CATALOGUING OF MEDICINAL PLANTS IN VELLANIKKARA RUBBER ESTATE

By

K. K. RAGHAVAN

DISSERTATION

Submitted in partial fulfilment of the requirements for the Post Graduate Diploma in Natural Rubber Production of the Kerala Agricultural University

Department of Plantation Crops and Spices
COLLEGE OF HORTICULTURE
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1992

DECLARATION

I hereby declare that this dissertation entitled **"Cataloguing of Medicinal Plants in Vellanikkara Rubber Estate"** is a bonafide fide record of research work done by me and that this dissertation has not previously formed the basis for award to me, of any degree, diploma or other similar title of any other University or Society.

Vellanikkara,
18-7-1992.

K.K. RAGHAVAN

CERTIFICATE

Certified that this dissertation entitled "Cataloguing of Medicinal Plants in Vellanikkara Rubber Estate" is a record of research work done independently by **SRI.K.K. RAGHAVAN** under our guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma or fellowship to him.

We, the undersigned members of the Advisory Committee of **SRI.K.K. RAGHAVAN**, a candidate for the Post Graduate Diploma in Natural Rubber Production, agree that the dissertation may be submitted by him in partial fulfilment of the requirement of the Diploma.

Dr.G. Sreekandan Nair
(Chairman)
Professor and Head
Dept. of Plantation Crops & Spices
College of Horticulture
Vellanikkara

Sri.P.J. George
(Co-Chairman)
Deputy Director
Germplasm Division
Rubber Research Institute
of India
Kottayam-9

Dr.P.A. Nazeem
(Member)
Associate Professor
Dept. of Plantation Crops
and Spices
College of Horticulture
Vellanikkara

Dr.Alice Kurian
(Member)
Associate Professor
Dept. of Plantation Crops
and Spices
College of Horticulture
Vellanikkara

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K.K. RAGHAVAN

CONTENTS

LIST OF PLATES

Introduction

1. INTRODUCTION

India is an evergreen emporium of medicinal plants. The drug resources of our country are vast and inexhaustible and it can be said without exaggeration that India could supply the whole of the civilized world with medicinal herbs. Most of the drugs of established therapeutic value used in the pharmacopoeias of different countries grow in great abundance and often in a state of nature in many parts of India. Medicinal properties, some genuine, some otherwise, have been attributed to a large variety of plants, more than 15,000 in number. India possesses climatic conditions varying from the torrid to the frigid zone. It embraces vast tracts of tropical plants, temperate hills and valleys, irrigated soil, most and dry climates. It is an accepted fact that the tropical rain forests are the richest biome on earth. In terms of human existence, the tropical rain forests represent a store of renewable natural resources, which have for eons, by virtue of their richness in both flora and fauna, contributed a myriad of items for the survival and well being of man. These include basic food supplies, clothes, shelter, fuel, spices, industrial raw materials and medicines (ethical drugs).

No one would seriously challenge the fact that man is still largely dependent on plants in treating his ailments. It is clear that plants can be useful in their crude or advanced

forms as drugs, that plants offer a source of drugs in their pure state and that biologically active secondary metabolites from plants can serve as templates for the synthesis of modern drugs. A large number of angiosperm species including medicinal plants are projected to become extinct within a decade or so, due to the mass extinction process as a consequence of disappearance of the rain forest due to encroachment and extensive cultivation and indiscriminate collection.

Traditionally, practitioners of the Indian systems of medicines - Ayurveda, Unani, Sidha - made up their own prescriptions for their patients, but, now a days, most of their remedies are manufactured products. The increasing demands of the pharmaceutical industry have created problems of supply and one of the major difficulties being experienced by the Indian system of medicine is the scarcity of medicinal plants for the manufacture of genuine remedies. For certain drugs like penicillin, aspirin etc. we still depend on plant sources. So there is urgent need to creat greater general awareness amongst the population as a whole, the medicinal and economic value of these plants, so that this heritage may be wisely used and exploited, and at the same time conserved for future generation.

As indicated earlier natural resources are now being threatened by deforestation and conversion of the land for agricultural purposes. Vast area is being converted into plantations

like rubber, tea etc. Natural Rubber plantation industry which took its tiny first step into our country at the dawn of the present century now covers more than 4.50 lakh hectares spread over in almost all states where rubber can grown as a commercial crop. In this steady progress towards its proliferation, the natural vegetation in large areas is destroyed during weeding operations at the time of cultivation. However, a large number of herbs and shrubs (more than 100 species) of annual or perennial nature are growing as under growths in the plantations. Weeds compete with rubber for light in the initial years and for moisture and nutrients at the later stage. Hence these plants are being eradicated during the cultural practices adopted in the plantation as they are harmful to the main crop. Weed control is one of the most important cultural practices in rubber plantations especially during the immature phase. The cost of manually controlling weeds amounts upto 34% of the total cost of cultivation in the unproductive immature phase of rubber making the most costly component. Weed control is to be carried out in mature areas also.

The lush natural flora of shade tolerent weed plants growing in the plantations contains a large number of species which are widely used in the folk medicines and indigenous medicines. Identification and cataloguing of the most important species of medicinal value will provide valuable information on the richness

of these plants in these areas. It will also help to identify the species which can be tried as intercrops in rubber plantations. And it was in this context the present study was undertaken.

Review of Literature

2. REVIEW OF LITERATURE

Plants have always played a major role in the treatment of human diseases. Use of plants for medical treatment in India dates back over 5000 years and has become codified in the Ayurveda, which contains over 8000 herbal remedies. Ayurveda, infact, is the very foundation stone of the ancient medical science of India. It is followed by Susruta and Charaka. After the period of Tantras and Siddhas, the glories of Hindu Medicine waned and declined due to the invasion of India by the Greeks, Scythians and Mohammedans suscessively. No original works were written and a good deal of existing Ayurvedic literature was mutilated or lost. When the British rule was established, the western system was introduced. Of late, considerable interest has been evinced by the public and by the medical profession regarding the use of indigenous drugs in the treatment of diseases. It is argued that apart from economic considerations, these drugs are more suited to the habits of the people and the climatic condition prevailing in this country.

The study of Indian indigenous drugs was first begun in the early part of the last century and it was then confined chiefly to the collection of available information about various medicinal plants. "Hortus Malabaricus" by Von Rheedes (1678) was the

first systemic work which codified the medicinal use of plants of India. The other earliest contributions were from Sir William Jones who wrote a memoir entitled "Botanical observations on select plants". This was followed in 1810 by John Fleming's "Catalogue of Indian Medicinal Plants and Drugs", Ainslies's "Materia Medica of Hindustan" in 1813, and Roxburgh's "Flora Indica" in 1874. O'Shanghnessy's (1841) "The Bengal Dispensatory and Pharmacopoeia" was the first book of its kind which dealt exclusively with the properties and uses of medicinal plants used in Bengal. In 1868, a 'Pharmacopoeia of India' was published by Waring. Mohideen Sheriff (1869) published his "Supplement to the Pharmacopoeia of India" which added considerable utility to Waring's work. "Materia Medica of Madras" by the same author was edited and published by Hooper. It is a very useful work dealing with drugs growing in the Madras Presidency and in use there. Dymock's (1883) "Vegetable Materia Medica of Western India", "Pharma Cographia Indica" in 1890-93 under the joint-editorship of Dymock, Warden and Hooper are some of the other works. It is a most careful and useful compilation containing a mass of information regarding the uses of the indigenous materia medica in the Eastern and Western medicine. "A Dictionary of the Economic products of India" by Sir George Watt (1889-1904) gives a summary of all the previous work on the medicinal plants. Works published later such as Kanailal Dey's "Indigenous Drugs of India" and Kirtikar and Basu's "Indian Medicinal Plants" are

largely summaries and compilation from the above mentioned literature. In the latter work, plates illustrating various important medicinal herbs are given which greatly help the worker in differentiating them from plants with which they are apt to be confused. Rao (1914) gives description and medicinal uses of 3535 plants of Travancore State.

Another work on the subject is the "Wealth of India" which is being published from 1949 under the auspices of the Council of Scientific and Industrial Research. In these the results of investigation of many drugs are given. Mooss (1953) in his "Ayurvedic Flora Medica" deals with the properties and notes on identification of important medicinal plants. "Indian Materia Medica" of Nadkarni (1954) is a worthy work on the subject. Chopra's (1956) "Glossary of Indian Medicinal Plants" gives brief notes on Pharmacological action and uses, chemical constituents etc. of common medicinal plants of India. Chopra's "Indigenous Drugs of India" (1958) explains in detail the pharmacopoeial and allied drugs, drugs used in the indigenous medicines, common bazar medicines of India etc. Dastur (1962) in his "Medicinal Plants of India and Pakistan" describes the morphological characters, action and uses of common medicinal plants of India and Pakistan.

Mooss (1976) reports the vegetable drugs that can be used as single drug remedies with much benefit as first aid

and in certain cases of common ailments. Dey (1988) introduces the Indian Medicinal Plants used in Ayurvedic preparations.

Chemical constituents of Medicinal Plants

It is well known that plants generally owe their virtues as medicinal agents to certain characteristic constituents like alkaloids, glycosides, saponins, flavonoids, tannins, volatile oil, steroids and/or terpenoids, resin and mucilage present in them. Plants synthesise these organic compounds during their metabolic process when they grow. The nature and amount of these chemical substances vary according to the agro-climatic conditions, growth stage etc. of the plant (Chopra et al., 1958). Orthodox medicine today relies to a great extent upon chemicals first located in plants, like morphine, vincristine, digoxine etc. Salicylic acid contained in Willow bark and violets is the glycosidal forerunners of aspirin. Penicillin, one of most famous antibiotics, vital in curing viral diseases, is a contribution from the lowest form of plant life (fungi).

The plants which provide almost all the known cures of human illness, can be dangerous too. The cardiac glycosides and pyrolizidine alkaloids are lethal to human, when they are administered indiscriminately. The deadly night shade, Atropa belladonna, which produces the alkaloids hyoscyamine and

hyoscine, ingested in over dose is fatal, but carefully controlled dose of belladonna is a valuable spasmolytic agent (Mossa et al., 1987).

The total effect of a plant when it is administered in its original complex biochemical package, is rarely produced by the isolated active principle. For example, the root of Rauvolfia serpentina was introduced into western medicine as a tranquilizer. When reserpine, one of the major alkaloids of this plant was used for this purpose, numerous cases were reported that patients treated with reserpine becoming depressed, while there was no report of patients who had received total extract of roots becoming depressed. We can elucidate the reason for this beneficial total effect of the plant extract as a synergistic or modifying action of the accompanying chemicals in the extract on the pharmacological activity of the main constituents (Mossa et al., 1987).

The alkaloids give a bitter taste to the plant and a considerable number of medicinal drugs owe their curative properties to these principles. Many naturally derived drugs like morphine from poppy, nicotine from tobacco, cocaine from cocoa, caffeeine from coffee etc. are alkaloids of plant origin (Chopra et al., 1958). Nearly 30 alkaloids have been detected from the roots of Rauvolfia serpentina, and reserpine is the most

important one (Duke, 1985). Codeine, emetine, quinine etc. are other examples of alkaloids of plant origin.

Glycosides are much wider in occurance than alkaloids and they are sugar containing compounds. They constitute major classes of drugs like digitalis glycosides, sennosides, rutin, arbutin etc. Saponins are glycosides generally with sterols or triterpenes as their aglycones. Saponin containing natural ingredients are sarsaparilla, alfalfa, fenugreek, licorice etc. (Mossa et al., 1987).

Essential oils, also known as volatile oils are usually complex mixtures of a wide variety of organic compounds like hydro-carbons, alcohols, ketones, phenols, acids, aldehydes, esters, oxides, sulphur compounds etc. eg. clove, cinnamon, peppermint, lemon and orange oils.

Further it is known that at least 121 chemical substances of known structure are still extracted from plants that are useful as drugs throughout the world (Farnsworth and Soejarto, 1988). According to an estimate of world Health Organisation (WHO), approximately 80% of the people in developing countries rely chiefly on traditional medicines for their primary health care needs, of which a major portion involves the use of plant extracts or their active principles. Even in the United States, where synthetic dominates the drug market scene, plant product still

represent an important source of prescription drugs using as extracted form, purified drugs, source of chemicals and herbal remedies (Farnsworth and Soejarto, 1988).

