

realising at the present high price of jaggery about Rs. 1,000 per acre. There is no crop so profitable as Mauritius sugarcane for South Canara ryots who have the facilities for growing it.

The economical method of jaggery preparing has solved the fuel difficulty which was standing in the way of the extension of cane cultivation in the district. Hard rinded Mauritius cane is well suited to the hilly district of South Canara where jackals are causing much damage to soft rinded local canes. In addition to 600 acres of Mauritius cane which was originally supplied by this Department, grown in the current year, there are over 150 iron mills in the district and the old method of jaggery making is becoming a thing of the past.

The Arecanut Palm in Malabar.

The arecanut or betelnut is the most beautiful of the palms. Its long, straight stem and graceful green leaves are sure to arrest the attention of any passer by. In regard to its utility it is not an unimportant plant. In Malabar the uses to which the palm and its produce are put are many. The trunks of old trees are used as reepers and beams in the construction of houses and sheds. The leaf sheaths are made use of in various ways for making caps which the Malabar coolies wear during day time, for making baskets to bale out water from wells and as ropes in thatching houses with coconut leaves. From the leaf-lets are made brooms. The nut is well known and there is hardly any Indian house where it is not used on ceremonial occasions. It has very valuable medicinal properties.

The palm is distributed all over Malabar but nowhere is it so extensively cultivated as in the red soil tract of the Ponnani Taluq where a total area of 10, 577 acres was recorded in Fasli 1324. The high lying paddy fields and valleys of hills are being converted into areca topes every year and the cultivation is therefore on the increase.

It is propagated by seed. Ripe nuts are gathered from old trees and are kept in shade for a few days before sowing. Seed beds are

dug well, a fine tilth is obtained and powdered cowdung and ashes are applied. The nuts are buried a foot apart and watered on alternate days. The germination takes place in 45 days. The seed beds must be clean from weeds. The seedlings are fit for transplanting when 2 to 3 years old.

The land selected for the plantation is cleared of all vegetation. Holes $2\frac{1}{4}$ ft. deep and $2\frac{1}{4}$ ft. by $2\frac{1}{4}$ ft. are dug at intervals of 6 ft. to 8 ft. sometime before the North-East monsoon ceases and the land gets hard. During the hot weather the holes are partially filled with rubbish, which is burnt to ashes. Seedlings are planted in April-May, June-July or November. The June-July planting is more universal. When the plants grow to 25 years old second planting is done in the inter-spaces to keep the plantation going.

This palm readily responds to liberal manuring and the produce shows the care bestowed on it. No initial manuring is given. Some cultivators manure their gardens on three occasions i. e. in July, November and March. The second manuring is very often neglected. A mixture of green leaves, cowdung and ashes is the manure used the quantity increasing with the age of the plantation. The difficulty of manuring is increasing as the supply of green leaves has been getting less and less. This defect may be remedied by raising a green manure crop before the South-West monsoon is in full swing. This serves an additional purpose of keeping down weeds also which spring up luxuriantly in the season.

Irrigation is an important item. It is expensive and laborious. It begins in December and is continued until the monsoon becomes regular. Irregularity in irrigation results in the shedding of nuts. The usual water-lifts in vogue are the picotta and the mhote. The former is used in small gardens of 500 trees or less and in big gardens the latter is in use.

The picotta is so fitted that 2 buckets can be worked at the same time. A bucket holds about 6 gallons of water. Two men for lifting, one boy or girl for guiding water are necessary and the work is done on contract at Rs. 5/- per mensem.

The construction of the mhote does not differ from that found at Coimbatore. But the wood and masonry works are not so substantial. The bucket is cylindrical in shape, is made of iron and has a leather mouth piece. The bucket varies in size with the cattle working. In some villages where good cattle costing Rs. 150/- to Rs. 200/- a pair are maintained buckets with a capacity of 20 to 25 gallons of water are used. Cattle are seldom available for hire for this work. Wells in these tracts are shallow, never more than 30 ft. deep and 10 ft. wide. A good well of this size costs Rs. 30/-. Even in the hottest part of the year most of the wells do not fail.

It is a very common practice to grow plantains between young arecanuts to provide shade. This crop gives an earlier intermediate return which helps in keeping down to some extent the cost of cultivation of the areca trees until they are able to pay. Also betel vine is trained to grow on the trunk of this palm and this is an extra source of profit to the owner.

