

Nursery techniques and management of medicinal plants

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ABSTRACT

The present study is based on nursery management and nursery techniques for medicinal plants. There are many plant species that are medicinally important for daily life and for the economy, and medicinal professionals demand these plants. The cultivation of such plants will be useful in meeting the requirements of several medicines. Medicinal plants can be considered to include all plant materials such as foliage, root, flower, fruit, and seed, which may be used as such or in the form of their extracts and chemical compounds isolated from them to produce drugs for human and veterinary medicine. The propagation techniques will help the people to raise them in private nurseries and adopt their cultivation on a large scale. The aim of good nursery management is to ensure the availability of planting material of the highest possible quality for new development areas and replanting, thereby reassuring the audience about the quality of the plants. Management of the nursery includes various activities like seed collection, seed treatment, potting the seedlings, manuring, irrigation, plant protection measures, weed control, management of mother plants, staff training for the use of pesticides, plant protection and general safety issues regarding nursery management. Planting of nursery-raised seedlings is a major component of forestation and reforestation programs. Nurseries can be permanent (also known as central or main nursery) or temporary (also known as site nursery or field nursery). Seedlings were grown in root trainers, seed beds, and plastic bags filled with either soil, soil with fertilizer, or compost substrates. After transplanting in the field, treatments with and without fertilizer and herbicide were applied to all nurseries. This paper examines various propagation methods, techniques and nursery management practices in medicinal plants.

Key Words - Seed collection, economical demand, management practices, propagation method. a forestation

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INTRODUCTION

Nursery is one of the components/managed sites that is designed to produce seedlings grown under favourable conditions until they are ready for planting. All nurseries primarily aim to produce and provide sufficient quantities of high-quality seedlings to satisfy the demands of the users. A nursery is defined as an area where plants are raised for eventual planting. It comprises nursery beds, paths, irrigated channels etc. A nursery bed

is defined as a prepared area in a nursery where seed is sown or into which seedlings or cuttings are raised. On the basis of the kind of plants growing in them, nursery beds are classified into seedling beds and transplant beds; seedlings beds are those nursery beds in which seedlings are raised either for transplanting in other beds or for planting out. A nursery which has only seedling beds, i.e. in which seedlings are only raised for transplanting,

is called a seedlings nursery. Transplant beds are those nursery beds in which seedlings raised in seedling beds are transplanted before planting out in the forest. A nursery that has only transplant beds, i.e., one in which seedlings are transplanted in preparation for forest planting, is called a transplant nursery. In India, separate seedling and transplant nurseries are seldom made in the same nursery. Generally, whatever is grown in a nursery for planting out is called nursery stock.

So, nurseries are in great demand for the production of plants, bulbs, rhizomes, suckers and grafts. But in general, good quality and assured planting material at a reasonable price is not available. So, people who have the skill of propagating plants can make paper, plywood, small timber for furniture, juice, jam, and pickle making. Hence, different kinds of nurseries target various end products. Nursery is a prerequisite for meeting the demand for quality seedlings, and nursery management is a potential tool for executing the activity successfully (Krishnan *et al.*, 2014).

MATERIAL AND METHOD

Layout of nursery

No standard blueprint for designing a plant nursery exists. On the contrary, each nursery will have a unique design based on distinct needs, resources, and requirements. Generally, a good nursery should consist of a water tank/pond, water pump/pump house, seed and fertilizer store room, implement shed, germination/mother bed area, potting/container filling area, seedling raising area, worker mess/hall; office room, propagation structures, compost area, etc. A nursery is usually arranged in a series of beds with pathways between them. An open area is needed at one end, where work such as soil sieving and container filling can be done. Usually, a room/shelter is required for staff and the watchman, and where equipment can be securely stored. The layout should be in a way that enables operations to flow logically through the nursery so as to save labour and time. Roads and paths within the nursery should be carefully planned. The nursery facilities should be kept clean. Every effort should be made to control weeds in and around

the nursery, as weeds may host insects and pathogens.

