Ethnomedicinal plants used by Kanikkars of Agasthiarmalai Biosphere Reserve, Western Ghats

S. Lalitha Rani1, V. Kalpana Devi2, P. Tresina Soris3, A. Maruthupandian2 and V.R. Mohan2*

1Department of Botany, Mount Carmel College, Bangalore 560027, India
2Ethnopharmacology Unit, Research Department of Botany, V.O. Chidambaram College, Tuticorin 628008, Tamil Nadu, India

Abstract
The study has been carried out in Agasthiarmalai Biosphere Reserve, Western Ghats, Tamil Nadu. Kanikkars, the predominant tribal community has their settlements in different areas in the Biosphere. A total of 174 medicinal plants belonging to 69 families are identified which have been employed by the tribal community for the treatment of various ailments.

Keywords: Ethnomedicine, Kanikkar tribes, Western Ghats

INTRODUCTION
Traditional medicine (TM) occupies an important place in the health care systems of developing countries. The World Health Organization (WHO) estimates that more than 80% of health care needs in these countries are met through traditional health care practices (Chendurpandy et al., 2010). The people in developing countries depend on TM, because it is cheaper and more accessible than Orthodox Medicine (OM) (Sofowora, 1993; Luoga et al., 2000; World Health Organization, 2002). Traditional medicine is also acceptable than OM because, it blends readily into the people's socio-cultural life (Tabuti et al., 2003).

The various tribal sects of India are repositories of rich knowledge on various uses of plant genetic resources, which have hitherto remained unknown (Khoshoo, 1996). But of later, due to several developmental activities around tribal areas which are after all not related to their welfare, the tribal people are losing their traditional identity resulting in a good deal of loss of such treasures of plant genetic resources (Shankar, 1995). In view of the harmful developments, the UN declared the year 1993 as the “International Year of Indigenous people” based on the recommendation of the Rio de Janeiro Earth Summit. The studies on the relationship between the aboriginal or primitive people and their surroundings including a critical evaluation of some of the important plants used by the tribes have received considerable attention in recent years (Das et al., 1989).

Many infectious diseases are known to be treated with herbal remedies throughout the history of mankind. Even today, plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries (Zakaria, 1991). Plants still continue to be almost the exclusive source of drugs for a majority of the world’s population (Hamburger & Hostettman, 1991).

It is a matter of great pride that, among the 16 hot spots known for rich flora in the world, two are located in India (Mohan et al., 2010). They are the Eastern Himalayas and the Western Ghats (Khoshoo, 1996). The hill chain of Western Ghats recognized as a region of high level of biodiversity is under the threat of rapid loss of genetic resources (Gadgil, 1996). The biodiverse nature of the Eastern Ghats is meagre. A perusal of the available literature reveals that, till date there is no comprehensive survey, documentation and enumeration of wild medicinal plants used by the tribe Kanikkars inhabiting the Agasthiarmalai Biosphere Reserve, Western Ghats, Tamil Nadu, India. Hence, in the present study, an attempt is made for the survey, documentation and enumeration of wild medicinal plants in the Agasthiarmalai Biosphere Reserve, Western Ghats, Tamil Nadu. The Kanikkars are the dominant tribal group inhabiting this locality. The present study focuses on the dependence of the Kanikkars on herbal medicines and attempts at an exhaustive analysis of the therapeutic values of such medicinal plants.

The Kanikkars have asserted this ethnic identity and practiced the traditional ethnomedicine is a standing example of the symbiotic relationship with man had enjoyed from time immemorial. If it is documented and intellectual rights are guaranteed to them, not only the Kanikkars but the whole nation would benefit.

The Kanikkar tribes

The Kanikkars belong to the southern tribal zone. They are distributed along the Southeastern slopes of altitude regions of Western Ghats in large numbers. Kanikkars means hereditary proprietor of land thus recognizing their ancient rights over the forests lands. The Kanikkars are generally very short in stature and meager in appearance. Some have markedly negroid features. They are traditionally a nomadic community. They speak in their own dialect, Kanikkar Bhasha or Malampashi, which is close to the Dravidian language Malayalam. Kanikkars once practiced migratory cultivation but have now to a large extent abandoned such cultivation. Most of the Kanikkar tribes have a general knowledge of medicinal plants that are used for first aid remedies, to treat cough, cold fever, headache, poisonous bites and some other simple ailments. Kanis still supplement their food by gathering roots and tubers from the nearby forest areas. They eat tubers like Manihot esculenta and Dioscorea oppositifolia, etc (Sutha et al., 2010). They are also
engaged in seasonal collection of honey, bee wax and some minor forest produce. They cultivate edible plants, like tapioca, banana, millets and cash crops such as pepper, areca nut and cashew nut.

**METHODOLOGY**

Frequent field surveys were carried out in Agasthiarmalai Biosphere Reserves Western Ghats during different seasons in 2008-2010. The Agasthiarmalai Biosphere Reserve lies between 8° 22' and 8° 53' North latitude and between 77° 10' and 77° 35' East longitudes in Tirunelveli and Kanyakumari district of Tamil Nadu in the Southern Western Ghats of India. The boundaries are Ambasamudram and Tenkasi taluks of Tirunelveli districts in the north, Ambasamudram and Nanguneri taluks of Tirunelveli districts in the east, Kanyakumari district in the south and Kerala State in the west.

Geographically, it is a part of South Western tip of the Western Ghats, a region that is known for its species richness, diversity and high degree of endemism. The Agasthiarmalai Biosphere Reserve area has been recognized as one of the 'hot-spots' for Biodiversity conservation by the IUCN (Ayyanar & Ignacimuthu, 2005). The altitude ranges from 100 to 1867m (MSL). It receives rainfall during the South West as well as North East monsoon.

In the study area, the Kanikkars live either in isolated pockets or small hamlets. Their habitations are known by the following names.

