4	-
Decoction	1	-	-	-	-
Juice	-	1	-	2	-
In some combination	1	1	6	2	-
<u>Corm</u>	1	-	-	-	-
In some combination	1	-	-	-	-

Contd.

Table 13. Continued

1	2	3	4	5	6
<u>Flower</u>	6	10	4	6	6
As such	2	-	-	-	-
Decoction	1	1	-	-	1
Infusion	-	2	-	-	-
Juice	-	1	1	-	-
Paste	-	2	1	-	-
Powder	-	1	-	1	-
In some combination	3	4	2	5	5
<u>Fruit</u>	13	15	26	16	13
As such	2	1	3	2	1
Decoction	-	-	1	-	-
Infusion	-	-	2	1	1
Juice	1	2	1	1	-
Paste	1	1	-	2	-
Powder	1	1	2	1	1
Rind as such	-	-	-	-	1
In some combination	8	10	17	9	9
<u>Leaf</u>	27	33	42	47	32
As such	1	4	3	8	7
Decoction	1	2	3	4	1
Infusion	2	2	1	1	-

Contd.

Table 13. Continued

1	2	3	4	5	6
Juice	5	6	8	7	2
Paste	2	4	10	7	2
Powder	1	2	-	-	-
In some combination	15	13	17	20	20
<u>Oil</u>	3	5	13	6	1
As such	2	2	1	-	-
In some combination	1	3	12	6	1
<u>Resin/Latex</u>	3	3	2	4	-
As such	1	3	2	4	-
In some combination	2	-	-	-	-
<u>Rhizome</u>	6	6	13	15	2
Decoction	-	-	1	2	-
Juice	-	-	1	1	-
Paste	-	1	-	1	-
Powder	-	-	1	-	-
In some combination	6	5	10	11	2
<u>Root</u>	12	17	27	14	6
As such	-	1	5	2	-
Decoction	2	1	1	-	-

Contd.

Table 13. Continued

1	2	3	4	5	6
Infusion	1	-	-	1	-
Juice	2	1	1	1	-
Paste	3	2	7	4	1
Powder	-	-	-	1	2
In some combination	4	12	13	5	3
<u>Root tuber</u>	3	3	3	1	1
As such	-	1	-	-	-
Juice	-	-	-	1	1
Paste	-	-	2	-	-
In some combination	3	2	1	-	-
<u>Seeds</u>	6	15	16	10	7
As such	-	-	-	-	1
Decoction	-	1	-	3	1
Infusion	1	1	-	-	-
Juice	-	-	-	-	1
Paste	-	1	2	1	-
Powder	2	1	-	1	1
In some combination	3	11	14	5	3
<u>Whole plant</u>	3	6	10	6	4
As such	-	1	1	-	-

Contd.

Table 13. Continued

1	2	3	4	5	6
Decoction	-	2	3	1	1
Infusion	-	1	-	1	1
Juice	-	-	1	2	-
Paste	2	-	-	-	1
Powder	-	1	-	1	-
In some combination	1	1	5	1	1
<u>Wood</u>	2	1	8	3	1
Decoction	-	-	1	-	-
Infusion	-	-	-	1	-
Paste	1	-	1	-	-
In some combination	1	1	6	2	1

Table 14. Mode of use of medicinal plants

Mode of use	Localities				
	Vazhani	Vazhachal	Chimminy	Marottichal	Sholayar
<u>External</u>	22	42	23	30	49
<u>Internal</u>					
Plant parts as such	8	6	10	2	19
Juice	12	22	16	19	18
Powder	9	14	5	10	8
Paste	21	21	12	16	37
Smoke inhalation	1	1	-	3	2
Decoction	5	17	14	20	27
Infusion	1	7	7	8	4
Oil	3	3	1	2	6

4.1.6. Combination medicines

4.1.6.1. Other plant/plant product

For majority of the cases, it so happens that no one plant is administered singly. It is given in combination with many other plants or plant products (Table 15). This category forms nearly 20 per cent of the total uses of plants.

4.1.6.2. Animal/animal product

Animal products like butter, milk, honey, animals like chicken, crab, tadpole and animal parts like hood of a cobra were also used effectively in combination with medicinal plants or their products for various ailments (Table 16).

4.1.6.3. Inert materials

Inert materials like ash, clay and salt also formed a part of different combinations used for external application. They were used alone or in combination with plant, animal or their products (Table 17).

4.1.7. Taboos/rituals associated with collection and use of medicinal plants

Religious or magical rituals often accompany the uses of plants. Cases like taking the paste of root bark of Alstonia venenata for snake-bite and preparation of a talisman with the root of Datura stramonium are the examples (Table 8).

Table 15. Plant products used in combination medicines

Plant product	Disease/condition	Mode of use and locality
1	2	3
Charcoal	burns	Applied as ointment prepared in coconut oil (Marottichal)
	skin eruptions	A paste with turmeric is applied (Chimminy)
Coconut gratings	rheumatism	Taken along with rice gruel prepared with the cotyledone of <i>Entada phaseoloides</i> (Sholayar)
Coconut oil	ear infections	<i>Calamus rotang</i> shoots dipped in this is burnt and the oil dripping out of this is applied to the ear (Sholayar)
"	sinusitis	Turmeric piece dipped in the oil, burnt, taken in a rolled jack leaf and the smoke is inhaled (Sholayar)
"	"	Oil prepared with equal quantity of the juice of <i>Elephantopus scaber</i> and applied to the scalp (Marottichal)
"	loss of hair	Oil prepared with $\frac{1}{2}$ its volume of the leaf juice of <i>Datura stramonium</i> and applied to the scalp (Sholayar)
"	"	Oil prepared with equal quantity of the leaf juice of <i>Murraya koenigii</i> and applied to the scalp (Marottichal)
"	wounds	Oil prepared by boiling tender leaves of <i>Pandanus odoratissimus</i> is applied (Vazhachal)

Contd.

Table 15. Continued

1	2	3
Coconut oil	bleeding from nose	Tender leaves of <i>Strychnos nuxvomica</i> is fried in the oil, made into a paste and applied to the forehead (Vazhachal)
''	burns	Oil prepared by boiling with soot, crab, tadpole and tender arecanut is applied (Sholayar)
Coconut water	headache	A paste with dried ginger and breast milk applied over the forehead (Sholayar)
jaggery	honey bee/wasp sting	A paste in lime water is applied (Vazhachal)
Rice flour	diabetic abscesses	Poultice with curd is applied (Vazhachal)
''	measles	Thickly dusted over the body (Vazhani)
''	rheumatic swellings	Applied as poultice with fresh leaf paste of <i>Datura stramonium</i> (Sholayar)
Rice water	canabis poisoning	Taken warm, mixed with curd/butter (Sholayar)
''	anthelmintic	Taken mixed with the seed powder of <i>Butea monosperma</i> (Marottichal)
''	diarrhoea	Taken along with the macerated tender aerial roots of <i>Ficus religiosa</i> and butter milk (Marottichal)

Contd.

Table 15. Continued

1	2	3
Rice water	snake bite	Taken with the leaf juice/root paste of <i>Indigofera tinctoria</i> (Sholayar)
,,	menstrual disorders	Taken with the bark paste of <i>Polyalthia cerasoides</i> (Vazhachal)
Sesame oil	improving hearing	Applied with equal quantity of goats urine (Marottichal)
,,	dog bite	Applied as paste prepared with the milky juice of <i>Calotropis gigantea</i> and red chilli (Chimminy)
,,	elephantiasis	Applied as paste with the leaves of <i>Eclipta alba</i> (Sholayar)
,,	conjunctivitis	A poultice with the yellow flowers of <i>Michelia champaca</i> is applied over the eyes (Marottichal)
,,	still birth	Taken mixed with equal quantity of the leaf juice of <i>Ocimum gratissimum</i> (Sholayar)
,,	child birth	Taken along with the leaf juice of <i>Cyclea peltata</i> (Marottichal)
Sugar	conjunctivitis	A fine powder blown into the eyes (Sholayar)

Contd.

Table 15. Continued

1	2	3
Sugar	asthma	Beaten in milk with equal quantity of the dried sliced tubers of <i>Curculigo</i> <i>orchioides</i> and the mucilage formed is taken (Marottichal, Chimminy)
	urinary disorders	Taken along with <i>Tectona grandis</i> roots boiled in cow's milk (Sholayar)

Table 16. Animal/Animal products used in combination medicines

Material	Disease/condition	Mode of use and locality
1	2	3
Blood of a rooster	Cataract	Applied to the eyes as salve (Chimminy)
Breast milk	Headache	Applied locally with dry ginger (Vazhachal)
Butter	Bleeding from the nose	Applied with the fried outer shell of <i>Phyllanthus emblica</i> seeds (Vazhani)
,,	Child birth	Taken with the root paste of <i>Aerva lanata</i> (Sholayar, Vazhachal)
Butter milk	Sour mouth	Triphala powder mixed in butter milk is used as gargle (Marottichal)
,,	Pimples	Applied along with turmeric and sandal (Vazhachal)
,,	Expelling worms	Taken with leaf juice of <i>Datura</i> (Chimminy)
Chicken	Common cold	Used to prepare a soup with garlic, ginger, cumin and black pepper (Sholayar)
Cobra hood	Child birth	The hood dipped in ghee is burnt and the smoke allowed to enter the vagina to hasten child birth in complications or delay in parturition (Sholayar)
Cobweb	Cut and wounds	Applied along with leaf paste of <i>Leucas aspera</i> . (Chimminy)

Contd.

Table 16. Continued

1	2	3
Cowdung	Headache	A solution of common salt is sprinkled on a floor plastered with cowdung. An onion cut into half is rubbed on this and applied to the forehead (Sholayar)
Cow's milk	Pimples	A paste of nutmeg seed with milk applied over the face (Marottichal)
,,	Rat bite	A small quantity of quicklime mixed with a glass of raw milk taken early in the morning in empty stomach for 7 days (Sholayar)
,,	Spider sting	Taken along with the root paste of <i>Indigofera tinctoria</i> (Sholayar)
,,	Jaundice	Taken with the mucilage of <i>Curculigo orchoides</i> tuber (Marottichal, Chimminy)
,,	Abortion	Taken, stirred with a piece of the root of <i>Plumbago rosea</i> (Chimminy)
,,	Child birth	Taken along with the root paste of <i>Strychnos nux-vomica</i> (Vazhani)
,,	Venereal disease	Taken with an equal quantity of the leaf juice of <i>Lawsonia inermis</i> (Chimminy)
,,	Jaundice	Taken with the whole plant extract of <i>Phyllanthus fraternus</i> (Marottichal, Vazhani, Vazhachal)

Contd.

Table 16. Continued

1	2	3
Cow's milk	Mental disorders	Taken mixed with the root powder of <i>Rauvolfia serpentina</i> (Vazhachal)
,,	Measles	Taken with the powder of turmeric and tamarind seeds (Marottichal)
,,	Leucorrhoea	Taken with shelled tamarind seeds (Vazhani)
,,	Menorrhagia	Taken with the flower buds of <i>Hibiscus rosasinensis</i> (Chimminy, Vazhani)
,,	,,	A decoction with the bark of <i>Polyalthia ceracoides</i> is taken (Marottichal)
Cow's urine	Fainting fits	A paste with the leaves of black pepper introduced into the nose of an adult (Vazhani, Sholayar)
,,	Pimple	A paste applied with sesamum seeds (Vazhani)
,,	Elephantiasis	Taken with the powdered fruit of <i>Terminalia chebula</i> (Chimminy)
,,	Obesity	A decoction with the bark of <i>Tectona grandis</i> is taken (Vazhachal)
Crab	Cuts and wounds	Used for preparing an oil with soot, tadpole and one tender arecanut for external application (Sholayar)

Contd.

Table 16. Continued

1	2	3
Curd	Sour mouth	Taken after swallowing a paste of <i>Centella asiatica</i> with turmeric and black pepper (Marottichal)
,,	Night blindness	Applied as salve around the eyes with a paste of black pepper (Marottichal)
,,	Diabetes	Applied as a poultice with rice flour on the abscesses (Vazhachal)
,,	Jaundice	Taken with the finely powdered flowers of <i>Pongamia glabra</i> / <i>Cocos nucifera</i> (Vazhani)
,,	Jaundice	Taken with the leaf juice of pumpkin and turmeric (Chimminy)
Egg	Common cold	Taken along with lime juice and honey (Marottichal)
,,	Cough	Taken with the leaf juice of <i>Adhatoda beddomei</i> and black pepper (Vazhachal, Marottichal)
Excreta of fowl	Dog bite	A paste applied over the wound (Vazhani)
Ghee	Sour mouth	Used for roasting the ripe fruits of <i>Solanum nigrum</i> (Chimminy)
,,	Dog bite	Taken along with a root decoction of <i>Alangium salviifolium</i> (Sholayar)

Contd.

Table 16. Continued

1	2	3
Ghee	Dog bite	Taken with leaf juice of <i>Datura stramonium</i> and honey (Vazhachal)
,,	,,	Used for frying the seeds of <i>Strychnos nux-vomica</i> , the paste of which is to be mixed with milk and taken for 41 days (Vazhachal)
,,	Child birth	Used for dipping the Cobra hood before burning (Sholayar)
,,	Mental disorders	Taken with <i>Datura</i> seeds (Marottichal)
Goat's milk	Conjunctivitis	Fresh milk applied to the eyes as a preventive (Marottichal)
,,	Urinary disorders	Taken boiled with the roots of <i>Tectona grandis</i> (Sholayar)
Goat's urine	Improve hearing	Prepared an oil with equal quantity of sesamum oil and applied to the ears for 41 days (Marottichal)
Honey	Common cold	Taken along with egg and lime juice (Marottichal)
,,	Ear ache	2-3 drops of the filtered honey after immersing roasted horsegram applied to the ears (Marottichal)
,,	Sour mouth	A paste with turmeric powder is applied (Vazhachal)

Contd.

Table 16. Continued

1	2	3
Honey	Eye diseases	Mixed with a decoction of <i>Hemidesmus indicus</i> and applied (Sholayar, Vazhani)
,,	Cataract	Applied to the eye with the leaf juice of <i>Vernonia cineria</i> (Marottichal)
,,	Loss of hair	Applied to the scalp with the leaf juice of <i>Solanum xanthocarpum</i> (Sholayar)
,,	Dog bite	Taken with ghee and the leaf juice of <i>Datura stramonium</i> (Vazhachal)
,,	Burns	Applied over the portion (Vazhani, Chimminy)
,,	Cough	Taken with the powder of dried leaves of <i>Vitex negundo</i> (Vazhani)
,,	,,	Taken with the leaf juice of <i>Cynodon dactylon</i> (Vazhani)
,,	Diarrhoea	Taken with a decoction of the tubers of <i>Cyperus rotundus</i> (Chimminy)
,,	,,	Taken with the root paste of <i>Tamarindus indica</i> and powder of black pepper (Marottichal)
,,	Jaundice	Taken along with the leaf pulp of <i>Aloe barbadensis</i> and ginger (Vazhachal)

Contd.

Table 16. Continued

1	2	3
Honey	Mental disorders	Taken with the fruit juice of pumpkin (Sholayar)
,,	Menorrhagia	Taken with the bark paste of <i>Polyalthea cerasoides</i> prepared in rice water (Vazhachal)
Human urine	Chest congestion	Taken with the leaf paste of <i>Cassia tora</i> (Vazhani)
Musk	Dog bite	Taken with the leaf juice of <i>Cassia fistula</i> (Marottichal)
Pig fat	Piles	Used for boiling ripe jack fruit fingers for taking daily in the morning (Vazhani)
Tadpole	Cuts and wounds	Used for preparing an oil by boiling in coconut oil along with soot, crab and tender arecanut (Sholayar)

Table 17. Inert materials used in combination medicines

Material	Disease	Mode of use
Ash	Stings	Applied with salt water (Marottichal)
	Dog bite	Mixed with salt water and applied over wounds (Marottichal)
	Blocking of the nose	Hot ash applied to the head (Chimminy)
Clay	Stings	Applied over the body part (Vazhani)
Common salt	Bleeding from nose	Applied to nostrils with the juice of <i>Allium</i> (Vazhani)
	Dentrifice	Applied to nostrils with leaf juice of <i>Mangifera indica</i> (Vazhachal)
	Dentrifice	Used for cleaning teeth and massaging gums along with Kudampuli and Black pepper (Sholayar)
,	Head ache	Applied along with cowdung and onion (Sholayar)
,	Abortifacient	Taken with half ripe pineapple fruit (Vazhani)
Soot	Burns	Used for preparing an oil by boiling in coconut oil along with crab, tadpole and tender arecanut (Sholayar)
Quicklime	Rat bite	Taken mixed with raw cow's milk (Sholayar)
	Goitre	A paste along with the macerated leaves of <i>Datura</i> is applied over the swollen gland (Vazhachal)

The Malayan tribe also have certain taboos about medicinal plants as they believe that,

- Women should not go near to or collect sacred plants like Ocimum spp. and Alstonia venenata
- The plants for the preparation of medicines should be collected either in the morning or in the evening
- Green plants are always better than their dry forms
- Bark of plants for any medicine should be collected from the eastern side
- Violation of any taboo can make the medicine ineffective.

The above account of information reveal that the tribal community of Thrissur District has a traditionally self managed system of folk medicine and primary health care, mainly based on herbal remedies. It is needless to say that these records require clinical investigation in order to ascertain and establish the utility and efficacy in therapeutics.

4.2. Botanical description of the selected rare plants

The selected rare plants are botanically described based on the specimens collected during the survey (Fig. 31 to 35).

4.2.1. Alstonia venenata R. Br. (Apocynaceae)

Mal: 'Analivegam' (Fig. 31)

A shrub usually 1.8-2.4 m high, sometimes a small tree 6 m in height, glabrous. Leaves in whorls of 3-6, membraneous,



10-20 by 2-4.5 cm, oblong-lanceolate, very finely acuminate, base much tapered; main nerves numerous, very close, parallel, slender, uniting in an intramarginal nerve, mid rib strong, petioles 1.3-2 cm long, but obscure owing to the decurrent leaf-blade. Flowers white, inodorous, in terminal subumbellate pedunculate cymes; the flowers often racemose in the branches. Calyx 2.5 mm long; lobes 1.6 mm long, triangular - ovate, acute, ciliate. Corolla - tube 13-22 mm long, slender, swollen at the top over the stamens, mouth contracted and closed by a ring of hairs, throat hairy at and below the insertion of the stamen; lobes 8 mm long, oblong, subacute, glabrous. Disc of 2 ligulate glands alternating with the carpels. Follicles 7.5-12.5 by 0.8 cm, stalked, falcately curved, tapering at both ends, beaked, glabrous, striate. Seeds 10-13 mm long, flattened, linear-oblong, with a tuft of hairs at each end, the hairs shorter than the seed.

4.2.2. Coscinium fenestratum Colebr. (Menispermaceae)

Mal: 'Maramanjil' (Fig. 32)

A climbing shrub. Branches covered with fuscous - cinerous bark, striate, when young yellow-tomentose. Petiole 10-12 cm long, inserted not far from the base of the lamina. Lamina coriaceous, shining and smooth above, minutely tomentose beneath, rotund ovate or broadly cordate, almost truncate or emarginate at the base, at the apex suddenly linear-acuminate, sometimes irregular or bilobed at the base and sinuate, 15-25 by 12-25 cm; basal

nerves 5-7. Inflorescence supra axillary, finely tomentose, divaricating branches 2 cm long, the male heads globose, dense-flowered, 6 mm diameter; petals yellow, the outer 6-8 rotund, 1.5 mm long and broad, the inner 3 longer, spatulate, 2 mm long, 1 mm broad, patent at the apex. Synandrium 1 mm long. Carpels of female flower pilose; styles reflexed, filiform. Female fruiting peduncles 2-3 cm long; drupes 1-3, very shortly stipitate, subreniform-globose, slightly tomentose, fuscous, about 2-2.5 cm diameter; endocarp 1.3 cm long, 1.9 cm broad, long, smooth, with an obsolete dorsal line.

4.2.3. Habenaria latilabris Wall. ex Lindl. (Orchidaceae)

Mal: 'Jeevakam' (Fig. 33)

Terrestrial orchid. Stout or slender, form an elongate horizontal rather fusiform tuber. Leaves, lower 7.5-12.5 cm, about 7 nerved, upper gradually smaller. Spike 7.5-15 cm, bracts lanceolate, the upper ones ovate - lanceolate; ovary 0.5-1.0 cm, often strongly curved to one side, shortly beaked; flowers very variable in size, 0.5-1 cm broad. Sepals 3-5 nerved, green; petals yellow-green, erect, fleshy, from linear to broadly ovate. Lip yellow-green, thick, linear or lanceolate, sides reflexed; spur stout or slender, often upcurved involute or flexuous. Anther small, broad, pollinia pyriform, cardicles short, glands small, stigmatic processes larger, sub-globose; rostellum short, triangular, obtuse, capsule 1.25 cm, sessile, fusiform, shortly beaked, more or less curved or twisted.

4.2.4. Rotula aquatica Lour. (Boraginacea)

Mal: 'Kallur-vanchi' (Fig. 34)

A small much branched shrub 0.6-1.8 m high; branches virgate, with numerous short lateral arrested branchlets; young parts pubescent. Leaves 6.25 x 3.6 mm, nearly sessile, crowded or fasciculate, spatulate, usually rounded at the apex, sometimes very shortly apiculate, usually entire, more or less hairy or glabrous, rarely densely hispid; petioles very short. Flowers pink, shortly pedicellate, solitary or 2 or 3 terminating short lateral branches; bracts at the base of the pedicels lanceolate, acute. Calyx 5 mm long, more or less hairy, somewhat fleshy, divided almost to the base; segments 5, imbricate, the 3 outer slightly larger than the 2 inner, all ovate-lanceolate, acuminate, ciliate. Corolla nearly 8 mm long; lobes twice as long as the tube, oblong, rounded at the apex, spreading. Stamens exerted beyond the corolla-tube; filaments 3 mm long; ovary ovoid; style 4 mm long; stigma capitate or minutely 2-lobed. Fruit 3 mm diameter, nearly dry, subglobose, shorter than the persistent calyx, tipped with the remains of the style, orange when ripe.

4.2.5. Woodfordia fruticosa Salisb. (Lythraceae)

Mal: 'Thathiri' (Fig. 35)

A straggling leafy shrub reaching 3-6 m height; branches long, spreading; bark smooth, cinnamon-brown; peeling off in fibres, young shoots terete, often clothed with fine white pubescence.

Leaves 5.9 by 1.3-2.5 cm; opposite or subopposite, sometimes in whorls of 3, sessile, ovate-lanceolate, acute, softly velvety above, usually hoary and always nigro-punctate beneath, base rounded or cordate; main intramarginal nerve. Flowers numerous, in short 2.15 (rarely 1) flowered cymes from the axils of former, less commonly of present leaves; pedicels short, glandular-pubescent. Calyx 1.6 cm long, striate, covered with glandular dots, with a small companulate base above the included capsule; mouth oblique; teeth about 2.5 mm long, triangular, acute. Petals slightly longer than the calyx-teeth, narrowly linear, produced at the apex to a long fine point. Capsule 1 cm long, usually splitting the calyx near the base, irregularly dehiscent, seeds cuneate-obovoid, brown, smooth.

4.3. Propagation studies

Attempts were made to multiply the selected rare plants using seeds and other propagules collected during the survey. The results of this study are presented here.

4.3.1. Alstonia venenata

4.3.1.1. Cutting

Rooting behaviour of the soft wood, semi hard wood and hard wood cuttings was assessed on the 60th day under the two treatment conditions, viz., with and without leaves. Effect of retention of leaves on the rooting of cuttings is given in Table 18.

Softwood cuttings failed to root. Semi hard wood cuttings recorded maximum sprouting, compared to hard wood cuttings. Retention or removal of leaves did not have remarkable influence on the rooting of cuttings.

The effect of different concentrations of IBA (500, 1000 and 1500 ppm) on the rooting of semi hard wood cutting was also studied (Table 19). The hormone was applied in quick dip method. The cuttings treated with 1000 ppm IBA showed a higher percentage (65%) of sprouting compared to control (40%). But, on uprooting, it was observed that none of the cuttings produced roots irrespective of the fact that they were still green with the growing sprouts (Plates 11 and 12).

4.3.2. Coscinium fenestratum

4.3.2.1. Seed

Germination of seeds started 30 days after sowing and was completed in a week. Seventy per cent of the seeds germinated. The observations on germination are presented in Table 20.

4.3.2.2. Cutting

Sixty per cent of the root cuttings sprouted (Plate 13). The percentage of sprouting was only 40 in stem cuttings. Both observations were taken on 60 days after planting. None of the stem cuttings produced roots (Table 21).

