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To improve employability by cultivation of medicinal plants: a current viewpoint

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ABSTRACT: Growing medicinal plants is a promising method for boosting employment opportunities, especially in rural areas with high unemployment rates. The emergence of new biopharmaceuticals has increased interest in medicinal plants and their products over the years. Various agricultural industry sectors are involved in medicinal plant cultivation, including harvesting, processing, research and development, manufacturing, and production. Furthermore, the plan emphasizes the establishment of small businesses, fostering self-employment, and advancing the local economy. Additionally, these efforts are aimed at conserving biodiversity, promoting sustainable resource use, controlling environmental degradation, and preserving medicinal herb knowledge. A number of challenges exist in this effort, including a lack of comprehensive training and technical skills, the inability to establish efficient market links, and the inability to implement excellent quality control measures. To encourage a suitable environment for the sustainable development of medicinal plants, it is essential that various stakeholders, including the government, research institutions, industry participants, and local communities should come together and have some collaborative efforts.

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INTRODUCTION:

The cultivation of medicinal plants has resulted in substantial employment prospects across diverse sectors, encompassing agriculture, manufacturing, production, and commerce. These plant species have played a crucial role in the preservation of biodiversity, protection of resources, control of pollution, and improvement of air quality. Different governments all over the world are currently engaged in proactive efforts to stimulate the growth of medicinal plants, providing farmers with government incentives and tax advantages [1]. There has been a surge in demand for medicinal plants in the market, leading to the cultivation of diverse plant species using environmentally sustainable methods.

Nevertheless, the presence of market volatility, the complex nature of cultivation procedures, and the susceptibility to pest control issues present significant challenges. The objective of this study is to identify plant species that possess medicinal properties, assess their economic viability, develop an educational curriculum for agricultural and pharmaceutical professionals, and promote the cultivation of these plants in targeted regions [2].

HOW IT RELATES TO EMPLOYABILTY:

The cultivation of medicinal plants has the potential to enhance employability in various sectors, including agriculture, research and development, advertising, and sales. The global market for medicinal plants is valued at over $100 billion, and the growing demand for natural and alternative medicines is driving the growth of this sector. In India, agricultural practitioners can initiate small business ventures focusing on the cultivation and commercialization of medicinal herbs, generating revenue for farmers and their households. In China, higher education institutions are providing research programs focused on medicinal plants, aiming to generate self-employment opportunities for individuals wanting to grow medicinal plants [3]. In the United States, pharmaceutical industries are creating novel pharmaceutical compounds from herbs having medicinal properties, generating employment opportunities for professionals in science, pharmaceuticals, medicals and entrepreneurship. The cultivation of medicinal plants also contributes to the improvement of public health and the preservation of traditional knowledge. The cultivation of medicinal plants also enhances the economic standards of a given area, creating job opportunities and contributing to the growth and development of different industries [4].

CRITERIA TO BE FOLLOWED BEFORE CULTIVATION:

The criteria to be followed before the cultivation of medicinal plants include, recognizing the demand for medicinal plants, choosing appropriate plants, obtaining permits and licenses, considering the significance of cultivation, developing a cultivation plan, ensuring the availability of a skilled workforce, researching the regulatory environment, minimizing environmental impact, ensuring adequate care for plant life, timely harvesting of herbs, analysis, and treatment of vegetation, and marketing and selling of products [5]. Additionally, individuals can enhance their chances of success in cultivating medicinal plants by obtaining certification in this area, engaging in collaborative networks with other cultivators, and engaging in research. These measures demonstrate the necessary skills and knowledge for the proper cultivation of medicinal plants, allowing individuals to stay informed about the latest developments in their respective fields and acquires valuable experiential knowledge. By implementing these measures, individuals can improve their chances of success in cultivating medicinal plants and enhance their employability prospects [6].

METHODS FOR CULTIVATION:

The cultivation of medicinal plants involves species selection, site selection, soil preparation, propagation, planting, irrigation, pest and disease management, harvesting, drying, and storage. Species selection aligns with climatic conditions, soil composition, and resource availability. The soil preparation method involves the removal of undesirable elements from the soil, and the proper use of propagation techniques including seed propagation, vegetative propagation, division, or tissue culture [7]. Planting, fertilization, harvesting, and storage are also other essential steps for the cultivation of medicinal plants. Sustainable practices, such as organic fertilizers, pest control, crop rotation, water resource conservation, and biodiversity promotion, are some of the crucial steps for the successful cultivation of medicinal plants [8].