(i) Ingikuzhi, (ii) Chinnamylar, (iii) Periyamylar, (iv) Agasthiarkanikudiyiruppu

The ethnobotanical data were collected through interviews and discussions among the herbal practitioners in and around the study area. Most of the information was gathered from the elderly people, who have a very long acquaintance with usage of plants. The information thus gathered was cross-checked adequately for reliability and accuracy by interacting with different groups of the Kanikkars from different habitats to confirm the use, mode of administration as well as dosage differences, if any. Data were also collected through questionnaires in their local language. In addition to the vernacular name and medicinal uses, detailed information about mode of preparation, form of usage was collected. The medicinal plants were identified, photographed and sample specimens were collected for the preparation of herbarium (Gamble, 1996; Mathew, 1983). The identified plant specimens were confirmed and deposited in the herbarium of Ethnopharmacology Unit, Research Department of Botany, V.O.Chidambararam College, Tuticorin, Tamil Nadu.

As many as 174 ethnomedicinal plants were identified as being used by the Kanikkar tribals of Agasthiarmalai Biosphere Reserves, Western Ghats, Tamil Nadu, India. They were tabulated (Table 1) alphabetically with botanical name, family name, vernacular name, plant parts used, mode of administration, dosage etc.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Botanical name Family</th>
<th>Vernacular name</th>
<th>Mode of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abrus precatorius L. Fabaceae</td>
<td>Kundumani</td>
<td>Two to three grams of fresh leaves are chewed carefully without swallowing the salva for a minute. Then the chewed leaves are spat out and the mouth is washed well with water. This procedure is repeated for two times a day for a period of three to four day to get relief from sensitiveness of teeth. About fifty grams of warm seed paste is applied over the affected joints twice a day until one experiences relief from stiffness of joints. A drop of pure filtered seed extract prepared with clean water is allowed to settle on the eyeballs twice a day for about three days to reduce irritation. Two to three grams of fresh leaves or roots of the plant with seeds are made into a paste and consumed along with cold water or cow’s milk two days for five to seven days to cure any poisonous bites.</td>
</tr>
<tr>
<td>2</td>
<td>Abutilon indicum (L.) Sweet Malvaceae</td>
<td>Thuthi</td>
<td>The juice prepared from ten grams of crushed leaves is applied externally two times a day for a period of three days to get relief from earache.</td>
</tr>
<tr>
<td>3</td>
<td>Acacia caesia (L.) Wild (Mimosca caesia L.) Mimosaceae</td>
<td>Vellinjal</td>
<td>The dried bark is made into powder and is used like soap to treat scabies, rashes and ringworm infection.</td>
</tr>
<tr>
<td>4</td>
<td>Acalypha racemosa Heyne ex Baill Euphorbiaceae</td>
<td>Sirusinni</td>
<td>The juice prepared from ten to fifteen grams of fresh leaves with fifty ml of water is taken orally two days a day for two days to get relief from indigestion.</td>
</tr>
<tr>
<td>5</td>
<td>Achyranthes aspera L. Amaranthaceae</td>
<td>Nayurivi</td>
<td>The paste prepared from fifteen grams of fresh leaves with water is applied externally two times a day for a period of ten days to treat dog bites.</td>
</tr>
<tr>
<td>6</td>
<td>Acorus calamus L. Arajaceae</td>
<td>Vasambu</td>
<td>A thread is inserted through a hole made in the dried rhizome and is worn as a necklace to ward off giddiness.</td>
</tr>
<tr>
<td>7</td>
<td>Aloe barbadensis Mill. (A. vera (L) Burm.F) Liliaceae</td>
<td>Chothukathalai</td>
<td>A fresh leaf is taken orally as such after removing the epidermal peel, once in a day for a period of three to four days to reduce body heat. One fresh leaf is taken per day for about ten days after removing the epidermal peel to cure kidney stone.</td>
</tr>
<tr>
<td>8</td>
<td>Alpinia calcarata Roscoe Zingiberaceae</td>
<td>Sittarathai</td>
<td>The paste prepared from ten grams of the rhizome mixed with water is taken orally twice a day for two days to get relief from stomach disorders.</td>
</tr>
<tr>
<td>9</td>
<td>Alstonia scholaris (L.) R.BR. Apocynaceae</td>
<td>Mukkampalai</td>
<td>Ten grams of the fresh stem bark is made into a paste with a few drops of water. This paste is mixed with one hundred ml of cow’s milk or rice fermented water and taken by nursing mothers twice a day for seven to ten days to improve lactation. One teaspoon of the powder made from shade dried leaves is orally administered in water or along with a few drops of the stem latex of the same plant, once in a day for a period of one month to get relief from asthma.</td>
</tr>
<tr>
<td>10</td>
<td>Amaranthus viridis L. Amaranthaceae</td>
<td>Kuppaikerai</td>
<td>A handful of the whole plant paste is externally applied in the morning hours to treat scabies.</td>
</tr>
</tbody>
</table>
11 Amorphophallus paeonifolius (Dennst.) Nicolson var. campanulatus (Blume ex Dence) Sivadasan Araceae

Kattukarunai One hundred grams of the tuber is boiled in water with an equal amount of fresh leaves of tamarind (Tamarindus indica L.). Then the peeled tuber is cooked in tamarind. The prepared curry is taken as medicine once a day for seven to ten days to get relief from bleeding piles.

12 Ammannia baccifera L. subsp. aegyptiaca (Willd) Koehne Lythraceae

Kailurvi The paste prepared from ten grams of whole plant with water is mixed with lemon (Citrus aurantifolia (Christm) Swingle) juice and it is applied externally twice a day for a period of one week to treat eczema.

13 Anaphyllum beddomei Engler. Araceae

Keerikiliangu About ten grams of the cleaned fresh rhizome made into a paste is externally applied twice a day to treat eczema and scabies.

14 Ancistrocladus heynanus wall.ex Graham Ancistrocladaceae

Malvadudamady The paste prepared from twenty grams of leaves with water is applied externally two times a day for a period of one month to treat rheumatism.

15 Andrographis paniculata (Burm.f.) Wall.ex Nees Acanthaceae

Neelavembu The paste prepared from ten grams of leaves along with ten grams of the root of adathoda (Justicia adathoda L.) is applied externally two times a day for a period of four days to treat poisonous insect bites.

