GROWING GREEN MANURE AND COVER CROPS IN ARECANUT GARDENS IN THE MALNAD TRACT

By

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The arecanut palm, like other plants, draws its requirements of mineral nutrients from the soil. The nutrients are present in the mineral particles as well as in the organic matter in the soil. The soil derives its supply of organic matter from the plants growing on it. Organic matter is also added to the soil by the cultivator to obtain increased yields of crops.

In addition to supplying to the crops mineral nutrients, the soil organic matter plays other important roles in the soil. It improves the condition of clayey soils by promoting a crumb structure, which allows of easy drainage of water and aeration, and makes sandy soils more cohesive and retentive of moisture. It absorbs and retains moisture itself, and thus helps to maintain and increase the moisture status of the soil. Organic matter stimulates boilogical activity of the soil and makes mineral nutrients, particularly the phosphates, easily available to the plants. It also prevents loss of nutrients by leaching.

The cultivator adds animal matter such as cowdung or plant material such as leaves and twigs and other plant residues to the soil to increase its organic matter content, and incidentally the mineral nutrient content also. The plant material is either brought from outside and is applied to the soil, or is grown on the same site and is cut down and incorporated in the soil. A crop that is grown on the site for the above purpose is called a green manure crop, and the practice of cutting down and incorporating the green matter is called green manuring. Cover crops also supply substantial quantities of organic matter and mineral nutrients to the soil when they are cut down. A cover crop is one which is grown on a land to bind the soil and give it a close cover and thus protect it from the erosive force of wind or water and from the fierce rays of the sun that cause loss of moisture and organic matter from the soil. Green manure crops also give adequate protection of the soil, and a distinct line therefore between green manure and cover crops does not always exist.

The green manure and cover crops may be leguminous or non-leguminous crops belonging to the common bean family are known as leguminous crops. These crops are endowed with the power to absorb nitrogen, which is an essential plant nutrient, from the atmosphere with the help of bacteria which live in the tiny nodules located on their roots. The bacteria use the nitrogen for their own growth and give the surplus to the plant itself. Thus leguminous green manure and cover crops are preferable to non-leguminous as they supply, besides organic matter, large quantities of

nitrogen to the soil. The green matter that is added to the soil is attacked by the micro-organisms present in the soil and becomes what is called humus or soil organic matter.

Growing green manure and cover crops and incorporating them is the cheapest method of increasing the organic matter content of the soil.

The arecanut grower has not been behind other agriculturists in realising the value of adding organic matter to the soil. He adds large quantities of cattle manure and green leaves and twigs to the soil periodically.

In the Malnad tracts he obtains the green matter from the forest areas (called "Soppinabetta") around his gardens. He applies the green matter after completing all cultural operations such as, weeding and digging, and applying cattle manure to the palms. In the Malnad tracts, where there is acute scarcity for water during the summer months, green matter is also spread out on the soil to conserve loss of moisture and keep the bases of the palms cool. Leaves and tender-twigs of the following trees are commonly applied to the arecanut gardens in this tract.

Common Kannada name	Botanical Name
1. Hunalu	*Terminalia paniculata*
2. Mathi	*Terminalia tomentosa*
3. Jambe	*Xylia Xylocarps labriformis*
4. Kunnerlu	*Eugenia sp.*
5. Haiga	*Hopea wightiana*
6. Lantana	*Lantana camara*
7. Salle	*Aporosa lindleyana*
8. Aramarlu	*Tripasia aurantiola*
9. Honge	*Pongamia glabra*
10. Nerale	*Eugenia jambolana*
11. Nelli	*Phyllanthus emblica*
12. Kawalu	*Careya orbosea*

The mineral nutrient content of these varies from 0.42 to 0 98% of nitrogen, 0.12to 0.15% phosphoric acid ($P_2 0_5$) and 0.47 to 0.90% potash ($K_2 0$) and 0.20 to 0.80% of lime (Cao).

In recent years, however, very acute scarcity is being felt for green leaf in most arecanut growing tracts, particularly in Malnads, due partly to the ever increasing demands made on the forests by the increasing area under the crop, and mainly to forest land getting submerged in river-valley projects, or utilization of such lands for agricultural or industrial purposes. The recession of forest boundaries has also increased the cost of collection and transport of the leaves enormously. The growers are thus faced with the serious problem of maintaining the fertility of their garden, and many of them are gradually giving up the practice of applying green leaf. It is not necessary to state that this will result in deterioration of soil-fertility accompanied by fall in productivity of the crops.

Growing green manure crops inside the gardens however offers a very easy solution to this difficult problem. Trials in this regard conducted at the Regional Arecanut Research Station, Thirthahalli, which lies in the heart of the arecanut growing belt of the Malnad tract, have given very encouraging results. For a beginning, trials were conducted with the following leguminous green-manure and cover crops.

1. *Crotalaria anagyroides,*
2. *Crotalaria striata,*
3. *Tephrosia candida,*
4. *Pueraria phasioloides,*
5. *Calopogonium mucunoides and*
6. *Centrosema pubesens.*

(The first three in the list are green manure crops and the rest are cover crops)

Seeds of these were sown in the garden alloys every month from June to October. The sowings done in September and October, after the monsoon became light, gave the best results as regards germination and subsequent growth and stand of plants.

The acre yield (calculated) of green matter given by the above crops in the preliminary trials were as follows:

1.	*Crotalaria anagyroides*	37,605 lb.
2.	*Crotalaria striata*	29,063 lb.
3.	*Tephrosia candida*	10,380 lb.
4.	*Pueraria phasioloides*	4,935 lb.
5.	*Calopogonium mucunoides* and	17,390 lb.
6.	*Centrosema pubecens**	783 lb.

*The germination of the seeds was very poor in this case.

It can be seen that *Crotalaria anagyroides* and *Crotalaria striata* have given very high yields of green matter. These therefore appear very suitable to this tract. The former crop attained an average height of 18 ft., and the latter about ten feet. These, as well as the other crops, tolerated of the shade as well as the leaf-drips of the arecanut palms and the banana intercrops. They produced large quantities of fertile seed also. The crops are also relatively free from diseases and pests. To obtain maximum benefit, the crops are to be cut down when they are in full bloom. *Crotalaria anagyroides* and *Crotalaria* striata took about eight months to attain this stage in these trials. Further studies on the yield of the crops and their economic life are being continued, but the above trials have brought out that green manure and cover crops can be grown very sncccssfully in arecanut gardens under Malnad conditions.

The accompanying photo shows a view of the garden under *Crotalaria anagyroides* and *Pueraria phasioloides* in the Arecanut Research Station.

Green manure and cover crops in arecanut gardens

The crop in the foreground is *P. phasioloides* and in the background *C. anagyroides*

It has to be stated here that growing green manure crops does not in any way interfere the cultural and spraying operations or movement of men within the garden. As stated above, the seeds are sown in September-October, by which time most of the cultural operations would be over, and the crop is cut down in May-June, well before the commencement of the second round of cultural operations or spraying operations.

Besides enriching the fertility of the soil, the green-manure and cover crops help in keeping down weed-growth in the garden and thus reducing expenditure on this operation.