Weeds in rubber plantations

The agro-climatic conditions under which the rubber is grown are favourable for the luxurient and rapid growth of different weeds. As the land is cleared for planting, whether it is new planting or replanting, vigorous growth of natural weed species dominates the area. Chromoleana oderata (Eupatorium odoratum) is the most common noxious weed found in such areas. The other weeds commonly found in the rubber plantations in South India are Lantana aculeata, Mimosa pudica, Imperata cylindrica, Pennisetum polystygon, Borreria spp. and a variety of other plants (Potty et al., 1980). Rubber in its first two two years does not occupy an area more than 10-15% of the land leaving the balance portion exposed to weed population. Weeds are a serious problem in all rubber plantation as they compete with rubber for sunlight, water and nutrients resulting in the suppressed growth of the latter especially during its initial period of growth. Uncontrolled growth of weeds will also hinder cultural operations. Hence weed control is an important cultural practice in rubber plantations. The weeds are controlled either by manual weeding or by the chemical herbicides. Establishment of leguminous cover crops in plantation is another practice to smother the

weeds. It is reported that the cost of weed control accounts to 34% of the total cost of cultivation in the immature phase of rubber, making it the most costly component. Regeneration of weeds is less in mature plantation because by that time the canopy of rubber tree would have closed.

When the weeds in the plantations are examined it was noted that many of them are useful medicinal plants. Those medicinal plants which are having good local demands can be tried as intercrops in plantations utilising the vast area now under rubber. This step will also help to conserve the endangered species.

Cultivation of medicinal plants

The collection of drugs scattered in forests is a very difficult task and often the cost of collection increases considerably the price of the crude drugs and their preparation. The disadvantages regarding the collection of drugs when they are growing in a state of nature in scattered areas are, difficulty of access and transport when the natural home of the drug plant is far away, sparse distribution, indiscriminate collection which may lead to exterminations, ignorance of collectors generally leading to the admixture of genuine with spurious plants. Due to the destruction of forests, over grazing of meadows, expansion of industry and urbanization, as well as excessive collection

in the wild, of rare and endangered plants, the natural resources of medicinal plants are being depleted day by day.

It is on account of these difficulties a suggestion was made to cultivate them. In order to ensure a regular supply of all drugs of standard quality to the pharmaceutical industry, it is essential that drugs growing in a state of nature should be brought under systematic cultivation and those which are exotics should be introduced and cultivated. Medicinal plants such as digitalis, cinchona, ipecacuanha, pyrethrum etc. have been tried in botanical gardens and in the tea and coffee plantations. At present the cultivation of drugs and narcotics occupy only a very small percentage of the total area under cultivation. Cinchona, hemp, tobacco, opium etc. occupy a comparatively small acreage (Chopra et al., 1958).

Of late, more interest is being given in cultivation of drug plants in India. A number of drug farms have been started. In Kashmir, digitalis, belladonna, hyoscyamus pyrethrum, senna etc. have proved successful in certain parts. In Karnataka State, cultivation of wattle, pyrethrum, derris, cinchona, geranium, peppermint and tung tree is successful. The Indian Council of Agricultural Research, through co-ordinated research projects, is also sponsoring such activity in several zones in north-eastern, northern and southern India. Rauvolfia serpentina is now cultivated in different parts of the country due to its high demand in the

market. Various agencies now promoting cultivation of different medicinal plants which are having good demand in the market and fetches an additional income. It is recently reported that Vinca rosea is being cultivated on a large scale along with other crops. Nair et al. (1991) reported the possibility of growing 13 medicinal/aromatic plants as intercrops in 8-20 year old coconut plantations. The potential plants identified are Greater galangal, Periwinkle, Panikurkka, Iruveli, Channakkuva, Ocimum (3 species), Koduveli, Sarpagandha (2 species), Mango ginger and Kacholam. The growth of these plants was not affected by the shade. Successful cultivation of medicinal plants in coconut plantations will bring out additional income to the lakhs of farmers.

Attempts to cultivate medicinal plants in rubber plantations have been reported recently. Annual report of the Rubber Research Institute of India, Kottayam (1987-88) mentions that certain shade tolerant medicinal plants can be cultivated as intercrops in the rubber plantations during the unproductive period. More than 24 species have been reported as potential intercrops. In a planting system (trench planting system) adopted by the Rubber Research Institute of India, it is reported that about 12000 numbers of "Koduveli" or 18000 numbers of "Karim-kurunji" or 36000 numbers of "Sarpagandhi" plants can be planted per hectare as intercrops in the rubber plantations. Certain shade tolerant species like Adhatoda bedommie (cheria

adalodakam), Adhatoda vasica (valia adalodakom), Rauvolfia serpentina (Sarpagandhi), Holostemma annulare (Adapathiyan), Kaempferia galanga (Kacholam), Alpinia galanga (Aratha), Sida rhombifolia (Kurumthotty), Peuraria sp. (Kattupayar), Desmodium sp. (Kattuzhunnu), Strobilanthus haenianus (Karimkurunji) etc. are reported to be shade tolerant species which can be successfully cultivated in rubber plantations (Vijayakumar et al., 1989).

The trials conducted at the Central Experiment Station of the RRII showed that biological bunds raised with Strobilanthus haenianus were found to perform well in conserving soil and water. Strobilanthus sp. was also found to attract honey bees for four months. Rauvolfia serpentina, Holostemma annulare, Sida rhombifolia and Peuraria sp. (Kattupayar) did not perform well under mature canopy. Adhatoda bedommie, A. vasica, Strobilanthus haenianus, Plumbago rosea, Kaempferia rotunda, K. galanga and Alpinia galanga were found to come up well under deep shade (RRII, 1989).

It is reported from trials on harvesting of Strobilanthus haenianus, Adhatoda vasica, Adhatoda bedommie, Plumbago rosea, Alpinia galanga and Kaempferia rotunda that the raising of these medicinal plants in mature rubber estate can fetch additional income.

To study the yield potentials and nutrient requirements of intercrops and the effect of intercrops on latex yield, a

statistically laid out trial has been initiated at the Central Experiment Station, Chethackel (RRII, 1990).

Materials and Methods

3. MATERIALS AND METHODS

The present study was carried out in the Department of Plantation Crops and Spices, College of Horticulture, Vellanikkara during the period 1991-92. Collection and identification of the plants was conducted in the Vellanikkara Rubber Estate owned by the Kerala Agricultural University at its main campus. The area is located at 10°31' N latitude and 76°13' E longitude at an altitude of 40 metres above M.S.L. The average annual rainfall in the locality during the last three years is 2758 mm. Relative humidity ranges from 51 to 88. The details of materials and techniques adopted during the course of investigation are presented hereafter.

The Vellanikkara Rubber Estate covers a total extent of 88.07 ha and it comprises rubber plants/trees aged 4 to 50 years. The old and uneconomic trees are not under tapping at present. It is thickly populated with numerous weed species as under growths. No cultural operations are being done in this area. The other areas where replanting done since 1978 are well maintained. Planting and upkeep operations are satisfactory.

Collection and identification of plants growing as under-growths were made from replanted areas of 1978 and 1979. This is the "Priyadarsini" block which is located just behind the

Estate Office and Factory. The total extent of this block is 8.50 ha comprising 2.00 ha of 1978 and 6.50 ha of 1979 replantings. The soil is of laterite type with rocky patches here and there. Topography is of undulating nature. Planting distances adopted in the plantation were 4.9 x 4.9 and 4.6 x 4.6 meters. Soil conservation measures have been undertaken in the area. Initial planting density was 423/ha where as the present stand is only 352/ha. The casualties were due to wind and drought in the subsequent years after planting and are seen at random in the plantation. Planting materials used were budded stumps of the clone RRIM 628, RRIM 623, RRII 105 and RRIM 600, Canopy is moderately dense in the entire block. Light penetration is more in the vacant patches.

Cultural operations have been done satisfactorily. Manuring is done using rubber mixture of the grade NPK 10:10:4. Usually 1 kg of this mixture is given in two equal split doses per tree as pre and post monsoon application. Leguminous ground cover (Pueraria phaseoloides) established in the early years have been almost completely vanished now due to closure of canopy. Traces of this legume are even now seen at random. Weeding is another cultural operation practiced in the plantation. Usually 2-3 rounds of slashing of weeds using sickle are carried out. Cattle grazing is strictly controlled.

Abnormal leaf fall and pink are the common diseases found in the plantation during monsoon period. Powdery mildew due to Oidium attack during the refoliation stage followed by wintering is another major disease. Prophylactic spraying using copper fungicides is conducted every year against abnormal leaf fall just before the out break of south west monsoon.

The growth of the trees is average though not uniform. Since 1987 tapping is conducted in the block.

A large number of herbs and shrubs of annual or perennial nature are growing as under growths in the plantation. Collection and identification of the flora found in the rubber estate with special reference to the medicinal plant species was carried out. The study was conducted for preparing detailed floristic accounts and for building up herbaria of economically important medicinal plants. The whole area was intensively studied and collection made regularly in different seasons. Complete sets of plants from the area were collected and recorded. Field book for labelling the plants and for recording notes about them in field was used. The data for each species recorded with care and precision at the time of collection. Specimens collected were serially numbered with dates of collection. Plant parts with flowers were collected where ever it was available. In the absence of flowers sterile twigs were collected.

The details recorded in the field note book include, propagation and distribution methods, habits, habitats, vernacular names and uses, other information etc. Pressing of the plant specimens was carried out in plant press to remove the moisture and for drying completely. Blotting paper was used for the purpose. When the plants got completely dried, they were removed from the press and placed in ordinary news papers. Later on these dried specimens were glued on herbarium sheets and relevant informations of the plants were noted.

A survey of the literature on the naturally occurring medicinal plants was carried out. The information on medicinal properties and uses found scattered in books on medical botany, in anthropological writings, in a variety of review articles and in other sources were also collected. Literature survey on the folklore medicinal and indigenous medicinal use of the plants was also carried out. Available informations on the main ingredients responsible for the medicinal properties of plants were collected from the literature. Enquiries with local people were also made regarding the local importance and uses.

Results and Discussion

4. RESULTS AND DISCUSSION

The information on collected plants relating to binomial nomenclature, vernacular name, family, morphological description, their distribution, chemical constituents responsible for medicinal properties, action and uses of 50 plants are described here under.

1. **Achyranthes aspera Linn.**

Vernacular name : Kadalati

Family : Amaranthaceae

Description: Annual or perennial herb. Stem erect, not much branched. Leaves few, usually thick, elliptic or obovate, rounded at the apex, finely or softly pubescent on both sides, petiole 6-20 mm long. Flowers greenish-white, numerous, stiffly deflexed against the woolly-pubescent rachis in elongated terminal spikes which are at first short but soon lengthen, reaching as much as 50 cm long in fruiting. Perianth 4-5, almost or nearly free, glabrous and shining, perianth lobes ovate-oblong, finely pointed with narrow white membranous margins. Stames 5, staminodes truncate, fimbriate. Gynoecium bicarpellary, syncarpous, ovary superior. Fruit (utricle) oblong or ovoid enlcosed in the hardened perianth. Seeds oblong and brown. Propagation is through seeds (Hooker, 1875).

Distribution: Throughout India. In Vellanikkara plantation, they are found in scattered clusters.

Constituents: The seed yields saponin. The dry plants contain potassium chloride, a fat and alkaloid (Mossa et al., 1987).

Action and uses: Roots, fruits and plant as a whole is medicinal. The herb is diuretic, laxative, stomachic, astringent, alterative, antiperiodic and purgative. Its juice is given in diarrhoea, dysentery, menorrhagia, piles, rheumatism, inflammation of internal organs, skin diseases etc. The juice in large doses hastens labour pains or causes abortion. The decoction is a good diuretic in renal dropsies. The dried plant is given to children for colic and also as an astringent in gonorrhoea. Water in which the crushed plant has been boiled is given in pneumonia. The infusion of the root is given as a mild astringent.

The seeds and leaves are considered emetic and are useful in hydrophobia. The ash of the herb contains a large quantity of potash; with honey it is given in cough and asthma. Paste made from the leaf bud is used to treat wounds and injuries. The ash of the plant in coconut oil is used for earache and against puzz secretion from the ear. (Kirtikar and Basu, 1935, Nadkarni, 1954, Pal and Jain, 1989, Neogi et al., 1989).

2. **Aerva lanata Juss.**

Vernacular name : Cheroola

Family : Amaranthaceae

Description: Perennial, erect or prostrate herb with a long tap root, branches many, terete, pubescent or woolly-tomentose, striate. Leaves alternate, elliptic or obovate, entire, pubescent above more or less white with cottony hairs beneath, petioles 3-6 mm long, often obscure. Flowers greenish white, very small, sessile, often bisexual, in small dense sub sessile axillary heads or spikes 6-13 mm long, often closely crowded and forming globose clusters. Perianth oblong, obtuse, sometimes apiculate, silky hairy on the back. Utricle broadly ovoid, acute, seed smooth polished and black. Propagation is through seeds (Gamble, 1957).

