



### DEVELOPMENT OF HERB BASED PHARMACEUTICAL INDUSTRY IN UTTARAKHAND STATE

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#### ABSTRACT

Uttarakhand has been known as a place for best medicinal plants since ancient times as referred in original Ayurvedic classics i.e. Charaka Samhita (1000 BCE). In recent years the pharmaceutical industries have realized its potential medicinal flora because of diversified agro climatic zone as well as less environmental pollution as 63% of the land belongs to forest. Thus the state has immense potential area to cater the demand to produce best Ayurvedic products nutraceuticals, cosmoceuticals and Agro-chemical based industrial products. Herb based Pharmaceutical industry is having great potential and opportunities for development in future because of acetate demand of the medicinal plants & their value added products are well accepted in Domestic & International Market as Ayurvedic, Unani and Siddha, Homoeopathic medicines, Herbal Nutraceuticals, Herbal Cosmoceutical, Herbal Health drinks, Dietary Health Supplements, Medicinal Plants / Crude Drugs, Herbal Extracts / Concentrates, Veterinary Medicines, Health Foods. Various issues & challenges of Herbal Pharmaceutical Industries in Uttarakhand need proper attention of policy makers in favour of small industries. If, the challenges & issues related to development of Herbal sector in Uttarakhand is addressed the State could be the capital of Herbs in India.

**KEYWORDS:** Uttarakhand, Herbal pharmaceutical industries, AYUSH, medicinal plants.

#### INTRODUCTION

Uttarakhand has been known as a place for best medicinal plants since ancient times as referred in original Ayurvedic classics i.e. Charaka Samhita (1000 BCE). In recent years the pharmaceutical industries have realized its potential medicinal flora because of diversified agro climatic zone as well as less environmental pollution as 63% of the land belongs to forest. Thus Uttarakhand is becoming mother hub for development of Ayurveda & other natural herbs based health science (AYUSH). The Business opportunities in Uttarakhand for Herb based pharmaceuticals are enormous due to diversified use of Herbs in pharmaceutical, Nutraceuticals, Cosmoceutical and Agro-chemical industries. Herb based Pharmaceutical industry is having great potential and opportunities for development in future. Mainly the medicinal

plants & their value added products are well accepted in Domestic & International Market as Ayurvedic, Unani, Siddha and Homoeopathic medicines. Apart from that Herbal Health drinks, Dietary Health Supplements, Medicinal Plants / Crude Drugs, Herbal Extracts / Concentrates, Veterinary Medicines, Health Foods, AYUSH Health Care Management, Ayurvedic Panchakarma Centre, Health SPA are the other areas of interest in the state<sup>[1]</sup>.

#### Uttarakhand: Socio-Economic Snapshot

Uttarakhand<sup>[2,3]</sup> was formed on the 9th November 2000 as the 27th State of India, when it was carved out of northern area of Uttar Pradesh. Located at the foothills of the Himalayan mountain ranges, it is largely a hilly State, having international boundaries with China (Tibet) in the north and Nepal in the east. On its north-west

lies Himachal Pradesh, while on the south is Uttar Pradesh. It is a mountainous state in north India having 13 districts. It has an area of 55483 km<sup>2</sup>, out of which about 63 % is the forest (Forest area 34650 km<sup>2</sup>) and about 12.50 % is cultivated land. Uttarakhand state is having Population about more than 10.1 million and state Growth rate [5] approx. 11.3. It is rich in natural resources especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks. Char-dhams- the four most sacred and revered Hindu temples of Badrinath, Kedarnath, Gangotri and Yamunotri are nestled in the mighty mountains. It's truly considered as God's Land (Dev Bhoomi) and Dehradun is the Capital of Uttarakhand. It is one of the most beautiful resorts in the sub mountain tracts of India, known for its scenic surroundings. The town lies in the Doon Valley, on the watershed of the Ganga and Yamuna rivers. Uttarakhand Government since its inception has projected itself as a herbal state in recognizing its inherited rich biodiversity and ethnic herbal traditions. It is blessed with a rare bio-diversity, inter-alia, 175 rare species of aromatic & medicinal plants. It has almost all major climatic zones, making it amenable to a variety of commercial opportunities in horticulture, floriculture and agriculture. It has a vast tourism potential in adventure, leisure, and eco-tourism.

