



POTENTIAL SPECIES OF MEDICINAL PLANTS FOR CULTIVATION IN DECCAN REGION

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Abstract- The Deccan or Dakshin (southern) region of India that came into existence some 65-67 million years ago due to volcanic activity encompasses eight Indian states with Western Ghats, Eastern Ghats and Vindhya and Satpura ranges as its western, eastern and northern boundaries. Godavari, Krishna, Cauvery, Tungabhadra, Narmada and Tapti are the major rivers. The region experiences semi-arid to tropical climate with south-west and north-east monsoons as the main rainy seasons. The region is agriculturally rich with agricultural, horticultural, spice and commercial crops under large scale cultivation. The Western (3500 species) and Eastern (>1500 species) Ghats are rich repositories of medicinal plants (MPs). The region is globally known for its sandalwood (*Santalum album L.*, Santalaceae) and red sanders (*Pterocarpus santalinus L.f.*, Fabaceae) reserves. A number of economically important MPs such as senna (*Cassia senna*), winter cherry (*Withania somnifera*), long pepper (*Piper longum*), glory lily (*Gloriosa superba*), basil (*Ocimum sanctum*), carry me seed (*Phyllanthus amarus*), periwinkle (*Catharanthus roseus*), Indian goose berry (*Emblica officinalis*), blue gum (*Eucalyptus globulus*), sweet flag (*Acorus calamus*), aloe (*Aloe vera*), coleus (*Plectranthus forskohlii*), safed musli (*Chlorophytum borvilianum*), itching bean (*Mucuna pruriens/cochinchinensis*), ambrette (*Abelmoschus moschatus*), king of bitters (*Andrographis paniculata*), aromatic ginger (*Kaempferia galanga*), greater galangal (*Alpinia galanga*) etc. are cultivated by the farmers of the region. The region has vast potential to cultivate many more medicinal herbs, shrubs, trees, climbers and creepers on a large scale to cater to the growing local and international demand for MPs.

Keywords- Deccan region, medicinal plant species, cultivation

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Introduction

Medicinal plants (MPs), phyto-chemicals, formulations and products derived from them have gained global economic significance with consumers demanding and preferring products with herbal ingredients in pharmaceuticals, cosmetics, perfumes, fragrances and other products [4,6-9]. The global imports and exports have reached US\$ 2.1 billion each in 2010 with growth rates of over 50% during the period 2005-2010 (UN Comtrade database). India and China are the major exporters of MPs. The market for traditional therapies that use herbal medicines is poised to grow to USD 5 trillion by 2050. Truly 21st century belongs to MPs and its products. India with 16700 flowering plants has 8000 MPs. Nearly half of them are housed in the Deccan region. The Deccan or Dakshin (southern) region that came into existence some 65-67

million years back due to volcanic activity encompasses eight Indian states with different languages (Marathi, Hindi, Urdu, Telugu, Tamil, Kannada, Malayalam) spoken by the people. Western Ghats, Eastern Ghats and Vindhya and Satpura ranges form its western, eastern and northern boundaries. Godavari, Krishna, Cauvery, Tungabhadra, Narmada and Tapti are the major rivers. The first four rivers flow from the west to the east discharging their waters into the Bay of Bengal. Narmada and Tapti flow from the east to the west joining the Arabian Sea. The region experiences semi-arid to tropical climate with south-west and north-east monsoons as the main rainy seasons. The temperatures during summer months of March to June cross 40°C in many parts of the region. The region is agriculturally prosperous with agricultural, horticultural, spice and commercial crops under large scale culti-

vation. The Western (3500 species) and Eastern (>1500 species) Ghats are rich repositories of MPs. The region is globally known for its rich reserves of sandalwood (*Santalum album* L., Santalaceae) and red sanders (*Pterocarpus santalinus* L.f., Fabaceae) that have dwindled in the recent past. The farmers of the region are progressive and are cultivating several MPs [2,3,5]. Many more MPs can be cultivated in this region to supply MPs on a sustainable basis to national and international markets [1].

