

Khet Bachao Abhiyan Series: ICAR RCER, Patna

ICAR-Research Complex for Eastern Region, Patna

No-9: Green Manuring: Hidden Wealth in the Field

Imagine producing your own fertilizer right in the field where crop will stand. No heavy lifting, no buying expensive bags of urea, and no hauling tonnes of manure across the farm. Sounds like a dream, right?

This is exactly what **Green Manuring** does. It is the practice of growing leafy, fast-growing crops—mostly legumes—and turning them directly back into the soil while they are still green and succulent. This age-old practice naturally revitalizes the soil, enriches fertility, texture, and organic matter from within.

What is Green Manuring?

Green manuring is an active organic farming technique where specific plants are grown solely to be buried back into the soil. As these plants decompose, they unlock hidden nutrients, release organic acids, and provide a massive feast for beneficial soil microbes.

Green Manuring vs. Green Leaf Manuring: The Difference

Farmers often get confused between these two terms. While they sound identical, the method of getting them into the field is completely different:

- **Green Manuring:** The green manure crop is grown **in-situ** (in the exact same field) and turned under right where it grew.
- **Green Leaf Manuring:** This refers to collecting green leaves, twigs, and tender branches from trees, shrubs, or bunds *outside* the field (like Gliricidia, Karanja, or Neem) and bringing them into the field to be ploughed under.

Important Green Manure Crops: Biomass & Nitrogen Fixation

Leguminous green manures have nodules on their roots filled with friendly bacteria that trap nitrogen directly from the air and store it in the plant. Non-leguminous crops (Don't fix nitrogen) like buckwheat, mustard, oats etc are also used as green manure crops mainly for adding organic matter and recycle nutrients into the soil.

Here is a breakdown of the most popular green manure crops used by farmers:

| Green Manure Crop | Scientific Name | Fresh Biomass Added (Tonnes/Ha) | Nitrogen Fixed (Kg/Ha) | Urea Bags Saved |
|----------------------------|--------------------------------|---------------------------------|------------------------|-----------------|
| Dhaincha | <i>Sesbania aculeata</i> | 20 – 25 | 75 – 130 | 1.7 – 2.9 |
| Sunnhemp | <i>Crotalaria juncea</i> | 25 – 30 | 80 – 130 | 1.8 – 2.9 |
| Cowpea | <i>Vigna unguiculata</i> | 15 – 20 | 60 – 70 | 1.3 – 1.6 |
| Pillipesara | <i>Phaseolus trilobus</i> | 15 – 18 | 50 – 60 | 1.1 – 1.3 |
| Cluster Bean (Guar) | <i>Cyamopsis tetragonoloba</i> | 15 – 20 | 60 – 70 | 1.3 – 1.6 |

When to Sow and the Golden Rule of Incorporation

Timing is everything in green manuring. If you miss the right window, you lose the benefits.

- **When to Sow:** Usually sown immediately after the onset of pre-monsoon showers (May-June) or right after harvesting a Rabi crop when there is residual moisture.
- **The Right Stage of Incorporation:** The absolute best time to plough the crop into the soil is at the **50% flowering stage** (usually 40-45 days after sowing). At this moment, the plants have reached their maximum green weight, and their stems are soft, succulent and juicy, making them incredibly easy to decompose.

The Danger of Waiting Too Long: Overaged Green Manure

What happens if you delay ploughing and let the green manure crop grow old, woody, and form seeds? It backfires completely:

- **Woody Stems (High Lignin):** As plants age, they develop tough, woody fibres. Soil microbes find it very difficult to break down this tough material.
- **Slower Decomposition:** Instead of rotting in a few days, an overaged crop can take weeks to decompose, delaying your main crop sowing.

Avoiding Nutrient Immobility (Nitrogen Lock)

When you plough a lot of organic material into the soil, microbes rush in to eat it. If the material is too woody, the microbes will actually *steal* the available nitrogen from soil to help them digest the fibre. This creates **Nutrient immobility**, leaving next crop starving and yellow.