Table 18. Effect of retention of leaves on sprouting of cuttings in *Alstonia venenata*

Type of cutting	Percentage of cuttings sprouted 60 days after planting	
	With leaves	Without leaves
1. Soft wood	--	--
2. Semi hard wood	45 [*] ± 3.5 ^{**}	40 [*] ± 3.9 ^{**}
3. Hard wood	5 [*] ± 0.4 ^{**}	5 [*] ± 0.4 ^{**}

Table 19. Effect of IBA on rooting of semi hard wood cuttings in *Alstonia venenata*

Treatment	Observations on 60th days after planting	
	Percentage of sprouting	No. of roots produced
500 ppm	40 [*] ± 3.8 ^{**}	-
1000 ppm	65 [*] ± 5.1 ^{**}	-
1500 ppm	35 [*] ± 2.1 ^{**}	-
Control	40 [*] ± 3.1 ^{**}	-

* Mean

** Standard Deviation

Table 20. Seed germination and seedling characters in
Coscinium fenestratum

Characters	Observations*
Days taken for germination of seeds	35 \pm 2.1 ^{***}
Percentage of seeds germinated	70 \pm 5.2 ^{***}
Average height of the seedling (cm)	10.68 \pm 1.32 ^{***}
Average girth of the seedling (cm)	1.30 \pm 0.25 ^{***}
Number of leaves produced	4 \pm 0.20 ^{***}
Average length of roots (cm)	5.68 \pm 0.46 ^{***}

* Morphological observations taken after 60 days of sowing

^{***} Mean

^{***} Standard Deviation

4.3.3. Habenaria latilabris

4.3.3.1. Pseudobulbs

The pseudobulbs (Plate 14) remained dormant under the soil for six months and then sprouted into a whole plant (Plate 15). Different media were tried and potting mixture in the ratio of 2:1:1, sand, soil and powdered cowdung was identified as the best for this plant (Table 22).

4.3.4. Rotula aquatica

4.3.4.1. Cuttings (Plate 16)

Rooting behaviour of the three types of stem cuttings viz., cuttings from the basal, middle and tip portion of the shoot are presented in Table 23. Percentage of sprouting was maximum on the cuttings from the basal portion, followed by the middle part. Cuttings from the proximal end did not sprout or strike roots.

4.3.5. Woodfordia fruticosa

4.3.5.1. Seed

Observation on the germination of seeds (Plate 17) and seedling characters of Woodfordia fruticosa are presented in Table 24. Seeds germinated seven days after sowing.

4.3.5.2. Cutting

Stem cuttings of the plant failed to sprout.

Table 21. Effect of type of cuttings on rooting in Coscinium fenestratum

Observations taken 60 days after planting	Type of cutting	
	Stem	Root
Percentage of sprouting	40 ± 2.5**	60 ± 5.2**
Average number of roots produced	--	4.2 ± 0.36**

Table 22. Effect of media on the sprouting of pseudobulbs in Habenaria latilabris

Media	Percentage of sprouting	Days taken for sprouting
Charcoal	--	--
Bricks	--	--
Charcoal + bricks (1:1)	--	--
Charcoal + bricks + gravel jelly (1:1:1)	--	--
Potting mixture of sand + soil + cowdung (2:1:1)	80 ± 6.2**	195 ± 18.5**

* Mean

** Standard Deviation

Table 23. Rooting behaviour of stem cuttings of Rotula aquatica

Observations	Type of cutting		
	Basal	Middle	Proximal
Percentage of sprouting	$80^{\bar{x}} \pm 6.5^{**}$	$70^{\bar{x}} \pm 0.6^{**}$	-
Average number of roots	$4^{\bar{x}} \pm 0.3^{**}$	$5^{\bar{x}} \pm 0.4^{**}$	-

Table 24. Seed germination and seedling characters in Woodfordia fruticosa

Sl.No.	Characters	Observations recorded*
1	Days taken for germination	$7.0^{\bar{x}} \pm 0.6^{**}$
2	Percentage of seeds germinated	$50.0^{\bar{x}} \pm 4.2^{**}$
3	Average seedling height (cm)	$9.8^{\bar{x}} \pm 0.7^{**}$
4	Average girth (cm)	$1.4^{\bar{x}} \pm 0.2^{**}$
5	Leaf number	$5.0^{\bar{x}} \pm 0.3^{**}$
6	Average length of root (cm)	$5.1^{\bar{x}} \pm 0.4^{**}$

* Morphological observations were taken 60 days after sowing

\bar{x} Mean

** Standard Deviation

4.4. Antimicrobial activity of plant extracts

The antibacterial and antifungal properties of ether and alcoholic extracts from ten medicinal plants were tested in vitro and the observations are presented in Table 25 and 26 respectively.

Similarly the antimicrobial activity of essential oil extracted from four plants was also tested and the results have been furnished in Tables 27 and 28.

Either ether extract or alcoholic extract of the ten plants tested failed to exhibit the antimicrobial activity.

It was found that the essential oil of Syzygium aromaticum, Alstonia venenata, Coscinium fenestratum and Cinnamomum viram showed varying degrees of antimicrobial properties.

Out of the four essential oils tested, clove leaf oil was found to be active against all the Gram negative and Gram positive bacteria tested (Table 27). The fungi tested were also inhibited with relatively wider zones of inhibition. The highest zone of inhibition was for I. cutaneum (32 mm) (Table 28).

Essential oil obtained from Alstonia venenata showed only antibacterial property but not antifungal. It was found to be inhibitory to two Gram negative and one Gram positive bacteria.

Essential oil obtained from Coscinium fenestratum showed cent per cent sensitivity to the bacteria and fungi tested. The

Table 25. Antimicrobial screening of plant extracts against pathogenic bacteria

Plant	Bacterial organism						
	<i>S. typhimurium</i>	<i>S. pullorum</i>	<i>E. coli</i>	<i>B. anthracis</i>	<i>S. agalactiae</i>	<i>S. pyogenes</i>	<i>S. aureus</i>
1	2	3	4	5	6	7	8
1. <i>Melia dubia</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
2. <i>Pterocarpus marsupium</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
3. <i>Wrightia tinctoria</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
4. <i>Aristolochia indica</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
5. <i>Gmelina arborea</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R

Contd.

Table 25.. Continued

1	2	3	4	5	6	7	8
6. <i>Alstonia venenata</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
7. <i>Coscinium fenestratum</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
8. <i>Holoptelia integrifolia</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
9. <i>Macaranga peltata</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R
10. <i>Cynodon dactylon</i>							
EE	R	R	R	R	R	R	R
AE	R	R	R	R	R	R	R

AE - Alcoholic extract, EE - Ether extract, R - Resistant

Table 26. Antimicrobial screening of plant extracts against pathogenic fungi

Plants	Fungal organism		
	<i>C. guillermondi</i>	<i>T. cutaneum</i>	
1. <i>Melia dubia</i>	EE	R	R
	AE	R	R
2. <i>Pterocarpus marsupium</i>	EE	R	R
	AE	R	R
3. <i>Wrightia tinctoria</i>	EE	R	R
	AE	R	R
4. <i>Aristolochia indica</i>	EE	R	R
	AE	R	R
5. <i>Gmelina arborea</i>	EE	R	R
	AE	R	R
6. <i>Alstonia venenata</i>	EE	R	R
	AE	R	R
7. <i>Coscinium fenestratum</i>	EE	R	R
	AE	R	R
8. <i>Holoptelia integrifolia</i>	EE	R	R
	AE	R	R
9. <i>Macaranga peltata</i>	EE	R	R
	AE	R	R
10. <i>Cynodon dactylon</i>	EE	R	R
	AE	R	R

AE - Alcoholic extract, EE - Ether extract, R - Resistant

Table 27. Antimicrobial screening of essential oils against pathogenic bacteria .

Plant	Bacterial organism						
	<i>S. typhimurium</i>	<i>S. pullorum</i>	<i>E. coli</i>	<i>B. anthracis</i>	<i>S. agalactiae</i>	<i>S. pyogenes</i>	<i>S. aureus</i>
1. <i>Syzygium aromaticum</i>	S (18)	S (19)	S (17)	S (20)	S (18)	S (18)	S (16)
2. <i>Alstonia venenata</i>	R	S (15)	S (12)	R	R	R	S (16)
3. <i>Coscinium fenestratum</i>	S (14)	S (15)	S (14)	S (20)	S (16)	S (19)	S (28)
4. <i>Cinnamomum verum</i>	R	R	S (15)	R	R	R	S (16)

S - Sensitive

R - Resistant

Figures in parenthesis indicate diameter of zone of inhibition in mm

Table 28. Antimicrobial screening of essential oils against pathogenic fungi

Plant	Fungal organism	
	<i>C. guillermondi</i>	<i>T. cutaneum</i>
1. <i>Syzygium aromaticum</i>	S (26)	S (32)
2. <i>Alstonia venenata</i>	R	R
3. <i>Coscinium fenestratum</i>	S (16)	S (18)
4. <i>Cinnamomum verum</i>	S (22)	S (28)

S - Sensitive

R - Resistant.

Figures in parenthesis indicate diameter of zone of inhibition in mm

highest zone of inhibition was for S. aureus (28 mm) and the lowest was for E. coli (14 mm).

Cinnamon leaf oil was found to possess cent per cent antifungal property in this study while it was found to be inhibitory to only two bacteria, E. coli and S. aureus.

The antibiogram of the bacteria tested against the commonly employed standard antimicrobial agents is given in Table 29.

The result of antifungal activity of the two common fungicidal agents, clotrimazole and Miconazole is furnished in Table 30.

The antibacterial activity of the four essential oils as compared to that of standard antibiotics can be seen from Table 31.

Clove leaf oil was found to be uniformly inhibitory to all test bacteria. In comparison with Ampicillin, clove leaf oil is superior as far as Gram negative bacteria are concerned; but a little less inhibitory to Gram positive organism. S. pullorum and B. anthracis resistant to chloramphenicol were inhibited by this oil. Except in the case of S. aureus, clove leaf oil showed more inhibitory zone compared to Erythromycin. Gentamycin could produce more inhibitory zones only for S. aureus where as clove leaf oil produced equal or wider zones of inhibition for the other organisms tested. Out of the seven organisms tested, Nitrofurantoin could produce more zones of inhibitions for two Gram negative

Table 29. Antimicrobial activity of standard antibiotics against pathogenic bacteria

Standard Antimicrobial agents	Bacterial organism						
	<i>S. typhimurium</i>	<i>S. pullorum</i>	<i>E. coli</i>	<i>B. anthracis</i>	<i>S. agalactiae</i>	<i>S. pyogenes</i>	<i>S. aureus</i>
1. Ampicillin	R (0)	R (8)	R (8)	S (29)	S (22)	S (24)	S (30)
2. Chloramphenicol	S (18)	R (9)	S (19)	R (0)	S (21)	S (30)	S (29)
3. Erythromycin	R (9)	R (0)	R (0)	R (0)	R (8)	R (0)	S (24)
4. Gentamycin	S (17)	S (15)	S (18)	S (17)	S (16)	S (15)	S (19)
5. Nitrofurantoin	S (21)	S (17)	S (19)	R (0)	S (20)	S (18)	S (21)
6. Penicillin	R (0)	R (0)	S (21)	S (21)	R (0)	S (28)	R (0)
7. Streptomycin	R (8)	R (0)	R (8)	R (0)	R (0)	R (9)	R (0)
8. Tetracycline	S (22)	R (0)	S (19)	S (19)	R (0)	R (12)	R (0)

S - Sensitive

R - Resistant

Figures in parenthesis indicate diameter of zone of inhibition in mm

Table 30. Antimicrobial activity of standard antifungal agents against pathogenic fungi

Standard Antifungal agents	Fungal organism	
	<i>G. guilliermondi</i>	<i>T. cutaneum</i>
1. Clotrimazole	S (22)	S (17)
2. Miconazole	S (18)	S (19)

S - Sensitive

Figures in parenthesis indicate diameter of zone of inhibition in mm

Table 31. Comparative antimicrobial activity of the essential oils and standard antimicrobial agents against pathogenic bacteria

	Bacterial organisms						
	<i>S. typhimurium</i>	<i>S. pullorum</i>	<i>E. coli</i>	<i>B. anthracis</i>	<i>S. agalactiae</i>	<i>S. pyogenes</i>	<i>S. aureus</i>
Standard Antimicrobial agents							
1. Ampicillin	R (0)	R (8)	R (8)	S (29)	S (22)	S (24)	S (30)
2. Chloramphenicol	S (18)	R (9)	S (19)	R (0)	S (21)	S (30)	S (29)
3. Erythromycin	R (9)	R (0)	R (0)	R (0)	R (8)	R (0)	S (24)
4. Gentamycin	S (17)	S (15)	S (18)	S (17)	S (16)	S (15)	S (19)
5. Nitrofurantoin	S (21)	S (17)	S (19)	R (0)	S (20)	S (18)	S (21)
6. Penicillin	R (0)	R (0)	S (21)	S (21)	R (0)	S (28)	R (0)
7. Streptomycin	R (8)	R (0)	R (8)	R (0)	R (0)	R (9)	R (0)
8. Tetracycline	S (22)	R (0)	S (19)	S (19)	R (0)	R (12)	R (0)
Essential oil from plant							
1. <i>Syzygium aromaticum</i>	S (18)	S (19)	S (17)	S (20)	S (18)	S (18)	S (16)
2. <i>Alstonia venenata</i>	R (0)	S (15)	S (12)	R (0)	R (0)	R (0)	S (16)
3. <i>Coscinium fenestratum</i>	S (14)	S (15)	S (14)	S (20)	S (16)	S (19)	S (28)
4. <i>Cinnamomum verum</i>	R (0)	R (0)	S (15)	R (0)	R (0)	R (0)	S (16)

S - Sensitive

R - Resistant

Figures in parenthesis indicate diameter of zone of inhibition in mm

and two Gram positive bacteria, where as clove leaf oil was more inhibitory to the other three. In comparison to Penicillin, this essential oil could produce more zones of inhibition for four microorganisms. Clove leaf oil was found to be a more efficient antimicrobial agent than Streptomycin and compared to Tetracycline, more inhibitory for four organisms.

Essential oil obtained from Alstonia venenata was inhibitory only to S. pullorum, E. coli and S. aureus. This oil produced more diameter of zones of inhibition compared to Ampicillin, Chloramphenicol, Erythromycin, Penicillin, Streptomycin and Tetracycline in the case of S. pullorum. It showed equal sensitivity pattern with Gentamycin but produced less zone of inhibition compared to Nitrofurantoin. As far as the antimicrobial activity of E. coli is concerned, it could produce more zones of inhibition compared to Ampicillin, Erythromycin and Streptomycin. This essential oil was more inhibitory to S. aureus compared to Penicillin, Streptomycin and Tetracycline.

Oil extracted from Coscinium fenestratum showed antibacterial properties to all the organisms tested in this study. It could produce more zones of inhibition for S. typhimurium compared to Ampicillin, Erythromycin, Penicillin and Streptomycin. This essential oil showed equal or more antimicrobial properties to S. pullorum compared to all the standard antibiotics except nitrofurantoin. It showed superior antimicrobial properties to E. coli

compared to the action of Ampicillin, Erythromycin and Streptomycin. As far as the action of this oil against B. anthracis is concerned, it could produce greater zone of inhibition than all the antibiotics except Ampicillin and Penicillin. Better zone was produced for S. agalactiae compared to Erythromycin, Penicillin, Streptomycin and Tetracycline. It could produce greater antimicrobial properties to S. pyogenes compared to Erythromycin, Gentamycin, Nitrofurantoin, Streptomycin and Tetracycline. In comparison to the action of Erythromycin, Gentamycin, Nitrofurantoin, Penicillin, Streptomycin and Tetracycline this essential oil yielded more zones of inhibition for S. aureus.

Cinnamon leaf oil showed antibacterial activity against E. coli and S. aureus. In comparison to standard antibiotics, this essential oil showed more zones of inhibition to E. coli compared to Ampicillin, Erythromycin and Streptomycin. Similarly, it was found to possess more antibacterial activity to S. aureus compared to penicillin, Streptomycin and Tetracycline.

The antifungal activity of the four essential oils as compared to that of standard antifungal agents - clotrimazole and Miconazole are presented in Table 32.

Clove oil showed relatively wider zones of inhibitions for fungi compared to the two broad spectrum antifungal agents tested. The diameter of the zones of inhibition produced by this oil were

Table 32. Comparative antimicrobial activity of the essential oils and standard antifungal agents against pathogenic fungi

	Fungal organism	
	<i>C. guillermondi</i>	<i>T. cutaneum</i>
Standard antifungal agents		
1. Clotrimazole	S (22)	S (17)
2. Miconazole	S (18)	S (19)
Essential oil from plants		
1. <i>Syzygium aromaticum</i>	S (26)	S (32)
2. <i>Alstonia venenata</i>	R	R
3. <i>Coscinium fenestratum</i>	S (16)	S (18)
4. <i>Cinnamomum verum</i>	S (22)	S (28)

S - Sensitive

R - Resistant

Figures in parenthesis indicate diameter of zone of inhibition in mm

26 mm and 32 mm respectively for C. guillermondi and T. cutaneum. The corresponding values for Clotrimazole and Miconazole were 22 mm and 18 mm against C. guillermondi and 17 mm and 19 mm against T. cutaneum.

The essential oil extracted from Alstonia venenata on testing was devoid of the ability to inhibit the growth of the fungal agents tested.

The essential oil of Coscinium fenestratum was effective against the two fungi but the zones of inhibition produced was less than the zones of inhibition produced by the standard antifungal drugs used in the present study.

As far as the antifungal property of the essential oil of Cinnamomum verum is concerned, it could produce more zones of inhibition compared to Miconazole and equal effect to Clotrimazole against C. guillermondi and more diameter of zone of inhibition to T. cutaneum compared to both the standard antifungal agents.

Discussion

DISCUSSION

The results of the investigations on ethnobotany of medicinal plants of Thrissur District are discussed in this chapter.

5.1. Ethnobotany of medicinal plants

The indigenous therapeutic system of India - Ayurveda - originated through the observations based on the use of herbs by the aborigines and through the experience of scientifically minded sages. Though the Allopathic system of healing is full fledged with synthetic drugs for all possible ailments, there is a revival of interest in natural plant products. After centuries of neglect on tribals and aborigines, modern man has now started approaching these people for the wealth of information available with them on plants used for curing various ailments.

The present study could throw light on 212 medicinal plants used by the Malayan tribe of Thrissur District for various ailments. Though pharmaceutically and clinically not evaluated, which was not a mandate of the present work, this will provide access in identifying new medicines to specialists in search of utilization in modern medicine. Besides, the forest flora of this area is getting depleted due to overfelling and fire hazards which may result in the loss of many of the medicinal plants before they are brought to light. Hence it is attempted to record the various medicinal plants used by the tribal folks of Thrissur District.

Major part of the tribal population in Thrissur District occupies five pockets, viz., Chimminy, Marottichal, Sholayar, Vazhachal and Vazhani, which were selected for the study. With the rapid rate of urbanisation, the traditional medicines are gradually becoming outdated. This is clearly evident from the ranking of the localities with respect to the use of plants. Tribe of Sholayar live in the remotest area, still not much exposed to the light of urbanisation. They are more attached to mother nature and depend more on her for the cure of their ailments. Another reason for this is the richness of the plants found in this locality. Admittedly, for complicated cases they depend on the Primary Health Centres. Even for those ailments for which known herbal remedies exist, they are compelled to depend on Allopathic methods, which they opined, was mainly because of the difficulty in collection of the herbs and the lack of experienced people to handle the situation.

Maximum number of plants were available at Sholayar, which was the remotest of the locations. It is 49 km east of Chalakkudy, which is the nearest town. The tribal people of this area were very co-operative and the plants mentioned by them for the various ailments were easily available around their habitats. Thirty two plant species not mentioned in any of the other localities were identified from here. These included Alstonia venenata, Caesalpinia sappan, Gymnema sylvestre, Laportea crenulata, Mesua ferrea, Pterocarpus santalinus, Thevetia nerifolia and Tribulus terrestris.

Compared to other localities, they were not reluctant in disclosing the ailments for venereal diseases and plants used as contraceptives and abortifacients. They even had a method for pregnancy testing with the leaves of Tragia involucreta. People at Sholayar had a knowledge of natural herbal medicines for almost all the diseases mentioned in the result.

Considering the availability and knowledge of medicinal plants, Vazhachal came next to Sholayar. It is 32 km east of Chalakkudy town. Fifteen plants, the uses of which were not obtained from other localities were collected from here. They included Allanthurus excelsa, Embelia ribes, Kaempferia galanga and Rauvolfia tetraphylla. Use of Allanthurus excelsa as a prophylactic for malarial fever is worth mentioning.

Vazachal and Sholayar had 11 plants commonly used by the tribes of both the localities. The uses were also the same for, Aerva lanata, Cajanus cajan and Cymbopogon flexuosus.

Next in the order of priority of availability of medicinal plants was the locality, Marottichal. It falls 18 km east of Thrissur town. Eighteen plants were observed to be exclusively used by them. Elephantopus scaber, Holoptelea integrifolia, Macaranga peltata and Wrightia tinctoria were among them. The tribe also had plant remedies for almost all the common ailments. But presently, the

tribe prefer to approach the Primary Health Centre. The plants are also not so easily available as in the other two localities. The number of people who have this information is also very few.

Tribal people of Chimmny and Vazhani were almost similar in their knowledge of medicinal plants. Chimmny is 38 km east of Thrissur town. Exclusive use of seven plants were recorded from this locality. Amorphophallus dubius, Heliotropium indicum, Ixora coccinia and Rubia cordifolia were among them. The decoction of Ixora coccinia arrests the heavy bleeding in menorrhagia immediately after administration.

Vazhani is 36 km east of Thrissur town. Among the 10 plants which found exclusive use at this locality are Abutilon indicum, Ananas comosus, Eupatorium triplinerve, Flacourtia cataphracta and Grewia tiliaefolia. The use of pineapple fruit for abortion, and the seed coat of Phyllanthus emblica to stop bleeding from the nose immediately after application are worth mentioning.

A critical analysis of the localities with respect to the use and availability of medicinal plants was made (Table 7). It was noticed that the Malayan tribe of all the five localities have the knowledge of medicinal plants for almost all the common ailments. But their depth of information varied. The tribal people of Sholayar were well informed about the use of medicinal plants. Next priority was for Vazhachal. The last three viz., Marottichal,

Chimminy and Vazhani were almost on the same level. This clearly indicate that the knowledge of ethnomedicine is still prevalent in the remote areas and is getting vanished as urbanisation advances.

The tribe of Sholayar knew the remedies for almost all the diseases except a few like asthma, bleeding, cataract and whitlow. The locality Marottichal is a clear cut example for the depreciation of the available knowledge of ethnomedicine. They even knew the prophylactic medicine for mumps, which is a unique and important knowledge. But for many other diseases like chicken pox, leucoderma, fractures and bites of animals, presently they do not have the plant remedies. Once they would have been well versed in ethnomedicine but the knowledge might have lost due to rapid urbanisation and consequent depletion of the forest flora.

It is also interesting to note that, though belonging to the same tribe, they hesitate to disclose their knowledge to the people of other localities. It is seen that there are some medicinal plants used as unique remedies for certain diseases in each locality. The tribe of Sholayar knew the plants for bone fracture (Justicia gendarussa), leucoderma (Clitoria ternatea), prolapse of rectum (Mangifera indica) and for detecting pregnancy in early stages (Tragla involucrata). Remedy for chicken pox is known only to the people of Vazhani (Azadirachta indica). Treatment for cat bite (Curcuma longa, Murraya koenigii), paralysis (Cassia fistula) and

thorn pricks (Carica papaya) are available only at Vazhachal. Only the tribe of Chimminy had the remedy for alopecia (Nyctanthes arbor-tristis) and rat bite (Physalis peruviana). Information on the antilactogenic use of Jasminum pubescens was obtained only from Marottichal.

The plants used were classified according to their uses for different ailments. It was observed that they had herbal remedies for almost all the possible diseases. More than 80 such diseases were identified (Table 2).

The occurrence of the diseases was more or less uniform in different localities. This reflected upon their similarity in the way of living and food habits. It was observed that tribes of different localities used different plant parts for the same disease. To cite one example is the use of Catharanthus roseus for diarrhoea. The tribe of Vazhani use the flowers, whereas in Marottichal the tribe use the leaf. Use of Musa sp. for burns by the tribe of Sholayar and Marottichal (Table 9) is another instance. This shows that even the same tribe of different localities still retain their own tradition so far as their treatments are concerned.

Maximum number of plants were used for eye diseases. Night blindness is a common disorder among children, clearly indicating the imbalanced nutrition. Though starchy tubers are

included in their food, leafy or other vegetables are not commonly used. Leaves rich in Vitamin A, like that of Holostemma ada-kodien, Moringa oleifera and Sesbania grandiflora are used for the treatment of night blindness. Conjunctivitis is another major eye disorder for which a number of remedies like the application of decoction of the seeds of Coriandrum sativum, leaf juice of Emilia sonchifolia, flower juice of Tabernaemontana coronaria, leaf juice of Vernonia cinerea are suggested. These plants were also identified for eye diseases in Ayurvedic literature (Nadkarni, 1954).

