

**A REVIEW ON CONVENTIONAL CULTIVATION AND
PROPAGATION OF SOME OF THE THREATENED AND
ENDANGERED WILD MEDICINAL PLANTS HAVING
COMMERCIAL IMPORTANCE**

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ABSTRACT

Medicinal plants throughout the world are becoming increasingly rare, due to an ongoing destruction of natural habitat, over-harvesting of wild species and detrimental changes to the climate and environment. Thus Large numbers of endangered plant species are preserved in private collections and also many project works are taken by the government of India to conserve and preserve such threatened and endangered medicinal plant species. Every year the maintainers of such collections spend a considerable amount of time, effort and money to preserve the status of their collections. Thus an effort is made here to

show the cultivation procedure of different kinds of endangered species which can be cultivated in a commercial basis for the industrial utilization and at the same time their destruction from the wild sources can be prevented in an extensive manner for conservation purpose.

KEY WORDS: over-harvesting, endangered, cultivation, conservation.

INTRODUCTION

Though several countries in the world have a rich heritage of herbal drugs, very few can put claim for their procurement only from cultivated species. It is recently that some of these

drugs have been subjected to systematic cultivation based on modern scientific information.^[1] Consumption of herbal medicine is widespread and increasing. Harvesting from the wild, the main source of raw material is causing loss of genetic diversity and habitat destruction. Domestic cultivation is a variable alternative to genetic and phenotypic variability. Both agronomic and medicinal traits can be improved by conventional plant breeding methods.^[2] The world health organization has estimated that more than 80% of the world's population in developing countries depends primarily on herbal medicine for basic health care needs.^[3] Unfortunately much attention is paid to the beauty, commercial value and rarity of the cultivated specimens. While the increasing availability of cultivated plants is a good thing which hopefully reducing the demand for wild collected material for industrial purpose. cultivated specimens are often not suitable materials for restoration and repopulation projects because of the paucity of genetic diversity within the cultivated plants.^[4] The ongoing initiative on conservation of threatened species medicinal plants/trees is aimed at conservation and sustainable harvesting of wild flora in the high altitude region. Groups of collectors are being brought together and made aware of the need to harvest sustainably. Currently, four high altitude medicinal plants species i.e. *Aconitum heterophyllum* (*Ativisha*) – EN (Endangered), *Picrorhiza kurrooa* (*Katuki*) – EN, *Valeriana wallichii* (*Tagara*) and *Dioscorea deltoidea* (*Shingli-Mingli*) – Negative list, have been raised in the nursery and planting carried out in some sites.^[5]

Three different approaches to conserve and produce medicinal plant species threatened in the wild are being explored.^[5]

1) Sustainable wild harvest

Inculcation of sustainable harvesting practices of wild harvest has obvious advantages of high bio chemical content and low input cost. The Working Plans prepared by the Forest Department has sound basis for closure of an area for 5 years to allow natural regeneration of forest and other non-timber forest produce. In reality, free access of right holders/ non right holder to common property resource and early & destructive harvesting technique to maximize collection in one hand, and on the other, inability of the government to check ruthless extraction has made it very difficult to engage people to adhere to sustainable harvesting practices.

2) In situ conservation

The obvious advantages of in situ production are access to an area where the mentioned species grow naturally, low input costs, understory to existing enclosed area for raising tree species, chemical free produce and scope for engaging communities of nearby villages.

3) Production in private plots

Traditionally high altitude villages have rights over “*kotley*”/*Ghassni* located close to the forest area, are allowed as rights holders to collect grass. These lands until recently were left unattended but some farmers have started cultivating crops that required very little inputs.

From the interaction with farmers and especially herb collectors, it clear that uncertain economic gains from production of medicinal plants is one of the major factor dissuading them from taking up this activity. Also the cost of production and prevailing market rate based on the wild harvest act as a deterrent. Increased use of chemical fertilizers and pesticides in apple/fruit orchards poses yet another challenge to organic production of medicinal plants in farmers’ land.

Improved marketing and market access to farmers for wild collected or organically grown medicinal plants holds a major potential to persuade villagers to take up medicinal plant related activities in a bigger way. Value addition, done locally, would be another possibility, but skill upgradation, assured supply side position and again access to efficient markets for value added products are a constraint. These could be addressed by specific project support.

Cultivation technique of some of the threatened medicinal plants of north east India

1. Cultivation of *Asparagus racemosus*^[6]

Planting

It is propagated by root suckers or seeds. For commercial cultivation, root suckers are preferred over seeds. The soil is prepared well by digging up to 15 cm depth. The field is divided into convenient sized plots and laid out into ridges at 60 cm apart. Well-developed root suckers are planted on the ridges.