### **Uttarakhand to be a Model Ayush State**

Uttarakhand has great potential to develop as Model AYUSH State. The Government of Uttarakhand has undertaken several policy measures and incentives in order to encourage inflow of investment into the various sectors of its economy. Here authors have found following plus point for setup Ayush Infrastructure or herbal industry because of Good policy environment, Pro-active state government and efficient administrative system, Secure industrial environment, Established industrial estates like Pantanagar, Dehradun, Haridwar, Selaqui and Sitarganj with all necessary infrastructural facilities, Good Electric supply due to huge potential for hydropower generation as a result of vast water resources, Development of good transportation infrastructure is Continuously going on, Attractive Govt. policy & govt. incentives on Herbal Industry, Widespread opportunities in sectors like Herbal Pharmaceuticals Industries, Varied topographic and climatic conditions, High Medicinal & Aromatic diversity, Presence of rare medicinal herbs, with over 175 species found in the state is

an added advantage for the success of herbal-based industries., Presence of key Herbal industrial players like Himalya, Dabur, Emami, IMPCL, Patanjali Ay. Limited, Ban, Gurukul, Deltas Pharma, Deshrakshaka Aushdhalaya, Maheshwari Pharma etc along with Good private and public sector efforts.[5]

### **Status of Herbal Pharmaceutical Sector in Uttarakhand**

Uttarakhand state<sup>[2,3]</sup> is endowed with an enormously rich flora including medicinal and aromatic plant (MAPs) more than 175. The State is rich in mineral deposits like limestone, marble, rock phosphate, dolomite, magnesite, copper, gypsum, etc. The number of small scale industries is 25,294 providing employment to 63,599 persons. As many as 1802 heavy and medium industries with an investment of Rs 20,000 crore employing 5 lakh persons. Most of the industries are forest-based. There is a total of 54,047 handicraft Khadi udhyog/Gram Udhog Units- 8592. SSIs- 400493. Factories- 27392. units in the state. The State has 542 Ayurvedic Hospitals/dispensaries 5 Unani Hospitals/dispensaries-107. Homoeopathic Hospitals/ dispensaries for serving people through ASU & homoeopathy drugs. These hospitals/dispensaries also important source of consumption of herbal medicines in uttrakhand. Uttarakhand has emerged as a significant destination for investments in manufacturing industry, tourism and infrastructure. Emphasis is on stimulating all three sectors of its economy (agriculture, industry and services), to their fullest potential in tandem with the geographic profile of the state. Uttarakhand has great infrastructure & opportunity for development of Herbal Pharmaceutical Industry. State having approx. 226 Licensed Ayurvedic & Unani pharmaceutical units in 2015[6]. The No. of Herbs species specified for Uttarakhand- >175, No. of species used by Pharmacies [7] are (approximately)- >300. The annual demand up to 2008[8] was (approximately)- 7500 MT. The cost of raw material up to 2007 was (approx.) - Rs 64.15 Cr, Annual demand up to 2008 (approx.) - 7500 MT, Expected annual Demand by 2010-11 (approx.)- 10,000 MT.

### **AYUSH: SWOT Analysis**

Authors have endeavored SWOT analysis of existing infrastructure of Ayush stream<sup>[4,5,6]</sup>. The strength of India has unique distinction of possessing large varieties of medicinal plant, knowledge associated with them and good network of infrastructure required for their

