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Rooted in the right media: The science of behind successful nurseries

A. Thanmai,
Shreedhar Beese,
Shrey Bhodankar,
G. Deevena,
B. Vaishnavi, K. Usha

*School of Agricultural Sciences, Anurag university

*Corresponding Author
A. Thanmai*

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INTRODUCTION

In modern plant nurseries, the quality of planting material decides the future success of crops, orchards, and landscape. Advanced growing enriched media is a special planting material used in nurseries instead of normal soil. It is mixed with cocopeat, vermicompost, bio-inputs like Phosphate Solubilizing Bacteria (PSB), Trichoderma, Pseudomonas, Potassium Solubilizing Bacteria (KSB), Azotobacter, *Beauveria bassiana* (BB). This media helps seeds and seedlings grow faster, healthier and stronger. With the rise of protected cultivation and commercial nurseries enriched growing media have become an essential part of modern nursery management. Adv**A. Thanmai, Dr. Shreedhar Beese, Dr. Shrey Bhodankar, G. Deevena, B. Vaishnavi, K. Usha**

*School of Agricultural Sciences, Anurag universityanced enriched media provides an ideal balance of air, water and nutrients which is essential for early root development. The inclusion of bio-inputs and organic components improves nutrient availability and microbial activity for better germination. It also reduces transplant shock and improves the establishment of plants after shifting to the main field.

OBJECTIVES:

- **Optimal root environment:** Advanced enriched growing media aim to provide a balanced root zone with proper aeration, drainage, and moisture retention. This creates ideal conditions for rapid and healthy root development without waterlogging.
- **Efficient nutrient supply:** The media are designed to supply essential nutrients in readily available forms, ensuring precise nutrient management and reducing losses due to leaching.
- **Water management:** These media improve water-holding capacity while maintaining adequate drainage, allowing efficient use of irrigation water and supporting modern irrigation system such as drip and mist.

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- **Uniform plant growth:** One of the major objectives is to ensure uniform physical and chemical properties, resulting in consistent seedling growth and better performance after transplanting.
- **Disease suppression:** Enriched media are usually sterile treated to reduce soil-borne pathogens, thereby minimizing disease incidence and the need for chemical control.
- **Increased productivity:** By improving root health, nutrient uptake, and environmental control, enriched media help in faster germination, shorter nursery cycles, and higher overall productivity.
- **Sustainability and environmental:** These media reduce dependence on natural soil resources and promote the use of renewable materials, contributing to sustainable nursery practices
- **Adaptability to modern systems:** They are formulated to suit advanced systems such as vertical farming, hydroponics and making them compatible with mechanizes and controlled environment

TRADITIONAL NURSERY MEDIA

Red soil red soil + cocopeat + vermicompost

MODERN NURSERY MEDIA

Soilless enriched media

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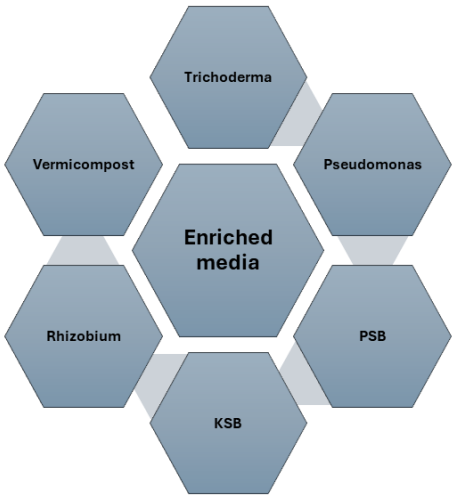
Benefits of modern nursery enriched media

It supplies balanced nutrients which support quick and uniform seedling growth. It has good water holding capacity plants gets enough moisture without waterlogging, the media is well aerated allowing roots to breathe and grow stronger, reducing seedling mortality this media promotes better root development which helps in seedling establishment after transplanting uniform growth of seedlings making nursery management easier.



What is actually enriched media:

Enriched media is a specially prepared nutrient medium used to grow and multiple beneficial microorganisms in large numbers. It contains extra nutrients like carbon sources, minerals, and growth factors so that microbes such as rhizobium, PSB, KSB and other useful bacteria can grow faster and remain active.

Pseudomonas:

It controls fungal and bacterial disease. For seed treatment add 10g/1kg of seeds shade dry for 30 minutes before sowing for root dipping add 20g/1 liter of water Mix 25kg/acre with compost apply to soil before planting for foliar spray dissolve 5-10g/1 liter of water spray on leaves

Fig 1. Preparation of pseudomonas in microbiology lab SoAS, Anurag university

Benefits:

Pseudomonas helps clean polluted soil and water, break down waste, supports plant growth, protects plants from diseases.