Distribution: A common weed throughout India. In small population among other weeds, in the field studied.

Constituents: Contain some tannin. The whole plant contains palmitic acid, sitosterol and a α-amyrin (Mossa et al., 1987).

Action and uses: The plant is diuretic and demulcent. In Sri Lanka it is used as a remedy for cystitis. The root is demulcent, diuretic, useful in strangury. It is also used in the treatment of headache. It is used for cough, also as a vermifuge for children. A decoction of plant mixed with milk taken twice daily

will reduce the bleeding during pregnancy (Anonymous, 1948, Mooss, 1953, Rajagopalan, 1990).

3. **Biophytum sensitivum DC.**

Vernacular name : Mukkutty

Family : Oxalidaceae

Description: Annual, stem long or short, hispidly pubescent. Leaves sensitive, crowded into a rosette on the top of the stem, petiole short, rachis slender, glabrous or hairy, leaflets opposite. Flowers dimorphic, yellow, peduncles many. Sepals 5, lanceolate, accuminate, petals 5, much exceeding the sepals; lobes rounded and spreading. Stamens 10, filaments free; styles 5, stigmas notched at the apex, or bifid. Capsule ovoid or oblong. Cells few seeded. Seeds ovoid, transversely striate (Gamble, 1957).

Distribution: Throughout the hotter parts of India. Mostly under the sparse canopy in the plantation.

Action and uses: The leaves are bitter, diuretic, relieve strangury. They allay thirst in bilious fevers. The seeds are powdered and applied to wounds, and with butter to abscesses to promote suppuration. The root in decoction is given in gonorrhoea and lithiasis. A decoction of the leaves is used as an expectorant; and the pounded leaves are applied to wounds and bruises. A

decoction of the leaves is given in asthma and snake bite. The plant is used as a tonic and mild stimulant (Kirtikar and Basu, 1935).

4. **Boerhaavia diffusa Linn.**

Vernacular name : Thazhuthama

Family : Nyctaginaceae

Description: A spreading herb with a stout root-stock and many erect or spreading branches. Stems slender, cylindric, thickened at the nodes, often purplish. Leaves at each node in unequal pairs, broadly ovate or sub orbicular, rounded at the apex, green and glabrous above, the margins entire, often coloured pink. Flowers very small shortly stalked or nearly sessile, 4-10 together, in small umbells arranged in slender long-stalked corymbose, axillary and terminal panicles. Perianth 3 mm long. Stamens 2 or 3, slightly exerted. Fruit oval, broadly and bluntly 5-ribbed, very glandular (Hooker, 1875).

Distribution: Throughout India. Plenty in the moist part of the estate.

Constituents: The active principle of the herb is the alkaloid punarnavine. There are also large quantities of Potassium nitrate and other Potassium salts present in the plant (Nadkarni, 1954).

Action and uses: The plant is bitter, astringent to the bowels, useful in biliousness, blood impurities, heart diseases, anaemia, inflammations, asthma. The leaves are useful in dyspepsia, tumours, enlargement of the spleen, abdominal pains. The leaves are having a sharp taste, appetizer, alexiteric, used in ophthalmia and for eye wounds, useful in joint pains. The seeds are tonic, expectorant, carminative, useful in muscular pain, lumbago, scabies, scorpion sting, purify the blood, hasten delivery.

Medicinally the most important part of the herb is the root; it is diuretic, laxative, stomachic, diaphoretic, and anthelmintic, as a diuretic the root is particularly useful in diseases of heart and kidneys, in gonorrhoea and dropsy. It is also given in oedema, anaemia, intestinal colic, cough and pleurisy. Taken in large doses it acts as an emetic.

The leaf juice is given in jaundice and other liver complaints. The drug appears to exert a much more powerful effect on certain types of cases of ascites, ie., those due to early cirrhosis of the liver and chronic peritonites (Dastur, 1962, Mooss, 1976, Drury, 1985).

5. **Calotropis gigantea R.Br.**

Vernacular name : Erikku

Family : Asclepiadaceae

Description: A common shrubby weed, about 1-2 m high, bark yellowish white, furrowed, branches stout, more or less covered

with fine appressed cottony pubescence. Leaves sessile, opposite and decussate, thick, glaucous-green, elliptic or obovate, oblong acute, clothed beneath and more or less above with fine cottony tomentum, with slightly cordate or often amplexicaul base. Flowers purplish or white, arranged in axillary umbellate cymes, pedicels much longer than the flowers, covered with cottony wool, buds ovoid. Calyx divided to the base, 5 sepals, cottony. Corolla with 5 petals, gamopetalous, corona consists of fleshy laterally compressed scales radiating from the large staminal column. Stamens 5, filaments connate in a fleshy tube around the ovary (staminal tube), the apex of the staminal tube united with much dilated stigmatic disc, to which the anthers are also coherent, forming the pentagonal gynostegium. Ovary superior, bicarpillary. Fruit known as follicles, broad, thick, fleshy, ventricosa, green. Seeds numerous broadly ovate, flattened, tomentose, brown, propagation is by seeds (Gamble, 1957).

Distribution: Throughout India. Seen on the peripheral sides of the plantation.

Constituents: Contains bitter resins, akundarin and calotropin. Latex contains uscharin, calotoxin, calactin (Chopra et al., 1956).

Action and uses: The plant is purgative, alexipharmic, anthelmintic, cures leprosy, leucoderma, ulcers, tumours, piles, diseases

of the spleen, the liver and the abdomen. The juice is anthelmintic and laxative, cures piles. The root bark is diaphoretic, expectorant, emetic, cures asthma and syphilis, in form of paste applied to elephantiasis. The flower is sweet, bitter, anthelmintic, analgesic, astringent, cures inflammations, tumours, rat-bite, good in ascites. The milk is bitter, heating, purgative, cures leucoderma, tumours, ascites, diseases of the abdomen; useful in leprosy, scabies, ring worm of the scalp, asthma, enlargement of spleen and liver, dropsy, applied to painful joints. The flowers are stomachic and good for the liver. The leaves are applied to paralysed parts, painful joints, swellings, heal wounds. Tincture of leaves used in intermittent fevers.

The root, bark and juice of the plant are used in medicine for their emetic, diaphoretic, alterative and purgative properties. The plant is a popular remedy for snake-bite and scorpion-sting. The juice of young leaves is poured into the ears in cases of ear-ache.

Other uses: Bark fibre silky and for making nets, lines, twine and strings. Seed oil is used for burning. Floss from fruits for stuffing beds, pillows etc. Wood for making gunpowder. Calotrophis latex is used to a limited extent in the tanning industry (Kirtikar and Basu, 1935, Mooss, 1976, Duke, 1985).

6. **Calycopteris floribunda Lam.**

Vernacular name : Varavalli, Pullani

Family : Combretaceae

Description: A scandent shrub, young branches slender and rusty. Leaves opposite, ovate-lanceolate or elliptic oblong, both surfaces more or less tomentose, the lower rusty and pitted, base usually rounded. Flowers sessile, yellowish green, in fubrous-pubescent terminal panicles. Calyx densily hairy with in the mouth of the tube and tube produced above the ovary, long in fruit, strongly 3 nerved and reticulately veined. Corolla with small petals. Stamens unequal, much shorter than the calyx-lobes. Ovary densely villous outside, ovules 3, pendulous from the apex of the cell with long funicles. Fruit oblong or ellipsoid, 5 ribbed, pubescent or tomentose, crowned by the persistent calyx-lobes (Gamble, 1957).

Distribution: Western Peninsula in deciduous forests, Orissa and Assam. Sparsely distributed in the Vellanikkara Rubber Estate.

Constituents: The leaves contain tannin and a yellow crystalline flavone calycopterin (Chopra et al., 1958).

Action and uses: The leaves are considered laxative and anthelmintic. It is bitter, astringent, in colic, grind and administered with butter as cure for dysentery and malaria, externally applied for ulcers. The juice is given in puerperal fever and applied

to the body as a diaphoretic. The root ground to a paste with that of Croton oblongifolium is applied to snake-bite. Fruit with various spices is used in jaundice. In Cambodia, the stems and leaves are considered tonic and depurative, they are administered as an infusion during the 15 days which follow delivery (Kirtikar and Basu, 1935).

Other uses: The stems store a large quantity of water and the stem juice is taken by the forest tribes in India for allaying thirst when water is scarce. The wood is used for making tool handles (Chopra et al., 1958, Agarwal, 1990).

7. **Cardiospermum halicacabum Linn.**

Vernacular name : Valliuzhinja

Family : Sapindaceae

Description: Annual and perennial. A small, delicate, wiry, smooth, climber. Leaves alternate, ternate, smooth, leaflets coarsely toothed, very acute at the apex and narrowed at the base. Flowers bisexual and unisexual, white, in few-flowered umbellate cymes, peduncle slender, stiff, axillary, provided beneath the cyme with 2 opposite usually circinate tendrils. Sepals and petals 4, one pair of each longer. Stamens 8, style 3-fid and very short. Capsules shortly stalked, subglobose or more commonly depressed - pyriform, trigonous, truncate at top, winged at the angles, bladdery, veined. Seeds black, globose with a small conspicuous white heart-shaped aril (Chopra, 1977).

Distribution: Common throughout India. Abundant in the study area.

Constituents: The plant contains saponin. Stigmasterol (glycoside) and quebrachytol from airdried plant and proanthocyanidin and apigenin from an alcoholic extract of the roots (Chopra et al., 1940, Oliverbeaver, 1983).

Action and uses: The whole plant rubbed up with water is applied to rheumatism and stiffness of the limbs. It is prescribed in snake-bite. The root is diaphoretic, diuretic, emetic, laxative, stomachic given in bleeding piles, gonorrhoea, rheumatism, worms etc. Leaves are administered for pulmonic complaints and mixed with castor oil are given internally for lumbago and rheumatism. The whole plant steeped in milk is applied to reduce swellings and hardened tumours. The fried leaves are considered emmenagogue. The leaves, mixed with jaggery, and boiled in oil, are specific in sore-eyes.

The juice of the plant promotes the catamenial flow during the menstrual period. It is also a demulcent in gonorrhoea and in pulmonary infection. It is dropped into the ears to cure earache and discharge from the meatus. The root is given in scorpion-sting. In certain countries the leaves are applied to cuts and injuries and used as a stimulent and diuretic. The seeds are a tonic in fever (Rao, 1914, Mooss, 1953, Dastur, 1962).

8. **Cleome viscosa Linn.**

Vernacular name : Kattukaduku

Family : Capparidaceae

Description: Annual, herbaceous, erect, softly pubescent. Leaves 3-5, foliolate, leaflets hairy, ovate or obovate. Flowers yellow, axillary, racemed and long pedicelled. Sepals 4, oblong-lanceolate, glandular pubescent outside. Petals 4, oblong-obovate, stamens 12-20, ovary sessile, ovules many. Capsules glandular pubescent. Seeds small, granular (Hooker, 1875).

Distribution: Abundant throughout tropical and warm India. Appears chiefly in the rainy season. Seen distributed in the studied area.

Constituents: Seeds contain a fixed oil which on standing deposited a crystalline substance containing myristic acid, palmitic acid, and viscoside acid. A new flavone called viscosin is also isolated (Chopra et al., 1958).

Action and uses: The plant has a bitter taste, cooling, stomachic, laxative, diuretic, anthelmintic, reduces tumours and inflammations; useful in skin diseases, itching, ulcers, leprosy; good in malarial fevers and fevers due to indigestion; enriches the blood and is useful in blood diseases and uterine complaints. Cures cough and earache. The leaves favour digestion and dispel intestinal fermentation; the juice cures earache; useful in piles and lumbago as a local stimulant.

The seeds are used as anthelmintic, vesicant and carminative. Also given in fevers and diarrhoea. The plant is said to be astringent and antipasmodic. The roots and seeds are considered cardiac stimulants (Kirtikar and Basu, 1935, Dastur, 1962, Menon, 1976).

9. **Clerodendron infortunatum Linn.**

Vernacular name : Peruku, Peruvellam, Peringalam

Family : Verbenaceae

Description: A shrub, clothed with brownish hairs, branches bluntly quandrangular. Leaves large, ovate, acuminate, thinly hairy on both sides, entire or denticulate, reticulately veined, base cordate or rounded. Flowers in large, terminal, erect, pubescent panicles. Calyx persistent, corolla densely pubescent outside, white tinged with pink. Filaments, ovary and style glabrous. Seeds drupe, black, nearly globose enclosed wholly by the enlarged pink calyx (Hooker, 1875).

