

# Assessing the Feasibility of Cultivating Medicinal Plants for Local Health Needs

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## ABSTRACT

Medicinal plants have long been central to traditional healthcare systems, particularly in developing regions where modern medical infrastructure is limited. With approximately 80–90% of populations in these areas relying on traditional remedies, cultivating medicinal plants presents a sustainable alternative to improve healthcare accessibility and resilience. This paper examines the feasibility of cultivating medicinal plants to meet local health needs by examining historical practices, current cultivation trends, local health assessments, species selection, cultivation techniques, and economic viability. It also considers the environmental and socio-political implications of medicinal plant domestication. Case studies from regions like the Udzungwa Mountains in Tanzania, the Eastern Cape in South Africa, and Marakwet in Kenya offer insights into both the opportunities and constraints faced by communities. The findings underscore the need for scientifically informed approaches, policy support, and community engagement to promote sustainable cultivation. This initiative, if carefully planned and supported, can enhance public health, biodiversity conservation, and rural economic development.

**Keywords:** Medicinal plants, Traditional healthcare, Sustainable agriculture, Local health needs, Biodiversity conservation, Community engagement.

## INTRODUCTION

The therapeutic properties of medicinal plants are well known. Currently, almost 85% of the population in developing countries relies on them as a primary source of health care. Medicinal plants are also an important source of dietary supplements [1, 2, 3, 4, 5, 6]. In developed countries such as the United States, nearly one in three individuals consumes some kind of herbal product. Edible plants are very important in everyday human diets, especially in Asian countries. The bioactive constituents of medicinal plants are believed to be beneficial to human health and can reduce the risks of developing diseases. Many of the species have been consumed as food or food ingredients for thousands of years [7, 8, 9, 10, 11, 12]. A key principle in the traditional use of medicinal plants is the belief in the balance and stability of the body in the way the ecosystem is perceived in Eastern philosophy. Traditional medicinal plant systems frequently play an important role in balancing human health problems with the health problems of the surrounding ecosystem [13, 14, 15, 16, 17]. The unsustainable use and cultivation of medicinal plants will not only result in environmental problems but may also generate social problems. However, diligent and thoughtful management of medicinal plants can create opportunities to maintain and improve local health care. At this time, there is an unmistakable need for modern scientific research to support these ancient beliefs and systems [18, 19, 20, 21, 22].

### Historical Context of Medicinal Plant Use

Since ancient times, various cultures have been influenced by a legacy of knowledge in the use of medicinal plants for the treatment of health. There is a large number of medicinal plants found in different areas because of the unique ecological conditions that influence the habitats of a large number of plant species and the different climates that result in the existence of different species within a habitat

[23, 24]. The ingredients in a plant species are also distinct and different from the ingredients in another species. This diversity has led to the existence of a large number of medicinal plants in the world that are used by indigenous people to treat various ailments [25, 26, 27]. One should be aware of the need for scientific validation from modern health research regarding the use and management of traditional knowledge. Surveys carried out on local people in the study area have shown that medicinal plants are still the most trusted by local people to prevent and treat common diseases for themselves due to the high cost of modern health care services and the high number of diseases that are expensive to treat [28, 29]. That being so, the practice of using and managing this plant has been done by trial and error and depends. There are a number of practitioners who have long used herbs for treatment. Researchers should make an effort to ensure that intellectual property rights of knowledge are properly considered and acknowledged; these knowledge holders who have deep knowledge have shown their concern that they are not willing to share their knowledge with others except their lineage or heirs. Below are recommendations that will help to decide on the practicality of cultivating some plant species for local health needs. Accordingly, it is necessary to conduct scientific research on the use, way of preparation, dose, and evaluation study on multiple users [30, 31, 32].

#### **Current Trends in Medicinal Plant Cultivation**

The therapeutic properties of medicinal plants have been well-known for centuries and are the basis for modern medicines. Currently, 80-90% of people in developing countries rely on traditional medicine for primary health care. Even in industrialized countries, people commonly turn to traditional therapies, mostly involving the use of medications based on herbs. Medicinal plants have long been used as dietary supplements and are consumed in some cultures due to their bioactive compounds and health benefits [33, 34, 35]. There are more than 18,000 plant species in the world with healing properties. Medicinal plants are vital for the healthcare system in both developed and developing countries. The annual trade value of the medicinal plant market is over US \$1,000 billion and growing at a rate of 15% annually. In the global medicinal plant market, the share of secondary products is about 85% [36, 37, 38]. Due to the high price of secondary products, they are significant economic raw materials for countries that cannot even produce such plants, i.e., about 90% of the 50 important secondary medicinal plants are obtained by trade. Along with increasing health consciousness, scientifically proven therapeutic value, and ecological concerns, there is a growing demand for herbal drugs. India ranks first in the export of MFP; however, most of them are imported because of deficits in their indigenous medicinal plants. As a result, there is a salient need to conserve most of the medicinal plant species with the proven high economic value, and those growing in the wild have been included as least concern status in the medicinal plant red list [39, 40].