promotion, propagation with its 15 Agro-climatic zones and 16 Forest types, India is home to 7% of the world's biodiversity making it one of 17 mega biodiversity rich countries in the world. India system of medicines use various raw materials, of which medicinal plants constitute 90% of raw drug material. About 3000 plants species are reported to be used in the codified Indian systems of medicines, like Ayurveda (900 species), Siddha (800 Species), Unani (700 species), and Amchi (300 species). 960 species of medicinal plant have been recorded in trade and 178 are traded in high volumes in quantities exceeding 199 metric Tons (MT) per year. Indian system of medicines have age old acceptance in the communities in India. And know Ayurveda, Yoga & Naturopathy, Unani, Siddha and Sowa Rigpa are recognized system of traditional medicines in India. Ayush infrastructure is rich with 725000 registered Ayush practitioners, 501 Ayush colleges (Ayurveda-261, Unani-41, Sidhha-09, homoeopathy-190), 5 research councils (CCRAS, CCRUM, CCH etc.), 8 national institute (one for each system), 2 North Eastern Institute, for education, research and clinical studies., Pharmacopoeia commission (PCIM&H), 2 Pharmacopoeial Laboratory (PLIM, HPL), All India Institute of Ayurveda (AIIA), Traditional knowledge digital Library (TKDL) and a public sector undertaking i.e. IMPCI) for manufacturing of pure & authentic Ayurveda and Unani Medicines etc. International cooperation initiatives like signing MoUs, establishment of academic chairs and Ayush Information cell in the foreign countries have created further global opportunities of collaboration and institutional linkage. Ayush systems were given special impetus with establishment of National Medicinal plant Board (NMPB) for large scale cultivation and conservation of medicinal plant. Till Jan 2013 the NMPB has supported resource augmentation in 28094.46 hectares, and in-situ conservation in 12,727 hectare in forest areas. Support for cultivation of medicinal plants in 1,62,184,5791 hectares of land has been provided to the farmers. 8896 licensed drug manufacturing units (in which 99.6 % are Private unit like Dabur India, Sri Baidyanath, Himalaya Drug Company, Emami, Patanjali Ayurved, Multani pharmaceuticals, Sandu, Charak pharmaceuticals, Zandu Pharmaceuticals, Hamdard, SBL, Bakson Shri Dhootpapeshwar, Aryavaidhyashala, Ozone group, deltas Pharmaceuticals, Ban Labs, Unjhan, Swadeshi, Jyoti herbals, Nagarjuna, Amil pharma, Wheezal, Recweg, WSI, Adven, HSL, Rex pharma etc which together account for approximately 85

% of India domestic market and about 39 ( 0.4 %) are Govt. sector pharmacies i.e. IMPCL, TAMPCOL, Oushadhi, CDF, MFPPARC, State pharmacy etc. ). Ayush ministry has given special attention for maintaining drug quality, emphasis has been laid down on drug regulation and developing and ensuring compliance of pharmacopoeial standards. Till Jan 2013 the API has covered 588 single monographs and 151 compound formulation, whereas UPI covered 298 single drugs and 100 compound formulation. SPI part I covering 139 monographs on single drugs covering 125 medicinal plants have been published. 9 volume of HPI have been published with total 944 monographs of homoeopathic drug have been approved by Homoeopathic Pharmacopoeia committee. One homoeopathic pharmaceutical codex comprising 101 homeopathic drug has also been published. Ministry of AYUSH also published Ayurvedic Formulary (Vol- I, II, III 636 Formulation), Unani Formulary (745 Formulation) Siddha Formulary (248 Formulation), Essential drug List (EDL) {Ayurveda-277 Unani -288 Homoeopathy -257, sidhha-302}. Manual for Inspectors-procedural guild lines for Inspection of ASU DTL, Guidelines for Inspection of GMP compliance by ASU drug Industry and Good clinical practice guidelines for clinical trials of ASU drugs. Now Government Drug testing laboratories (27) and AYUSH Approved Drug Testing Laboratory (39) is working for of Delivering good quality drug as per pharmacopoeial standards.

#### **HPI : Weakness**

Author found following weakness after detail survey of various stakeholder of Ayush stream as almost small players have very limited open market share due to lack of strong marketing team which cost very high, up to date Infrastructure / state of the art machinery, automation in process, Technical manpower, Process and Product standardization & Validation, Poor F & D initiatives for process & product development, Limitation in standards of raw material and finished product, Service oriented motto rather than business oriented approach which makes product adulterated/spurious. It needs implementation of GMP, Ayush mark, QCI, GLP, GPP, GAP, GCP, Organic certification etc. on ground levels.

#### **Opportunities**

The following areas have been visualized as opportunities [5 to 10] after details survey of various stakeholder of Ayush stream as Herbal Pharmaceutical industry having great potential and opportunities for development in future.

