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Ethnomedicinal plants used by the local people of the rural people of Aryanadu, Thiruvananthapuram, Kerala

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Abstract
In this study, a total of 28 medicinal plant species from 23 families were identified, all of which are commonly used by the villagers of Aryanadu, Thiruvananthapuram. These 28 plants were used to make 40 different herbal remedies. The Asclepiadaceae family was frequently used (4 remedies from 3 species), while the Acanthaceae, Euphorbiaceae, and Solanaceae families each contributed 9 remedies from 6 species. Most of the remedies were used to treat respiratory problems such as colds, coughs, asthma, and fever (12 remedies from 7 species). *Adhatoda zeylanica* and *Vitex negundo* (5 remedies) were two of the most commonly used plants in the preparation of medicines for the treatment of respiratory problems. Six home remedies for stomach aches, while four for skin problems were observed in the present study. According to the findings of this study, the villagers of Aryanadu rely on wild plant resources for their personal medical care and suggest that potential medicinal plants could be grown in their backyards to supplement their needs. The information gathered from the indigenous community is expected to aid in the development of new herbal formulations.

Keywords: Ethnobotany, herbal remedies, indigenous knowledge, medicinal plants

Introduction
Nature has always provided a stunning illustration of the amazing symbiosis phenomenon. Natural medicines made from plants, animals, and minerals have traditionally been used to treat human illnesses. For their primary healthcare, about 80% of people in developing nations still rely on traditional medicine, which is largely based on plant and animal species. Currently, there is a huge demand for herbal medications, and that demand is only increasing. There are about 800 plants that have been used in indigenous medical systems, and about 500 of them have been mentioned in ancient literature. There are many medicinal plants in India that are used in traditional medicine [1]. Different plant species are used by the various indigenous medical systems, including Siddha, Ayurveda, Unani, and Allopathy, to treat various illnesses [2]. Due to the toxicity and side effects of allopathic medications, the use of herbal medicine is growing in popularity. This caused a sudden rise in the number of companies producing herbal drugs [20, 4]. Since ancient times, herbal remedies have served as the main treatment in the conventional medical model. Due to their biomedical advantages and cultural significance, the practices are still used today in many parts of the world, and they have significantly improved human health. About 800 plant species are used by more than 500 traditional communities in India to treat a variety of diseases. Eighty percent of the world's population currently uses plant-derived medicine as their first line of primary healthcare because it has no side effects [5, 6].
In order to establish priorities with the community and ensure that local values are translated into rational resource use, effective biological diversity conservation, and cultural knowledge conservation, ethnobotanical research focuses on defining traditional knowledge. The socioeconomic development of a region and its inhabitants is a result of plants as bioresources. Many people's daily activities and means of subsistence depend on biodiversity, which is also one of the resources that families, communities, countries, and future generations rely on. Since the beginning of human society on this planet, it has been inextricably linked to the plant kingdom. Beyond providing food, clothing and shelter, plants and human cultures have long and symbiotic relationships that have influenced religious rituals, ornamentation, and health care [7, 8].

As a field of study, ethnobotany offers a deep comprehension and appreciation of the complexity and closeness of relationships between people and the natural world. Ethnobotany is based on observations of human beliefs regarding the use of plants and other interactions with them. Perhaps using the knowledge base to effectively address the current issues facing humanity is where ethno botany's future lies, rather than simply adding to the observational foundation [9]. Ethnobotany is the study of how plants have been used, controlled, and viewed in human societies. This includes plants that have been used in rituals, food, cosmetics, dyes, textiles, building tools, clothing, currency, and music. Along with listing the conventional uses of plants, ethnobotanical data aids ecologists, pharmacologists, taxonomists, watershed managers, and wildlife managers in their efforts to increase an area's wealth [10].