#### **Local Health Needs Assessment**

The traditional healthcare delivery system of a nation is dependent on the use of medicinal plants by communities. Before the advent of modern pharmaceuticals, these traditional systems were the sole source of medications. Even with modern advances, the World Health Organization has estimated that 80% of the world's population still relies on traditional medicines [41, 42, 43]. For the local people living around the Udzungwa Mountains National Park (UMNP), medicinal plants gathered from the forest are seen as the only solution to their health problems due to poverty, poor infrastructure, and lack of health facilities in their villages. The 14 villages living in the Udzungwa Mountains are, as a whole, heirs to the initiative but have run locally since 2004 by the Udzungwa Ecological Monitoring Centre. A basic element of ecotourism development through part of this initiative is the introduction of village game scouts. Although the village game scouts are trained in the principles of wildlife management and the reasons of conservation, the project is seen by the local people as a means of creating a new cadre for the protection of the forest [44, 45, 46]. This development is creating obstacles to such age-old meteorite harvest practices as the collection of *Hemizygia bracteosa* in the park itself and also to the collection of its favorite tree, *Erythrina abyssinica*, now highly threatened in some areas, mainly by elephants. The unwanted presence of elephants in the arable lands of the villages has the potential to create misunderstandings between the local people and the conservation agency. Hence, the project is entering the critical phase, and it could be counterproductive if a solution is not found [47, 48, 49].

#### **Selection of Medicinal Plants**

Deciding what species to cultivate was one of the main challenges facing the community group. Indigenous knowledge is considered a primary resource for the selection of plants with medicinal qualities. The biodiversity solution, reflected in the promotion of wild-harvesting as an economic

incentive for the preservation of plant species otherwise used in African traditional pharmacopoeia, only covers one aspect of multiple threats to traditional biodiversity. Wild species are becoming more and more difficult to access due to disappearing natural habitats, while violations of indigenous intellectual property rights through bioprospecting are ongoing and tough to regulate. Fortunately, in the present case study at least, the shift from exploitation to cultivation could be facilitated by the knowledge that domestication was technically feasible [50, 51, 52, 53]. The recent past has seen a trend towards cultivating medicinal and spiritual species that were nevertheless already well-represented in the wild. The present study usually begins with a brief rationale as to why only species actually selected are considered worthy of cultivation. The result is a considerably lower research priority on conservation concerns. This also reflects the reality that indigenous medicinal knowledge is not going to go extinct when its practical application is affected. The steady increase in the popularity of traditional healing as a profession has been shown. The rationale is that scarcity of wild resources could have been seen as beneficial if it a priori necessitates a consultation of the healer. The present study has found, on the contrary, that medicinal plants are increasingly sought in urban settings and at times, even from industries or big supermarkets [54, 55, 56]. This process can be expected to strengthen along with the growth of traditional healing as a profession, as healers no longer depend solely on their inherited knowledge, in situ resource observances or distant plant markets, but increasingly turn towards formal means of information to enhance their social prestige and to cultivate the image of a 'professionally competent' healer. Moreover, while in the past a ritual exchange between elders and initiates may have been interpreted as a transfer of knowledge, traditional healing is increasingly the domain of well-off individuals who do not have time or interest in maintaining supportive social networks with herbalists. Regarding relatively simple technical failures concerning the collection or preparation of medicine, such clients are more likely to consider their consultation fees a waste of money better spent on palliatives than an impetus for the individual healer to specialise [50, 51, 53, 54].