METHODS OF PREPARATION OF HERBAL PRODUCTS:

There are numerous techniques employed for practice of herbal formulations, some of the techniques usually employed has been given below [9],

- Decoction.
- Infusion
- Maceration.
- Distillation.
- Soxhlation

TYPES OF HERBAL FORMULATIONS (NATURAL PRODUCTS):

There are so many types of herbal formulations which can be generated for use in cosmetic and medicinal purposes. Few examples of these herbal formulations has been illustrated below [10],

- Tinctures.
- Extracts.
- Powders.

- Capsules.
- Tablets.
- Syrups.
- Ointments/Creams.
- Inhalations.
- Aromatherapy.

For demonstration purposes, one example of herbal formulation as an anti-bacterial face pack has been given in Table 1.

Table 1. Formula for an Anti-bacterial face pack.

Name of the Ingredients	Scientific Name	Weight of Ingredients (For 100 g)
Orange Peel powder	*Citrus reticulate*	10 g
Neem powder	*Azadirachta indica*	15g
Sandal Wood powder	*Santalum alba*	20g
Aloe Vera powder	*Aloe barbadensis*	15g
Turmeric powder	*Curcuma longa*	5g
Bentonite	Absorbent Aluminum phyllosilicate clay	20g
Light Kaolin	Hydrated Aluminum silicate	15g

Method of Preparation of Anti-Bacterial Face Pack:

At first, the exact amount of materials present in Table-1 is weighed accurately. Then these ingredients were put inside a mortar. Grinded and mixed into a fine powder with the help of a pestle. Sieved it using a mesh no # 80. This resulted in the preparation of the final formulation. Then, the prepared face pack was stored in an airtight container. Labelled and can be used for future research [11].

INCREASED OUTCOME (PRODUCTIBILITY):

The enhancement of medicinal plant cultivation productivity can be achieved through the implementation of diverse methodologies, including the adoption of improved cultivation strategies, the establishment of nurseries, the provision of training and education, the creation of markets for medicinal plants, and the promotion of the utilization of high-yielding plant species [12]. The implementation of these techniques has the potential to enhance the yield of medicinal plants and generate employment prospects within the cultivation industry [13].

In India, the government has implemented the establishment of nurseries with the aim to facilitate the production of superior seedlings, thereby ensuring that farmers have access to optimal planting material. Consequently, this phenomenon has resulted in a notable augmentation in both productivity levels and employment rates [14]. The Chinese government has actively advocated for the utilization of medicinal plant species in both traditional and contemporary medical practices, resulting in an increased need for medicinal flora [15].

In the context of Peru, a cooperative entity has played a pivotal role in facilitating the enhancement of farmers' cultivation methodologies and facilitating their entry into marketplaces, thereby leading to notable increments in productivity levels and employment opportunities [16]. The expansion of markets for medicinal plants has the potential to generate employment opportunities within the industry through client education on the advantages of utilizing medicinal plants and collaboration with retailers to enhance the accessibility of medicinal plants [17]. The creation of employment opportunities in the expanding medicinal plant industry can be achieved through the improvement of productivity in medicinal plant cultivation and the exploration of novel markets for medicinal plant life [18].

METHODS OF CULTIVATION:

Various cultivation techniques for medicinal plants are employed, depending on factors such as botanical species, resource availability, and specific objectives. Field cultivation involves direct cultivation in exposed fields, with soil preparation, sowing seeds, and regular management [19]. Contour cultivation is suitable for hilly or sloping terrain, while indoor cultivation in greenhouses offers a regulated environment for year-round cultivation [20]. Hydroponics, aeroponics, container gardening, vertical gardening, and agroforestry are a few methods of growing medicinal plants. Hydroponics is suitable for limited space or indoor farming, while aeroponics, container gardening, and vertical gardening represent a better use of space for compact gardens or urban environments. Agroforestry represents the combination of planting medicinal plants and trees together for ecological benefits, proving shade, and conserving water for social benefits [21]. For growing medicinal plants, a garden dedicated to cultivating these herbs is needed, or a free landscape that can provide a varied and visually interesting space for planting. It is

important to consider the specific needs of each medicinal plant species and carefully research their specific cultivation techniques [22].

