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Deccan region a hub for Medicinal plants Cultivation-An overview.

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ABSTRACT
Medicinal plants are known for their phytochemicals and formulations in the product formation like in medications, cosmetics, fragrances etc. These products have economic significance worldwide. The Deccan regions were found to be rich in producing valuable commodities, which contributes to the nation's economy. In this present study, the cultivation of high demand medicinal plants suitable for Deccan region are discussed which includes the mentioning of common name, scientific name, Varieties, Yield and Economics. It is concluded that this region has a huge possibility to produce a big number of legislators, which is crucial given the rising demand for legislators on a national and international scale.
Keywords: Medicinal plants, Deccan region, Cultivation, Carry me, Periwinkle, King of Bitters.

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INTRODUCTION

Consumer demand and desire for herbal ingredients in medications, cosmetics, fragrances, and smells, as well as products derived from medicinal plants (MPs), phytochemicals, formulations, and products, has raised the economic significance of MPs and their derivatives worldwide. This is evident in nations like China, India, and the United States [1-3]. An increase annual growth rates was observed during the period between 2005 and 2010(UN Comtrade database) with a global import and export of the globe reached $2.1 billion in 2010. India and China are the two leading producers and exporters of MP in the world. It is possible that by 2050, the market for alternative medicines, such as herbal cures, will be worth $5 trillion. The true inheritors of the 21st century will be the members of Congress and their goods. India is home to 8000 types of blooming plants, with a total of 16700 flowering plant species. It is possible that half of them reside in the Deccan. Volcanic eruptions took place between 65 and 67 million years ago, resulting in the formation of the Deccan or Dakshin (southern) region of India. Presently, there are eight Indian states in this region, and its inhabitants speak a vast variety of languages (including Marathi, Hindi, Urdu, Telugu, Tamil, Kannada, and Malayalam). Godavari, Krishna, Cauvery, Tungabhadra, Narmada, and Tapti are included in this list of rivers. As they make their way to the ocean, the waters of the first four rivers move eastward and finally join with the waters of the Bay of Bengal. The Narmada and Tapti rivers travel in opposite directions till they meet at the Arabian Sea in the most western section of India. The climate can range from semi-arid to tropical, and there are two primary wet seasons known as the south-west monsoon and the north-east monsoon. During the months of March through June, this region typically experiences temperatures that exceed 40 degrees Celsius. All of the region's agricultural, horticultural, commercial, and spice crop production contribute to its powerful economic success. The Western (3,500) and Eastern (>1,500) Ghats are home to some of India's most populous concentrations of Members of Parliament. Over the past several decades, the region's reputation as a source of valuable commodities such as sandalwood *(Santalum album* L., Santalaceae) and red sanders (*Pterocarpus santalinus* L.f., Fabaceae) has declined. Farmers in the surrounding area that take initiative are fostering a new generation of legislators with a progressive mindset [4-6]. Increasing the number of legislators in this field would provide a steady supply for both domestic and foreign markets [7].

MPs demand:

Dry herbs and other plant components that are used in herbal therapy are among India's main exports, with 40,000 to 50,000 tonnes transported annually to the West (mostly USA, Europe and Japan). An additional consumption of roughly 2700000-2800000 tonnes is brought about by the local manufacturing industry as well as rural people. There is an annual harvest of around one million metric tonnes of fresh herbs to satisfy demand both domestically and internationally. Thankfully, more than 45% of the biomass comes from 40 cultivated species, while 37% of the biomass received from 77% of the species comes from the forest [8], with a sizeable portion coming from the Western and Eastern Ghats. This dichotomy is due to the fact that cultivated species produce more biomass per unit area than wild species do. The Western Ghats have been designated as one of the world's 34 biodiversity hotspots. Despite this designation, the region has lost approximately 70 percent of its original plant diversity due to overexploitation, the destruction of habitat as a result of human activities, and the effects of climate change. The Eastern Ghats are not an island unto themselves. The efforts of governments and non-governmental organisations to protect biodiversity for the benefit of future generations have so far been met with favourable outcomes and generated positive benefits. One of these approaches is the restriction of collecting for purposes other than scientific research, as well as assistance for in situ and ex situ cultivation. According to a survey that was conducted by the Foundation for the Revitalization of Local Health Traditions (FRLHT), the city of Bangalore requires more than one hundred tonnes of more than one hundred species on an annual basis [8].