Diarrhoea and dysentery are common among the tribal people. They appear to be transferred through water which is normally polluted. Sometimes due to scarcity of water, they are compelled to use non potable water also for their routine work. Twenty one plants were suggested as remedy for this disease. Out of this, Holarrhena antidysenterica finds its use in many combinations. Clinical studies also recorded the efficacy of this drug in intestinal amoebiasis (Singh, 1986). Seventy percent good response was observed in Entamoeba histolitica cyst passers when treated with this drug. Bhils of Madhya Pradesh also use this plant against diarrhoea and dysentery (Maheshwari et al., 1986). It appears that this well known traditional antidiarrhoeal plant will prove to be a very economic drug. Tribes of Vazhachal use the leaves of Murraya paniculata for this disease. Another species belonging to this genus, Murraya koenigii, showed antibacterial effects against

Entamoeba histolitica on biological screening (Bhakuni et al., 1969). This plant is used against diarrhoea/dysentery by the tribes of Madhya Pradesh (Sahu et al., 1983). They also use the plant Flacourtia indica for this purpose, thus supporting the use of Flacourtia cataphracta by the tribe of Vazhani.

Helminthiasis poses great threat to the proper growth and development of children. This is probably due to poor practices of hygiene. Children, as they are vulnerable to all types of infections, easily succumb to it due to environmental conditions and inadequate parental attention. But they are aware of the natural anthelmintics. Fourteen plants were identified for this purpose. Among them, Azadirachta indica, Centratherum anthelminticum and Embelia ribes are the common home remedies of Kerala. Clinically, neem leaves were found to be effective against human ascariasis (Singh et al., 1989). Shah and Kapoor (1974) have proved the anthelmintic property of Embelia ribes.

As the tribes live in jungle environment, they are exposed to many poisonous insects and animals. They are also familiar with the antidotes. In this study, 36 plants of this category have been brought to light. They include plants for cat-bite, dog-bite, snake-bite and stings of centipedes and poisonous insects. Among them, Alstonia venenata is considered to be very effective against viper poison. They treat the plant as very sacred and believe that snakes going near to the tree on full moon days will not survive.

Alangium salviifolium is a plant used by the tribe as an antidote for dog-bite. The anti-poisonous effect of the plant is already known (Nair et al., 1986). The root bark of this plant has been identified as an antidote for poisonous bites including snake bite in Ayurvedic literature (Nadkarni, 1954). The root paste of Aristolochia indica is used against snake bite by the tribe of Chimminy and Vazhani regions. Tribal people of Kamrup, Assam, also use the plant for the same purpose (Deka et al., 1983). In Bihar, the aborigines keep the roots of Aristolochia indica in the house to ward off snakes (Chandra et al., 1985).

The tribe have a good knowledge of plants connected with abortion and contraception. The informants were very reluctant to divulge the knowledge. Despite this, some of them yielded to reveal the information. The list includes 11 abortifacient and four contraceptive plants. The properties of many of these plants have already been proven clinically.

Seeds of Abrus precatorius are used for contraception by the tribal women of Sholayar. The antifertility action of this has been confirmed biologically (Prakash and Mathur, 1976). The fruit of Ananas comosus is used by tribal women of Vazhani and those at Sholayar used Carica papaya. Steroids isolated from the unripe fruit and juice of Ananas Comosus were reported to exert abortifacient effect in mice (Prakashi and Basak, 1976). Clinical studies also confirmed the abortifacient activity of unripe fruit of Carica

papaya in rats (Gopalakrishnan and Setty, 1978). The effect of Plumbago rosea, used in Chimminy and Sholayar, is also proved scientifically. According to Gaitonde and Mahajan (1980), plumbagin (2-methyl-5-hydroxy, 1, 4-naphthhaquinone), isolated from Plumbago zeylanica, showed significant anti-implantation, anti-ovulatory and abortifacient activity, without any teratogenic effect in rats.

Antifertility, abortifacient and fertility promoting drugs have been reported from other tribes also. The antifertility activity of Abrus precatorius and Datura metel and the abortifacient activity of Lawsonia inermis and Plumbago rosea have been reported by Hemadri and Rao (1983) from Dandakaranya.

Tribal women of Vazhani use a decoction of the whole plant of Mimosa pudica to stop bleeding in menorrhagia. Haemostatic use of this plant due to its action on small blood vessels has been reported by Vaidya and Shetti (1985). The medicinal properties of this plant for excessive uterine bleeding has also been clinically proven (Guvanti et al., 1986).

Lactogenic and anti-lactogenic plants too were reported by the tribe. They use the bark of Alstonia scholaris and leaves of Erythrina variegata for this purpose. Erythrina variegata is successfully used by the common people of this locality as a galactagogue. Bandaging the breasts with jasmine flowers to suppress lactation is also a common practice. Studies conducted on lactating

mice confirmed this usage (Abraham et al., 1979). The results of the study showed that contact with Jasminum pubescens flowers led to suppression of milk production with involution of the mammary gland. Even exposure to the smell of these flowers indicated similar changes although to a lesser degree.

Though not a common disorder among them, the tribe gave information of plants used for diabetes also. Nine plants were said to possess hypoglycemic activity. Leaves of Aegle marmelos and inner bark of Azadirachta indica were effectively used by the people of Sholayar and Vazhachal, respectively. Vyas et al. (1979) have reported the hypoglycemic activity of Aegle marmelos. They could observe a rise in plasma insulin with a simultaneous fall in blood sugar in patients of diabetes mellitus, treated with the leaves. Murthy et al. (1975) reported the hypoglycemic as well as anti-hyperglycemic effects of Azadirachta indica on dogs with adrenalin - induced and glucose - induced hyperglycemia.

Phyllanthus fraternus is widely used by the tribe for jaundice. Abraham et al. (1986) reported this plant to be very effective in the treatment of infective hepatitis in children. Thyagarajan et al. (1982) also observed that Phyllanthus fraternus inactivated hepatitis surface B antigen in vitro. Umarani et al. (1985) tried this plant for its effectiveness in ethanol induced fatty livers, developed in rats. They used the powder of the

whole plant dried in shade. It was observed that the increased deposition of triglyceride, cholesterol and phospholipid found in the liver, brain, kidney and heart due to ethanol administration were brought back to the normal values on the administration of the herbal powder. Another plant used for jaundice by the tribe of Vazhachal is Boerhaavia diffusa. The use of this plant for liver disorders has been mentioned by Deka et al. (1983).

Tylophora asthamatica, the leaves of which is used by the tribe of Marottichal as a cure for asthma, has been studied extensively for its effect in bronchial asthma, since the initial reports of Shivpuri et al. (1986). Alcoholic extract and total alkaloid of this plant showed non-specific anti-spasmodic action on isolated tissues (Dhananjayan et al., 1975). Aqueous extract of Tylophora indica prevented albumin - induced anaphylaxis in guinea pigs. The broncho-dilator, membrane - stabilizing and immunosuppressive effects of the plant were confirmed in rat lung perfusion experiments (Nagampalli and Seth, 1979). Equivocal results were obtained by Gupta et al. (1979) and Gore et al. (1980).

The tribe of Marottichal prepares a preserve with the fruits of Terminalia bellirica as a remedy for cough. Tribes of Srikakulam District of Andhra Pradesh use this plant for bronchitis (Rao and Sreeramalu, 1985).

Turmeric powder forms an ingredient in many of the preparations for boils in the mouth. The report of Sinha et al. (1975) on the anti-ulcer action of curcumin supports this usage.

Tribal people of Vazhachal apply Leucas aspera over areas of scorpion sting and rheumatic swellings. Studies conducted by Reddy et al. (1986) with the aqueous and alcoholic extracts of the plant on inflammation, showed significant anti-inflammatory effects in both acute and chronic models of inflammation. The action is comparable with that of phenylbutazone.

Flower paste of Mesua ferrea is applied over bleeding piles. The relief might be due to the analgesic and anti-inflammatory properties of the flowers of this plant as reported by Gopalakrishnan et al. (1980). Tribal people of Dhandakaranya also use this plant for bleeding piles (Deka et al., 1983).

Human urge to live long suggested using drugs of longevity. The tribe suggested some plants for this purpose also. Four such plants were identified from Sholayar and Vazhachal areas. They were Habenaria latilabris, Terminalia chebula, Withania somnifera and Zingiber officinale. Clinical studies also support the efficacy of some of these plants. Withania somnifera root powder administered in milk for one year showed significant improvement in several parameters in human volunteers aged 50-59 years as compared to placebo (Kuppurajan et al., 1980). Children of 8-12 years old

also showed increase in body weight, total proteins and mean corpuscular haemoglobin concentration (Venketaraghavan et al., 1980).

The root powder of Rauvolfia serpentina mixed with milk is taken for mental disorders. Clinical studies proved its effect on various types of schizophrenia, comparable with chlorpromazine (Mahal et al., 1976). The use of the roots as a sedative for insanity has also been reported by Rao and Sreeramalu (1985). Ancient ayurvedic literature also shows the use of this drug in cases of high blood pressure, insanity and schizophrenia (Nadkarni, 1954).

Root paste of Plumbago zeylanica along with the leaves of Eclipta alba is used for local application in leucoderma by the tribe of Sholayar. Use of the plant for skin diseases and leprosy has been reported by Rao and Sreeramalu (1985).

Recitation of mantras while collection or application of certain drugs is an inevitable practice among the tribes. The ceremony includes the beating of drums and enchanting mantras while the preparation and application of a paste of the root bark of Alstonia venenata for snake bite. Though this might be commented as an 'outdated custom' or more simply a 'taboo', analysing in the light of the reports of Karnick (1983), it is highly scientific. He had experimentally proved that sound waves in the form of

mantras activate the static electrical points within the plants and which in their turn sets into motion certain electric ionic discharges which effects the nerve centres of the human brain. The chanting of mantras while collecting the roots of Datur-
stramonium for preparing a talisman, the presence of which is believed to prevent conception can also be explained by the same theory.

By attaching certain taboos and religious faith, it is possible to prevent cutting and removing the vegetation. Taboos on collection of medicinal plants at particular period and from a particular side of the tree, etc. can be attributed to this. Manilal (1989) also opined that various religious beliefs, superstitions and folklore are mainly aimed at preventing wanton destruction of plants.

While surveying the different tribal localities of Thrissur district, it was observed that the knowledge and availability of medicinal plants are more in the remote area, clearly indicating the deterioration of ethno-medicine by the advances in urbanisation. It was also alarming to note that only a few people, especially the older ones possess the knowledge. They are either reluctant to pass on the information to their coming generation or the successive generation is ignorant about such things. Though belonging to the same tribe, the people of different localities kept their knowledge secretive. The reluctance in sharing the knowledge even

with the people of their own brotherhood shows their secretive attitude. But this was mainly because of the taboo that revealing the effects of certain plants would lead to the destruction of that effect.

The tribal people have a self sustainable system of medicine. They have drugs for many a human disease. While introducing the Allopathic system of medicine and establishing Primary Health Centres in every nook and corner, attempts could also have been made to strengthen the system of ethnic medicine. They must be made aware of the importance of the system and the need for preserving this for the coming generation. This could be done as a part of the programmes for tribal development. Study classes and constant persuasions would change their attitude and make them come forward with whatever knowledge they have at present, gained from their ancestors through centuries.

There is no doubt about the achievement of modern medicine during the last 100 years. There is also no doubt that a great number of medicinal problems remain to be solved, many of which require a systematic and scientific approach. Through clinical and pharmacological studies, the basic information collected from the tribe could also contribute towards this. Comprehensive and systematic surveys and documentation are required in other unexploited areas also for gathering such valuable information before they are lost.

5.2. Propagation of the selected rare plants

Attempts to propagate the five rare plants, viz., Alstonia venenata, Coscinium fenestratum, Habenaria latilabris, Rotula aquatica and Woodfordia fruticosa using different propagules were made, the results of which are discussed below.

In Alstonia venenata, the semi hardwood and hardwood cuttings produced sprouts. But none of them not even formed the callus. This could be due to the slow mobilization of reserve food materials, especially starch and sugars necessary for the initiation and development of roots as in the case of Populus nigra (Nanda and Anand, 1970).

Though 70 per cent of the seeds of Coscinium fenestratum germinated, the rate of survival of the seedlings was very poor. They, being very delicate, might have possibly failed to withstand the fluctuations in environmental conditions. The plant naturally produces root suckers, hence the success with root cuttings is not surprising. Propagation by root cuttings is very simple, but the size of the cutting is to be standardised. Since the root also forms an economic part and they are also being collected, the procedure is not that laborious.

Habenaria latilabris is a terrestrial orchid and hence it preferred the common potting mixture containing sand, soil and

cowdung. Though the characters of a good rooting medium are almost the same, the requirements vary with species (Zimmerman, 1980).

In Rotula aquatica, the cuttings from the basal portion of the shoot only produced sprouts and roots. The high carbohydrate content in the basal portion, compared to tops might have stimulated the process of rooting. It has already been noticed that in certain plant species, carbohydrates accumulate at the base of the shoots and root initials will form at the base, possibly under the influence of root promoting substances from buds and leaves. In such species, the basal portions of shoots form the best cuttings (Hartman and Kester, 1983).

Seeds of Woodfordia fruticosa are very small and the seed coat is very thin. They germinated within seven days. The controlling mechanism of germination lies within the seed coat which allows water to enter the seed but restricts the movement of gases (Hartman and Kester, 1983). The cuttings failed to root. This might be due to the occurrence of some natural rooting inhibitors as found in grapes (Spiegel, 1954) and in pear (Hansen, 1976).

Though these preliminary observations will help to point out the most common and easy method of propagation, further detailed investigation will be necessary before we could arrive

at a conclusion on the possibility of exploiting the large scale multiplication of the above species commercially.

5.3. Antimicrobial activity of plant extracts

The antibacterial and antifungal properties of the ether and alcoholic extracts of 10 medicinal plants and essential oils of four plants were assayed by disc diffusion method described by Bauer et al. (1966).

In the present study, none of the ether or alcoholic extract revealed any antimicrobial properties eventhough there are many reports regarding the antimicrobial properties of the ethanolic extracts obtained from the medicinal plants like the root of Glycyrrhiza glabra var. typica (Mitscher et al., 1980).

Essential oils extracted from Syzygium aromaticum, Alstonia venenata, Coscinium fenestratum and Cinnamomum verum exhibited broad spectrum in vitro inhibitory activity against Gram positive and Gram negative organisms. Because of the ability of medicinal plants and their products to inhibit the growth of pathogenic microorganisms, they have been used in the treatment of infectious diseases (Ikram and Inamul Haq, 1984). In this study also, all the organisms were isolated from animals and human beings suffering from different pathological conditions.

Out of the above four essential oils, clove leaf oil was found to be active against all the Gram positive and Gram negative bacteria. The fungi tested were also inhibited and the diameter of the zone of inhibition were more than the zone of inhibition produced for bacteria. Similar antibacterial studies on essential oils obtained from Myristica fragrans and Cymbopogon nardus against selected animal pathogenic bacteria like S. aureus and S. paratyphi had been reported by Pathak et al. (1979).

It is interesting to note that clove leaf oil showed more in vitro antibacterial activity to all Gram negative bacteria compared to Ampicillin and Streptomycin. On comparison to Erythromycin in its antibacterial effect, other than for S. aureus, clove oil could produce more diameter of zones of inhibition for the rest of the microbes. All the organisms tested were more sensitive to the effect of this essential oil compared to Streptomycin. Out of the seven organisms tested, four were found to be more amenable to clove leaf oil than tetracycline.

The results accrued out of the present study points to the possibility of employing clove leaf oil as a drug more efficient than the commonly available antibiotics to combat bacterial infection.

Besides being antibacterial, clove leaf oil is antifungal too. Both the fungi tested in this study were suppressed to a

great extent as revealed by the wider zones of inhibition. The zone of inhibition produced for C. guillermondi and T. cutaneum were 26 mm and 32 mm respectively. The antifungal activity of essential oils of Ocimum americanum (Jain et al., 1980) and Citrus aurantifolia, Murraya koenigii and Feronia limonia (Gupta and Singh, 1982) has been reported.

The essential oil obtained from Alstonia venenata was able to suppress the growth of pathogenic Gram negative organisms like S. pullorum, E. coli and Gram positive organisms such as S. aureus. Emeruwa (1982) has reported the inhibition of S. aureus and E. coli by the extracts of ripe and unripe fruits of Carica papaya. Comparative efficacy of this oil to standard antimicrobial agents revealed that this oil was more powerful than Ampicillin, Chloramphenicol, Erythromycin, Penicillin, Streptomycin and Tetracycline to inhibit S. pullorum. It was found to be more effective in suppressing the growth of E. coli, compared to Ampicillin, Erythromycin, Streptomycin and Tetracycline. Susceptibility studies indicate that in combating S. aureus infection also it was superior to Penicillin, Streptomycin and Tetracycline. But this essential oil did not possess any antifungal property as shown by the results of this study. This need not be the real picture because only two fungi were included in the present study. Whether it has got action on other classes of fungi is to be determined

for making categorical statement about its antifungal action.

The essential oil of Coscinium fenestratum showed remarkable antibacterial as well as antifungal properties to all the organisms tested. Similar antifungal properties have been reported by Joarder and Khatum (1987) while working with lemongrass oil. In vitro studies indicated that in combating S. typhimurium infection, it was found to be more effective than Ampicillin, Erythromycin, Penicillin and Streptomycin. Eventhough it has good suppressive action on S. pullorum and E. coli some antibiotics are found to be superior to this oil. In the suppression of Gram positive bacteria, this oil was found superior to Streptomycin and Tetracycline. For arresting the growth of Gram negative organisms too, this essential oil seems to be superior to Erythromycin, Streptomycin and Tetracycline.

This essential oil is effective in inhibiting the growth of fungi. When compared to the zone of inhibition produced by the broad spectrum antifungal agents used in this study it could be inferred that this essential oil is less efficient than the standard antifungal agents used in this study.

Cinnamon leaf oil also showed fairly good antibacterial and antifungal properties. It was found to be superior in inhibiting the growth of E. coli compared to Ampicillin, Erythromycin

and Streptomycin. Its ability to combat Gram positive organisms like S. aureus was found to be superior to Penicillin, Streptomycin and Tetracycline. The ability to arrest the growth of S. aureus by the oil obtained from Ocimum gratissimum has been reported by Thomas (1989).

The antifungal property of cinnamon leaf oil was remarkable because it could produce more zone of inhibition compared to Micanazole as far as the sensitivity of C. guillermondi is concerned. Similarly, it could produce greater inhibitory zone to T. cutaneum compared to clotrimazole.

Though all the essential oil tested in this study possess varying degree of antimicrobial properties, further in vivo studies are required in order to prove its efficacy in natural/experimental infections before its utility is advocated for field applications.

Summary

use were documented and described. Majority of the Malayan tribe are cultivators and agricultural labourers. The knowledge of medicinal plants and their uses are limited to a few. People living in the remotest areas are still well versed in the use of medicinal plants and gifted with the richness of the flora. Both these factors are depleting as urbanization advances. According to the magnitude of availability of information and plants, the localities could be ranked as Sholayar > Vazhachal > Marottichal > Chimminy/Vazhani.

The tribe knew the remedy for almost all the common diseases. Occurrence of the disease was more or less uniform in the different localities. Certain plants were exclusively used by the tribe of each locality. Use of the plants like Alstonia venenata and Laportea crenulata was unique for the tribe of Sholayar; Ailanthus excelsa and Embelia ribes for Vazhachal; Elephantopus scaber and Wrightia tinctoria for Marottichal; Heliotropium indicum and Rubia cordifolia for Chimminy and Flacourtia cataphracta and Grewia tiliaefolia for Vazhani.

It was observed that the maximum number of plants, either alone or in combination were used for eye diseases (28), followed by diarrhoea/dysentery (21), loss of hair (16) and snake bite (15). Use of single plant could be observed in ailments like bone fracture (Vitex negundo), chicken pox (Azadirachta

indica), alopecia (Nyctanthes arbor-tristis), leucoderma (Clitoria ternatea), whitlow (Euphorbia antiquorum) etc. Plants are also employed for curing the diseases of cattle also. Plants like Calotropis gigantea, Eclipta alba, Gardenia gummifera and Woodfordia fruticosa were successfully used for this purpose.

Four plant species used for repelling insects and animals were identified from Marottichal, Sholayar and Vazhani localities.

The tribe developed systems for preventing and diagnosing using simple and very common raw drugs found in and around their habitation. Taking a preparation of Allium sativum with Ocimum sanctum as a prophylactic for mumps (Marottichal), Ailanthus excelsa for malarial fever (Vazhachal) and using the leaves of Tragia involucrata for confirming pregnancy in the early stages (Sholayar) are worth mentioning.

The form of use of the plants varies with the locality. The most common and repeatedly used form was the decoction, followed by paste prepared with different plant parts.

For majority of the diseases, no one plant is administered singly. It is given in combination with many other plants or plant products like oils, jaggary, sugar etc. This category forms nearly 20 per cent of the total uses. Animal products like butter, milk, honey; animals like chicken, crab, tadpole and animal

SUMMARY

Investigations on the Ethnobotany of medicinal plants of the tribes of Kerala were carried out in the Centre for Advanced Studies on Humid Tropical Tree Crops and Environmental Horticulture attached to the College of Horticulture, Vellanikkara during 1988-1991. The various aspects of the study included documentation of ethnomedicines, botanical description and propagation studies of selected five rare plants, and screening of selected plants for antimicrobial activity.

The first part of the study was completed by conducting survey among the Malayan tribe of the selected localities of Thrissur District. These localities were Chimminy, Marottichal, Sholayar, Vazhachal and Vazhani. Screening the plant extracts for antimicrobial activity was done at the Department of Microbiology of the College of Veterinary and Animal Sciences, Mannuthy. Botanical description of the selected rare plants was done based on the samples collected during the survey, by referring different floras. Propagules of these rare plants were also collected from different localities and their multiplication studies conducted at the College of Horticulture, Vellanikkara. The results of the investigation are summarised below.

Information on 212 plant species, belonging to 184 genera of 73 families and their therapeutic applications and manner of

parts like hood of a cobra were also used effectively in combination with medicinal plants and their products for various ailments. Inert materials like ash, clay and salt also formed a part of different combinations of medicines used for external application.

Religious or magical rituals accompany the uses of certain plants. Collection of the root bark of Alstonia venenata for preparing a medicine for snake bite and that of Datura stramonium for the preparation of a talisman used in birth control often accompany the beating of drums and chanting of mantras. They also keep certain taboos about medicinal plants and strongly believe that violation of any taboo can make the medicine ineffective.

Five rare plants, viz., Alstonia venenata, Cosciniun fenestratum, Habenaria latilabris, Rotula aquatica and Woodfordia fruticosa were selected for detailed botanical studies. They were illustrated and botanically described based on samples collected during the survey.

Propagation studies on the above five species revealed that the easiest methods of propagation is through root cuttings in Cosciniun fenestratum, pseudobulbs in Habenaria latilabris, hardwood cuttings in Rotula aquatica and seeds in Woodfordia fruticosa. Further detailed investigations are required to standardise the propagation technique in all these species, especially in Alstonia venenata.

The antimicrobial properties of the ether and alcoholic extracts and essential oils of 12 plants were screened against seven test bacteria and two fungi. Their activity was compared with the standard antimicrobial agents available in the market. All the essential oils possessed antibacterial and antifungal properties. None of the ether and alcoholic extracts had any such effect.

Clove leaf oil was found to be inhibitory to all the bacterial and fungi tested. The inhibition was more compared to most of the antibiotics and fungicides available in the market. The essential oil of Coscinium fenestratum showed remarkable antibacterial and antifungal properties to all the organisms tested. Cinnamon leaf oil also showed fairly good antibacterial and antifungal properties. The essential oil of Alstonia venenata was able to suppress the growth of bacteria, though ineffective in the case of fungi tested. Further in vivo studies are required in order to prove the efficacy before field application.

The information gathered revealed that the tribal community of Thrissur District has a traditionally self managed system of folk medicine and primary health care, mainly based on herbal remedies.