#### **Cultivation Techniques**

During the last decades, more and more people have expressed a wish to participate in health issues more actively and have turned to 'natural' health care, including herbal drugs. While economic considerations have been the main motivation for most research in plant biotechnology, in the field of medicinal plants, research has also been driven by the concern for the conservation of plants used in traditional medicine. As most of the well-known medicinal plants sold in Europe have been nearly conventionally wild-harvested and are significantly important for the health care in countries of the Third World, endangered species have to be considered [55, 56]. Therefore, so far, research in biotechnological possibilities for the cultivation of medicinal plants did not only aim at high yields in virus- or pest-disease-free plant materials, or substances produced in parts of the plant not accessible by wild-harvesting or of very laborious production, but on the needs of local health care. However, the wish to involve a broad range of participants and of local health needs has, until now, been difficult to realize. Early this year, a farmer in Ober-Gleen initiated a pilot project that could encourage local attempts at cultivation. The farmer has been growing ginseng, garlic, Echinacea, and other medicinal plants on his farm, studied dendrology and biosophy, and participated in courses in herbal drugs. The appalling over-exploitation of several important medicinal plants in some areas of the world has stimulated national and international activities trying to contribute to a more sustainable use of these plants. The pilot project in Ober-Gleen could be an example for similar studies on a smaller scale [50, 51, 52, 53].

#### **Economic Feasibility Analysis**

Several factors contribute to the growing interest in cultivating medicinal plants among local producers, including the availability of these plants and related economic activities. While producers lack technical expertise, they persist in traditional, unskilled agricultural practices. With operational support and facilities for handling medicinal plants, they could expand both the cultivation area and production volume. This indicates a commercial potential in the medicinal plant sector. Feasibility studies are crucial for assessing project viability. Technical and productive assistance is necessary for increasing land use for medicinal plants and developing infrastructure, such as greenhouses and irrigation systems, to facilitate product handling and marketing. Agriculture-promoting organizations should create an operational project that provides support for both the cultivation and commercialization of medicinal plants. This initiative can encourage innovative solutions to the challenges faced in this field. Health consciousness is increasingly important in contemporary society, driving a shift from synthetic additives to natural therapies to combat urban lifestyle impacts. Various plant treatments are employed, with each culture

utilizing their regional natural resources, drawing from extensive agricultural and medicinal traditions. The progress of modern medicine, grounded in rigorous scientific studies, aims to maximize efficacy while minimizing side effects, often conflicting with traditional practices. Over the past century, the nature of cultivated plants has evolved, focusing on improved taste and pest resistance. Meanwhile, pharmaceutical advancements have led to the artificial synthesis of many medicines. This has resulted in a decline in biodiversity, as industrialized harvesting has favored profitable monocultures, often using excessive pesticides and fertilizers. Consequently, many plants have either remained wild or faced extinction, further diminishing the natural variety of medicinal properties [12, 13].

#### **Environmental Impact Considerations**

Flora colonizes exceedingly heterogeneous habitats using mechanisms selected over 400 million years. If we try to domesticate medicinal plants and escape those adaptations, unsustainable management is likely to ensue: poor growth, need of irrigation, high levels of energy and other inputs costs. Medicinal plants are an essential part of traditional healthcare systems for bioactive treatment and represent a precious tool for health controversies in developing countries. Meager or absent health service triggers a deep knowledge of medicinal properties of phytochemicals, which has enabled peasants to remain healthy for centuries. Fifty-five percent of the world's plant collection is medicinal flora, and it is the basis of modern medicine, with 78,000 structured recipes based on 500 drugs. By contrast, 1200 drugs come from 500 sources in the most prominent pharmacopeia in antiquity, that of Dioscorides. Agriculture is a base of modern development, but as medical plant collection from the wild has been formal for decades from actual biodiversity, manmade plant collection is inadequate. Domestication is a solution based on the expert system of current aggradation, focusing research on how forest manage thee (dome) medicament (domes) that can be sustainable in rural conditions. Herbal plants in an agrotechnological regime increase herb yields from 5 t ha<sup>-1</sup> in sicca to 30 in nemorose plots. Nutrient uptake slit-root, SOS systems, or arbuscular mycorrhiza can reduce organic attribution for longevity, taking up nutrients out of usual reach. Optimum growth can be achieved with the use of horticultural techniques normally not available in rural conditions. Mechanical shaking of herbs and isosynchronous growth increase homogeneity, enabling volunteer farmers to be replaced by machinery operators. Comprehensive results are hard to obtain, often focusing on a single plant, although diagnoses based on the species already improperly address a monoculture approach: a kickpicly-wide problem. Most analyses study formulas while stratified justify plant usages: drug norms are often ambiguous because a hegemony of allopathic medicine makes some recommendations inadequate to distributed practitioners. Memory hoarding of elderly individuals easily explains drug mixtures, especially in the case of compounds with toxic requirements. Phytochemical peer-reviewed analyses are unavailable, the studies are often simply not available. Recalling medicinal properties from flora is learned after botanical identification and drug preparation techniques. Major problems in collecting medicinal plants are postharvest storage and transportation, especially in terms of quality [14, 15].