MPs in high demand that are suitable for Deccan region:

Ved & Goraya include *Abrus precatorius, Acacia catechu, Acacia nilotica, Acacia sinuata, Achyranthes aspera, and Xanthocybe cumini* as high-demand species that can be grown in the Deccan region (2008). Other species in high demand include *Achyranthes aspera*. The eagle marmelos, also known as the flying eagle (*Aerva lanata*) Examples of such plants are *Albizzia amara* and *Alstonia scholaris. Anogeissus latifolia* is the common name for this plant. For instance,*Asparagus racemosus* for example, *Bacopa monnieri,* Plant genus: *Baliospermum montanum B. diffusa, or Boerhavia,* The Bombax species "*Boswellia serrata,"* also known as "Lanzan of Bucharest" or "One-Seeded Butea," *Cardiospermum halicacabum*. The Careya tree in its entirety (Careya arborea), *Asparagus racemosus*, Numerous members of the genus Cassia, include the fistulous Asian centella, Insecticidal Clover, and other closely related plants; Examples of this plant include the *Celastrus paniculatus*, also known as a Panicked Cluster of Celastrus Tuberous Chlorophylle, *Convolvulus microphyllus, Coscinium fenestratum, Citrullus colocynthis, and Clerodendrum phlomides. I*nfected genital warts are typically referred to as *curculigo orchioides.* Common name: *Cyclea peltata*, Medicinal plant datura, The indica fruit is produced by both the hamiltonii decapepis and the Malaria-causing *Desmodium gangeticum, Embelia tsjerium-cottam, Eclipta prostrata, Garcinia, and Fumaria*. The Gardenia, also known technically as *Resino spermum* This species' scientific name is *Gmelina arborea*. The name of this plant is *Gymnema sylvestre. H. corymbosus, H. indicus, and H. corymbosus Helicterus isora,* in addition to *Holostemma ada-kodien, Holostemma pubescens, Hololoptelea integrifolia, and H. corymbosus Helicterus isora. A Holarrhena pubescens* specimen A schulli's hygrophylla, The Ipomoea species (*I. mauritiana and I. nil*), Ixora (*I. coccinea*), Lannea (*L. coromandelica*), Litsea *(L. glutinosa)*, and Litchi (*L. chinen)* The common name for *Lobelia nicotianaefolia* is Lobelia nicotianaefolia. The tree referred to as *Madhuca indica, Tridentate merremia,* we have gotten ourselves into a mess, commonly known as the *Messua ferrea* or *Mimusops elengi.* This is a pubescent variant of the plant Moringa. A Ciliated *Nilgirianthus*, "*Ocimum americanum," Turpethum operculatum*, A tree indigenous to India Oroxylum, The *Harmala peganum*, also known as *Plumbago zeylanica*, Regarding the *Premna serratifolia* species, A pseudodarthia with a dense texture, *Psoralea corylifolia, Pterocarpus marsupium, and Pterocarpus santalinu*s, as well as *Psoralea santalinus*, are examples of such plants. The serpentine was winding. Rauvolfia The *Rubia cordifolia*, often known as the red-carpet flower, is the subject of a compilation CD by Santalum. This term translates from the language of the *Sapindus mukoross*i as the ever-present use of sarcasm: *"Saraca asoca, Swietenioides schrebera, Anacardium semecarpus Robust Shorea, Rhombifolia Sida, Irio sisymbrium, Asparagus glabrata,* and "*Saraca asoca, Swietenioides schrebera, Anacardium semecarpus Robust Shorea, Rhombifolia Sida, Irio sisy* Another example is Soybean Feverfew, commonly known as *Soymida febrifuga.* The Indian Sphaeranthus, also known as *Sterculia urens, S. chelonoides, stereospermum, Aspergillus fumigatus, Aspergillus niger, Streptococcus sp.*, and the species *Aspergillus fumigatus and Aspergillus niger. Symplocos racemosus, Tephrosia purpurea, Terminalia arjuna, Terminalia bellirica, and Terminalia chebula* are a few others to list. The Cordyceps fungus was involved in a terrible occurrence (Tinospora). This species of Trichosanthes is known more widely as *Tribulus terrestris*, while its scientific

name is cucumerina. This blend consists of the plants *Papaya indica, Ziziphus xylocarpus, Woodfordia fruticosa, Wrightia tinctoria, and Withania coagulens.*

