

Cultivation of Ayurvedic Herbs to Meet the Domestic Needs of Ayurvedic Pharmaceutical Industry

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ABSTRACT

In the present paper the cultivation of medicinal plants having the greater demand are prioritized. In total 148 plants which are mostly incorporated in both classical as well as ethical formulations have been identified. The medicinal plants which are already being cultivated viz., Yavani, Jeeraka, Hingu, Dhanyaka, Methika, Shunthi, Haridra, Shatpuspha, Dadima, Kushmanda, Soorna, Badara etc. are excluded from this list cultivation of medicinal plants is incomplete without considering the application of manure and pesticides. Keeping this in view some of the aspects of organic farming techniques and herbal pesticides have been discussed.

INTRODUCTION

Indian exports of medicinal plants during the last decade have enormously increased. As most of the herbs being collected from the wild, hundreds of species are now threatened with extinction because of over-harvesting destructive collection techniques, and conversion of habitats to crop based agriculture. Tribals are debriding the forest land for cultivating food grains. The pharmaceutical industries have made massive investments on pharmacological, clinical and chemical researches to develop an useful drug

phytomolecule. The benefits of these efforts would reach to the masses in future, if farmers initiate commercial cultivation of medicinal plants. India is blessed with varieties of aromatic and medicinal plants. More than 7,500 species of medicinal plants are grown in India now and more than 4,000 pharmaceutical companies are processing herbal formulation by utilizing them. The treasure of medicinal plants is exhaustible if over used and sustainable if used with care and wisdom. The forest area which is the major source of herbs is steadily shrinking due to the vast deforestation while demand for herbs is increasing steeply. Looking at the prevailing situation the ministry of environment and forest has already banned 29 endangered species of medicinal plants from their natural habitat [1].

In view of globalization of Ayurveda and indigenous medicinal plants sector, the policy makers should give top priority for strengthening the supply of genuine herbal material to the Indian pharmaceutical

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industry before giving emphasis for export requirements. According to the opinion of herbal drug industry experts, hundreds of medicinal plants are at the risk of extinction, threatening the discovery of future cures of diseases. Keeping in view the necessity of Indian pharmaceutical industry which is processing the classical as well as ethical herbal products an attempt is made to identify the medicinal plants which are essential and having a good demand in crude drug market for the purpose of cultivation and conservation [2]. In recent times scientists have carried out research enquiries with certain Ayurvedic herbs for evaluating their efficacy in the management refractory conditions like Arthritis, Liver diseases, Renal calculi etc. The Indian pharmaceutical industry is evincing keen interest to promote their ethical formulations for these conditions which has lead to create a greater market demand for Ayurvedic herbs.

List

Psycho-nervous diseases [3] (Anxiety neurosis, Depression, Dementia)

1. Mandukaparni -*Centella asiatica*
2. Yastimadhu -*Glycyrrhiza glabra*
3. Vacha -*Acorus calamus*
4. Shankhapushpi -*Convolvulus pluricaulis*
5. Jatamansi -*Nordostachys jatamansi*
6. Jyotishmati -*Celastrus paniculatus*
7. Brahmi -*Bacopa monnieri*
8. Tagar -*Valeriana wallichii*

Respiratory disorders (Asthma, C.O.P.D.)

9. Bharangi -*Clerodendrum serratum*
10. Shati -*Hedychium spicatum*
11. Pushkarmoola -*Inula racemosa*
12. Devadaru -*Cedrus deodara*
13. Aguru -*Aquilaria agallocha*
14. Kataphala -*Myrica nagi*
15. Talispatra -*Abies webbiana*
16. Vasa -*Adathoda vasica*

17. Apamarga -*Achyranthes aspera*
18. Tulasi -*Ocimum sanctum*
19. Pippali -*Piper longum*
20. Kustha -*Saussurea lappa*
21. Shunthi -*Zingiber officinale*
22. Maricha -*Piper nigrum*
23. Twak -*Cinnamomum zeylanicum*
24. Tamala -*Cinnamomum tamala*
25. Ela -*Elattaria cardamomum*
26. Nagakeshar -*Mesua ferrea*
27. Shrishha -*Albizia lebeck*
28. Duralabha -*Alhagi camelorum*

