

## Importance of Green manuring and Green Leaf Manuring in Soil Health Management – Key Role in Organic/Natural Farming

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### Introduction

#### A. Green Manuring

Green manuring/In situ green manuring involves raising of crops specifically to be incorporated into the soil where it was raised. Green manure crops, are typically legumes, grasses, or other plants that are rich in nutrients and organic matter. Green manuring improves physical, chemical and biological properties and helps in maintaining soil fertility, structure, and overall soil health, reducing the need for synthetic fertilizers and promoting sustainable agriculture. In Situ Green manuring advantages:

- Crops are grown and incorporated into the soil in the same location
- No transportation or storage required
- Reduced labor and costs
- Immediate soil improvement
- Examples: sun hemp, cowpea, dhaincha
- Enhances soil fertility and structure
- Supports beneficial microorganisms
- Increases nutrient availability
- Reduces soil erosion
- Promotes ecosystem services

#### Benefits:

1. **Soil fertility improvement:** Green manure adds organic matter, nutrients, and beneficial microorganisms to the soil.

2. **Soil structure improvement:** Green manure helps improve soil porosity, aeration, and water-holding capacity.
3. **Erosion control:** Green manure crops help hold soil in place, reducing erosion and soil loss.
4. **Weed suppression:** Green manure crops can outcompete weeds, reducing the need for herbicides.
5. **Pest and disease management:** Some green manure crops repel pests and diseases, reducing the need for pesticides.

#### Types of Green Manure Crops:

1. **Legumes (e.g., clover, beans, peas, Pulses):** Fix nitrogen, add protein-rich organic matter.
2. **Grasses (e.g., rye, oats, wheat):** Add organic matter, improve soil structure.
3. **Brassicas (e.g., kale, broccoli, cauliflower):** Repel pests, add organic matter.
4. **Comfrey:** Acts as a fertilizer plant, adding nutrients to the soil.

#### Incorporation Methods:

1. **Ploughing:** Green manure crops are plowed into the soil while still green.
2. **Mulching:** Green manure crops are chopped and left on the soil surface.
3. **Cover cropping:** Green manure crops are grown between cash crops, then incorporated into the soil.

#### Timing:

1. **Off-season:** Green manure crops are grown during the off-season to prepare the soil for the next crop.
2. **Inter cropping:** Green manure crops are grown between cash crops to improve soil health.

#### B. Green Leaf Manuring

Green leaf manuring/ Ex Situ Green manuring involves adding leaves or foliage from trees or shrubs from nearby bushes or forests to the growing soil as a mulch or amendment. This practice adds organic matter, nutrients, and beneficial microorganisms to the soil, improving its fertility and structure. Green leaf manuring is a simple and effective way to promote soil health and reduce the need for synthetic fertilizers.

#### Benefits:

1. **Soil fertility improvement:** Green leaf manure adds organic matter, nutrients, and beneficial microorganisms to the soil.

2. **Soil structure improvement:** Green leaf manure helps improve soil porosity, aeration, and water-holding capacity.
3. **Pest and disease management:** Some green leaf manure repels pests and diseases, reducing the need for pesticides.
4. **Weed suppression:** Green leaf manure can suppress weed growth, reducing competition for crops.
5. **Soil erosion control:** Green leaf manure helps hold soil in place, reducing erosion and soil loss.

#### Types of Green Leaf Manure:

1. Neem leaves (*Azadirachta indica*): Repel pests, improve soil health.
2. Babul leaves (*Acacia nilotica*): Add organic matter, improve soil fertility.
3. Pongamia leaves (*Millettia pinnata*): Fix nitrogen, add organic matter.
4. Gliricidia leaves (*Gliricidia sepium*): Add organic matter, improve soil fertility.
5. Leucaena leaves (*Leucaena leucocephala*): Fix nitrogen, add organic matter.

#### Application Methods:

1. **Mulching:** Green leaf manure is applied as a surface mulch.
2. **Incorporation:** Green leaf manure is mixed into the soil.
3. **Composting:** Green leaf manure is composted before application.

