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## Traditional home gardens: A preserve of medicinal plants

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Traditional home gardens have been described as man-managed ecosystems with high energy subsidy, complex structure, and multiple functions. These have been reported as treasure trove of a rich biodiversity of plant species including medicinal plants used for traditional home remedies of various ailments. A review of research work on the status of medicinal plants in traditional rural home gardens is presented with the objective to explore them as potential preservation site for medicinal plants. From the available literature it can be ascertained that these traditional rural home gardens can be a suitable site for conservation, propagation, and expansion of medicinal plants that form the backbone of the traditional medicine system and are fast dwindling due to over exploitation and development pattern. Widely reported presence in rural home gardens of medicinal plant species, such as, *Adhatoda vasica*, Nees., *Aloe vera*, Mill., *Asparagus racemosus*, Willd., *Chlorophytum tuberosum*, Baker., *Curcuma angustifolia*, Roxb., *Dioscorea bulbifera*, L., *Dioscorea hispida*, Dennst., *Embllica officinalis*, Gaertn., *Gymnema sylvestre*, Br., *Rauwolfia serpentina*, Benth., *Terminalia arjuna*, (Roxb.) Wight. and Arn., *Tinospora cordifolia*, Miers., that are considered endangered is a further confirmation of this belief that traditional rural home gardens can be a good conservation site for domestication and conservation of these plant species.

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**Keyword:** Home Garden, Medicinal Plants, Herbs, Endangered, Tropical

### 1. Introduction

All the systems of medicine including the Indian systems of medicine 'Ayurveda', 'Sidha', 'Unani' entirely, and homeopathy to some extent, depend on plant materials or their derivatives for treatment of human ailments<sup>[1]</sup>. About 12.5% of the total 422,000 plant species documented worldwide are reported to have medicinal values<sup>[2]</sup>. The medical heritage of India is claimed to use raw drugs pertaining to some 7500 medicinal plant species<sup>[3]</sup>. It is estimated that more than 6,000 higher plant species forming about 40% of the higher

plant diversity of India are used in its codified and folk healthcare traditions <sup>[4]</sup>. Most of the population, especially in rural areas, depends on traditional healers and their knowledge of various treatments for different ailments using various plants or their parts. However, due to rapid spread of urbanisation, increasing cost of land, random and careless harvesting of plant species for commercial gains, overall environmental degradation and the resultant dilapidation, loss, and fragmentation of habitat are causing serious threat to existence of many of these plant species

having medicinal values. Simultaneously, due to rapid change in cultural ethos, hasty ingress of modern urban life style, there is change in traditional way of life and along this there is serious risk of loss of knowledge of rich traditional systems of medicine based on natural products obtained from plants.

There is a strong fear that some of these plant species might be actually facing a serious threat of extinction. Out of more than 600 taxa of Indian plants included in The Red Data Book of Indian Plants<sup>[5-7]</sup> around 70 have known medicinal usage. FRLHT's (Foundation for Revitalisation of Local Health Traditions) rapid threat assessment exercises, using the latest IUCN Red List criteria and categories, have resulted in assessment of around 265 wild medicinal plant species as threatened (Critically Endangered, Endangered or Vulnerable) in different regions in India itself<sup>[4]</sup>.

Medicinal remedies prepared from indigenous plants are almost always the only readily accessible and affordable therapies for the control of diarrhoea in many rural communities in the developing world<sup>[8]</sup>. A large population of the world do not have access to modern healthcare and rely solely on low-cost plant based traditional treatment. The threat to this only recourse to a healthy life will make the conditions even worse. Hence, urgent efforts are required to conserve, propagate, and enhance, both, the plant species having medicinal values and the traditional knowledge of healing.

Home gardens have traditionally been a source of medicinal plants. Tremendous knowledge about their usage for various ailments exists with traditional healers and home garden families. This is an attempt to review the status of medicinal plants species in traditional home gardens.

### 1.2. Traditional home gardens

Defined as a multi-story, multi-species, multi-use small scale land-use system in particular ecosystems that are for the immediate needs of household members primarily as regards their food, health, fuel and spiritual requirements, traditional rural home gardens have generated lot of research interest recently, particularly, since the late eighties, because of their indispensable utility as source of sustenance, nutritional supplement and variety to sometimes bland rural cuisine, source of plant produces for variety of uses; and recently, as treasure trove of biodiversity. According to a review of home garden research these tropical home gardens have proven to be a promising land use system and have been studied by several researchers<sup>[9]</sup>.

