

Khet Bachao Abhiyan Series: ICAR RCER, Patna

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No-7: Green Leaf Manuring for Sustaining Soil Health

Introduction:

The increasing cost of chemical fertilizers and the gradual decline in soil fertility have become major concerns in modern agriculture. Continuous cultivation and excessive dependence on chemical fertilizers often lead to nutrient imbalance, poor soil structure, and reduced biological activity in the soil. The National priorities are to improve nutrient use efficiency by 25–30% and reduce chemical fertilizer consumption by 25% through the promotion of balanced fertilization, organic inputs, biofertilizers, and other sustainable approaches. Under such circumstances, green leaf manuring (GLM) offers a simple, economical, and environmentally friendly option for maintaining soil productivity.

What is green leaf manuring?

- Green manuring (GM) and green leaf manuring (GLM) are often confused, but they differ in the source of biomass. Though the purpose and functions of GM and GLM are same in soil fertility building.
- In GM, a crop is grown in the field specifically for incorporation into the soil at a tender stage. It's also called as green manuring *in-situ* (*same place*).
- GLM refers to the practice of collecting fresh leaves and tender twigs from trees, shrubs, and herbaceous plants grown outside the field and incorporated into the soil during field preparation or before sowing.
- Plants growing in wastelands, field bunds, forestry etc., are sources of GLM.
- The decomposing biomass releases nutrients and improves soil fertility, structure, and biological activities.
- Based on kinds of leaf or tender biomass used in GLM, the decomposition and nutrient availabilities varies.
- Both GM/GLM helps improving soil fertility, reduce dependence on chemical fertilizers and improves nutrient-use efficiency.

Common green leaf manure species

Several tree and shrub species are suitable for GLM due to their rapid biomass production and nutrient-rich foliage. While both trees and shrubs are useful sources of GLM, tree species generally provide a larger and more sustained supply of biomass, whereas shrubs offer quicker biomass production and easier management on bunds and terraces. Commonly used species include:

Leguminous trees

- Subabul (*Leucaena leucocephala*)
- Gliricidia (*Gliricidia sepium*)

- Agathi (*Sesbania grandiflora*)
- Karanj (*Pongamia pinnata*)

Leguminous shrubs

- Dhaincha (*Sesbania bispinosa* / *S. aculeata*)
- Tephrosia (*Tephrosia purpurea*)
- Indigo (*Indigofera tinctoria*)
- Sunnhemp (*Crotalaria juncea*)
- Flemingia (*Flemingia macrophylla* / *Flemingia congesta*)





Non-leguminous trees

- Neem (*Azadirachta indica*)
- Cassia (*Cassia siamea*)
- Prosopis (*Prosopis juliflora*)

Non-Leguminous shrubs

- Aak / Madar (*Calotropis gigantea* / *Calotropis procera*)
- Jatropha (*Jatropha curcas*)

Among these, Gliricidia and Subabul are particularly valued because of their high biomass production and relatively high nitrogen content. Even tender biomass of weedy shrubs like Ambrosia sp., Eupatorium sp etc. are also used as green leaf manure due to their good nutrient concentrations and ability to improvement soil fertility.

	
<p>Gliricidia (<i>Gliricidia sepium</i>)</p>	<p>Subabul (<i>Leucaena leucocephala</i>)</p>
	
<p>Agathi (<i>Sesbania grandiflora</i>)</p>	<p>Karanj (<i>Pongamia pinnata</i>)</p>

Figs: Common species used for green leaf manuring

Table 1. Nutrient content of few green leaf manure species

Green leaf manure	Scientific name	Nutrient content (%) on air dry basis		
		N	P ₂ O ₅	K ₂ O
Plants				
Gliricidia	<i>Gliricidia sepium</i>	2.76	0.28	4.60
Pongamia	<i>Pongamia glabra</i>	3.31	0.44	2.39
Neem	<i>Azadirachta indica</i>	2.83	0.28	0.35
Gulmohur	<i>Delonix regia</i>	2.76	0.46	0.50
Peltophorum	<i>Peltophorum ferrugenum</i>	2.63	0.37	0.50
Weeds				
Carrot grass	<i>Parthenium hysterophorus</i>	2.68	0.68	1.45
Water hyacinth	<i>Eichhornia crassipes</i>	3.01	0.90	0.15
Horse purslane	<i>Trianthema portulacstrum</i>	2.64	0.43	1.30
Morning glory	<i>Ipomoea sp.</i>	2.01	0.33	0.40
Giant milkweed	<i>Calotropis gigantea</i>	2.06	0.54	0.31
Golden Shower Tree	<i>Cassia fistula</i>	1.60	0.24	1.20

Method of application

- Fresh green leaves and tender twigs are collected from nearby trees and shrubs and spread uniformly over the field. Whenever required, the tender biomass may be chopped to 5-10 cm for easy incorporation and proper decomposition. The hardy/woody portions must be discarded.
- The material is then incorporated into the soil about 2–3 weeks before sowing or transplanting so that sufficient decomposition can take place.
- In rice cultivation, green leaves are often incorporated during final puddling before transplanting.
- Depending on availability, about 5–10 tonnes of fresh green leaves per hectare can be added to the soil.



Fig: GLM incorporation in rice fields

Role in rice-based cropping systems

- Green leaf manuring is particularly beneficial in rice cultivation.
- Incorporation of nutrient-rich leaves before transplanting rice improves nutrient availability during the vegetative stages of crop growth.
- In many traditional rice-growing regions, farmers have successfully used leaves of Gliricidia, Subabul, Sesbania, and other locally available species to supplement fertilizer nitrogen.

Benefits of green leaf manuring

- GLM trees and shrubs can be grown on field bunds, hills, terraces, and sloping lands, where they help conserve soil and reduce erosion.
- Their pruned leaves and twigs can be applied as mulch to conserve soil moisture, suppress weeds, and recycle nutrients back to the soil.
- Regular addition of leafy biomass improves soil organic matter, stimulates beneficial microorganisms, and enhances long-term soil fertility.

Precautions

- Use fresh and disease-free leaves.
- Incorporate leaves well before sowing or transplanting to allow proper decomposition.
- Avoid using leaves from toxic or allelopathic plant species.
- Ensure uniform distribution of biomass across the field.
- Integrate green leaf manuring with balanced fertilization and soil-test-based nutrient management for best results.

With increasing emphasis on sustainable agriculture and reduced dependence on chemical fertilizers, GLM offers a practical and low-cost nutrient management option for small and marginal farmers. The abundance of trees and shrubs along farm boundaries, roadsides, canal banks, and wastelands provides a valuable source of biomass that can be effectively utilized to improve soil fertility. Wider adoption of this practice, along with biofertilizers, compost, crop residue recycling, and balanced fertilizer use, can contribute significantly to improving soil health, reducing input costs, ensuring long-term agricultural sustainability and contribute in achieving national priorities.

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