16 Anisomeles malabarica (L.) R. Br.ex Sims Lamiaeae

Perunthambai Handful of leaves are boiled in two litres of water in a closed container. When the steam emanates the lid of the container is slowly removed and vapour bath is administered to get relief from rheumatic pain.

17 Argemone mexicana L. Papaveraeaceae

Kudiyoetti About ten grams of the leaf paste is externally applied once in a day to treat ringworm infection.

18 Aristolochia bracteolata Lam. Aristolochiaceae

Aaduthinnapalai Handful of the whole plant paste is externally applied twice a day to treat eczema, scabies and ringworm infection.

19 Aristolochia krysgagattha Sivaranjan &Pradeep Aristolochiaceae

Karudakodi About fifty grams of root and an equal quantity of leaves are boiled in one litre of coconut oil (Cocos nucifera L.) for about fifteen to twenty minutes over a low flame. This oil is filtered after cooling and applied on the head once in a day for seven to ten days as the treatment for rheumatism. This therapy is used to reduce excessive body heat.

20 Asystasia travancorica Bedd. Acanthaceae

Aathuorinneri About ten grams of a paste made from the leaves and the flowers is mixed with honey and is taken orally, twice a day, for three weeks for the treatment of rheumatism. The use of tamarind, fish and egg is avoided.

21 Azadirachta indica A Juss Meliaeae

Vembo The oil extracted from the seeds is massaged over the joints as an embrocation in rheumatism. Neem oil is used in many medicated preparations for the treatment of rheumatism. About twenty to fifty grams of stem bark is boiled in five hundred ml of water for twenty to thirty minutes. This decoction is taken orally for three weeks to treat rheumatic complaints.

22 Bacopa monnieri (L.) Pennell (Moniera cuneifolia Michaux) Scorpoliariaceae

Nirbrahmi Fifty to one hundred grams of whole plant is boiled in coconut oil (Cocos nucifera L.) and the oil is applied on the knees three times a day for three days to get relief from pain on the knees.

23 Bauhinia racemosa Lam. Caesalpiniaeae

Aathi Two to three drops of pure filtered juice prepared from three to five fresh leaves with water is applied on the eyes twice a day to remove particles like dust.

24 Begonia subpeilata Wight Begoniaceae

Onuyelathamare The paste prepared from twenty grams of leaves with water is taken orally three times a day to get relief from stomachache.

25 Biophytum sensitivum (L.) DC Oxalis sensitiva L. Oxalidaceae

Manivattipatchilai Twenty grams of leaf is made into a paste with water and is applied externally once in a day to treat skin rashes and eczema.

26 Blepharis maderaspatisensis (L) Heyne ex Roth Acanthaceae

Sadhaiotti The paste prepared from fresh leaves with water is applied externally once in a day for a period of one week to heal the wounds.

27 Boerhavia diffusa L. (B. repens L.) Nyctaginaceae

Vethalamai One hundred grams of leaves is boiled in half a litre of coconut oil (Cocos nucifera L.) and the oil extract is applied twice a day to treat scabies and ringworm infection.

28 Bridelia scandens (Roxb,Wild) Euphorbiaceae

Akavalle The paste prepared from twenty five grams of the stem bark with water is taken orally in a single dose for a period of twenty days to treat jaundice.

29 Bulbophyllum albidum (Wight) Hook. f Orchidaceae

Kalmalpuravai The juice prepared from twenty grams of fresh leaves and bulb along with water is taken orally two times a day for a period of one month for strengthening of a weak uterus for conception.

30 Cadaba inflata (Roxb.) Wight &Amn Capparaceae

Mayiladikurutha The paste prepared from twenty grams of whole plant with a few drops of water is applied externally two times a day for a period of twenty days to treat rheumatism.

31 Calanthe masuca (D.Don)Lindi Orchidaceae

Kalai kombu About ten grams of dried tuberous root is powdered and made into a paste with water. This paste is used to treat acnes and sebaceous cysts.

32 Calophyllum inophyllum L. Clusiaceae

Punnai Few drops of oil extracted from the seeds are applied externally twice a day to treat ringworm infection.

33 Calotropis gigantea (L.) R.Br Asclepiadaceae

Enkku A poultice of roasted leaves is applied on the rheumatic joints for one week or more to soothe pain and to reduce swelling.

34 Calycopteris floribunda Lam. Combretaceae

Minnarkodi Ten grams of the leaf paste is applied externally twice a day to treat scabies and skin inflammation.

35 Canthium parviflorum Lam. Rubiceae

Kattikarai The paste prepared from twenty grams of root mixed with coconut oil (Cocos nucifera L.) is applied externally three times a day for a period of four days to treat boils.

36 Capparis sepiaria L. Capparaceae

Muruviiloki Ten grams of the fresh bark of the stem is made into paste with lemon juice (Citrus aurantifolia (Christm) Swingle) and is applied externally once in a day for a period of one week to treat eczema and dandruff.