Different Types of Nurseries

Temporary nursery

This type of nursery is established in or near the planting site. Once the seedlings for planting are raised, the nursery becomes part of the planted site. These are sometimes called "flying nurseries." This type of nursery is developed only to fulfil the requirements of the season or a targeted project. The nurseries for the production of seedlings of transplanted vegetables and flower crops are temporary. Likewise, temporary arrangements for growing forest seedlings for planting in a particular area can also be done in a temporary nursery.

Permanent nursery

This type of nursery is placed permanently so as to produce plants continuously. These nurseries have all the permanent features. The permanent nursery has permanent mother plants. The work goes on continuously all year round in this nursery. These can be large or small depending on the objective and the number of seedlings raised annually. Small nurseries contain less than 100,000 seedlings at a time, while large nurseries contain more than this number. In all cases, permanent nurseries must be well-designed, properly sited, and have adequate water supply.

Tools for nursery

Axes, crowbars, wheelbarrows, boxes, plastic buckets, watering cans, wire cutters, digging forks, hammers, nails, hoes, hand pruning knives, budding knives, respiratory masks, sprayers, saws, scissors, secateurs, budding and grafting knives, budding and grafting tape, germination trays, iron pan, spade, forks, etc.

Management of nursery

Nursery plants require due care and attention after having either emerged from the seeds or have been raised from other sources like rootstock or through tissue culture technique. Usually, they are grown in the open field under the protection of Mother Nature, where they should be able to face the local environment. It is the duty and main objective of a

commercial nursery grower to supply the nursery plants with suitable conditions necessary for their development and growth. This is the major work of management in the nursery, which includes all such operations right from the emergence of young plantlets till they are fully grown up or ready for uprooting and transplanting in the main fields.

Seed Pre-sowing Treatments

Pre-sowing treatments are methods applied to overcome seed dormancy to ensure rapid, uniform and timely seed germination that facilitates seedling production. Pre-sowing treatments are applied to seeds immediately before sowing. Most methods require only a few minutes to 24 hours. However, some pre-sowing methods require a few to several days. Appropriate pre-sowing treatment methods depend on the seed's dormancy characteristics. The most common pre-sowing treatment

Methods of pretreatment:

1. Soaking in cool water
2. Soaking in hot water
3. Boiled water treatment
4. Scarification (acid, mechanical, manual) methods
5. Fire or heating methods
6. Soaking in chemicals
7. Alternate wetting and drying

Manure and irrigation

Commonly, a sufficient quantity of nutrients is not available in the soil used for the seedbed. Hence, well rotten F.Y.M / compost and leaf mould are added to the soil. Rooted cuttings, layers or grafted plants till they are transferred to the permanent location require fertilizers. The addition of fertilizers will give healthy and vigorous plants with good root and shoot systems. It is recommended that each nursery bed of 10 X 10m area should be given 300 gm of ammonium sulphate, 500 gm of Single super phosphate, and 100 gm of Muriate of Potash (MOP), also known as potassium chloride (KCl). Irrigation, either in the nursery beds or watering the pots, is an important operation. Hand watering should be done for potted plants, and for beds, low-

pressure irrigation by hose pipe is usually done. Heavy irrigation should be avoided.

The quantity of water required depends on the size of the nursery, the kind of soil, the species, the number of seedlings, and the irrigation method used. More water is needed in arid region nurseries because the sandy soils have a low water-holding capacity. For a nursery of about one-hectare area, the estimated water requirement is about 60,000 l per day during the dry season. To avoid drying of seedlings, a reliable and continuous supply of water should be ensured by the facility of storage of water for at least 3 days' supply

Potting the seedling

Before planting the saplings in the pots, the pots should be filled with the proper potting mixture. Nowadays, different sizes of earthen pots or plastic containers are used for propagation. Loamy soil, sand, and compost can be used in a 1:1:1 proportion to fill the pots. Sprouted cuttings, bulbs, corms, or polythene bag-grown plants can be transferred to earthen pots for further growth. All the necessary precautions are taken before filling the pots and planting the saplings in them.