Distribution: Throughout India. Very common in rubber plantations as undergrowth.

Constituents: Leaves contain a bitter substance clerodin which act as a vermifuge. Leaves also contain proteinase and peptidase (Chopra et al., 1956).

Action and uses: The plant has a bitter, pungent taste with flavour, tonic, aphrodisiac, antipyretic, anthelmintic, useful in biliousness, "Kapha", "tridosha", leucoderma, thirst, burning sensation, foul odours, diseases of the blood.

The leaves and roots are used externally for tumours and certain skin diseases. The fresh juice is employed as a vermifuge, and also as a bitter tonic and febrifuge in malarial fevers. The fresh juice or decoction is given as a rectal enema for killing ascaris. The leaves enter into the composition of pills used in chest complaint with cough and difficult expectoration. Leaves and flowers are prescribed in scorpion-sting. The sprouts are recommended for snake-bite.

Leaf oil is used for making soaps and wood as fuel (Kirtikar and Basu, 1935, Agarwal, 1990).

10. **Corchorus olitorius Linn.**

Vernacular name : Chanam

Family : Tiliaceae

Description: A herbaceous, glabrous annual plant with erect, branched slender stem. Leaves light green, lanceolate, serrate, acute or acuminate, often with two teeth at the base of the blade prolonged into filiform appendage over 6 mm long, petioles hairy, short. Flowers solitary or up to 3 on short, thick stalks, small yellow. Sepals 5, petals 5, stamens numerous. Style short, stigma

microscopically papillage. Carpels 5, united with a 5 locular ovary. Capsules linear, cylindric, erect, 10-ribbed, beaked, glabrous, 5 valved. Seeds numerous, black (Hooker, 1875).

Distribution: Widely spread in India. Seen in the exposed areas of the rubber plantation.

Constituents: The plant contains the glycosides corchorin, corchoroside A, corchoroside B and olitorin. The seed contain saponins (Chopra et al., 1969, Mossa et al., 1987).

Action and uses: Leaves of the plant are demulcent, tonic, diuretic, alterative, alexiteric, useful in chronic cystitis, gonorrhoea and dysuria. Infusion of the leaf is tonic and febrifuge. It is astringent to the bowels, remove tumours, pain, ascites, abdonominal tumours and piles. The dried plant, roasted and powdered, is used in visceral obstruction. A cold infusion is given to patients recovering from acute dysentery to restore the appetite, and improves the strength. The seeds are purgative. Fruit contains vitamin C (Mossa et al., 1987).

Other uses: Seed oil as lubricant and seeds oil cake as manure, fibres widely used for making antiseptic surgical dressings, sacs, tents and coarse woven fabrics etc. (Agarval, 1990).

11. **Curculigo orchioides Gaertn.**

Vernacular name : Nilapana

Family : Amaryllidaceae

Description: Root-stock stout, short or elongate, with copious fleshy root-fibres. Leaves sessile or petiolate, linear-lanceolate, membranous, glabrous or sparsely softly hairy, base sheathing (Plate 1). Flowers star like, bright yellow on short, clavate scape, distichous, the lowest bisexual, the upper male. Perianth segments elliptic-oblong, acute, hairy on the back. Stamens small, filaments short, anthers linear. Ovary lanceolate, the cells 6-8 ovulate, stigma 3-cleft. Capsules 1-4 seeded with a slender beak. Seeds oblong, testa grooved in wavy lines, black, shining. Propagation by root-stock (Gamble, 1957).

Distribution: Western Peninsula, Bengal, Assam. Very common in the rubber plantation.

Action and uses: The root-stock is bitter, sweet, heating, alterative, appetizer, aphrodisiac, fattening, carminative, demulcent diuretic, vulnerary, tonic and antipyretic, it is useful in piles, biliousness, fatigue, diseases of the blood, bronchitis, ophthalmia, diarrhoea, lumbago, gonorrhoea, gleet, pains in the joints, asthma, colic etc. The powdered rhizome put into cuts is said to stop bleeding and to dry up the wounds. Used as poultic for itch and skin diseases (Rao, 1914, Chopra et al., 1958, Dastur, 1962, Mooss, 1976, Narayanaswamy, 1987).

Plate 1. Curculigo orchioides (Nilapana) growing in rubber plantation

12. **Cyclea peltata Hook f. and Thoms.**

Vernacular name : Padakizhangu/Padathali

Family : Menispermaceae

Description: A climbing shrub. Leaves peltate, deltoid, acute or sub acute (Plate 2). Flowers in axillary panicles. Calyx companulate, 4-lobed. Corolla an irregularly 4-lobed cup. Male flowers hispid or glabrous. Anthers 4-6, connate crowning the staminal column. Ovary single. Drupe pilose. Seed curved, cotyledons slender (Hooker, 1875).

Distribution: From Konkan down to south and from Assam and Khasia Hills east wards. Common in the rubber plantations.

Constituents: The rhizome contains a bitter, amorphous alkaloid-cyclein. Traces of the alkaloid are also found in the leaves. Other alkaloids present are burmannaline, base C base D, d-tetrandrine, dl-tetrandrine, d-isochondrodendrine (Anonymous, 1950, Chopra et al, 1969).

Action and uses: Leaves are used for preparing beverage, rhizome in antifebrile medicine. Roots are used in indigenous system for a variety of ailments-jaundice, stomachache, fever, leprosy and asthma (Chopra et al., 1969, Agarval, 1990).

Plate 2. Cyclea peltata (Padakizhangu) growing in rubber plantation

13. **Cynodon dactylon Pers.**

Vernacular name : Karuka

Family : Gramineae (Poaceae)

Description: A perennial glabrous grass. Stems slender, creeping, rooting at the nodes, forming matted tufts, with slender short erect or ascending flowering branches. Leaves narrowly linear or lanceolate, glaucous, soft, usually conspicuously distichous in the barren shoots and at the base of the stems, sheaths with or without hairs, tight. Inflorescence consisting of 2-6 spikes radiating from a slender green or purplish peduncle, rachis slender compressed or angular. Spikelets 1.7-2.5 cm long. Involucral glumes lanceolate, acute to subulate-mucronulate, the upper slightly longer. Anthers oblong. Propagation is by seeds and stem cuttings (Gamble, 1957).

Distribution: Widely spread in India. Distributed in patches in the plantation area.

Constituents: The grass contain cynodin, triticin, vitamin C, and hydrocyanic acid (Mossa et al., 1987).

Action and uses: The grass is diuretic, astringent, and styptic; it is used in dropsy, haematuria and vomiting. The plant is also useful in biliousness, thirst, burning sensation, bad taste in the mouth, hallucinations, epileptic fits, fatigue, leprosy, scabies,

skin diseases, dysentery, fever, erysipelas, epistaxis.

A decoction of the roots is diuretic and is used in dropsy, secondary syphillis etc. An infusion of the root is useful in bleeding piles. The expressed juice is astringent and is used as an application to fresh cuts and wounds. It is also useful in catarrhal ophthalmia.

The roots crushed and mixed with curds are used in cases of chronic gleet. The fresh juice is also used in gout and rheumatism (Chopra et al., 1956, Singh et al., 1979).

14. **Cyperus rotundus Linn.**

Vernacular name : Muthanga

Family : Cyperaceae

Description: Glabrous, stolons elongate, slender, 10-20 cm long, bearing hard ovoid tunicate black fragrant tubers, root fibres clothed with flexuous hairs; stem sub-solitary, 10-75 cm long, triquetrous at the top, sometimes tuberous at the base. Leaves shorter or longer than the stem, narrowly linear, finely acuminate, flat, one-nerved. Umbel simple or compound, rays 2-8, the longest reaching 7.5 cm long, bearing short spikes of 3-10 slender spreading red-brown spikelets. Bracts 3, variable in length. Spikelets variable in length, linear sub acute, red-brown, 10-50 flowered, compressed, rachilla with hyaline wings. Glumes oblong, obtuse or slightly apiculate, back reddish brown,

3-7 nerved, sides, margines, and tip hyaline. Stamens 3. Stigmas 3, elongate much exserted. Nut broadly ovoid, trigonous and greyish black (Gamble, 1957).

Distribution: Throughout India. Common in the plantation.

Constituents: Tubers yield essential oil of antibiotic activity. The essential oil contains about 27 components comprising pinene, traces of cineole, sesquiterpenes (hydrocarbons, epoxides, ketones) monoterpenes, and new alcohol Iso-cyperol. The fatty oil contains neutral waxy substance, glycerol, linolinic, linolic, oleic, myristic and stearic acids (Chopra et al., 1956, 1969).

Action and uses: The root is diuretic, emmenagogue, diaphoretic, anthelmintic, vulnerary, useful for ulcers and sores, fevers, dyspepsia, urinary concretions. It is pungent, acrid, cooling, astringent, bitter, appetiser, stomachic, useful in leprosy, thirst, blood diseases, biliousness, dysentery, vomiting, epilepsy, ophthalmia, erysipelas. They are held in great esteem as a cure for disorders of the stomach and irritation of the bowels. The fresh tubers are applied to the breast as a galactagogue. The small tubers act on the lungs and liver. The tubers are given in large doses as an anthelmintic for round worms (Chopra et al., 1956, Dastur, 1962, Mooss, 1976).

15. **Desmodium gangeticum Dc.**

Vernacular name : Orila

Family : Leguminosae (Papilionaceae)

Description: An under-shrub, stem irregularly angled, glabrescent, branches angled, clothed with appressed white hairs. Leaves I-foliate, petioles 1-2 cm long, stipules scarious, linear-subulate, striate at the base. Leaflets membranous, ovate-oblong, acute or slightly acuminate, the margins some what wavy glabrous and green above, paler and clothed with dense soft whitish appressed hairs beneath, reticulately veined, base rounded, truncate, or sub-cordate. Flowers in copious ascenting terminal and axillary racemes 15-30 cm long, arranged in few-flowered fascicles along a slender pubescent some what angular rachis. Pedicels filiform, pubescent, calyx hairy, teeth triangular, longer than the cómpanulate tube. Corolla violet or white, standard 3 mm broad, cuneate at the base. Pods sub falcate, indehiscent sparsely clothed with minute hooked hairs, the lower edge rounded, the upper straight (Gamble, 1957).

Distribution: Found throughout India. Distributed in singles in the estate.

Constituents: Contain Indol-3-alkylamines showing antidepressant activity. 12 alkaloids consisting of carboxylated and decarboxylated tryptamines, β-carbolines and β-phenylethylamines have been isolated (Oliverbeaver, 1983).

Action and uses: The root is astringent in diarrhoea, tonic, diuretic, useful in chronic fevers, biliousness, chronic affections of the chest and lungs, cough, vomiting, asthma and nausea. It is hot and bitter, alterative, aphrodisiac, anthelmintic, fattening, useful in piles, inflammations, alexipharma, prevents the death of the foetus in the womb and used in hemicrania.

The plant is considered antipyretic and anticatarrhal. The root is prescribed in combination with other drugs for the treatment of snake-bite and scorpion-sting.

The stem is used for paper making (Kirtikar and Basu, 1935).

16. **Elephantopus scaber Linn.**

Vernacular name : Anachovadi (Kozhuppa)

Family : Compositae

Description: A common weed. Rootstock short, giving off many stout fibrous roots; stem usually dichotomously branched, strigose, with appressed white hairs. Leaves mostly radical, large lie flat on the ground forming a spreading rosette, obovate-oblong, rounded or sub acute coarsely serrate-dentate, more or less hairy on both surfaces, base tapering into an obscure petiole. Cauline leaves smaller than the radical, sessile or nearly so. Heads numerous, sessile, closely packed, forming a large flat-topped terminal inflorescence surrounded at the base by 3 large stiff

broadly-ovate cordate conduplicate conspicuously nerved leafy bracts. Involucral bracts in 2 series enclosing 4 flowers, bracts of outer row half as long as those of the inner. Corolla violet, exerted, tube long, slender, limb deeply cleft on one side causing the 5 linear lobes to present a palmate appearance. Style much exserted, the arms recurved. Achenes truncate, finely 10 ribbed, slightly pubescent (Chopra, 1977).

Distribution: Throughout India. Seen throughout the estate.

Action and uses: The plant is astringent, cardiac tonic, alterative, febrifuge, antipyretic, alexipharmic and used in snake-bite. A decoction of roots and leaves is emollient, given in dysuria, diarrhoea, dysentery and swellings or pains in stomach. The root is also given to arrest vomiting, powdered with pepper applied to tooth-ache. Bruised leaves boiled in coconut oil applied to ulcers and eczema. Alcoholic extract of whole shoot shows antibiotic activity. Root decoction is good for fever. The plant is also good for treating leprosy (Menon, 1976).

