

# ETHNOBOTANY OF PACHAMALAI HILLS

M. Geetha Rani

Gene Bank Manager, M.S.Swaminathan Research Foundation, Chennai- 600 113.  
Email: genebank@mssrf.res.in

The traditional knowledge on application of plants for different medicinal uses evolved and currently maintained is largely determined by the locally available biodiversity, both in the past and the present. Pachamalai Hills, the present study areas in Tiruchirapalli and Salem situated in the Eastern Ghats are fairly rich in biodiversity and many of the plant species used in various medicinal formulations are either naturally existing or cultivated here for long time. The results of this study presented reveal abundance of Indigenous Knowledge available among the local communities in the study area, the diverse plant species, wild and cultivated, used for equally diverse medicinal preparations, and the perception of individuals and communities on the efficacy of a medicinal formulation.

**Key Words:** Pachamalai Hills; Indigenous Knowledge (IK); medicinal plants

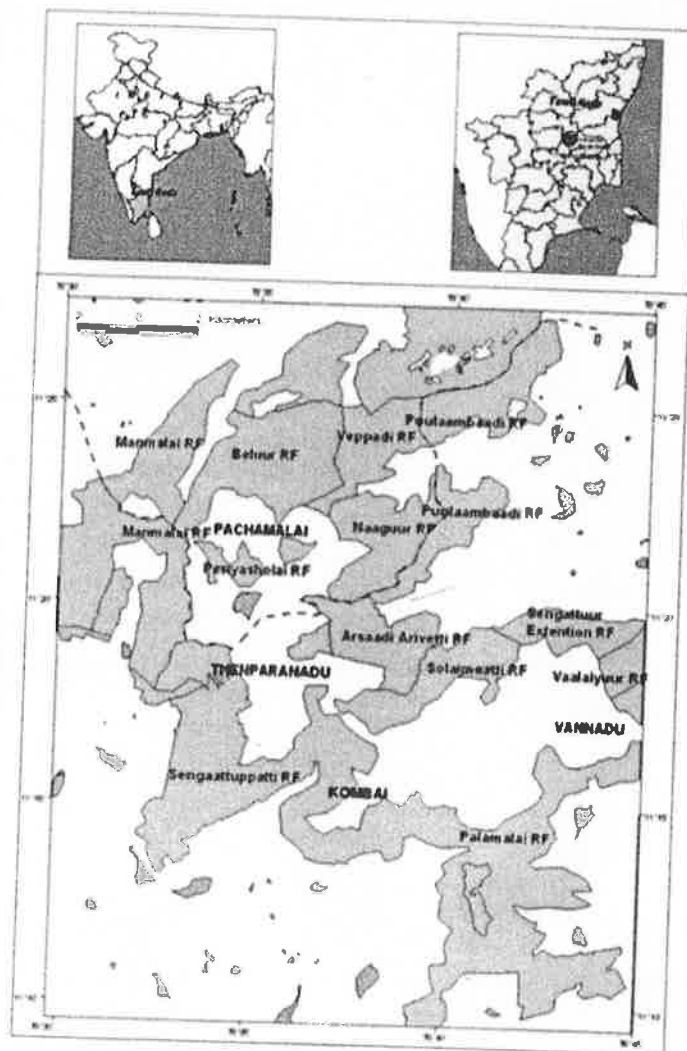
## Introduction

Distinction of some plants as 'medicinal plants' conveys an important association between these plants and a set of traditional knowledge on their use in medicinal preparations to treat human, livestock or plants. The communities over years of trial and error have established the traditional knowledge or Indigenous Knowledge (IK) on the application of different species, their specific part, their specific combinations and a specific way of formulation and application. The traditional knowledge on application of plants for different medicinal uses evolved and currently maintained is largely determined by the locally available biodiversity, both in the past and the present. Pachamalai Hills, the present study areas in Tiruchirapalli and Salem situated in the Eastern Ghats are fairly rich in biodiversity and many of the plant species used in various medicinal formulations are either naturally existing or cultivated here for long time. The climate and soil of the region also have important bearing on the local ecosystem and its component species as well as genetic diversity, both in the case of natural flora as well as cultivated crops. The communities involved in this study are largely traditional, who are still practicing much of their knowledge for day-to-day applications, largely engaging the healthcare. The results of this study presented reveal abundance of Indigenous Knowledge available among the local communities in the study area, the diverse plant species, wild and cultivated, used for equally diverse medicinal preparations, and the perception of individuals and communities on the efficacy of a medicinal formulation. The community revealed some of the details only after considerable

confidence building with the objectives of this study and on the safety of disclosure. The study brings out the following information on ethno-botany of Pachamalai Hills.

## Study area

The Pachamalai hills spread over two districts, namely, Salem and Tiruchirapalli in Tamil Nadu. It is about 75 km away from Tiruchirapalli city.



This hill is situated in the southern parts of the Eastern Ghats. It lies between the latitude 11°09' and 11°30' N and between 78°28' and 78°49' East longitudes (Map 1). Its elevation ranges from 400 metres to 1200 metres above Mean Sea Level (MSL). The forest comprises of tropical thorny, dry deciduous and moist deciduous types of vegetation. The Pachamalai hills include different regions, namely Kombai, Pachamalai, Thenparanadu and Vannadu. Total geographical area of hill Pachamalai is 14,277 ha. A scheduled tribe called Malayali lives in these hills.

Kombai, Pachamalai, Thenparanadu and Vannadu revenue villages were selected as the study sites. These areas were selected as they are well connected due to good transport and facilities highly accessible for making periodic visits to meet villagers, recording data and interaction. Out of 81 villages, 30 villages (4 villages from Kombai, 10 villages from Pachamalai, 9 villages from Thenparanadu and 7 villages from Vannadu) were selected for the study by using random sampling procedure.

### Materials and Methods

Visit was first made to meet the NGOs working on medicinal plants in Tiruchirapalli. Guidance was taken from Anthyodhaya, an NGO working on cultivation and promotion of medicinal plants. Organized meetings and interactions in the selected villages with villager's, knowledgeable individuals, local panchayat and forest officials. Resource persons were also consulted in and around Pachamalai. An unstructured interview schedule through PRA was used when the villagers were interviewed to collect information on the objectives. Discussions were held with a small group of knowledgeable individuals (both women and men) belonging to the age group of 50 to 70, comprising both the educated and uneducated. The help of key informants was also solicited in identifying the actual practitioners, and the information collected was triangulated.

Diagnosis of diseases and administration of each of the formulation documented under various disease management categories was based on the expertise and the knowledge of the individuals who disclosed it. With the aid of the selected villagers,

the researcher went to the site and critically analyzed the existing native plants. Known plants and their density were recorded instantly, while the plants indicated by the villagers that were unknown to the researcher were taken to the concerned botanist for identification and classification. Herbarium specimens were also prepared.

### Results and Discussion

#### Identification of Plant Resources Related IK at Pachamalai Hills

This study identified and carefully documented 84 different cases of indigenous knowledge from this region. The social practices and the living style of the local populations, who are largely tribal, appear to be the reason for the continuing wealth of IK available in these Hills. However, the cultural and life style changes rapidly happening in this region is threatening the continued practice of many of the IKs recorded here. The IK encompasses the entire spectrum of life, ranging from plants to animals and to human. Many of these IKs are concerned with management of plant, animal and human diseases and some of their physiological disorders. Out of these 84 cases, the largest number of cases (40) dealt on various human diseases, followed by 31 cases related to treating animal diseases or disorders and 13 cases of controlling pests and diseases of crop plants. These are described in detail in the following sections:

#### IK on management of animal disease, physiological disorders and pests

The 31 cases of IKs related to different aspects of animal disease and health management identified by this study are presented in the following section. The disease and health management cases are organized in alphabetical order and the plant species used are described first with local name along with common name and botanical name.

#### Anorexia

A combination of three plants and palm jaggery prepared in specific manner is used to treat anorexia in cattle. According to this 200 g each of fresh manjal (Turmeric; *Curcuma longa*), pagarkai (Bitter gourd; *Momordica charantia*), inji (Ginger; *Zingiber officinale*) and a whole plant of pagarkai (Bitter gourd; *Momordica charantia*) were taken and

ground well along with 250 g of palm jaggery. This mixture is administered orally twice a day for one week.

### **Bloat**

A decoction made from 100 g of vetrilai leaves (Betel leaf; *Piper betle*), 25 g each of thippili (Long pepper; *Piper longum*), omam (Ajwain or Yavanika; *Carum copticum*), venthayam (Fenugreek; *Trigonella foenum-graceum*) and perunkayam (Asafoetida; *Ferula asafoetida*) is administered orally twice a day till symptoms disappear.

A paste ground from 10 g each of thippili (Long pepper; *Piper longum*), inji (Ginger; *Zingiber officinale*), milagu (Black pepper; *Piper nigrum*), and perunkayam (Asafoetida; *Ferula asafoetida*) along with 250 g of palm jaggery is administered orally twice a day. Alternatively, 100 ml of gingelly oil and one bunch of erukku leaves (Crown flower; *Calotropis gigantea*) were ground well into a paste and internally administered once in a day.

### **Bone fracture**

A paste prepared by grinding 200 g of karumpulan bark (*Securinega virosa*) is applied on the fractured part and the bone is supported by tying with moongil (Bamboo; *Bambusa arundinacea*) splinters of appropriate size.

### **Cold & fever**

A well ground mixture comprising 10 g of panai root (Palmyrah; *Borassus flabellifer*), three grains of milagu (Black pepper; *Piper nigrum*) and three pods of poondu (Garlic; *Allium sativum*) is either directly fed to the cattle or the juice extracted from the paste by squeezing it through a white cloth is applied into the eyes.

### **Cough & fever**

Cattle fever and cough is controlled by administering twice a day a mixture made by grinding 100 g seppankizhangu (Colocasia; *Colocasia esculenta*), 20 pieces of dried milagai (Chilli; *Capsicum frutescens*), one piece of poondu (Garlic; *Allium sativum*) and three grains of milagu (Black pepper; *Piper nigrum*), which is mixed with hot water.

