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CULTIVATION AND PROPAGATION TRAILS OF THREATENED COMMERICIAL MEDICINAL FOREST PLANTS OF BUNDELKHAND

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ABSTRACT

There are hundreds of plants whose medicinal value is known only to tribal. Conservation of medicinal plant species requires the preservation and protection of the habitats upon which they depend for growth and reproduction, prevention of the destruction of plant populations and their habitats, maintenance and enhancement of the population level and variability and prevention of collection and commercial exploitation are their key function involved in-situ conservation protective areas are the best alternative ex-situ conservation, like botanical garden, medicinal plant nursery, herbarium are the important ex-situ conservation methods.

KEYWORDS: Cultivation, Propagation, Threatened, Medicinal, Forest

Medicinal and aromatic plants have been use since the beginning of the civilization. There are hundreds of plants whose medicinal value is known only to tribal. The tribal population resides in inaccessible regions of different forest types in the state and have been using a wide range of wild plants for their requirement of medicine, food, spices etc, and they continue to do so. Bundelkhand is one of the major diversity area in the country. The richness of flora in state gives us more responsibility to conserve the present biodiversity in order to use it sustainably for future generations too. Due to various constrains such as biotic pressure on land, demand for plant resources, degrading land etc. the fragile ecosystem can no longer be conserved in-situ. Therefore for conservation of medicinal plants, alternative methods have to be evolved.

In recent years the conservation of medicinal plants gaining proper alternation as their medicinal values are becoming more popular all over the world.

Conservation of medicinal plants species requires the preservation and protection of the habitats upon which they depend for growth and reproduction. Prevention of the destruction of plant populations and their habitats, maintenance and enhancement of the population levels and availability and prevention of collection and commercial exploitation are the key functions involved in *in-situ* conservation. Protected areas are the best alternatives for *ex-situ* conservation, like botanical garden, medicinal plant nurseries and herbarium are the important *ex-situ* conservation methods. For *ex-situ* conservation of medicinal plants the important pre-requisites are to recognize which species are generally threatened with extinction, to acquire sufficient knowledge of their habitat requirements and condition for propagation to be able to satisfy these within the confines of a botanical garden or green house. To bring these plants into effective cultivation in good time. Cultivation of threatened species on formers land is one of the best *ex-situ* conservation strategy. Sobti and Koul (1977), singh et al (1995) and Chauhan and Thakur (1995). The present deterioration condition of medicinal plants in natural forests is very precarious and needs immediate consideration not only for conservation but also for its propagation. In present work, Cultivation trials on some threatened medicinal plants i.e. *Acorus calamus, Gloriosa supurba* were done to ascertain the best technique of cultivation in Indian conditions was conducted on following guidelines suggested by the Badhwar et.al (1965), Nigam et.al(1991), Chatterjee and Lama (1977) and gupta et.al (1993). Many worker are described cultivation and propagation technique of these threatened medicinal plant i.e. Pal et al (1993 and 1995), Sharma and sett (2001) and Pandy et al (2001).

MATERIALS AND METHODS

In present work the cultivation studies includes large-scale production of some vegetatively propagated of some species. The experimental cultivation of such species like *Acorus calamus, Artemisia vulgaris, Costus speciosus, Commiphora mukul, Dioscorea bulbifera* and *Gloriosa superba* were done.

Planting Material

In present work following planting materials were used as propagation material in accordance to the nature of species.

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Acorus calamus – Rhizome, *Artemisia vulgaris* and *Commiphora mukul*- stem cutting, *Costus speciosus* and *Gloriosa superba*- Rhizome, and *Dioscorea bulbifera* – bulb/rhizome. In this present work vegetative structures of above mentioned parts are selected for the large-scale production because the vegetative structure of such species have the capacity for the regeneration and seed germination rate of these species are also much lower than others.

Propagation Methods

Propagation methods of species include following steps:

1. Preparation of cuttings
2. Propagation structures
3. Treatment of cutting with fungicides
4. Treatment of cuttings with growth regulators.

Preparation of Cuttings

Cuttings are made from the vegetative portion of the plant, such as stem modified stem rhizome, tubers and bulbs. In present work two types stem cutting were used i.e. (a) semi-hard wood, soft wood and (b) rhizome and tuber.