#### **Policy and Regulatory Framework**

Medicinal plants can be developed as a potential bridge between sustainable economic development of rural populations as well as fiscal growth of the Nation versus safe and affordable health care for the greater population and other living resources. For a reliable supply chain and designated medicines of acceptable quality, appropriate steps are proposed that need to be carried out by competent sectors of the stakeholders, such as the Rangers and Forest department. Nonetheless, benefits from the commercial flow of the plants can be well distributed within the harvesting and growing zones to encompass broader economic growth of the herb gatherers, farmers or collectors and also marketing infrastructure. This would so motivate them socially, to progressively domesticate, and subsequently conserve them in ways possible and achievable. Nurseries and planting should be consulted in an organized manner to make available desired plants of suitable quality at the appropriate time for local farmers and growers. *Sceletium* has been sold in South Africa and has gained popularity in the USA and some European countries. Since more than 50% of the collection is of wild origin, the plant became vulnerable and faced the danger of extinction locally. When scarcity faced the plant, the global demand initiated an effort to cultivate it. The growing of indigenous medicinal plants has a long tradition in South Africa, and in 2009, official initiatives on this were recorded. The collection of wild *Sceletium tortuosum* was phased out in South Africa in 2013, and the plant was listed in Appendix 1 of the National Environmental Management: Biodiversity Act. Environmental management in South Africa is governed by the National Environmental Management: Biodiversity Act, which gives effect to the provisions of the Nagoya Protocol. Most

medicinal plants in the country excluded from the National Conservation Act were opened for low-impact uses, and the key stakeholder in this process is the Department of Agriculture, Forestry, and Fishers. To support this, they established the Natural Resources Management in the Department of Forestry and allocated resources to coordinate these efforts [16, 17].

### Community Involvement and Education

Doctors can encourage healthy living with community involvement and education before ailments begin. One such endeavour could involve cultivating medicinal plants in a public garden, where herbs, spices, and flowers traditionally used in medicines would be grown, and for which people would receive education on growing, harvesting, and recipes or uses for common health problems. Such an approach would not only be preventative but also enlightening and empowering to the public health direction of a community. Healthcare is a major issue among most immigrant and refugee communities, which often face financial and linguistic barriers to proper services. Furthermore, exposure to the panoply of Western drugs and treatments has raised curiosity for learning about more natural, traditional, and potentially less harmful forms of healthcare. A public garden of medicinal plants could open the doors to understanding this other tradition of healing. By offering such a facility, there would be an outreach option for community education. Bi-weekly workshops could demonstrate how to grow, harvest, and use the plants and also present recipes for common ailments. Such a garden could work to foster empowerment among marginalized and underprivileged community members who might feel they do not have much control over their health or access to adequate healthcare. Further, it would be possible to hire the community members themselves to manage the garden and teach the public, providing fruitful employment and a means of expressing unused talents and knowledge for a small financial return [18, 19].

### Case Studies

This study in the Eastern Cape, South Africa, focused on the cultivation of *Alepidea amatymbica* and its medicinal efficacy. A survey of medicinal plant trade in the Amathole District revealed 67 species from 46 families, with 25 identified as overexploited and scarce, prompting conservation prioritization. Data collected from 51 traditional health practitioners (THPs) indicated a significant relationship between their demographic variables and knowledge regarding plant collection. Most THPs did not consider sustainability in their collection methods. Trade analysis showed that nearly all towns, except one, purchased similar plant species from urban traders. The findings will inform conservation strategies proposed by THPs and include educational programs to validate *Alepidea amatymbica*'s medicinal properties. In Marakwet, Kenya, the United Nations Industrial Development Organization has focused on cultivating *Artemisia annua* since 2004 to produce artemisinin for malaria treatment. However, four participating villages with 1,500 families have faced challenges, including limited resources for cultivation, as *A. annua* is unsuitable for the local environment and lacks a market. Families cannot afford seeds, water, and the labor needed for its cultivation. Additionally, users prefer wild plants over cultivated ones, deeming them more effective. After three years, production levels have not been achieved. The focus on this cash crop has led to the sale of fertile land, harming families' sustenance. Consequently, the families face neglect, inappropriate crop demands, false promises, and ignored warnings, resulting in a poverty trap with limited choices, risking either program withdrawal or increased impoverishment and health issues [20, 21].

