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Improved Propagation Techniques in Ginger and Black Pepper

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Ginger (*Zingiber officinale* Rosc.) is a herbaceous perennial and the rhizomes are used as a spice. India is a leading producer of ginger in the world and during 2012-13, the country produced 7.45 lakh tonnes of the spice from an area of 157839 hectares. Ginger is cultivated in most of the states in India. However, states namely Karnataka, Orissa, Assam, Meghalaya, Arunachal Pradesh and Gujarat together contribute 65 per cent to the country's total production. In conventional planting, the seed rhizome size and weight vary from place to place and variety to variety. In general, seed rhizomes are broken into small pieces of 2.5 – 5 cm length, weighing 20-25 g with one or two viable buds are used for planting. The seed rate varies from 1500 to 2500 kg per hectare depending on seed size and spacing.

Though transplanting in ginger is not conventional, it is found profitable. A transplanting technique in ginger by using single bud sprouts (about 5 g) has been standardized to produce good quality planting material with reduced cost. The yield level of ginger transplants is on-par with conventional planting system. The technique involves raising transplants from single sprout seed rhizomes in the pro-tray and planting in the field after 30-40 days. The advantages of this technology are production of healthy planting materials and reduction in seed rhizome quantity and eventually reduced cost on seeds.

Technology

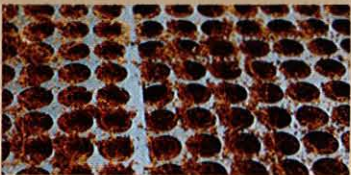
1. Select healthy ginger rhizomes for seed purpose.
2. Treat the selected rhizomes with mancozeb (0.3%) and quinalphos (0.075%) for 30 minutes and store in well ventilated place.
3. One month before planting, the seed rhizomes are cut into single buds with small piece of rhizomes weighing 4-6 g.
4. Treat the single bud sprouts with mancozeb (0.3%) for 30 minutes before planting.
5. 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.
6. Plant the ginger bud sprouts in pro-trays.
7. Maintain the pro-trays under shade net house.
8. Adopt need based irrigation with rose cane or by using suitable sprinklers.
9. Seedlings will be ready within 30-40 days for transplanting.

Advantages

1. Less planting material requirement, 500-750 kg per ha
2. Saving in seed cost
3. 98-100 percent field establishment



Preparation of single bud sprouts



Filling pro-trays with nursery medium



Maintenance of portrays of ginger transplant



Transplant ready ginger plants

4. High cost: benefit ratio

5. Suitable for high production technology

The productivity of ginger is around 20-25 t/ha which depends on several factors predominantly the cultivar in use, prevailing biotic and abiotic stress, and geographical location. However, much higher productivity has been realized in some countries and can be achieved worldwide. Conventional propagation methods of rhizomes being slow due to

a dormancy period, a rapid method of multiplication is needed especially for newly developed high yielding varieties, which are available in small quantities. Production of quality planting material by simple transplanting technology can be capitalized to ensure healthy crop.

Soil-less nursery mixture for black pepper multiplication

Black pepper (*Piper nigrum* L.), the 'King of Spices' is cultivated for its green and dried fruits. It is native to South India, and is extensively cultivated in South India and elsewhere in tropical regions. Currently Vietnam is the world's largest producer and exporter of pepper, producing 34 percent of the world's crop.

Considering its economic importance, area under black pepper is increasing both in traditional and non-traditional areas. But, availability of quality planting material of high yielding varieties is a major production constraint in all black pepper growing countries. The conventional propagation methods have limitations due to low success rate, poor rooting, spread of soil borne pathogens and nematodes, poor survival and growth of transplanted cuttings.

Transportation of cuttings in nursery bags containing conventional potting mixture to distant places is difficult due to its bulky nature. Improvement in the conventional method is essential, and hence there is a need for technology that boosts production of quality planting material.

Technology

Partially composted coir pith and vermicompost (75:25) enriched with *Trichoderma* (in talc formulation, 107 cfu g-1 at the rate of 10 g kg-1) is found to be an ideal potting medium for black pepper nursery for healthy planting material production using plug-trays (cell dimension of 7.5 x 7.5 x 10.0 cm)



Modified serpentine multiplication for initial rooting (45-60) days



Planting of rooted cuttings in plug-trays filled with soil less nursery mixture (45-60 days for establishment)



Hardening (45-60) days



Planting ready black pepper cuttings

compared to conventional multiplication.

1. The plug-tray nursery technique involves initial multiplication of black pepper runners in a modified serpentine method, i.e. by allowing runners to strike roots in the partially decomposed coir pith and vermicompost (75:25) bed of convenient dimension (1.5 m width, 10 cm height and convenient length).

2. The vines trail on rooting medium and strike roots at every node.

3. After 45-60 days, leaving the terminal 5 nodes, about 15-20 node rooted runner is cut into single node rooted cuttings and transferred to plug-trays (cell dimension of 7.5 × 7.5 × 10.0 cm) filled with soil-less nursery mixture [composted coir pith and vermicompost (75:25) enriched with Trichoderma].

4. Better rooting and establishment is recorded under humidity controlled green house (27±2°C) with intermittent mist.

5. The cuttings are retained in the trays for about 45-60 days (4-5 leaf stage) for initial establishment. The established cuttings are then transferred to shade net/naturally ventilated green house for hardening (45-

60 days).

6. Healthy black pepper rooted cuttings are ready for field planting after 120-150 days.

Advantages

1. Ease in transportation, allowing efficient movement of quality plant material throughout black pepper growing regions.

2. The nursery mixture has higher moisture (77-83 percent) content than conventional potting mixtures (22-28 percent). It also has higher organic carbon, available iron, zinc, manganese and copper contents as compared to potting mixture (soil: sand: FYM, 2:1:1).

3. Better nursery (plant and root) growth in coir pith, vermicompost and Trichoderma due to higher moisture retention capacity, better texture, porosity



and nutrient status.

4. Successful vine establishment-starting with healthy planting material

5. Use of Trichoderma and vermicompost enriched coir pith in black pepper nurseries minimizes use of chemical fungicides, as Trichoderma colonizes the root system of cuttings which will help in preventing the infection by pathogens in the main field.

6. Since there is not much additional cost involved, the use of Trichoderma enriched coir pith can also be adopted by commercial nurseries.



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