Steps to be followed in the cultivation of Medicinal plants: If you are a farmer or company owner interested in cultivating MPs or building an enterprise based on MPs, you should examine the following.

- The initial objective is to determine if the region under consideration is suitable for the development of MPs. It is essential to undertake water and soil tests.
- Collect extensive information on the legislators who will be targeted for cultivation: Farmers, as well as federal and state government institutions, are dependable information sources for this topic.
- Discuss with all of your partners the strategy you will employ to either start a farming business or create value.
- You must conduct market research and familiarise yourself with the marketing potential and anticipated demand growth.
- It is essential to investigate all potential sources of financial aid, including personal investments, loans, and government grants, among others.
- Create irrigation and drying systems for the crops.
- Employ organic farming techniques whenever possible, and be willing to become certified by organisations that are already established in the organic agricultural business.
- Obtain some authentic, high-quality plant material from a reliable source.
- To obtain the greatest harvest from your crop, you must plant it at the optimal time of year. Delays in planting might result in decreased yields as well as diminished quality.
- If absentee landlords reside on the property, ensure that the labour is frequently supervised. This is crucial for applying inputs (fertilizers/manures, other chemicals) and when using a large number of employees for weeding, harvesting, and other duties.
- It is advised that you employ organic preventative methods to keep diseases and pests at bay.
- Make effective use of the available materials (such as water, dung, and fertilizer).
- Your harvest timing is of the utmost significance. When harvesting is delayed, both the quantity and quality of the produce diminish.
- Ensure that the collected material is completely dry before storing it.
- It is crucial to package and preserve dry goods correctly.
- Before selling fresh fruits and vegetables, ensure that they can pass quality inspections
- We strongly recommend making this product accessible to the broader public as soon as possible. The carelessness with which harvested crops are handled and stored after harvest reduces both their freshness and shelf life.

Common Medicinal plants cultivated in Deccan region:

The following are some of the most common medicinal plants farmed for commercial reasons in this region: Carry me seed (Carryme), African glory lily (*Gloriosa superba*), aloe vera (*Aloe vera*), ambrette (*Abelmoschus moschatus*), fragrant ginger (*Kaempferia galanga*), basil (*Ocimum sanctum*), and blue gum (*Eucalyptus globulus*) (*Phyllanthus amarus*), col The great majority of MPs are grown on a smaller scale, such as in personal herb gardens, cooperative forest management programmes, and other functionally comparable contexts [9-10].

Economic Value of some selected Medicinal plants:

This section contains the yield and economics of some cultivated varieties and species of Deccan region [11-13].

Table-1: Cultivation and Economic value of *Andrographis paniculata*

Factor	Details
Common/scientific name, family	King of bitters, Kalmegh, Nela vemu. *Andrographis paniculata (*Burm. f) Wall. Ex Nees. Acanthaceae.
Uses	Useful in treating fevers, jaundice, inflammations, digestive problems, cough, diabetes. Pain reliever, kills cancer cells, immune enhancer, prevents blood clots.
Varieties and cultivation	CIM-Megha. Raise nursery in May–June (400–500 g seeds/ha). Seeds germinate in 8–10 days (70–80% germination). Transplant 45–60 days old, 8–10cm tall seedlings during rainy season with 30x15–30 cm spacing. Irrigate during dry periods at 7–10 day intervals. Apply 25 t/ha FYM+bio-fertilizers. 220kg urea+450kg SSP+100kg MOP/ha. FYM, P and K basal application. N applied in 3 splits at planting, 30 and 60 days after planting. Weed at 30 and 60 days after planting. Harvest at flower initiation (90–120 days), 10–15 cm above the ground level. Harvest ratoon crop 50–60 days after the first harvest.
Yields and economics	Shade dry the harvested herb for 3–4 days. Herb yield/ha: 2.5–3.0 t (up to 5.0 t possible) (1.0-1.2 t/ac). Cost of cultivation/ha: Rs. 15000 (Rs. 6000/ac); gross profit/ha: Rs.37500–45000 (Rs.15000-18000/ac); net profit /ha: Rs. 22500–30000 (Rs. 9000-12000/ac); price: Rs. 10-15/kg dried herb.