The plant is vulnerary, cures biliousness, remove foul taste from the mouth, useful in all poisoning from the bites or from the nailes of animals; bronchitis and small pox.

The herb is tasteless with a flavour, tonic, laxative, analgesic, used in griping, inflammations, tonic to the brain,

lesses sleep. The leaves are used in pains and piles. The flowers are aphrodisiac, tonic, expectorant, cures liver troubles, good in syphilis. The plant is much used as a diuretic and febrifuge. Paste made from the root is applied for pimples. The root also given to new mother to help her milk flow (Chopra et al., 1956, Anderson, 1986).

17. **Emilia sonchifolia Dc.**

Vernacular name : Muyalcheviyan

Family : Compositae

Description: A glabrous slender herb, erect or diffuse, variously branched. Leaves variable, the lower petioled, lyrate or obovate, toothed or entire; the cauline more or less amplexicaul and auricled, usually acute. Heads few, laxly corymbose, without bracteoles beneath the head; flowers purplish, peduncles very slender, glabrous. Involvcre cylindric, bracts almost equalling the corollas, linear-oblong, acute with scarious margins. Pappus copious, white, soft nearly equalling the involucral bracts. Achenes narrowly oblong, 5 ribbed brown, scabrid on the ribs (Gamble,1957).

Distribution: Common throughout India. Distributed throughout the estates.

Action and uses: A decoction of the plant is febrifuge and given in infantile tympanitis and bowel complaints. The pure juice of

the leaves is poured drop by drop into the eyes in night blindness and inflammations of eyes. It is also used in ear sores. The root is used for diarrhoea. Plant juice is antiseptic and applied on wounds and cuts.

In Indochina, a decoction of the leaves is prescribed as an antipyretic. The plant is also used as an astringent, antiasthmatic and vulnerary. The leaves are used to cure sore throat. Roots boiled and liquid drunk as treatment of tuberculosis (Kirtikar and Basu, 1935, Anderson, 1986, Neogi et al., 1989, Agarwal, 1990).

18. **Euphorbia hirta Linn.**

Vernacular name : Nelapala

Family : Euphorbiaceae

Description: Annual herb, errect or ascending, hispid with long crisped hairs; stems usually terete, branches often 4-angled. Leaves opposite, obliquely oblong-laceolate or obovate-lanceolate acute, or sub acute, serrulate or dentate. Involucres numerous crowded in small axillary shortly pedunculate globose cymes; gland minute, globose. Flowers male and female. Stamen without floral envelopes. Ovary 3 celled, capsule appressedly hairy. Seeds ovoid-trigonous, light reddish brown (Gamble, 1957).

Distribution: Throughout the hotter parts of India. Distributed throughout the estate.

Constituents: Contain alkaloid and essential oil-1-inositol is isolated (Chopra et al., 1958).

Action and uses: The juice of the plant is given in dysentery and colic and the milk applied to destroy warts. Decoction is used in asthma and chronic bronchial affections. The plant is used in worms, bowel complaints and cough in childhood. It is prescribed in gonorrhoea. The herb is as an astringent in chronic diarrhoea and dysenteries. It is applied to ulcers, oedemas, and phlegmons. The juice is considered tonic, narcotic and antiasthmatic. An extract of the plant has sedative effect on the mucous membrane of the respiratory and genito-urinary tract (Kirtikar and Basu, 1935, Chopra et al., 1958).

19. **Ficus hispida Linn.**

Vernacular name : Parom

Family : Urticaceae

Description: A shrub. All parts of the plant more or less hispid-pubescent. Leaves usually opposite, petiolate, membranous, ovate, oblong, apiculate, toothed or entire, the lower surface hispid pubescent, the upper hispid-scabrid. Receptacles yellowish when ripe with bracts scattered on the sides; on peduncles in pairs from the axils of the leaves. Male flowers rather numerous near the apex of the receptacle containing the galls. Sepals 3, concave, hyaline, stamen 1, anther broad, filaments

short. Gall flowers pedicellate. Perianth O. Ovary smooth, globose, style short, stigma dilated. Achenes ovoid (Hooker, 1875).

Distribution: More or less throughout India. This shrub is common in the rubber plantations.

Constituents: Contain saponin (Chopra et al., 1958).

Action and uses: All parts are bitter, cooling, acrid, astringent to the bowels, antidysenteric, useful in "Kapha", ulcers, biliousness, psoriasis, anaemia, piles, jaundice, haemorrhage of the nose and mouth, diseases of the blood.

The fruit is aphrodisiac, tonic, lactogogue, emetic. The powdered fruit heated with water to form a poultice is applied to buboes. It is also given to milch cattle to dry up their milk.

The fruit, seeds and bark are possessed of valuable emetic properties (Kirtikar and Basu, 1935).

20. **Glycosmis cochinchinesis Pierre ex Engler Syn. Glycosmis pentaphylla correa**

Vernacular name : Panal

Family : Rutaceae

Description: An erect shrub, twigs tomentose, terete. Leaves alternate, 3-7 foliate, the rachis terete, tomentose, stout up to 18 cm long. Leaflets alternate or sub-opposite, elliptic rhomboid

or ovate, acuminate or acute, entire rarely obscurely toothed, pubescent on both surfaces, glandular especially on the leaf-margin, pellucid-punctate, thinly coriaceous aromatic when crushed.

Flowers yellowish, tetramerous, in terminal softy pubescent panicles. Berry ovoid, pale orange, verrucose with tufts of short hair or glabrescent when ripe (Gamble, 1957).

Distribution: A very common weed in the rubber plantation. Seen throughout India.

Constituents: Leaves contain alkaloids glycosin, arborine, glycosminine and arborinine (Chopra et al., 1969).

Action and uses: The roots pounded and mixed with sugar are given in cases of low fever. The wood bruished with water is administered internally as an antidote for snake-bite. An infusion of the dried leaves is given as a tonic and appetizer to women after delivery.

The plant is an indigenous medicine for cough, rheumatism, anaemia, jaundice; leaf juice is used as vermifuge; leaf paste with ginger in water is used in skin diseases. Root extract used in facial inflammations. Twigs are used as tooth brushes (Chopra et al., 1969, Agarwal, 1990).

21. **Helicteres isora Linn.**

Vernacular name : Valampiri

Family : Sterculiaceae

Description: A shrub, young shoots clothed with stellate hairs. Leaves bifarious, oblong, obovate or roundish, cordate, suddenly and shortly acuminate, closely dotted on both surfaces with stellate hairs, more or less irregularly crenate-serrate. Flowers distinctly bilabiate in axillary clusters of 2-6 together, pedicels very short, stellately tomentose. Clayx tubular, some what 2-lipped. Petals red at first, fading to lead colour, very unequal, closely reflexed on the clayx, separate but with the claws closely hooked together. Staminal column fused with the gynophore, much exserted, suddenly deflexed, anthers 10 in a ring round the ovary. Ovary conical on a curved gynophore, style as long as the ovary, deflexed. Follicles 5, beaked, spirally twisted into the form of a screw, stellately tomentose. Seeds numerous, angular (Gamble, 1957).

Distribution: Common in almost all parts of India as well as in the estates. Shows stumpy growth due to frequent slashing.

Action and uses: The fruits are demulcent, astringent and useful in the griping of bowels and flatulence of children. The fruits are also made into a liniment for ear sores, and administered internally for colic. The bark is used in diarrhoea and dysentery.

The juice of the root is having a beneficial effect in empyema, stomach affections, diabetes and is a favourite cure for snake-bite. The root and bark are expectorant, demulcent, astringent to the bowels, antigalactagogue, lessen griping, and a cure for scabies when applied topically.

Bark fibre and stem fibre are used for rough sacs, canvas, cordage, string, container bags etc. Leaves as fodder rich in vitamin A, wood as fuel and making gun powder charcoal (Kirtikar and Basu, 1935, Agarwal, 1990).

22. **Heliotropium indicum Linn.**

Vernacular name : Venalpacha

Family : Boraginaceae

Description: A coarse annual herb with stout stem and ascending branches more or less densely hirsute with spreading hairs. Leaves alternate or often sub-opposite, ovate or ovate-oblong, the margins much undulate or sub serrate, base rounded or cordate or narrowed, often unequal - sided and then suddenly contracted and decurrent into the petiole. Petioles more or less winged. Flowers pale violet, numerous, sessile, in simple usually extra-axillary bristly ebracteate spikes. Calyx bristly with a few long hairs outside, segments linear-lanceolate, unequal. Corolla tube hairy outside, narrowed upwards, lobes orbicular oblong. Stamens inserted below the middle of the corolla-tube, filaments

very short, anthers ovate, acute. Fruit 2-lobed, lobes compressed, bluntly 4-ribbed, produced above into a short blunt bidentate beak and containing 2 angular beaked hard 1 seeded pyrenes (Hooker, 1875).

Distribution: Very common in India. Seen scattered in the plantations.

Constituents: It is stated to contain an alkaloid (Chopra et al., 1940).

Action and uses: The leaves are applied to ulcers, wounds and boils. The plant is diuretic, astringent, cures fevers and a decoction of the leaves and young shoots is taken for urticaria.

The flowers in small doses are emmenagogue and abortifacient in higher doses. Plasters of the roots and leaves are applied externally in ring worm and for rheumatism. An infusion is used in venerial disease. The leaves are used to cure gonorrhoea, erysipelas and for stings of insects and reptiles (Kirtikar and Basu, 1935, Chopra et al., 1958).

23. **Hemidesmus indicus R. Br.**

Vernacular name : Nannari, Naruninti

Family : Asclepiadaceae

Description: It is known as Indian Sarsaparilla. A perennial twining or prostrate shrub, root stock woody; stems numerous, slender, terete, striate, thickened at the nodes. Leaves variable

from elliptic-oblong to linear lanceolate, glabrous, dark green, often variegated with white above, pale and sometimes silvery white and pubescent beneath (Plate 3). Flowers crowded in sub sessile cymes in the opposite axiles; pedicels short, clothed with numerous ovate acute imbricating bracts. Calyx glabrous outside, lobes ovate, acute with membranous ciliolate margins. Corolla greenish outside, purple within, tube very short, lobes valvate, fleshy. Follicle very slender, spreading. Seed ovate-oblong, flattened, black (Gamble, 1957).

Distribution: Seen in many parts of India. Very common in the rubber plantation.

Constituents: The roots yield by simple distillation with water a steroptene which is a volatile acid. The roots also contain an essential oil of which 80% consists of a crystalline material 2-hydroxy-4-methoxy benzaldehyde, sterols (hemidosterol and hemi-desmol), resins, tannin, glycoside and saponin (Chopra et al., 1958).

Action and uses: The roots are an excellent substitute for sarasaparilla. They are sweet, demulcent, alterative, diaphoretic, diuretic, tonic and blood purifier. The root is prescribed usually in the form of syrup. It is aphrodisiac, antipyretic, alexiteric, antidiarrhoeal, astringent to the bowels, cures leprosy, leucoderma, itching, skin diseases, fevers, foul odour from the body, loss of appetite, asthma, bronchitis, leucorrhoea, thirst, burning

Plate 3. Hemidesmus indicus (Naruninti) growing in rubber plantation

sensation, useful in piles, rat bite poisoning, eye troubles, epileptic fits in children, hemicrania, pain in the joints and syphilis.

The leaves are good for vomiting, colds, wounds and leucoderma. The stem is diaphoretic, diuretic, laxative, lessen inflammation, good for diseases of brain, liver, kidney, gleet, uterine complaints, paralysis, cough, asthma and gargle is good for tooth ache.

The root in combination with other drugs is prescribed in snake-bite (Rao, 1914, Chopra et al., 1958, Narayanaswamy, 1987).

24. **Hibiscus surattensis Linn.**

Vernacular name : Kattuchembaratti

Family : Malvaceae

Description: Erect or trailing, branches slender, sparsely covered with recurved prickles. Leaves orbicular or ovate, acute to palmately 3-5 lobed, with truncate base, crenate-serrate, petioles prickly, stipules broad, leafy, ear-shaped, toothed and ciliate. Pedicels prickly. Involucral bracts 9-12, each consisting of a prickly stalk carrying a spathulate apiculate leaf-like appendage prolonged downwards into a linear toothed ciliate spur. Calyx membranous, deeply divided, lobes ovate, accuminate, the tips often armed with stout recurved prickles with coloured mid and

marginal nerves and hairy margins. Corolla yellow, centre dark purple. Capsules ovoid, hairy (Gamble, 1957).

Distribution: Seen throughout India. Seen in isolated population in the rubber plantation.