37 Capsicum annuum L. (C. frutescens Sensu Clarke) Solanaceae

Usimilagai A thick paste made from twenty grams of fruits, along with ten grams of ginger (Zingiber officinale Roscoe) and ten grams of vellaipoondu (Allium sativum L.) is given orally to women after delivery. This is followed by the administration of fifty milliliters of gingelly oil (Sesamum indicum L.) or honey to prevent rheumatic complaints.
<table>
<thead>
<tr>
<th>Page</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Carissa carandas L.</td>
<td>Kalaaka Fresh fruits are taken as a coolant twice a day for a period of three days to reduce body heat.</td>
</tr>
<tr>
<td>39</td>
<td>Carica papaya L.</td>
<td>Pappali The juice prepared from twenty five grams of fruit with milk and sugar is taken orally for a period of one week, two times a day to cause abortion.</td>
</tr>
<tr>
<td>40</td>
<td>Carmona retusa (Vahl) Masamune (Ehretiamicrophylla Lam)</td>
<td>Seethavetrilai The paste prepared from ten grams of fresh leaves and stem along with ten grams of the leaves of keerai (Phyllanthus lawii Graham ex Mull-Ang) and applied externally twice a day for a period of six days to get relief from swelling of legs.</td>
</tr>
<tr>
<td>41</td>
<td>Cassia alata L.</td>
<td>Yanalihavari Twenty grams of fresh leaf paste is applied twice a day to treat ring worm infection.</td>
</tr>
<tr>
<td>42</td>
<td>Cassia kleinii Wight &amp; Arn</td>
<td>Mullilathottavadi Handful of the whole plant is made into a paste and is applied externally twice a day to treat eczema.</td>
</tr>
<tr>
<td>43</td>
<td>Chlorophyllum laxum R.Br</td>
<td>Pelamanak The paste prepared from ten grams of fresh leaves is mixed with honey is administered two times a day for period of three days to treat indigestion.</td>
</tr>
<tr>
<td>44</td>
<td>Cipadessa baccifera (Roth) Miq</td>
<td>Pullipamcheddi The paste prepared from twenty grams of fresh leaves with water is applied externally twice a day for a period of two days to get relief from wasp sting.</td>
</tr>
<tr>
<td>45</td>
<td>Cissus quadrangularis L.</td>
<td>Pirandai About ten grams of paste made from the tender shoots is consumed twice a day for three weeks for the treatment of rheumatism.</td>
</tr>
<tr>
<td>46</td>
<td>Cissampelos pareira L.</td>
<td>Malaiathkivaer The paste prepared from leaves with water is taken orally along with cow’s milk two times a day for a period of two days to get relief from lumbago.</td>
</tr>
<tr>
<td>47</td>
<td>Clerodendrum inerme (L.) Gaertn (Valkameria inermis L.)</td>
<td>Changukuppi The leaf paste is externally applied once in a day for a week to treat psoriasis, scabies and ringworm infection. The leaf paste is also applied on the site of insect bite.</td>
</tr>
<tr>
<td>48</td>
<td>Clerodendrum viscosum Vent.</td>
<td>Perungilai The paste prepared from ten to fifteen grams of leaves is applied externally two times a day for a period of three days to prevent excessive bleeding due to injury.</td>
</tr>
<tr>
<td>49</td>
<td>Cilloutia ternatea L. Fabaceae</td>
<td>Changupushpam Twenty grams of leaf paste is externally applied twice a day to treat skin inflammation, scabies and ringworm infection.</td>
</tr>
<tr>
<td>50</td>
<td>Cocoonia grandis (L.) Voig (C. indicia Wight &amp; Arn)</td>
<td>Kovai The paste prepared from ten grams of fruit with water is applied externally on the gums two times a day for a period of two days to get relief from toothache.</td>
</tr>
<tr>
<td>51</td>
<td>Commelina benghalensis L</td>
<td>Valiapachai The leaf paste is applied externally twice a day to treat scabies. The leaf paste is also applied once in a day on the wounds for healing and to remove the poisonous spines that had struck accidently on the body parts.</td>
</tr>
<tr>
<td>52</td>
<td>Corallorcaporus epigaeus (Rottl&amp;wild.) Clarke Cucurbitaceae</td>
<td>Akashagaruden The paste prepared from twenty grams of bulb with water is mixed with honey and is taken orally two times a day for a period of two day to treat cold and cough in children.</td>
</tr>
<tr>
<td>53</td>
<td>Coscinium fenestratum (Gaertn) Coleb Menispermaeae</td>
<td>Maramanjali About fifty grams of the dried climbing stem are boiled in one hundred ml of coconut oil (Cocos nucifera L.). Few drops of this oil extract are applied on the burns twice a day for healing. The stem paste is used to treat acne.</td>
</tr>
<tr>
<td>54</td>
<td>Costus speciosus (Koen,J.E Smith Costaceae</td>
<td>Koshtam The rhizome and leaf paste are externally applied once in a day to treat ringworm infection.</td>
</tr>
<tr>
<td>55</td>
<td>Crateva magna (Lour.) DC Capparaceae</td>
<td>Maralingam The juice prepared from five to ten grams of fresh stem bark with one hundred ml of water is taken orally in empty stomach once in a day for a period of one week during the early stages of pregnancy to cause abortion.</td>
</tr>
<tr>
<td>56</td>
<td>Crinum defixum Ker-Gawl Amaryllidaceae</td>
<td>Vishanarayani About ten bulbs made into a paste with water are applied externally twice a day on the inflamed skin that is formed due to insect bites or allergy.</td>
</tr>
<tr>
<td>57</td>
<td>Crotton tiglium L.</td>
<td>Nervilankai The seeds are purified by soaking them in lime water for two days. The oil expelled from the seeds is applied twice a day on the infected areas to treat eczema. The oil is also used to treat alopecia. The leaf paste is externally applied twice a day to treat scabies and ringworm infection.</td>
</tr>
<tr>
<td>58</td>
<td>Cymbopogon citratus (DC.) Stapf (Andropogon citratus DC) Poaceae</td>
<td>Chukkunaaripullu A sufficient quantity of the whole plant is chopped and boiled in water for thirty minutes and the warm water is used during bath twice a day for twelve days as treatment for rheumatism. Handful of fresh leaves is crushed with water into juice. After filtration, half a cup of this juice is given orally twice or thrice a day for one week as an effective management of rheumatism.</td>
</tr>
<tr>
<td>59</td>
<td>Datura metal L. (D. fastuosa L.) Solanaceae</td>
<td>Oomathai The leaves are soaked in boiling water and they are bandaged over the affected part to get relief from rheumatic pain. The boiled leaves are also used for fomentation on the rheumatic swelling for fifteen to twenty minutes.</td>
</tr>
<tr>
<td>60</td>
<td>Dioscorea bulbifera L. var.vera Poaceae</td>
<td>Vetthalavalai/ Kanuvalli Fifty grams of fresh or boiled tuber is taken orally twice a day for a period of two to three days to arrest dysentery.</td>
</tr>
<tr>
<td>61</td>
<td>Dioscorea pentaphyilla L.var pentaphyilla (D. pentaphyilla L.var.linnaei Prain &amp; Burkill) Dioscoreaceae</td>
<td>Mulluvalli Twenty grams of the tuber is fried in ghee and made into a paste. This paste is taken orally three times a day for a period of four days for general good health.</td>
</tr>
<tr>
<td>62</td>
<td>Dioscorea tomentosa Koen ex Spreng Dioscoreaceae</td>
<td>Noovalli Ten grams of boiled and peeled tuber is given to children once in a day for three days to relieve bowel complaints.</td>
</tr>
<tr>
<td>63</td>
<td>Diospyros melanoxylon Roxb. Ebenaceae</td>
<td>Vaathabeedi Fifty grams of fresh leaves is made into a paste. This paste is warmed on low flame and applied over the knee twice a day for five to six days to get relief from joint pain. A hundred to two hundred grams of fresh leaves is boiled in water. A bath with this warm water treats the parts affected by rheumatism.</td>
</tr>
<tr>
<td>64</td>
<td>Diploclossia glaucenscens (Blume) Diels</td>
<td>Erumaithirankodi Ten grams of dried leaves are soaked in one hundred ml of coconut oil (Cocos nucifera L.) for few days. The oil infusion is externally applied thrice a day to treat leprosy and scabies.</td>
</tr>
</tbody>
</table>
Menispermacaeae

