

Advance Technology for Mass Production of Better Planting Material in Banana

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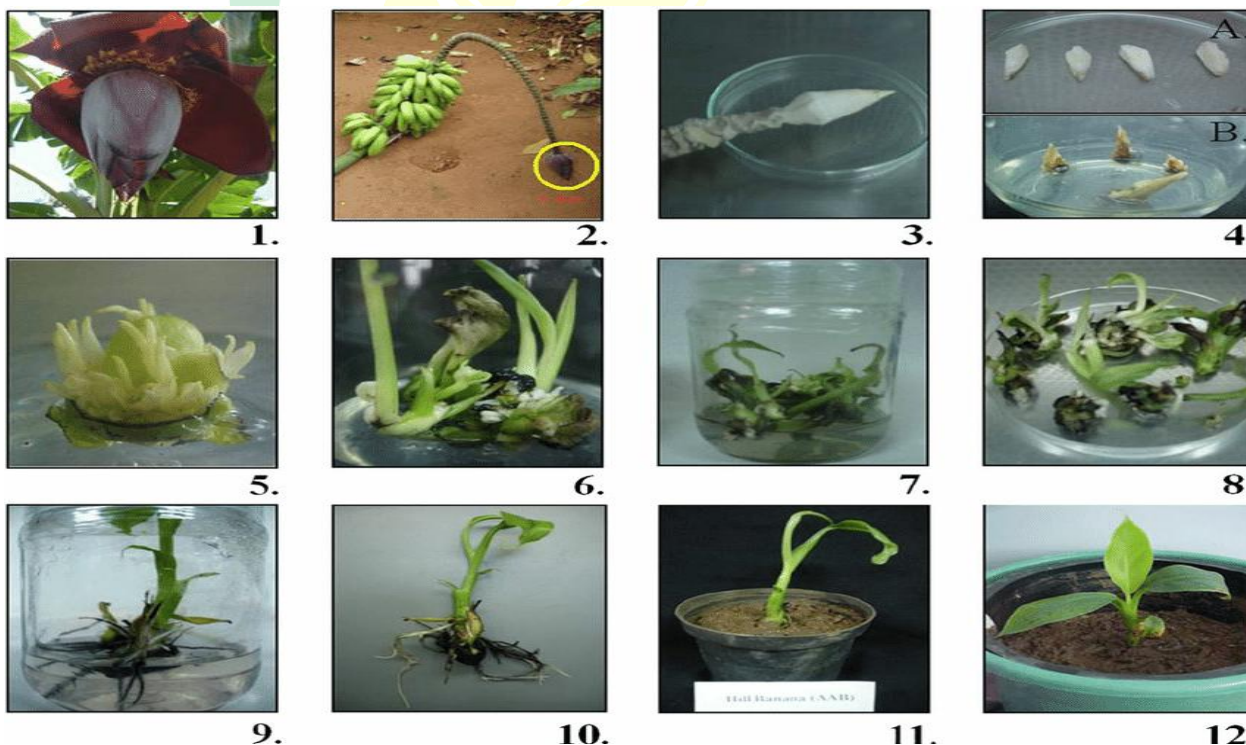
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Introduction

India is the largest producer of banana in the world .it is not possible without the contribution of tissue cultured banana planting material. Present time tissue culture industries produce plantlets from shoot tip explants and distributed throughout the country but poor farmers cannot afford high prices of Shoot tip explants based material. It is necessary to address this issue with possible high-throughput technology to meet the higher demand of quality planting materials in banana.