Medicinal use value of plant species commonly found in rural home gardens has been reported by several studies. The literature on the subject is piling up at a rapid rate; an attempt has been made to include review of literature relevant to the potential of traditional home gardens in rural areas as preserver of medicinal plant species.

### 1.3. Traditional Home Garden As Source Of Medicinal Plants

Herbs or medicinal plants have been extensively reported for their various applications in treatment of a variety of ailments <sup>[1]</sup>. In a review of several studies presence of medicinal plant species was identified as one of the key characteristics of traditional home gardens <sup>[10]</sup>. However, until the late 1980s, not many studies have explored the ethnomedicinal values of home gardens. More frequently than not, published research on traditional home gardens includes a list of plant species having medicinal use values with their use in treatment of various ailments <sup>[11-25]</sup>. Medicinal plants in home gardens are either

deliberately cultivated or they come up spontaneously as wild and weedy species<sup>126-321</sup>. All these studies list several medicinal plants, like *Adhatoda vasica*, Nees., *Aloe vera*, Mill., *Asparagus racemosus*, Willd., *Chlorophytum tuberosum*, Baker., *Curcuma angustifolia*, Roxb., *Dioscorea bulbifera*, L., *Dioscorea hispida*, Dennst., *Embllica officinalis*, Gaertn., *Gymnema sylvestre*, Br., *Rauwolfia serpentina*, Benth., *Terminalia arjuna*, (Roxb.) Wight. and Arn., *Tinospora cordifolia*, Miers. some of which are even considered endangered, regularly used for treatment of mundane ailment like common cold to some serious diseases like cancer. Collecting wild plants and growing them in managed patches such as home garden for food, medicinal and cultural purposes has been an important activity in Xishuangbanna and other tropical regions<sup>1331</sup>. Another study on agrobiodiversity and its importance in home gardens of hill tribes in Xishuangbanna, South West China, reported that in sampled home gardens, among a total of 298 species of useful plants from 82 families, medicinal uses constitute the highest percentage (44.9%)<sup>1341</sup>. Similarly, a study on traditional home gardens of north-east India found that the second dominant species in relation to use category per home garden was the medicinal species<sup>1351</sup>. In the home gardens in Assam, India after vegetable and fruit constituents, the medicinal plants were the most dominant species<sup>1361</sup>. A study on 420 home gardens from 14 villages in Nigeria reported over 60% of the plant species as medicinal plants<sup>1371</sup>.

Home gardens offer an economically and socially viable option for large-scale production of phytochemicals from important medicinal plants under organic cultivation<sup>1381</sup>. Medicinal plants are frequently planted in the lower strata of multistrata systems such as home gardens<sup>1391</sup>. Maximum diversity for

medicinal plants in a study on Cuban home gardens was reported<sup>1311</sup>. 50 out of the 101 plant species, maximum species diversity, recorded in the home gardens of Cuba were cultivated as medicinal plants<sup>111</sup>. In home gardens in Mexico out of 338 species, 39.3% had the highest secondary medicinal usages. Cultural influence was also reflected in the existence of some medicinal species which were only grown in home gardens of families who used them in their native villages, on the other hand, the home gardens of Marne des Esses in Martinique had more medicinal (56%) and ritual species<sup>1401</sup>.

A study on various roles of home gardens, emphasized the contribution of medicinal plants from home gardens for well-being of people as an important role<sup>1411</sup>. Herbs and medicinal plants are grown in home gardens all over the world, and in developing countries nearly 80% of the people use them to treat various illnesses, diseases, and also to improve their health conditions<sup>1381</sup>. A generous portion of the plants found in home gardens have some medicinal value and they can be used to treat many common health problems in a cost-effective manner. For instance, in Kandyan home gardens in Sri Lanka, out of the 125 plant species found, about 30% were exclusively used for medicinal uses and about 12% for medical and other purposes<sup>1421</sup>. Medicinal plants were documented to be an important plant group second only to high-value species in Sri Lanka and in Bangladesh<sup>1431</sup>. Another study of 30 home gardens in Southwestern Nigeria also reported the medicinal use of plants as second most common use<sup>1231</sup>. However, home gardens in Bukoba district of Tanzania contained plant species grown entirely for medicinal purposes<sup>1441</sup>. Around 70% of the plant species identified in forests and gardens in the Yucatan had a medicinal use<sup>121</sup>, and in traditional Mayan home gardens nine species of the 77 useful plants

found were exclusively used for medicinal purposes and 26 species had mixed uses as medicines, food, spices, and ornamentals<sup>[45]</sup>.