Stem Cuttings

These stem cutting are used as a propagation material of *Commiphora mukul* and *Artemisia vulgaris* plant species. The cuttings were made 15 to 20 cm long and the basal cut was made usually just below a node. Soft wood was used in this study these were taken from the soft wood, succulent and new spring growth of plant. This type of cuttings is always made with leaves attached, soft wood cutting 10 to 15 cm long with one or more nodes. The basal cut was usually made below a node the leaves on the lower portion of the cuttings were removed. While those on the upper part were retained.

Rhizome Cutting

Propagation is carried out by cutting the rhizome in to sections making sure that each piece has at least one lateral buds, or "Eye", it is essentially a stem cutting. This general method worked well for the leptomorph rhizome, in which a dormant lateral growing point is present at most nodes. The rhizomes are cut or broken in to piece, and adventitious root and new shoot develop from the nodes. The Rhizome were used for vegetative propagation in *Acorus calamus, Dioscoria bulbifera, Costus speciosus* and *Gloriosa superba*. Cuttings are made from the vegetative portion of the plant, such as rhizome actually it is modified stem and used as a propagated material.

The rhizome of *Acorus calamus* is cut into short pieces of length from 25 to 50 mm long and scattered horizontally over the surface of the soil. *Dioscorea bulbifera, Costus speciosus* and *Gloriosa superba* these species showed vegetative propagation by rhizome but in *Dioscorea bulbifera*. it was found that two types of propagation methods are available i.e. by storage root or by bulbils by the case the storage root or bulbils were sown.

Propagation Structure

In propagation procedure cuttings are some time planted directly in the field but in the present study were planted in pots or poly bags. Clay pots were used for planting of cutting, which were filled with pre planting treated mixture of soil. To provide potting mixture and better textures sand and some organic matter, such as cow dung manure or saw dust or shredded bark are usually added. During the ensuing 24 hours the moisture will tend to become equalized throughout the mixture.

Treatment of Cuttings with Fungicides

Soil may be containing weed seeds nematodes and various fungi and bacteria harmful to plant tissue. It was desirable to treat the soil mixture before can be applied to growth of many soil born fungi like formaldehyde, chloropicrin, dexon (P-dimethylaminobenzemide sodium), pentachloronitrobenzene.

Treatment of Cutting with Growth Regulators

In this process the cutting were treated with IBA,IAA, and NAA growth regulators using different concentration (PPM) applied by dip methods for growth production of plants, Pal and Sharma (1996).

RESULTS AND DISCUSSION

In present work cultivation trails of *Acorus calamus* clearly reveals that the rhizomes of this species are the main propagating organs because seed are not available during study. Result of cultivation trails also suggest that the growth and development of *Acorus calamus* is much better in marshy black soil which is rich in nitrogen and phosphate, for the vegetative production of rhizome in this species. It was realized during study the planning period was late June and desire time to germination10 to 16 days and the germination percentage was found to be 75% Crops are harvested within 3 to 5 month only Tiwari et.al (1998). Result of cultivation studies are presented in Table 1.

The cultivation trail of the *Artemisia vulgaris* has clearly shown that the stem and root and the main propagating material of this species. The growth and development of *Artemisia vulgaris* is much better in black soil where moderate treatment of sowing material was done using different concentration if IBA growth regulator. Planting period of this species was August to September, and desired time for germination was find to be 11 to 22 days. During study germination percentage was found 65%. Completion of Crops was 9 to 10 months and product was whole plant. Todaria and Purohit (1979).

Table 1: Observation on cultivation and treatment of medicinal plant species

Sl. No.	Name of Species	Planting Material	Pre-treatment of sowing material	Soil treatment	Soil type	Planting period	Desired time for germination	% of germination	Period of crop in month	Product
1	*Acorus calamus*	Rhizome	IBA	Nitrogen phosphate	Marshy black soil	Late june	10-16 days	75%	3-4 months	Rhizome
2	*Artemisia vulgaris*	Stem/ root	IBA	Nitrogen phosphate	Black Soil	August-October	18-12 days	65%	9-10 months	Whole Plants
3	*Costus speciosus*	Rhizome	IBA	Biofertiliger	Sandy loam	June-july	10-16 days	80%	5-6 months	Rhizome/ Seed
4	*Dioscorea bulbifera*	Rhizome /bulbils/ seed	NAA	Nitrogen phosphate	Black sandy	May-june	7-9 days	75%	3-5 months	Rhizome/ Bulbs
5	*Commipho ra mukul*	Stem	IBA	Biofertiger	Red &Black Soil	Sept-October	20-25 days	72%	3-5 months	Stem/ Gume
6	*Gloriosa superba*	Seed/ tuber	IBA	Nitrogen phosphate	Black soil	June-july	10-15 days	85%	3-4 months	Tuber/ Seed