Micro propagation



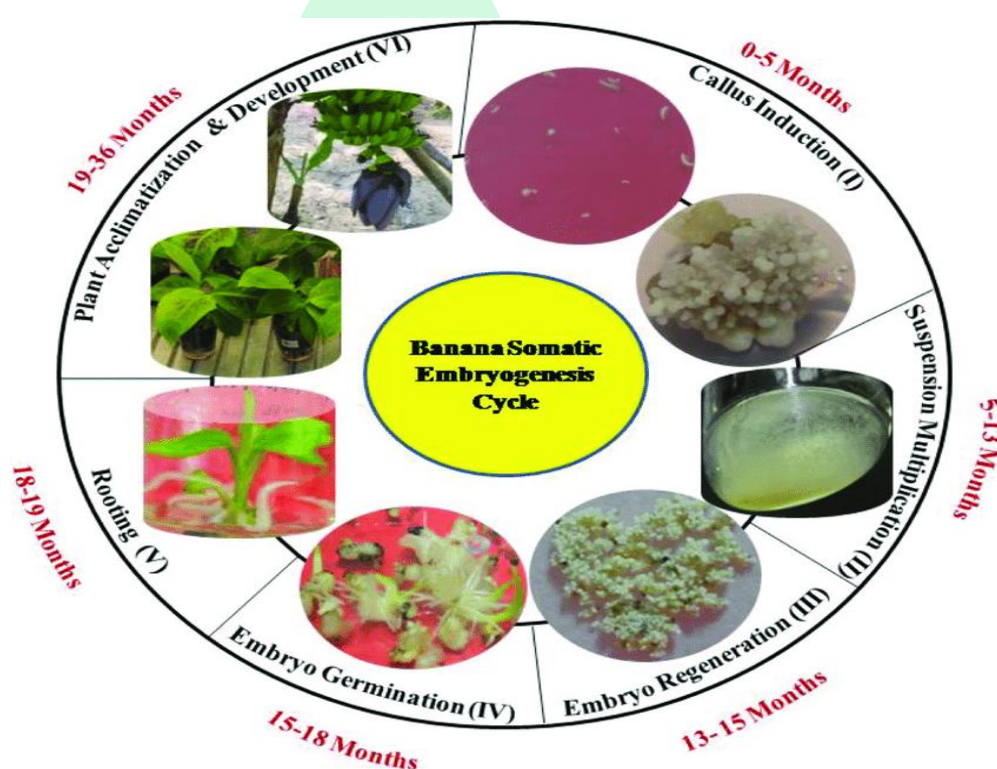
Stages involved in the micro propagation from male floral meristems of banana (*Musa* spp.) cultivar ' Virupakshi ' (AAB).

Micro-propagation

Micro propagation is an artificial method for rapid multiplication of plants in a short duration using the tissue or cell culture techniques in a controlled environment. The method is extensively used to produce genetically identical plants, pathogen-free plants, mass production of plants, gene conservation etc.

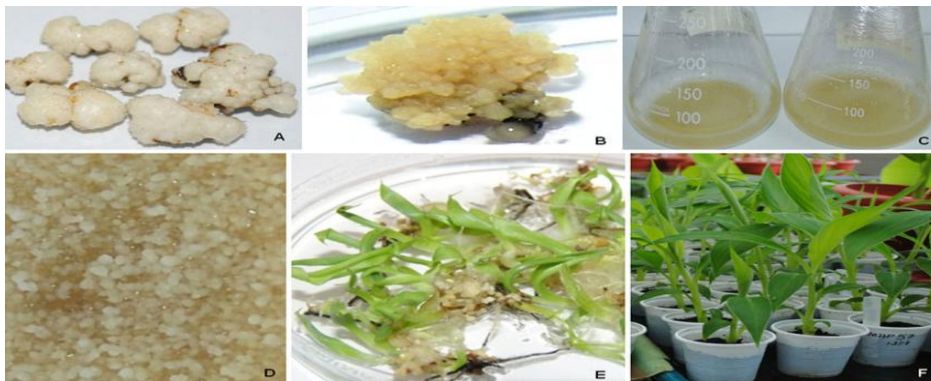
Somatic embryogenesis

Somatic embryogenesis is a process, in which somatic cells differentiate into embryos which eventually develop and regenerate into plants. SE is exploited to generate a large quantity of very high economic value, genetically identical and disease-free plants.



Banana somatic embryogenesis developmental stages. Different developmental stages of banana somatic embryogenesis cycle are following: (I) Callus Induction (0-5 months) (II) Suspension and Multiplication (5-13 months) (III) Embryo Regeneration (13-15 months) (IV) Embryo Germination (15-18 months) (V) Rooting (18-19 months) (VI) Plant Acclimatization and development (19-36 months).

Embryogenic cell suspension – Embryogenic cell suspension is a good source for mass production of plant in short span of time. It is established from pro-embryogenic cell mass by culturing in liquid medium with appropriate conditions.



Stages involve in embryogenic cell suspension

Multiplication of embryogenic cells

Multiplication of embryogenic cells by bioreactors. Five different types of bioreactors -bubble column bioreactor type -1, bubble column bioreactor type-2, bubble column bioreactor type-3, balloon type bioreactor type-1, balloon type bioreactor type-2. Among the five bioreactors balloon type bioreactor type-1 was found for multiplication of ECS of banana.

Regeneration, maturation & Germination of Somatic Embryos - Regeneration of somatic embryos from embryogenic cell suspension. The ratio of cells varies according the presence of nutrients & environment takes place. Once the cells regenerated in large scale the maturation is difficult due to lack of techniques in large scale of maturation technique. Germination of somatic embryo with root & shoot is achieved on media with PGR.

Steps of somatic embryogenesis

1. Cell suspension
2. Multiplication
3. Regeneration
4. Maturation
5. Germination
6. Acclimatization