Action and uses: The mucilaginous flowers used as an emollient and pectoral. A lotion of the leaf and stem is used for the treatment of penile irritation of any sort including venereal sores and urethritis. It is sometimes applied as an ointment for the same purposes. An infusion is also used as an injection into the urethra and vagina for gonorrhoea and other inflammations.

Leaves given in coughs, constipation and their decoction in skin diseases (Kirtikar and Basu, 1935, Agarwal, 1990).

25. **Holarrhena antidysenterica Wall.**

Vernacular name : Kodakappala

Family : Apocynaceae

Description: A shrub, bark pale brown. Leaves opposite, subsessile, elliptic, membranous, 6-12 inches long. Flowers scented, white in terminal corymbose cymes. Calyx minute, ciliate; petals 5, tips rounded. Follicles in pairs, upto 15 inches long, very narrow often dotted with white spots. Seeds ½ inches long with a tuft of long brown hairs at the apex (Hooker, 1875).

Distribution: Seen throughout India. Common in the rubber plantation.

Constituents: The bark and seeds contain alkaloids - conessine, kurchine, kurchicine, holarrhimine, conarrhimine, conamine, conessimine, isoconessimine, conimine, conessidine, lettocine, holarrhine etc. (Chopra et al., 1940).

Action and uses: The bark is bitter astringent, anthelmintic, stimulant, tonic, digestive, stomachic, expectorant, antidysenteric and febrifugal; cures fevers, piles, leprosy, thirst, skin diseases, diseases of the spleen, biliousness.

The flowers are bitter, appetiser, anthelmintic, used in diarrhoea, diseases of the blood, leucoderma. The seeds are also used for the above purpose.

The bark is vulnerary, styptic, good in headache, lesses inflammation, excessive menstrual flow. The smoke is good for piles. The leaves are astringent, galactagogue, tonic, aphrodisiac, remove pain in the muscles, cool the brain, good in chronic bronchitis, lumbago, urinary discharges, boils, ulcers, wounds, useful to regulate menstruation, used to fumigate the child and the mother after delivery.

The seeds are carminative, astringent, aphrodisiac, tonic, given in affections of the chest, asthma, colic, diuresis, piles etc. Pessaries made of the seeds and the bark give tone to the

relaxed uterine and vaginal tissues after child birth (Dastur, 1962, Mooss, 1976, Drury, 1985).

26. **Hyptis suaveolens Poit.**

Vernacular name : Thrijada

Family : Labiatae

Description: A tall, coarse, branched, very sweet-smelling herbaceous plant, varying in stature with obtusely 4-angled stems. Leaves ovate sinuate and crenate-denticulate, slightly cordate, hairy, upper smaller. Flowers small, blue in colour when young, capitate, 2-4 together on an axillary peduncle (in globose heads) or in bracteate axillary racemiform cymes. Filaments hairy. Calyx compressed 2-lipped some what deflexed and with an inflexed ring of hairs in the mouth of clayx tube. Nutlets compressed ovoid oblong, emarginate at the tip, pointed below, ribbed (Hooker, 1875).

Distribution: Common throughout India. Sparsely distributed in the plantation.

Constituents: Plant yield essential oil containing menthol, 1-sabinene, d-limonene and azulenic sesquiterpenes (Chopra et al., 1956, 1969).

Action and uses: The plant is pounded and applied to parasitical cutaneous diseases. It is stimulant, carminative, sudorific in

catarrhal conditions, lactagogue, infusion is given in uterus infection, plant paste in water as snuff in nose bleeding, leaf juice in stomach pains, antirheumatic and antisuporific baths. Root extract as appetiser. The root is chewed with betel-nuts as a stomachic (Chopra et al., 1969, Agarwal, 1990).

27. **Ichnocarpus frutescens R.Br.**

Vernacular name : Palvalli

Family : Apocynaceae

Description: A large much branched twining shrub. Young branches finely fulvous-tomentose. Leaves elliptic-oblong, acute or acuminate, glabrous above, slightly pubescent and pale beneath. Flowers greenish white, numerous in axillary and terminal rusty pubescent trichotomous pedunculate cymes. Pediceles rusty-pubescent, often three together. Calyx fulvous-hairy, lobes ovate, acute. Corolla tube with a narrow portion below, the middle portion of the tube much inflated over the stamens, the upper portion constricted below the lobes. Stamens 5; gynaecium bicarpellary. Follicle straight or slightly curved, slender, cylindric. Seeds linear and black (Gamble, 1957).

Distribution: More or less throughout India. Very common in rubber plantations.

Action and uses: The properties of root are similar to Hemidesmus indicus. It is sweetish, cooling, approdisiac, alterative, tonic,

cures thirst, vomiting, fever, biliousness, diseases of the blood, and employed as a substitute for sarsaparilla. A decoction of leaves and stalks is used in fever (Kirtikar and Basu, 1935, Chopra et al., 1956).

28. **Jasminum angustifolium Vahl Enum**

Vernacular name : Kattumulla

Family : Oleaceae

Discription: A twining shrub, stems glabrous, twigs pubescent. Leaves simple, numerous, variable even on the same plant, small, usually 1.3-5 cm but sometimes attaining 9 cm, ovate - oval or oval - lanceolate, rounded at base, sometimes attenuate, obtuse or acute at apex, glabrous.

White flowers on longer slender pedicels, solitary or more usually in threes at ends of short lateral divaricate twigs. Calyx glabrous, segments distant, short filiform, acute, corolla tubed, lobes 7 or 8, equalling the tube, linear-oblong, very acute. Stames 2 included in the corolla tube, filaments short, anthers oblong. Ovary 2 celled, style slender, stigma capitate or linear. Fruit a berry (Gamble, 1957).

Distribution: Seen in eastern and southern parts of India. Sparsely seen in the plantation.

Action and uses: The bitter root, grind small and mixed with the powdered root of Acorus calamus and lime juice and applied

externally in cases of ring worm (Kirtikar and Basu, 1935).

29. **Lantana aculeata Linn. Syn. Lantana camera**

Vernacular name : Arippu, Kongini

Family : Verbenaceae

Description: A large scrambling evergreen shrub, twigs usually prickly, pubescent. Leaves opposite, ovate, sub-acute, crenate-serrate, scabrid on both sides. Flowers in heads which are permanently capitate, usually orange. Peduncles hispid. Calyx small. Corolla-tube slender, pubescent, cylindric, lobes 4. Stamens 4, ovary 2 celled. Fruit black, shining (Gamble, 1957).

Distribution: Seen throughout India. A common weed in the rubber plantation.

Constituents: Contains an essential oil (Chopra et al., 1958).

Action and uses: The plant is considered vulnerary, diaphoretic, carminative, antispasmodic. A decoction is given in tetanus, rheumatism and malaria. It is a powerful tonic, much used in atoxy of the abdominal viscera (Kirtikar and Basu, 1935).

30. **Leucas aspera spreng**

Vernacular name : Thumba

Family : Labiatae

Description: A pubescent annual herb 15-45 cm high, stem erect and diffusely branched; branches quandrangular. Leaves sub-sessile

or shortly petiolate, linear - oblong or oblong - lanceolate, entire or crenate, hairy. Flowers sessile in terminal and axillary whorls. Calyx variable, tubular, tube curved, contracted above the nutlets. Corolla white, enlarged and pubescent above, annulate about the middle, upper lip 3 mm long, densely white woolly, lower lip about twice as long, the middle lobe obovate, rounded, the lateral lobes small. Stamens 4, gynoecium bicarpellary. Nutlets oblong, sub truncate at the apex, smooth and brown (Gamble, 1957).

Distribution: Seen almost all parts of India. Common in the estate.

Constituents: The leaves contain glucoside (Chopra et al., 1956).

Action and uses: All parts of plants - stem, leaves, flowers and sometimes roots are used for medicinal purpose. The plant is antipyretic, and insecticidal. The flowers used in cold. The juice of the leaves is applied in psoriasis, scabies, and chronic skin eruptions. The leaves are useful in chronic rheumatism. Pounded leaves applied in scorpion-sting. The essence extracted by grinding flowers and leaves mixed with a little asafoetida and is given two or three times to check worms in the children. The leaves have antibacterial activity and a bath in hot water with the leaves given to women after delivery (Chopra et al., 1956, Agarwal, 1990, Rajagopalan 1990).

31. **Lygodium flexuosum (SW.)**

Vernacular name : Vallipanna

Family : Polypodiaceae

Description: A fern, fronds glabrous or slightly hairy, pairs of fronds stipitate-pinnate with the pinnules again pinnate or variously lobed or sub palmate, all serrulate; sori protruding from the margin; texture subcoriaceous.

Distribution: Common in South India and upto 5000 ft in Himalayas. Seen commonly along the margins of cuttings in the plantation.

Action and uses: The plant is used as an expectorant. The fresh root is boiled with mustard oil and used externally in rheumatism, sprain, scabies, ulcers, eczema, and cut wounds. It is a local application to carbuncles (Kirtikar and Basu, 1935).

32. **Merremia vitifolia Hallier F.**

Family : Convolvulaceae

Description: A perennial twiner, stems long, stout, much branched, the young ones clothed with spreading deciduous hairs. Leaves when young are bronze-coloured, palmately cut into 5 or sometimes 7 triangular acuminate lobes, more or less hairy, margins coarsely serrate-dentate. Flowers 1-7 in pedunculate cymes, buds pointed, bracts linear. Calyx densely clothed outside with long spreading hairs. Sepals more than 1.3 cm long, enlarged in fruit, broadly elliptic and obtuse. Corolla yellow, sub companulate, bands distinct,

strongly lineate. Stamens 5, epipetalous. Gynoecium bicarpellary and syncarpous. Capsules sub-globose. Seeds glabrous (Gamble, 1957).

Distribution: Throughout India. Sparsely distributed in the plantation.

Constituents: Contain glucoside (Chopra et al., 1956).

Action and uses: The plant is given in strangury and urethral discharges. The juice is cooling, diuretic; it is given with milk and sugar. A 'lep' is prepared consisting of the juice, with lime juice one part, opium ½ and Coptis teeta ¼, which is applied around the orbit of the eye in inflammations. The root is eaten raw as a remedy for stomach-ache (Kirtikar and Basu, 1935, Chopra et al., 1956).

33. **Mimosa pudica Linn.**

Vernacular name : Thottavadi

Family : Leguminosae (Mimosaceae)

Description: A diffuse, prickly under-shrub. Leaves sensitive, digitately branched; leaf stalks 2.5-5 cm long, bristly; pinnae 1-2 pairs, 5-7.5 cm long, sessile or nearly so, their rachis clothed with ascending bristles. Leaflets 12-20 pairs, very small, sessile, leathery, linear oblong, bristly beneath. Flowers small, bisexual and unisexual, tetramerous, pink, in globose heads, usually

in axillary pairs all along the branches; flower stalks prickly. Calyx very minute. Corolla pink, divided, lobes 4, ovate-oblong, obtuse. Stamens 4, much exserted. Pods flat, slightly recurved consisting of 3-5, one seeded, joints which fall away from the persistant sutures which are clothed with spreading yellowish weak bristles, the faces of the pods glabrous (Chopra, 1977).

Distribution: Grows throughout India. Very common in the estate.

Constituents: Contain an alkaloid - mimosine (Chopra et al., 1956).

Action and uses: The root is bitter and acrid, vulnerary, alexipharmic, cures biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, diseases of the blood.

The root is resolvent, alterative, useful in diseases arising from corrupted blood and biles, bilious fevers, piles, jaundice, ulcers, small pox.

The leaves and roots are useful in gravel and other diseases of the kidneys, piles and fistula. A part of the leaves is applied to hydrocele. The leaf and stem in combination with other drugs are recommended for the treatment of snake-bite and scorpion-sting. The plant is used externally in oedema, rheumatism, myalgia and tumours of the uterus (Kirtikar and Basu, 1935, Dastur, 1962).

34. **Mollugo oppositifolia Linn.**

Vernacular name : Kaipajira

Family : Ficoidaceae

Description: Diffuse, prostrate or ascending, stems numerous, branched dichotomously with long internodes, slender, glabrous or pubescent near the ends. Leaves in whorls of 4-5, unequal, oblanceolate or linear - lanceolate, apiculate at the apex, much tapered into the petiole which is therefore obscure. Flowers white in axillary fascicles 2 or more, pedicels filiform. Calyx glabrous inside, sepals oblong with membranous margins. Stamens usually 3, ovary glabrous, styles 3, very short, stigma spreading. Capsule ellipsoid, a little shorter than the sepals, 3 celled. Seeds numerous, sub reniform, dark brown (Gamble, 1957).

Distribution: Seen in Gujarat, southern parts of India. Distributed in isolated patches scatered in the estate.