India, one of the most medically and culturally varied nations in the world, has a long history of using medicinal plants, and this tradition is still held in high regard today. Ayurveda, Unani, and Siddha are the three primary traditional medical systems used here. The Rigveda, which was composed between 4500 and 1600 BC, contains the earliest mention of using plants as medicine [11]. The traditional knowledge of how to employ plants for medicine is likely most abundant in India. Sages, monks, devoted social workers, and practitioners of traditional medicine used plants as medicinal agents to care for people's health in the past. These therapeutic plants have primarily been found in forests. India's resources are currently under a lot of stress from the country's rapidly expanding population. The pharmaceutical industry's drive for domestic and export sales as well as the large-scale commercialization of plant-based medicines over the past 20 years have led to a dearth of medicinal plant species in our forests and plains. India lacks a structured system for the cultivation of key medicinal plants, which makes the problem worse [12]. Particularly for the discovery of crude medications, ethnobotanical investigations are frequently essential in uncovering locally significant plant species. Many significant current day pharmaceuticals have been made possible by the documentation of traditional knowledge, particularly regarding the medicinal benefits of plants. Numerous such studies on the ethnobotany of medicinal and other valuable plants have been conducted [7, 8, 12, 13]. In the current investigation, information about ethno medical values was gathered from the locals in Aryanadu, Nedumangadu Taluk, Thiruvananthapuram.

Materials and Methods

Ethnobotanical survey of the villagers from Aryanadu, Nedumangadu Taluk, Thiruvananthapuram was carried out during the year 2018-2019.

Description of the Study Area

Aryanadu is a village town lying under the foothills of the Agastyarkudam of the Sahya Mountains. The town is situated nearly 25 km East from Thiruvananthapuram, 10 km South from Nedumangad and 10 km North from Kattakkada. In beauty and all other aspects this is a typical Kerala model village. Most of the communities are doing agricultural practices. Coconut, rubber, banana, and vegetables are the main farming items. Old agers quotes Aryanmarude (Aryas) Nadu" is the abbreviated form of Aryanadu. Most of the village peoples having folk traditional medicine knowledge.

Methods of data collection

Ethnobotanical data were collected from October 2011 to March 2012. The information was mainly gathered through semi-structured interviews. A number of locals of old age belonging to various ethnic groups have been personally interviewed during field trips and asked questions regarding traditional uses of plants. Photography of individual plant has also been done for easy identification of individual plant and to know the actual habitat of the plant. Information regarding gathering, preparation and use, status/abundance trend, cultivation practice of medicinal plants and their marketability were also collected. At the end of each interview, specimens of the plants cited for their medicinal are were collected and identified.

Identification

The plant materials were identified with the help of expert taxonomists and standard local floras. Preliminary identification was done by examining fresh plants procured from the villagers. The corresponding raw materials were collected and the morphological characters were compared with the fresh plants and vernacular names. Few respondents were more informative and co-operative; they have shown fresh plants in the habitat, which was useful for the final identification.

Data analysis

The first-hand information on the medicinal plants used by the villagers was arranged by genus and species name. The information on each plant included botanical name, family name and vernacular name. The available ethnomedicinal properties, the method of preparation, dosage and mixture of other herbs if any were also provided.

Results

In the present investigation, a total of 28 species of medicinal plants belonging to 23 families were identified which are in common use among the villagers from Aryanadu, Thiruvananthapuram. The collected plants were arranged according to their medicinal use providing their binomial followed by local name, family, and parts used along with their ethnomedicinal uses. Out of 28 species enumerated 25 species belonged to dicotyledons and 3 were monocotyledons. Based on life forms, herbs, shrubs, under shrubs, trees, creepers/twiners were present among them. The dominant families were analyzed and found that Asclipiadaceae was the dominant family with three species followed by Acanthaceae, Euphorbiaceae and Solanaceae with two species each.