#### Timing:

1. **Before planting:** Green leaf manure is applied before sowing of main crops.
2. **During crop growth:** Green leaf manure is applied as a side dressing or mulch also.

By incorporating green leaf manuring into farming practices, farmers can improve soil health, reduce synthetic fertilizer use, and promote sustainable agriculture.

#### C. Key differences:

1. **Location:** In situ (same location) vs. ex situ (different location)
2. **Transportation:** In situ (none) vs. ex situ (required)
3. **Labour:** In situ (less) vs. ex situ (more)
4. **Costs:** In situ (lower) vs. ex situ (higher)

Both green manuring and green leaf manuring are valuable practices for improving soil health, reducing synthetic fertilizer use, and promoting sustainable agriculture. By incorporating these methods into farming practices, farmers can enhance soil fertility, structure, and overall health, leading to improved crop yields and reduced environmental impacts.

**D. Biomass production and N accumulation of green manure crops and nutrient content:**

Crop	Age (Days)	Dry matter (t/ha)	N accumulated (kg/ha)
<i>Sesbania aculeata</i>	60	23.2	133
Sunnhemp	60	30.6	134
Cow pea	60	23.2	74
<i>Pillipesara</i>	60	25.0	102
Cluster bean	50	3.2	91
<i>Sesbania rostrata</i>	50	5.0	96

**Nutrient content of green manure crops:**

Plant	Scientific name	Nutrient content (%) on air dry basis		
		N	P	K
Sunnhemp	<i>Crotalaria juncea</i>	2.30	0.50	1.80
Dhaincha	<i>Sesbania aculeata</i>	3.50	0.60	1.20
Sesbania	<i>Sesbania speciosa</i>	2.71	0.53	2.21
Cow Pea	<i>Vigna unguiculata</i>	1.70	0.25	1.51
Greengram	<i>Vigna radiata</i>	2.21	0.26	1.26

**Nutrient content of green leaf manure crops:**

Plant	Scientific name	Nutrient content (%) on air dry basis		
		N	P	K
Gliricidia	<i>Gliricidia sepium</i>	2.76	0.28	4.60
Pongania	<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
<b>Weeds</b>				
Parthenium	<i>Parthenium hysterophorus</i>	2.68	0.68	1.45
Water hyacinth	<i>Eichhornia crassipes</i>	3.01	0.90	0.15
Trianthema	<i>Trianthema portulacastrum</i>	2.64	0.43	1.30



Ipomoea	<i>Ipomoea</i>	2.01	0.33	0.40
Calotrophis	<i>Calotropis gigantea</i>	2.06	0.54	0.31
Cassia	<i>Cassia fistula</i>	1.60	0.24	1.20

**Conclusion:**

Therefore, it can be concluded that green manures improve soil structure, letting more air into the soil and improving drainage. Organic matter helps sandy soil hold more water and not drain so quickly as a result of increased aggregate stability and porosity. Also, organic matter reduces rate of runoff and soil erosion. Change in chemical property of soil could be clearly observed. Leguminous green manure crop in soil increases nitrogen level by fixation.

<b>Ex situ green manuring process in Natural Farming Paddy at KVK, Garikapadu</b>	
	
<b>Incorporation of green leaf manure (Calotropis)</b>	<b>Collection Gliricidia for organic farming</b>
	
<b>Incorporation of Gliricidia in organic farming paddy plots</b>	<b>After incorporating Puddling in Paddy nursery</b>



**transplanting of Paddy**



**Healthy growth in Natural farming plots**

**In situ green leaf manuring with sunhemp Natural Farming Paddy at KVK, Garikapadu**



Note cam lite  
Address : Garikapadu, Andhra Pradesh, India  
Latitude : 16.9499307°  
Longitude : 80.05653139°  
Altitude : 52.9 meter  
Date : 08/07/2024 09:38 am  
Accuracy : 3.7900925 meter  
Time zone : IST  
Note : Dr.PN Siva Prasad, SMS (CP), Garikapadu

**Incorporation of green manure (Sunhemp) in the soil (Organic farming paddy plot)**

**References**

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