Another formulation common in the area for controlling fever and cough of cattle nasal

application of three drops of a mixture prepared by squeezing out the juice from ten fruits of kandankathiri (Yellow-berried nightshade; *Solanum surattense*) which are tied in a cloth and dipped overnight in goat urine. The application is twice a day for two days.

### **Conception**

Conception is promoted both by bringing the cattle to heat and enhancing the success of mating or insemination. The two methods used by the community to achieve this are:

A paste made from two kg leaves of puli (Tamarind; *Tamarindus indica*) along with required water is administered orally for one week.

A paste prepared from 350 g leaves of adutheendapalai (Worm killer; *Aristolochia bracteolata*) and about 300 g kernel of thenkai (Coconut; *Cocos nucifera*) along with water from fermented rice (Paddy; *Oryza sativa*) is orally given once a day for three days, with care that the animal is not given water for two hours after administration.

### **Diarrhoea**

The IK on treating diarrhoea of cattle and goats are different and hence these are described separately.

### **Goat**

Fine slurry prepared from tender kaddukai (Chebulic myrobalan; *Terminalia chebula*) 30 g is taken in stone mortar and ground well. Half a litre of water is added to this mixture. This is fed to cattle. Tender sapota (Sapota; *Achras sapota*) may be used in place of kaddukai (Chebulic myrobalan; *Terminalia chebula*).

### **Cattle**

An effective treatment is oral administration of twice a day a mixture made into a ball by using two pieces of vazhai inflorescence (Banana; *Musa paradisiaca*), 25 g seed of jeeragam (Cumin; *Cuminum cyminum*) and 100 g of small vengkayam (small Onion; *Allium cepa*).

Few leaves of adathoda (Vasaka; *Justicia adhatoda*) are crushed to make 50 ml of juice and this is given twice a day for two days.

A paste made from 20 g of dried fruits of nelli (Gooseberry, *Phyllanthus emblica*), 20 g sugar and 10 g chukku (Dried Ginger, *Zingiber officinale*) is mixed with half a litre of water and fed to cattle at a dose of about 20 g, twice a day.

A mixture prepared by grinding leaves of thalaisurili (Indian birthwort; *Aristolochia indica*) with rice water is given twice a day for three days.

Powder made out of 10 g of dried roots of vasambu (Sweet flag; *Acorus calamus*) is mixed with one piece of ground vazhai inflorescence (Banana; *Musa paradisiaca*) and 200 ml honey to make a paste or ball. This is fed twice a day for two days.

A paste made by grinding one kg of athi bark (Fig; *Ficus racemosa*) is blended with buttermilk made from buffalo milk and given twice daily for two days.

#### Drowsiness

For curing the drowsiness of cattle, 10 g each of thippili (Long pepper; *Piper longum*), vasambu (Sweet flag; *Acorus calamus*), common salt and 100 g fruits of puli (Tamarind; *Tamarindus indica*) are mixed with water and administered.

#### Dysentery

A paste made from well pounded 10 g of semmaram bark (Red sandal wood; *Pterocarpus santalinus*), one and half kg of small vengkayam (small Onion; *Allium cepa*) and 120 g rice of cumbu (Pearl millet; *Pennisetum typhoides*) is mixed with 200 ml/g of pig fat and the mixture is fed to cattle.

A juice prepared from 200 g nicely pounded semmaram bark (Red sandal wood; *Pterocarpus santalinus*), three grains of milagu (Black pepper; *Piper nigrum*) and one piece of poondu (Garlic; *Allium sativum*), red in colour is fed to cattle twice a day.

A paste using required water is made from separately ground 20 g each of naval bark (Jaman; *Syzygium cuminii*), illavam bark (*Ceiba pentandra*), small vengkayam (small Onion; *Allium cepa*) and 10 g of white vakkana bark (*Diospyros montana*). Pig fat is mixed with this paste and 50 g of the resultant mixture fed to cattle once a day in the morning.

The outer skin removed two fruits of mathulai (Pomegranate; *Punica granatum*) are taken and soaked in curd overnight. The soaked mixture is fed to the cattle four times a day.

#### Enteritis

Well-ground mixture made from one pinch of viluthi leaf (*Cadaba fruticosa*), 200 g of vengkayam (Onion; *Allium cepa*) and 50 g of seeds of jeeragam (Cumin; *Cuminum cyminum*) are given internally thrice a day, followed by 100 ml of gingelly oil.

A mixture made from 10 g of well pound kadukkai (Chebulic myrobalan; *Terminalia chebula*) and 250 ml of buttermilk is given orally followed by feeding of porridge of boiled rice.

A paste prepared from 50 g each of leaves of thuthi (Country mallow; *Abutilon indicum*) and jeeragam seeds (Cumin; *Cuminum cyminum*) are given thrice a day.

Hemorrhagic enteritis is also cured by feeding a mixture thrice a day made from 250 g leaves of aavaaram (Tanner's cassia; *Cassia auriculata*) and one vazhai inflorescence (Banana; *Musa paradisiaca*) along with 500 ml of buttermilk.

A paste prepared by grinding 500 g leaves of murungai (Drumstick; *Moringa oleifera*) and 250 g seeds of jeeragam (Cumin; *Cuminum cyminum*) are given internally with one litre of water.

One-fistful leaves of vellai/sivappu kundumani (Indian liquorice; *Abrus precatorius*) is taken and made into a paste. This paste is mixed with half a litre of milk and given two times a day.

#### Eye disease

White poo or retinal opacity of cattle is controlled by this practice. About 10 g of amanakku leaves (Castor; *Ricinus communis*), three vetrilai leaves (Betel leaf; *Piper betle*), one pakku (Areca nut, *Areca catechu*) and some lime were taken together and chewed well by a person. The chewed juice coming about 10 ml is blown directly from mouth of a person into the affected eyes of the cattle two times a day, to control.

Also a juice prepared by crushing the flowers of nithyakalyani (Madagascar periwinkle; *Catharanthus roseus*) and using as eye drops will

control the same eye problem. About five ml juice is required for each eye.

Three drops squeezed out from about 20 g tender leaves of pala (Jackfruit tree; *Artocarpus heterophyllus*) is applied on eyes for three days.

Two drops prepared from a mixture of 20 g leaves of anathalai (*Clausena dentata*) and 10 g salt is applied in the eyes for two to three days.

### Fever

A paste made from 200 g leaves of thuthuvalai (Purple-fruited pea eggplant; *Solanum trilobatum*) is administered orally twice a day for three days.

A paste prepared by grinding five fruits of kumati (Bitter apple; *Citrullus colocynthis*) along with 100 g of palm jaggery is administered twice a day.

### Fits

A mixture containing well ground parts comprising 10 g each of velam bark (Golden vattle; *Acacia arabica*), kodivaeli bark (Ceylong leadwort; *Plumbago zeylanica*), alinji bark (Sage-leaved alangium; *Alangium salviifolium*), pachaikorali bark (*Ixora notoniana*), murungai bark (Drumstick tree; *Moringa oleifera*), veppilai bark (Neem; *Azadirachta indica*), pala bark (Jackfruit tree; *Artocarpus heterophyllus*), chillodai bark (*Acacia eburnea*) and kaddukai bark (Chebulic myrobalan; *Terminalia chebula*) is added with few pieces of poondu (Garlic; *Allium sativum*) and three grains of milagu (Black pepper; *Piper nigrum*) and fed to cattle in empty stomach for two weeks.

A thick mixture made by grinding 20 g tender leaves of nochi (Five-leaved chaste tree; *Vitex negundo*), three grains of milagu (Black pepper; *Piper nigrum*) and three pieces of poondu (Garlic; *Allium sativum*) along with human urine is taken in a white cloth and the extract squeezed out of the cloth is poured through nostrils.

### Preventive measures for Foot and mouth disease

A paste or ball made from grinding three fruits of vazhai (Banana; *Musa paradisiaca*), one bundle of kothamalli seedling (Coriander; *Coriandrum sativum*) and 250 g leaves of venthayam (Fenugreek; *Trigonella foenum-graecum*) are given orally once in a week for four weeks.

Powder of 100 g each of etti bark (*Nux vomica*; *Strychnos nux-vomica*) and oduvan bark (*Cleistanthus collinus*). These powders are mixed with half a litre of water kept for four days and thereafter it is applied on the wound for three days to cure ulcers caused by foot and mouth disease.

Crush two fruits of malai vazhai (hill Banana; *Musa paradisiaca*), mix with 50 ml of vembu oil (Neem; *Azadirachta indica*) and 10 g of kaskas (Kaskasa; *Saccharum spontaneous*) and the mixture is made into a ball. This is fed to cattle for quick relief. Vembu oil is also applied on the foot.

A decoction is made by crushing 200 g leaves of pala (Jackfruit tree; *Artocarpus heterophyllus*) and 300 g bark of vembu (Neem; *Azadirachta indica*) using five litres of water, which is reduced to three litres by heating. 500 ml of this decoction is given orally twice a day.

A paste is prepared by using 100 g manjal powder (Turmeric, *Curcuma longa*) and 20 ml gingelly oil or vembu oil (Neem; *Azadirachta indica*) One hour after application on the foot, the cattle is taken to a muddy place and allowed to walk for about 10 minutes.

An about two kg leaves of manathakali (Kangaroo apple; *Solanum americanum*) is fed to cattle daily to get relief from foot and mouth disease.

Properly grind 100 g of etti bark (*Nux-Vomica*; *Strychnos nux-vomica*) is soaked in one litre of water and keep it for a day. Next day, using small pieces of white muslin cloth dipped in the decoction is gently wiped on the wound. This is continued until the wounds are healed.

### Increase in milk yield

Methods to enhance milk yield from cow is very widely used. Most of the formulations use locally available plants or plants specially cultivated for this purpose. The different formulations recorded by this study are:

After calving, feed the cow or cattle were with kollu (Horsegram; *Macrotyloma uniflorum*), cumbu (Pearl millet; *Pennisetum typhoides*) and rice husk in the morning and evening.