The data obtained from the field survey are presented in Table 1 which recorded 28 plant species belonging to 23 families distributed in 27 genera. This contributed to the creation of 40 different remedies. 4 remedies from 3 species belong to the Asclepiadaceae family; 9 remedies from 6 species belong to the Acanthaceae, Euphorbiaceae, and Solanaceae families. As shown in Table 1, the majority of the remedies were used to treat respiratory problems such as colds, coughs, asthma, and fever (12 remedies from 7 species). *Adhatoda zeylanica* and *Vitex negundo* (5 remedies) were two of the most commonly used plants in the preparation of medicines for the treatment of respiratory problems. Stomach aches and skin problems were also common ailments. Six remedies were observed to be used to cure stomach aches while four remedies were used against skin problems.

A brief description about the major plant species discussed in the present study is given below

***Acalypha indica*:** Grows as weed in wastelands, throughout planes. It is an erect annual herb grows up to 60 cm in height. Leaves are ovate-rhombic, with long petiole, acute, crenate-serrate; flowers unisexual, found in axillary spikes; fruits capsules, covered with persistent bracts; seeds ovoid, pale brown.

***Achyranthes aspera*:** Is a shrub that grows up to one meter height; leaves simple, opposite, obovate or elliptic; flowers bracteate and bracteolate, greenish, in spikes; fruits oblong urticle; seeds single, inverse.

***Acorus calamus*:** Is found throughout India growing wild in marshy areas. It is cultivated also. It is a rhizomatous, perennial semi aquatic plant grows up to 40 cm in height. Leaves are simple, bright green, distichous, thickened in the middle, ensiform; flowers seen in densely packed spadix inflorescence, fruits oblong berries seeds few suspended from the apex of cells. Underground rhizomes are creeping, branched about 1 cm in diameter.

***Adhatoda zeylanica*:** Is found throughout India, growing wild. It is a large shrub grows crowded along waste land, roadsides etc. Leaves are simple, opposite, ovate-lanceolate, acute or acuminate and shiny. Flowers arise from axillary condensed spikes, white; fruits capsules.

***Aegle marmelos*:** Is a medium sized thorny deciduous tree grows up to 10 meters in height. Leaves are trifoliate, aromatic, and alternate. Leaflets are ovate-lanceolate. Lateral leaflets are sub sessile and terminal long petioled. Flowers are greenish white, found in axillary panicles. Fruits are globose woody berry with yellow pulp. Seeds are numerous, oblong and embedded in pulp.

***Andrographis paniculata*:** Is an annual herb growing up to 50 cm in height, having slender quadrangular branches, leaves opposite, lanceolate, sub sessile, flowers small bluish white, numerous, whitish, fruits minute pointed capsules, seeds are many.

***Asparagus recemosus*:** Is a thorny, climbing undershrub with woody stems. Young stems are very delicate, brittle and smooth; leaves are reduced to minute scales and spines. Curved cladodes replace the leaves. Flowers are white fragrant, in simple or branched racemes. Fruits are globular, or vaguely 3 lobbed, pulpy berries, purplish black when ripe, seeds with hard and brittle testa. Roots are succulent and tuberous, from 30 cm to 1 m in length, smooth and tapering at both ends.

***Biophytum sensitivum*:** Is a slender erect annual; leaves abruptly pinnate, leaflets opposite, 6-12 pairs, the terminal pair is the largest; flowers yellow with many peduncles; fruits ellipsoid capsules.

***Boerhaavia diffusa*:** Is a perennial diffuse herb with stout root stock and many branches. Leaves are simple opposite in unequal pairs. Leaves are ovate-oblong, acute or obtuse, rounded or subcordate at base, glabrous above, whitish beneath. Flowers are pale rose in color, in irregular clusters of terminal panicles. Fruits are highly viscid, easily detachable, one seeded, indehiscent with thin pericarp.

***Centella asiatica*:** Is a creeping perennial with rooted nodes; leaves simple, having long petioles, reniform or cordate in shape; flowers pink, small and sessile; fruits laterally compressed.