Diploclocyclus palmatus (L.) Jeffrey (Bryonepis lacinioa Sensu Naud.) Cucurbitaceae

Dipteracanthus patulus (Jacq.) Nees (Rueilia patula Jacq.) Acanthaceae

Dolichos trilobus L. (D. falcatus auct non klein ex wild) Fabaceae

Drymglossum heterophyllum (L.) Trimen Polygodiaceae

Eclipta prostrata (L.) (E. alba (L.) Hassk) Asteraceae

Entada pursaetha DC (E. scandens auct.non Benh) Mimoseae

Erythropalum scandens Bl.Bijdr (E. popullolium (Am.) Mast.) Erythropalaceae

Erythrina variegata L. (E.indica Lam.) Fabaceae

Ficus benghalensis L.var benghalensis Moraceae

Ficus racemosa L. Moraceae

Ficus religiosa L. Moraceae

Goniothalamus wighti HK. f. Th. Annonnaeae

Hemionitis arifolia (Burm)T. Moore Hemionitidaceae

Hiptage benghalensis (L.) Kurz Malpighiaceae

Hugonia mystax L. Linaceae

Indigofera longeracemosae Boiv ex Bail Fabaceae

Indigofera wighti Graham ex Wight & Arn Fabaceae

Isonandra lanceolata Wight Sapotiaceae

Ixora coccinea L. Rubiaceae

Jatropha gossypifolia L. Euphorbiaceae

Justicia adhatoda L. (Adhatoda vasica Nees) Acanthaceae

Mimosaceae

Annonaceae

Hiptage benghalensis

Hemionitidaceae

Moraceae

Acanthaceae

Indigofera wighti

Fabaceae

Sapotaceae

Euphorbiaceae

Rubiaceae

Justicia adhatoda L.
88 Kingiiodendron pinnatum (Roxb.ex DC.,Harm.) Harms. (Hardwickia pinnata Roxb.ex DC) Caesalpiniae

Kulavu

The resin obtained by piercing the trunk is applied on the affected joints before going to bed along with a soft massaging in circular motion. In the morning lukewarm water is poured over the joints. It is also applied on the fissured foot for five to seven days to get relief.

89 Lantana camara L. var aculeata (L.) Mold Verbenaecae

Unnipoor

The powder prepared from the shade dried leaves is taken orally along with water two times a day for a period of one week to reduce body heat. A teaspoon of paste made from an equal quantity of leaves and flowers is mixed with honey and taken orally thrice a day for sixteen days as treatment for rheumatism.

90 Lawsonia inermis L. (L. alba Lam) Lythraceae

Maruthani

The leaves are soaked in coconut oil (Cocos nucifera L.) along with the flowers of asokam (Saraca asoca (Roxb.) Wilde) for a week and this oil infusion is used as a hair tonic to promote hair growth and to treat dandruff. This oil is also used to treat ringworm infection.

91 Lepianthes umbellata (L.) Rafin (Packeria subpellata (Willd.) Kunth) Piperaceae

Thendemani

The paste prepared from twenty grams of fresh leaves with water is applied externally twice a day for a period of two days to prevent any swelling caused by wasp bites.

92 Leucas aspera (Willd) Link Lamiaceae

Tambai

One teaspoonful of juice prepared from five to ten grams of leaves mixed with honey is taken orally three times a day for a period of two days to get relief from cough in children.

93 Mallotus philippensis (Lam.) Muell-Arg Euphorbiaceae

Kaathuthakadi

One teaspoon of paste is made from an equal quantity of leaves and tender fruit. This is mixed with honey and is taken orally twice a day for thirteen days to get relief from rheumatism. During this period the consumption of salt, spicy food and tamarind is avoided.

94 Merremia tridentata (L.) Hall. f subsp hastata (Desr.) Ooststr Convolvulaceae

Koonthalvalarthi

The entire plant is boiled in coconut oil (Cocos nucifera L.) and the extract is used to treat dandruff and to promote hair growth. Ten grams of the leaves made into a paste is applied once in a day to treat various skin infections.

95 Mirabilis jalapa L. Nyctaginaceae

Anthimanthari

Twenty grams of dried root tuber made into a paste with water is applied externally twice a day to treat sebaceous cysts.

96 Momordica charantia L. var. charantia Cucurbitaceae

Paakakai

As a vermifuge fifty to one hundred grams of unripe fruit is cooked as curry and taken two times a day for a period of three days.

97 Morinda pubescens J.E. Smith var pubescens Rubiaceae

Manjanatti

Ten grams of fresh leaves, two or three small vengayam (Allium cepa L.) and one teaspoon of manjal powder (Curcuma longa L.) are made into a paste. This paste is heated in five to ten ml of coconut oil (Cocos nucifera L) and the hot paste is applied on the injury caused by weapons once in a day for four to five days to heal the wounds.