A paste is first made from makka cholam (Maize; *Zea mays*), mochai (Hyacinth bean; *Lablab*

*purpureus*), thattapayar (*Vigna unguiculata*) and cake of verkadalai (Groundnut, *Arachis hypogea*). This is then mixed with sufficient amount of water and the mixture is allowed to ferment for a day. The cattle are then made to drink fermented mixture.

A mixture is made by grinding one kg tubers of thaneervittan kizhangu (Wild asparagus; *Asparagus racemosus*) 250 g of small vengkayam (small Onion; *Allium cepa*) and 250 g of palm jaggery. This is then mixed with five litres of fermented rice water (Paddy; *Oryza sativa*) and the decoction is given as a single dose, once a day for five days.

Enhanced milk secretion is also achieved by feeding daily with five kg leaves of malai vembu (*Melia azadirach*).

### Indigestion

Feeding a paste prepared as follows treats indigestion of cattle. About 2.5 kg each of small vengkayam (small Onion; *Allium cepa*), grains of cumbu (Pearl millet; *Pennisetum typhoides*) and pig fat are boiled. Add to this cooked mix 10 kg of common salt and whole content is kept in a mud pot for two days. This is fed twice a day at the rate of two kg per dose.

Another formulation is made by mixing 0.5 kg leaves of moongil (Bamboo; *Bambusa arundinacea*) 0.5 kg leaves of naluvai (*Canthium diccocum*) and feeding the same to the cattle. It is claimed that after three hours, the cattle does release dung and excreta and gains relief.

Small medicinal balls are made from the paste prepared from 20 g of small vengkayam (small Onion; *Allium cepa*), 10 g each of jeeragam (Cumin; *Cuminum cyminum*) and thippili grains (Long pepper; *Piper longum*). These are fed to cattle to ease indigestion.

Partially pound mixture made from 0.5 kg each leaves of naluvai (*Canthium diccocum*), moongil leaves (*Bambusa arundinacea*), three grain milagu (Black pepper; *Piper nigrum*) and one piece of poondu (Garlic; *Allium sativum*) are fed to cattle to provide relief in three hours.

### Insect bite

Treatment is important when cattle suffer from

serious insect bites, usually from bees, wasps and other predatory insects.

A decoction made in hot water from a paste is applied on the insect bitten area. The paste is made from 10 g each of erukku roots (Crown flower; *Calotropis gigantea*), avuri roots (Wild indigo; *Tephrosia purpurea*), etti roots (Nux Vomica; *Strychnos nux-vomica*), alinji roots (Sage laved alangium; *Alangium salviifolium*), kodivaeli roots (Ceylong leadwort; *Plumbago zeylanica*), molagarana roots (Tape vine; *Stephania japonica*), leaves of kalakka plant (Karaunda; *Carissa carandas*), three grains of milagu (Black pepper; *Piper nigrum*) and a piece of poondu (Garlic; *Allium sativum*). Once this application is made, the cattle are not fed.

Juice extracted from leaves of peenarisangu (Indian privet; *Clerodendron inerme*) is applied on the cow's body and also sprinkled around the area.

### Intestinal worms

A decoction made from 20 g of amanakku leaves (Castor; *Ricinus communis*) and 25 g of ripened fruits of puli (Tamarind; *Tamarindus indica*) along with 100 ml of elumichai juice (Lemon; *Citrus limon*) is given as a single dose only in the morning for three days.

A paste made from 50 g fruits of sundai (Night shade; *Solanum torvum*) is given once a day at morning for three days.

### Itching

It is common that skin infection first leads to loss of hair in the region, which becomes white patches and eventually to wounds. To control itching in such areas, a paste from the following formulation is applied on the spot in the evenings and the treatment continued for a week. The formulation includes ash from the burnt dried leaves of arali (Rose laurel; *Nerium oleander*), 10 ml of thenkai oil (Coconut; *Cocos nucifera*) and 10 ml of vembu oil (Neem; *Azadirachta indica*).

### Kunthu

A paste made from well-pounded two pieces of outer skin removed sothukatrashai (Barbados aloe; *Aloe vera*) with sombu (Fennel; *Foeniculum vulgare*) is fed to cattle to get relief.

When the cattle are grazed in the field, the whitish foam deposited on the grass, immediately affect them. A paste made from bark of palkattanji (*Plecosperrum spinosum*) 50 g and 50 g milagai (Chilli; *Capsicum frutescens*) is mixed well. This mixture is fed to cattle twice a day.

A paste made from well-pounded one hundred grams of seppankizhangu (Colocasia; *Colocasia esculenta*) outer skin removed with three milagu grains (Black pepper; *Piper nigrum*) and one poondu (Garlic; *Allium sativum*) piece is taken in a vessel. The paste is made into three balls and fed to cattle. If there is no improvement, the following method could be adapted. A mixture made from fifty grams of palkattanji (*Plecosperrum spinosum*) bark, siru milagai (Chilli; *Capsicum frutescens*) 10 numbers, 30 ml of pig fat, one poondu (Garlic; *Allium sativum*) piece and three milagu (Black pepper; *Piper nigrum*) grains well pound is fed along with hot water. All the cattle owners in this hilly region know this knowledge.

Cattle sometimes stuck out their tongues and refused to take food for a long time. This is called pachakunthu. To treat cure this, mixture of 200 g of puli (Tamraind; *Tamarindus indica*) fruits and 20 g of salt is taken and rubbed on the tongue to get immediate relief.

A well pound mixture comprising of 50 g bark of palkattanji (*Plecosperrum spinosum*) with 100 ml of pig fat. Three small balls made out of the prepared mixture, is fed to cattle twice a day for four days.

#### Loss of appetite

A mixture made from stem of pirandai (Adamant creeper; *Cissus quadrangularis*) well pound with salt is rubbed on the tongue twice a day for three days.

#### Overexposed to the sun in summer

Generally in summer, cattles are over exposed to sun and this made cattle tired. A paste prepared by grinding twenty grams of alinji bark (Sage leaved alangium; *Alangium salvifolium*), two kg of seppankizhangu (Colocasia; *Colocasia esculenta*), three milagu (Black pepper; *Piper nigrum*) grains and three poondu (Garlic; *Allium sativum*) pieces is divided into six small portions. Three balls are

fed in the morning and three in the evening. This gives immediate relief to cattle.

#### Poisonous bite

A paste is made from well pound fifty grams of siriyangai (Cret; *Andrographis paniculata*) leaves with 50 g of black milagu (Black pepper; *Piper nigrum*) grains is administered orally twice a day and continued for two days.

A paste prepared from 250 g of vagai (Siris tree; *Albizia lebeck*) bark with 10 g of jeeragam (Cumin; *Cuminum cyminum*) seeds is fed to cattle.

A juice is prepared from one litre of vembu leaves (Neem; *Azadirachta indica*) with and veliparuthi (*Pergularia daemia*) leaves. This mixture is applied over the area.

Well-ground mixture made from each 100 g of sirukurinjan (Periploca of the woods; *Gymnema sylvestre*) leaves, 100 g of siriyangai (Cret; *Andrographis paniculata*) leaves and 50 g of adutheendapalai (Worm killer; *Aristolochia bracteolata*) leaves are given two times in a day for two days.

A nice paste prepared from three pieces of poondu (Garlic; *Allium sativum*), three milagu grains (Black pepper; *Piper nigrum*), and three dried milagai (Chilli; *Capsicum frutescens*) pods is squeezed into the nostril of snake bitten cattle two times at two hours interval.

A juice made from leaves of tulsi (Sacred basil; *Ocimum tenuiflorum*) and kuppaimeni (Indian Acalypha; *Acalypha indica*) is squeezed through nostril

#### Placenta removal

A nicely soaked two kg of gingelly (Sesam; *Sesamum indicum*) cake powder in water is fed to cattle to ease removal of placenta. It is administrated twice a day.

A well ground mixture made from one kg of white cholam (Sorghum; *Sorghum bicolor*), one kg kollu (Horsegram; *Macrotyloma uniflorum*) and one kg puli leaves (Tamarind; *Tamarindus indica*) is fed to cattle. Placenta removal may occur in two hours of in take.

A mixture prepared from two-dried well-matured thenkai (Coconut; *Cocos nucifera*) powder,

half kg soaked raw rice and half kg of brown sugar is fed to cattle continuously for three days. It helps easy expulsion of placenta.

Another formulation of 500 g leaves of mudakkattan (Ballon vine; *Cardiospermum halicacabum*) is ground well with rice water and administered once in every one hour. Within three hours expulsion of the placenta noticed.

A decoction made from each 200 g of athi (Fig; *Ficus racemosa*) bark, nayuruvi (Prickly chaff flower; *Achyranthes aspera*) stem, amirthavalli/seenthil (Heart-leaves-moonseed; *Tinospora cordifolia*) stem, paruthi (Cotton; *Gossypium hirsutum*) leaves and arasu (Peepal tree; *Ficus religiosa*) bark is mixed with three litres of water. After it is reduced to half by boiling, 250 g of palm jaggery is added and administered internally.

### Sappai

Cattle sometimes developed swelling in the thighs. Sap of kalli (Sweet prickly pear; *Opuntia dillenii*) is applied to get relief.

### Skin

A well ground mixture of seemaiagathi (Ringworm shrub; *Cassia alata*) leaves with elumicham (Lemon; *Citrus limon*) juice is applied over the affected area for any skin.

### Swelling

A well pound mixture of dried varagu (Kodo millet; *Paspalum scrobiculatum*) plant taken in one vessel and mixed with coconut oil. This mixture is applied on the neck swelling, two times a day. Sometimes, water alone may be sprayed on the neck to reduce swelling.

Another formula of mixture prepared using a handful each of the following; avuri bark (Wild indigo; *Tephrosia purpurea*), erukku (Crown flower; *Calotropis gigantea*) root, molagaranai (Tape vine; *Stephania japonica*) root, mullu keerai (Prickly amaranth; *Amaranthus spinosus*), velam bark (Golden vattle; *Acacia arabica*), veliparuthi (*Pergularia daemia*) bark, kalli pith (Sweet prickly pear; *Opuntia dillenii*) and half kg thippili (Long pepper; *Piper longum*) grains. This is administered with hot water.