Cardio vascular disorders (Hypertension, Ischemic Heart diseases, Dyslipidaemias)

29. Arjuna -*Terminalia arjuna*
30. Gugglu -*Balsamodendron mukul*
31. Sarpagandha -*Rauwolfia serpentina*

Liver disorders (viral hepatitis, cirrhosis of liver)

32. Bhumyamalaki -*Phyllanthus urinaria*
33. Katukarohini -*Picrorhiza kurroa*
34. Kakamachi -*Solanum nigrum*
35. Kalmegh -*Andrographis paniculata*
36. Sharpunkha -*Tephrosia purpurea*
37. Kumari -*Aloe barbadensis*

Gastro-intestinal disorders (Peptic ulcer, I.B.S., Amoebic colitis)

38. Kutaja -*Holarrhena antidysentrica*
39. Chitraka -*Plumbago zeylanica*
40. Ativisha -*Aconitum heterophyllum*
41. Madanphala -*Randia dumetorum*
42. Trivritta -*Operculina turpethum*
43. Danti -*Baliospermum montanum*
44. Markandika -*Cassia angustifolia*
45. Babbula -*Acacia arabica*
46. Shatpuspha -*Antheum sowa*
47. Shalmali -*Bombax ceiba*

48. Aravagdha –*Cassia fistula* **Urolithiasis (Kidney stone & B.P.H.)**
 49. Kuberaksha –*Caesalpinia crista* 83. Pashanbheda –*Bergenia lingulata*
 50. Musta –*Cyperus rotundus* 84. Varuna – *Creteva religiosa*
 51. Putika –*Mentha piperata* 85. Kusha –*Desmostachya bipinnata*
 52. Ashwagola –*Plantago ovata* 86. Kasha –*Saccharum spontaneum*
 53. Jayapal –*Croton tiglium* 87. Nala –*Arundo donax*
 54. Chavya –*Piper chaba* 88. Darbha -
 55. Beejapura –*Citrus medica* 89. Kandikshu-*Saccharum officinarum*
 56. Patha –*Cissampelos pariera* 90. Parnayavani –*Carum copticum*
 57. Amlavata –*Garcinia pedunculata*
 58. Dhataki –*Woodifordia fruticosa*

Aphrodisiacs

59. Shatavari –*Asparagus racemosus*
 60. Varahikanda –*Dioscorea bulbifera*
 61. Vidarikanda –*Pueraria tuberosa*
 62. Kapikacchu –*Mucuna prurita*
 63. Ashwagandha –*Withania somnifera*
 64. Musali –*Asparagus adscentdens*
 65. Ikshuraka –*Astercantha longifolia*
 66. Bala –*Sida cordifolia*
 67. Atibala –*Abutilon indicum*
 68. Nagabala –*Grewia hirsuta*
 69. Aakarkarbha –*Anacyclus pyrethrum*
 70. Jatiphala –*Myristica frgrans*
 71. Eranda root –*Ricinus communis*
 72. Mudgaparni –*Phaseolus trilobus*
 73. Mashaparni – *Teramnus labialis*

Female disorders

74. Ashoka –*Saraca asoka*
 75. Bola – *Commiphora myrrha*
 76. Vata – *Ficus bengalensis*
 77. Udumbara-*Ficus racemosa*
 78. Plaksha – *Ficus lacor*
 79. Parisha – *Thespesia populnea*
 80. Aswatha –*Ficus religiosa*
 81. Lodhra –*Symplocos racemosa*
 82. Mundi –*Spheranthus indicus*

Antihelminthic agents

91. Palasa –*Butea monosperma*
 92. Vidanga –*Embelia ribes*
 93. Parasikayavani –*Hyoscymus niger*

Galactogogue

94. Jivanti –*Leptadenia reticulata*

Musculo-skeletal disorders (Anti - inflammatory, arthritis)

