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The Green Manure/Cover Crop approach in RAMA-BC

Green Manure is intercropping maize (or cassava) with cover crops that fix nitrogen. This improves the health of the soil; increases organic matter and fertility; retains more moisture in the soil, and helps control weeds. The crops used for green manure are pulses such as pigeon peas, cowpeas, mung beans, lablab beans, and jack beans. The aim here is to improve productivity, especially maize productivity.

We may achieve this by doing the following:

- ✓ Not ploughing and practicing minimal soil disturbance
- ✓ Covering at least 30% of the soil surface for at least 80% of the year
- ✓ Practicing crop rotation /intercropping

In order to have a clear understanding of how to organize cover crops on the farm, we must distinguish between 'anchor' and 'secondary' cover crops:

Definition: An 'anchor' crop is a cover crop such as pigeon pea, or lablab beans, or jack beans that is intercropped with a 'main' crop (usually maize or cassava).

Jack bean, pigeon pea and lablab are considered 'anchor' crops as they persist for most of the season, covering the soil; whereas 'secondary' crops such as cowpea and mung bean, being short season, cover the soil for only a part of the season. A 'secondary' crop is a crop such as cowpea or mung beans, which have a short life cycle (60-75 days) and don't compete, but act as fillers in the initial stages of crop growth at the start of the season, so that the soil is covered for as long as possible. To avoid overcrowding and excessive competition, only one of the 'anchor' crops should be planted on the same plot at the same time with the main crop. Therefore, to manage competition, there should be only one 'secondary' crop, with an 'anchor' crop. To summarize as an example, the intercrop should be as follows: 1 'main' crop (maize) + 1 'anchor' crop (example pigeon pea) + 1 'secondary' crop (example cowpea).

Summary of Cover Crops:

Jack bean

Jack bean can fix 100-240 kg of Nitrogen per year/ha. Jack bean can be intercropped with maize or used as a crop rotation. As a rotating crop, jack bean can be used as a *sequential* cover crop after soya, sesame and common beans after they bear their first pods and before the end of the rainy season. In this case, the jack bean can be sown in March or April - its tolerance to drought will allow it to complete its cycle in 5-6 months, before the next rainy season. In this way jack bean will keep the soil covered.



Jack bean intercropped with maize

Jack bean is recommended for degraded soils that need rehabilitation. Jack bean, being less palatable to animals, can also be used to cover the soil in places where ruminants usually invade and eat the existing crops in the field.

When sowing the main crop, sow jack bean between the maize lines that are 75 cm apart and 30 cm between plants, resulting in a cover of 3-5 plants per square metre. The same density should be followed when using jack bean sequentially with soya or common bean, sowing jack bean with residual humidity/just before the rains cease.

Pigeon Pea

Pigeon pea is a bushy legume crop with a cycle of up to 3 years, that can be ratooned annually before each maize season. In addition to fertilizing the soil, pigeon pea is a nutritious human food. When intercropped with maize, the pigeon pea plant is pruned in the second year at a height of 30 cm (favouring maize) or at a height of 60 cm (favouring pigeon pea). Pigeon pea fertilizes the soil by fixing 60-120 kg of Nitrogen per hectare/year. When sowing the main crop, such as maize, sow pigeon peas between the maize lines, at 75 cm between rows and 30 cm between plants, resulting in a cover crop of 3-5 plants per square metre.



Pigeon peas with maize

If at pigeon pea harvest the whole plant is cut and threshed, sow jack bean between plants whilst the pigeon peas are beginning to pod, but before the end of the rain season, so as to keep the soil covered.

Lablab beans



Lablab with maize

Lablab bean is an annual cover crop that can be used as a maize intercrop or used as a crop rotation. Lablab improves soil fertility by fixing between 60 to 140 kg/ha/year of nitrogen.

Sown between the maize lines, lablab climbs over the maize plant and pods following the maize harvest, and continues to cover the soil until it dies, often because of the lack of moisture. If the lablab does not die, it can be pruned in the same way as the pigeon pea is pruned, and can regrow after sowing the next maize crop.

With maize, sow lablab between the rows of maize at a spacing of 75 cm between rows and 30 cm between plants, with a cover crop density of 3-5 plants per square metre. Lablab has its

limitations: It is prone to being eaten by animals and dies off when the soil dries out.

Cowpeas

Cowpeas fix between 40 to 60 kg of Nitrogen/ha/year. This crop is very resistant to drought. Cowpeas can be used as food and as a cash crop. Sow cowpeas 15 days after maize at 75 cm between rows and 30 cm between plants. Cowpeas can be sown together with other 'anchor' cover crops, such as Canavalia or pigeon peas, as they have a short cycle of 60-75 days, reducing the risk of competition.



Cowpeas with pods

Mung beans

Mung beans can be intercropped with other cover crops, such as jack bean or pigeon pea, with their short cycle of 60-75 days, reducing the risk of competition. It deposits 40 to 60 kg of Nitrogen /ha/year.



Mung beans with pods

Mung bean is sown 15 days after sowing maize 75 cm between rows and 60 cm between plants.

In summary: intercropping and cover crops can be managed as follows:

- ✓ Maize x pigeon pea x cowpea (pigeon pea pruned in the 2nd year and resown in the 3rd year)
- ✓ Maize x jack bean x cowpea
- ✓ Maize x lablab
- ✓ Soya x jack bean (jack bean sown after formation of the soya bean pods, when there is still soil moisture)
- ✓ Common Beans x jack bean (jack bean sown after formation of beans pods when there is still soil moisture)
- ✓ Cowpeas x jack bean (jack bean sown after formation of cowpea pods when there is still soil moisture)