Sambalpur University

Department of Biotechnology &Bioinformatics

Production of Tissue Culture Banana and Supply to Farmer of Western Odisha

With the financial support of NABARD, Odisha Regional Office the tissue culture facility has been established in the Department of Biotechnology and Bioinformatics, Sambalpur University towards commercial level production of Tissue Culture Banana to supply to the farmers. The facility created is the first of its kind in the Western Odisha. With the current setup we can produce upto 50,000 plants per year. In a single batch about 10,000 plants could be produced. We have also established the Green House and Green Shade Net House facility with controlled environment and humidity for the primary and secondary hardening of the tissue culture plants. The tissue culture banana produced from the Sambalpur University will definitely be beneficial to the farmers, as it will be available with minimum price. Presently we are producing G-9 variety of banana. We also assured to provide hands on training to the farmers for tissue culture banana and its cultivation practices.

Background

Plant tissue culture has become an accepted practice for large scale propagation of many fruit, ornamental, medicinal and aromatic plants on a commercial scale and is creating new avenues for the production of disease-free stocks within shortest periods of time at lower cost and with higher quality. With the financial support of NABARD, the Department of Biotechnology and Bioinformatics, Sambalpur University, has established a sophisticated Plant Tissue Culture. Further, the Sambalpur University has a vision to transfer knowledge from laboratory to farmers and unemployed youth to create self-employment by hands on training .


Working Area

Rationale and objective

Banana is one of the oldest, popular, and important fruit crop in different countries including India. It is generally grown in tropical region. Nearly 15% of total global production of banana is from India only. This plant is well known for its food, medicinal as well as industrial values. Economically, banana possesses fifth rank as agricultural food crop in the global market. Banana plant generally propagated through conventional method by using rhizome or corms, large and small suckers, and sword suckers, which is slow and time consuming process. Therefore, this traditional process of propagation could not produce large number of stocks in a short duration of time to meet the demand of farmers. Cultivation and production of banana through traditional is also hampered by several risk factors like pests and diseases (weevil borers, nematodes, sigatoka complex, fusarium wilt, moko disease as well as viruses) as well as non-uniform fruiting. Moreover, sometimes it becomes difficult to arrange adequate planting material to start a new plantation. These problems can be overcome by propagating banana plants by tissue culture. In addition to uniform fruiting the stocks raised through plant tissue culture produce fruits four months earlier as compared to those from suckers.


Innoculation Chamber

Objectives

•To utilize the sophisticated plant tissue culture laboratory for the commercial level production of banana varieties such as Grand Naine, Champa, Bantala and Robusta and supply of planting materials to the farmers for cultivation towards enhancement of their livelihood.

•To transfer knowledge from laboratory to farmers and unemployed youth to create self-employment by hands-on training programme and by developing practical manual/leaflets/study books, etc.


Culture Room

Different Stages of Banana Tissue Culture


Green House

Selection and collection of planting materials of banana

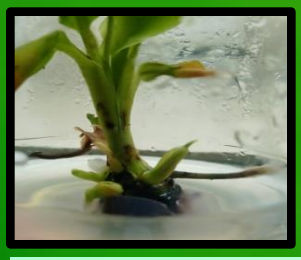
•Select healthy, disease free, 2-3 months old suckers from an elite plant.
•Remove all the roots and top of the plant leaving only 6 inches from the rhizome.
•Wash the plant thoroughly in tap water to remove adhering soil and dirt.
•Remove the outer leaf sheath leaving only 4-6 inner most leaf sheath

Standardization of surface sterilization of explants

•Dip the explants in Tween 20 and Bavistin for 30 minutes and wash repeatedly under distilled water.
•Surface sterilization the explants in 0.1% $HgCl_2$ for 30 minutes.
•Rinse 3-5 times in double distilled water.

Innoculation of Sucker Explant

•Keep sterilized media, forceps, scalpel, petridish, sprit lamp and rectified sprit in the laminar air flow cabinet under UV light for 15 minutes.
•Clean the laminar air flow bench and hands with rectified sprit.
•Cut the surface sterilized explants longitudinally into 4 pieces with the help of scalpel
•Place the rhizome pieces (one in each Bottle) in the initial medium with forceps



Initiation of Shoots

•Stock solution from A to H were taken with Sucrose, with Shooting Hormones.
•Sterilize the media in autoclave at 121 ºC temperature and 15 Pascal pressure for 20 minutes.
•Excised the shoot from the sucker and innoculated in shoot media

Shoot Multiplication

•Separating shoots and culturing them into fresh culture media and again going through the same cycle for another subculture.
•This step repeated for 7 to 8 cycles.