***Clitoria ternatea*:** Is a perennial climber. Leaves are pinnate 5-9 foliate. Flowers are showy, blue or white, petals unequal, style bearded below the stigma. Fruits are pods, linear, compressed with 6-10 black seeds.

***Elettaria cardamomum*:** Is an erect, tall perennial herb grows up to 3 meters in height. Leaves are sub sessile, elliptic-lanceolate, the leaf sheaths wrap one over another forms a pseudo stem. Flowers are seen in long drooping panicles arises from the base of vegetative shoots, fruits there chambered, sub globose capsules, containing 15-20 brownish black aromatic seeds.

***Evolvulus alsinoides*:** Is a small perennial herb having a woody root stock from where the branches arise. Leaves – simple, alternate, elliptic-oblong. Stem and leaves are clothed with small hairs; flowers bluish in color, seen in pairs or sometimes solitary, axillary; fruits globose, 4-valved drooping capsules.

***Gymnema sylvestre*:** Is a large, woody climber. Leaves are simple, opposite, elliptic, pointed at the end; flowers small, yellow in umbellate cymes, axillary; fruits slender, brownish follicles.

***Hemidesmus indicus*:** Is a perennial, slender, laticiferous twinning or prostrate shrub with woody stock and numerous slender stems. Leaves are simple, opposite, linear lanceolate. Flower greenish purple, sub sessile cymes in the opposite leaf axils. Fruits are slender follicles, cylindrical, 10 cm long tapering to a point at the apex, seeds are flattened, black, ovate-oblong with silvery white coma. The tuberous root is dark brown, with transversely cracked and longitudinally fissured bark. It has a strong central vasculature and pleasant smell and taste.

***Ocimum sanctum*:** Is an erect much branched undershrub, grows up to 1 m in height. Leaves are pale dark brown in color, simple and opposite, elliptic, oblong, obtuse or acute, serrate, entire, pubescent on both sides. Petiole is slender and hairy. Flowers are purplish in elongate recemes. Fruits nutlets, smooth, not mucilaginous when wet.

***Piper nigrum*:** Is a perennial climber, rooting at nodes, leaves simple, alternate, cordate, and broadly ovate; flowers minute in hanging spikes, usually dioecious; fruits globose, one seeded berries, red when ripe. Seeds are globose with acrid taste.

***Plumbago zeylanica*:** Is a pretty perennial shrub with semi woody stems and numerous branches. Leaves are simple alternate, oblong-lanceolate and acute; flower white in long terminal spikes. Roots are cylindrical irregularly bent having transverse shallow fissures at bents.

***Phyllanthus amarus*:** Is an annual herb with slender leaf-bearing branches. Leaves are numerous, sub sessile, elliptic; flowers yellowish green, axillary, males in groups of 1-3, females solitary; fruits small, globose, seen underneath the branches and having 3 seeds.

***Scoparia dulcis*:** Is an erect annual herb grows up to 30 cm in height. Leaves are simple, opposite or a whorl of three, ovate or rhomboid and serrate. Flowers are axillary, solitary, dull white and small. Fruits are small round pods, contains numerous small seeds.

***Terminalia chebula*:** Is a moderate sized to large deciduous tree with spreading branches. Leaves are ovate, elliptic, or obovate, glabrous to tawny-villous beneath with a pair of large glands at the top of the petiole; flowers yellowish white in the terminal simple spikes or short panicles fruits glabrous, shining, ellipsoidal, obovoid or ovoid drupes, yellow to orange brown in color, faintly angled, up to 3.75 cm long; seeds hard, pale yellow.

***Tinospora cordifolia*:** A spreading perennial deciduous twinner with succulent stems and easily peeling off papery bark. Leaves are simple, alternate, cordate, entire and glabrous, with 7-9 nerves. Flowers yellow in recemes, arising from nodes on the old wood. Male flowers usually are in clusters and female solitary. Fruits are drupes, red when ripe. Mucilaginous greenish crust is covered with grey colored coat studded with tubercles.