How to Prevent This:

1. **Ensure Adequate Moisture:** Always ensure there is standing water or good moisture in the field when ploughing the green manure crop in. Microbes need water to do their job.
2. **The "Waiting Period":** Allow **1 to 2 weeks** of time between ploughing under the green manure and transplanting or sowing crop. This gives the soil time to finish the initial intense phase of decomposition.
3. **A Tiny Starter Dose:** If green manure is a bit too old when ploughed, apply a small "starter dose" of chemical nitrogen (like a light sprinkle of urea) to feed the microbes so they don't starve main crop.

Perfect Fitting: How Dhaincha Powers Up Rice Farming

One of the greatest success stories in Indian agriculture is fitting **Dhaincha** right before **Wetland Rice (Paddy)**. Dhaincha is incredibly sturdy—it tolerates waterlogging, salinity, and drought like a champ.

The Cropping Sequence:

The timing for sowing, turning into soil and transplanting varies from region to region as per monsoon rain/irrigation water availability.

Summer Fallow / Pre-Monsoon (May): Sow Dhaincha (Broadcast 25-30 kg seed/ha) and grow for 40-45 days

Late June/First week of July: Flood field & Plow Dhaincha into the mud and allow 7-10 days to decompose

Mid July :Transplant Rice Seedlings.

Why this works perfectly: Dhaincha roots open up hard, compacted soil layers. When the field is flooded for rice, the buried Dhaincha releases organic acids that neutralize alkaline soils, making phosphorus and zinc easily available to the young rice seedlings.

What is Brown Manuring? A Modern Solution

For farmers who practice **Direct Seeded Rice (DSR)** and don't flood their fields to puddle the mud, traditional green manuring is tough. That is where **Brown Manuring** comes in. In brown manuring, the main crop (like rice or corn) and the green manure crop (usually Dhaincha) are sown **at the exact same time** in rows. After about 25 to 30 days, when the Dhaincha starts shading the main crop, a weedkiller like 2,4-D is sprayed. The herbicide kills only the Dhaincha, causing it to lose its green colour, dry up, and turn **brown** right on top of the soil. It acts as a dead organic mulch that prevents weeds from growing, conserves soil moisture, and slowly decays to provide nutrients to the main crop.

Ideal Cropping Systems for Green Manuring

Green manuring cannot be done everywhere; it requires a gap in the farming calendar. It fits best in:

- **Rice-Wheat Systems:** Sown in the summer window (May-June) before rice.
- **Sugarcane-Based Systems:** Grown as an intercrop between wide sugarcane rows and buried during earthing-up operations.
- **Maize-Pulse/Wheat Systems:** Sown before the monsoon maize crop.
- **Rainfed & Semi-Arid Areas:** Growing short-duration pulses like Cowpea or Horsegram to conserve moisture before winter cropping.

Multi-Fold Benefits of Green Manuring

- **Saves Money:** Can replace up to 30–50 Kg of chemical nitrogen per hectare.
- **Reclaims Sick Soils:** Effectively lowers the pH of alkaline soils.
- **Prevents Soil Erosion:** Acts as a cover crop during fierce summer winds and heavy early-monsoon rains, stopping precious topsoil from washing away.
- **Nutrient Scavenging:** Deep roots pull up nutrients from deep underground layers and deposit them on the topsoil for your next crop.

Limitations of Green Manuring

- **Water Dependency:** If pre-monsoon rains fail or you don't have assured irrigation, growing a green manure crop is nearly impossible.
- **The "Lost Window":** Farmers often feel they lose a chance to grow a commercial summer cash crop (like moong bean or vegetables) because that 50-day window is given to the manure. Under such condition a short duration crops like summer moong is advocated which provides both grain and acts as manure when biomass is incorporated.
- **Extra Cost:** While it saves fertilizer cost, farmers still need to spend on green manure seeds and tractor fuel to plough it back to soil.

The Golden Takeaway

Green manuring is like giving your farm a health tonic. By sacrificing just 40-45 days of field time before main crop, one can ensure that soil remains soft, fertile, and deeply nourished.

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