98 Moringa concanensis Nimmo ex Gibs Moringaceae

Kattumoringai

Fifteen to twenty grams of fresh leaves are made into a paste along with two to three grams of black pepper (Piper nigrum L.) and five grams of vellaipoondu (Allium sativum L.). This paste is taken in the early morning hours in empty stomach once in a day for a period of three to four days to treat jaundice. During this treatment one bucketful of cold water is poured on the head of the patients. One teaspoonful of fresh leaf juice is given to children in a single dose to treat bowel disorder.

99 Moringa pterygosperma Gaerth (M. oleifera acut.non Lam) Moringaceae

Moringai

About two hundred grams of stem bark from a ten year old tree is boiled in neem oil (Azadirachta indica A.Juss) along with fifty grams of crushed vellaipoondu (Allium sativum L) and fifty grams of coarsely powdered fenugreek (Trigonella foenecum –graecum L.) on a moderate flame for about twenty minutes. This oil is applied on the affected part as an embrocation for rheumatic swelling. Hot water bath is administered after few hours.

100 Mucuna prurniens (L.) DC var prurniens Fabaceae

Poonaykali

Powdered hairs on pods are administered with honey for expelling intestinal worms.

101 Mukia maderaspatana (L.)M.Roem Cucurbitaceae

Musumusukkai

One teaspoon of juice prepared from the fresh leaves is taken orally once in a day for a period of three days to get relief from cold and cough. The juice prepared from ten grams of fresh leaves with two hundred ml of rice fermented water is taken orally twice a day for a period of one week to reduce bile problem.

102 Murraya koenigii (L.) Spreng Rutaceae

Karivepillai

Twenty to twenty five grams of fresh leaves are made into a paste along with equal quantity of fresh endosperm of thennai (Cocos nucifera L.) The paste is mixed with a little water and applied on the head an hour before taking bath. This procedure is practiced once a week regularly to induce hair growth, to delay the development of grey hair and to arrest falling of hair.

103 Murraya paniculata (L.) Jack (M. exotica L.) Rutaceae

Malaivembu

About fifty grams of fresh leaves is made into a paste with a little water. This paste is warmed for few minutes and bandaged on the affected part in the morning and the patient is advised hot water bath in the evening. This helps to relieve rheumatic pain.

104 Mussaenda glabrata (Hook.f) Hutchinson ex Gamble Rubiaceae

Veillimadanthai

The leaf paste is applied externally once in a day to treat skin allergy and inflammation. Fifty grams of the fresh leaves are boiled in two hundred ml of coconut oil (Cocos nucifera L) and the extract is applied on the scalp to promote hair growth.

105 Myxopyrum serratum A.W. Hill Oleaceae

Saduramullai

Five grams of the leaf paste is applied externally twice a day to treat skin rashes, scabies and ringworm infection.

106 Ocimum gratissimum L. Lamiaceae

Perumtulsi

The paste prepared from one hundred grams of fresh leaves is applied externally three times a day for a period of one week to get relief from muscle pain.

107 Paspalum scrobiculatum L. (P.comersonsi Lam) Poaceae

Varegu

The paste prepared from equal quantity of leaves and root with water is applied externally to get relief from pain during delivery.

108 Pavonia odorata Wild Malvaceae

Thuthi

The juice prepared from twenty grams of the whole plant with one hundred ml of water is mixed with five grams of pepper powder (Piper nigrum L.) and is taken orally twice a day for a period of five days to treat fever and cough.
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109  **Pergularia daemia** (Forssk.) Chiov 
*P. extensa* (Jacq.) N.E.Br, Asclepiadaceae  Veliparuthi

Fifty grams of fresh roots and an equal quantity of fresh leaves is crushed together with twenty five grams of stem bark of *multumunuragi* (*Erythrina variegata* L.) and ten grams of poppy seeds (*Papaver somniferum* L.). This is boiled for twenty five to thirty minutes on a low flame in an earthen pot or brass vessel. The filtered oil is massaged on the joints and the affected parts two times a day for ten to fifteen days. A hot water bath is administered during the course of the treatment. The use of chicken, pork, fish and having sex is to be avoided.

110  **Phyllanthus amarus** Schum & Thonn, Euphorbiaceae  Kilanelli

The juice prepared from ten grams of the fresh clean aerial parts of the plant in twenty five ml of water. The filtered juice is taken orally as such or along with hundred ml of cow’s milk twice a day for about seven to ten days to treat jaundice.

111  **Phyllanthus gardnerianus** (Wight) Baill, Euphorbiaceae  Opanicchay

The paste prepared from ten to fifteen grams of leaves and fruits in water are taken orally in a single dose for a period of two weeks to treat jaundice.

112  **Phyllanthus singampattiana** (Sebastine & Henry) Kumari & Chandrabose comb.nov, Euphorbiaceae  Kattugoliya

One teaspoonful of juice prepared from the fresh leaves is taken twice a day for a period of four to five days to relieve cold and cough.

113  **Piper nigrum** L., Piperaceae  Milagu

One hundred to two hundred grams of leaves with shoot is boiled in water together with tender shoot of bamboo (*Bambusa arundinacea* (Retz.) Roxb) and neem leaves (*Azadirachta indica* A.Juss). Hot water bath is taken twice a day with this water while it is comfortably hot for twelve days or more to get relief from rheumatic pain.

114  **Pleiopserium alatum** (Wall.ex Wt. & Am) Swingle, Rutaceae  Malinaarathai

The juice extracted from one hundred grams of fresh leaves and hundred grams of fresh leaves of lemon grass (*Cymbopogon citratus* (DC) Stapf) is boiled in one litre of neem oil (*Azadirachta indica* A.Jess) in a low flame for twenty minutes. This oil is applied on the joints, shoulders and the other affected parts. Hot water is sprinkled to get relief from rheumatic complaints.

115  **Plumbago zeylanica** L., Plumbaginaceae  Vellaikkoduvili

The paste prepared from ten to fifteen grams of root with water is applied externally in a single dose for a period of three days to get relief from poisonous insect bites.