Figures and Plates

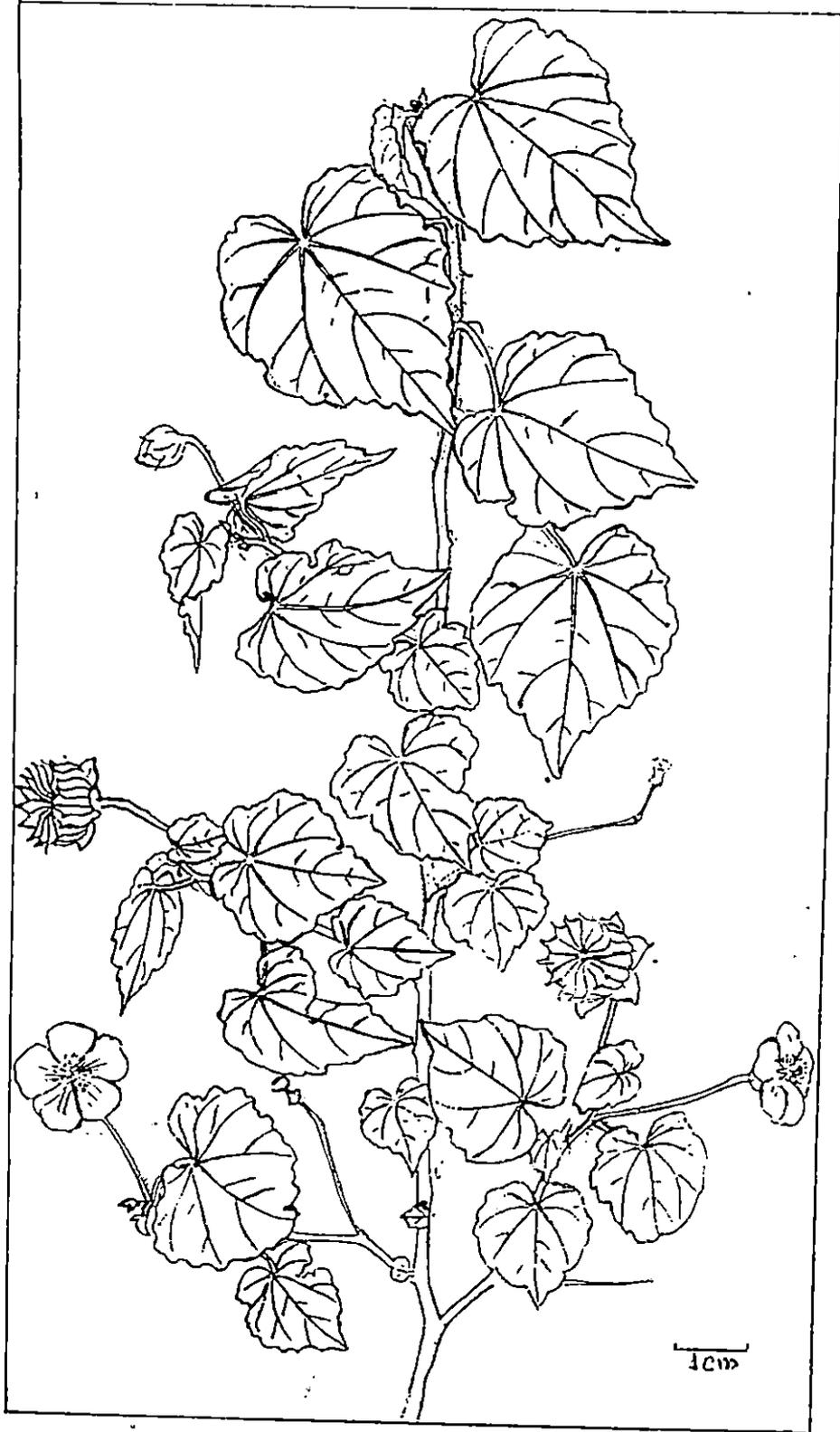


Fig. 2. *Abutilon indicum* Linn.



Fig. 3. *Abrus precatorius* Linn.

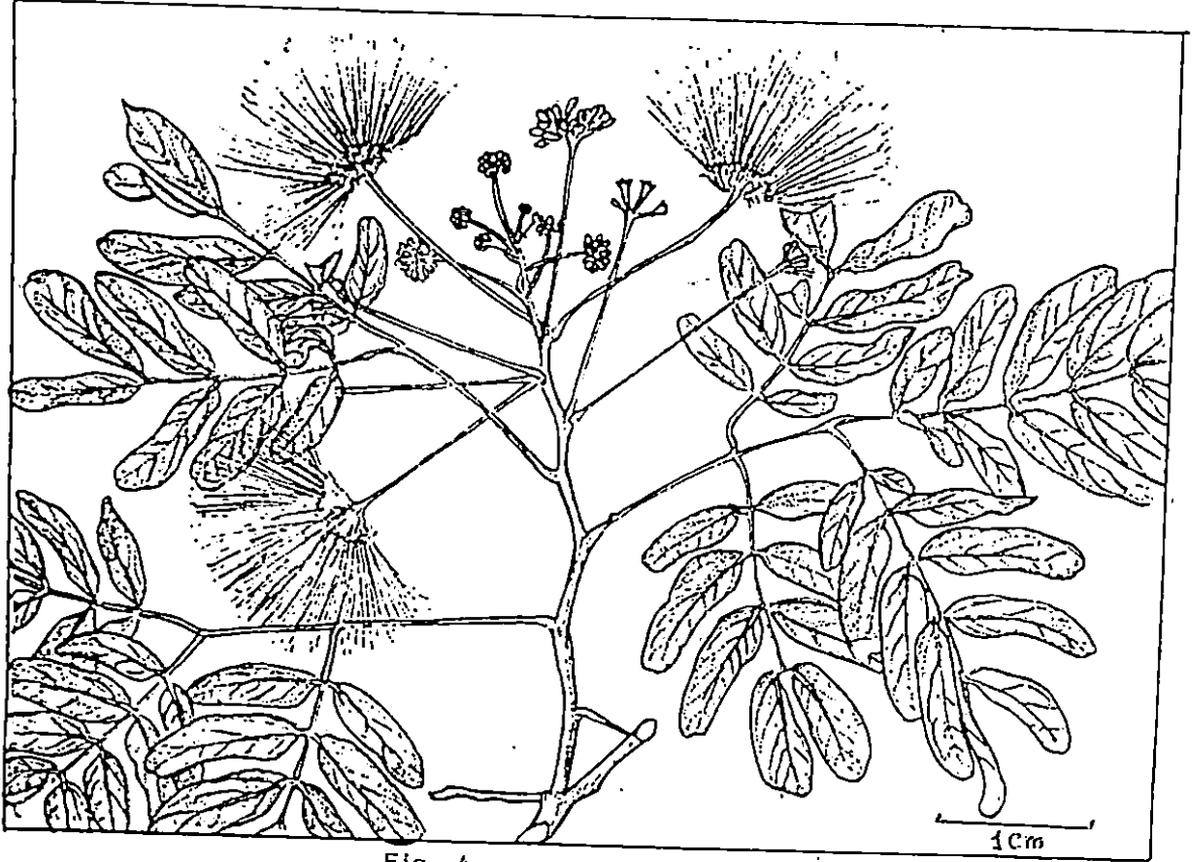


Fig. 4. *Albizia lebbek* Benth.

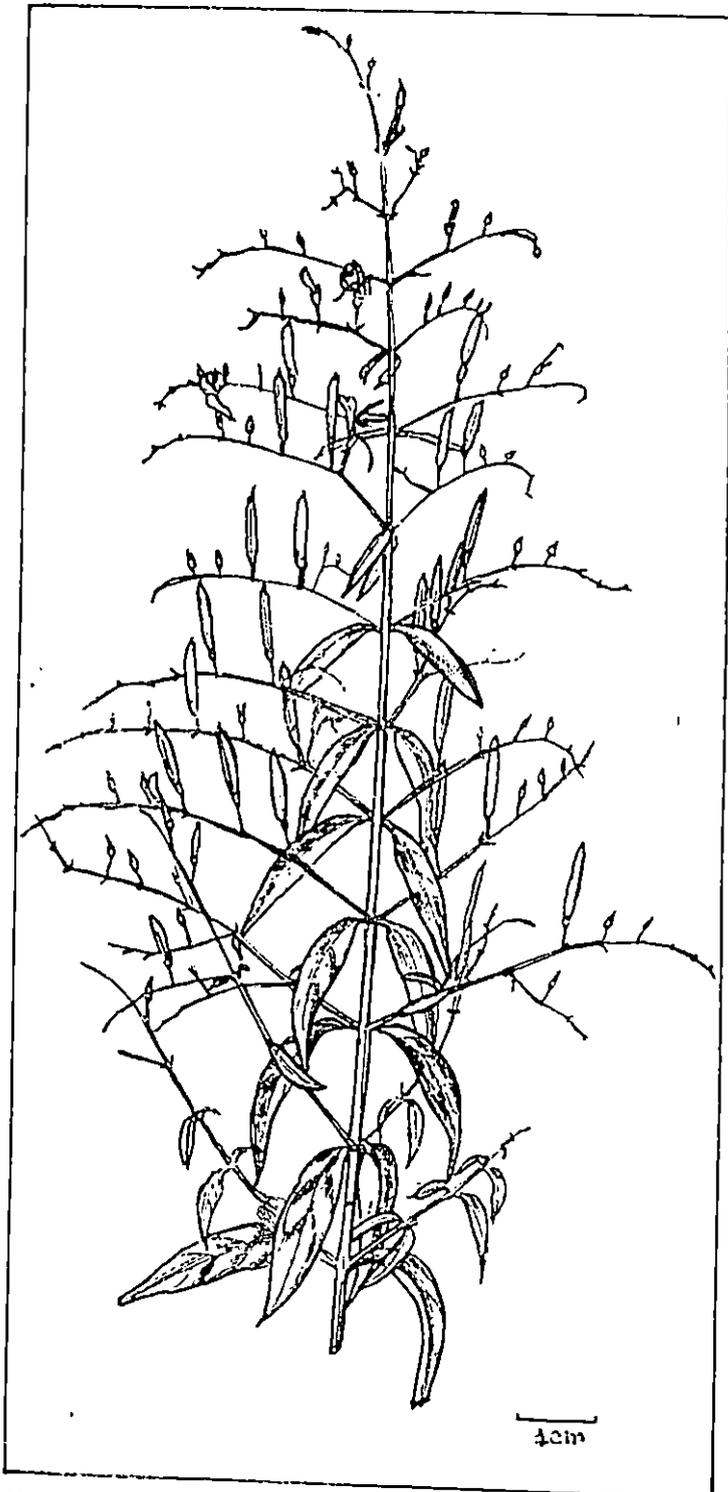


Fig. 5. *Andrographis paniculata* Wall. ex Nees

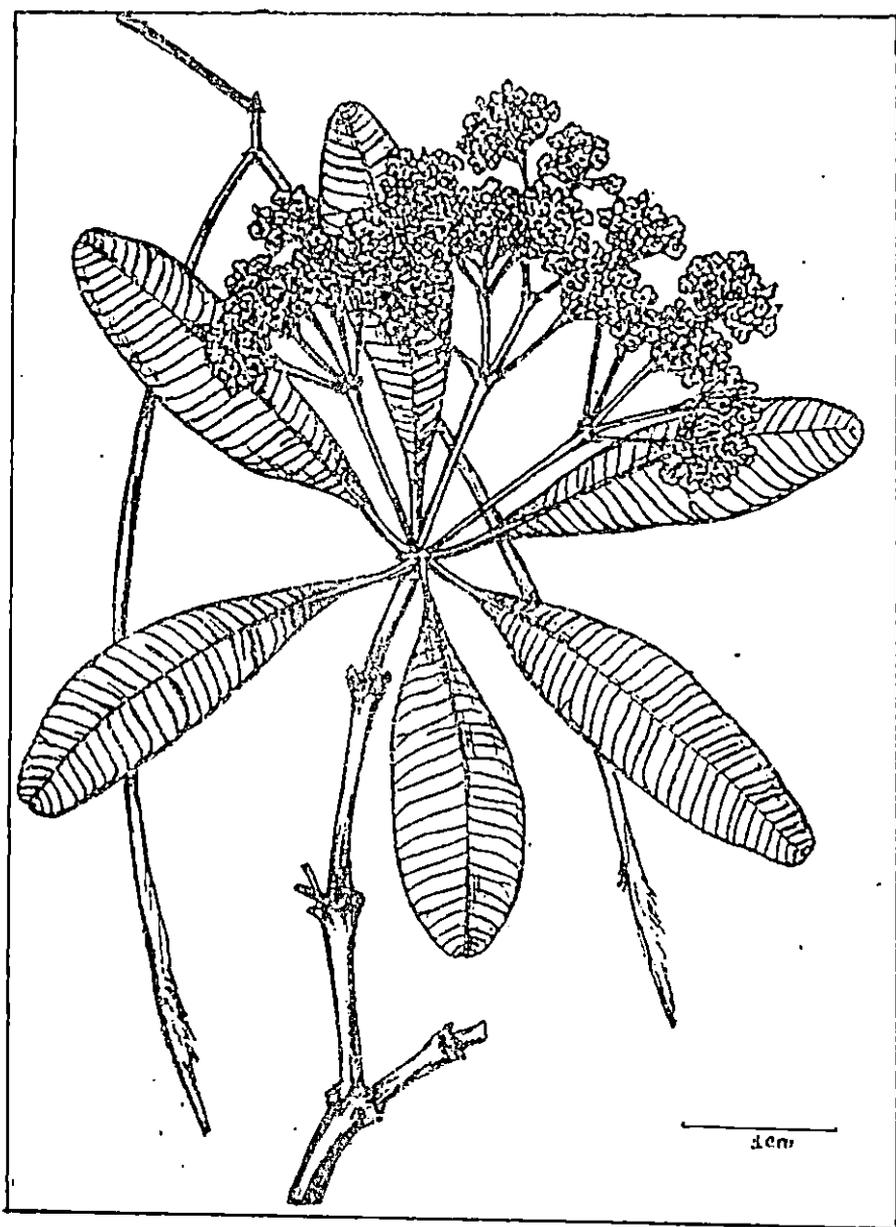


Fig. 6. *Alstonia scholaris* R. Br.

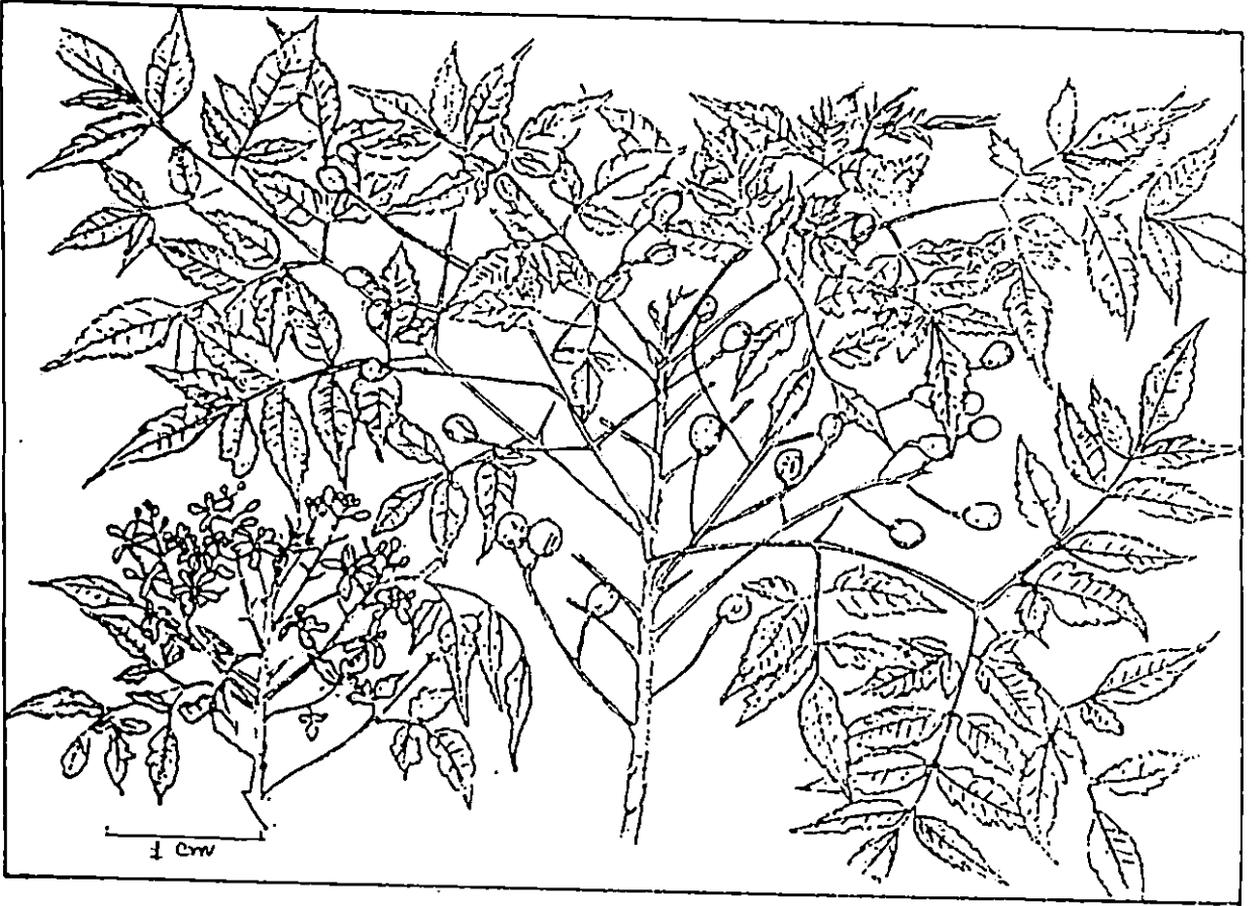


Fig. 7. *Azadirachta indica* A. Juss.

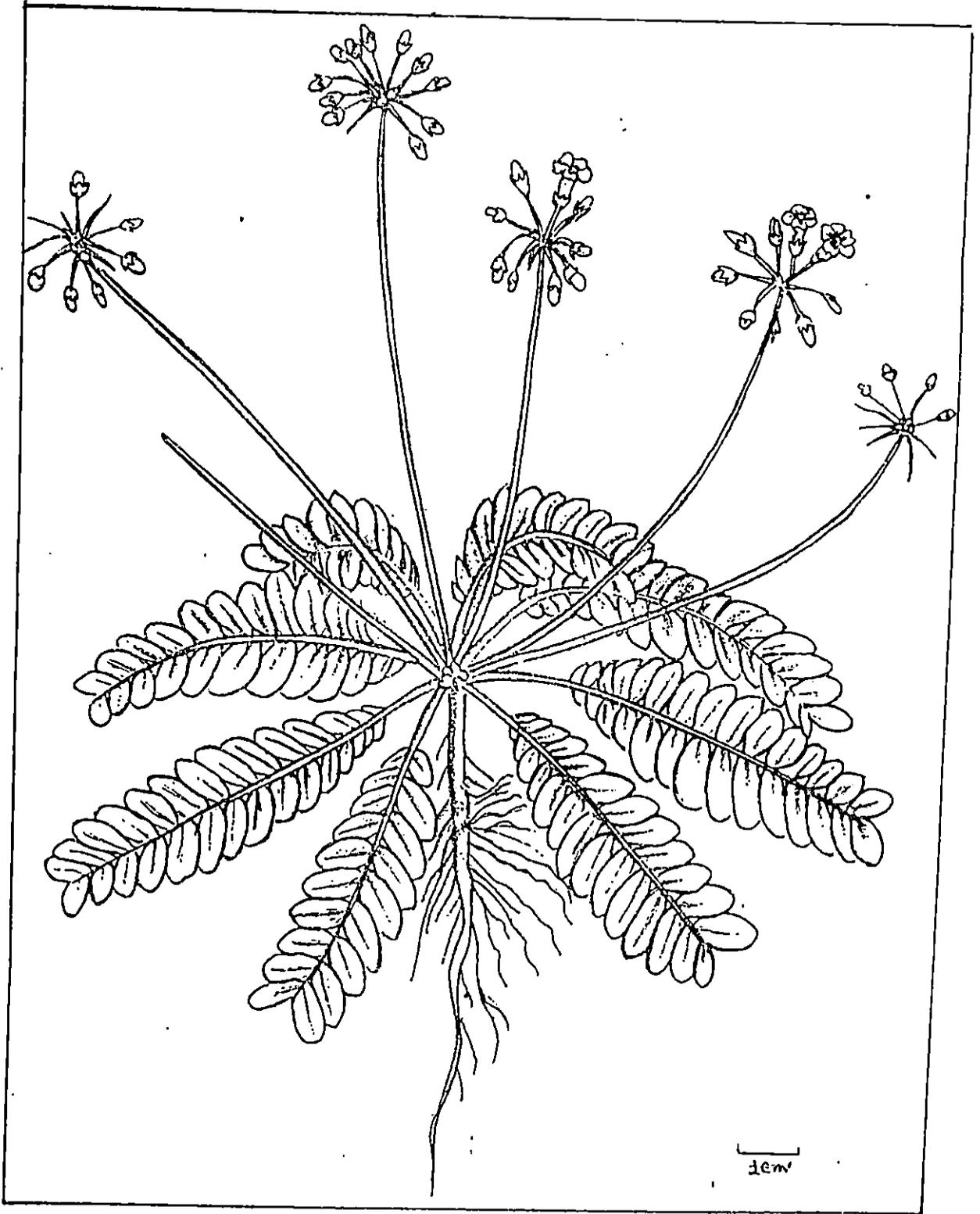


Fig. 8. *Biophytum sensitivum* (Linn.) DC

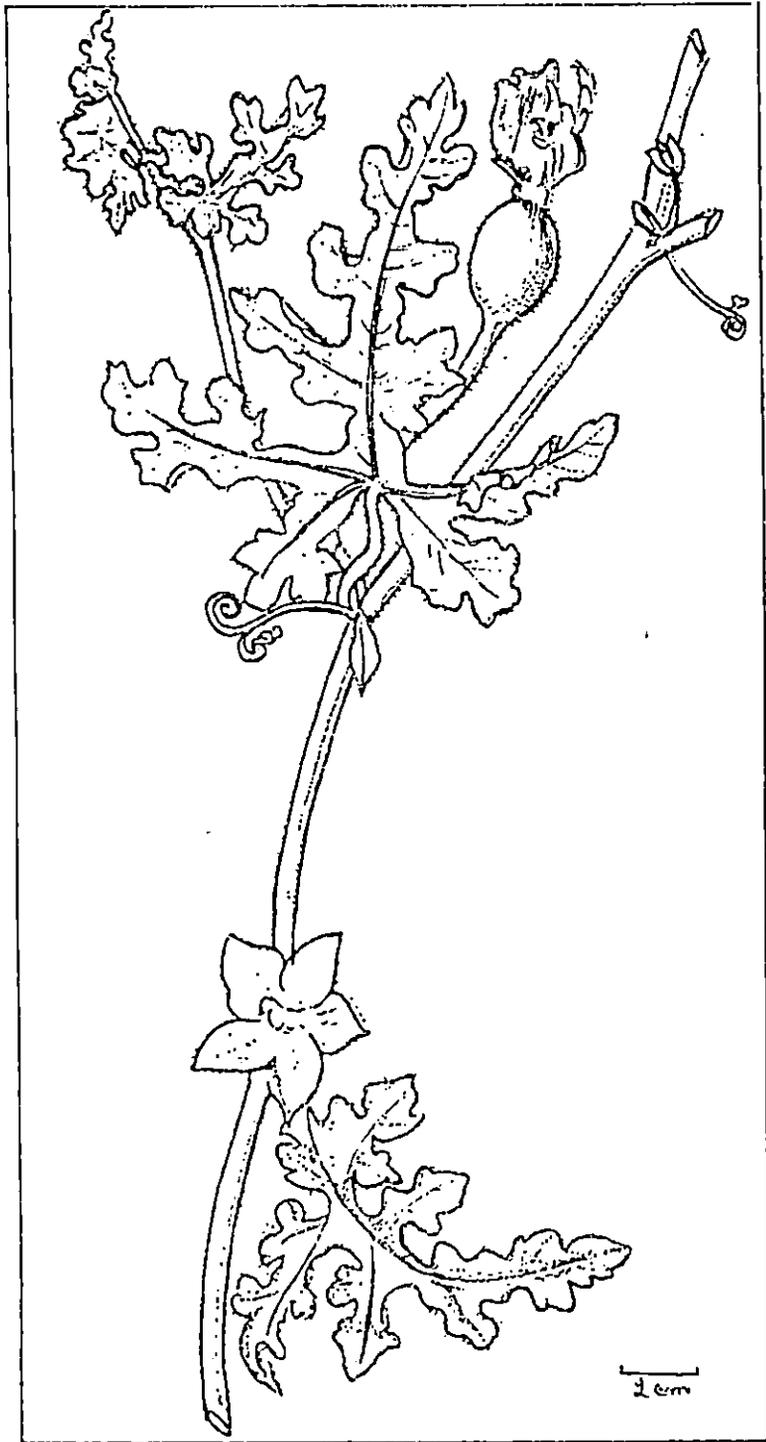


Fig. 9. *Citrullus colocynthis* Forsk.



Fig. 10. *Eclipta alba* (Linn.) Hassk.