Measures against heat and cold

The younger seedling is susceptible to strong sun and low temperatures. To protect against strong sun, shading with a timber framework of 1-meter height may be used. Net houses and greenhouse structures can also be used.

Nursery Disease Management

Seedling stress symptoms like damping off, wilt, root rot, rust, and powdery mildew are caused by pathogen infection and result in stunted growth of seedlings. These pathogens may be soil, seed, or airborne in nature. Nurseries established in recently cleaned land hardly invite parasitic organisms. Stunted seedling growth indicates soil fertility loss, excess watering, and dumping of seedlings in shady areas.

Sterilizing the nursery mixture and pre-treating seeds with fungicides can control the disease as a preventive measure. If the disease occurs, the casual pathogen may be identified by the

expression of symptoms, and accordingly, a fungicide may be applied. Table 9 lists the important nursery diseases and their control measures.

Table 1- Important nursery diseases and their control measures

Symptoms	Affected seedling species	Control measures
Wilt, root rot, collar rot	Sisham, neem, casuarinas, Eucalyptus, tomato	Soil drenching with 0.1% carbendazim
Leaf spot	Eucalyptus, pomegranate	Spraying Dithane M 45 or Fytolan 0.2% or Copper oxychloride 0.2%
Leaf rust	Teak, sisham, ber, bhringraj	Spraying 0.2% Zine Spraying 0.2% wettable sulfur
Leaf blight	Neem, Eucalyptus	Spraying Carbendazim 0.2%
Powdery mildew	Teak, Neem, Casuarinas	Spraying 0.2% Dithane z- 78 or Bordeaux mixture 0.1%

Scheduling of Nursery Activities

The successful establishment of quality seedlings depends upon the proper planning and timely execution of activities. Preparing a level nursery activity calendar will facilitate seedling production. The following are important points to remember when planning nursery activities.

Mature pods/fruit must be collected just before they fall, and subsequently, the seeds should be extracted without damage to the seeds. Seed sowing should be carried out early in the morning (7 to 9 a.m.) or evening (3 to 5 p.m.). Planning and Scheduling of Nursery Activities Transplanting, watering, weeding, and shifting operations in the nursery need to be done at fixed intervals. Hardening of vegetative seedlings and dispatching grown-up seedlings should be in proper time. Engaging the skilled and trained labour in nursery activities ensures success.

Water storage for the lean available period and maintenance of the mother plant for the seasonal collection of materials are some important resource management activities. The timely availability of nursery inputs (soil, sand, FYM, bio-fertilizer, chemicals, water, etc.) and their collection in a cheap cost period can reduce seedling production costs.

Some Medicinal Plant Production Technology

Information on the propagation of medicinal plants is available for less than 10%, and production

technology is available only for 1% of the total known plants globally. This trend shows that developing production technology for common medicinal and aromatic plants should be one of the thrust areas for research.

BRAHMI

The Brahmi (*Bacopa monnieri*) plant is used in manufacturing medicines for mental disorders, epilepsy, anxiety, neurosis and insanity. It is a remarkable herb for enhancing memory.

The plants grow faster at high temperatures (33-40°C) and humidity (65-80%) and should be cultivated as summer-rainy season crops. The field should be ploughed thoroughly and made free of weeds. The land should be irrigated a day before planting for the successful establishment of plant cuttings. Plant cuttings about 4-5 cm long, each containing a few leaves, nodes, and roots, are ideal planting materials. These can be obtained by cutting mother plants into small pieces with roots. The cuttings are transplanted in wet soil at a spacing of 40 cm x 40 cm. Flood irrigation is provided immediately after planting. Ideally, the plants should be transplanted in March-June and allowed to grow and proliferate through hot and humid months of monsoon till September, after which harvesting should be done. Irrigation immediately after transplanting is essential for the successful survival of the plants.

LEMON GRASS

Lemon grass (*Cymbopogon schoenanthus* L. Spreng) is used as a stimulant, carminative, antiperiodic, and perfumer, as well as in herbal tea, hair oil, scent, and soap making.