A study of plant species and their uses in home gardens of migrant Maya and Mestizo smallholder farmers in Calakmul, Campeche, Mexico reported a total of 310 plant species from 94 families with a varied number of species within the sampled home gardens (32–141 plant species) and the villages (111–203 plant species). The most frequent use of plants was ornamental (41%), followed by food (35%) and medicinal use (30%)<sup>[46]</sup>. While, studies in the Equatorial Amazon observed that the home gardens there were composed, to a large degree, of medicinal plants<sup>[47]</sup>.

Soemarwoto and Conway in their study on Javanese home gardens highlighted the cultural influence in preference in cultivation of plant species, observing that Javanese families grow more medicinal plants, whereas the Sudanese grow more vegetables. The Javanese consume considerable quantities of extracts from medicinal plants (the *jamu*) to treat and protect against a variety of diseases and as a way of keeping fit. They are especially important during and after pregnancy. By contrast, the Sudanese are fond of eating raw vegetables and, because they also like neat gardens, they grow relatively more vegetables and ornamentals<sup>[48]</sup>.

A study on rural home gardens in Amatola region of Eastern Cape, South Africa reported that cultivation of medicinal plants in rural home gardens can serve as a tool for combined biodiversity conservation and poverty alleviation<sup>[49]</sup>. Knowledge of medicinal plants and their role in treatment of various ailments can help in women emancipation. A study exploring women's role in traditional farming systems such as home gardens in Bangladesh found that medicinal plants are an importantly gendered knowledge held by women, health

care and diffusion of knowledge, making women's role important in male dominated societies<sup>[50]</sup>.

Another important fact, that apart from directly providing medicinal value, the home gardens are also contributing to overall health of the families by providing various ingredients of nutritious diet through nutrition rich variety of vegetables, fruits, tubers, and roots and making otherwise bland and simple rural diet tasty and attractive, should not be missed. In a review of 300 studies on the subject, it was found that the recent growing interest to evaluate the contribution of home gardens to health of people, takes in to account, along with the traditional role of providing medicinal plants, the nutritional aspect, as home gardens are regarded as an important option for addressing malnutrition and causes of micronutrient deficiencies<sup>[51]</sup>. Another study on dietary diversity amongst HIV/AIDS affected households in rural Ghana concluded that home gardens contribute significantly to dietary diversity providing valuable nutrition in HIV-positive rural households<sup>[52]</sup>.

Potential of home gardens as source of medicinal plants in mountain regions of Catalonia, Iberian Peninsula was also reported<sup>[53]</sup>. Thus, several studies confirm the role of home gardens as main source of medicinal plants in different parts of the world<sup>[54]</sup>. Many a times medicinal plants fail to be listed due to lack of awareness about them amongst the local home garden owners. Where the local people have awareness about the medicinal values of various planted or spontaneous plants (weeds, ruderal plants) in their gardens, they get listed invariably in the surveys conducted<sup>[31]</sup>.

#### 1.4. Indian Scenario

In India, medicinal plants had been an important source for traditional health care

systems. In Uttaranchal Himalayas a variety of medicinal plants are cultivated and conserved by the rural people for centuries<sup>[55]</sup>. Traditional medicinal plants in Mizoram, Northeast India have great diversity and potential therapeutic applications of 135 plant species<sup>[56]</sup>. Ethnomedicinal studies of different tribes of Arunachal Pradesh, Northeast India were conducted by several authors and reported great diversity of medicinal plants and their medicinal uses<sup>[57,58]</sup>. Ethnobotany of Mikirs of Karbi Anglong district of Assam in Northeast India along with use of plants for their medicinal values in folklore and folklife among them had been reported<sup>[59]</sup>. Another important study reported sixty two medicinal plant species used in different types of health treatment among the Nath community of Assam, India<sup>[60]</sup>.