Irrigation and Interculture

The field is irrigated immediately after planting. It is continued at 4-6 days interval until a month and thereafter at weekly interval. Frequent weeding is required during its early period of growth. Care should be taken to avoid any damage to growing shoots at the time of

weeding. Totally, about 6-8 hand weeding is needed to keep crop free of weeds. The crop being a climber requires support for its proper growth. For this purpose, 4-6 feet long stakes are used to support the general growth. In large scale plantation, the plants are trailed on brush wood pegged in alternate rows.

2. Cultivation of *Rauvolfia serpentine*^[7]

Propagated by seed, stem cutting and root cuttings. Large amount of humus and good drainage are supposed to be ideal for the cultivation.

Collection: Root of exploitable size is generally collected 3-4 years after planting.

3. Cultivation of *Embelia ribes*^[8]

Propagation Techniques and Cultivation

The ideal time for seed collection is from June to August. Mature seeds of *E. ribes* are purple to black unlike red colored seeds of *E. basaal*. Propagation can be achieved through seed germination and through stem cuttings.

By Seeds: Matured and ripened fruits are packed in polythene covers and placed under the artificial light source for 8 hr/day. The cycle is continued for a period of 4-5 days. Pre sowing treatment of (10 per cent) H₂SO₄ for 10 min + GA₃ (4000 ppm) is the best treatment for *Embelia ribes*. By this method, 40 percent seed germination can be achieved successfully. Sand media are sufficient to achieve the seed germination. Sand bed with at least 9 cm thickness prepared in large tray is sufficient for raising seedlings under nursery conditions. Seeds are sown in a row inside the handmade furrows. Uniform and thin layer of sand should be spread over the seeds. Immediate watering should be done. The trays thus prepared should be placed inside the poly tunnel. Watering should be done when required. Compost/Vermicompost and organic manure are preferred.

Through Stem Cuttings

Pencil sized stem cuttings of 1.0-1.5 cm thickness bearing 3 nodes are planted 3 cm deep in polybags and kept in shade. Cuttings are treated with two types of root regulators such as Indole Butyric Acid (IBA) (200 ppm) and commercial quick root solution before planting. Post-Monsoon season is the best time for collection of stem cuttings. Pretreated stem cuttings are placed in root trainers and transferred to poly chambers. Rooting media is prepared from sand, coir pith and perlite.

Microclimate with ambient condition is created inside the micro-poly chambers. By this method nearly 10 per cent of the stem cuttings sprout immediately. The rooting commences only after 35-40 days and within 3 weeks one or two axillary buds above the leaf scars develop and grow into branches. After the formation of healthy root system, it is ready for transplanting.

4. Cultivation of *Cinnamomum zeylanica*^[9]

Propagation: Cinnamon is commonly propagated through seed, though it can be propagated by cuttings and air layers. Under the West Coast conditions, cinnamon flowers in January and fruits ripen during June-August. The fully ripe fruits are either picked up from the tree or fallen ones are collected from the ground. Seeds are removed from fruits, washed free of pulp and sown without much delay, as the seeds have a low viability. The seeds are sown in sand beds or polythene bags containing a mixture of sand, soil and well - powdered cow dung in a 3:3:1 ratio. The seeds germinate within 10-20 days. Frequent irrigations are required for maintaining adequate moisture level. The seedlings require artificial shading till they become 6 months old.

Planting: Pits of 50 cm are dug at a spacing of 3 x 3 m. They are filled with compost and-topsoil before planting. Cinnamon is planted during June-July to take advantage of monsoon for the establishment of seedlings. One-year-seedlings are planted. In each pit, 5 seedlings can be planted. In some cases, the seeds are directly dibbled in pits that are filled with compost and soil. Partial shade in the initial years is advantageous for healthy and rapid growth of plants.

Table No 1: Comparative study of cultivation parameters.^[10]

Sl no	Sanskrit name	Suitable altitude in mtr	Temp. range in degree celcius	Required rain fall in cms	Desired pH	Propagation method	Duration of crop	Yield in kgs per hectare
1	<i>Vatsanabha</i>	2400-3500	25-35	100-200	4.5	Seeds, root splits	3-4 yrs	1000-1200 kg
2	<i>Daruharidra</i>	2000-3000	15-30	60-70	6-8	Seeds, stem cuttings	2yrs	-
3	<i>Yastimadhu</i>	1200-1500	5-25	50-100	6-8.5	Stolons, tissue culture	3-5 yrs	5000-6000 kg
4	<i>Katuki</i>	1800-2700	25-35	100-200	Neutral	Seeds, rhizome	2yrs	500-600 kg
5	<i>Sarpagandha</i>	1300-1400	10-38	100-200	4	Seeds, roots, stem cutting	3-4 yrs	1000-1200 kg