Total Global Market<sup>13</sup> of herbal product (Natural Products) is estimated approx. 62 billion US\$. The Compounded annual growth of Pharmaceutical industry is estimated as 17.8%. Assumption By 2050 herbal market is expected to reach US \$ 5 trillion.<sup>18</sup> Worth of Domestic market of Ayurvedic, Siddha, Unani and Homeopathy Medicines is estimated by approx. Rs. 1000-12000 Crore (Classical Ethical product (P&P) OTC Herbal Cosmetic). Of which Classical AYUSH medicines market is estimated to be about 500-100 Crore. Ayurvedic Medico tourism market is estimated by ASSOCHAM is >800 crore. According to the information compiled by Pharmexil the "India's total export value of herbals was 2437.377 USD Million" and "total import value of herbals was 175 USD Million"

### Possible business opportunities in Uttarakhand State

Authors have found following possible business opportunities from various herbal sector after detail survey of various stakeholder of Ayush stream eg. 1. Industrial/Pharmaceuticals (Herbal drug /health care industries using natural materials/medicinal plants (AYUSH Product). 2. Herbal Cosmoceutical (Herbal product for personal care & cosmetic purpose). 3. Health Food & Nutraceuticals (Dietary health supplements & Nutraceuticals with curative properties. 4. Herbal Health Drinks (Natural plants based juice, herbal tea, syrup). 5. Aromaceuticals & Aroma therapy (Essential oil, distillation of Aromatic plants). 6. Intermediate Drugs (Bulk semi processed material for drug manufactures). 7. Veterinary Products (Plants derived herbal medicines for veterinary uses). 8. Crude drug (Cultivation & marketing of crude drug which is commonly used in Herbal Industries). 9. Others (Honey processing, Gomutra, Shilajit, etc.). 10. Export Business (Export of Organic Medicinal plant & drugs). 11. Medico-tourism (Ayurveda, Yoga, Panchakarma centers & naturopathy Education & Rejuvenating Center/ Spa). 12. Traditional Healthcare (Traditional healthcare practices (AYUSH)

### Global Demand Trend

Mainly following Herbal Medicinal Plants & their Value Added Products will be well accepted in Domestic & International Market as Medicinal Plants / Crude Drugs, Herbal Extracts/ Concentrates, Herbal Medicines, Ayurvedic Medicines, Nutraceuticals / Cosmoceutical, Dietary Supplements, Health and Functional Foods. A trend towards herbal product for following indication/use found very high demand globally eg- 1. Anti-Arthritic & Joint Pain

Management. 2. Lifestyle disease .eg. (DM, Obesity, dyslipidemia etc), 3. Rasayan (Rejuvenative drugs), 4. Aphrodisiac, 5. Anti tumor drug, 6. antioxidant drugs, 7. anti allergic drugs, 8. Anti addiction drug, 9. Herbal Nutraceutical, 10. Immuno-modulator, 11. Sports Medicines, 12. Herbal Cosmoceuticals, 13. Spa needed products, 14. Personal care product range (Cream, Lotion, Gel etc.). 15. Natural Health drink/Juice

### Why herbal product more popular globally?

There may be several positive causes of global popularities & acceptance of herbs based pharmaceuticals, Nutraceuticals, Cosmoceutical. e.g. 1. Easy accessibility & approach for Ayurvedic drug mostly time tested for their efficacy. 2. Cost effective and affordable. 3. Most of ISM drugs of Herbal origin are safe to use. "Assume to be no side effect". 4. Increasing awareness about AYUSH systems due to it emphasize on Prevention of Diseases & Promotion of Health as it Considered Body, Mind and Soul as one unit & Ayush Healthcare also provided complete Disease management. 5. Increasing public awareness for adverse effects of synthetic drugs

### Threats

Author found following threats after detailed survey of various stakeholder of Ayush stream as 1. Raw drug unavailability in proportion of demand, 2. increasing number of endangered medicinal plants, 3. Commercialization (High cost of product), 4. Drug Adulteration, 5. Skilled technical traditional Ayush professional with scientific background. 6. Statutory regulation, 7. Poor R & D activities etc. 8. Lack of standards. 9. Lack of Scientific documentation, 10. Lack of validation and 11. Influence of Pharma majors, which are possible threats may create hardship for herbal industries in future.