### Challenges in Cultivating Medicinal Plants

The importance of wild medicinal plants has been well recognized in traditional health care systems such as the Ayurvedic, Greek, Unani-Tibbi Siddha, Amchi, Chinese, and other systems of medicine. The therapeutic properties of medicinal plants are the basis of phytopharmaceuticals, phytotherapy, and herbal medicines. Currently, nearly 85% of the world's population relies on medicinal plants as their primary source of health care, and many of these people are poor and depend on folk medicine, which is mostly plants. Apart from the use of wild medicinal plants as a traditional remedy, they are also frequently used as dietary supplements. The increasing life expectancy and health care demand, as well as growing wealth, have stimulated the rapid increase in the dietary supplement, cosmetic, and pharmaceutical industries. This is, in turn, anticipated to cause a rapid increase in the global demand for medicinal plants. Similar to the situation in the individual healing practice, a large share of the demand is likely to go unmet, although the global annual production of medicinal and aromatic plants is estimated at 200,000 tonnes of dried plant matter, in addition to raw materials collected from natural sources. The unsustainable utilization of medicinal plants from the wild source is already common and expected to exacerbate. This, in turn, can have detrimental effects on the ecosystem and problematize the

reproducibility of such commodities due to the mortality of their wild resource base. Estimates of the impact of the management on the remaining natural habitats uncovered its importance, especially in the biodiversity-rich Amazon, which, as calculated in the course of the study, further underlines the importance of the continued local availability of medicinal forest plants in contributing to people's health. Conversely, careful management and artificial cultivation of medicinal plants can create the conditions necessary for a sustainable development of traditional health care practices and for the transformation of these locally important commodities into income-generating export products [22, 25].

#### Future Research Directions

The therapeutic properties of medicinal plants are well-known. Currently, nearly 85% of the world's population relies on medicinal plants as their primary source of health care. Medicinal plants are frequently used as dietary supplements, which greatly impact human health. The global trade of medicinal plants and their derivatives will increase, causing a rapid increase in global demand for medicinal plants. On the one hand, more attention has been paid to the research of micronutrient pharmacopoeia, and the development and utilization of Chinese hypericum have played an increasingly important role in local health care. On the other hand, with the protection of wild resources, the scale of available Chinese hypericum resources is decreasing. Furthermore, the unreasonable excavation of Chinese hypericum is caused by the different concepts of various ethnic groups. Therefore, it is a research hotspot to vigorously develop the exploitation and utilization of Chinese hypericum resources to meet local health needs. Medicinal plants are non-wood products of woody plants that are used in public health and animal husbandry in addition to forests, fish, wildlife, fruit products, gums, and essential oils. Each part of the plant can be used as medicinal material, such as roots, stems, leaves, flowers, fruits, seeds, and sap. Medicinal plants are often used as dietary supplements, and their healthy products have been widely recognized. It has been estimated that by 2024, the global herbal trade market will reach USD \$345 billion. However, a severe crisis in the sustainability of wild products, including plants and animals, has been forced by the increasing market demand. Careful management of plant resources and artificial cultivation offer the best sustainable opportunities for the medicinal plants market. However, the traditional method of cultivating medicinal plants does not meet the market's demand, and it is expected that other non-traditional cultivation systems can be used. In addition, current cultivation systems of medicinal plants increase yields but are frequently associated with intensive application of chemical inputs. This practice can cause soil degradation, increase the risk of pests, and reduce biodiversity. Moreover, the uptake of pesticide residues and heavy metals from the soil by medicinal plants can endanger consumer safety. Organic agriculture is considered a feasible alternative to conventional methods for sustainable plant cultivation, although the impact of organic cultivation on the metabolites of medicinal plants should be taken into account. The agricultural systems will be modern, diversified, and integrated with traditional farming, involve GPS technology, and high-value fruits, nuts, and medicines [26, 29].

#### CONCLUSION

The cultivation of medicinal plants for local health needs is both a viable and necessary initiative, particularly in rural and underserved communities. This practice supports healthcare systems by offering cost-effective and culturally familiar remedies while also contributing to biodiversity conservation and rural economic development. However, successful implementation requires more than just planting—scientific research, policy frameworks, environmental considerations, and active community participation are crucial. Education and capacity building can empower local communities to manage these resources sustainably, while case studies highlight the importance of aligning cultivation practices with ecological and socio-economic realities. With thoughtful planning and multi-stakeholder collaboration, medicinal plant cultivation can serve as a powerful tool for health equity and environmental sustainability.

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