116  **Polygala chinensis** L., Polygalaceae  Siriyangai

The paste prepared from ten grams of the root is applied externally twice a day for a period of three days to treat any poisonous bites.

117  **Polygala javana** DC. Polygalaceae  Palpiranthai

Five to ten grams of fresh leaves are made into a paste and applied on the breast twice a day for a period of two to three days to get relief from pain after breast feeding is stopped.

118  **Pongamia pinnata** (L.) Pierre (*P. glabra* Vent), Fabaceae  Pongan

One hundred grams of dried bark powder is boiled in half a litre of coconut oil (*Cocos nucifera* L.) and the oil extract is applied externally once in a day to treat eczema, rashes and ringworm infection.

119  **Psychotria nilgiriensis** Deb & Gang, Rubiaceae  Odaikaappatchilai

A ten gram paste made from the tender fruits is consumed along with honey once in a day for twelve days or more for the treatment of rheumatism.

120  **Psychotria nudiflora** Wt & Arn, Rubiaceae  Kalpoo

A ten gram paste is made from an equal quantity of leaves and flowers which is consumed along with honey once in a day for twelve days for the treatment of rheumatism.

121  **Pterocarpus marsupium** Roxb. Fabaceae  Vengai

Fifty grams of the stem resin is soaked in one hundred ml of water for about twelve hours. It is applied externally on the knee twice a day for a period of five to six days to get relief from joint pain.

122  **Rauwolfia densiflora** (Wall.) Berth.ex Hk.f, *Tabernaemontana densiflora* Wall., Apocynaceae  Paararisunilla patchilai

The paste prepared from ten grams of leaves and flowers is consumed orally two times a day for five days to treat rheumatic complaints.

123  **Rivina humilis** L., Phytolaccaceae  Molagsar

The paste prepared from ten to fifteen grams of fresh leaves with water is applied externally two times a day for a period of one day to treat insect bites.

124  **Sansevieria roxburghiana** Schultes &Schultes (*S. zeylanica* Roxb), Agavaceae  Marul

A hundred grams of chopped leaves, twenty grams of vellaiapooendu (*Allium sativum* L.) and twenty grams of vengayam (*Allium cepa* L.), fifty grams of stem bark of moringai (*Moringa pterygosperma* Gaertn.) and ten grams of mustard seeds (*Brassica juncea* (L.) Czern) is boiled in one litre of neem oil (*Azadirachta indica* A.Juss) on a low flame. This lukewarm oil is massaged by applying medium pressure on hands and legs for fifteen days or until one gets relief from rheumatic pain.

125  **Santalum album** L., Santalaceae  Santhanam

The wood paste is applied externally on the skin to treat prickly heat, skin rashes and allergy.

126  **Sarcostemma acidum** (Roxb.) Voigt, Asclepiadaceae  Kodiakalli

One teaspoonful of latex from the plant is applied externally three times a day for two days to treat heat boils in children.

127  **Saraca asoca** (Roxb.) Wilde, Caesalpiniiaceae  Asokam

Fifty grams of the dried flowers along with the leaves of maruthani (*Lawsonia inermis* L.) are boiled in coconut oil (*Cocos nucifera* L.) and the extract is applied externally twice a day to treat eczema and scabies.
128 Scleria lithosperma (L.) Sw (Scripus lithosperma) Cyperaceae Kathipul Twenty grams of dried rhizome made into a paste with water is applied externally twice a day to treat eczema, leucoderma and scabies.

129 Senna auriculata (L.) Roxb. (Cassia auriculata L.) Caesalpiniaeaceae Aavarai The paste prepared from five to ten grams of sepal and petals from the flowers with a small quantity of asafoetida (Ferula asafoetida L.) and poppy seeds (Papaver somniferum L.) using hot water. This paste is given orally for two days in single dose to relieve colic pain.

130 Solanum surattense Burm.F (Solanaceae) Kandargatti The decoction prepared from fresh leaves of kandangattiri (Solanum surattense Burm.F) thothuvalai (Solanum trilobatum L.) dried ginger (Zingiber officinale Roscoe) coriander seeds (Coriandrum sativum L.) and pepper (Piper nigrum L.) is taken orally two times a day for two days to arrest cold, cough and fever.

131 Solanum torvum Sw (Solanaceae) Sundalakai As vermifuge fifty to one hundred grams of unripe fruits is cooked as curry and taken two times a day for a period of three days.

132 Sonerila tinneveliensis Fischer Melastomataeae Kalpuli A handful of leaves are boiled with one litre of water that is, further, reduced to a hundred ml and consumed on an empty stomach once in a day for twelve to fifteen days to get relief from rheumatic complaints.

133 Sphaeranthus indicus L. Asteraceae Oothuchedi At the time of giddiness three or four fresh leaves are squeeze using both the palms and then smelled to get relief.

134 Tabernaemontana heynana Wall (Ervatamia heynana Wall.) Apocynaceae Nandhiavattai Two drops of pure filtered aqueous extract prepared from the flower petal is applied on the eyes for a period of seven days to improve vision.

135 Tamarindus indica L. Caesalpiniaeaceae Puli A dried seed is rubbed on a rough floor for few seconds to remove the outer testa and the rubbed surface of the seed is pressed immediately on the spot of scorpion sting to relieve pain.

136 Tephrosia purpuraea (L.)Pers Fabaceae Kattikolingi One teaspoonful of juice prepared from the fresh root bark is mixed with a pinch of asafoetida (Ferula asafoetida L.) and given to children in single dose to get relief from bowel disorder.

137 Theopsea populnea (L.) Soland ex Correa Malvaceae Puvarasu A few tender shoots are made into a paste along with one or two small vengayam (Allium cepa L.) This paste is applied immediately on the area of scorpion sting to relieve pain.

138 Thottea silquosa (Lam.) Ding Hou Aristolochiaceae Kuravan kandi mooli The shade dried plants are powdered and one teaspoon of the powder is taken orally along with water in empty stomach for a period of two to three days to get relief from gastric problems. A teaspoon of shade dried stem bark powder is taken after meals with honey three times a day for five to ten days to get relief from rheumatic pain.