### Selected Species of Medicinal Plants for cultivation in Uttarakhand State

38 Medicinal and Aromatic Plants (MAPs) selected by State medicinal plant board of Uttarakhand for cultivation in Uttarakhand<sup>[11]</sup> which are as follows- 1. Atees (*Aconitum hetrophyllum* Wall.) 2. Kutki (*Picrorhiza kurrooa* Royle ex Benth.) 3. Kuth (*Saussurea lappa* C.B. Clarke) 4. Jatamansi (*Nardostachys jatamansi* DC.) 5. Chirayata (*Swertia chirata* Karst.) 6. Van kakari (*Podophyllum hexandrum* Royle) 7. Pharad (*Allium stracheyi* Baker) 8. Kala jeerak (*Carum carvi* Linn.) 9. Guladaudi (*Chrysanthemum cinerariifolium*) 10. Tagar (*Valeriana wallichii* DC.) 11. Manjistha (*Rubia cordifolia* Linn.) 12. Badi Ela (*Amomum subulatum* Roxb.) 13. Patthar

chur (*Coleus barbatus* Willd.) Briq.) 14. Rosemary (*Rosmarinus officinalis* Linn.) 15. Geranium (*Pelargonium graveolens*). 16. Sarpagandha (*Rauvolfia serpentina* Benth.) 17. Kalihari (*Gloriosa superba* Linn.) 18. Satavari (*Asparagus racemosus* Willd.) 19. Lemon grass (*Cymbopogon flaxuosus* D.C.). 20. Chamomyle (*Matricaria chamomilla* Linn.). 21. Milk thistle (*Silybum marianum* Gaertn.). 22. Stevia (*Stevia rebaudiana* Bertoni). 23. Pippali (*Piper longum* Linn.). 24. Brahmi (*Bacopa monnieri* Linn.). 25. Atrilal (*Ammi majus* Linn.). 26. Hridpatri (*Digitalis lanata* Ehrh.). 27. Tejpatta (*Cinnamomum tamala* Nees & Eberm.). 28. Chura (*Madhuca butyracea* Roxb.). 29. Haritaki (*Terminalia chebula* Retz.). 30. Bahera (*Terminalia bellerica* Roxb.). 31. Amalaki (*Emblica officinalis* Gaertn.). 32. Chhipi (*Pleurospermum angelicoides* DC). 33. Chorak (*Angelica officinalis* Hoffm.). 34. Reetha (*Sapindus mukurossii* Gaertn.). 35. Gulab (*Rosa centifolia* Linn.). 36. Mint (*Mentha arvensis* Linn.). 37. Jangli ajwayan (*Thymus serpyllum* Linn.). 38. Lavender (*Lavandula officinalis* Linn.).

Some other plants may also be proposed to grow and cultivate in Uttarakhand<sup>[12]</sup>, which have been in a huge demand in Ayurvedic drug manufacturing industry e.g. 1. Patala (*Sterospermum Suaveolence* DC), 2. Syonak (*Oroxylum indicum* Vent.), 3. Kanchanar (*Bauhinia variegata* Linn.). 4. Bilva (*Aegle marmelos* Corr.). 5. Agnimanth (*Premna integrifolia* Linn.). 6. Gambhari (*Gmelina arborea* Linn.) 7. Daruharidra (*Berberis aristata* DC) 8. Jeevanti (*Leptadenia reticulata* W. & A.) 9. Snuhi (*Euphorbia neriifolia* Linn.) 10. Kapikachhu (*Mucuna prurita* Hook.) 11. Trivrita (*Operculina turpethum* Silva Manso) 12. Jayapala (*Croton tiglium* Linn.) 13. Sharpunkha (*Tephrosia purpurea* Linn.), 14. Arjun (*Terminalia arjuna* W. & A.), 15. Ashok (*Saraca indica* Roxb.) 16. Varun (*Crataeva nurvala* Buch.-Ham.), 17. Akarkara (*Anacyclus pyrethrum* D.C.). 18. Talisha patra (*Abies webbiana* Lindl.), 19. Sthauneyak (*Taxus baccata* Linn.), 20. Tulsi (*Ocimum Sanctum* Linn.), 21. Hingu (*Ferula narthex* Boiss.), 22. Chandan (*Santalum album* Linn.), 23. Bala (*Sida cordifolia* Linn.), 24. Brihati (*Solanum indicum* Linn.), 25. Kantakari (*Solanum surattense* Burm.f.), 26. Tumburu (*Zanthoxylum alatum* Roxb.), 27. Pushkarmula (*Inula racemosa* Hook. F) 28. Vatsanabha (*Aconitum ferox* Wall.) 29. Pashana bheda (*Bergenia ligulata* Engl.), 30. Asthishrinkhala (*Cissus quadrangularis* Linn.), 31. Shallaki (*Boswellia serrata* Roxb.), 32. Jyotishmati (*Celastrus panniculatus* Willd.), 33. Vanafsha (*Viola odorata* Linn.),