Iniatiation Roots

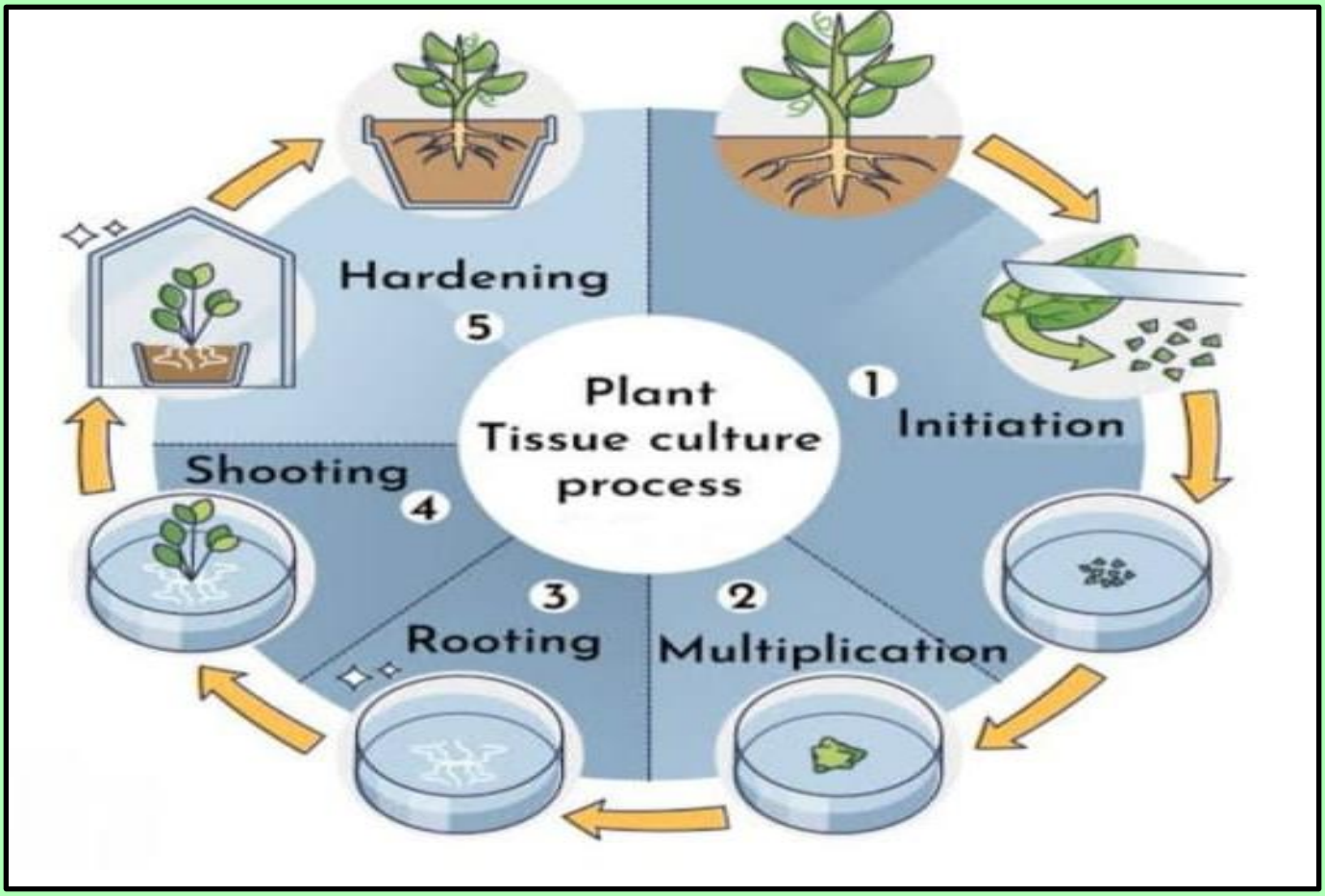
•Stock solution from A to H were taken with Sucrose, with Shooting Hormones.
•Sterilize the media in autoclave at 121 ºC temperature and 15 Pascal pressure for 20 minutes
•The plant with 2 -3 cm length are transfer to rooting media for generation roots.

Hardening at Green house

Plantlets is develop with shoot and root then it is transfer to the primary hardening i.e. Green house. At the controlled environment for Acclimatization of plants. And temperature should be below 30 ºC.

Economical Values

If we cultivated sucker in one acre agriculture land than we can get approx. Rupees 47,000 for the first year and Rupees 42,000 in second year. But if we cultivated tissue culture banana plants instead of traditional methods than cost will be Rupees 10,000 more than traditional cultivation. But in tissue culture banana plant in one acre earning will be approx .Rupees 75,000 in first year and 60,000 in second year.



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