Swelling is controlled by administering a filtrate prepared with grinding of kari pala (Jack fruit tree;

*Artocarpus communis*) tree bark with water. After boiling, this mixture is made into paste. Puttruman (Ant mud) is added with the paste and applied on the swelling part.

A juice is made by using boiled leaves of virali (Hopseed; *Dodonaea angustifolia*), hot white stone (calcium) and paste of pirandai (Adamant creeper; *Cissus quadrangularis*) is tied in a G421 gunny bag. This poultice is applied on the swollen area.

### Stomach ache

A fine paste made by grinding bark of each 20 g of athandai (*Capparis divaricata*), gunda thadichi (*Grewia tilifolia*) and konna (Indian laburnum; *Cassia fistula*) and naluvai (*Canthium dicoccum*) bark is mixed with hot water and fed to cattle as drink. Relief may occur within three hours of intake.

### Urinary obstruction & disorders

A fine paste made by grinding 100 g of leaf of sothukatrashai (Barbados aloe; *Aloe vera*) with out skin portion is fed to cattle twice a day for two days.

Another formulation is made by grinding 200 g of vilvam (Bael tree; *Aegle marmelos*) leaves, 200 g of puli (Tamarind; *Tamarindus indica*) fruits and 300 g of onion (Onion; *Allium cepa*) is added with 100 ml of gingelly oil. This mixture is fed to cattle.

### Wheezing - breathing trouble

A well nicely chewed mixture prepared by using Molagaranai (Tape vine; *Stephania japonica*) tender leaves (20 g), 20 g of kothankodi (Dodder; *Cassytha filiformis*) leaves, three milagu (Black pepper; *Piper nigrum*) grains and three poondu (Garlic; *Allium sativum*) pieces. This juice is directly blown from the person's mouth to cattle ears.

### Wounds

A nicely boiled two naarthai (Sour orange; *Citrus aurantium*) is taken and broken into two halves. This portion is as such smashed on the foot of cattle. This administered twice a day for two days to cure foot wounds.

A fine paste made of 100 g of seetha (Custard apple; *Annona squamosa*) leaves; 5 g of camphor and 20 g of pugayila (Tobacco; *Nicotiana tabaccum*)



leaves are taken and applied over the wounds till it is cured.

A mixture of 100 ml of vembu oil (Neem; *Azadirachta indica*), 10 naphthalene balls, 10 g of pugayila (Tobacco; *Nicotiana tabaccum*) powder and 10 g of manjal (Turmeric; *Curcuma longa*) is taken in a vessel. A paste ground from the mixture is applied on the wound, twice a day and continued for one week.

After delivery if it is not attended properly sometimes it may develop in to severe wounds. Another formulation common in the area to control this problem is to prepare mixture of etti bark (Nux vomica; *Strychnos nux-vomica*) 100 g is taken in a vessel and well pound. Human urine, (half a litre) is added and the mixture is kept for one day. A piece of cloth wrapped at the tip of a stick may be used to apply this solution every day till cattle get relief.

A well smashed paste from flowers of thumbai (Thumbe; *Leucas aspera*) 10 g and calcium is applied on the wound.

A paste ground from Desi varagu (Kodo millet; *Paspalum scrobiculatum*) ash with 20 ml pig fat is mixed well. This paste is administered externally for three days.

A well pound powder of naphthalene balls, 10 g of manjal (Turmeric; *Curcuma longa*) and 10 g of pugayila (Tobacco; *Nicotiana tabaccum*) is mixed with 10 ml of vembu oil (Neem; *Azadirachta indica*) is taken in a vessel. Paste made from this mixture is applied on the wound twice a day until it gets relief.

A practice of applying smashed etti (Nux vomica; *Strychnos nux-vomica*) fruits without seeds is followed twice or thrice in a day until cure is seen.

#### **Documented IK associated with the crop pest and disease management**

About 13 IKs were predominant at the study area covering various aspects of crop management and those are listed below

#### **Caterpillars, green bugs in rice and vegetables & insect in cotton**

A solution prepared by well ground mixture each 500 g of seetha (Custard apple; *Annona*

*squamosa*) seed, tobacco leaves (Tobacco; *Nicotiana tabaccum*) and erukku (Crown flower; *Calotropis gigantea*) leaves is taken and soaked in six litres of water and 100 g of zinc prior to spray. Depending on the field size, solution may be prepared.

#### **Fungal & bacterial disease**

A well-prepared mixture by grinding 10 kg of pappali (Papaya; *Carica papaya*) leaves with water is filtered and used for rice crops.

A solution prepared from grinding of five kg of pugayila (Tobacco; *Nicotiana tabaccum*) leaves, five kg vembu (Neem; *Azadirachta indica*) leaves, and two kg vasambu (Sweet flag; *Acorus calamus*) rhizome is taken for soaking in in water for 24 hours. Approximately one litre solution is added with 100 litre of water prior to spraying for rice and vegetable crops.

#### **Leaf eating caterpillars & woollen worms in oil seed crops**

Seven kg leaves of each nochi (Five leaved chaste tree; *Vitex negundo*); pungam (Indian beech; *Pongamia pinnata*), amanakku (Castor; *Ricinus communis*) and erukku (Crown flower; *Calotropis gigantea*) were added in 20 litres of water, boiled (20 litre juice +, 100 litre water) and used.

#### **Fruit borer, leaf eating caterpillars & leaf roller**

A practice of spraying vembu (Neem; *Azadirachta indica*) leaf juice or seed extract (10 litre juice +, 90 litre water) is used.

A method to control leaf roller in paddy, millets and vegetables is followed by using five kg leaves of each adathoda (Vasaka; *Justicia adhatoda*), nochi (Five leaved chaste tree; *Vitex negundo*), adutheendapalai (Worm killer; *Aristolochia bracteolata*), karuomathai (Thorn apple; *Datura metal*), erukku (Crown flower; *Calotropis gigantea*), thumbai (Thumbe; *Leucas aspera*), tulsii, (Sacred basil; *Ocimum tenuiflorum*), pirandai (Adamant creeper; *Cissus quadrangularis*), peenarisangu (Indian privet; *Clerodendron inerme*), arali (Rose laurel; *Nerium oleander*) and konna bark (Indian laburnum; *Cassia fistula*) is taken, and chopped into pieces. This mixture is soaked in a mud pot with cow dung and cow urine for 12 days. Three hundred ml of

this mixture is taken in 10 litres of water and used as spray.

A practice of spraying a mixture prepared by grinding 40 kg of malai vembu (Margosa tree; *Melia azadirach*) leaves with water for spraying. One litre of juice is mixed with 10 litres of water prior to spraying to control rice stem borer and maize bug.

Two kg of dried leaves each of etti (Nux vomica; *Strychnos nux-vomica*), sothukatrazhai (Barbados aloe; *Aloe vera*), vembu (Neem; *Azadirachta indica*) and pungam (Indian beech; *Pongamia pinnata*) were made into a powder and soaked in 20 litres of cow urine. The above mixture is allowed to soak for 24 hrs to control powdery mildew, cabbage-worm, and red woollen worm in groundnut, cabbage and tapioca

#### Effective pesticide preparation

A mixture made from one kilo each of unni leaves (Wild sage; *Lantana camara*), vembu leaves (Neem; *Azadirachta indica*), oduvan leaves (*Cleistanthus collinus*) and erukku leaves (Crown flower; *Calotropis gigantea*) is added with five litres of cow urine and kept in a mud pot. This is kept for 15 days for fermentation. After fermentation, one litre of mixture is added in 10 litres of water and sprayed for one hectare, to control rice pest.

Well-ground mixture made from one kilo each leaves of etti (Nux vomica; *Strychnos nux-vomica*), sothukatrazhai (Barbados aloe; *Aloe vera*), erukku (Crown flower; *Calotropis gigantea*), parthenium (Fever few; *Parthenium hysterophorus*) and bark of oduvan (*Cleistanthus collinus*) is allowed for 15 days fermentation. Half litre of the filtrate is added with in 10 litres of water, sprayed against paddy insects.

A practice to cure a disease called Poosananoi, Kuruthuvettu, two kg of unni leaves (Wild sage; *Lantana camara*), two kg of vembu (Neem; *Azadirachta indica*) leaves, three kg of oduvan (*Cleistanthus collinus*) leaves, one kg of erukku leaves (Crown flower; *Calotropis gigantea*) and two kg of anathalai leaves (*Clausena dentata*) were taken in a vessel and pound well. Five litres of cow urine and ten litres of water are added to this mixture. Allow this mixture for fermentation. After

15 days, two litres of filtrate is mixed with 10 litres of water and sprayed for one-acre rice field.

A practice of spreading parthenium (Fever few; *Parthenium hysterophorus*) plant in the rice field at the time of ploughing act against nursery pest.

A well made powder of etti bark (Nux vomica; *Strychnos nux-vomica*) one kg, murungai bark (Drumstick tree; *Moringa oleifera*) one kg, vazhai (Banana; *Musa paradisiaca*) stem juice 20 ml, oduvan bark (*Cleistanthus collinus*) one kg and naval bark (Jaman; *Syzygium cuminii*) one kg is taken. Adding two litres of cow urine facilitates fermentation. After fermentation, one litre of solution is added in nine litres of water and sprayed to control pest in rice field.

Spraying a mixture prepared from the paste of kodi rose (Coral creeper; *Antigonon leptopus*) with cooked rice kanji, controls white fly menace in tapioca field.

A Black colour spot on the leaves of coffee plant called as 'Mie' according to the villagers. A practice of growing elumicham vasana pillu (Lemon grass; *Cymbopogon citratus*) at the base of coffee plant is followed to control this disease further.

A white colour patch on the lime tree caused by bugs is controlled by preparing a juice of pirandai (Adamant creeper; *Cissus quadrangularis*). One litre of juice is mixed with five litres of water for spraying.

A mixture of two kg kitchen ash and ten kg pig dung is dried well and powdered nicely. Early in the morning, this powder is dusted on thakkali (Tomato; *Lycopersicon esculentum*) brinjal (Egg plant; *Solanum melongena*) and milagai plants (Chilli; *Capsicum frutescens*) fields. This application helps to control leaf spot disease in tomato, brinjal and chillies.