Table-2:Cultivation and Economic value of *Phyllanthus amarus*:

Factor	Details
Common/scientific name, family	Carry me seed, *Bhumyamalaki*, Nela usiri. *Phyllanthus amarus* Schumach. & Thonn. Euphorbiaceae (Phyllanthaceae).
Uses	Plant is used to treat jaundice, kidney and gall bladder stones, dyspepsia, diarrhea, dysentery, and dropsy, diseases of urino-genital system, edema, ulcers, and ophthalmia, diabetes and skin affections.
Varieties and cultivation	CIM-Jeevan. Seeds (1.0 kg/ha) are sown in April-May in nursery beds. Seedlings of 30-40 days, 10-15cm tall are transplanted with 15-25×10-20 cm spacing in rainy season. Irrigate once in 15 days. Apply 10 t FYM, 75kg N, 37.5kg P, 37.5kg K. 1-2 manual weedings are necessary. 90-120 days old, green crop is harvested close to the ground level. Shoot biomass is dried to 8% moisture and stored. 1-2 ratoon harvests at 45-60 days intervals are possible.
Yields and economics	Biomass yield: 1500-2500 kg/ha (600-1000 kg/ac); cost of cultivation Rs. 15000/ha (Rs. 6000/ac); price: Rs. 15-20/kg; gross profit: Rs. 30000-50000/ha (Rs. 12000-20000/ac); net profit: Rs. 15000-35000/ha (Rs. 6000-14000/ac).

Table-3:Cultivation and Economic value of *Gloriosa superba:*

Factor	Details
Common/scientific name, family	Glory lily, Agni sikha, Potti dumpa, Langali. *Gloriosa superba* L. Liliaceae.
Uses	Colchicine present in the tubers and seeds is used to treat gout, rheumatism and for inducing polyploidy in plants. Traditionally, the tubers are considered as tonic, stomachic and anthelmintic in small doses.
Varieties and cultivation	Propagated through tubers. Tubers weighing 50-60 g (1 t/ac) treated with 0.1% Carbandazim are planted 6-8 cm deep during rainy season in furrows with 60×45 cm spacing. Crop requires live support or trellis. Short duration legumes can be grown as intercrops. At early stages, crop is irrigated once in 4-7 days, later at 15 day intervals. Apply 10 t FYM, 50kg urea, 300kg SSP, 100kg MOP/ha applied at planting and 75kg urea top dressed at flowering. Two manual weedings are needed. Flowers during August-September, mature pods can be seen in October-November and are harvested at 170-180 days after seeding. Hand pollination enhances seed yield. Tubers are harvested once in 3-5 years.
Yields and economics	Seed yield: 20–250 kg/ac; tuber yield: 1000–1200 kg/ac after 3–5 years; gross return: Rs. 500000–600000/ac; net return: Rs. 250000–350000/ac; cost of cultivation: Rs. 250000/ac 1st year; 75000–100000/ac 2nd year; price of seeds: Rs.1000/kg and tubers: Rs.400/kg

Table-4:Cultivation and Economic value of *Catharanthus roseus*:

Factor	Details
Common/scientific name, family	Periwinkle, Sadabahaar, Billa ganneru. *Catharanthus roseus* (L.) G. Don. Syn. *Vinca rosea* L. (Purple, white, white with red spot, 6-petalled flowers). Apocynaceae.
Uses	Leaves are used in the treatment of cancers such as Hodgkin's disease, leukemia and chorio-carcinoma. Roots are used in the treatment of high blood pressure.
Varieties and cultivation	Dhawal, Nirmal, Prabal (All white flowered). Direct sowing during rainy season with 2.5 kg/ha seeds or transplant 30-45 days old nursery raised (May-June) seedlings (seed rate 500 g/ha) with a spacing of 45×30 cm. Intercrop in orchards and tree plantations. Irrigate once in 15-20 days during non-rainy periods. Apply 10 t FYM+175-220kg urea+250kg SSP+65kg MOP/ha/year. Apply FYM, P and K as basal dressing and N in 3-4 equal splits. Spray micronutrients once. 2-3 weedings/hoeings are required. 3 leaf harvests (4-6, 7-9, 10-12 months after planting) and one root harvest (10-12 months after planting) are possible. Shade dry harvested leaves and roots to a moisture content of 8% before packing and storing.
Yields and economics	Leaf yield: irrigated:1.0-1.5 t/ha, rainfed: 0.8-1.0 t/ha; Root yield: irrigated: 0.8-1.0 t/ha, rainfed: 0.5-0.8 t/ha; cost of cultivation/ha: irrigated: Rs. 20000, rainfed: Rs. 15000; gross profit/ha: irrigated: Rs. 37000-60000, rainfed: Rs. 27500-42000; net profit/ha: irrigated: Rs. 17000-40000, rainfed: Rs. 12500-27000; price: leaves: Rs.25-30/kg, roots: Rs. 15/kg.

Table-5:Cultivation and Economic value of *Cassia angustifolia*

Factor	Details
Common/scientific name, family	Indian Senna, Sona/Suna mukhi. *Cassia angustifolia* Vahl. Syn. *C. senna* L. Caesalpinaceae.
Uses	Leaves and immature pods are used as bulk laxatives.
Varieties and cultivation	Sona, ALFT-2. Planting in February-March under limited irrigation conditions by sowing seeds (15-25 kg/ha) in rows of 30-45 cm. After germination, crop thinned to give a spacing of 30×30 cm. Irrigate at 15-20 day intervals. Apply 250kg SSP+75kg MOP+25-50kg Zn/ha as basal application, 135kg urea in 2 splits. One weeding at 45 days after sowing of the crop. The plants start flowering 60 days after sowing, first flush is removed to encourage vegetative growth. About 90-100 days after sowing, fully-grown bluish colored leaves and golden-yellow colored, immature pods are stripped manually. A second harvest is taken 30-45 days after the first harvest. The leaves and pods are shade dried for 10-15 days to a moisture content of 8-10% and packed. The leaves are winnowed to remove dust and stones and then passed through sieves of different sizes to separate them in to different grades denoted as Prime 1-5.
Yields and economics	Yield: Irrigated 1.0-1.2 t/ha leaves and 300 kg pods and rainfed: 500-600 kg leaves, 150 kg pods/ha. Cost of cultivation/ha: Rs. 8000–10000; gross profit/ha: Rs. 19500–30000; net profit/ha: Rs. 11500–20000; price: leaves: Rs. 15-20/kg and pods: Rs. 15-20/kg.

Table-6:Cultivation and Economic value of *Abelmoschus moschatus*:

Factor	Details
Common/scientific name, family	Ambrette, Musk mallow, Muskdana, Kasturi benda. *Abelmoschus moschatus* Medic. Syn. *Hibiscus abelmoschus* L. Malvaceae.
Uses	The seeds are added to coffee; unripe pods, leaves and new shoots are eaten as vegetables. It is used externally to relieve spasms of the digestive tract, cramps, poor circulation and aching joints. It is considered an insecticide and an aphrodisiac. Used as a substitute for animal musk. In industry the root mucilage provides sizing for paper; tobacco is sometimes flavored with the flowers. Essential oil is used in perfumery.
Varieties and cultivation	Seeds (300-500 g/ac) are dibbled @ 3-5 seeds/hill during June-July with 1.0-1.3×0.5-0.75 m spacing in fertile soils; 60-90×60 cm in less fertile soils. Irrigate at 10 day intervals during non-rainy periods. Apply 8 t FYM, 50:25:25:4 N, P, K, S/ac. Spray micronutrients once. 2-3 weedings are necessary. Crop flowers in 90 days, pods mature 60 days later. Mature pods are picked 4-6 times or more, threshed, winnowed, seeds are separated, dried and stored.
Yields and economics	Seed Yield: 400-800 kg/ac; cost of cultivation: Rs.10000/ac; price of seeds: Rs. 80-120/kg; gross profit: Rs. 32000-96000/ac; net profit: Rs.22000-86000/ac.