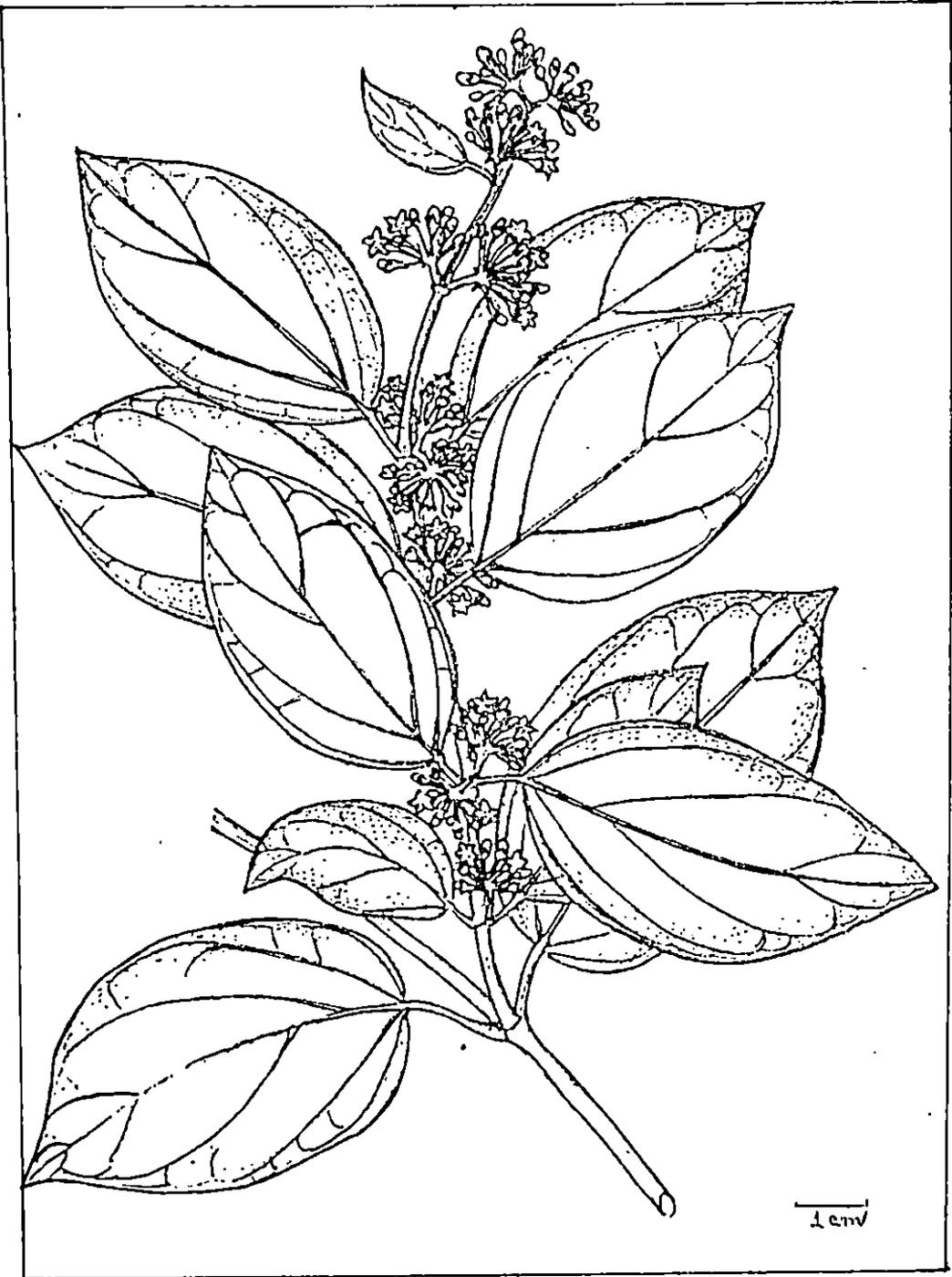


Fig. 11. *Gymnema sylvestre* R. Br.

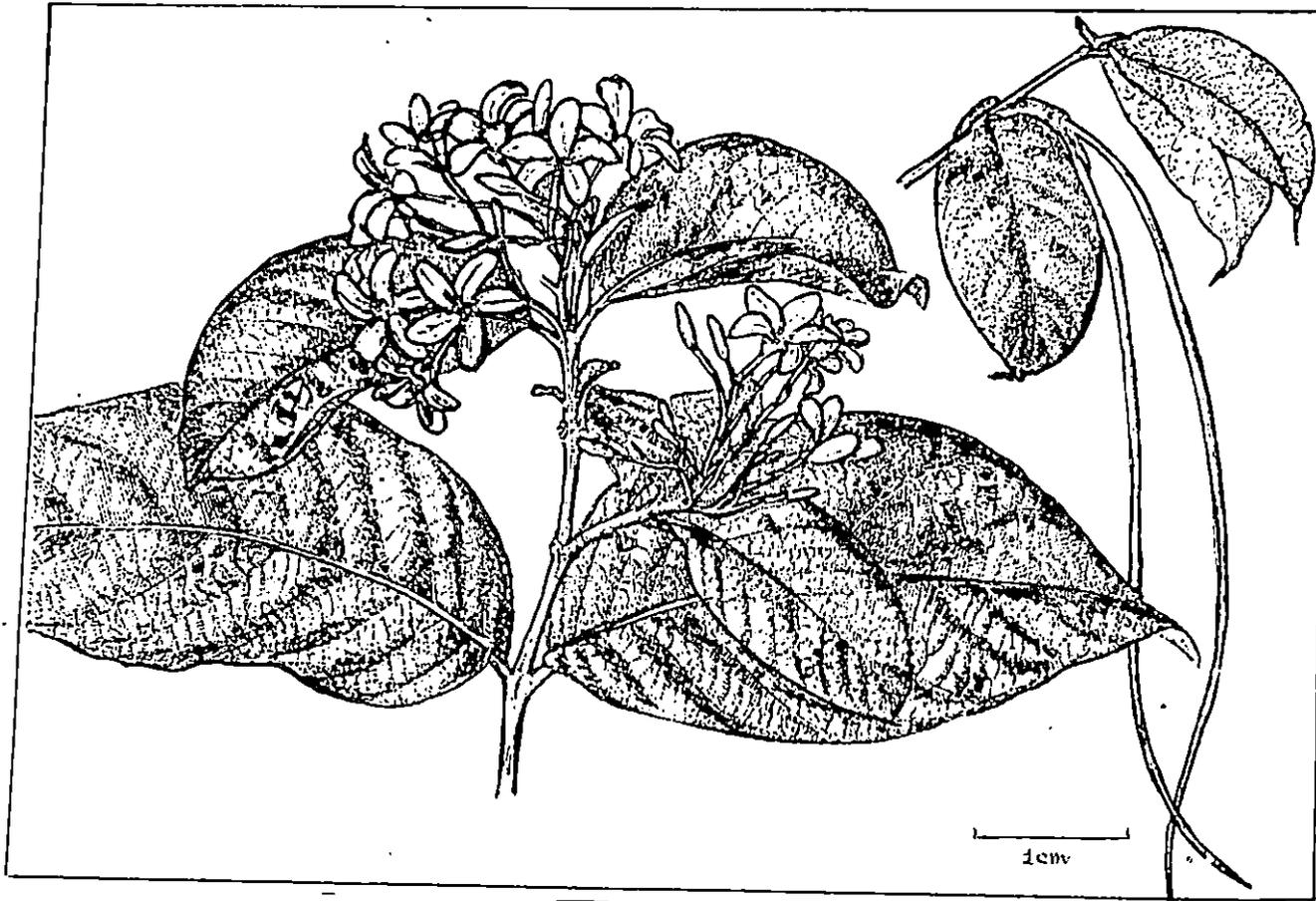


Fig. 12. *Holarrhena antidysenterica* (Linn.) Wall

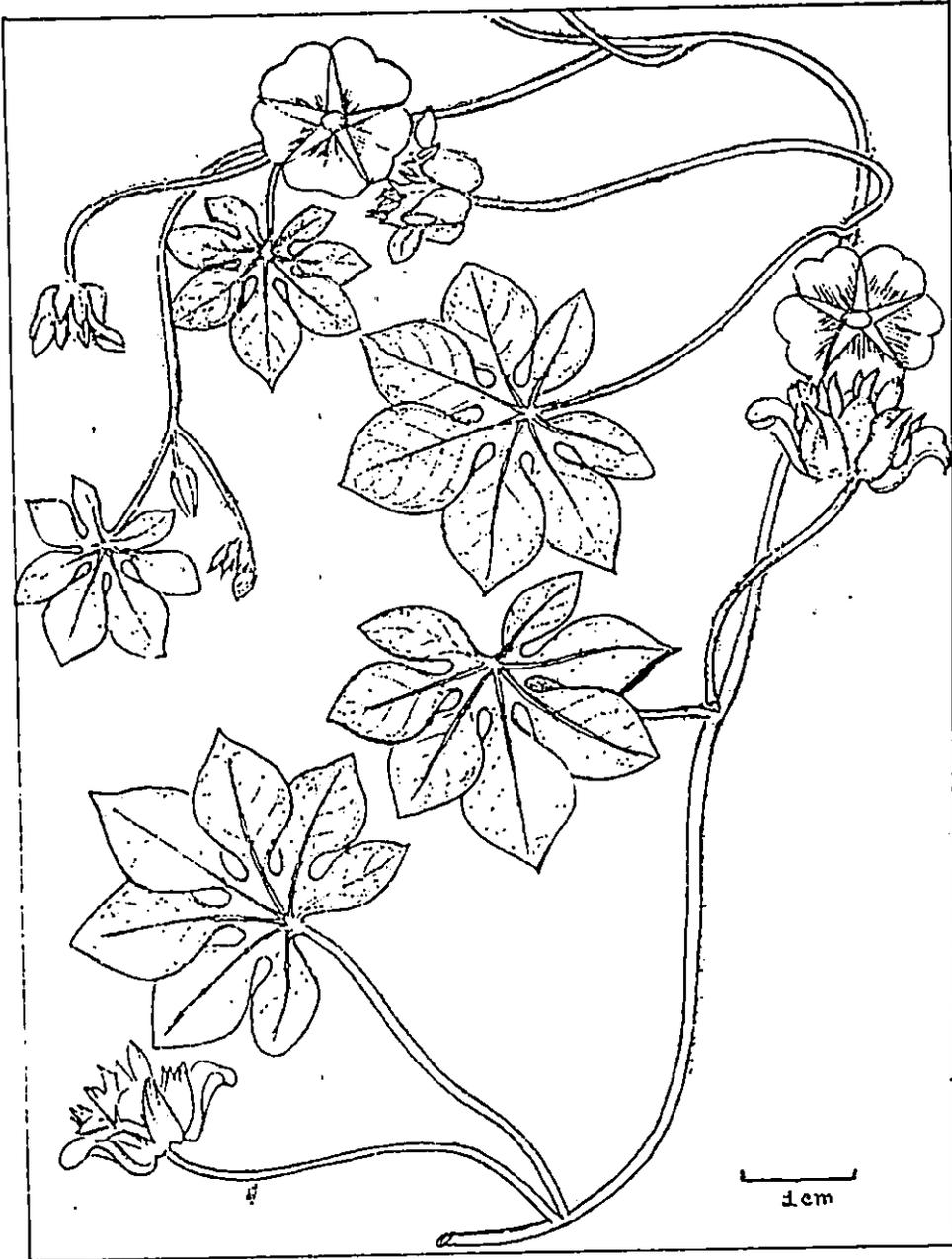


Fig. 13. *Ipomoea pes-tigridis* Linn.



Fig. 14. *Laportea crenulata* Gaudich.

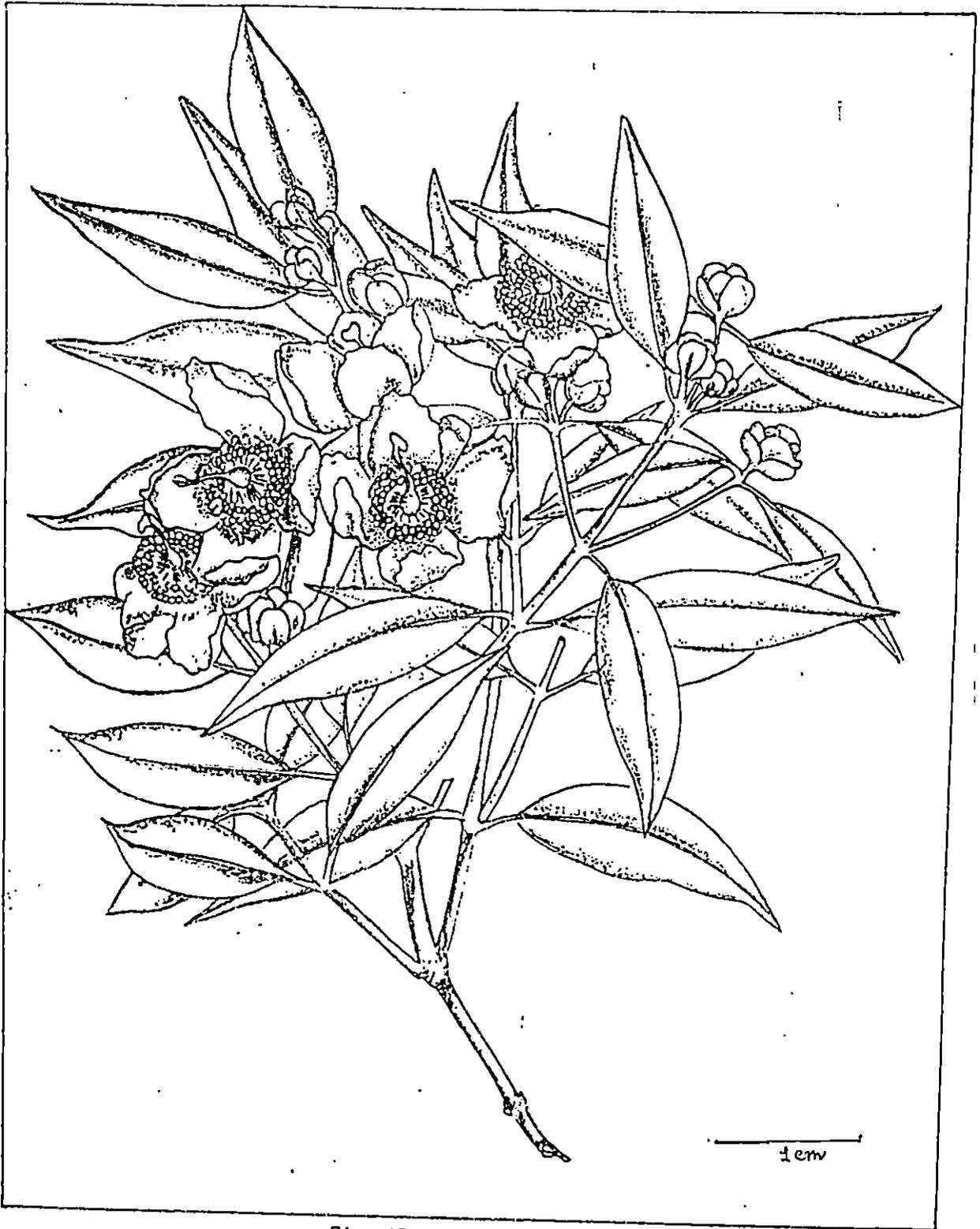


Fig. 15. *Mesua ferrea* Linn.

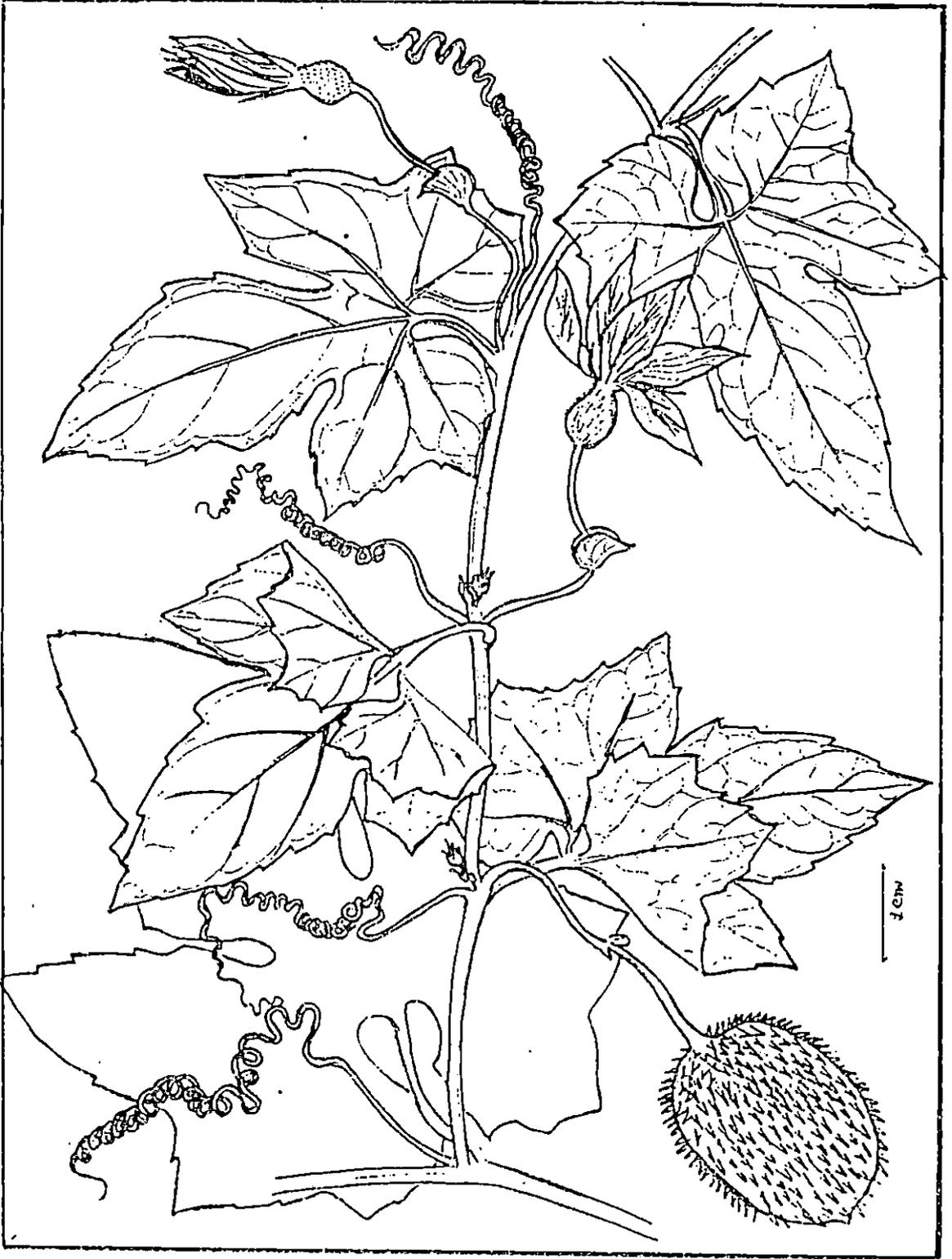


Fig. 16. *Momordica dioica* Roxb. ex. Willd.



Fig. 17. *Plumbago zeylanica* Linn.

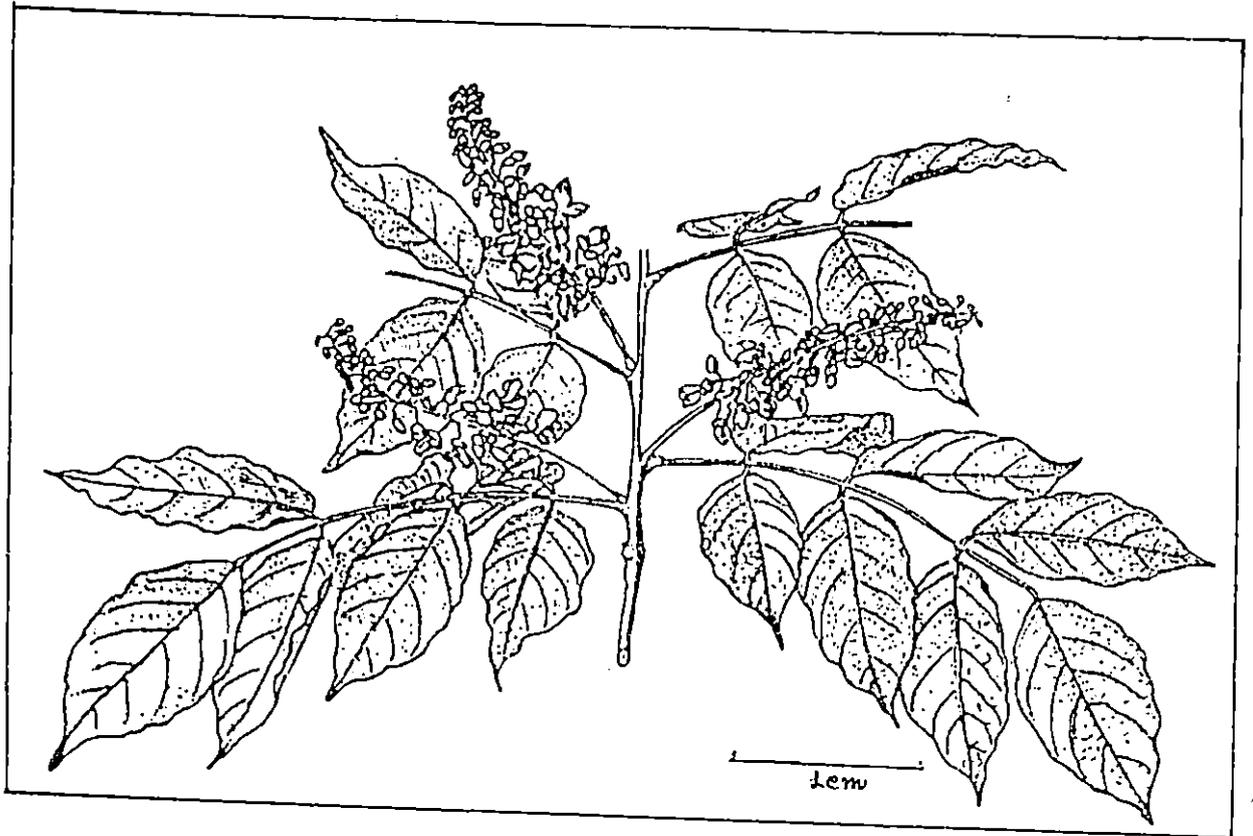


Fig. 18. *Pongamia glabra* Vent.



Fig. 19. *Ricinus communis* Linn.



Fig. 20. *Ruta graveolens* Linn.

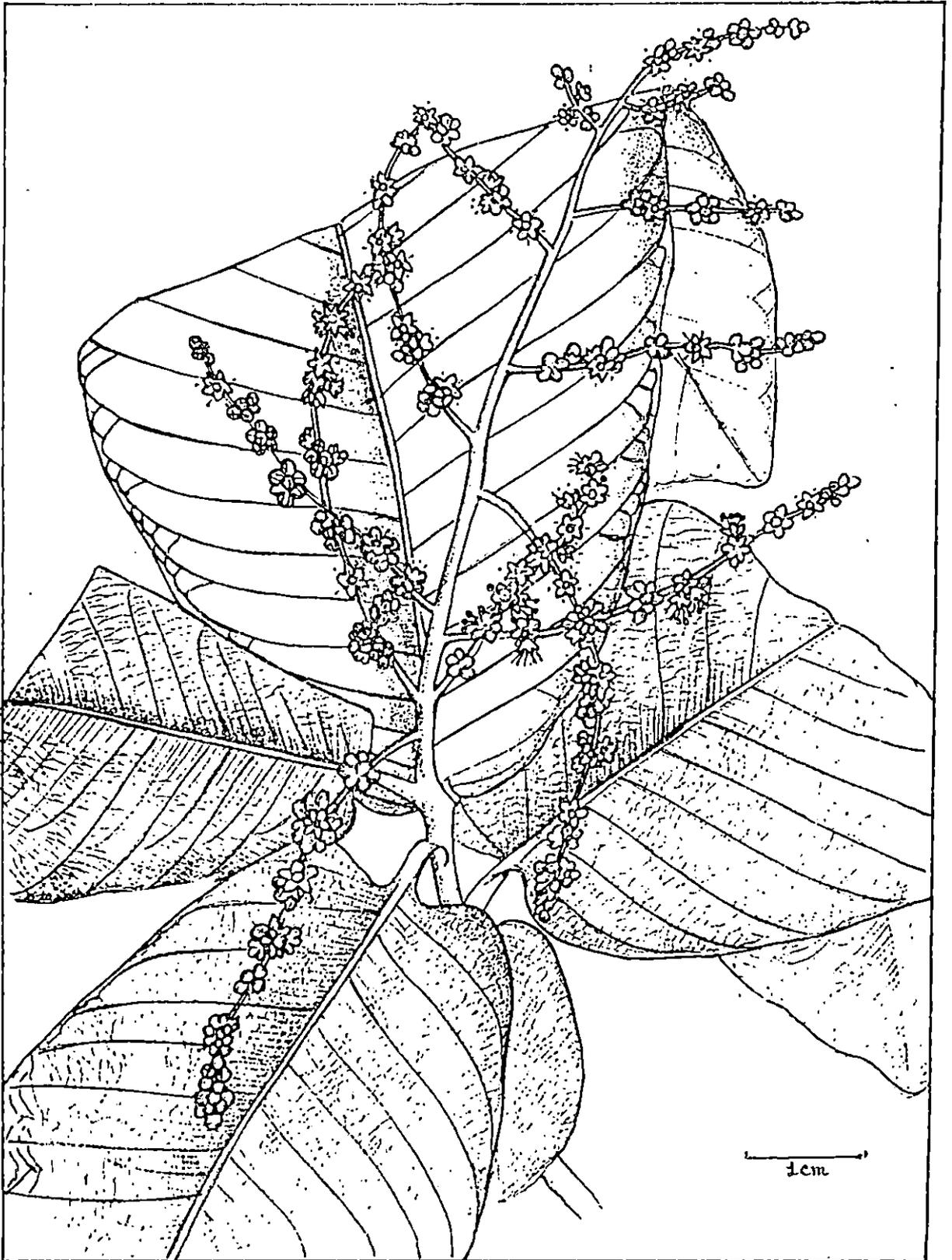


Fig. 21: *Semecarpus anacardium* Linn. f.