RAW MATERIAL USED FOR MAIN INGREDIENT OF HERBAL FORMULATIONS:

Herbal formulations are a mixture of diverse botanical elements, with most of the ingredients obtained from total plants to leaves, barks, stems, buds, flowers, fruits, seeds, roots, rhizomes, glues, etc. These materials are essential for the composition of herbal products, which could show off variability relying on the meant cause and the substantiation of their utilization through conventional expertise or clinical investigation[23]. Additionally, other excipients like vehicles, preservatives, colors, flavors, sweeteners, and stabilizers may be used to create suitable dosage forms like powders, tablets, capsules, or tinctures and to improve the stability of the herbal products [24].

MARKET AND GLOBAL RELEVANCE:

The global market for medicinal plant life is projected to exceed a value of $100 billion and is experiencing an over 6% compound annual growth rate. The growth in this industry is attributed to several factors, including the rising demand for natural and alternative medicines, the increasing number of elderly individuals in the population, and the growing recognition of the health advantages associated with medicinal plants [25]. The top five medicinal plants in terms of market value include Ginkgo biloba, ginseng, St. John's wort, echinacea, and valerian.

These plants are utilized for the treatment of various conditions, encompassing anxiety, depression, insomnia, and pain [26]. There are numerous small and medium-sized companies operating in the global medicinal plant market, which exhibits significant fragmentation. There is a wide range of products made from medicinal plants, including dietary supplements, cosmetics, and pharmaceuticals.

Prominent entities in the market include Schwabe, Madaus, Weleda, and Bionorica [27]. The natural ingredients in dietary supplements provide immune function enhancement, stress reduction, and sleep improvement, among other health benefits. In the field of cosmetics, medicinal plants are often used to add a variety of beneficial properties, including anti-inflammatory, antibacterial, and antioxidant properties[28]. Herbal medicines are often included in prescription medications to treat pain, inflammation, and anxiety. Due to the growing demand for natural and alternative medicines, medicinal plants are becoming more prevalent in additives. Physical fitness and overall well-being can be improved through medicinal plants, which are regarded as reliable and potent remedies [29].

END USER ACCEPTIBILITY:

End-user acceptance is crucial to the success of cultivating medicinal plants. Several factors affect end-user acceptance, such as relative effectiveness, plant protection level, ease of use, cost, and availability. End-user acceptance of plant-based products can be increased by participating in empirical investigations, collaborating with fellow scientists, creating and refining user-friendly products, ensuring that plant-based products are affordable, and building a strong distribution network [30].

Education, culture, and regulations are supplementary factors that enhance end-user acceptance. Understanding and addressing these factors will improve the likelihood of medicinal plants becoming widely available and used for health and wellness [31]. Medicinal plants have a diverse customer base consisting of consumers, healthcare professionals, and organizations. Medicine plants are used by consumers to enhance their health and well-being [32].

Medicinal plants are used by healthcare professionals for the treatment of a variety of medical ailments. Pharmaceutical and cosmetic companies increasingly incorporate medicinal plants into their product portfolios to diversify their product lines [33].

USE FOR COMMON PEOPLE:

Throughout centuries, individuals have employed medicinal plants as a means to address a wide range of ailments. In recent years, there has been a resurgence of interest in the utilization of medicinal plants, as individuals are actively seeking herbal and alternative approaches to augment their well-being [34]. There exist numerous distinct approaches to the utilization of medicinal plants. Certain individuals decide to consume medicinal plants in the form of supplements, while others prefer to utilize them in the preparation of tinctures [35]. The utilization of herbal remedies is generally considered to be safe; however, it is imperative to consult with a healthcare practitioner before consuming any herbal remedy, particularly if one is pregnant, breastfeeding, or concurrently using other medicinal substances [36].

CONCLUSION:

The cultivation of medicinal plants is a promising approach to enhance employment opportunities, as the global market for medicinal plant life is experiencing growth. To pursue a career in plant cultivation, one can either start their own enterprise or work with a company. To prepare, one must conduct extensive research, acquire necessary skills through educational courses, read, and seek guidance from experts, expand their proficiency through farm work or horticultural education, and actively engage in communication with individuals within the industry. This lucrative occupation offers numerous prospects for professional development and progression.

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