Table2: List of plants used in medicine with category based on red data book

Sl. No.	Name of Species	Local Name	Family	Category	Part Use	Diseases
1	*Acorus calamus*	Vacha	Araceae	CR	Root stock	Branchitis,Diarrhoea, Epilepsy.
2	*Artemisia vulgaris*	Nagadona	Composite	CR	Whole Plant	Anathematic and stomachic tonic.
3	*Coatus speciosus*	Kev-kand	Gingiberaceae	DD	Rhizome	Purgative, depurative stimulant, useful in snakes-bite
4	*Dioscorea bulbifera*	Ratalu,yam	Dioscoreaceae	EN	Tuber/ Bulb	Ingredient of chyawanpras, cures gonorrhoea.
5	*Commiphora mukul*	Guggal	Burseraceae	CR	Gum/wood	Sleen diseases, heart diseases.
6	*Gloriosa superba*	Kalihari	Lilliacease	EN	Tuber/seed	Ulcer, poles, gonorrhoea, abortion.

Result based on red data book (1997). "The ministrey of environment and forest, Government of india in its Latter dated 3-4-97", CR = critically endangered, DD = data deficient, EN = endangered

It was realized that during study *Costus speciosus* as mainly propagated by rhizome/seed. The Preparation of *Costus speciosus* have also suggested that the growth and development is much better in sandy to clay cloam texture which is rich in bio-fertilizer and has nearly acidic to neutral pH. The rhizome cutting trail during June and July give above 80% germination because rhizome was a number of buds.Tiwari et al (1998).

Table 1 clearly indicated that *Dioscorea bulbifera* is propagated by seed and also by the rhizome/bulbils. Hence the germination rate of rhizome is much better but the seedling mortality is high in comparison to the germination rate, of seed in which seedling mortality is low. Therefore the best way of vegetative propagation is rhizome/bulbils. The growth of this species is much better in black sandy soil containing more nitrogen and phosphate. The species gave 75% germination during May to June. After 2 to 3 months crops may be obtained.

In present work it has been found that the stem cuttings are the main propagating organs of *Commiphora mukul*. The results on propagation of *Commiphora mukul* have also suggested that the growth of this species is much better in red and black soil which is rich in bio-fertilizer. To increase the germination percentage pre-planting treatment of sowing material was done by different concentration of IBA by dipping method. After 20 to 25 days about 72% germination was obtained. The planting period of this species is in the months of September to October and the period for obtaining the produre is 3 to 5 years,Mishra (1998). Results presented in table 1.

Results of study on propagation of *Gloriosa superba* suggested that the proper growth of this species is much better in black sandy soil, which has rich amount of nitrogen and phosphate. It was also realised during study that the seed and tuber atre the best organs for propagation the species. After the desired the for germination percentage was found to be 85%, which is comparatively better to other selected species. The species is immune to insect or fungal attack. High level of moisture is required for proper growth. Since the plant is leaf climber (tendril) it need supports from other plants, to forest it was observed that the leaf climber attains a total length of 3 to 4 meter.

The crops may be obtained after 2 to 3 months and the main products were seed and tuber. Fasciculated tuberous roots are 'L' shaved and are annual in nature. They are produced by the plants to tide over the unfavorable dry spell of the summer, as they remain dormant after weathering away of the herbaceous shoot. When the favorable season comes i.e. the fall, prior to the dormant parts are activated, a bud is produced (generallu coinciding with Akshay tritiya).

Rhizome growth of Acorus calamus. *Gloriosia superba* and *Costus speciosus* by elongation of the growing point are produced at the terminal end on the lateral branches. Length also increases by growth in lower part of internodes.

CONCLUSION

Therefore an attempt has been made to study the cultivation and vegetative propagation of economic threatened medicinal plant species. Vegetative propagation involves reproduction from vegetative parts of plant and is possible because the vegetative parts of many plants have the capacity for germination.

Vegetative propagation maintains clonal status. Such propagation involves mitosis cell division in which there is application of complete chromosomes system and associated cytoplasm from the parent cell to daughter cell. Consequently plants propagated vegetatively reproduce by means of DNA replication, with all the genetic information of the parent plants.

The conservation assessment of the important threatened plant species has been made which will provide a basis the future management and conservation. To ensure their long term survival, species and habitat, evaluation management plan and its preservation must be given the highest priority.

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