Fig. 22. *Sida cordifolia* Linn.



Fig. 23. *Solanum indicum* Linn.



Fig. 24. *Solanum nigrum* Linn.



Fig. 25. *Symplocos racemosa* Roxb.

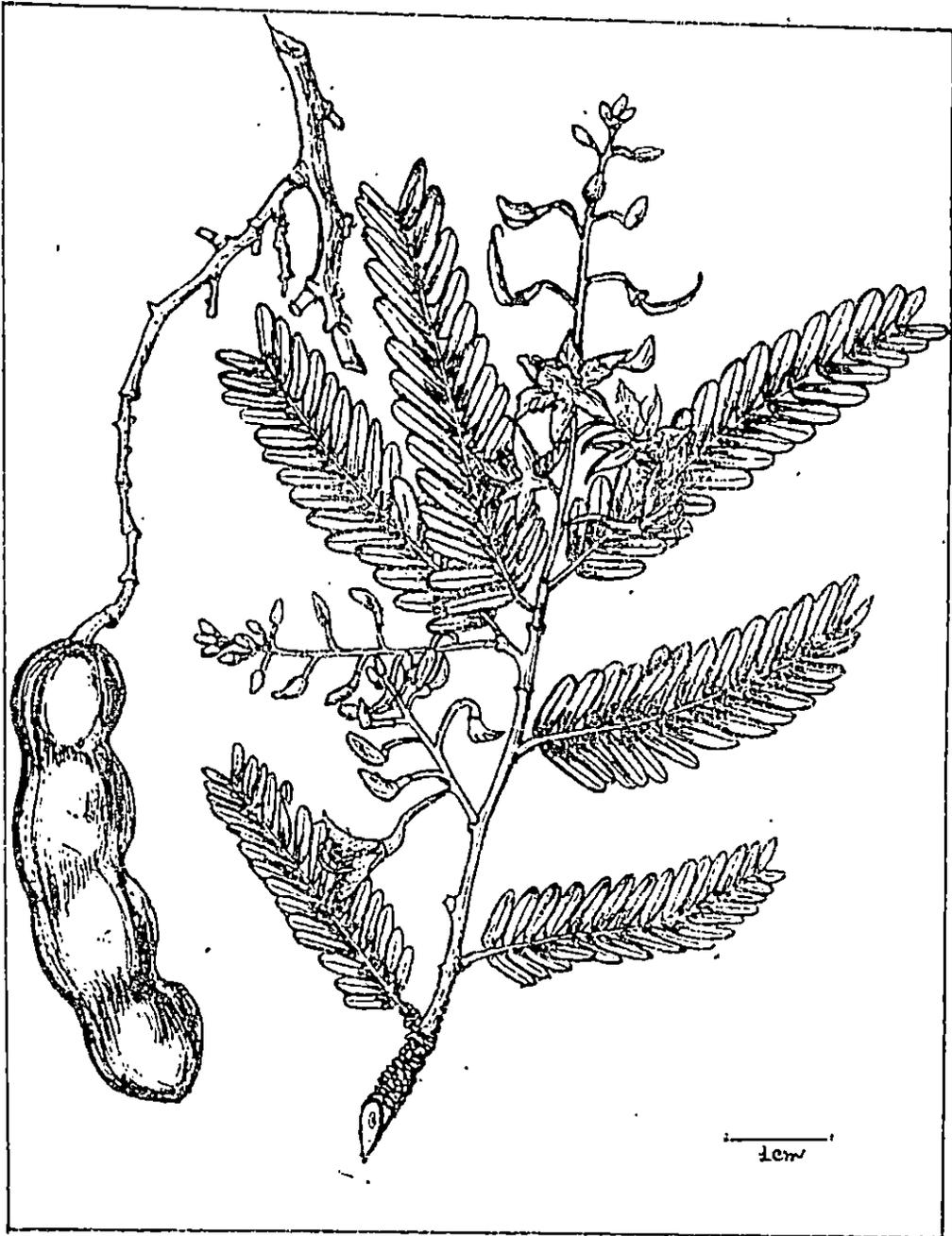


Fig. 26. *Tamarindus indica* Linn.



Fig. 27. *Terminalia chebula* Ritz.



Fig. 28. *Tragia involucrata* Linn.

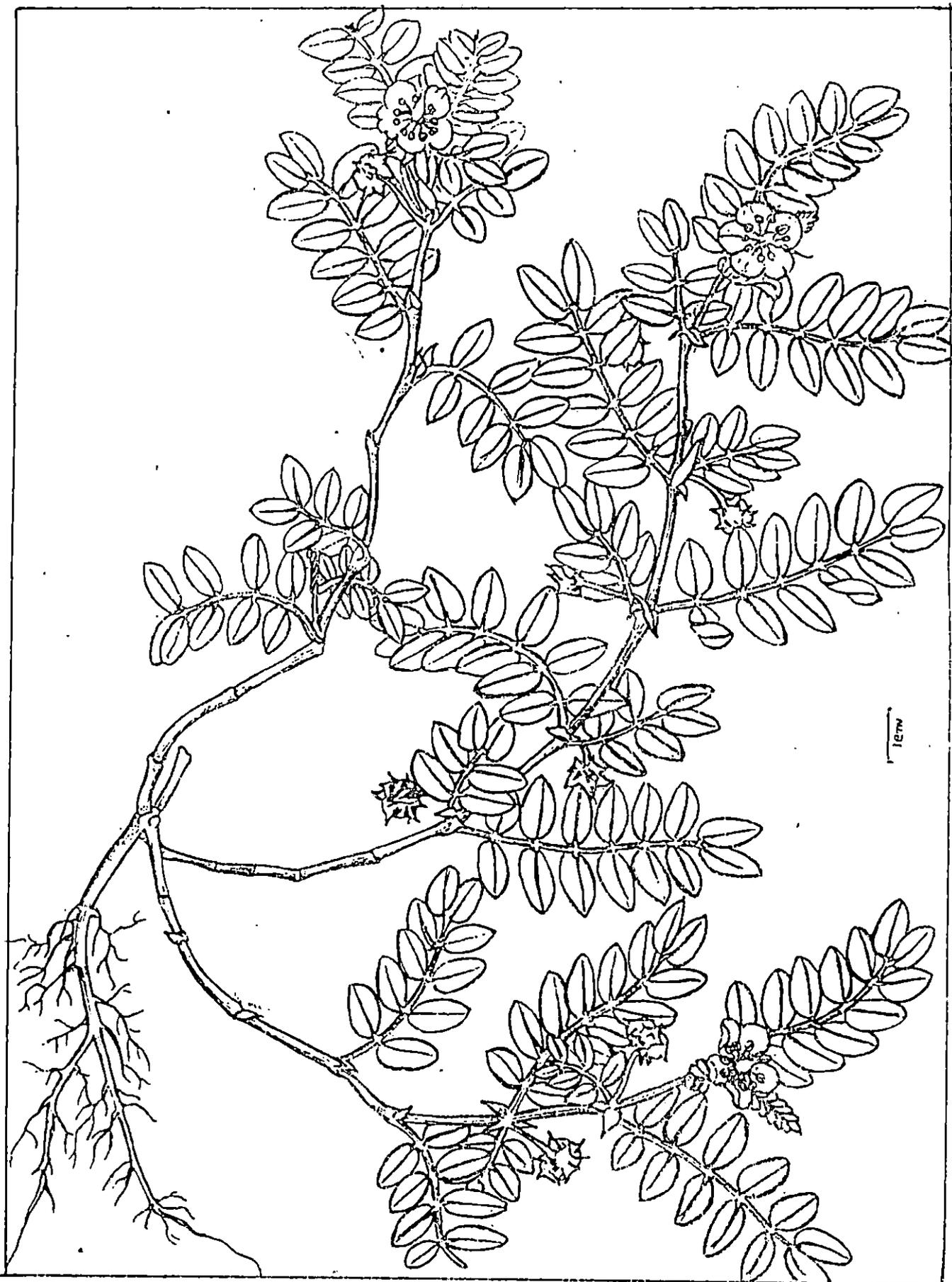


Fig. 29. *Tribulus terrestris* Linn.



Fig. 30. *Withania somnifera* Dunal



Fig. 31. *Alstonia venenata* R. Br.

1. A flowering twig; 2. a single flower; 3. Gynoecium; 4. Corolla split open, showing the anthers; 5. a fruiting branch; 6. a fruit, split open; 7. seed

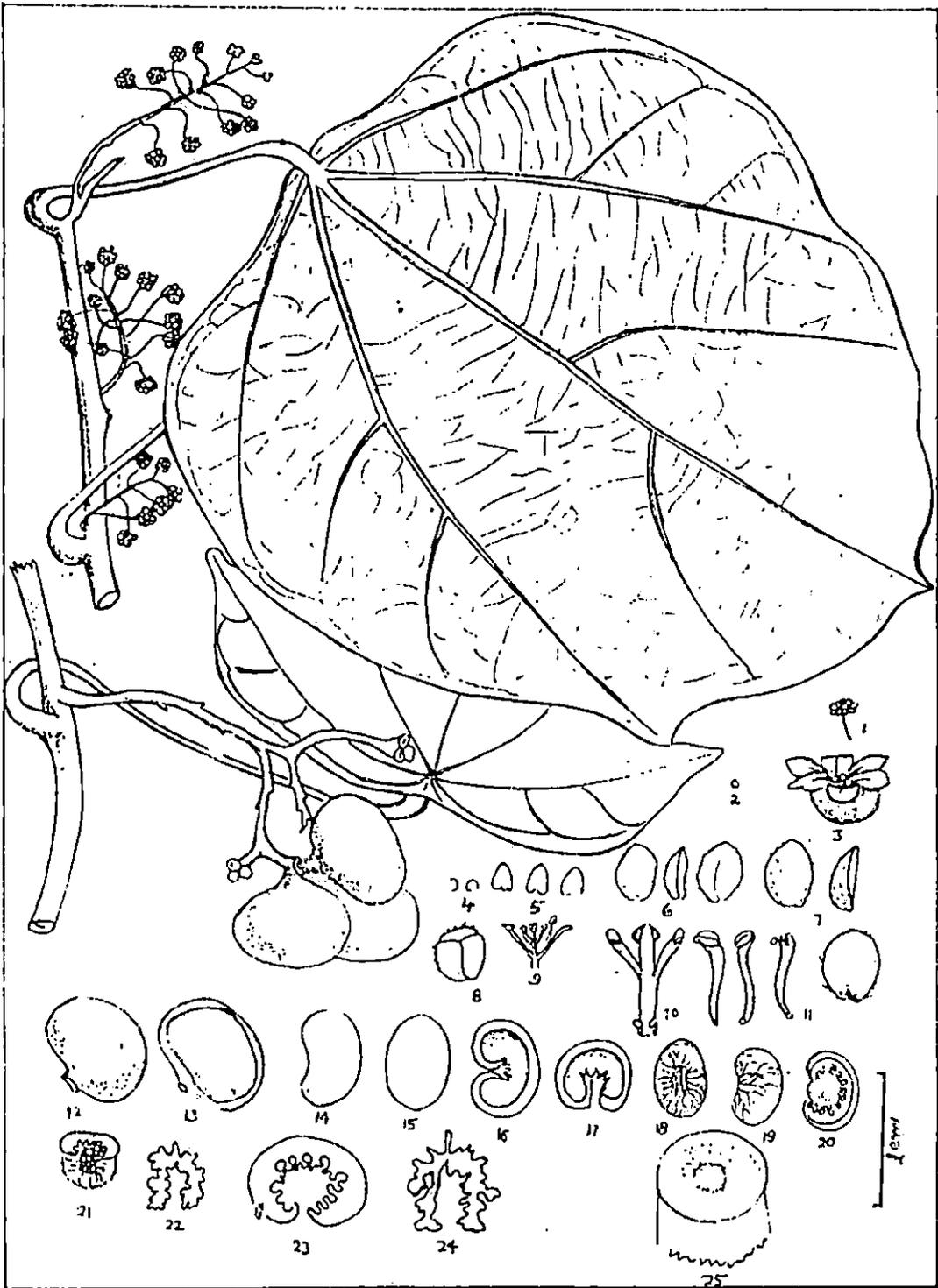


Fig. 32. *Coscinium fenestratum* Colebr.

1 to 11. Male head and different parts; 12-20. female flower parts; 21-24. endocarp showing the dorsal line; 25. T.S. of stem



Fig. 33. *Habenaria latilabris* Wall ex. Lindl.

1. flower and bracts; 2. flower with the dorsal sepal and a petal removed; 3. flower with the perianth segments displaced; 4. dorsal sepal; 5. petal; 6. lip; 7. pollinia

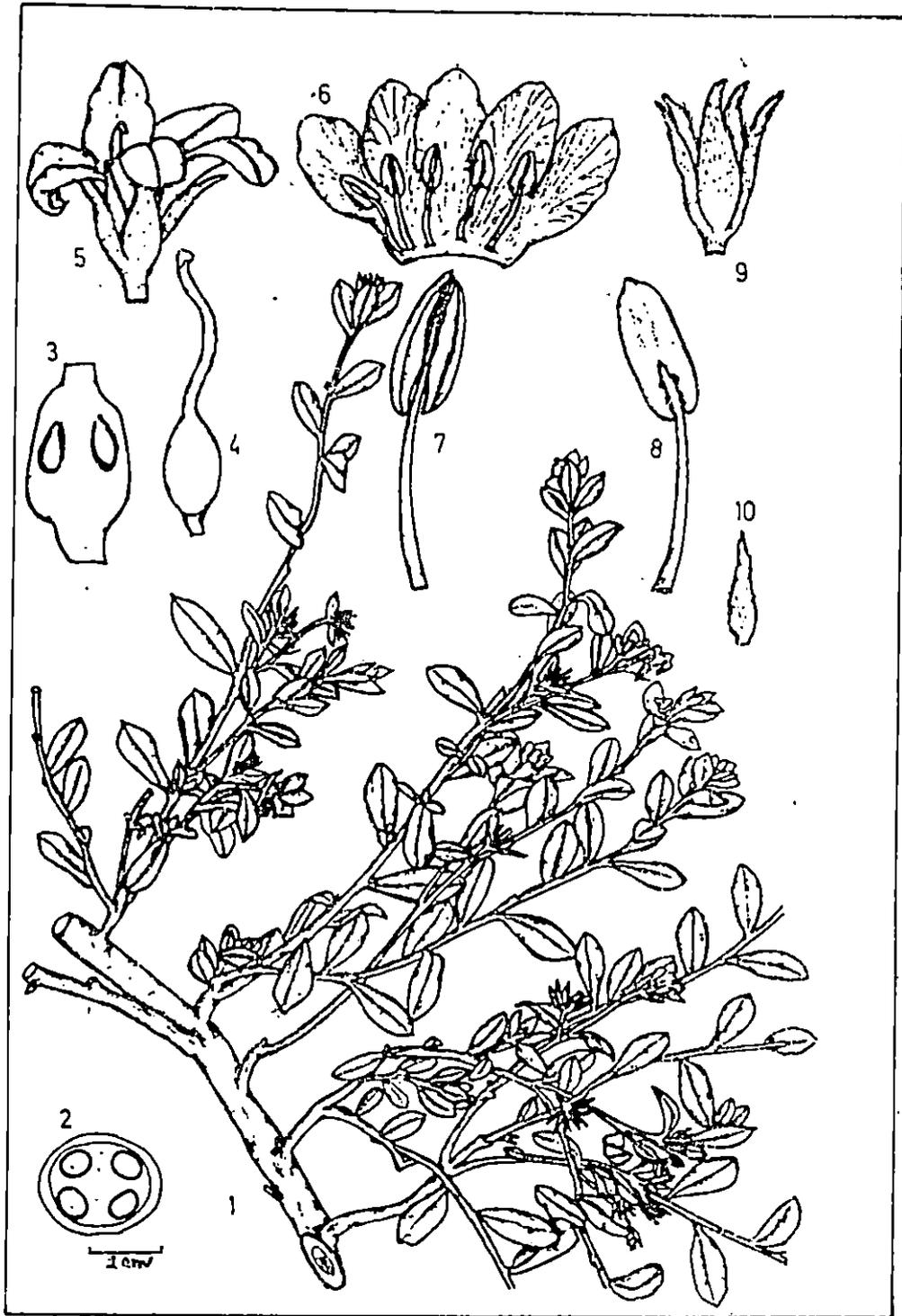


Fig. 34. *rotula aquatica* Lour.

1. twig; 2 & 3. ovary, t.s. & l.s; 4. pistil;
 5. flower; 6. corolla, split open; 7 & 8. stamens;
 9. calyx; 10. bract



Fig. 35. *Woodfordia fruticosa* Salisb.

1. A flowering twing; 2. A single flower;
2. Corolla split open; 4. Gynoecium

Plate 1. *Butea monosperma* (Lam.) Kuntze

Plate 2. *Helicteres isora* Linn.



Plate 3. *Justicia gendarussa* Burm. f.

Plate 4. *Kaempferia rotunda* Linn.



Plate 5. *Oroxylon indicum* Vent.

Plate 6. *Petalium murex* Linn.

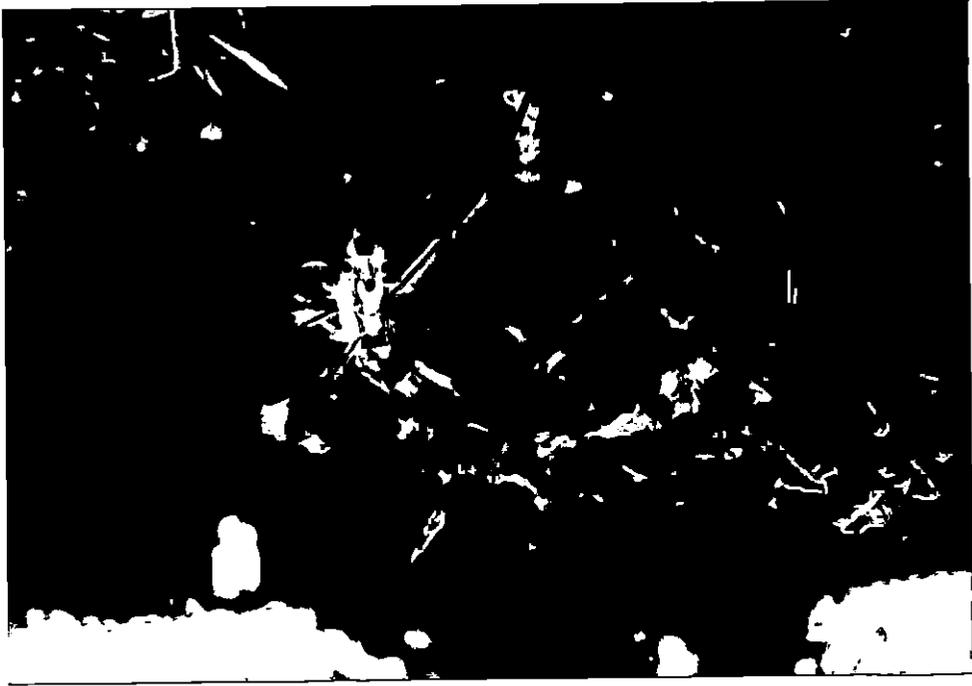


Plate 7. *Tribulus terrestris* Linn.

Plate 8. *Vitex negundo* Linn.



Plate 9. *Withania somnifera* Dunal

Plate 10. *Wrightia tinctoria* R. Br.



