

Advanced Propagation Techniques in Spice Crops

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A spice is a seed, fruit, root, bark, or other plant substance primarily used for flavoring, coloring or preserving food. India is the land of Spices, the largest producer, consumer and exporter of the spices in the World. According to the Spice Board of India, sixty three spices are grown in the country. The spices continued to be one of the major foreign exchange earning items which necessitated expansion of area under these crops and hike in production because of its high enrich flavours and colouring agents for food. More than 90% of spices produced in India are used for domestic consumption and the remaining are exported in raw and value added forms. Lack of quality and insufficient planting material is a bottle neck for the productivity of spice crops. Under this context there is a need to develop advanced methods of propagation to meet the requirements of farmers for the planting material is need of the hour.

Conventional V/S modern propagation techniques

Conventional propagation needs a large quantity of planting material which results less sprouting ratio, more incidences of disease and pests and poor root development as well as field establishment. Modern propagation techniques are more advantageous over conventional one. Through

modern propagation techniques production of virus free, disease and insect pest resistant planting material with large quantities within a shorter space of time can be possible. These plants grow faster and more vigorously. Also gives higher yield as compare to conventional methods.

Advanced propagation techniques of spice crops

Black pepper

Black pepper (*Piper nigrum* L.) (Family: Piperaceae) (King of spices/ Black gold) is a perennial vine grown for its berries extensively used as spice and in medicine Black pepper can be propagated by seeds, cuttings, layering, and grafting. Seed propagation often results in genetic variation while other methods of propagation are slow and time consuming. So, there is a need to introduce efficient methods for rapid propagation of black pepper.

Rapid multiplication method

A propagation technique developed in Sri Lanka and modified for adoption in India for quick and easy multiplication of black pepper vines. A trench of 45 cm depth, 30 cm width and of convenient length is made. The trench is filled with rooting medium comprising of forest soil, sand and farm yard manure in 1:1:1 ratio. Split halves of bamboos are fixed at 45° angle by keeping split portion facing upward on a strong support on one side of the trench. The split bamboos are coated with tar or black paint to control the termite infestation. Rooted cuttings are planted in the trench at the rate of one cutting for each bamboo split. The lower portions of the bamboo splits are filled with rooting medium (preferably weathered coir dust-farm yard manure mixture in 1:1 ratio) and the growing vine is tied to the bamboo split in such a way to keep the nodes pressed to the rooting medium. Each single noded cutting with the bunch of

roots intact is cut and planted in polythene bags filled with fumigated potting mixture. Trichoderma @ 1g and VAM @ 100 cc/kg of soil can be added to the potting mixture. The buds start developing in about three weeks and the poly bags can then be removed and kept in shade till main field planting.

Advantages:

- (i)Rapid multiplication rate (1:40)
- (ii)Well developed root system
- (iii)Higher field establishment
- (iv)Vigorous growth as a result of better root system

Vertical column method

A novel method of intensifying quality planting material production has been standardized using vertical columns with soil-less media. The technique involves growing orthotropes on vertical column (2 m height, 0.3 m diameter) made of half an inch plastic coated welded wire mesh. The column is filled with partially decomposed coir pith and vermicompost @ 3:1 ratio fortified with bio-control agent Trichoderma harzianum. Growing the vine on vertical column can be effectively utilized for the production of three types of planting material i.e., single node cuttings, top shoots with lateral branch (use of top shoots for field planting is having advantage of producing fruit bearing branch from the base and start yielding early) and laterals or plagiotropes which can be used for production of bush pepper.

The hi-tech poly house (temperature of 25-28°C and relative humidity 75-80% with intermittent misting) is advisable for the above production system. Eight to ten cuttings can be planted around each vertical column. The cuttings are allowed to trail on the column ensuring that each node comes in contact with the medium. It takes about four to five months for the cuttings to reach the top of the column. At this stage each vine will have

around 20 nodes with few lateral branches (at 12th- 15th node). The top 5-7 nodes with lateral branches can be used as orthotropic shoots for field planting. In four to five months, about 150 single node cuttings, 10 – 15 laterals and 10 top shoots can be produced in this method. Two hundred such columns can be accommodated in a poly house size of 320 m². In a year, three harvesting cycles can be made. These cuttings can be rooted further for field planting using pro-trays.



