

## Scale up of organic manures for production of quality seedlings of MPTs in nursery

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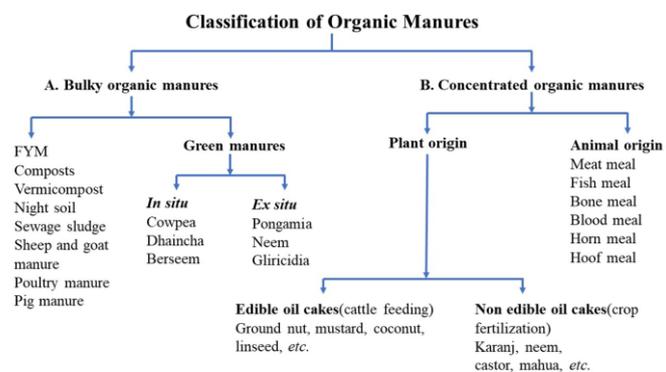
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### INTRODUCTION

The term *manure* is derived from the French word *manoeuvre*, meaning “to work with the hand,” and from the Middle English term *manuren*, which refers to the cultivation of land. Over time, the meaning of manure expanded to include any practice aimed at improving the physical, chemical, and biological properties of soil (Mani, 2011). Organic manures are organic materials derived from plant, animal, and human residues that contain essential plant nutrients in complex organic forms and generally in low concentrations. These manures are broadly classified into two categories: (1) bulky organic manures, such as farmyard manure (FYM), green manure, compost, and crop residues; and (2) concentrated organic manures, which originate either from plant sources- such as mustard oilcake, neem oilcake, and karanj oilcake- or from animal sources, including bone meal, meat meal, and hoof meal. A brief classification of different types of organic manures is presented in figure 1. Concentrated organic manures are applied in smaller doses due to their relatively high content of major plant nutrients such as nitrogen (N), phosphorus (P), and potassium (K). In contrast, bulky organic manures are applied in larger quantities, as they supply plant nutrients in comparatively lower concentrations (Goswami *et al.*, 2012).



**Figure 1: Classification of organic manures**

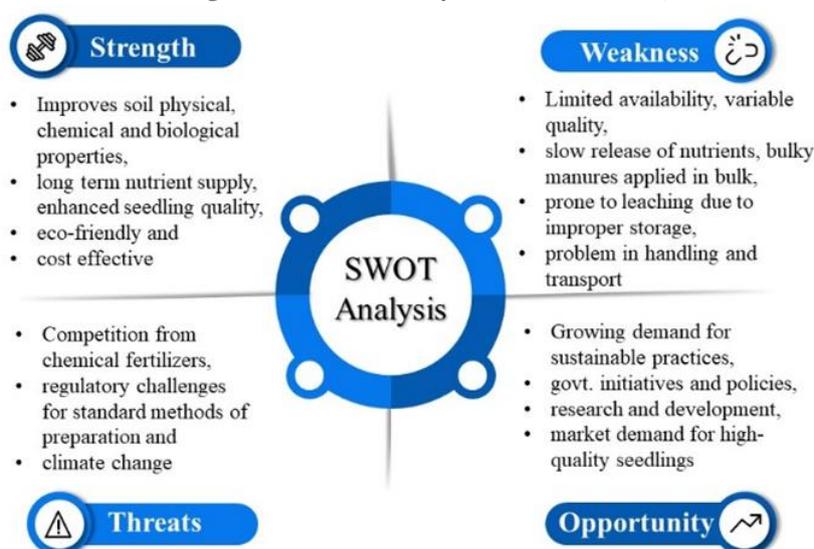
Organic manures play a vital role in improving soil properties by enhancing (i) physical characteristics such as soil aggregation, aeration, water-holding capacity, and permeability; (ii) chemical properties, including increased cation exchange capacity and buffering capacity, improved nutrient solubility and availability, regulation of soil salinity, sodicity, and pH, and enhanced phosphorus absorption efficiency, which together promote luxuriant plant growth; and (iii) biological properties by stimulating microbial activity in the soil (Suhartatik and Sismiyati, 2000; Alabandan *et al.*, 2009). Traditionally, soil has been used as a growing medium for seedling establishment and growth; however, when used alone without organic amendments, it often exhibits poor quality and is