Action and uses: The plant is stomachic, aperient and antiseptic. Administered for suppression of the lochia. Applied warm moistened with a little castor oil for earache. The juice is applied in itch and other skin diseases (Kirtikar and Basu, 1935, Chopra et al., 1956).

35. **Naregamia alata Wight & Arn.**

Vernacular name : Nilanarakam

Family : Meliaceae

Description: A small branching under-shrub. Leaves alternate, 3-foliolate, petioles winged. Flowers solitary or 2 together, axillary, calyx 5 lobed, imbricate. Petals 5, free, elongate, linear spathulate, white. Disk annular. Staminal tube long - slender, cylindric below, inflated near the top and sometimes cleft in 2 parts, obscurely 10-crenate at the mouth; anthers 10, appendaged at the apex. Ovary 3-celled, style filiform, stigma capitate, ovules 2 in each cell, collateral, pendulous. Fruit an ovoid-globose capsule, loculicidally 3-valved, the cells 2-seeded. Seed pendulous, curved, truncate at both ends, cotylendons flat, foliaceous (Gamble, 1957).

Distribution: Konkan, N. Kanara, Western ghats upto 3000 ft. In the estate, it is seen in the spots where diffused light is available.

Constituents: Root bark contains alkaloid Naregamin (Chopra et al., 1956).

Action and uses: The root is sweet and cooling, alexiteric, volunerary, cures asthma, bronchitis, biliousness, ulcers. The leaves and stem are given in decoction with bitters and aromatics as a remedy for biliousness.

The root is a good emetic and cholagogue. It is useful in acute dysentery and as an expectorant. The plant is used in rheumatism and itch (Kirtikar and Basu, 1935, Chopra et al., 1956).

36. **Narevelia zeylanica Dc**

Vernacular name : Kuruppakodi, Vathakodi

Family : Ranunculaceae

Description: A common climbing shrub. Leaves 3-foliolate. Roots tuberous, terminal leaflet generally transferred into a 3-branched tendril and other two opposite, ovate-cordate. Flowers solitary and axillary, peduncles, small with a pleasant scent; sepals 4-5, petals 6-12, narrow. Achenes red, with long feathery styles. The plant propagates by seed or cuttings (Hooker, 1875).

Distribution: Tropical forests of Himalaya, Bengal, Assam, W. Peninsulas. Seen scattered in the rubber estates.

Action and uses: The tender stem used as tooth sticks in tooth-ache, crushed fresh roots applied in headache. The stem fibre is used for making ropes (Rao, 1914, Anonymous, 1966, Agarwal, 1990).

37. **Passiflora foetida Linn.**

Vernacular name : Poochapazham

Family : Passifloraceae

Description: A slender foetid-smelling climber with palmately 3-lobed leaves, ciliate and denticulate with gland-tipped setaceous

hairs, similar hairs also beneath and simple hairs above, stipules lacinate with gland-tipped segments. Flowers greenish, mostly solitary axillary, with an involucre of finely pinnatifid bracteoles with capillary glandular segments. Fruit like a small green gooseberry (Gamble, 1957).

Distribution: Widely present in India. Seen as a climber on other shrubs and rocks in the estate.

Constituents: Contain hydrocynic acid (Chopra et al., 1956).

Action and uses: The leaves are applied on the head for giddiness and headache, a decoction is given in biliousness and asthma. The fruit is employed as an emetic. The leaves are emmenagogue, they are prescribed in hysteria. The herb is used in the form of lotions or poultices for erysipelas and skin diseases with inflammation.

Ripe fruits are edible (Kirtikar and Basu, 1935, Oliver-beaver, 1983).

38. **Phyllanthus niruri Linn.**

Vernacular name : Kizhanelli

Family : Euphorbiaceae

Description: A much branched glabrous annual herb. Leaf bearing branchlets slender, spreading. Leaves numerous, small, alternative, arranged in 2 rows, membranous, usually having a fine bloom

on the under surface, elliptic, narrow at the base; stipules 2. Flowers very small, yellowish, monoecious, the males 1-3, the females solitary in the axils. Sepals of male flowers rounded, those of the female oblong, sub-acute, with white margins. Stamens 3, anthers sessile on a short column. Styles minute, free, 2-lobbed. Capsules globose having several shallow lobes. Seeds 3-gonous (Chopra, 1977).

Distribution: Throughout the hot parts of India. Common weed in the estate area studied.

Constituents: Leaves contain bitter substance Phyllanthin; dry leaves yield bitter principles Hypophyllanthin and Phyllanthin (Chopra et al., 1956).

Action and uses: The herb is astringent, diuretic, stomachic, cholagogal, laxative, deobstruent and bitter tonic. It is given for dropsical disorders, gonorrhoea, and other genito-urinary diseases, jaundice, constipation, dyspepsia and dysentery. The juice of the plant is an efficacious dressing for offensive sores; used in ophthalmia.

The fruit is bitter, useful for tubercular ulcers, wounds, sores, bruises, scabies, ring worm. The powdered leaves and roots are made into poultice with rice-water to lessen oedamatous swellings and ulcers.

The fresh root is an excellent remedy for jaundice. The decoction of the root and leaves is a favourite remedy for the intermittent fevers. Fresh roots with rice water given for menorrhagia, with milk given as a galactagogue (Kirtikar and Basu, 1935, Mooss, 1976).

39. **Rauvolfia canescens Linn.**

Vernacular name : Kattuamalpori

Family : Apocynaceae

Description: It is a small erect, shrub, glabrous. Leaves in whorls of 4, unequal in size and elliptic. Flowers in corymbose or umbellate cymes. Calyx with 5 short lobes, round and ciliate. Corolla tube short, broad with 5 very short and rounded lobes. Stamens 5, included on the corolla tube. Filaments short and anthers small. Disc cup shaped or annular. Ovary with 2 carpels. Style filiform and stigma bifid. Fruit is drupe joined to the top, ovoid and red in colour. Propagation is through seeds (Gamble, 1957).

Distribution: It is found throughout South India, M.P. and Eastern India. It grows as under growth in the rubber plantation.

Constituents: An alkaloid rauwolscine has been isolated from the leaves. It is similar to yohimbine. Present throughout the plant. Reserpine also found in low content (Chopra et al., 1956, 1958).

Action and uses: Its' roots are used as adulterant to Rauvolfia serpentina with low content of reserpine. Plant is toxic, cause vomiting, paste of roots in mustard oil used as liniment in skin troubles, bark extract in chronic skin diseases, destroy parasites like ring worm.

Rauwolscine has been found to be a depressent of the cardio-vascular system. It lowers the blood pressure and it is maintained in most cases indicating an action on the blood vessels (Chopra et al., 1956, 1958, Duke, 1985, Agarwal, 1990).

40. **Rauvolfia serpentina Benth. ex Kurz For.**

Vernacular name : Chuvanna amalpori, Sarpagandhi

Family : Apocynaceae

Description: A small erect shrub rarely reaching 0.9 m high, bark pale. Leaves in whorls of three, thin, lanceolate, acute on acuminate, glabrous bright green above, pale beneath, base tapering into a short stalk. Inflorescence long stalked, many flowered corymbose cymes, 1-2 inches across, stalk 2-5 inches long, stout and bright red. Flowers white often tinged with violet. Calyx very small, glabrous, bright red. Corolla tube long, slender, swollen a little above the middle, lobes elliptic-oblong, rounded at the apex. Stamens 5, epipetalous. Superior ovary, bicarpellary syncarpous. Drupes single or didymous and connate, purplish black when ripe. The infloresence of the plant with red pedicels and calyx and white corolla is striking (Hooker, 1875).

Distribution: Tropical Himalayas, Hills of Uttar Pradesh, Sikkim, Assam, Andamans, Konkan, N. Kanara, Western Ghats. It is cultivated for medicinal uses. Very sparse in the rubber plantations.

Constituents: More than 30 alkaloids have been isolated - mainly from roots. Important ones are ajmaline, ajmalinine, ajmalicine, serpentine, serpentinine, rauwolfine, reserpine, alloyohimbine, chandrine, deserpidine, papaverine, raunolinine, rescinnamine, sarpagine, serpentinine, serpine, yohimbine etc. Cerpacil, the drug for blood pressure is manufactured from the roots. Drugs used for actions of uterus and snake poison are also manufactured from roots. Oleoresins, glucose, sucrose, mineral salts etc. are also present in roots, stem etc. (Chopra et al., 1958, Duke, 1985).

Action and uses: The root is anthelmintic, cures "Tridosha", ulcers, poisonous effects of scorpion-sting and snake-bite. It is a febrifuge and emmenagogue. It has a marked sedative and hypnotic action, it is a valuable remedy for insomania, hypochondria, hyperglycemia, mental disorders, high blood pressure, certain forms of insanity. Also used for hypertension, neuropsychiatry, gynecology.

The root is used for fever, dysentery and other painful intestinal ailments such as cholera, gastritis etc. In ayurvedic medicines it is used for worms, ulcers, scorpion sting and snake bite. A decoction of the root is employed in labours to increase uterine contractions. Juice of the leaves is instilled into the

eyes as a remedy for the opacity of the cornea (Chopra et al., 1940, Lehane, 1977, Duke, 1985, Sheela, 1990).

41. **Scoparia dulcis Linn.**

Vernacular name : Kallurikki

Family : Scrophulariaceae

Description: Popularly known as "Sweet Brown Weed". An erect branched foetid herb with 3-nately whorled, glandular and serrate leaves which are rhomboid or elliptic with tapering base. Flowers 3-6 from each whorl on slender long pedicels. Sepals 5; petals 5, gamopetalous, white. Stamens 4. Gynoecium bicarpellary. Capsule very small, sub globose, valves ultimately 2-fid (Gamble, 1957).

Distribution: Widely spread in India. Seen near the boundaries of plantation.

Constituents: Contain an alkaloid; an antidiabetic principle amellin (Chopra et al., 1956).

Action and uses: The plant is used as an infusion in ague. Every part of the plant is emetic. Used as a gargle for tooth-ache. A decoction of the root is given in blennorrhagia and in excessive menstruation.

The root is astringent, mucilaginous and emollient. An infusion of the bitter leaves is prescribed in febrile conditions

and stomach troubles. It is diuretic and is a popular remedy for children. The leaf infusion is used in fever, cough, bronchitis, hot extract diuretic, cold extract in kidney stone; roots, leaves and tips infusion in diarrhoea, dysentery, emetic, seed paste in water is a cooling drink, green plant antidiabetic, good in anaemia, balances blood and urine sugar (Chopra et al., 1956, Agarwal, 1990).

42. **Sida rhombifolia Linn.**

Vernacular name : Anakurunthotti

Family : Malvaceae

Description: A small erect under-shrub. Branches rough clothed with minute stellate hairs. Leaves variable in shape, glabrous above, grey pubescent beneath, coarsely toothed towards the tip, entire towards the base. Petioles pubescent, swollen in the upper part. Flowers axillary. Calyx small, triangularly lobed, hairy and acuminate. Corolla yellow. Carpels 7-10 with 2 short awns. Seeds smooth and black (Hooker, 1875).

Distribution: A common weed seen in all parts of India. Found throughout the estate studied.

Constituents: Leaves contain large amount of mucilage (Chopra et al., 1956) and also rich in ephedrine (Agarwal, 1990).

Action and uses: The root and leaves are sweetish, aphrodisiac, tonic, remove 'tridosha', good in urinary complaints, discharges

and strangury, useful in fever, heart diseases, burning sensations, piles, all kinds of inflammations.

The plant combined with other drugs is prescribed as an antidote to snake venome and scorpion venome. The root is commonly used in the treatment of rheumatism. Roots are taken internally to help child birth. Pounded leaves are applied on swellings. The stem rich in mucilage is employed as demulcent and emollients. Roots and leaves are used in tuberculosis. The stem is febrifuge (Kritikar and Basu, 1935, Chopra et al., 1940, Agarwal, 1990).

43. **Stachytarpheta indica Vahl.**

Family : Verbenaceae

Description: Annual herb, stems erect, dichotomously branched, glabrous; young branches nearly quadrangular. Leaves elliptic, obtuse or acute, coarsely serrate, base much tapering and decurrent into the petioles which are consequently obscure.

Flowers sessile in long slender glabrous spikes reaching 30 cm long, the rachis hollowed out beneath each flower; bracts lanceolate-subulate, scariously margined near the base. Calyx membranous, tubular, teeth 4, short, acute. Corolla deep, blue, glabrous; tube slightly curved, hairy inside, limb 5 lobed. Filaments slender, hairy below. Ovary glabrous, style long, filiform, glabrous. Fruit oblong, ribbed, splitting into 2 pyrenes (Hooker, 1875).