Table-7: Cultivation and Economic value of *Piper longum*:

Factor	Details
Common/scientific name, family	Long pepper, Pipli, Pippallu. *Piper Longum* L. Piperaceae.
Uses	The fruits and roots are used for cough, bronchitis, asthma, muscular pains, inflammation, coma, drowsiness, insomnia, and epilepsy, diseases of bile duct, dysentery, stomach disorders, leprosy, abortion and tuberculosis.
Varieties and cultivation	Pipali. Propagated through stem cuttings or suckers. Stem cuttings 15-20 cm long with 3 nodes are planted in the nursery in March-April. Planting is done during rainy season with 60×60 cm spacing. In Vizag tribals intercrop turmeric and long pepper. The crop is irrigated at 15-20 days intervals. Apply 10-15 t FYM, 250kg SSP, 65kg MOP, 25-50kg zinc sulphate/ha basally and 150kg urea in 3 splits. Do 2-3 manual weedings. Crop for spikes comes to bearing in the 1st year (November-December). The dry spike yield/ha increases from 400 kg in the 1st year to about 1000 kg in the 2-3rd years after which the crop is replanted. The spikes are harvested while still green and unripe, as they are most pungent at this stage. Crop for roots is harvested after 2-3 years. The roots are dug out, cleaned, cut into pieces of 2.5-5.0 cm, dried in shade and stored. The roots are graded into 7 grades.
Yields and economics	Dry tuber yield: 400 kg/ac/2yrs; cost of cultivation: Rs. 20000/ac; dry tuber price: Rs. 300-400/kg; gross profit: Rs. 120000–160000/ac; net profit/ac: Rs. 100000–140000/ac.

Table-8: Cultivation and Economic value of *Coleus forskohlii*

Factor	Details
Common/scientific name, family	Coleus, Paashana bhedi. *Coleus forskohlii* Briq. Syn. *Plectranthus forskohlii/barbatus*. Lamiaceae.
Uses	Tubers are used as marinated food, or pickle. Used for treating cardiovascular diseases, abdominal colic, respiratory disorders, painful urination, insomnia, bronchial asthma, convulsions, glaucoma and for weight management.
Varieties and cultivation	Bhagya. Propagated by stem cuttings. About 80000-100000 plants are required/ha. Terminal cuttings 10-12 cm length are planted in nursery beds. The cuttings will be ready for planting in 30 days. The crop is planted during June-July on well-prepared ridges with a spacing of 60×20-40 cm. The crop should be raised under assured irrigation facilities. Apply 40kg N, 60kg P and 50kg K/ha. The area should be kept free of weeds through manual weeding. Flowers should be nipped to obtain good root and vegetative growth. After 150-175 days the soil is loosened, the tubers dug and separated from the plants, cleaned, cut into pieces and dried.
Yields and economics	Average yield of dry tubers: 625–815 kg/ha (250-325 kg/ac), good yield of dry tubers: 1750-2500 kg/ha (700-1000 kg/ac); cultivation cost: Rs. 30000/ha (Rs. 12000/ac); price of dry tubers: Rs. 100-125/kg; gross profit: Rs. 62500–102000/ha (Rs. 25000-40800/ac); net profit: Rs. 32500-72000/ha (Rs.13000-28800/ac).

CONCLUSION

The Deccan area of India, which consists of eight distinct states, has a large variety of medicinal plants. A number of the states in this region harvest, process, and sell MPs. It is possible to cultivate and exchange multiple additional MPs. We have compiled a list of both currently existing and potentially growing high-demand representatives. Current grown legislators include: This region has a huge possibility to produce a big number of legislators, which is crucial given the rising demand for legislators on a national and international scale.

Competing Interests

The authors declare that there are no competing interests

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