Plate 11. *Alstonia venenata* R. Br. - a twig

Plate 12. *Alstonia venenata* R. Br.
- a sprouted cutting



Plate 13. *Coscinium fenestratum* Colebr.
- a sprouted root cutting

Plate 14. *Habenaria latilabris* Wall ex. Lindl.
- pseudobulbs

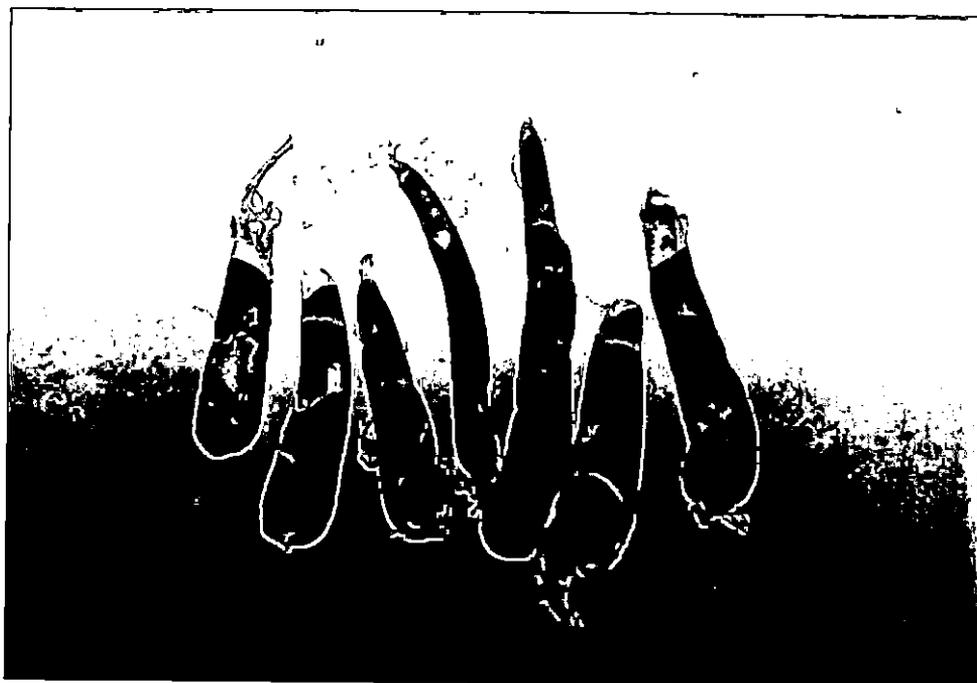


Plate 15. *Habenaria latilabris* Wall ex. Lindl.
- sprouted whole plant

Plate 16. *Rotula aquatica* Lour - a twig

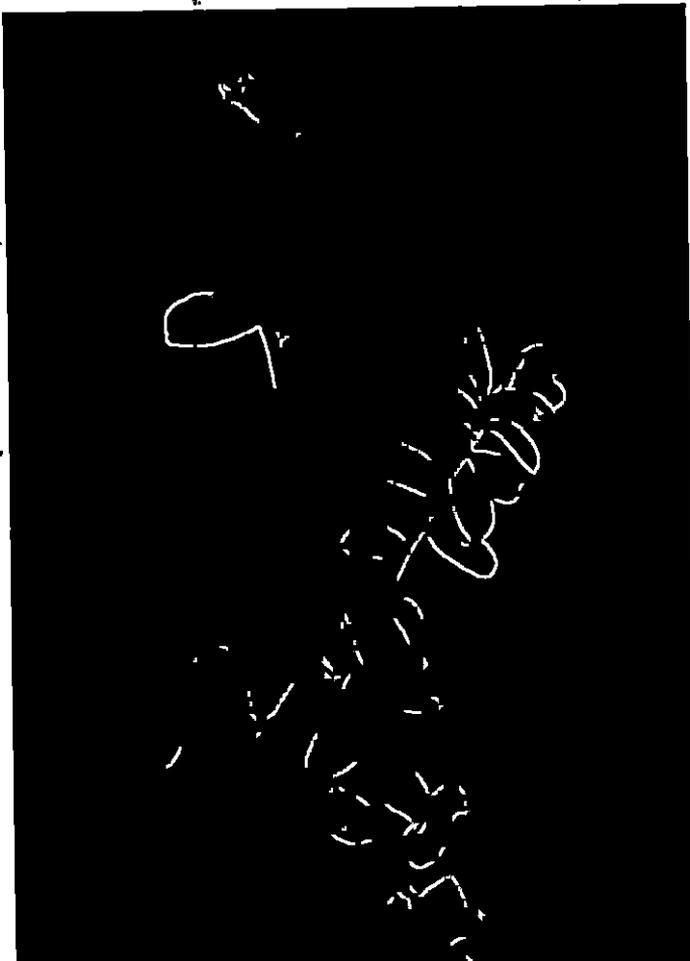
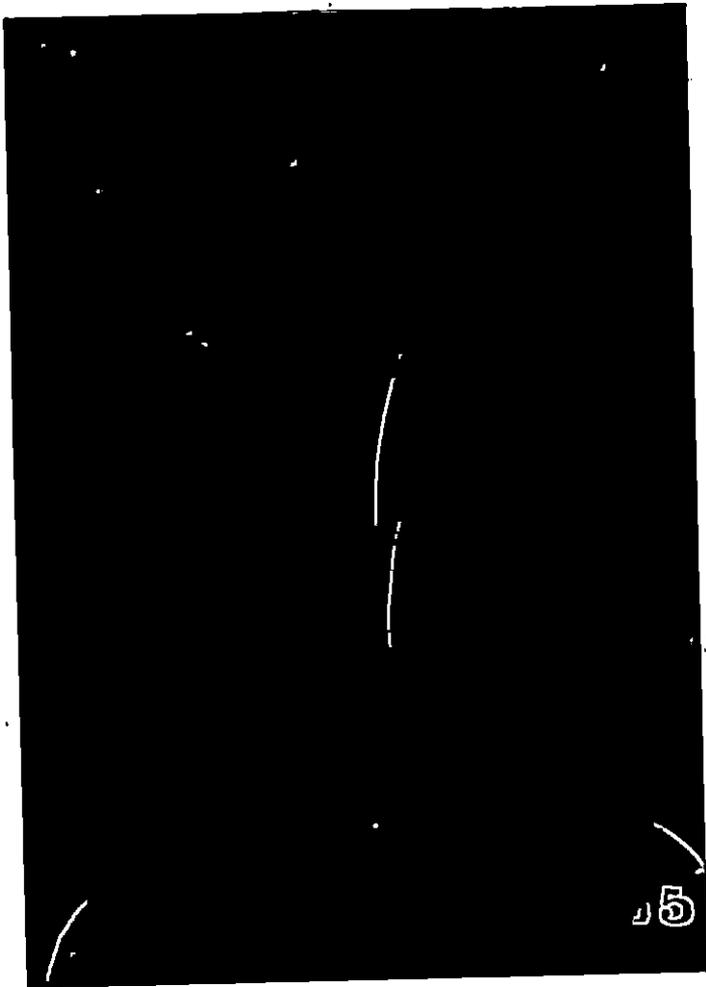
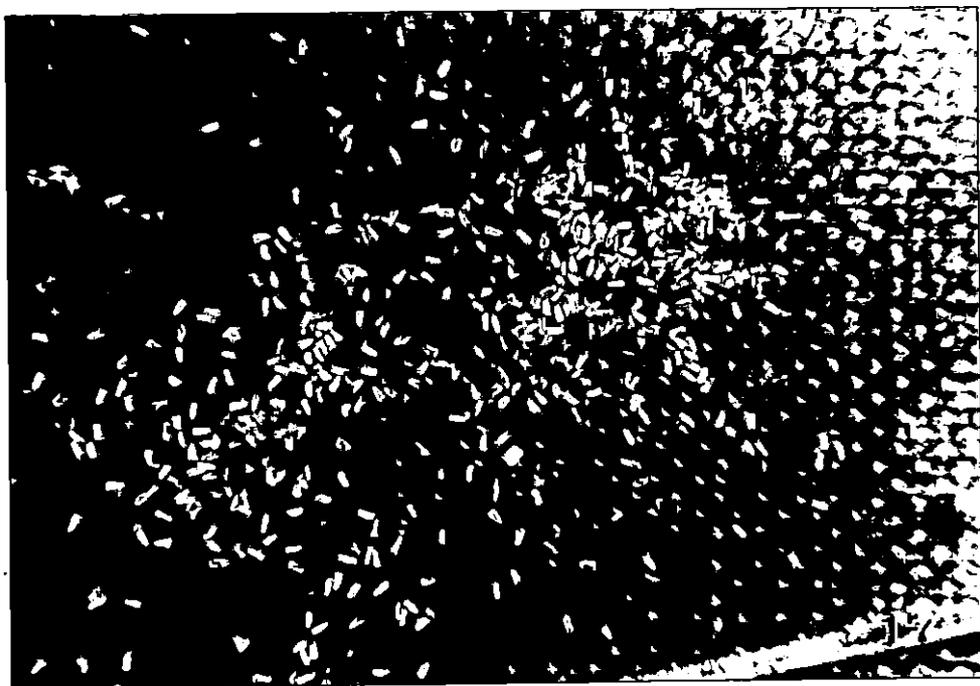


Plate 17. *Woodfordia fruticosa* Salisb.
- seeds magnified



References

REFERENCES

- Abraham, D.S., Bhakuni, H.S., Garg, A.K., Goel, B.N., Mehrotra, B.N. and Patnaik, G.K. 1986. Screening of Indian Plants for Biological Activity. Indian J. Expt. Biol. 24:48-68.
- Abraham, M., Devi, S.N. and Sheela, R. 1979. Antilactogenic activity of the flowers of Jasminum sambac on lactating mice. Indian J. Med. Res. 69:88-92.
- Abraham, Z. 1978. Ethnobotanical notes on the Todas, the Kotas and the Irulas of the Nilgiris. Indian Bot. Soc. 57:67.
- Agarwal, V.S. 1969. Roots of Indian plants as source for medicines. Indian Mus. Bull. 4(2):81-101.
- Aiyappan, A.A. 1957. Primitive medicine at a Malabar temple. Indian J. Hist. Med. 2:37-42.
- Altschul, S.V.R. 1970. Ethnobotanical research on less known medicinal plants of India. In Cultivation and Utilization of Medicinal Plants. Atal, C.K. and Kapur, B.M. (ed). 1982. CSIR. pp.538-557.
- Anandan, T. and Veluchamy, G. 1986. Folk-medical claims from Tamil Nadu (North Arcot District). Bull. Medico-Ethno-Bot. Res. 1(3&4):99-109.
- Anderson, E.F. 1986. Ethnobotany of the hill tribes of Northern Thailand II. Lahu medicinal plants. Econ. Bot. 40(4): 442-50.

- Areauas and Azorero, P.R.M. 1977. Plants of common use in Paraguayan folk medicine for regulating fertility. Econ. Bot. **31**:298.
- Arora, B.K. 1973. Adlay (Coix) group in Meghalaya. J. Indian Bot. Soc. **52**:92-98.
- Arora, R.K. 1978. Native food plants of North eastern tribals. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi :188-192.
- *Aubaile-Sellenave, F. 1982. Recherches et documentation ethnobotaniques et ethnozoologiques. J. Agric. Trad. Bot. Appl. **19**(2):123-178.
- Austin, D.F. 1982. Operculina turpethum (Convolvulaceae) as a medicinal plant in Asia. Econ. Bot. **36**(3):265-269.
- Bauer, A.W., Kerby, W.M.M., Sheries, J.C. and Truck, M. 1966. Antibiotic susceptibility testing by a standard single disk method. Amer. J. Clin. Pathol. **45**:493-496.
- Beaujard, P. 1988. Plants and traditional medicine of South-East Madagascar. J. Ethnopharmacol. **23**(2-3):165-265.
- Bedi, S.J. 1978. Ethnobotany of the Ratan Mahal hills, Gujarat, India. Econ. Bot. **32**:278-284.
- Belog, F.B., Masilungan, V.A., De la Cruz, R.M., Ramos, E.V. 1976. Investigation of some Philippine plants for antimicrobial substances. Philipp. J. Sci. **105**(4):205-213.

- Bhakuni, D.S., Dhar, M.L., Dhar, M.M., Dhawan, B.N. and Mehrotra, B.N. 1969. Screening of Indian plants for biological activity. Indian J. Exp. Biol. **7**:250.
- Bhandari, C. 1951. Vanoushadhi Chandrodaya (Hindi). Kitabistan, Varnashi. pp.52-55.
- Bhatt, D.J., Baxi, A.J. and Parikh, A.R. 1963. Chemical investigations of the leaves of Sida rhombifolia Linn. J. Indian Chem. Soc. **60**(1):98.
- Bhowmick, B.N. and Vardhan, V. 1981. Antifungal activity of some leaf extracts of medicinal plants on Curvularia lunata. Indian Phytopathol. **34**(3):385-386.
- *Bisset, N.G. 1974. The Asian species of Strychnos Part III. The Ethnobotany. Lloydia **37**:62-107.
- Bocek, B.R. 1984. Ethnobotany of Costanean Indiana California, based on collections by Harrington, J.P. Econ. Bot. **38**(2): 240-255.
- Borthakur, S.K. 1978. Plants in folk lore and folk life of Karbis of Assam. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi: 288-296.
- *Butch, G.M. and Navachoo, I.A. 1988. Ethnobotanical exploration of Ladak - J & K. J. Phytol. Res. **1**(1):69-76.
- Bye, R.A. 1985. Botanical perspectives of ethnobotany of the greater South West. Econ. Bot. **39**(4):375-386.

- *Castelner, E.F. 1944. The domain of ethnobiology. Am. Nat. 78:158.
- Chandra, K., Pandey, B.N. and Lal, V.K. 1985. Folk-lore Medicinal plants of Bihar. Anc. Sci. Life. 4(3):181-185.
- Charya, M.A.S., Reddy, S.M., Kumar, B.P. and Reddy, S.R. 1980. Laboratory evaluation of some medicinal plant extracts against two pathogenic fungi. New Bot. 6:171-173.
- Chauhan, V. and Chauhan, N.S. 1988. Ethnobotany of Transgiri area of Sirmow district of Himachal Pradesh. Bull. Medico-Ethnobot. Res. 9(3-4):106-122.
- Chetty, K.M. and Rao, K.N. 1989. Ethnobotany of Sarakallu and adjacent areas of Chittoor District, Andhra Pradesh. Vegetos. 2(1):51-58.
- Chopra, S., Mehta, A., Mehta, P., Srivastava, R. and Kharya, M.D. 1981. Antibacterial activity of Azadirachta indica. Bull. Bot. Soc. Uni. Saugar. 24:74-76.
- Clark, A.M., Jurgens, T.M. and Huffort, C.D. 1990. Antimicrobial activity of juglone. Phytother. Res. 4(1):11-14.
- *Cruz, T., Cabo, M.P., Cabo, M.M., Jimenez, J., Cabo, J. and Ruiz, C. 1989. In vitro antibacterial effect of the essential oil of Thymus longiflorus Boiss. Microbios. 60(242):59-61.
- CSIR 1969. The Wealth of India. Council for Scientific and Industrial Research, New Delhi.

- Dagar, H.S. 1988. Euphorbiaceae in folk life of the Nicobarese tribals. Bull. Medico-Ethnobot. Res. 9(182):21-23.
- Dagar, J.C. and Dagar, H.S. 1984. Ethnobotanical and other uses of some gymnosperms found in Andaman and Nicobar Islands. J. Econ. tax. Bot. 9(1):201-205.
- Darias, V., Bravo, L., Rubaual, R., Sancez, L., Mateo, C., Luis, R.M.G. and Perez, H.A.M. 1989. New contribution to the ethno-pharmacological study of the Canary Islands. J. Ethnopharmacol. 25(1):77-92.
- Das, P.K. and Kant, R. 1988. Ethnobotanical studies of the tribal belt of Korapat (Orissa). Bull. Medico-Ethnobot. Res. 9(384):123-128.
- Davis, E.W. and Yost, J.A. The Ethno-medicine of a waorani of Amazonian Ecuador. J. Ethnopharmacol. 9(283):273-297.
- De, J.N. 1968. Ethnobotany - A newer science in India. Sci. Cult. 34:326-328.
- Deka, L., Majumdar, R. and Dutta, A.M. 1983. Some Ayurvedic important plants from district Kamrup (Assam). Anc. Sci. Life 3(2):108-115.
- Dennis, P.A. 1988. The Miskito of Eastern Nicaragua. Econ. Bot. 42(1):16-28.
- Dhananjayan, R., Gopalakrishnan, C. and Kameswaran, L. 1975. Antispasmodic action of the alcoholic extract of Tylophora asthamatica on isolated tissues. Indian J. Pharmacol. 7: 13-20.

Dikshit, A., Singh, A.K. and Dixit, S.N. 1980. Fungitoxic activity of some essential oils against Helminthosporium oryzae. Indian Perfum. **24**(4):222-223.

Dolores, L. and Lattore, A. 1977. Plants used by the Mexican Kickapoo Indians. Econ. Bot. **31**:340-357.

*Effron, D.H. 1967. Ethnopharmacologic search of psychoactive drug. US Public Health Publ. No.1645. Washington: 121.

Emeruwa, A.C. 1982. Antibacterial substance from Carica papaya fruit extract. J. Nat. Prod. **45**(2):123-127.

Faulks, P.J. 1958. An Introduction to Ethnobotany. Moredale Publications, London. pp.183.

*Fomum, Z.T., Ayafor, J.F. and Mbafor, J.T. 1983. Novel antibacterial flavanones from Erythrina sigmaidea. Tetrahedron Lett. **24**(38):4127-4130.

Gaitonde, B.B. and Mahajan, R.T. 1980. Antifertility activity of Lygodium flexosum. Indian J. Med. Res. **72**:597-604.

Gamble, J.S. 1957. Flora of the Presidency of Madras. Oxford and IBH, London.

Garg, S.C. and Kasera, H.L. 1983. In vitro antibacterial activity of the essential oil of Sphaeranthus indicus L. Fitoterapia. **54**(1):37-39.

- Ghosh, S.B., Gupta, S. and Chandra, A.K. 1980. Antifungal activity in rhizomes of Curcuma amada Roxb. Indian J. Exp. Biol. 18(2):174-176.
- Gopalakrishnan, C., Shankaranarayanan, D., Nazeemudin, S.K., Viswanathan, S. and Kameswaran, L. 1980. Indian J. Pharmacol. 12: pp.181.
- Gopalakrishnan, M. and Setty, R. 1978. Effect of papaya (Carica papaya) on pregnancy and estrus cycle in albino rat. Indian J. Physiol. Pharmacol. 22:66-70.
- Gore, K.V., Rao, A.K. and Guruswami, M.N. 1980. Screening of Indian plants for biological activity. In Dhar, M.L., Dhawan, B.N., Prasad, C.R., Rasthogi, R.P., Singh, K.K. and Tandon, J.S. Indian J. Med. Res. 71:144-148. .
- Gunvanti, H., Vaidya, B.G. and Sheth, V.K. 1986. Mimosa pudica (Linn.). Its Medicinal value and Pilot clinical use in patients with Menorrhagia. Anc. Sci. Life 5(3):156-160.
- Gupta, C. and Singh, V.P. 1982. In vitro antifungal effect of the essential oil of some medicinal plants. Sci. Cult. 48(12):441-443.
- Gupta, H.P., Mathur, I.S. and Gupta, S.K. 1979. Antisaps-
modic action of Tylophora asthamatica on rat lung perfusion. Indian Vet. Med. J. 3:69.
- Gupta, R. 1978. Plants in folk lore medicine of Himalayas. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi: 177-180.

- Gupta, S.P. 1978. Folk lore about plants with reference to Munda culture. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi: 194-198.
- *Han, J. 1988. Traditional Chinese medicine and the search for antineoplastic drugs. J. Ethnopharmacol. 24(1):1-17.
- Hansen, J. 1976. Adventitious root formation induced by gibberellic acid and regulated by irradiance of the stock plants. Phys. Plant. 32:170-173.
- *Harshberger, J.W. 1896. The purpose of Ethnobotany. Bot. Guz. 31:146-156.
- Hartmann, H.T. and Kester, D.E. 1983. Plant Propagation - Principles and Practices. Prentice Hall of India Pvt. Ltd., New Delhi. pp.211-271.
- Hazlett, D.L. 1986. Ethnobotanical observations from Cabecar and Guaymi settlements in Central America. Econ. Bot. 40(3):339-352.
- Hemadri, K., Raj, P.V., Rao, S.S. and Sharma, C.R.R. 1980. Folk-lore claims from Andhra Pradesh I. J. Sci. Res. Plants Med. 1(2):37-49.
- Hemadri, K. and Rao, S.S. 1983. Antifertility, Abortifacient and fertility promoting drugs from Dandakaranya. Anc. Sci. Life 3(2):103-107.
- Hindman, D.C. and Frodin, D.G. 1980. Ethnobotany of Schefflera in the OKTED Region, Papua New Guinea. Ethnomedicine 6(184):101-126.

- *Hocquemiller, R., Cava, A., Jacquemin, H., Touche, A. and Forgacs, P. 1982. Alkaloids from Annonaceae XXXVI, Alkaloids of Annona crassiflora. Mart. Plant. Med. Phtother. 16(1):4-6.
- Holdsworth, D. 1987. Medicinal Plants of the Morobe Province, Papua New Guinea. Part V. Int. J. Crude Drug Res. 25(4): 231-235.
- Holdsworth, D. and Wamoi, B. 1982. Medicinal plants of the Admiralty Islands, Papua New Guinea. Part I. Int. J. Crude Drug Res. 20(4):169-181.
- Hooker, J.D. 1890. Flora of India. International book distributors, Dehradun.
- Ikram, M. and Inam-ul Haq. 1984. Screening of medicinal plants for antimicrobial activities. Fitoterapia 55(1):62-64.
- Jain, P.C., Jain, C.K. and Jain, K. 1980. A note on the activity of odoriferous compounds against dermatophytes. Indian Drugs 17(12):397-398.
- Jain, S.K. 1963a. Studies in Indian ethnobotany - less known uses of 50 common plants from tribal areas of Madhya Pradesh. Bull. bot. Surv. India 5(384):223-226.
- Jain, S.K. 1963b. Studies in Indian ethnobotany - further contribution towards the less known plants from tribal areas of Madhya Pradesh. Bull. Bot. Surv. India 5(6):120-125.

- *Jain, S.K. 1964. Wild plant - foods of the tribals of Bastar (Madhya Pradesh). Proc. Nat. Acad. Sci. **30**:56-80.
- Jain, S.K. 1965a. Wooden Musical instruments of the Gonds of Central India. Ethnomusicology. **1**:39-42.
- Jain, S.K. 1965b. Medicinal plant lore of the tribals of Bastar. Econ. Bot. **19**:236-250.
- *Jain, S.K. 1967. Plants in Indian medicine and folk lore associated with healing of bones. Ind. j. Orthopaed. **1**:95-104.
- Jain, S.K. 1978. The method and prospects of studying folk life for plants. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi: 160-163.
- Jain, S.K. and Dam, N. 1979. Some Ethnobotanical notes from North Eastern India. Econ Bot. **33**:52-56.
- Jain, S.K. and De, J.N. 1964. Some less known plant foods among the tribals of Purulia (West Bengal). Sci. Cult. **30**:285-286.
- Janaki Ammal, E.K. 1954. The scope and functions of the reorganized Botanical Survey of India. Sci. Cult. **20**:275-280.
- Janaki Ammal, E.K. 1974. Plants and man. In Glimpses of Indian Ethnobotany. Jain S.K. (ed) 1981. Oxford & IBH, New Delhi 117-120.
- Janaki Ammal, E.K. and Jebhdas, W.A. 1978. Ethnobotany of the Kanikkara of South India. J. Indian Bot. Soc. **57**:66.

- Janaki Ammal, E.K. and Viswanathan, T.V. 1974. A high alkaloid containing race of Solanum incanum Linn. collected from the Paniyas of Kerala. Curr. Sci. **43**:378.
- Jha, A.K., Jha, S. and Mishra, N. 1989. Some folk medicines of Madhubani - North Bihar. Vegetos. **2**(1):104-107.
- Joarder, G.K. and Khatun, M. 1987. Inhibitory effects of lemon-grass oil on indigenous microflora. Part II. Bangladesh J. Sci. Ind. Res. **22**(1):41-48.
- John, D. 1984. One hundred useful raw drugs of the Kani tribes of Trivandrum Forest Division, Kerala, India. Int. J. Crude Drug Res. **22**(1):17-39.
- * Jones, V.H. 1941. The nature and status of ethnobotany. Chron. Bot. **6**:219.
- Joshi, M.C. 1988. Rare and endangered plants of Gujarat State forests. Bull. Medico-Ethno-Bot. Res. **9**(1&2):31-39.
- Joshi, P. 1982. An ethnobotanical study of Bhils - A preliminary survey. J. Econ. Tax. Bot. **3**(1):257-266.
- Ju, R.C. and Chow, C.C. 1983. Antimicrobial activity of various solvent extracts of Piper betle. Natl. Sci. Counc. Mon. **11**(5):385-394.
- Kachroo, P. and Nahvi, I.M. 1976. Ethnobotany of Kashmiris. In Forest flora of Srinagar. (ed) Singh, M.P. Dehradun. pp.239-263.

- Kalakoti, B.S. and Pangley, V.P.S. 1988. Ethnomedicine of Bhatia tribes of Kumaon Himalaya, U.P. Bull. Medico-Ethno-Bot. Res. 9(1-2):11-20.
- Karnick, C.R. 1983. Effect of Mantras on human beings and plants. Anc. Sci. Life 2(3):141-147.
- KAU 1986. Final Report of Co-ordinated Research Project on Restoration of Degraded Environment in Chambakad Tribal Colony Area. Kerala Agricultural University, Vellanikkara, Trichur, Kerala. 2-12.
- Khan, S.S. and Chaghatai, S.A. 1982. Ethnobotanical study of some plants used for curing skin afflictions. Ancient Sci. Life 1:236-238.
- Kharkongor, P. and Joseph, J. 1978. Folk-lore medicobotany of the rural folks of the Khasi and Jaintia tribes - Meghalaya. Xth International Congress on Anthropological and Ethnobotanical Science, New Delhi: 150-159.
- Khosha, R.L. and Singh, R.H. 1972. Betel nut - an antifertility agent. J. Res. Indian Med. 2(4):65-66.
- Kirtikar, K.R. and Basu, B.D. 1935. Indian Medicinal Plants Vol.1-4. L.N. Basu & Co., Allahabad.
- Koelz, W.N. 1979. Notes on the Ethnobotany of Lahul, A province of the Punjab. Q. J. Crude Dgur Res. 17(1):1-56.
- Krishna, B. and Singh, S. 1987. Ethnobotanical observations in Sikkim. J. Econ. Tax. Bot. 9(1):23-34.

- Kumar, A. and Sharma, V.D. 1982. Inhibitory effect of garlic (Allium sativum Linn) on enterotoxigenic Escherichia coli. Indian J. Med. Res. **16**:66-70.
- Kuppurajan, S., Rajagopalan, S.S., Sitaraman, R., Rajagopalan, V., Janaki, K., Revati, R. and Venkataraghavan, S. 1980. Pharmacological studies on Indian medicinal plants. In Current Research on Medicinal Plants in India. Dhawan, B.N. (ed). Indian National Science Academy, New Delhi. pp.55.
- Lakshmanan, K.K. and Narayanan, A.S.S. 1988. Some folk-lore medicines in the remote hamlets, Dhoomanoar and Chempukarai of Anakatty hills, Coimbatore, Tamil Nadu. Ind. J. For. **11**(3):217-219.
- Laurens, A., Mboup, S., Grono-Barber, P., Sylla, O., David-Prince, M. 1982. Study of antimicrobial activity of Anacardium occidentale L. Ann. Pharm. Fr. **40**(2):143-146.
- Leterme, E. 1982. Ethnobotanic study of the fruit species of Grand Lands. J. Agric. Trad. Bot. Appl. **29**(1):3-29.
- Lipp, F.J. 1971. Ethnobotany of Chinatic Indians, Mexico. Econ. Bot. **25**:234-244.
- Lokar, L.C. and Poldini, L. 1988. Herbal remedies in the traditional medicine of the Venezia Giuhia Region (North East Italy). J. Ethnopharmacol. **22**(3):231-279.

- Mahal, A.S., Ramu, M.G., Chaturvedi, D.D., Thomas, K.M., Sempali, H. and Murthi, M.N.S. 1976. Pharmacological studies on Indian medicinal plants. In Current Research on Medicinal Plants in India. (ed) Dhawan, B.N. Indian National Science Academy, New Delhi. pp.57.
- Maheswari, J.K., Kalakoti, B.S. and Lal, B. 1986. Ethnomedicine of Bhil Tribe of Jhabua District, M.P. Anc. Sci. Life 5(4):255-261.
- Maheshwari, J.K. and Singh, J.P. 1984. Plants used in Ethnomedicine by the Kohls of Allahabad District, Uttar Pradesh. Bull. Medico-Ethnobot. Res. 5(384):105-121.
- Mahunnah, R.L.A. 1987. Traditional plant medicines used by Hayas of North Western Tanzania. J. Econ. Tax. Bot. 10(2):371-379.
- Maitaile, G. 1981. Bibliography on botany and ethnobotany of China (ancient and contemporary). J. Agric. Trad. Bot. Appl. 28(384):353-368.
- Manandhar, N.P. 1987. An ethnobotanical profile of Manang Valley, Nepal. J. Econ. Tax. Bot. 10(1):207-214.
- Mandal, S. and Yonzone, R. 1988. Ethnobotanical studies on some plants of Darjeeling, India. Envir. Ecol. 6(4):849-854.
- Manilal, K.S. 1981a. Ethnobotany of the rices of Malabar. In Glimpses of Indian Ethnobotany. Jain, S.K. (ed). Oxford Publishing House, New Delhi. pp.297-307.