***Toddalia asiatica*:** Is a prickly climber grows over bushes and hedges. Leaves are palmately compound, trifoliate, with oblong acute leaflets. Flowers are white or greenish yellow in terminal or axillary panicles. Fruits are sub-globose, fleshy, orange colored, with small seeds covered by mucilage.

***Tylophora indica*:** Is found throughout India growing wild in planes, as a spreading plant. It is a slender twinner shrub. Leaves are simple, opposite, fleshy, ovate cordate, acute; flowers in umbel inflorescence, purplish; fruits fusiform, divaricate, and tapering to the apex; seeds ovate with long coma.

***Vitex negundo*:** Is an aromatic large shrub or small tree of about 3 meters in height with quadrangular branches; leaves opposite, extipulate, long petioled and digitately 3-5 foliolate, all leaflets with petiolules, the middle one longer flowers bluish purple in panicles, up to 30 cm long; fruits globose or ovoid or obovoid, four seeded drupe, black when ripe.

Table 1: Ethnomedicinal plant species, plant parts used by the villagers in Aryanadu, Thiruvananthapuram

Therapeutic indication and associated plants	Local Name	Family	Parts used and Ethnomedicinal preparation by the villagers
Asthma	Putharichunda	Solanaceae	Leaf juice is taken orally for seven days.
Solanum trilobatum L.			
Adhatoda zeylanica Medicus.	Adalodakom	Acanthaceae	Leaf juice is taken orally.
Cough & Cold	Adalodakom	Acanthaceae	Leaf powder is mixed with water and taken orally in the morning.
Adhatoda zeylanica Medicus.			
Terminalia chebula Retz.	Kadukka	Combretaceae	Powdered fruit is mixed with water or cow's or goat's milk and taken internally.
Vitex negundo L.	Notchi	Verbenaceae	Fresh leaves are boiled with water and the vapour is inhaled twice a day.
Evolvulus alsinoides L.	Vishnu Kranthi	Convolvulaceae	Whole plant decoction is administered 2-3 times a day to cure cough and cold.
Ocimum sanctum	Thulasi	Lamiaceae	A decoction of fresh leaves is used for cold
Diabetes	Kiriyathu	Acanthaceae	Leaf powder is mixed with cow's or goat's milk and taken orally.
Andrographis paniculata Wallich ex Nees			
Gymnema sylvestre (Retz.) R. Br. Ex Roem. & Schult.	Chakkarakolli	Asclepiadaceae	Powdered leaves are mixed with cow's milk and boiled rice, kept overnight and taken internally twice a day.
Jaundice	Kudangal	Apiaceae	Leaf juice is mixed with an equal amount of goat's milk and taken orally for seven days.
Centella asiatica (L.) Urban.			
Phyllanthus amarus Schurn and Thomn	Keezhanelli	Euphorbiaceae	The fresh root paste with water or cow's milk is taken orally
Stomachache	Valli kizangu	Dioscoreaceae	The paste of rhizome is taken internally.
Dioscorea oppositifolia L. var. tomentosa			
Elatteria cardamomum (L.) Maton.	Yelakkai	Zingiberaceae	Dried fruits are taken internally with food.
Hemidesmus indicus H.f.	Nannari	Asclepiadaceae	Fresh leaves are taken internally.
Toddalia asiatica (L.) Lam.	Thodali mullu	Rutaceae	Leaf decoction is taken internally.
Plumbago zeylanica L.	Koduveli	Plumbaginaceae	Powdered root is mixed with goat's milk and taken internally.
Solanum nigrum L.	Mani thakkali	Solanaceae	Fresh leaves are cooked with onion bulbs and cumin seeds and taken along with food regularly.
Throat infection	Vayambu	Araceae	Dried rhizome is rubbed on stone with water and one or two drops of watery paste is given orally to the children for clarity of speech.
Acorus calamus L.			
Piper nigrum L.	Kurumulaku	Piperaceae	The dried seeds are taken orally.
Dysentery	Muringa	Morningaceae	For a single dose, about 250 gms of the bark of *Moringa oleifera* is crushed finely and the juice thus obtained was given orally. The dose is continued for a week.
Moringa oleifera Lam.			
Acorus calamus L.	Vayambu	Araceae	Fresh rhizome is ground and mixed with hot water taken three times daily for 3 days early morning in the empty stomache
Aegle marmelos Correa ex. Roxb	Kuvalam	Rutaceae	Fresh roots are grounded and made as paste and taken orally
Fever	Adalodakom	Acanthaceae	Leaf decoction is taken internally twice a day until cure.
Adhatoda zeylanica Medicus			
Hemidesmus indicus H.f.	Nannari	Asclepiadaceae	Decoction of whole plant is taken internally.
Terminalia chebula Retz.	Kadukka	Combretaceae	Powdered fruit is mixed with the water or cow's or goat's milk and taken internally.