#### Sucking pest and leaf eating caterpillars in vegetables

A practice to control leaf cutter in thakkali (tomato), kathiri (brinjal) and vendai (bhendi), is taken up by well grinding of etti bark (Nux vomica; *Strychnos nux-vomica*) half kg, oduvan (*Cleistanthus collinus*) leaves one kg, oduvan bark (half kg) two kg sothukatrazhai (Barbados aloe; *Aloe*

*vera*), one kg erukku (Crown flower; *Calotropis gigantea*) leaves and one kg of parthenium (Fever few; *Parthenium hysterophorus*) leaves with ten litres of water and allowed for fermentation for one week. One litre of the filtrate is mixed with ten litres of water and sprayed.

#### **Termite, white flies & stem borer in horticulture crops**

A practice of spraying a mixture prepared by grinding fifty grams of thippili (Long pepper; *Piper longum*) and fifty grams of poondu (Garlic, *Allium sativum*) with four litres of hot water is sprayed. A mixture of 300 ml juice is mixed with 10 liters of water is taken for spray.

#### **Tikka disease in groundnut & all cereals**

A procedure of preparing a solution by grinding two hundred and fifty grams of puthina (Field mint; *Mentha arvensis*) leaves mixed with two litres of water is ready for spraying. The proportion of leaf juice and water is 500 ml of juice: 10 litre of water.

#### **Storage Structure**

Generally storage of seeds in any traditional system is followed by the construction of seed storage structure using locally available materials. At the same time, in order to keep the seeds in a disease free environment, adding leaves of some plant species along with the seed material is also in the practice. After the completion of harvest in any agricultural systems, selected seed materials are kept as seeds for next growing seasons. Under this circumstances seed storage structure, methods of storage are believed to be very important. The documented information is explained further:

#### **Seed storage in Ser**

After paddy harvest, seeds are dried, cleaned and stored in Ser. Size of the structure is 8 m length, 4 m height and 3 m breadth, made up of red sand and coated with cow dung and in addition amanakku (Castor; *Ricinus communis*), pungam (Indian beech; *Pongamia pinnata*) leaves are also mixed and kept inside. 1 x 1 meter hole is made at the top so that one person could go inside and come out.

#### **Seed storage in Thombai**

Cereals, after harvest, are dried in the sun. Selected seeds were stored for the next season.

Cleaned seeds were kept in this storage structure. Leaves of vembu (Neem; *Azadirachta indica*), pungam (Indian beech; *Pongamia pinnata*) and nochi (Five leaved chaste tree; *Vitex negundo*) are spread along the seed material. This helps to control storage pest.

#### **Seed storage in gunny bags**

Generally all types of seeds are stored in gunny bags. Sometimes, storage pests do enter inside the bag. To avoid the entry of storage pest, the gunny bags are dipped in 10 percent salt water. (One kg salt dissolved in 10 litres of water). Dried gunny bags are ready to store seeds.

#### **Storage for Onion (*Allium cepa*)**

At the time of harvest, small onions, along with the leaf sheath, are taken for storage on a bed raised either on the field or at the farmyard. Beds are raised with stone and wood totally covered with thennai (Coconut; *Cocos nucifera*) leaf sheath. This type of storage is known as onion patarai, and the capacity is about one tonne and size is five m length, two m height and two m depth. This helps to store vengkayam (Onion; *Allium cepa*) for a period of one year.

#### **Storage for Maize (*Zea mays*)**

After harvest, dried makka cholam (Maize; *Zea mays*) cobs are selected and stored for storage for next season as seed material. The maize cobs are hanged in side the house or some time just above the cooking fire.

#### **Seed storage pest management**

A practice to control storage pests in any type of storage are by adding, vasambu (Sweet flag; *Acorus calamus*) powder with the seeds. This is best for one-year storage. For 150 kg of seeds, it is advised to add one kg vasambu powder (Sweet flag; *Acorus calamus*).

A method to store seeds in mud pots is in practice. Leaves of the following plant species such as adathoda (Vasaka; *Justicia adhatoda*), tulsi (Sacred basil; *Ocimum tenuiflorum*) and vembu (Neem; *Azadirachta indica*) leaves are found mixed with the storage seed material. Leaves are first taken in the pot, then seeds are put on top of it and finally again leaves are spread at the upper portion to get

it completely covered. This set up prevents entry of pests in the storage.

#### **Rice growth hormone**

A method of spreading vellari leaves (*Cucumis sativus*) at the time of ploughing especially in the paddy field is a practice continued by the tribals. Paddy growth is boosted up by this application.

#### **Onion as intercrop in tapioca field**

A practice of planting onion as an intercrop in tapioca field, is found to increase the yield of tapioca

#### **Rhinoceros beetle in coconut plantation**

In order to control rhinoceros beetle in the coconut plantation, a mixture of 250 g of common salt and two kg sand is kept at the bottom of leaf sheath. This mixture is very effective and found to control the beetle. Once in three months, this mixture may be replaced.

#### **Documented indigenous knowledge associated with human disease management**

About 40 IKs were found at the study area for human disease management. This covers physical, physiological and chemical sides and is presented below.

#### **Abscess**

A method of preparing a dish by frying leaves of anathalai (*Clausena dentata*) with gingelly oil is given twice a day and continued for 48 days is found to be very effective to cure swelling on the affected area. Sometimes one or two leaves (*Clausena dentata*) also taken orally. Even paste made up of leaves of anathalai (*Clausena dentata*) may be applied over the abscess area till swelling is reduced.

The outer seed coat of amanakku (*Castor; Ricinus communis*) is removed and made into a paste. This paste is applied over the spot to get relief.

#### **Anaemia**

A dish prepared from murungai (*Drumstick; Moringa oleifera*) leaves is taken along with the food. It is done once a day for 15 days.

#### **Anaemia & Constipation**

A juice prepared from pappali (Papaya; *Carica papaya*) is taken once a day. Recommended dose is 100 ml juice per day. Sometime one piece of pappali (Papaya; *Carica papaya*) fruit is also taken at bedtime.

#### **Anaemia & hair fall**

A powder prepared from shade-dried karuveppilai (Curry leaf; *Murraya koenigii*) leaves are added with salt and puli (Tamarind; *Tamarindus indica*) fruits is taken thrice a day and continued for 15 days. One teaspoon of powder along with honey is preferred.

#### **Anaemia, Jaundice, liver disease & loss of appetite**

A powder prepared from one gram of karisalanganni (False daisy; *Eclipta alba*) leaves are taken internally thrice in a day along with honey is found to be a good remedy. This application is continued until cure.

#### **Anaemia & Swelling (*Oedema*)**

A juice prepared from twenty ml of fresh vilvam leaves (Bael tree; *Aegle marmelos*) mixed with thippili (Long pepper; *Piper longum*) powder 5 g is taken two times in a day, for 20 days.

#### **Arthritis**

A mixture made from fifty grams of etti (*Nux vomica; Strychnos nux-vomica*) seeds is added with 100 ml of goat's milk. The seeds are dried in shade and boiled in a pan with 200 ml of gingelly oil, till the seed color become brown. The filtered oil is applied on the painful area.

#### **Bite**

In remote hilly area, if a person is bitten by a dog, insect, or snake approaching a physician is very critical in an unusual time. The people who live here used to treat this type of poisonous bite with their known knowledge using some of the plant species as medicine. These practices are described here.

#### **Dog bite**

A mixture made from, 10 g of nayuruvi (Prickly chaff flower; *Achyranthes aspera*) leaves and two small vengkayam (Onion; *Allium cepa*) is applied

on the spot and tied with white cloth. This treatment is followed for three days. This application is administered soon after dog bite.

#### **Insect bite**

A juice made from 30 g leaves of thumbai (Thumba; *Leucas aspera*) with sufficient water is taken internally with in one hour of insect bite.

#### **Poison bite**

A paste made from grinding leaves of vembu (Neem; *Azadirachta indica*) is applied over the affected skin. Sometime one hundred grams of this paste can also be taken orally early morning for three days till it is cured.

A mixture made from one fistful of siriyangai (Cret; *Andrographis paniculata*) leaves, one vengkayam (Onion; *Allium cepa*) and 10 milagu (Black pepper; *Piper nigrum*) grains is taken and chewed nicely. This is applied on the area to subside poisonous effects.

Well-ground mixture made from roots of thalaisurili (Indian birthwort; *Aristolochia indica*) root is applied on the spot. Sometime one gram of powder is taken with hot water.

#### **Pooran bite (millipede / centipede)**

A fine-crushed leaf of fifty grams of thumbai (Thumba; *Leucas aspera*) is mixed with 50 ml of water and taken as a drink. This gives quick relief to the person bitten by pooran.

#### **Scorpion bite**

A fine mixture prepared from 30 g leaves of nuna (*Morinda pubescence*), 10 g common salt and 10 ml of water is applied on the spot of bite. This prevents spreading of scorpion poison.

#### **Burning feet & fungal infections**

A juice made from leaves of maruthani (Henna; *Lawsonia inermis*) is applied over the fungal infections soles at night time. This helps to reduce burning and the nail fungus also.

#### **Burning urination, scanty urination & white discharge**

A practice of cooking leaves of pasalai (Indian spinach; *Basella alba*) and eaten along with food, weekly twice gives immediate relief and reduce burning urination, scanty urination and white

discharge. This administration is continued for three months.

#### **Cold, cough, asthma, wheezing, throat pain, gastritis, ulcer, fever, and etc.**

**Cold:** A practice of chewing the leaves of vetrilai (Betel leaf; *Piper betel*) gives relief from cold.

**Cold & asthma:** A fine powder prepared by using equal quantities of thippili (Long pepper; *Piper longum*), milagu (Black pepper; *Piper nigrum*) and inji (Ginger; *Zingiber officinale*) is taken internally. One gram of this powder is mixed with honey and taken twice per day.