95. Rasna –*Pluchea lanceolata*
 96. Nirgundi –*Vitex negundo*
 97. Kulanjana- *Alpinia galanga*
 98. Asthisaharaka –*Cissus quadrangularis*
 99. Parijata- *Nyctanthes arbortristis*
 100. Sallaki –*Boswellia serrata*

Anti-diabetic agents

101. Bijaka –*Pterocarpus marsupium*
 102. Kataka –*Strychnos potatorum*
 103. Patraka – *Cinnamomum tamala*
 104. Meshashrunji –*Gymnema sylvestre*
 Skin and hair care herbs
 105. Kanchanara – *Bauhinia purpuria*
 106. Sariva – *Hemidesmus indicus*
 107. Daruharidra –*Berberia aristata*
 108. Kirattikta – *Swertia chirata*
 109. Bakuchi –*Psoralia corylifolia*
 110. Kumari –*Aloe barbadensis*

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| 111. Saptaparna - <i>Alstonia scholaris</i> | 144. Karveera- <i>Nerium indicum</i> |
| 112. Neem - <i>Azadirachta indica</i> | 145. Kupilu- <i>Strychnos nux-vomica</i> |
| 113. Karanja - <i>Pongamia pinnata</i> | 146. Arka- <i>Calotropis gigantea</i> |
| 114. Patola - <i>Tricosanthes dioica</i> | 147. Snuhi- <i>Euphorbia nerifolia</i> |
| 115. Khadira - <i>Acacia catechu</i> | 148. Gunja- <i>Abrus precatorius</i> |
| 116. Bhallataka - <i>Semicarpua anacardium</i> | |
| 117. Chakramard - <i>Cassia tora</i> | |
| 118. Manjistha - <i>Rubia cordifolia</i> | |
| 119. Chandana - <i>Santalum album</i> | |
| 120. Raktachandana - <i>Pterocarpus santalinus</i> | |
| 121. Bhringraja - <i>Eclipta alba</i> | |
| 122. Ushira - <i>Vetiveria zizanioides</i> | |
| 123. Jati - <i>Jasminum grandifloram</i> | |
| 124. Priyangu - <i>Callicarpa macrophylla</i> | |
| 125. Kankola - <i>Piper cubeba</i> | |

Antioxidants⁴

126. Guduchi -*Tinospora cordifolia*
 127. Haritaki -*Terminalia chebula*
 128. Amalaka -*Embelia officinale*
 129. Vibhitaka - *Terminalia bellerica*
 130. Punarnava -*Boerhaavia diffusa*

Dashamoola

131. Patala -*Sterospermum suaveolens*
 132. Agnimantha -*Premna mucronata*
 133. Shyonaka -*Oroxylum indicum*
 134. Bilva -*Aegle marmelous*
 135. Kashmarya -*Gmelina arborea*
 136. Kantakarika -*Solanum surattense*
 137. Bruhati -*Solanum indicum*
 138. Shalaparni -*Desmodium gangeticum*
 139. Prishanaparni -*Uraria picta*
 140. Gokshura -*Tribulus terrestris*

Poisonous plants

141. Vastanabha- *Aconitum ferox*
 142. Dhatura-*Datura metel*
 143. Langali-*Gloriosa superba*

CONCLUSIONS

1. An attempt is made to prioritize certain herbs which are having the greater demand in the current Ayurvedic pharmaceutical industry. In total 148 herbs which are mostly incorporated in both classical as well as ethical formulations have been identified. The medicinal plants which are already being cultivated viz., Yavani, Jeeraka, Hingu, Dhanyaka, Methika, Shunthi, Haridra, Shatpuspha, Dadima, Kushmanda, Soorna, Badara etc. are excluded from this list.