Vitex negundo L.	Notchi	Verbenaceae	Fresh leaves are boiled with water and the vapour is inhaled twice a day.
Evolvulus alsinoides L.	Vishnu Kranthi	Convolvulaceae	Root mixed with *Andrographis paniculata* (Burm. f.) Wall. ex. Nees and *Adhatoda zeylanica* Medi. roots and then dried, powdered by mixing in equal proportions, then a spoonful of the powder administered 2-3 times a day for curing fever
Constipation	Sangu pushpam	Fabaceae	Seed powder mixed with pepper is given
Clitoria ternatea L.			
Health tonic	Chittamruthu	Menispermaceae	The leaf was crushed and the juice was administered twice a day after delivery as a health tonic
Tinospora cordifolia (Willd.) Miers. ex Hook. F. Thoms			
Poison bites	Kadaladi	Amaranthaceae	Fresh roots are ground and applied externally on the affected portion against snake bite or scorpion poisoning
Achyranthes aspera Linn.			
Andrographis paniculata (Burm. F.) Wall. Ex Nees.	Kiriyathu	Acanthaceae	Paste of leaves is applied externally on bitten site of scorpion sting and snakebites.
Tylophora indica (Burm. F.) Merr.	Vallippala	Asclepiadaceae	Paste of leaf and root is mixed with equal amount of root paste of *Rauvolfia serpentina* and applied externally on the spot of snakebite. Leaf juice alone is also taken internally to cure snakebite.
Biophytum sensitivum (L.) D.C.	Mukkutti	Oxalidaceae	Fresh whole plant is ground and applied on affected area against poisonous bite
Skin diseases	Koduveli	Plumbaginaceae	Crushed roots are applied on affected area
Plumbago zeylanica L.			
Ocimum sanctum	Thulasi	Lamiaceae	Fresh leaf juice is applied on affected area
Acalypha indica L.	Kuppameni	Euphorbiaceae	Leaf and root paste is applied topically on the affected places.
Centella asiatica (L.) Urban.	Kudangal	Apiaceae	Leaves ground with fresh turmeric and applied against skin diseases
Urinary disorders & Kidney stone	Kallurukki	Scrophulariaceae	Crushed root extract is given for urinary disorders and kidney stone
Scoparia dulcis L.			
Asparagus racemosus Willd.	Sathavari	Liliaceae	One teaspoon dried rhizome powder mixed with one glass cow's milk is taken twice daily against urinary disorders
Boerhavia diffusa L	Thazuthama	Nyctaginaceae	Fresh whole plant is sliced and boiled in water and taken as such against kidney stone

Discussion

Ethnobotanical investigations related to the tribal communities of Kerala have been made by earlier workers with different perspectives [14, 15]. Due to high demand and less access and availability of forest resources, these people are forced to go for the unsustainable harvest of resources. Therefore, concerted actions are needed to sensitize the community for the judicious exploitation and conservation of these vital resources and preservation of traditional knowledge on the uses of plants. The potential medicinal uses of the trees based on the traditional knowledge of the village community could be scientifically explored and therapeutic value assessed for utilization in the pharmaceutical industry [16, 17].