MPs demand

India regularly exports over 40000-50000 tons of dried herbs and herbal plant parts to the western world (mostly USA, Europe and Japan). In addition, the local industries and rural households consume another 270000-280000 tons. Considering that fresh herbs contain 75% moisture, nearly a million tons of fresh herbs are harvested every year to satisfy the local and export requirements. Fortunately over 45% of the biomass comes from <40 cultivated species, but 37% of the biomass obtained from 77% of the species are harvested from the forests [13], a substantial portion from Western and Eastern Ghats. As a result of over exploitation, habitat loss due to anthropological reasons and climate change, the Western Ghats have been classified as one of the world's 34 biodiversity hot spots that have lost 70% of their original plant wealth. Eastern Ghats are no exception. The initiatives of both the government and non-government institutions to regulate unscientific collections and encourage in situ and ex situ cultivation have yielded encouraging results, but need to be continued and strengthened to protect the biodiversity for posterity. FRLHT (Foundation for Revitalization of Local Health Traditions), Bangalore after a survey has indicated that 178 species are required in quantities of >100 tons/annum [13].

MPs in high demand that are suitable for Deccan region

Species that are in high demand [13] and can be grown in Deccan region are: *Abrus precatorius*, *Acacia catechu*, *Acacia nilotica*, *Acacia sinuata*, *Achyranthes aspera*, *Aegle marmelos*, *Aerva lanata*, *Albizia amara*, *Alstonia scholaris*, *Anogeissus latifolia*, *Asparagus racemosus*, *Bacopa monnieri*, *Baliospermum montanum*, *Boerhavia diffusa*, *Bombax ceiba*, *Boswellia serrata*, *Buchnania lanzan*, *Butea monosperma*, *Cardiospermum halicacabum*, *Careya arborea*, *Cassia absus*, *Cassia fistula*, *Cassia tora*, *Centella asiatica*, *Centratherum anthelminticum*, *Celastrus paniculatus*, *Chlorophytum tuberosum*, *Citrullus colocynthis*, *Clerodendrum phlomides*, *Convolvulus microphyllus*, *Coscinium fenestratum*, *Curculigo orchioides*, *Cyclea peltata*, *Datura metel*, *Decalepis hamiltonii*, *Desmodium gangeticum*, *Eclipta prostrata*, *Embelia tsjerium-cottam*, *Fumaria indica*, *Garcinia indica*, *Gardenia resinifera*, *Gmelina arborea*, *Gymnema sylvestre*, *Hedyotis corymbosa*, *Helicteres isora*, *Hemidesmus indicus*, *Holarrhena pubescens*, *Holoptelea integrifolia*, *Holostemma ada-kodien*, *Hygrophylla schulli*, *Ipomoea mauritiana*, *Ipomoea nil*, *Ixora coccinea*, *Lannea coromandelica*, *Litsea glutinosa*, *Lobelia nicotianaefolia*, *Madhuca indica*, *Merremia tridentata*, *Messua ferrea*, *Mimusops elengi*, *Morinda pubescens*, *Nilgiranthus ciliatu*, *Ocimum americanum*, *Operculina turpethum*, *Oroxylum indicum*, *Peganum harmala*, *Pluchea lanceolata*, *Plumbago zeylanica*, *Premna serratifolia*, *Pseudarthria viscid*, *Psoralea corylifolia*, *Pterocarpus marsupium*, *Pterocarpus santalinus*, *Rauwolfia serpentina*, *Rubia cordifolia*,

Santalum album, *Sapindus mukorossi*, *Saraca asoca*, *Schrebera swietenoides*, *Semecarpus anacardium*, *Shorea robusta*, *Sida rhombifolia*, *Sisymbrium irio*, *Smilax glabra*, *Solanum anguivi*, *Solanum nigrum*, *Solanum virginianum*, *Soymida febrifuga*, *Sphaeranthus indicus*, *Sterculia urens*, *Stereospermum cheilonoides*, *Strychnos nux-vomica*, *Strychnos potatorum*, *Symplocos racemosus*, *Tephrosia purpurea*, *Terminalia arjuna*, *Terminalia bellirica*, *Terminalia chebula*, *Tinospora cordifolia*, *Tragia involucrate*, *Tribulus terrestris*, *Trichosanthes cucumerina*, *Vateria indica*, *Withania coagulens*, *Woodfordia fruticosa*, *Wrightia tinctoria*, *Ziziphus xylocarpus*.

