

Green manures

Green manuring & Green leaf manuring

- Green manuring
 - Growing of crop purposely and incorporating it in the soil for manuring
- Green leaf manuring
 - Collecting green leaves from all available sources and using for manuring

Importance of green manuring

1. Leguminous green manure fix atmospheric nitrogen
 1. Green leaf additions 20-40 kg N
 2. Root fixes 5-20kg
 3. There is saving in the N budget
2. They decompose easily without leaving much residue
 1. Cattle manure leaves more humus than GM
3. Leguminous green manure fix atmospheric nitrogen
 1. Green leaf additions 20-40 kg N
 2. Root fixes 5-20kg
 3. There is saving in the N budget
4. They decompose easily without leaving much residue
 1. Cattle manure leaves more humus than GM
5. GM withdraws plant nutrients from lower layers and leaves on surface
6. Subsidiary objectives of GM are:
 1. They are 'catch crop' to the nutrients being lost before next crop
 2. Shade crop: to provide shade in young orchards besides adding N
 3. Cover crop: Clothing the soil with vegetative cover in hill slopes during rainy season
 1. Also to check wind erosion
 4. Forage crop: few cuttings as fodder and then as GM
 1. Pillipesara (*Phaseolus trilobus*) is broadcast in standing rice

Green manuring possibilities

- Rainfed dry lands
 - Only hardy crops
 - Or where there is high rainfall
- Irrigated dry lands
 - It has to be fitted between two main crops
 - GM crop should be quick growing and producing heavy foliage in short period
 - It should be leguminous crop
 - Capable of raising with little cost
- Wetlands
 - In between two rice if the period available is 40-60days
 - After the rice but sown as rice fallow / self sown *Tephrosia purpurea*

- Before rice if rain is there under prepared field

Green manure suitable for S. India

Daincha - Sesbania aculeata

- Tolerant to drought, stands under flood
- Vigorous growth produces good biomass
- Can be incorporated within 45 days
- 10-20 t of green matter
- Easy decomposition
- Seed rate 20 kg

Sesbania speciosa

- Resembles daincha
- Can be cultivated in the standing water
- Biomass production is higher than *S. aculeata*
- Seed rate 15 kg
- It can be even in the bunds
 - To be used as GLM
 - To have seed production

Sesbania rostrata

- As intercrop along rice
- As daincha it can be cultivated
- Germination requires seed scarification
- More suitable to summer
- Stem nodulating GM
- Seed rate 15-20 kg

Kolunchi / wild indigo (Tephrosia purpurea)

- Suitable for sandy soil
- It is very hardy and drought tolerant
- Self sown crop is possible if sown 3-4 times
- Mature seeds remain dormant in the rice soil
- More suitable for single cropped wetlands
- Not grazed by cattle
- Seed scarification is needed
- Seed rate 15-20 kg

Indigo / Avuri (Indigifera tinctoria)

- It is long duration crop resembles kolunchi
- It is more leafy
- Also a medicinal plant of today
- Comes up well in clayey soil
- One or two irrigations are needed
- Seed rate 15 kg

Sunnhemp - Crotalaria juncea

- Vigorous growing
- Comes well in loamy soil under irrigation
- Seed rate 25-35 kg /ha
- Subject to complete defoliation by insects
- Susceptible to water logging

Pillipesara -Vigna trilobata

(Syn: *Phaseolus trilobus*)

- It is pulse crop
- Sown as rice fallow pulses in AP
- Early slow growth
- Graced by animals and then allowed to grow
- Green matter produced is 8 – 10t if allowed for six weeks
- Seed rate 10-15 kg

Sowing of Green manure crops

Done by different ways

- Broadcasting on standing crops (rice)
- Broadcasting after field preparation
- Drum seeding in rice inter rows

Seeds to be scarified, if hardy like Kolunchi or *S. rostrata*

- Hot water treatment
- Mixed with sand and pounding to abrade the seeds for germination

Green leaf manure - GLM

Leguminous trees

- Pungam
- Cassia
- Subabul
- Gliricidia
- Trees & shrubs
- Neem
- Calotropis
- Ipomoea
- Pungam - *Pongamia glabra*

Evergreen trees

- Can be grown in all the places
- Drought tolerant
- Seeds oil producing
- Medicinal value

Konnai – *Cassia spp*

- Establishes in all places
- Drought tolerant

Subabul - *Luecaena leucocephala*

- Forage cum GLM
- Live fencing
- Leguminous tree
- Bund, border, and waste lands

Gliricidia maculata

- Tree
- Bund and border crop
- Alley cropping

Gliricidia maculata

- Tree

- Bund and border crop
- Allay cropping

Kattamani -*Ipomoea spp.*

- Many spp
- Water loving
- Shrub
- Spread through water
- Propagation – plant material, seeds

Erukku - *Calotropis gigantea*

- Wasteland weeds
- Water loving
- Spread through canal bunds
- Seeds - source of propagation

Green manure N content

Green manure	N content (%)	N accumulation (kg/ha)
<i>Crotolaria juncea</i>	2.8 – 3.2	80 – 130
<i>Sesbania aculeata</i>	2.6 – 3.2	130 – 185
<i>S. rostrata</i>	3.2 – 3.4	170 – 220
<i>S. speciosa</i>	2.3 – 3.1	115 – 160
<i>Phaseolus trilobus</i>	2.2 – 2.8	85 – 115
<i>Tephrosia purpurea</i>	2.9 – 3.2	70 - 115

Green leaf manure – N Content

Tree	Botanical name	N (%)
Pungam	<i>Pongania glabra</i>	1.3 – 1.5
Neem	<i>Azardirachta indica</i>	1.0 – 1.2
Konnai	<i>Cassia florida</i>	1.4 – 1.6
Glyricidia	<i>Gliricidia maculata</i>	2.3 – 2.8
Vahai	<i>Albizzia lebbek</i>	1.1 – 1.4
Erukku	<i>Calotropis gigantea</i>	1.4 – 1.5
Subabul	<i>Leucaena lucocephala</i>	3.5 – 3.7

Green manuring

GM & GLM

- GM – part of cropping, requires all inputs
 - GLM – it is an input, saves land and time
- GM – fixes nutrients and alters the position
 - GLM – adds as external
- GM – not possible to all the crops
 - GLM – possible to all the crops