The current study identified 28 medicinal plant species from 23 families, all of which are commonly used by the villagers of Aryanadu, Thiruvananthapuram. These 28 plants were used to create 40 herbal remedies. The Asclepiadaceae family contributed four remedies from three species, while the Acanthaceae, Euphorbiaceae, and Solanaceae families each contributed nine remedies from six species. The plant species belonging to Asclepiadaceae are most used for the preparation of herbal medicine by Yanadi tribe of Chandragiri reserve forest area [18]. Easy approachability of herbs or medicinal plants, useful treatment action and reasonable price of healthcare facility are the main factors for the advancement and preference of herbal medicines in the rural and poor communities.

Leaves were the most preferred parts in herbal remedies, as these comprise extraordinary bioactive ingredients. The indigenous communities mainly used the leaf of the plant for their ethnomedicinal uses as this part was maximum used with 83 species followed by the fruit (55 species), and least was the seed with four species [19]. During the current study, it was discovered that aerial parts such as leaves, and shoots were used in most of the cases. However, the entire plant is not much preferred to be used for ailment treatment because removal of plants will lead to plant species loss. Therefore, the use of aerial parts of plants as medicine is more suitable for the sustainable management of medicinal flora. Water is the general medium for the majority of the preparations; other often employed media are cow milk, honey, rice water, butter milk, ghee and jaggery. This observation is also in concordance with earlier reports.

The current generation lacks sufficient knowledge of indigenous medicinal plants and their modes of application for the treatment of various ailments. Thus, it is critical to transfer this valuable ethnobotanical knowledge from the elderly and resourceful to the young generation, as well as document it, because proper documentation of this knowledge will prevent us from losing this limitless natural wealth, which will vanish quickly. As a result, this study provided important information about the ethnobotanical use of medicinal plants in a selected remote village in Kerala's Thiruvananthapuram District for the treatment of various ailments. Detailed screening for such medicinal plants, on the other hand, should be focused on discovering new pharmacological ingredients.

Many endemic plants that grow wild and are still used today are rare, threatened, or endangered, so they must be protected. Due to rising trade demands for less expensive goods and new plant-based therapeutic markets instead of more expensive target-specific drugs and biopharmaceuticals, ethnomedicinal plant reserves in developing countries are decreasing and are in danger of going extinct. Due to commercial exploitation, grazing, unsustainable harvesting methods, loss of growth habitats, and unregulated trade in medicinal plants, the genetic diversity of ethnobotanical plants is constantly in danger of extinction. This is due to the fact that ethnomedicinal plants were freely collected by users from their immediate surroundings for either personal use or for domestic trade. Although the harvesting of these species, which have multiple

uses, may endanger them, it can also increase the likelihood that they will be conserved, particularly through home gardens (Raj *et al*., 2018) [19]. Local cultivation of medicinal plants and other economic species can contribute significantly to the area's economic development. For the long-term conservation of the area's natural resources, it is necessary to actively involve local people in evaluation, planning, implementation, and monitoring processes, as they are the best judges of the area.

Conclusions

The unsustainable use of land resources has severely harmed the region's flora. The general public should be made aware of the importance of protecting the region's natural resources, which are extremely scarce and rapidly dwindling. Much work needs to be done in this promising field with the help of the villagers to restore the value of these economically significant plants for the benefit of future generations. Communities should be motivated to cultivate commercially viable ethnomedicinal species using improved methods through capacity building, timely policy intervention, and solid market linkage. This will ensure the generation of income, the improvement of livelihoods, and, ultimately, the survival of these species. The current data may serve as a starting point for further research into newly reported species for new compounds and biological activities, which can be extremely valuable for societies' survival.

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