Check List of Points for Cultivation of MPs

Farmers and entrepreneurs who wish to cultivate or start an enterprise based on MPs are advised to carefully consider the following points

- 1) Assess the suitability of the area for cultivation of MPs: Soil and water tests are desirable.
- 2) Collect complete information about the MPs intended for cultivation: Central and State Government organizations/ Departments, cultivating farmers provide the desired information.
- 3) Discuss the proposal with all partners to establish a farming enterprise or for value addition.
- 4) Survey the market and satisfy yourself concerning marketing opportunities and future demand.
- 5) Arrange for funds through self investment, loans, subsidies etc.
- 6) Create irrigation facilities and drying facilities.
- 7) Practice organic farming methods as far as possible and be prepared to obtain organic certification from certified agencies.
- 8) Procure good planting material from authentic sources.
- 9) Plant the crop in the right season and time. Delayed planting reduces yields and quality.
- 10) Ensure periodical supervision of the work force in case of absent landlordism particularly at inputs application (fertilizers/manures, other chemicals) time and when engaging many workers for weeding, harvesting etc.
- 11) Practice organic prophylactic measures to prevent/check pests and diseases.
- 12) Apply inputs (manures, fertilizers, irrigation) at appropriate time.
- 13) Harvest at the right time. Delay in harvesting results in low yields and poor quality of the produce.
- 14) Ensure proper drying of the harvested material before storing.
- 15) Follow recommended methods for packing and storing the dried produce.
- 16) Test the quality of the produce before marketing.
- 17) Market as soon as possible. Improper post-harvest handling and storing reduces shelf-life and quality of the produce.

MPs cultivated in the Deccan region

The following MPs are commercially cultivated in this region: African glory lily (*Gloriosa superba*), aloe (*Aloe vera*), ambrette (*Abelmoschus moschatus*), aromatic ginger (*Kaempferia galanga*), basil (*Ocimum sanctum*), blue gum (*Eucalyptus globulus*), carry me seed (*Phyllanthus amarus*), coleus (*Plectranthus forskohlii*), greater galangal (*Alpinia galanga*), Indian goose berry (*Emblca*

officinalis), itching/velvet bean (*Mucuna pruriens*/ cochinchinensis), king of bitters (*Andrographis paniculata*), long pepper (*Piper longum*), periwinkle (*Catharanthus roseus*), safed musli (*Chlorophytum borvilianum*), senna (*Cassia senna*), sweet flag (*Acorus calamus*), winter cherry (*Withania somnifera*) etc. Many more MPs are grown in home herbal gardens, in joint forest man-

agement schemes, and on small scale [2-5,11,12].

Economic importance of some of the cultivated MPs- The economics and brief cultivation details of some the cultivated species [3,5,11] are presented below:

King of bitters

Table 1- King of bitters

Factor	Details
Common/scientific name, family Uses	King of bitters, Kalmegh, Nela vemu. <i>Andrographis paniculata</i> (Burm. f) Wall. ex Nees. Acanthaceae. 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.

Carry me seed

Table 2- Carry me seed

Factor	Details
Common/scientific name, family Uses	Carry me seed, Bhumyamalaki, Nela usiri. <i>Phyllanthus amarus Schumach. & Thonn.</i> Euphorbiaceae (Phyllanthaceae). Plant is used to treat jaundice, kidney and gall bladder stones, dyspepsia, diarrhea, dysentery, dropsy, diseases of urino-genital system, edema, ulcers, 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 15-25x10-20 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).

Glory lily

Table 3- Glory lily

Factor	Details
Common/scientific name, family Uses	Glory lily, Agni sikha, Potti dumpa, Langali. <i>Gloriosa superba</i> L. Liliaceae. 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 60x45 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: 200–250 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 1 st year; 75000–100000/ac 2 nd year; price of seeds: Rs.1000/kg and tubers: Rs.400/kg

Periwinkle

Table 4- Periwinkle

Factor	Details
Common/scientific name, family Uses	Periwinkle, Sadabahaar, <i>Billa ganneru</i> . <i>Catharanthus roseus</i> (L.) G. Don. Syn. <i>Vinca rosea</i> L. (Purple, white, white with red spot, 6-petalled flowers). Apocynaceae. 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 45x30 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/hoings 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.