**Cold & cough:** For curing cold and cough, a special paste prepared by frying leaves of thuthuvalai (Purple fruited pea egg plant; *Solanum trilobatum*) and ghee. The paste is administered for seven days along with rice.

**Cold, cough & fever:** A juice is prepared from a fistful of adathoda (Vasaka; *Justicia adhatoda*) leaves. This is then mixed with equal amount of honey. Thirty ml of this juice is taken twice a day till the disease is cured.

**Cold, cough, asthma, wheezing & throat pain:** A decoction is prepared from milagu (Black pepper; *Piper nigrum*) grains is taken at early morning for seven days to get relief from cold, cough and throat pain.

**Cold, cough, difficulty in breathing & throat pain:** The whole plant of kandankathi (Yellow berried night shade; *Solanum surattense*) is dried in shade, crushed and made into a fine powder. Equal quantity of thippili (Long pepper; *Piper longum*) powder and water is added for administration. Sometime one gram of powder is taken with honey twice a day till the disease is cured.

**Cough, cold, gastritis & ulcer:** A curry prepared from leaves of manathakali (Kangaroo apple; *Solanum americanum*) is eaten along with food also give immediate relief. This application is continued for three to four days.

**Fever:** Children, who are suffering from fever, sometimes developed swollen legs and hands. To cure this, a mixture prepared by using, 100 g mullu

keerai (Prickly amaranth; *Amaranthus spinosus*), 50 g siru keerai (Chinese spinach; *Amaranthus tricolor*) with roots, 30 g velam (Golden vattle; *Acacia arabica*) roots and 30 g amanakku bark (Castor; *Ricinus communis*) is taken and dissolved in one litre of water. This mixture is kept overnight. Fifty ml of final juice collected is taken twice a day and continued for two to three days.

### Constipation

The outer skin removed kaddukai (Chebulic myrobalan; *Terminalia chebula*) fruit is taken and powdered. Ten gram of this powder is taken every day at bedtime.

### Constipation & gastritis

A well prepared powder of nicely fried venthayam (Fenugreek; *Trigonella foenum-graceum*) seeds are taken every day at bedtime. One gram of this powder is mixed with hot water and taken internally.

### Constipation, excess bleeding, piles & iron tonic

A practice of cooking immature athi (Fig; *Ficus racemosa*) fruits and eating along with food is considered as a source of iron. Another practice of preparing juice made from boiling 20 g of athi bark (Fig; *Ficus racemosa*) mixed with 300 ml of water is finally reduced to 100 ml. The juice is prescribed orally twice a day and continued for seven days.

### Constipation & uterine problems

A powder made from shade dried fresh part of the kumati (Bitter apple; *Citrullus colocynthis*) fruit is taken as medicine. Approximately sixty-five mg to three hundred mg is prescribed after food, twice a day and continue for one week.

### Control bleeding at the time of menstrual period

A powder is prepared from naval bark (Jaman; *Syzygium cumini*) 30 g and 30 g of ayila bark (*Holoptelea integrifolia*) is mixed with water and taken as drink at the time of menstrual cycle.

### Diabetes

A nicely made powder by using shade dried leaves of sirukurinjan (Periploca of the woods; *Gymnema sylvestre*) is prescribed as remedy to control diabetes. Half teaspoon of powder is taken

with hot water before food. Prescribed dose is twice a day and continued for one week.

A fine powder prepared from shade dried flowers of aavaaram (Tanner's cassia; *Cassia auriculata*) is consumed, early in the morning, as medicine to control diabetes. This prescribed dose is continued for one month at empty stomach.

### Diarrhoea

A mixture is prepared from molagaranai root (Tape vine; *Stephania japonica*) 10 g, naval bark (Jaman; *Syzygium cumini*) 20 g, three poondu (Garlic; *Allium sativum*) pieces and three black milagu (Black pepper; *Piper nigrum*) grains. Water is added and taken internally three times a day.

### Dysentery

A paste made from thottalsinungi (Sensitive plant; *Mimosa pudica*) leaves 30 g is consumed with cow's milk two times per day.

### Fits

A mixture made from well pounded each 10 to 20 g of avuri roots (Wild indigo; *Tephrosia purpurea*), usila roots (*Albizia amara*), erukku roots (Crown flower; *Calotropis gigantea*), kodikali roots (*Sarcostemma acidum*), velam roots (Golden vattle; *Acacia arabica*) and thumbai (Thumbe; *Leucas aspera*) leaves is prepared and boiled well. Asafoetida, poondu (Garlic; *Allium sativum*), jeeragam (Cumin; *Cuminum cyminum*), and thippili (Long pepper; *Piper longum*) are added to the mixture at the time of boiling. After boiling, this mixture is kept aside to cool. One tumbler of this mixture is given two times per day for two weeks.

### Headache – one-sided

A nicely crushed each 20 g of leaves and flowers of thumbai (Thumbe; *Leucas aspera*) is added with 20 ml of mother's milk. This solution is poured in to nostril, before sunrise. It is given for three days.

### Enhancing health

A well-prepared juice from twenty grams of nithyakalyani (Madagascar periwinkle; *Catharanthus roseus*) flowers is mixed with water and boiled. This is taken once a day for 20 days.

### Increasing milk at the time of breast feeding

A well-ground mixture made from kalakka flower (Karaunda; *Carissa carandas*), Seruppada (Coldenia procumbens) leaves, tender pala seed (Jack fruit tree; *Atrocarpus heterophyllus*) and three poondu (Garlic; *Allium sativum*) pieces is added with water and goat milk. If this is taken once in the morning, lactation is found to be improved.

### Indigestion

A nicely made paste from twenty grams of murungai (Drumstick; *Moringa oleifera*) leaves, 5 g asafoetida (Asafoetida; *Ferula asafoetida*), two grams salt and two numbers of poondu (Garlic; *Allium sativum*) pieces is taken as such and consumed.

Another practice of preparing juice from two gram of jeeragam (Cumin; *Cuminum cyminum*) is taken as a drink. This is taken along with a glass of hot water two times at an interval of three hours.

### Indigestion, bleeding and piles

The outer layer of the stem of pirandai (Adamant creeper; *Cissus quadrangularis*) is removed and inner part is fried with ghee and vengkayam (Onion; *Allium cepa*), puli (Tamarind; *Tamarindus indica*) fruits and salt is nicely made into a paste. This paste is taken along with food for seven days.

### Indigestion & loss of appetite

To overcome indigestion, chutney prepared from puthina (Field mint; *Mentha arvensis*) leaves fried with ghee is eaten. To add to taste, little salt and puli (Tamarind; *Tamarindus indica*) is also added to this chutney is taken along with food once a day for 10 days.

### Mouth ulcer

To cure and get relief from mouth ulcer, a practice of chewing leaves of five grams of vellai / sivappu kundumani (Indian liquorice; *Abrus precatorius*) for three minutes, twice a day is prescribed.

### Nervous problems & weakness

The outer layer of the seeds of poonaikali (Common cowitch; *Mucuna pruriens*) is removed, powdered and sieved through a cloth add equal

quantity of powdered sugar. Half a teaspoon of this powder mixed with milk is given two times a day till improvement is observed.

A dish prepared with the fruits of sundai (Night shade; *Solanum torvum*) is nicely cooked and taken along with food, weekly twice for two months.

### Pain & sprain

#### The practice of getting relief from pain and ache is described

**Body:** A powder made from whole plant of mudakkattan (Ballon vine; *Cardiospermum halicacabum*) with equal amount of thippili (Long pepper; *Piper longum*) is taken as medicine. One gram of powder is taken with hot water twice a day for 20 days.

**Joint:** A mixture prepared by frying viluthi (*Cadaba fruticosa*) leaves with castor oil is applied over the joints and nicely tied with cloth. This method gives immediate relief.

**Eye:** A juice is prepared from 20 g of kovakka leaves (Indian round gourd; *Coccinia grandis*) by crushing. This juice is administered as drop in eyes and prescribes three to five drops, two times in a day.

**Sprain:** A decoction is made from molagaranai root (Tape vine; *Stephania japonica*) 20 g and jeeragam (Cumin; *Cuminum cyminum*) 10 g is mixed with water. This is applied twice a day for three days.

**Sprain:** Gingelly oil is heated in a pan and allowed to cool. This is taken and massaged on the neck region. After that puli (Tamarind; *Tamarindus indica*) leaf is also pressed on the spot.

### Piles

A practice to take thuthi (Country mallow; *Abutilon indicum*) leaves cooked with dhal, eaten along with food. This is prescribed once a day for 15 days.

### Reduce Swelling & abscess

A thick decoction is made from virali leaves (Hopseed; *Dodonaea angustifolia*) fried with castor oil. This is then applied on the swelling area and abscess. Prescribed dose is, twice a day for seven days.

### Respiratory disorders & problems

Well-ground mixture made from vellai erukku (Crown flower; *Calotropis gigantea*) flowers is added with equal quantity of black pepper (Black pepper; *Piper nigrum*), made into a paste. The paste is made in to pills of approximately 100 mg size each. Two pills are prescribed for two times a day and continue for 30 days.

### Skin disease, painful menstruation & Intestinal worms

A well-made powder by grinding dried malai vembu (Margosa tree; *Melia azadirach*) bark is taken internally. Two grams of this powder is given internally two times a day for 30 days to get relief at the time of menstruation.

In addition, juice made from crushed leaves of malai vembu (Margosa tree; *Melia azadirach*) is administered in empty stomach for three days. Fifteen ml of this juice is prescribed per dose, to cure skin disease, painful menstruation and intestinal worms

A paste made from grinding leaves of adutheendapalai (Worm killer; *Aristolochia bracteolata*) is added with manjal (Turmeric; *Curcuma longa*) and applied over the affected skin. This is applied two times a day for 20 days to cure skin disease

### Stomach ulcer

Chutney made from manathakali leaves (Kangaroo apple; *Solanum americanum*) with little puli (Tamarind; *Tamarindus indica*) is taken along with breakfast.

A juice prepared by grinding konna bark (Indian laburnum; *Cassia fistula*) 30 g is along with water.