Distribution: Seen throughout India. Plenty in the rubber holdings.

Constituents: Contain glucosidic substance (Chopra et al., 1956).

Action and uses: The plant is used externally for purulent ulcers, and given internally for fevers and rheumatic inflammations. It is much used in the treatment of dysentery. The leaves are crushed and the juice used in the cure of eye troubles (such as cataract), and for open sores in childrens' ears. Also used to cure heart trouble (Kirtikar and Basu, 1935, Chopra et al., 1956).

44. **Streblus asper Lour.**

Vernacular name : Paruva

Family : Moraceae

Description: Commonly known as 'Rough Bush'. A rigid evergreen shrub or small tree. Bark light-grey or greenish with faint ridges, rough when old. Juice milky, twigs hairy, scabrid. Leaves alternate, rhomboid-elliptic, acute or acuminate, more or less sinuate or crenate, scabrid on both surfaces. Flowers dioecious, axillary. Male flowers in globose pedunculate heads; peduncles 1-4 together. Perianth companulate, sepals 4, pubescent outside and imbricate in bud. Stamens 4, inflexed in bud, anthers reniform. Female flowers solitary, inconspicuous, long peduncled, perianth closely embracing the ovary, sepals 4, enlarged in fruit. Ovary 1-celled; ovule pendulous, styles 2, very long, filiform, connate at the base. Fruit single seeded berry loosely enclosed by the enlarged sepals, yellow when ripe (Hooker, 1875).

Distribution: Mostly drier parts of India. Sparse in the rubber plantations.

Constituents: Bark contains bitter substance (Chopra et al., 1956).

Action and uses: Decoction of bark is given in fever, dysentery and diarrhoea. Roots are used as application to unhealthy ulcers and sinuses. It is an antidote to snake-poison. The milky juice is antiseptic and astringent; applied to chopped hands and sore heels.

The plant is useful in leprosy, piles, diarrhoea, dysentery, elephantiasis, tuberculous glands (Kirtikar and Basu, 1935, Chopra et al., 1958).

45. **Tragia involucrata Linn.**

Vernacular name : Choriyanam, Cherukodithuva

Family : Euphorbiaceae

Description: Commonly known as "Stinging Nettle". A perennial, evergreen more or less hispid herb, with scattered stiging hairs, stems elongate, slender and twining. Leaves simple, oblong cordate, apex pointed in young leaves, rounded in older leaves, serrate, covered with stinging hairs.

Flowers shortly pedicellate in terminal axillary and leaf opposed usually hairy racemes. Monoecious - the male flowers upper most each with a bract, white and green; female flowers below the male flowers. In male flowers sepals 3, concave, glabrous.

Stamens 3. Pistilloid small, 3 fid. In female flowers sepals 6, ovate, hispid. Ovary 3-lobed, hispid, styles 3, circinately revolute, united below in a stout cylindric column. Capsules round, 3 lobed, white, hispid. Seeds globose, smooth (Gamble, 1957).

Distribution: Throughout India. Common in the dense shaded canopy of the estate.

Action and uses: The root is diaphoretic and alterative; its infusion is given in ardent fever and in itching of the skin. The root also forms the base of an external application in leprosy. Root also for pains in the legs and arms; in form of a paste used to aid the extraction of guinea-worm. The fruit rubbed over the head with a little of water is useful in baldness for promoting growth of hair (Chopra et al., 1958, Dastur, 1962, Behl and Captain, 1979).

46. **Trianthema portulacastrum** Linn.

Family : Ficoidaceae

Description: A prostrate somewhat succulent herb; stems more or less angular, much branched. Leaves sub-fleshy, obliquely opposite, unequal, the upper one of the pair the larger. Flowers solitary, sessile almost concealed by the pouch of the petiole. Calyx-lobes ovate, acute, stamens 10-20. Ovary truncate; style 1. Capsules small, almost concealed in the petiolar pouch. Seeds reniform, dull black (Gamble, 1957).

Distribution: A common weed throughout India. Seen along the boundaries of the plantation.

Constituents: Saponin and alkaloid Punarnavine have been isolated (Chopra et al., 1958).

Action and uses: The plant is alexiteric, analgesic, stomachic, laxative, alterative, cures bronchitis, heart diseases, blood diseases, anaemia, inflammations, piles, ascites. The root applied to the eyes cures corneal ulcers, itching, dimness of sight, night blindness.

The powdered root is given in combination with ginger as a cathartic and is used to induce abortion (Kirtikar and Basu, 1935, Chopra et al., 1958).

47. **Tridax procumbens Linn.**

Vernacular name : Odiyanpachila

Family : Compositae

Description: A hispid, procumbent herb, with woody base, sometimes rooting at the nodes, upto 6 cm high. Leaves ovate - lanceolate, lamina, pinnatisect, sometimes 3-lobed, flowers in small, long peduncled heads. Ray florets strap shaped, white, disc florets yellow. Achenes black, narrowly obconical with feathery pappus (Hooker, 1875).

Distribution: Found as weed upto an altitude of 2,400 metre throughout India. Seen throughout the estate studied.

Action and uses: Leaves are used in bronchial catarrh, dysentery, diarrhoea, for restoring hairs, check haemorrhages. Leaf juice is antiseptic, insecticidal, depressant to respiratory organs. Herb oil is used in insecticidal preparations (Anonymous, 1976, Agarwal, 1990).

48. **Urena lobata Linn.**

Vernacular name : Uram, Udiram

Family : Malvaceae

Description: It is a common herb, erect, 5-10 cm high. Leaves usually broader than long, cordate serrate or toothed, stellately hairy on both surfaces, roundish, angled, lobes generally acute or acuminate varying in size and number. Gland at the base of the mid rib and 2 adjacent nerves. Petiole variable in length, hairy. Pedicels hairy, short and clustered. Calyx deeply divided, lobes lanceolate and ciliate. Corolla pink. Stamens numerous, monadelphous forming staminal tube around gynoecium, anthers one celled. Gynoecium multi-carpellary, syncarpous with axile placentation. Styles twice as many as the carpels; carpels separating on maturity from axis. Capsules pubescent, covered with blunt spines, each spine having 2 straight bristles pointing downwards at an angle from the apex. Seeds smooth, rounded on the back and wedge shaped on the inner side (Hooker, 1875).

Distribution: A common weed in India. Sparsely distributed in the study area.

Constituents: Seeds contain an enzyme urease (Chopra et al., 1956).

Action and uses: The root is employed as an external remedy for rheumatism. It is a popular diuretic. The leaves and roots are made into poultice and used as an emolient. A decoction of root and stem is a remedy in windy colic.

The flowers are used as an expectorant in coughs. An infusion of the flowers is used as a gargle for aphthae and sore throat. The root is widely used for procuring abortion. A short piece of root is inserted into the vagina and left there for several hours (Chopra et al., 1958, Agarwal, 1990).

49. **Vernonia cinerea Less.**

Vernacular name : Poovankuruntal

Family : Compositae

Description: Annual herb with erect hairy stem and branches. Leaves variable, broadly elliptic or lanceolate, obtuse or acute, smooth or hairy, irregularly toothed or shallowly crenate serrate. Flowers in heads. Heads small, about 20 flowers, in lax divaricate terminal corymbs. Flowers bisexual, pinkish violet, tubular and similar. Pappus white, the exterior row short. Achenes oblong, terete, slightly narrowed at the base, clothed with appressed white hairs (Gamble, 1957).

Distribution: Throughout India. Spread all over in the estate.

Constituents: Presence of flavonoids, sesquiterpene lactones and alkaloids are reported (Mossa et al., 1987).

Action and uses: The herb is diaphoretic, anthelmintic, alterative and bitter tonic. A decoction is used to promote perspiration in febrile conditions. The plant is stomachic, astringent, cures 'tridosha', asthma and bronchitis. The expressed juice is given in piles. Used as a remedy for spasm and strangury.

The roots are bitter, diuretic and anthelmintic, it is given in dropsy. The flowers are used in conjunctivitis. It also cures fever. The seeds are used as an alexipharmic, anthelmintic and it is an efficacious remedy for skin diseases like leucoderma, psoriasis, eczema and ring worm. It is given in malaria along with quinine and it has been administered for amoebic dysentery, intestinal worms etc. The seeds are also used as an antidote and valuable as a tonic and stomachic, given in intestinal colic, dysuria, flatulence and cough (Chopra et al., 1956, Mossa et al., 1987).

50. **Zizyphus oenoplia Mill.**

Vernacular name : Kottavalli

Family : Rhamnaceae

Description: A straggling shrub often semiscandent by its prickles; young branches rusty-tomentose. Leaves numerous, distichous ovate, acute with pubescent tips, minutely denticulate. Flowers

12-20, in subsessile pubescent paniculate cymes which are slightly longer than the petioles. Calyx hairy outside, lobes ovate, 5 in number. Petals 5, obovate, shorter than the calyx lobes exceeding the stamens. Stamens 5. Disc with 10 short deeply pitted lobes glabrous, ovary 2-celled, styles 2, united to above the middle. Drupe edible, globose or obovoid, one celled, black, shining, pulp scanty (Hooker, 1875).

Distribution: Seen throughout the hoter parts of India. The plant remains as stump due to slashing.

Action and uses: A decoction of the root bark is used to promote the healing of fresh wounds. The fruit is used as an ingredient in the preparation of stomach-ache pills (Kirtikar and Basu, 1935).

Some of the species mentioned above are of very common occurrence in plantation and their population density is high. Examples are Hemidesmus indicus, Ichnocarpus frutescens, Curculigo orchioides, Cyclea peltata, Clerodendron infortunatum, Merremia vitifolia etc. A large number of species are seen where the canopy is sparse. Such plants include Achyranthes aspera, Calycopteris floribunda, Cynodon dactylon, Glycosmis cochinchinensis, Helicteres isora, Hibiscus surattensis, Naregamia alata, Passiflora foetida, Scoparia dulcis, Sida rhombifolia, Tragia involucrata, Urena lobata etc. A few are seen scattered and rare in the plantation. These include Calotropis gigantia, Cardiospermum halicacabum, Desmodium gangeticum, Rauvolfia serpentina and Narevelia zeylanica.

Many other weeds are also seen in the plantation. Eupatorium odoratum, Berraria sp., Alsycarpus rugosus, Zornea gibbosa, Triumfetta rhomboidea, Blumea oxydonta, Asytaceae sp., Desmodium triflorum, Kirganelia reticulata, Cayratia pedata etc. are some of the common species found in the estate. These plants are of little medicinal value. Moreover, they have not been fully investigated with reference to their economic importance. The regeneration of weed species is very high during onset of rain. Many of them are drought resistant and seen during different seasons of the year. Others dry up at the beginning of drought period and regenerated when the rainfall sets in through seeds and rhizome lying hidden underneath the soil surface.

Summary and Conclusion

5. SUMMARY AND CONCLUSION

The investigation revealed the presence of many medicinal plants growing as undergrowths in the rubber plantation. These plants are widely used by all sections of the population, whether directly as home remedies or in the medicaments of the different indigenous systems of medicines, or indirectly in the pharmaceutical preparation of modern medicine. It can be presumed that the vast area occupied by the rubber plantation industry in our country is richly endowed with a wide variety of plants of medicinal value which represent a great national resource. India officially recognises over 2500 plants as having medicinal value, and it has been estimated that over 6000 plants are used in traditional, folk, and herbal medicine, representing about 75 per cent of the medicinal needs of the country. Some of these plants are also abundant in rubber plantations.

The presence of a large number of weeds having medicinal value under the shade of rubber plantation give inference to the fact that they can be cultivated as intercrops in the plantation provided there is internal market demand and fetches a good remunerative profit. This will bring additional income to the lakhs of rubber growers from their limited unit areas. Plants like Hemidesmus indicus and Curculigo orchioides which find a favourable growth under the dense canopy of rubber, are of much commercial importance. But the impact of cultivation of these plants

on the growth and yield of rubber needs investigation. The experiments started at the Rubber Research Institute of India in this line will definitely bring out positive developments in the near future.

Further about 80 per cent of the raw materials for drugs used in the Indian system of medicine and homoeopathy are based on plant products. The credibility of these systems of medicine depends on having available authentic raw materials in sufficient quantities. With some 46,000 licenced pharmacies manufacturing the traditional remedies of these medicinal systems, it is necessary to plan for large scale cultivation of medicinal plants and ensure that they are accurately identified, properly processed, free of adulterants and of acceptable quality. In areas where land is limiting these crops can be cultivated as intercrop. Moreover this will be an indirect attempt for the conservation of the endangered plants of medicinal importance.

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