Senna

Table 5- Senna

Factor	Details
Common/scientific name, family Uses	Indian Senna, Sona/Suna mukhi. <i>Cassia angustifolia</i> Vahl. Syn. <i>C. senna</i> L. Caesalpinaceae. 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.

Ambrette

Table 6- Ambrette

Factor	Details
Common/scientific name, family Uses	Ambrette, Musk mallow, Muskdana, Kasturi benda. <i>Abelmoschus moschatus</i> Medic. Syn. <i>Hibiscus abelmoschus</i> L. Malvaceae. 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 flavoured 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.

Long pepper

Table 7- Long pepper

Factor	Details
Common/scientific name, family Uses	Long pepper, Pipli, Pippallu. <i>Piper Longum</i> L. Piperaceae. The fruits and roots are used for cough, bronchitis, asthma, muscular pains, inflammation, coma, drowsiness, insomnia, 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 1 st year (November-December). The dry spike yield/ha increases from 400 kg in the 1 st year to about 1000 kg in the 2-3 rd 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.

Coleus

Table 8- Coleus

Factor	Details
Common/scientific name, family Uses	Coleus, Paashana bhedi. <i>Coleus forskohlii</i> Briq. Syn. <i>Plectranthus forskohlii/barbatus</i> . Lamiaceae. 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 of 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).

Conclusions

The Deccan region comprises 8 states of India and is rich in MPs diversity. A number of MPs are cultivated, processed and marketed in different states in this region. Several more MPs can be grown and traded. MPs cultivated and potential MPs with high demand that can be grown have been listed. With increasing national and global demand for MPs, there is excellent scope for cultivating many MPs in this region.

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References

- [1] Janardhan Reddy K. and Rajeswara Rao B.R. (2006) *Frontiers of medicinal plant research- Biotechnology and biodiversity*, 134-139.
- [2] Rajeswara Rao B.R. (1990) *National Workshop on Medicinal, Aromatic Plants and Non-Edible Oil Seeds for Rural Industrialisation*, 1-75.
- [3] Rajeswara Rao B.R. (1999) *Medicinal plants for dry areas. In: Sustainable Alternate Land Use Systems For Drylands*, 139-156.
- [4] Rajeswara Rao B.R. and Rajput D.K. (2010) *National Conference on Conservation of Medicinal Plants-Herbal Products and Their Uses*, 17-20.
- [5] Rajeswara Rao B.R., Rajput D.K., Kothari S.K., Sastry K.P. and Singh C.P. (2006) *National Exhibition and Seminar on Medicinal Plants and Herbal Products*, 1-16.
- [6] Rajeswara Rao B.R., Rajput D.K., Pate R.P., Sastry K.P., Reddy L.P.A., and Ramesh Kumar R. (2008) *National Conference and Exhibition on Herbal and Traditional Therapies*, 41-46.
- [7] Rajeswara Rao B.R., Rajput D.K. and Sastry K.P. (2005) *National Seminar on Biotechnology: Its Applications in Agriculture*, II, 36-42.
- [8] Rajeswara Rao B.R., Sastry K.P. and Rajput D.K. (2004) *Workshop on On-farm and Non-farm Linkages for Employment Generation*, 1-9.
- [9] Rajeswara Rao B.R., Sastry K.P., Rajput D.K., Patel R.P., Ramesh Kumar R. (2008) *National Seminar cum Exhibition on Traditional and Ethnic Foods-Opportunities and Challenges for Industrial Development*, 17-20.
- [10] Rajeswara Rao B.R., Sastry K.P., Ramesh Kumar R., Rajput D.K., Patel R.P. and Reddy L.P.A. (2009) *National Level Seminar on Medicinal and Aromatic Plants and Value Added Products*. 26-36.
- [11] Rajeswara Rao B.R., Singh K., Sastry K.P., Singh C.P., Kothari S.K., Rajput D.K. and Bhattacharya A.K. (2007) *In- Advances in Medicinal Plants*, 112-122.
- [12] Rao M.R. and Rajeswara Rao B.R. (2006) *Tropical Homegardens: A Time Tested Example of Agroforestry*, 205-232.
- [13] Ved D.K. and Goraya G.S. (2008) *Demand and Supply of Medicinal Plants in India*.