more susceptible to root-knot nematode infestations and root rot diseases (Egunjobi and Ekundare, 1981). The incorporation of organic manures into soil facilitates the slow and sustained release of essential nutrients, while also supporting beneficial microbial populations that convert nutrients into plant available forms (Erin, 2007). Manures derived from different animal sources vary considerably in their nutrient composition. Poultry manure generally contains higher levels of nitrogen (N) and phosphorus (P) but lower potassium (K) compared to pig, sheep, and horse manures (Therios, 1996). In contrast, cow manure is a rich source of nitrogen, magnesium (Mg), organic carbon (C), and calcium (Ca) (Adegunloye *et al.*, 2007).

The difference between organic manures and chemical fertilizers is depicted in Table 1 below.

Organic Manures	Synthetic Fertilizers
1. Manure is an organic material derived after plants and animal residues have been decomposed by microorganisms, fungi, earthworm, <i>etc.</i>	1. Fertilizer is an inorganic compound prepared artificially in the industries by using different chemicals.
2. <b>No nutrient specificity</b> - nutrient supplied to soil but its type and amount is hard to determine.	2. <b>Nutrient specificity</b> - specific nutrients are supplied in specific quantities.
3. <b>Bulky and voluminous in nature</b> - difficult to store, handle and transport.	3. <b>Compact in nature</b> – requires comparatively less space and easy to store, handle and transport.
4. <b>Organic manures are released slowly in soil</b> - provides huge organic matter improving soil texture and water retention.	4. <b>Fertilizer is rapidly absorbed by plants</b> - not providing any humus to the soil.
5. <b>Cost effective and no detrimental effects on soil</b> - long term use of manures help to replenish soil health.	5. <b>More expensive and leaching of fertilizers</b> - pollute nearby soil and water bodies; its long term use deteriorates soil health.

**Table 1: Difference between organic manures and synthetic fertilizers** (Source: Verma *et al.* 2024).



**Figure 2: SWOT Analysis for the use of organic manures for production of quality seedlings of multipurpose tree species**

The use of organic manures as growing media for producing high-quality seedlings of multipurpose tree species is vital and aligns with the need for sustainable and eco-friendly nursery practices. Organic manures significantly enhance seedling quality by improving parameters such as root-shoot ratio, sturdiness quotient, volume index, seedling quality index, and seedling vigour index, while also promoting faster establishment of nursery raised seedlings under field conditions. The SWOT analysis presented in figure 2 highlights that the use of organic manures offers greater strengths and opportunities compared to weaknesses and threats. Overall, organic manures prove to be an effective growing medium for raising superior quality seedlings of multipurpose tree species, thereby justifying their use as a viable and sustainable alternative for seedling production in afforestation and reforestation programmes.

### CONCLUSION

Organic manures play a crucial role in producing healthy and vigorous seedlings of multipurpose tree species in forest nurseries. Several studies have shown that the application of farmyard manure, vermicompost, poultry manure, goat manure, oil cakes, compost, and organic sludges significantly enhances seedling height, stem girth, root development, and overall plant vigor. Seedlings raised with organic manures establish more quickly and perform better after transplanting under field conditions. Multipurpose tree species contribute to improved soil fertility by enriching the soil with natural nitrogen, while also supplying fuelwood, fodder, timber, and important environmental services. The use of organic manures as potting media promotes eco-friendly nursery practices, minimizes reliance on chemical fertilizers, and helps sustain soil health. Thus, organic manures provide a simple, cost-effective, and sustainable approach for producing quality planting material, making them ideal for afforestation and agroforestry programmes.

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