Rapid multiplication method



Vertical column method

Cardamom

Cardamom (*Elettaria cardamomum* Maton) (Family: Zingiberaceae) (Queen of spices/ Green gold) originated in the Western Ghats of South India. It is one of the most highly priced and exotic spices in the world. The main reason for low cardamom productivity in India is the use of unselected and heterogeneous planting material raised from seed. Planting of propagules multiplied from elite plants could be used to raise cardamom productivity.

Rapid clonal nursery technique

A quick method of proliferation of suckers at IISR under controlled overhead shade to generate more number of planting units as well as high yield in a short time by restoring to HDP in trenches at close spacing.



High yielding plants free from pest and disease, with bold capsules marked and a part of clump uprooted leaving the mother clump in original site for further sucker development. Each planting unit consists of one grown up sucker and growing young shoot which are planted in trenches of 45cm width, 45 cm depth and of any convenient length may be taken across the slope or along the contour at 1.8 m apart which will accommodate 6800 plants/ha. The top 20 cm depth soil is excavated separately and heaped on the upper side of the trench. The lower 25 cm is excavated and heaped on the lower side of the trenches all along the line. The top soil is mixed with equal portions of top soil is mixed with equal proportions of humus rich jungle soil, sand and cattle manure and filled back by leaving a depression of 5 cm at the top to facilitate mulching for retention of soil mixture. Suckers, each consisting of one grown up tiller and a growing young shoot, are placed at a distance of 0.6 m distance in the trenches during March-October. Regular cultural operations are to be followed including high fertilizer dosed 100:50:200 kg NPK/ha in 6 split doses at 60 days interval. Irrigation should be provided atleast twice in a week. On average, 32-42 suckers per planting unit will be produced by 12 months after planting (after one year we get 16-21 planting units from one clump. In an area of 1 ha clonal nursery 1-1.4 lakh planting units can be produced after 12 months.

Turmeric

Turmeric (*Curcuma longa* L.) (Family: Zingiberaceae) (golden spice/ spice of life) is a tropical perennial rhizomatic spice crop. Turmeric is commonly propagated through rhizomes. Hence, large quantity of rhizome is required because of the low efficiency of vegetative propagation. The availability of quality planting material is also low during the cropping season (June - September). In order to overcome these problems, a technology on rapid multiplication of turmeric using single bud rhizome has been standardized at TNAU, Coimbatore. In this portray technique of turmeric, planting material requirement will be reduced; about 25 per cent of planting material requirement can be reduced.



Method of planting in portray

1. Select healthy turmeric rhizomes for seed purpose.
2. Treat the selected rhizomes with mancozeb (0.3%) and quinalphos (0.075%) for 30 min and store in well ventilated place.
3. One month before planting, the seed rhizomes are cut into single buds with small piece of rhizomes weighing 5- 7 g.
4. Fill the pro-trays (98 well) with nursery medium containing partially decomposed coir pith and vermicompost (75:25), enriched

with PGPR/Trichoderma 10g/kg of mixture.

5. Plant the turmeric bud sprouts in pro-trays.

6. Maintain the pro-trays under shade net house (50%).

7. Adopt need based irrigation with rose can or by using suitable sprinklers.

8. Seedlings will be ready within 30-35 days for transplanting

Conclusion

The major bottle neck of the spice production is due to unavailability of quality planting material. Keeping this constraints in mind the traditional methods of propagation in spice crops are following the advance techniques for rapid multiplication like split bamboo method, vertical column method, trench method in cardamom propagation and propagation of turmeric and ginger using single bud rhizomes as advance propagation techniques which has greater scope for multiplication of large quantity of planting material in small area.