Another study on rural home gardens of upper Assam, Northeast India reported a total of 96 medicinal plant species belonging to 85 genera of 54 families which are used in 124 medical remedies against 61 different human and livestock ailments. The study indicated that the area is very rich in traditional knowledge and home gardens harbour a great diversity of medicinal plants which offer a convenient strategy for promoting cultivation and conservation of variety of medicinal plants in home gardens<sup>[54]</sup>.

A study on 80 home gardens in 17 villages of upper Assam in northeastern India, reported medicinal plants as 15-17% of the total economically important species having different curative properties, abundant in all categories of home gardens. Weeds and grasses, contributing 11-14 % of the total flora, have potential medicinal properties as well <sup>[61]</sup>. Similarly, medicinal plants were found in all the 75 home gardens of Thrissur district in Kerala and were considered very important by the home garden owners<sup>[62]</sup>.

A study on traditional home garden systems in northeast India also found that the use value of various species grown in the sites owned by the three different farming communities included medicinal values<sup>[63]</sup>.

### 1.5. Medicinal plants in crisis

A study on endangered medicine plants used by tribals in Central India identified the important role played by the traditional knowledge for the use of these plant species to cure a number of infectious diseases and metabolic disorders but due to uncontrolled industrial growth, urbanization pressure, unethical activities and illegal cutting of forest, the forest habitat of tribal races is getting destroyed continuously along with biodiversity, which is rich in ethnomedicinal specimens, triggering a high rate of morbidity and mortality among some sensitive tribal races<sup>[64]</sup>.

In a study on use and conservation of herbal medicine by tribes of Central Aravalli region of Rajasthan it was found that economically and medicinally important plants of the study area are facing pressure due to uncontrolled harvesting, overexploitation, premature harvesting, overgrazing, burning etc., because of which few of them have become rare, threatened and endangered. The conclusion of the study was the need for community based efforts in order to raise awareness amongst local rural and tribal people of the Central Aravalli hills about the importance and conservation of these valuable taxa<sup>[65]</sup>.

A review study of rural home gardens of South Africa reported that traditional medicines remain an important health-care service among African indigenous cultures. In South Africa, medicinal plant use (bark, roots, bulbs, and herbs) threatens biodiversity and the sustainability of this informal industry. Several realities, such as declining supplies, localized extinctions, increasing market prices, and economic

opportunities for commercializing traditional medicinal products, have stimulated experimental and adaptive management research into cultivation of key high-demand medicinal plant species in and around the home gardens of poor rural communities for domestic use and for trade. It was concluded that successful propagation is not dependent on elaborate and expensive equipment and technologies, but rather on some basic principles of plant growth and methods of manipulating these under controlled conditions<sup>[66]</sup>.

It is realized that community based efforts have to be made in order to raise awareness amongst local rural and tribal people of the Central Aravalli hills about the importance and conservation of medicinally valuable taxa<sup>[65]</sup>. Long back, recognizing the important role the home gardens can play in species conservation; the World Health Organisation in its report on conservation of medicinal plants has strongly recommended the distribution of seeds, seedlings and/or saplings to individuals and communities for cultivation in home gardens<sup>[67]</sup>.

Recognising the potential of home gardens in the conservation of fast diminishing population of medicinal plant species, United Nations Development Project in association with Ministry of Environment and Forest, Government of India, has launched a project under which over 12000 home-herbal-gardens are to be set up in Chhattisgarh with the help of Traditional Healers Association to reduce health expenditure, promote traditional knowledge, and also demonstrate an exemplary model of *ex-situ* conservation. Traditional rural home gardens can be a promising opportunity for conservation and propagation of medicinal and endangered plant species.

## 2. Conclusion

Cultivating and maintaining medicinal plant species in home gardens is cost effective,

expertise in raising plants is already available with village populations, particularly women, and, most importantly, it provides an effective way of treating various ailments without having to consume costly drugs and pills. In developing economies where majority of population does not have access to even primary health care, the medicinal plants available in home gardens provide great relief and are playing an important role in rural health care. There is strong need of creating awareness about the medicinal use value of various plant species found in local home gardens and their methods of application. Efforts are also imperative for creating awareness about the conservation of such species through concerted efforts. However, caution must be taken to understand the ecology of rural home gardens with particular attention to distribution of other plant species contributing to their biodiversity. Our enthusiasm to promote medicinal plants should not be at the cost of rich biodiversity of other plants that make the traditional home garden a rich living system.

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