- Manilal, K.S. 1981b. An ethnobotanic connection between mushrooms and dolmens. In Glimpses of Indian Ethnobotany. Jain, S.K. (ed). Oxford & IBH, New Delhi. pp.321-325.
- Manilal, K.S. 1984. Hortus Malabaricus and the Ethnoiatrical knowledge of ancient Malabar. Anc. Sci. Life 4(2):96-99.
- Manilal, K.S. 1989. Linkages of ethnobotany with other sciences and disciplines. Ethnobotany 1(182):15-25.
- Mathur, P.R.G. 1987a. Anthropology of tribal medicine, disease and curing techniques among the tribals of North Wynad (Kerala), India. Paper presented at the National Workshop on Tribal health and Medicine in forest Environment, KIRTADS, Kozhikode.
- Mathur, P.R.G. 1987b. The ethnomedicine of the Irular of Attappady, Kerala. Paper presented at the National Workshop on Tribal health and Medicine in forest Environment, KIRTADS, Kozhikode.
- Mehra, K.L., Kanodia, K.C. and Srivastava, R.N. 1975. Folk uses of plants for adornment in India. Econ. Bot. 29:39-46.
- Misra, N., Batra, S. and Misra, D. 1988. Antifungal activity of the essential oil of Cymbopogon martini against Aspergilli. Int. J. Crude Drug. Res. 26(2):73-79.
- *Misra, S.B. and Dixit, S.N. 1979. Antifungal activity of leaf extracts of some higher plants. Acta Bot. Indica 7(2): 147-150.

- Mitscher, L.A., Park, Y.H., Clerk, D. and Beal, J.L. 1980. Antimicrobial agents from higher plants Antimicrobial isoflavanoids and related substances from Glycyrrhiza glabra L. var. typica. J. Nat. Proc. **43(2)**:259-269.
- *Mohsin, A., Shah, A.A., Al-Yahya, M.A., Tariq, M., Janira, M.O.M. and Agrel, A.M. 1989. Analgesic, antipyretic activity and phytochemical screening of some plants used in traditional Arab system of medicine. Fitoterapia **60(2)**:174-177.
- Montes, G.M., Wilkomirsky, F.T. 1981. Some aspects of popular indigenous medicine of the region of Bio-Bio Chile. An. Read. Acad. Farm. **47(8)**:272-284.
- Murthy, S.B., Garg, S.K. and Chaudhary, R.R. 1975. Antihyperglycemic effects of Azadirachta indica. Indian J. Med. Res. **57**:893-899.
- Nadkarni, K.M. 1954. Indian Materia Medica. Popular Prakashan, Bombay.
- Nagampalli, S.S. and Sheth, U.K. 1979. Broncho-dilatory and immuno suppressive action of the alcoholic extract of Tylophora indica. Indian J. Pharmacol. **11**:229-232.
- Nagaraju, N. and Rao, K.N. 1989. Folk-medicine for diabetes from Rayalaseema of Andhra Pradesh. Anc. Sci. Life **9(1)**: 31-35.
- Nagata, K.M. 1971. Hawaiian medicinal plants. Econ. Bot. **25**:245-254.

- Nair, K.V., Gopakumar, K., Yoganarasimhan, S.N., Shantha, T.R. and Kesavamurthy, K.R. 1986. Medico-Botany of Andaman and Nicobar Islands-IV. Ayurvedic drugs-2. Anc. Sci. Life 5(2):191-196.
- Nair, P.T. 1965. Tree-symbol worship among the Nairs of Kerala. Folk-lore 6:114-124. .
- Nair, V.N. 1985. Tribal health and medicine in Kerala - A study of interrelationship between habitat, health, medicine, society and culture. Ph.D. thesis submitted to the University of Calicut, Kerala.
- Nandha, K.K. and Anand, V.K. 1970. Seasonal changes in auxin effects on rooting of stem cuttings of Populus nigra and its relationship with mobilization of starch. Plant Physiol. 23:99-107.
- Narayana, V., Rao, K.K. and Giridhar, R. 1980. Antimicrobial activity of essential oil from Elettaria cardamomum Maton. East. Pharm. 23(271):113-144.
- Pal, D.C. 1972. Magico-religious belief about plants among adibasis of Bihar. Folk-lore 13(12):479-483.
- Pal, D.C. 1973. Tribal folk lore about some plants associated with eye treatment. Folk-lore 14(12):446-447.
- Pal, D.C. and Jain, S.K. 1988. Notes on Lodha Medicine in Midnapur District, West Bengal, India. Econ. Bot. 43:465-470.

- Pandey, D.K., Tripathi, N.N., Tripathi, R.D. and Dixit, S.N. 1982. Fungitoxic and phytotoxic properties of the essential oil of Hyptis suaveolens. Z. Pflauzenki Pflauzenschutz. 89(6):344-349.
- Pandey, G., Singh, V.K. and Batnagar, L.S. 1981. New records to the medicinal efficacy claims of certain plants recorded from Guntour forest circle, M.P. - A preliminary contribution. Bull. Medico-Ethno-Bot. Res. 2:303-315.
- Pathak, R.K., Chourasia, S.C. and Singh, K.V. 1979. Antibacterial activity of essential oil of some medicinal plants. Indian Drugs Pharm. Ind. 14(5):7-8.
- *Powers, S. 1874. cf. Schultes, R.E. 1967. The place of ethnobotany in ethnopharmimetic drugs. In Ethnopharmacologica Search for Psychoactive Drugs. (ed) D.Effron. Public Health Services Publishers No.1645. pp.33-57.
- Prakash, A.O. and Mathur, R. 1976. Screening of Indian plants for antifertility activity. Indian J. Exp. Biol. 14:623-626.
- Prakashi, A. and Basak, B. 1976. Abortifacient effect of steroids from Ananas comosus and their analogues on mice. J. Reprod. Fert. 46:461-462.
- Pushpangadan, P. 1986. 'Arogyapacha' (Trichopus zeylanicus Gaertn.) - The 'Ginseng' of Kani tribe of Agasthyar hills (Kerala) for evergreen health and vitality. Anc. Sci. Life 8(1):13-16.

- Pushpangadan, P. and Atal, C.K. 1984. Ethno-medico-botanical investigations in Kerala I. Some primitive tribals of Western Ghats and their herbal medicine. J. Ethnopharmacol. **11(1)**:59-77.
- Quanshah, N. 1988. Ethnomedicine in the Maroantsetra Region of Madagascar. Econ. Bot. **42(3)**:370-375.
- Raghunathan, K. 1976a. Andaman and Nicobar Island. Recordings of the Medico-Botanical Survey Team. CCRIMH, New Delhi. Publication No.19.
- Raghunathan, K. 1976b. Preliminary Techno-economical Survey of natural resources and herbal wealth of Ladakh. CCRIMA, New Delhi. Publication No.21.
- Raghunathan, K. 1976c. Tribal pockets of Nilgiris. Recordings of the field study on medicinal flora and health practices. CCRIMH, New Delhi. Publication No.22.
- Ramachandran, V.S. and Nair, N.C. 1981. Ethnobotanical studies of the Irulas of Tamil Nadu and Cannanore District, Kerala. J. Econ. Tax. Bot. **2**:65-72.
- Rao, K.P. and Sreeramalu, S.H. 1985. Ethnobotany of selected Medicinal Plants of Srikakulam District, Andhra Pradesh. Anc. Sci. Life **4(4)**:238-244.
- Rao, R.R. and Jamir, N.S. 1982. Ethnobotanical studies in Nagaland I. Medicinal Plants. Econ. Bot. **36(2)**:176-181.

- Reddy, M.B., Reddy, K.R. and Reddy, M.N. 1988. A survey of medicinal plants of Chenchu tribes of Andhra Pradesh. Int. J. Crude Drug Res. 27(1):189-196.
- Reddy, M.K., Viswanathan, S., Sambantham, P.T., Ramachandran, S. and Kameswaran, L. 1986. Effect of Leucas aspera on experimental inflammation and mast cell degranulation. Anc. Sci. Life 5(3):168-171.
- Reddy, R.K., Sundaram, G. and Rao, G.P. 1989. Plant drugs of Chittoor District, Andhra Pradesh, India. Int. J. Crude Drug Res. 27(1):41-54.
- Robbins, W.W., Flarrington, J.P. and Freire-Marreco. 1916. In The Ethnopharmacologic Search for Psychoactive Drugs (ed) Effron, D. Public Health Service. Publication No. 1645. pp.33-57.
- Sahu, T.R., Sahu, I. and Dakwale, R.B. 1983. Further contributions towards the ethnobotany of MP 2: Plants used against diarrhoea and dysentery. Anc. Sci. Life 2(3): 169-170.
- Saklani, A. and Jain, S.K. 1988. Ethnobotanical observations on plants used in North-Eastern India. Int. J. Crude Drug Res. 27(2):65-73.
- Sanjappa, M. 1987. The Indigoferas of Sri Lanka. J. Econ. Tax. Bot. 10(2):711-903.

- Sankaranarayanan, A.S. 1988. Folk-lore medicines for jaundice from Coimbatore and Palghat Districts of Tamil Nadu and Kerala, India. Anc. Sci. Life 7(3&4):175-179.
- Schultes, R.E. 1937. Peyote (Lophophora williamsii) and plants confused with it. Bot. Mus. Leaflet 5:61.
- *Schultes, R.E. 1941. La ethnobotanica: su alcance Y sus objetos. Caldoria. 3:7.
- *Schultes, R.E. 1954. A new narcotic snuff from the North West Amazon. Bot. Mus. Leaflet 16:241.
- Schultes, R.E. 1956. Ethnobotanical research on less known medicinal plants of India. In Cultivation and Utilization of Medicinal Plants. Atal, C.K. and Kapur, B.M. (ed). CSIR. pp.538-557.
- *Schultes, R.E. 1957. The identity of the malphigiaceous narcotics of South America. Bot. Mus. Leaflet 18:1.
- Schultes, R.E. 1960. Tapping our heritage of ethnobotanical lore. Econ. Bot. 14:257-262.
- *Schultes, R.E. 1961. Native narcotics of the new world. Texas J. Pharm. 2:142-167.
- *Schultes, R.E. 1962. The role of the ethnobotanist in the search for new medicinal plants. Loydia 25:257-285.

- *Schultes, R.E. 1963a. The widening panorama in Medical botany. Rhodora **65**:97-120.
- *Schultes, R.E. 1963b. Botanical sources of the new world narcotics. Psyched Rev. **1**:145-166.
- *Schultes, R.E. 1965. E in halbes Jahrhundert Ethnobotanik ameri-
kanischer Hallu zenogene. Planta Medica **13**:125-152.
- Schultes, R.E. 1967. The place of ethnobotany in the ethnopharma-
cologic search for psychoactive drugs. In The Ethnopharma-
cologic Search for Psychoactive Drugs. Efforon, D.H. (ed)
U.S. Public Health Service. Publication No.1645. pp.33-
57.
- Schultes, R.E. and Raffauf, R.F. 1960. Prestonia - An Amazon
narcotic or not. Bot. Mus. Leaflet **19**:109-122.
- Sengupta, P.N. and Biswas, S.K. 1956. Studies on the nutritional
status of the Kanikkar and Urali tribes of Travancore.
Bull. Anthropol. Surv. India. **9**(2):25-37.
- Shah, C.S. 1982. Recent developments of some natural products
in Cultivation and Utilization of Medicinal Plants. Atal,
C.K. and Kapur, B.M. (ed) 1982. CSIR. pp.128-132.
- Shah, G.L. and Gopal, G.V. 1985. Ethnomedical notes from the
tribal inhabitants of the North Gujarat (India). J. Econ.
Tax. Bot. **6**(1):193-201.
- Shah, N.C. and Joshi, M.C. 1971. An ethnobotanical study of
the Kumaon Region of India. Econ. Bot. **25**:414-422.

- Shah, N.C. and Kapoor, L.D. 1974. A study of Embelia ribes Burm. J. Res. Ind. Med. 9:11-12.
- Shah, N.C. and Kapoor, L.D. 1977. Ethnobotany of Acorus calamus. Indian J. Pharm. 28:155.
- Sharma, B.N. 1988. Traditionally useful medicinal plants of Totladoha. Bull. Medico-Ethno-Bot. Res. 7(3&4):110-119.
- Sharma, D. 1988. Aloe - a safe home remedy. J. Nat. Int. Med. Assoc. 30(12):9-10.
- Sharma, D.C. 1969. Vedon mein Dravyagun Shasta (Hindi) Ayurved. Gujarat University, Gujarat. pp.62-74.
- Sharma, P.C. 1981. Folk-lore antifertility plant drug of Bihar. Bull. Medico-Ethno-Bot. Res. 2:296-302.
- Sharma, P.V. 1971. Trimala Bhatt: His date and work with special reference to his materia medica in one hundred versus. Indian J. Hist. Sci. 6:67-74.
- Sharma, P.V. 1972. Bhava Mitra - A land mark in History of Indian Medicine. J. Res. Indian Med. 1:63-75.
- Sharma, P.V. 1973. Drugs as land mark of the history of Indian Medicine. J. Res. Indian Med. 8:86-93.
- Shekhawat, G.S. and Anand, S. 1984. An ethnobotanical profile of Indian desert. J. Econ. Tax. Bot. 5(3):591-598.

- Shivpuri, D.N., Menon, M.P.S. and Prakash, D. 1986. Biological screening of plants for bronchial asthma. J. Assoc. Physician India. **16:9**.
- Siddique, M.B., Alamo, M.M. and Hussain, W. 1989. Traditional treatment of skin diseases in Uttar Pradesh, India. Econ. Bot. **43:481-486**.
- Singh, A.K., Dikshit, A. and Dixit, S.N. 1983. Fungitoxic properties of essential oil of Mentha arvensis var. piperascens. Perfum. Flavorist **8(11):55-58**.
- *Singh, B. and Chunekar, K.C. 1972. Glossary of vegetable drugs in Bralittayil (Hindi). Chowkhamba Press, Varanasi. pp.29.
- Singh, H. 1988. Ethnobotanical treatment of piles by Bhoras of Uttar Pradesh. Anc. Sci. Life **8(2):167-170**.
- Singh, K.K., Pelvi, S.K. and Singh, H.B. 1981. Survey and biological activity of some medicinal plants of Mannanur forest, A.P. Indian J. For. **4:115-118**.
- Singh, K.P. 1986. Clinical studies on amoebiasis and giardiasis evaluating the efficacy of Kutaja (Holarrhena antidysenterica) in Entamoeba histolytica cyst passers. Anc. Sci. Life **5(4):223-231**.
- Singh, P.N., Shoeb, A., Kapil, R.S. and Popli, S.P. 1989. Screening of medicinal plants for biological activity. Phytochemistry. **25 B:1258**.

- Singh, V. and Pandey, R.P. 1980. Medicinal plant lore of the tribals of eastern Rajasthan, India. J. Econ. Tax. Bot. 1:137-147.
- Sinha, M., Mukherjee, B.P., Mukherjee, B., Sikdar, S. and Dasgupta, S.P. 1975. Indian J. Pharmacol. 798-100.
- Spiegel, P. 1954. Auxins and inhibitors in canes of Vitis. Bul. Res. Coun. Israel. 4:176-183.
- Tarafder, C.R. 1978a. Some interesting new uses of the well known plant Vitex negundo L. Bull. Bot. Surv. India 20: 176-177.
- Tarafder, C.R. 1978b. Plants used for antifertility and conception from the Dangas forests in Gujarat. Indian J. For. 1:1319.
- Tarafder, C.R. 1983a. Ethnogynaecology in relation to plants Part II, Plants used for abortion. J. Econ. Tax. Bot. 4:507-516.
- Tarafder, C.R. 1983b. Traditional medicinal plants used by tribals of Ranchi and Hazaribagh districts of Bihar - Plants used in stomach troubles. J. Econ. Tax. Bot. 4:891-896.
- Thakare, R.P. 1980. Studies on the antibacterial activity of some plant extracts. Indian Drugs 17(5):148.
- Thomas, O.O. 1989. Re-examination of antimicrobial activity of Xylopi arthiopia, Carica papaya, Ocimum gratissimum and Jatropha curcas. Fitoterapia 60(2):147-155.

- Thothathri, K., Banerjee, S.P., Hazra, P.K. and Pal, G.D. 1973. Botanical results of the joint scientific expedition to the great Nicobar Island. Bull. Bot. Surv. India **15**:235-265.
- Thyagarajan, S.P., Thiruneelakantan, K., Subramanian, S. and Sundaravelu, T. 1982. In vitro anti-hepatitis activity of Phyllanthus fraternus. Indian J. Med. Res. **76**(8):99-101.
- Tirupathi, R., Majumder, R. and Bhattacharjee. 1978. Some medicinal plants from district Tirap of Arunachalpradesh. Indian J. Pharm. Sci. **40**:206-208.
- Tiwari, K.C., Majumdar, R., Bhattacharjee, S. 1979. Folk lore medicines from Assam and Arunachal Pradesh. Q. J. Crude Drug Res. **17**(2):61-67.
- Tiwari, K.C., Majumdar, R. and Bhattacharjee, S. 1981. Folklore information from Assam for family planning and birth control. Int. J. Crude Drug Res. **19**(2):57-69.
- Tiwari, K.C., Majumdar, R., Sharma, B.N. and Bhattacharjee, S. 1988. Some medicinal plants and folk tribal medicinal claims from Garo belts of Meghalaya. Bull. Medico-Ethno-Bot. Res. **7**(3&4):120-137.
- Trotter, R.T. 1981. Folk remedies as indicators of common illness: examples from the United States - Mexico border. J. Ethno-pharmacol. **4**:207-221.

- Uniyal, M.R. 1968. Medicinal plants of Bhagirathi valley lying in Uttarkashi forest division. Indian For. **94**:407-420.
- Uniyal, M.R. and Billare, K.V. 1973. Tylophora hirsuta - an indigenous drug for inducing abortion. J. Res. Indian Med. **8**(1):95.
- Uniyal, M.R. and Issar, R.K. 1988. Utility of hitherto unknown herbal drugs traditionally used in Ladak and possible alternative medicines. Bull. Medico-Ethno-Bot. Res. **9**(384): 96-105.
- Umarani, D., Devaki, T., Govindaraju, P. and Shanmugasundaram, K.R. 1985. Ethanol induced metabolic alterations and the effect of Phyllanthus fraternus in their reversal. Anc. Sci. Life **4**(3):174-180.
- Uppalapati, L. and Rao, J.T. 1979. Antimicrobial properties of the essential oil of Vitex negundo. Indian Drugs Pharm. Ind. **14**(4):31-33.
- Vaidya, B.G. and Shetti, B.V. 1985. Some controversial drugs of India Medicine. J. Res. Indian Med. **20**(3):64-77.
- Venkatraghavan, S.; Seshadri, C., Sundersan, T.V., Revathi, R., Rajagopalan, V. and Janaki, K. 1980. Pharmacological studies on Indian medicinal plants. J. Res. Ayu. Sidha. **1**:370.
- *Vestal, A. and Schultes, R.E. 1939. The Economic Botany of Kiwa Indians as it relates to the history of the tribes. Thesis submitted to Harvard University, London.

- Viswambharan, V. and Aravindakshan, M. 1987. Agricultural Situation in Tribal Colonies. Directorate of Extension, Kerala Agricultural University. pp.40.
- Viswanathan,, T.V. 1973. A new source of glyco-alkaloid Solanum trilobatum Linn. and its tetraploid derivative. Curr. Sci. **42**:805.
- Viswanathan, T.V. 1975. Cytongenetic studies on some medicinal plants of the genus Solanum utilized by the tribals of Kerala and Tamil Nadu. Ph.D. Thesis submitted to the University of Calicut, Kerala.
- Vyas, D.S., Sharma, V.N., Sharma, H.K. and Khanna, N.K. 1979. Pharmacology of medicinal plants. J. Res. Indian Med. Yoga Homoeao. **14**:63-66.
- Wat, C.K., Johns, T. and Towers, N.G.H. 1980. Phototoxic and antibiotic activities of plants of the Asteraceae used in folk medicine. J. Ethnopharmacol. **2**(3):279-290.
- Weiner, M.A. 1971. Ethnomedicine in Jonga. Econ. Bot. **25**:423-450.
- Wiragonda, P.B. 1980. The traditional medicine in Sri Lanka. J. Ethnopharmacol. **2**:71-73.
- Wilson, R.T. and Morian, W.G. 1979. Medicine and magic in Central Tigri. A contribution to the Ethnobotany of the Ethiopian Plateau. Econ. Bot. **33**(1):29-34.

- Wong, W. 1976. Some folk medicinal plants from Trinidad. Econ. Bot. **30**:103-142.
- Yoganarasimhan, S.N., Tcgunassheri, K.R., Murthy, K. and Govindan, A. 1982. Medico-botany of Thumkur district, Karnataka. J. Econ. Tax Bot. **3**:391-406.
- Zimmerman, P.W. 1980. Oxygen requirement for root growth of cuttings in water. Amer. J. Bot. **67**:842-861.
- Zoller, C. 1980. Traditional medicine in Latin America with particular reference to Mexico. J. Ethnopharmacol **2**:37-41.

* Originals not seen

ETHNOBOTANY OF MEDICINAL PLANTS USED BY TRIBES OF KERALA

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ABSTRACT OF THE THESIS

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ABSTRACT

Investigations were carried out on the Ethnobotany of medicinal plants of the tribes of Kerala in the Centre for Advanced Studies on Humid Tropical Tree Crops and Environmental Horticulture attached to College of Horticulture, Vellanikkara during 1988-1991. The study included documentation of ethnomedicines, botanical description and propagation of selected five rare plants and screening of selected plants for antimicrobial activity. The Malayan tribe of the selected localities, viz., Chimminy, Marottichal, Sholayar, Vazhachal and Vazhani were selected for the study.

Ethnomedico-botanic information on 212 plant species, belonging to 184 genera of 73 families were documented. According to the magnitude of availability of information and plants, the localities could be ranked as Sholayar > Vazhachal > Marottichal > Chimminy/Vazhani. Erosion of the knowledge and depletion of the flora as urbanization advances were observed.

The tribe knew the remedy for almost all the common diseases. Single plant remedies were observed for alopecia (Nyctanthes arbor-tristis), bone fracture (Justicia gendarussa), paralysis (Cassia fistula), prolapse of the rectum (Mangifera indica), whitlow (Euphorbia antiquorum) and as analgesic (Thevetia neriifolia), antilactogenic (Jasminum pubescens) and diaphoretic (Oroxylum indicum). Maximum number of plants, either alone or in combination

were used for eye diseases followed by diarrhoea and dysentery, loss of hair and snake bite.

Plants used as animal and insect repellents and for cattle diseases were also documented. Information was also obtained on diagnostic and prophylactic plants. Use of Allium sativum along with Ocimum sanctum as a prophylactic for mumps, Ailanthus excelsa for malarial fever, and the leaves of Tragia involucrata for diagnosing pregnancy were very simple and worth mentioning.

Plants were used in combination with other plants; plant products like oils, jaggery, sugar, animals like chicken, crab and tadpole; animal products like butter, honey and milk; and inert materials like ash, clay and salt.

Religious or magical rituals accompany the uses of certain plants. They also keep certain taboos about medicinal plants.

Five rare plants, Alstonia venenata, Coscinium fenestratum, Habenaria latilabris, Rotula aquatica and Woodfordia fruticosa were botanically described and illustrated. Feasibility of multiplication of these species under Vellanikkara conditions revealed that the easiest method of multiplication was through root cuttings in Coscinium fenestratum, pseudobulbs in Habenaria latilabris, hardwood cuttings in Rotula aquatica and seeds in Woodfordia fruticosa. In Alstonia venenata, the treatments tried were not successful.

None of the ether and alcoholic plant extracts screened showed any antimicrobial properties while the essential oils from four plants showed remarkable traits in this aspect.

Clove leaf oil was found to be inhibitory to all the bacteria and fungi tested. The inhibition was more compared to most of the antibiotics and fungicides available in the market. The essential oil of Coscinium fenestratum and Cinnamomum verum also showed fairly good antibacterial and antifungal properties. The essential oil of Alstonia venenata was able to suppress the growth of bacteria, though ineffective in the case of fungi. However, further in vivo studies are required in order to prove its efficacy in natural/experimental infections before its utility is advocated for field conditions.

The information gathered revealed that the tribal community of Thrissur District has a traditionally self managed system of folk medicine. Comprehensive and systematic surveys and documentation are required in other unexploited areas also for gathering such valuable information before they are being lost.