The soil should be well pulverized to form the seedbed, and it should be a raised bed. Leaf mould and farm yard manure are also added to the soil while forming the bed. 15-20 kg of seeds are required to raise seedlings for one hectare. Seeds are sown in lines drawn at 10 cm intervals in the beds and covered with cut grass materials. When the seedlings are about 2 months old or about 12 to 15 cm high, they are ready for transplanting. Lemon grass comes to harvest 90 days after planting, and subsequently, it is harvested at 50-55-day intervals. The grass is cut 10 cm above the ground level, and 5-6 cuttings can be taken in a year, subject to the climatic conditions. Depending upon the soil and climatic conditions, the crop can be retained in like field for 5 to 6 years.

BHRINGRAJ

Bhringraj (*Eclipta prostrata* L.) is a tonic, rejuvenator, hepatoprotective and useful in spleen enlargement, jaundice, skin diseases, asthma, darkening of hair, liver disorders, stomach ailments and preparation of bhringraj hair oil.

It is a hardy crop and can be grown on varied types of soil. Soils with high moisture content are preferred. Red loamy soils rich in organic matter are best for its cultivation. The crop can be propagated through seeds as well as cuttings. To raise the seedlings, seeds are sown in 1 x 3 x 0.15 m nursery beds in rows about 6 cm apart, gently covered with soil and watered using a sprinkler. Seedlings are ready for transplanting when 45-60 days old. Harvesting is done by plucking out the plant from the ground and chopping the root of the plant.

Table 2- Seeds of Medicinal Plant

Botanical name	Hindi name	Month of collection	Avg. No. of seed per kg	Duration of Viability	Price per Kg. in Rs.	Other remarks
<i>Alstina scholaris</i>	Satvan (chatim)	March - April	...	12 months	400.00	Apply after soaking in 12 hr. in water
<i>Phyllanthus emblica</i> N.S 7	Amla N.S 7	Jan -Feb	9000	12months	1500.00	For medicinal purpose
<i>Polygonum plebelum</i>	Putranjeeva	Feb - July	1200	12 Months	100	Use as medicines
<i>Mucana (Big)</i>	Konch (banda)	March - April	800	12 Months	200	Consumed as medicine
<i>Mucana prurieuens (Black)</i>	Konch (kala)	Feb - July	1000	12 Months	150	Use as itching oil
<i>Cinnamomum camphora</i>	Kapoor	May - June	3000	6 Months	400	For medicinal purpose
<i>Strychnex vomica</i>	Kochila	Feb - May	100	12 Months	200	For medicinal purpose
<i>Centra therum</i>	Kalijiri	Feb - April	10000	12 Months	400	Used as T.V medicine
<i>Cymbopigon citratus</i>	Lemmon grass	Jan - July		12 Months	0.8	For medicinal purpose
<i>Pongarniap irnata</i>	Karanj	March - May	200	6 Months	40	For medicinal purpose
<i>Melia azadirach</i>	Baken	March April	1000	12 Months	100	For medicinal purpose
<i>Aegle marmelos</i>	Bel	March - April	1000	12 Months	100	For medicinal purpose
<i>Dolichas biflorus</i>	Hirda	June - July	10000	12 Months	100	Consumed as medicine
<i>Casia fistula</i>	Amaltas	April - May	2000	36 Months	100	For medicinal purpose

CONCLUSION

India has favourable agro-climate conditions for the cultivation of various medicinal and aromatic crops. Medicinal and aromatic plants have an immense potential for providing livelihood support to marginal and small farmers in general and to farm women in particular. Growing medicinal plants and their sustainable use is a need of the hour. For these, proper strategies should be followed. It will be helpful for health security. It is concluded that the aim of good nursery management is to provide material of the highest possible quality for new development areas and replanting. The importance of good nursery practices cannot be over-emphasized. The nursery should be maintained at the highest standard to ensure only healthy, vigorous and uniform plants are planted in the field.

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