139 Tinospora cordifolia (Wild.) Miers ex.Hk.f &Th Malvaceae Senthilkodi Two hundred ml of juice is extracted from a sufficient quantity of leaves without adding water. This juice is boiled in one litre of neem oil (Azadirachta indica A.Juss) along with twenty grams of cumin seeds (Cuminum cyminum L.), twenty grams of pepper seeds (Piper nigrum L.) twenty grams of mustard seeds (Brassica juncea (L.)Czern) twenty grams of dried ginger (Zingiber officinale Roscoe) hundred grams of vellapooondi (Allium sativum L.) and fifty grams of crushed stem bark of murungai (Moringa pterygosperma Gaertn) on a low flame for ten minutes. This medicated oil is massaged for a period of ten days which helps to give relief from rheumatic pain.

140 Toddalia asiatica (L.) Lam.var asiatica Rutaceae Milagaranai The shade dried plants are powdered and one teaspoon of the powder is taken orally along with water in empty stomach for a period of two to three days to get relief from gastric problems. A teaspoon of shade dried stem bark powder is taken after meals with honey three times a day for five to ten days to get relief from rheumatic pain.

141 Tribulus terrestris L. Zygoiphyliaeaceae Sirunerini The juice prepared from ten grams of fruit with two hundred ml of goat’s milk is taken orally twice a day for a period of three days to treat leucorrhoea.

142 Trichodesma zeylanicum (Burm.f) R.Br. (Borago zeylanica Burm.f) Boraginaceae Kavuthumbai Thirty to forty grams of fresh leaves are roasted with eight to ten vengayam (Allium cepa L.) in coconut oil (Cocos nucifera L.) and made into curry. This curry is taken one hour before meals twice a day for a period of four to five days to treat bleeding piles.

143 Tridax procumbens L. Asteraceae Mookuthieli Fifty grams of fresh leaves are made into juice. The juice is applied externally once in a day for period of three to four days to get relief from shoulder pain. Ten grams of fresh leaves are made into paste along with a pinch of calcium hydroxide. This paste is externally applied on the eczema affected area or on an injury made by weapon once in a day for three or four days for complete cure.

144 Uruginea indica (Roxb.)kunth Liliaceae Kattuvengaum The paste prepared from ten grams of bulb with water is applied externally once in a day for a period of three days to treat painful corns on the lower surface of the feet.

145 Ventilago madraspatana Gaertn Rhamnaceae Vembadan One hundred grams of the stem bark is coarsely powdered with fifty grams of roots of veliparuthi (Pergularia daemia (Forssk.) Chiov) and is mixed with one litre of neem oil (Azadirachta indica A.Juss) and heated for twenty minutes on a low flame. This oil is massaged on the joints twice a day.

146 Vilex negundo L. Verbenaceae Notchi One hundred ml of juice prepared by boiling fresh leaves is taken orally once in a day for a week. Cooked leaves are also used to foment the averted joints to disperse swelling in case of acute rheumatism.
RESULTS AND DISCUSSION

The present study focuses the extensive usage of as many as 174 medicinal plants by the Kanikkars tribe inhabiting the Agasthiarmalai Biosphere Reserves, Western Ghats, Tamil Nadu. As an outcome of the present investigation, 174 plants (151 plants collected and 23 plants/extracts procured) belonging to 155 genera and 69 families including 2 pteridophytes were recorded. Of the recorded plants, a maximum of 10 ethnomedicinal plants belong to Fabaceae, it is followed by Euphorbiaceae (9 species), Caesalpiniaeae (7 species), Rubiaceae (6 species), Apocynaceae, Acanthaceae and Rutaceae (5 species each). Among the 151 plants reported as herbal drugs, 48 plants are herbaceous in habit, while 50 plants are shrubs, 32 plants are trees, 20 plants are climbers and 1 is an epiphyte.

![Figure 1: Percentage of plant parts used](image1)

![Figure 2: Percentage of form of administration](image2)

This is consistent with the general observations made earlier in relation to ethnomedicinal studies on some of the other tribal communities of India (Karthikeyani, 2003; Karuppusamy, 2007; Kamble et al., 2009; Yusodharan and Sujana, 2009; Subramanian et al., 2010; Mohan et al., 2010). The percentage of plant parts used and the form of administration is represented in figure 1 and figure 2. The enumerated 174 plants are used to cure as many as 53 different types of human maladies. A maximum of 63 plants are used to treat skin diseases, followed by 38 plants to treat various body pain, 14 plants for insect bites/general poisonous bites and 6 plants for fever, cold and cough. In the study, some of the ethnomedicinal plants are endemic to Agasthiarmalai Biosphere Reserve Western Ghats, Acorus calamus, Asystasia travancorica, Calanthe masuca, Eugenia singampattiana, Psychotria nudiflora, Goniothalamus wightii and Sonerila tinnevelliensis (Jain and Rao, 1983; Ahmedullah and Nayar, 1986; Nayar and Sastry, 1987; Nayar, 1996). Of these, Eugenia singampattiana, Psychotria nudiflora and Sonerila tinnevelliensis are endangered plants. The medicinal plants used by the Kanikkars need to be systematically screened by phytochemists and pharmacologists for the potent active principles. Scientific validation of these remedies may help in discovering new drugs from these medicinal plants.

CONCLUSION

This study revealed that medicinal plants still play a vital role in the primary healthcare of this tribal community. The indigenous knowledge and efficacy of these medicinal plants have been proven in their community since time immemorial. There is a need for follow-up ethnopharmacological screening based on tribal claims, by testing these ethnomedicinal recipes in their crude form and also as aqueous and alcoholic extracts on animal models. There is enormous potential for establishing herbal drug centre for collection, processing and preparation of ethnomedicine, developing cultivation farms and documentation of potential and promising ethno medicinal plants in social forestry operation for improving the economy of Kanikkars tribe and for general human welfare.

REFERENCES