Trichoderma:

It is a bio fungicide useful for all crops. seed treatment add 5-10g/1kg of seeds dry them in shade before sowing. For root dip 5-10g/1liter dip the roots of seedlings for 1530minutes before transplanting. Soil application mix 2-5kg of Trichoderma powder with 50-100kg of well decomposed compost. Foliar spray mix 5-10g/1 liter of water and spray on the plants use this treatment every 15 days to suppress foliar fungal disease.

Fig 2. Preparation of Trichoderma

Phosphate solubilizing bacteria (PSB):
It is biofertilizer useful for all crops. Seed treatment mix 10g PSB powder with 1kg of seeds using jaggery solution or water uniform coating and dry in shade for 30 minutes before sowing. Root dipping prepare 10l of water dip the seedlings for 20-30 minutes before transplanting. Soil application mix 2-5kg of powder with 50kg compost broadcast in the field before planting during early crop growth.

Fig 3. Preparation of phosphate solubilizing bacteria

Benefits:
In plants by converting insoluble phosphorus in the soil into a form that plants can easily absorb. This increase soil fertility, improves root development, and plant yield.
Preparation of Potassium solubilizing bacteria (KSB):
It is a biofertilizer used for all crops, for seed treatment 25-50g/kg seed (powder) in (liquid)10ml/kg, seedling root dip prepare 10 liters of water dip in water for 20-30 minutes before transplanting, soil application mix 2-4kg/acre with compost.

Fig 4. Preparation of potassium solubilizing bacteria

Benefits:
It helps plants by converting unavailable potassium in soil into a form. Strengthens plant roots and stems, increases resistance to diseases and stress helps in better yield.
Preparation of *Beauveria bassiana:*
It is a biopesticide useful for all crops. Seed treatment 5-10g/kg of powder let them dry for 30minutes before planting. Soil drenching for soil borne pests mix 5-10g/liter of water pour the solution at plant root zone using a water can. Foliar spray mix 2-5g/1 liter of water. Directly apply powder in dusting form on affected area.

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Fig 5. Preparation of Beauveria bassiana

Benefits:

Beauveria bassiana is a beneficial fungus used as natural biopesticides. It helps control harmful insects by infecting and killing them without harming plants, humans or animals it is eco-friendly.

Rhizobium:

It is a bio fertilizer recommended for groundnut. For seed treatment mix 50g of rhizobium formulation with 10kg seeds in 10 liters of water dry the seeds to air in shade for 30 minutes before sowing, for seedling treatment make slurry 1kg/10 liters of water dip the seedling for 30 minutes, apply 5kg of biofertilizer/100kg of organic manure as soil application when the soil is moist.

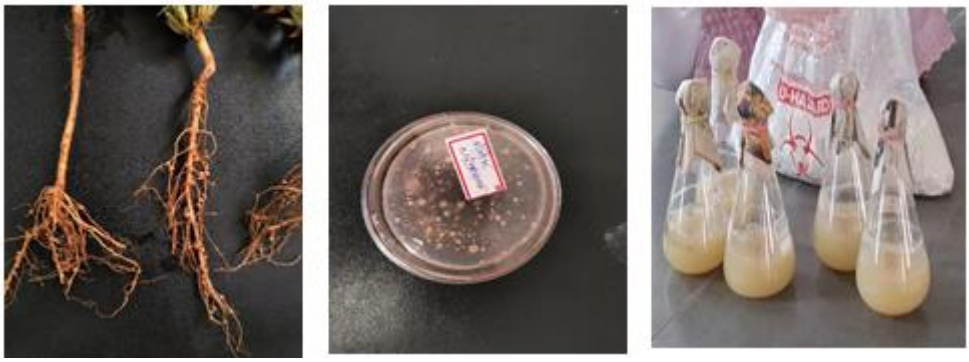

Fig 6. Preparation of Rhizobium

Benefits:

It is a beneficial bacterium that lives in the roots of leguminous plants .it helps in fixing atmospheric nitrogen into form that plants can use for growth.

CONCLUSION

Advanced enriched media plays a very important role it helps in producing healthy disease free and strong seedlings. It saves time, improve plant. Growth and increase success in horticulture crops. Therefore, enriched media is essential for modern nursery production. This media has transformed nursery practices by providing a clean, efficient and reliable environment for raising quality planting material for raising quality planting material. It also helps nursery growers reduce losses, maintain uniform growth, and meet the increasing demand for healthy seedlings. This media is a key component in achieving efficient sustainable and successful nursery production

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