6	<i>Sweta Musali</i>	1500	25-30	50-75	6.5-7	Seeds, tuber	9months	800-900 kg
7	<i>Kustha</i>	2400-3500	25-30	60-70	6-7	Seeds, root cuttings	3 yrs	2000-3000 kg
8	<i>Shatavari</i>	1500	30-35	50-100	7-8	seeds	2-3 yrs	6000-7000 kg
9	<i>Chandan</i>	600-1100	10-45	80-135	6-7	seeds	30-40 yrs	50 kg per tree
10	<i>Ashoka</i>	600-750	10-30	Upto 100 cm	6-8	seeds	perennial	100 kg per tree
11	<i>Swarnapatri</i>	600-900	30-35	25-40	7-8	seeds	9 months	12000 kg
12	<i>Amalaki</i>	1500-1700	25-30	60-80	6.5-7.5	seeds	perennial	10500-17500 kg
13	<i>Vidanga</i>	900-1700	25-30	50-150	6-8	seeds	2.5 yrs	1500-2000kg
14	<i>Pippali</i>	Sea level to 1000	30-35	200-400cm	6-8	Seeds, suckers	perennial	1000kg fruits, 500kg roots
15	<i>Brahmi</i>	1300-1400	30-40	50-100	6-8	Seeds, plant cuttings	perennial	10000 kg
16	<i>Meshasringi</i>	Upto 600	20-30	50-100	6-8	Seeds, stem cuttings	perennial	-
17	<i>Sankhapuspi</i>	1200-1300	30-35	85-130	5.5-7	seeds	annual	1000-2000 kg
18	<i>Guggulu</i>	600-1100	30-40	10-40	7.5-9	Seeds, stem cuttings	perennial	2000-3000kg
19	<i>Maricha</i>	Sea level to 1200	10-30	200-300cm	6-8	Seeds, vine cuttings	perennial	300-400 kg
20	<i>Aswagandha</i>	Upto 1500	30-35	65-75	7.5-8	seeds	9months	400-500kg

Cultivation techniques as explained in *Vrikshayurveda* text^[11]

- 1) Seeds obtained from fully ripend natural fruits should be sprinkled with milk and dried for 5 days then fumigate with *vidanga* and ghee.
- 2) The seeds sprinkled with milk and placed in paste of ghee, *Tila*, *Brihati* ash and rubbed with cow dung followed by fumigation with *majja* will germinate immediately.
- 3) Seeds sprinkled with milk rubbed with cow dung dried in shade followed by application of honey and *vidanga* paste will germinate without fail.
- 4) According to the experts seeds sprinkled with milk dried well in shade followed by application of paste made from *Brihati*, *Tila*, *Kamalnaala* and *Ghritha*. Such seeds are best for germinating purpose.

- 5) Seeds of *Makand*, *Jambu* and *Panas* should be treated like above when they are in the fresh stage. Seeds of *Kshirika* and *Bakula* should be treated as above and tip of seed is cut and sown slight obliquely.
- 6) Seeds of *Urvaru* kept in pipe like structure made from leaves and sprinkled with *Jaggery* water then kept on land followed by continuous heat by 3 days.
- 7) A suitable seed should be treated like this and protected for good germination and the trees grown from the seeds treated like above will give always flower and fruits.
- 8) Seeds separated from naturally ripened fruits is treated with *Ankola taila* and *Arjuna taila* and sown on the coconut water treated soil will germinate immediately.
- 9) Seeds dipped in *Ankola taila* and *Sukar majja*, then dried, is sown in a fertile soil, moistened with coconut water will germinate immediately.
- 10) Seeds treated with *Shlesmataka taila* for 100 times is sown in soil and moistened with coconut water will germinate very early.
- 11) Pomegranate seeds if treated with blood of hen several times and dried in sun then sown and moistened with water followed by fumigation with *nara mamsa* and *majja* will give fruits very early.
- 12) Seeds are treated with *Ankola taila*, *sishumara* fish, pig and crocodile oil then dried and sown on fertile land, moistened with coconut water. Trees obtained from such seeds will give flower and fruits very early.
- 13) Seeds of *utpala* should be treated with buffalo urine and dry cow dung solution for 7 days, then sown on fertile land and moistened with coconut water then it will take shape of *karavira* plant.
- 14) Seeds should be procured from a fruit without any blemish, fully developed in natural course. It should be dried in shade and then be coated with cow dung for 5 days. It then thoroughly smoked by the fire of *Vidanga* and ghee. This procedure is followed for all the trees.
- 15) In case of trees having a milky sap: Seeds should be soaked in cow's milk for 10 continuous nights. After drying in shade this milk is mixed with milk of tigress and ass, obtained by burning barley and wheat. Seeds should then be coated with cow dung before sowing.

SUMMARY AND CONCLUSION

Medicinal plants are in a state of vulnerability since last decade due to its over exploitation and unscientific harvesting for commercialization purpose in pharmaceutical industries.

Hence there need to be increase in awareness to invent some new ideas and techniques to conserve such endangered and threatened species which can be environmental friendly and helpful to the farmers cultivating such plants for their earning. The cultivation of such plants must carried out which are most valuable and effective in herbal medicine and pharmaceutical industries.

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