The arecanut begins to bear in the seventh year of its planting and only in the tenth year it comes to full bearing stage. It bears for 45 years and may live 80 years or more. It flowers in February and in every month till July a flower spathe is thrown out. There will be 4 to 5 bunches of nuts on each palm and in a few cases 7 bunches even. A good bunch contains up to 400 nuts the average being 75 to 100 nuts. Thus a tree yields 300 to 400 nuts annually. The first picking commences in June, a few nuts being ready. Later the nuts increase in number with every picking. The bulk of the harvest takes place in October. Harvesting wages are paid in kind 2 nuts being given for every bunch plucked. An able bodied cooly will climb 100 trees in the busy season and earn about 400 nuts valued at 8 to 12 as. In a pretty old plantation harvesting is easier than in a young plantation that has just begun to yield as the climber in the former case can reach tree after tree by swinging.

The garden owner husks the nuts before he takes the produce to a market. A cooly gets 4 to 5 palms (1 palm=15 Re. weight) for every maund of husked nuts. About 1,500 shelled nuts weigh a local

maund of $37\frac{1}{2}$ lbs. A similar weight of dry nuts sells at Rs. 10/-. 3 maunds green are reckoned as equal to 1 maund dry. The process of preparing the nuts is done by merchants. There are several centres for this trade and the chief of them is Chalanin. The green nuts are sliced into different shapes and sizes to suit the requirements of different buyers of several purchasing centres and boiled and dried.

The cultivation charges for 500 trees for the 1st year will come to Rs. 90/- and later the amount will not exceed Rs. 60/-. Investment in the areca plantation is profitable as in normal years a block of 500 trees yields an annual profit of Rs. 250. But this palm like most other cultivated plants has its enemies too and in recent years the out-break of a most invidious disease popularly called "Mahli" is causing very severe loss to the garden owners. Some of the land owners who depend upon this crop for their maintenance have been brought to the verge of ruin on account of the continuous attack of this disease for a number of years. This disease is due to a fungus which enters into the green nuts and spoils them. This occurs during the heavy rains of June, July and August. Several remedial or preventive measures seem to have been tried of which the most recent and generally successful one is the spraying of the Bordeaux mixture on the cluster of nuts. Spraying has been done in several affected localities and still the practice has not spread to other places where the attack is very general. One may ask why? One reason is that the spraying has to be done on a clear day when the cultivator can be sure of a bright sun. Another reason is that during the spraying season the cultivator is out of funds and finds it difficult to employ labour. The first depends on circumstances over which the worker has little control. The latter is possible provided that there is organised effort on the part of the intelligent and willing ryots working in a body. This can be done through co-operative societies with this object in view where the members can buy a sprayer or two and a few chemicals for the purpose. Another way in which the society could be useful is in dispensing with the necessity for the present middlemen—the mopla merchants—who keep running accounts with

the growers by supplying them with necessaries and small luxuries from time to time and recovering the value in the shape of arecanuts at harvest time, of course at reduced rates. This deprives the arecanut growers of what profit they could otherwise get and keeps them always in a state of indebtedness to the moplas. If big merchants could in their own interest be more considerate and extend their sphere of beneficial influence over the growers direct by stocking chemicals and sprayers advancing what little is required by the growers at reasonable rates, they will get nuts of better and uniform quality which will ensure stability in trade.

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The principles of crop production.*

Up to 1840 farmyard manure held undisputed sway as a fertiliser. It was known that plants contained metallic constituents, and that certain metallic compounds were useful fertilisers, but in as much as organic matter was the chief constituent of plants, it is believed that organic manures must be the best. In 1840, Liebig taught that the true function of a manure was to provide mineral matter, the nature of which was to be deduced from the composition of the plant ashes. His prescriptions failed completely in practice; and the Rothamsted experiments showed that he had overlooked the role of nitrogen, and that the composition of the ash of the plant was no guide to the soil amendment required in any specific case. When artificial fertilisers were first introduced, it was maintained that the fertilising effect would not endure but experience disproved this, and experiments for over 60 years at Rothamsted have shown that good crops can be grown almost indefinitely by supplying sufficient nitrogen, phosphorus, and potash. Plot experiments by Wille in the sixties disclosed the nature of the fertilising elements required by a given soil, but his work was purely

*Lecture delivered before the Chemical Society by Dr. E. J. Russell.