### Tooth

A practice of using roots of nayuruvi (Prickly chaff flower; *Achyranthes aspera*) as toothbrush is seen as common practice.

A mixture made from five grams of kumala (*Gmelina arborea*) leaves, five grams of nochi (Five leaved chaste tree; *Vitex negundo*) tender leaves, one poondu (Garlic; *Allium sativum*) piece and three milagu (Black pepper; *Piper nigrum*) grains is chewed nicely. This mixture is kept on the rotten teeth. Soon after taking this mixture, one should see that saliva is not spit.

The seeds of kandankathiri (Yellow berried night shade; *Solanum surattense*) are smashed and remove seeds. With the smashed fruits, coconut oil is added and goggled daily three times to cure toothache.

### Vomiting, flatulence & diarrhoea

A decoction made by boiling fifteen grams of vasambu (Sweet flag; *Acorus calamus*) rhizome with 400 ml of water. After boiling, it is reduced to 100 ml of decoction. This is prescribed as 100 ml for two times a day and continues for five days.

### Weakness

A powder is made by frying and grinding tubers of thanneervitankilangu (Wild asparagus; *Asparagus racemosus*). One gram of this powder is mixed with milk and taken two times a day for 30 days.

### White discharge

A mixture is made by grinding four flowers of semparuthi (Shoe flower; *Hibiscus rosa-sinensis*) and mixed with 100 ml of milk. This mixture is prescribed at early morning for 30 days. It cures white discharge and uterus problem. It is given to understand that the paste of this flower if eaten regularly for one month at early morning, one can avoid cardiac problem, if any.

A paste made from leaves of peenarisangu (Indian privet; *Clerodendron inerme*) is taken early morning to eliminate this problem. Prescribed dose is 20 g per day.

One leaf blade of sothukatrazhai (Barbados aloe; *Aloe vera*) is taken and outer skin is removed, washed thoroughly for several times. One hundred gram of the gel is taken for 48 days internally at early morning.

### White discharge & loose motion

A decoction is made by boiling a mixture of 20 g of vagai (Siris tree; *Albizia lebbek*) bark with 400 ml of water. After boiling, this is to 100 ml decoction, one hundred ml of this decoction is administered two times a day, continued for five days.

### Wounds

A powder is made from crushing seeds of seetha (Custard apple; *Annona squamosa*) is dusted on the wound spot.



Summing up the above described cases of documented ethonobotanical knowledge, this study identified 188 cases under 84 subject matter covering disease and health management of animals, plants and humans.

### Identification of Plant Resources Associated with IK at Pachamalai Hills

Compilation of different plant species deployed in various formulations described In above cases showed that altogether 119 species are involved.

These species are arranged in Table shown below on the basis of alphabetical order generated by their botanical name, along with local (tamil) name and name of family to which the species belongs.

The identified 119 plant species belong to 52 families. There is extreme uneven distribution of species associated with IK across families. Eleven out of the 52 families accounted for 48 per cent of the species. The families, which contributed to maximum number of species in order of importance,

Table: Catalogue of Plant resources associated with the documented IK

Sl. No	Plant Species	Vernacular Name	Family Name
1.	<i>Abrus precatorius</i> L.	Kundumani	Fabaceae
2	<i>Abutilon indicum</i> (L.) Sweet	Thuthi	Malvaceae
3.	<i>Acacia arabica</i> (Lam.) Willd.	Velam	Mimosaceae
4.	<i>Acacia eburnea</i> (L.f.) Willd.	Chillodai	Mimosaceae
5	<i>Acalypha indica</i> L.	Kuppaimeni	Euphorbiaceae
6	<i>Achras sapota</i> L.	Sapota	Sapotaceae
7	<i>Achyranthes aspera</i> L.	Nayuruvi	Amaranthaceae
8	<i>Acorus calamus</i> L.	Vasambu	Araceae
9	<i>Aegle marmelos</i> (L.) Corr. Serr.	Vilvam	Rutaceae
10	<i>Alangium salviifolium</i> (L.f.) Wangerin	Alinji	Alangiaceae
11	<i>Albizia amara</i> (Roxb.) Boivin	Usila	Mimosaceae
12	<i>Albizia lebeck</i> (L.) Benth.	Vagai	Mimosaceae
13	<i>Allium cepa</i> L.	Vengkayam	Liliaceae
14	<i>Aloe vera</i> (L.) Burm.f.	Sothukatrazhai	Liliaceae
15	<i>Amaranthus spinosus</i> L.	Mullukeerai	Amaranthaceae
16	<i>Amaranthus tricolor</i> L.	Sirukeerai	Amaranthaceae
17	<i>Andrographis paniculata</i> (Burm.f.) Wallich ex Nees	Siriyangai	Acanthaceae
18	<i>Annona squamosa</i> L.	Seetha	Annonaceae
19	<i>Antigonon leptopus</i> Hook. & Arn.	Kodirose	Polygonaceae
20	<i>Arachis hypogea</i> L.	Verkadalai	Fabaceae
21	<i>Areca catechu</i> L.	Pakku	Palmaceae
22	<i>Aristolochia bracteolata</i> Lam.	Adutheendapalai	Aristolochiaceae
23	<i>Aristolochia indica</i> L.	Thalaisurili	Aristolochiaceae
24	<i>Artocarpus communis</i> J.R.Froster & G. Forster	Kari pala	Moraceae
25	<i>Artocarpus heterophyllus</i> Lam.	Pala	Moraceae
26	<i>Asparagus racemosus</i> Willd.	Thaneervittan kizhangu	Liliaceae
27	<i>Azadirachta indica</i> Adr.Juss	Vembu	Meliaceae

28	<i>Bambusa arundinacea</i> (Retz.) Willd.	Moongil	Bambusaceae
29	<i>Basella alba</i> L.	Pasalai	Basellaceae
30	<i>Borassus flabellifer</i> L.	Panai	Arecaceae
31	<i>Cadaba fruticosa</i> (L.) Druce	Viluthi	Capparaceae
32	<i>Calotropis gigantea</i> (L.) R.Br.	Erukku	Asclepiadaceae
33	<i>Canthium dicoccum</i> (Gaertner) Teijsm. & Binnend.	Naluvai	Rubiaceae
34	<i>Capparis divaricata</i> Lam.	Athandai	Capparaceae
35	<i>Capsicum frutescens</i> L.	Milagai	Solanaceae
36	<i>Cardiospermum halicacabum</i> L.	Mudakkattan	Sapindaceae
37	<i>Carica papaya</i> L.	Pappali	Caricaceae
38	<i>Carissa carandas</i> L.	Kalakka	Apocynaceae
39	<i>Cassia alata</i> L.	Seemaiagathi	Caesalpiniaceae
40	<i>Cassia auriculata</i> L.	Aavaaram	Caesalpiniaceae
41	<i>Cassia fistula</i> L.	Konna	Caesalpiniaceae
42	<i>Cassytha filiformis</i> L.	Kothankodi	Lauraceae
43	<i>Catharanthus roseus</i> (L.) don	Nithyakalyani	Apocynaceae
44	<i>Ceiba pentandra</i> (L.) Gaertner var. <i>pentandra</i>	Illavam	Bombaceae
45	<i>Cissus quadrangularis</i> L.	Pirandai	Vitaceae
46	<i>Citrullus colocynthis</i> (L.) Schrader	Kumati	Cucurbitaceae
47	<i>Citrus aurantium</i> L.	Naarthai	Rutaceae
48	<i>Citrus limon</i> (L.) Burm.f.	Elumichai	Rutaceae
49	<i>Clausena dentata</i> (Willd.) Roemer	Anathalai	Rutaceae
50	<i>Cleistanthus collinus</i> (Roxb.) Benth.ex.Hook.f.	Oduvan	Euphorbiaceae
51	<i>Clerodendron inerme</i> (L.) Gaertner	Peenarisangu	Verbenaceae
52	<i>Coccinia grandis</i> (L.) J.Voigt	Kovakka	Cucurbitaceae
53	<i>Cocos nucifera</i> L.	Thennai	Arecaceae
54	<i>Coldenia procumbens</i> L.	Seruppada	Boraginaceae
55	<i>Colocasia esculenta</i> (L.) Schot	Seppankizhangu	Araceae
56	<i>Coriandrum sativum</i> L.	Kothamalli	Apiaceae
57	<i>Cucumis sativus</i> L.	Vellari	Cucurbitaceae
58	<i>Curcuma longa</i> L.	Manjal	Zingiberaceae
59	<i>Cymbopogon citratus</i> (DC.) Stapf.	Elumicham vasana pillu	Poaceae
60	<i>Datura metel</i> L.	Oomathai	Solanaceae
61	<i>Diospyros montana</i> Roxb.	Vakkanathi	Ebenaceae
62	<i>Dodonaea angustifolia</i> L.f.	Virali	Sapindaceae
63	<i>Eclipta alba</i> L.	Karisalangani	Asteraceae
64	<i>Ficus racemosa</i> L.	Athi	Moraceae
65	<i>Ficus religiosa</i> L.	Arasu	Moraceae