34. Kartakshringi (*Pistacia integerrima* Steud ex Brandis), 35. Bharangi (*Clerodendrum serratum* Spreng.), 36. Bakuchi (*Psoralea corylifolia* Linn.), 37. Lodhra (*Symplocos racemosa* Roxb.), 38. Kesara (*Crocus sativus* Linn.), 39. Nagakesara (*Mesua ferrea* Linn.), 40. Chharila (*Parmelia perlata* Ach.), 41. Musta (*Cyperus rotundus* Linn.), 42. Priyangu (*Callicarpa macrophylla* Vahl), 43. Shalparni (*Desmodium gangeticum* DC), 44. Prishanaparni (*Uraria picta* Desv.), 45. Vasa (*Adhatoda vasica* Nees), 46. Chitrak (*Plumago zeylanica* Linn.) 47. Nirgundi (*Vitex negundo* Linn.), 48. Haldi (*Curcuma longa* Linn.), 49. Kalmegh (*Andrographis paniculata* Burm f.), 50. Vacha (*Acorus calamus* Linn.), 51. Safed Musali (*Asparagus adscendens* Roxb.), 52. Kali Musali (*Curculigo orchoides* Gaertn), 53. Kapoor Kachari (*Hedychium spicatum* Ham. ex Smith), 54. Ghritkumari (*Aloe Vera* Tournefort ex Linn.), 55. Punarnava (*Boerhaavia diffusa* Linn.), 56. Latakaranja (*Caesalpinia crista* Linn.) 57. Bala (*Sida cordifolia* Linn.), 58. Atibala (*Abutilon indicum* (Linn.) Sweet), 59. Sanaya (*Cassia angustifolia* Vahl), 60. Mandukaparni (*Centella asiatica* (Linn.) Urban), 61. Kampillaka (*Mallotus philippinensis* Muell.-Arg.), 62. Patha (*Cissampelos pareira* Linn.), 63. Bijapur (*Citrus medica* Linn.), 64. Sringika visa (*Aconitum chasmanthum* Staph) 65. Patisha (*Aconitum palmatum* D. Don) 66. Ratanjota (*Alkanna tinctoria* Tauscher) 67. Jambutrina (*Allium stracheyi* Baker), 68. Saptaparni (*Alstonia scholaris* R. Br.), 69. Gandhanakuli (*Aristolochia indica* Linn.) 70. Sahachar (*Barleria prionitis* Linn.) 71. Sinduri (*Bixa orellana* Linn.) 72. Varahikanda (*Dioscorea bulbifera* Linn.) 73. Murva (*Marsdenia tenacissima* Wight & Arn.) 74. Bhringaraja (*Eclipta alba* (Linn.) Hassk.), 75. Anantamula (*Hemidesmus indicus* R.Br.) 76. Vanapatola (*Trichosenthes cucumerina* Linn.), 77. Guduchi (*Tinospora cordifolia* (Willd) Miers ex Hook. f. & Thoms.) etc.

### New futuristic initiatives for the development of AYUSH stream in India taken by Ministry of AYUSH<sup>12</sup>

Various solid steps have been taken by Ministry of AYUSH, Govt. of India in last decade for mainstreaming, Ayush system of medicines in India. Ministry has also taken new futuristic initiatives for the growth of herbal sector in India viz., 1. Various AYUSH promoting schemes. 2. AYUSH –Ayurvedic Pharmacopoeia Commission. 2. Golden Triangle Projects [G.T.P] to validate Ayurvedic Products. 3. Standardization of Ayurvedic Education, Publication of minimum Standards of Education. 4. Support to Ayush Drugs Industries. 5. Ayush Cluster, 6. More Focus

on Collaborative Research in Ayurveda. 7. Initiative for Global promotion of Ayurveda. 8. Continuation of TKDL Project to safe guard patents (IPR). 9. Establishment of AIIA (All India Institute of Ayurveda, New Delhi), CRISM (Centre for research in Indian System of Medicines, University of Mississippi), IIM, Jammu, Ayurgenomics project are a few of the areas.