2. The cultivation of medicinal plants will not be successful without using pesticides and manure.

A. The current pest control technology relies heavily on chemical pesticide. For a proper implementation of cultivation techniques herbal pesticide and organic manure are highly essential. Some of the drugs included in the list are reported to possess significant pesticidal property viz Neem, Garlic, Aloe, Ponagamia, Nirgundi, Custard apple, Poison nut etc.

B. Cow's urine must be mixed with every phytopesticidal formulation as it is reported have to pesticidal property.

C. Herbal pesticides:

Herbs are being used as biopesticides in the current cultivation practices various types of biopesticide include biochemical (Pheronomons), microbial (Bacteris, fungi etc) and botanicals (Herbs). Among biopesticide botanicals (weeds) like Lantana, Tulasi, Vasa (Adathoda) can be used which act as natural repellent to many pests. Farmers in their traditional wisdom have identified and used a variety of plant products and extracts for pest control, especially in storage. As many as 2,121 plants species are reported to possess

pest management properties, 1,005 species of plants exhibiting insecticidal properties, 384 with antifeedant properties, 297 with repellent properties, 27 with attractant properties and 31 with growth inhibiting properties have been identified. The most commonly used botanicals are neem (*Azadirachta indica*), pongamia (*Pongamia glabra*) and manhua (*Madhuca indica*). Neem seed kernel extract (2% to 5%) has been found effective against several pests including rice cutworm, diamond backmoth, rice brown plant hopper, rice green leafhopper, tobacco caterpillar, several species of aphids and mites. Mahua seed kernel extract (5%) is effective against sawfly (*Athalia leugens proxima*) and others. The efficacy of vegetable oils in preventing infestation of stored product pests such as bruchids (*Callosorbuchus spp.*), rice and maize weevils (*Sitophilus spp.*) has been well documented. Root extract of Tagetes or Asparagus works as nematicide for plant parasitic nematodes. Similarly, leaf extracts of many higher plants can inhibit a number of fungal pathogens. A number of plants like *Chenopodium*, *Bougainvillea* etc. have also been reported to be sources of antiviral principle.

D. In the cultivated fields Mustard plant (Sarahapa) must be grown to reduce heavy metal contents i.e. lead among cultivated herbs.

3. Organic farming should be adopted to reduce residual pesticide content and to facilitate the growth of the plant in the natural condition. Organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and control insects, weeds and other pests.

4. Kunaphajala mentioned in Vrikshaayurveda prepared from goats meats, sesame (Tila), blackgram(Masha) and cow's milk should be sprayed during vegetative stage for a better yield. This preparation acts as a growth regulator. Kunapjala should be applied near irrigation channel so as to mix with water [5].

5. Traditional agricultural practices must be adopted during cultivation.

6. In situ and ex-situ conversation should be given the top priority for endangered, severely threatened species.

7. Use of green house for nursery production of medicinal plants should be started.

8. Collection of the herbs: drugs become capable of producing maximum therapeutic effects when their potency is augmented by *desha-sampat* (collecting the plants from the appropriate habitat), *kala-sampat* (collecting these plants in the appropriate season), *guna-sampat* (collecting plants when these are enriched with excellent attributes) and *bhajana-sampat* (storing these plants in appropriate containers) [6]. Acharya Sushruta advocates to collect the drugs possessing cold potency during cold seasons (Varsha, Shishira and Hemant) and drugs of hot potency during hot seasons (Sharad, Vasant and Grishma) [7].

9. The period of collection influences the quantity of active principles. A study has been conducted at I.P.G.T. and R.A., G.A.U., Jamnagar, with regard to taste threshold and phytochemical constituents of Parijata collected during various seasons and the observations recorded are as follows [8],

- Seasonal variations in physical dimensions, moisture contents of fresh leaves are noticeable. The taste of drug confirmed the classical dictum as tikta pradhan kashayam anurasa. Noteworthy taste threshold variations observed highest at November month.

- The seasonal variations in loss on drying, ash analysis, volatile oil analysis, extractive values and their spectral analysis, TLC studies are all worthy of notice.

- Study reveals the chemical compound are higher in quality and quantity in November sample followed by January sample and least in March samples.

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