66	<i>Gmelina arborea</i> Roxb.	Kumala	Verbenaceae
67	<i>Gossypium hirsutum</i> L.	Paruthi	Malvaceae
68	<i>Grewia tilifolia</i> Vahl	Gundathadichi	Tiliaceae
69	<i>Gymnema sylvestre</i> (Retz.) R.Br.ex Roemer & Schutles	Sirukurinjan	Asclepiadaceae
70	<i>Hibiscus rosa-sinensis</i> L.	Semparuthi	Malvaceae
71	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Ayila	Ulmaceae
72	<i>Ixora notoniana</i> Wallich ex	Pachakorali	Rubiaceae
73	<i>Justicia adhatoda</i> L.	Adathoda	Acanthaceae
74	<i>Lablab purpureus</i> (L.) Sweet var. <i>purpureus</i>	Mochai	Fabaceae
75	<i>Lantana camara</i> L.	Unnichi	Verbenaceae
76	<i>Lawsonia inermis</i> L.	Maruthani	Lythraceae
77	<i>Leucas aspera</i> (Willd.) Link	Thumbai	Lamiaceae
78	<i>Macrotyloma uniflorum</i> (Lam.) Verdc.	Kollu	Fabaceae
79	<i>Melia azadirach</i> L.	Malaivembu	Meliaceae
80	<i>Mentha arvensis</i> L.	Puthina	Lamiaceae
81	<i>Mimosa pudica</i> L.	Thottalsinungi	Mimosaceae
82	<i>Momordica charantia</i> L.	Pagarkai	Cucurbitaceae
83	<i>Morinda pubescence</i> Roxb.	Nuna	Rubiaceae
84	<i>Moringa oleifera</i> Lam.	Murungai	Moringaceae
85	<i>Mucuna pruriens</i> (L.) DC.	Poonaikali	Fabaceae
86	<i>Murraya koenigii</i> (L.) Sprengel	Karuveppilai	Rutaceae
87	<i>Musa paradisiaca</i> L.	Malai vazhai / vazhai	Musaceae
88	<i>Nerium oleander</i> L.	Arali	Apocynaceae
89	<i>Ocimum tenuiflorum</i> L.	Tulsi	Lamiaceae
90	<i>Opuntia dillenii</i> (Ker Gawler) Haw.	Kalli	Cactaceae
91	<i>Oryza sativa</i> L.	Nellu	Poaceae
92	<i>Parthenium hysterophorus</i> L.	Parthenium	Asteraceae
93	<i>Paspalum scrobiculatum</i> L.	Varagu	Poaceae
94	<i>Pennisetum typhoides</i> (Burm.f.) Stapf. & C.E. Hubb.	Cumbu	Poaceae
95	<i>Pergularia daemia</i> (Forsskal) Chiov.	Veliparuthi	Asclepiadaceae
96	<i>Phyllanthus emblica</i> L.	Nelli	Euphorbiaceae
97	<i>Plecosperrum spinosum</i> Trecul	Palkattanji	Moraceae
98	<i>Plumbago zeylanica</i> L.	Kodivaeli	Plumbaginaceae
99	<i>Pongamia pinnata</i> (L.) Pierre	Pungam	Fabaceae
100	<i>Pterocarpus santalinus</i> L.	Semmaram	Fabaceae
101	<i>Punica granatum</i> L.	Mathulai	Punicaceae
102	<i>Ricinus communis</i> L.	Amanakku	Euphorbiaceae
103	<i>Sarcostemma acidum</i> (Roxb.)	Kodikali	Asclepiadaceae

104	<i>Securinega virosa</i> (Roxb. Ex.Willd.) Baillon	Karumpulan	Euphorbiaceae
105	<i>Solanum americanum</i> L.	Manathakkali	Solanaceae
106	<i>Solanum surattense</i> Burm.f.	Kandankathiri	Solanaceae
107	<i>Solanum torvum</i> Sw.	Sundai	Solanaceae
108	<i>Solanum trilobatum</i> L.	Thuthuvalai	Solanaceae
109	<i>Sorghum bicolor</i> L.	Cholam	Poaceae
110	<i>Stephania japonica</i> (Thunb.) Miers	Molagaranai	Menispermaceae
111	<i>Strychnos nux-vomica</i> L.	Etti	Loganiaceae
112	<i>Syzygium cumini</i> (L.) Skeels	Naval	Myrtaceae
113	<i>Tamarindus indica</i> L.	Puli	Caesalpiniaceae
114	<i>Tephrosia purpurea</i> (L.) Pers.	Avuri	Fabaceae
115	<i>Terminalia chebula</i> Retz.	Kaddukai	Combretaceae
116	<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Seenthil	Menispermaceae
117	<i>Vigna unguiculata</i> (L.) Walp.ssp. <i>cylindrica</i> (L.) Verdc.	Thattapayar	Fabaceae
118	<i>Vitex negundo</i> L.	Nochi	Verbenaceae
119	<i>Zea mays</i> L.	Makka Cholam	Poaceae

are Fabaceae, Poaceae, Solanaceae, Euphorbiaceae, Mimosaceae, Moraceae and Rutaceae. Looking at the Genus level, it is noted that the 119 species belonged to 107 genera. Only very few genera contributed more than one species. Genus *Solanum* led the list with four species, followed by *Cassia* with three species, and *Acacia*, *Albizia*, *Amaranthus*, *Aristolochia*, *Atrocarpus*, *Citrus* and *Ficus* with two species each.

Examination of all species for their habit showed that 29.4 per cent among them are shrubs, 29.4 per cent are herb, and 26.9 per cent are trees and 14.3 per cent are climbers.

Further examination of the species for the parts they contributed to the different IK formulations reported in this study showed that leaves are the widely used plant part followed by the bark. These results show that in 52 per cent of the cases the IK is deploying leaves of different species, while deployment of bark is 26.9 per cent, seeds 13.5 per cent, roots 10.9 per cent, fruits 12.6 per cent, flowers 6.7 per cent and whole plant 5.9 per cent.

The IK documented by this study have been in existence over generations among the Malayali tribe and they are still practicing with occasional

innovative improvements. Although it is recognized that compared with the modern health care systems the IK-based health remedies take a long time to achieve favorable results, the community values the latter for its ready accessibility with least or no economic cost and no side effect. It is found that for practicing the IK-based health care, it is not only the knowledge that is important but also the ready access to all required plant species resources. This paper also touches upon the significance of this study in relation to the sustainable management of bio-resources of the Eastern Ghats.

### Discussion

Literature survey shows that some of the knowledge on use of medicinal plant species identified in the current study is also prevalent among other tribes living in the Eastern Ghats. It was earlier reported that kandhas of Kandhamal (Behera *et al.* 2006), local people at Narayanapatna hills, in Koraput (Das and Misra 2003), tribals at Jajpur (Satapathy and Brahman 2003) in Orissa; Konda reddy (Prasad *et al.* 2002), Chenchuas, Sugalis, Yerkuals of Kurnool (Goud *et al.* 2003) and in Mahabunagar (Kumar and Pullaiah 2003), in Anantapur (Reddy *et al.* 2003) in Andhraprash;

paliyans, pulayan (Ganesan *et al.* 2004), badagas, chetties, kotas and kattunaya tribals at Nilgiri, Tamil Nadu (Baburaj *et al.* 2003) used similar plant species documented at Pachamalai Hills for various treatment.

It may be noted that *Acacia species*, *Justicia species*, *Aegle marmelos*, *Alangium salvifolium*, *Albizia species*, *Aloe vera*, *Andrographis paniculata*, *Asparagus racemosus*, *Cadaba fruticosa*, *Cardiospermum halicacabum*, *Cassia fistula*, *Coldenia procumbens*, *Dodonea angustifolia*, *Holoptelea integrifolia*, *Mucuna pruriens*, *Ocimum tenuiflorum*, *Solanum species*, *Strychnos nuxvomica*, *Syzygium cumini*, *Tamarindus indica*, *Tephrosia purpurea*, *Terminalia chebula*, and *Tinospora cordifolia* were recorded in the study area for various animal and human ailments. From the information furnished it is interpreted that similar to other tribes, in the present study area the tribe Malayali, uses similar medicinal plants for treating concerned human diseases. This fact strengthens that the Eastern Ghats is highly blessed with medicinal plants and this must be conserved through awareness and training to tribals living in Eastern Ghats etc.

Though, there exists great similarity of medicinal use of these plants prescribed, some are used individually or in combination with other plant parts for treatment. Whatever is applicable for human diseases may also be used to treat animals in a different dose. The method of preparation, proportion, quantity, duration and mode of administration may vary from place to place. Generally, medicinal plants used to treat human ailments were used for treating animals, but in different doses (Mathias-Munday and McCorkle (1989) and Varier (1996). It is given to understand that the present study made similar observation.

Among the States, wherein the Eastern Ghats passes, there must be a joint effort to develop a common biodiversity policy based on dialogue with the pharmaceutical companies, tribals, conservation biologist, and other interested NGOs, to draw a meaningful policy to conserve the existing flora and fauna.

In the present study area it may be noted that there are 119 herbal plants, which belonged to 52

were identified from 14,277 ha. Indigenous Knowledge and the relevant plant resource available for animal, crop and human disease management that are presently available in the Pachamalai Hills, Eastern Ghats would provide an alternate science to treat the present day exotic human diseases.

Extensive field and literature survey in Eastern Ghats revealed that Euphorbiaceae was the dominant top ten families followed by Rubiaceae, Moraceae, Mimosaceae, Rutaceae, Lauraceae, Verbenaceae, Meliaceae, Tiliaceae (Rani and Pullaiah 2006). In the case of Malayali tribals, similar families were found distributed in Pachamalai Hills.

In the present study it is observed that identified medicinal plant species such as *Acorus calamus* (vulnerable - TN) *Aegle marmelos* (vulnerable - TN), *Pterocarpus santalinus* (critically endangered globally) along with *Piper longum* (endangered - TN) and *Piper nigrum* (lower risk near threatened - TN) were among those listed in the survey conducted by FRLHT in Southern States of India on Red listed medicinal plants (Kumar and Ved 2000).

This kind of work and applications paves way for building a pro-nature community life with high bio-safety and bio-happiness (MSSRF 2006). When compared to Western Ghats, only limited studies are available on the plant resources of Eastern Ghats. Therefore, the present study would strengthen our understanding on the state of ethanobotany and traditional knowledge system in the Eastern Ghats.

This study also underscores the critical importance of conservation of cultivated, semi-wild and wild forms of biological resources in the Eastern Ghats to render the traditional knowledge system sustainable and available to the community. This study also supports the view that sustainable bio-resource conservation has an underlying utility principle, whether rooted in IK or other economic value. Increased awareness among the younger generation on the importance of plant resources become important to the continued conservation of the IK and associated bio-resources. Efforts to educate communities, old and young, on the consequences of unsustainable use, the processes leading to the endangerment of species and genetic resources would eminently support the community

conservation ethos. The social value of these bio-resources and associated IK does not require emphasis in the context of vast population living in rural and inaccessible regions heavily depending on traditional herbal and indigenous knowledge for the health care of their own, their animals and crop plants (Kala 2006).

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