### Various working & coordinating dept/institute/agencies for the development herbal sector

There are several Dept./ Institute/ NGO/ agencies are working together for the growth & development of Herbals sector in Uttrakhand/India. eg. 1. AYUSH Dept., Govt. of India. 2 AYUSH Dept Govt. of Uttarakhand. (Ay. & Unani Services, Homoeopathy). 3. Dept. of Horticulture/Agriculture. 4. NMPB, Govt. of India, SMPB, Govt. of Uttarakhand. 5. Herbal Research and Development Institute (HRDI). 6. Centre for Aromatic Plants(CAP). 7. Dept. of Industry, Govt. of Uttarakhand. 8. Bhasaj Vikas Ikai/ District Bhasaj Sangh, Govt. of Uttarakhand. 9. Department of Forest /Forest Development Corporation, Govt. of Uttarakhand. 10. KMVN/ GMVN, Govt. of Uttarakhand. 11. GB Pant. University, Pantnagar. 12. Uttaranchal Environment protection & Pollution control Board. 13. Central ASU drug control cell, Govt. of India. 14. CCRAS, CCRUM, CCH, CCYN, CSIR, ICMR, DST, IIM- Govt. of India. 15. IMPCL (Indian medicines pharmaceutical corporation Limited, mohan), PCIM & H (Pharmacopoeial Commission of Indian Medicines & Homeopathy), PLIM (Pharmacopoeial Laboratory of Indian Medicines) & Homeopathy), HPL (Homeopathy Pharmacopoeial Laborator), Minsitry of Ayush, Govt. of India. 16. Dept of fire Control/Excise/Income Tax. 17. AYUSH Promoting NGO's- eg BASAV, GTZ, GREEN etc.

### CONCLUSION

In view of the cited facts it is obvious that

- The global interest in traditional medicine of India is increasing with the result of that herb based single and compound formulations market is growing very fast.
- The international and national ministries/organization/institutions have emphasized on quality products for safe use by the consumers. Therefore, mandatory regulations for authentic use of herb under legal provisions of respective countries have been imposed.
- The synthetic drug for health care is going to be minimized and medicinal plant based

natural products as health care, nutraceuticals, functional food substances, cosmochemicals natural colouring agents having medicinal value are accelerating in India and global market.

- Therefore, it is the high time to work together and facilitate the farmers (medicinal plant cultivars) through by back policy, skilled collection of raw drug substances, conservation and cultivation of highly demanded medicinal plants in uttarakhand state at their habitat.
- Special attention of policy makers is needed in favour of small industries to develop Suitable Infrastructure for Herbal Industry by providing; land availability, road transport, electricity, man power etc. on priority basis to generate a chain to develop various sectors for pharmaceutical industries. At the same time, Geographical conditions should be considered while making policies in favor of Small manufacturers of Uttarakhand state.
- The availability of authentic raw material is now the real challenge for future of Herb based industry. Effective implementation of GAP & Program for Promotion, Conservation and Cultivation of Medicinal plant in Uttarakhand should be taken in priority.
- There should be provision for cold storage facilities for the drugs cultivars and traders under quality programme by Govt. for safe use of Herbal material i.e. fruits of Haritki, Bibhitaka, Amlaki etc. alongwith Quality certification / Testing of Herbs on subsidized basis to facilitate them.
- Development of Herbal Mandi for Crude Herbs should be made in the proximity of each Tahsheel and district headquarters. Each of them may be connected through digital information about the availability of crude drugs with them so that market need may be met.
- Some preference to be given to Uttarakhand based herb based Pharmaceutical Units in drug purchase on Govt. level by reducing VAT duty, Single window system for problems of Local farmers/stock holders, More Subsidy & other facilities.
- Industrial Loan on low interest for Setting up of Herb Industries in Uttarakhand would help to those who are preparing

good quality drugs from generation to generation.

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