Reprinted from
SCHOOL SCIENCE 3(4) : December, 1964

Around the Research Laboratories in India

Central Coconut Research Station

THE coconut crop is of considerable importance in international trade as a source of coconut oil and coir goods. In India where it is also a food crop its importance is all the more, particularly in the State of Kerala which accounts for as much as 10 lakhs of acres out of the total Indian acreage of 17 lakhs under the crop. The coconut industry which was occupying an important place in the economy of this country in the early years of this century fell into a very bad state of affairs during the severe economic depression that struck the world in the early thirties of this century. In order to rehabilitate the industry the Government of India constituted in 1945 the Indian Central Coconut Committee and made it responsible for the development of coconut cultivation, its marketing and utilization in India. The Committee lost no time in reviewing the research work already done in India and accepted the recommendations made on future work. Two Central Coconut Research Stations were set up, one at Kasaragod for carrying out fundamental work on the botanical, agronomical and chemical aspects of the coconut and the other at Kayangulam, (both in Kerala), for conducting investigations on the pests and disease aspects of the palm. The Madras Government's Agricultural Re-

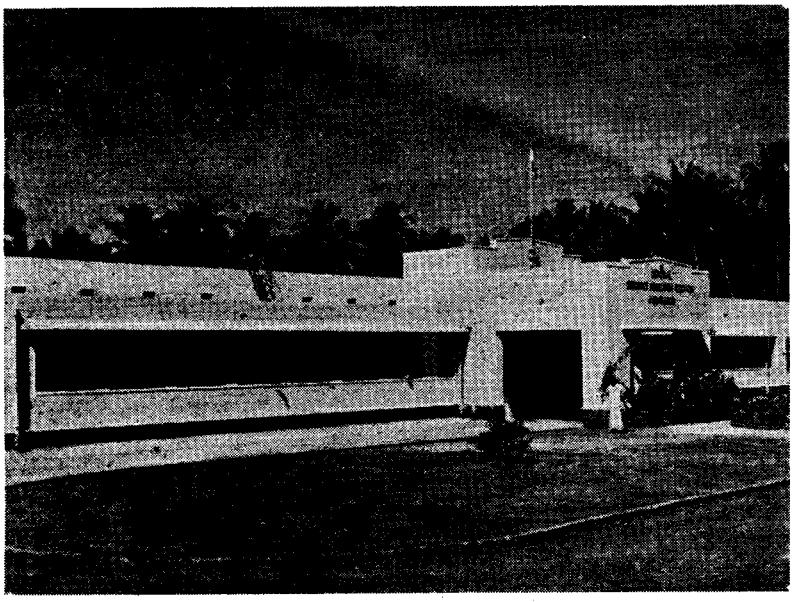

Fig. 1 The Central Coconut Research Station, Kasaragod

search Station, Kasaragod, which was in existence from 1916 was taken over and expanded with regard to area, additional staff and laboratory facilities. The Research Station is situated about three miles to the north of the Kasaragod Railway Station, and is now about 178 acres in extent. It has the unique advantage of having four different soil types, viz., white littoral sand, light sandy loam, red loam and laterite gravel. About 100 acres have already been planted while the rest are available for fresh planting which is now under way.

Research Work

The research work is being carried out in four sections, viz., Botany and Breeding, Cyto-anatomy, Agronomy and Chemistry.

Research work mainly of fundamental and applied nature is on the programme of the Station. In the Botany and Breeding section problems connected with the improvement of the crop by introduction, selection and hybridization are under investigation. Work in the Cyto-Anatomy section includes studies on button shedding and barren nuts, cytological and embryological investigations of the crop and allied aspects. The Agronomy Section is engaged in the investigation of the manurial, cultural and irrigation aspects, studies on green manure, keeping of flowering and fruiting records of trees, crop weather investigations, etc. In the Chemistry Section, soil survey of the coconut tracts of the West Coast, soil and tissue analytical studies with special reference to the nutritive aspects of the coconut under healthy and abnormal conditions and work on certain technological aspects of copra and coconut oil are under way. In short, all the agricultural aspects of the crop are receiving active attention.

Results of Research

Exotic varieties like Laccadive Ordinary, Laccadive Small, Straits Settlements, Fiji and indigenous variety Gangabondam are the types suitable for propagation in the West Coast.

Comparative study on the performance of Tall × Dwarf hybrids has shown that in annual out-turn of copra, the hybrids are better than random bred progenies of West Coast talls under Kasaragod conditions. In view of their early and heavy bearing characters they may also be propagated. For maximum production they should be heavily manured every year.

Study on natural cross progenies of dwarf has revealed that they are generally better than the artificial hybrids of Tall × Dwarf. Such natural progenies of dwarfs may be selected and planted wherever possible.

Regular cultivation and manuring of adult bearing palms has been demonstrated to be very necessary to maintain the yield at a high level particularly in soils deficient in plant nutrients. For most areas a manurial dose consisting of 3 to 4 lb of ammonium sulphate; 2 to 3 lb of superphosphate or bonemeal and 2 to 3 lb of muriate of potash would ordinarily be sufficient. In soils deficient in organic matter like sandy soils it is very necessary to apply a basal dose of cattle manure, compost or green leaves at 50 to 100 lb per tree per year.

Balanced manuring appears to be very necessary. Nitrogen is found to show its beneficial effect on early yield, i.e., in the

Fig. 2. The Coconut Nursery attached to the Station

third year itself but it has some bad effect on the quality of the nut. Potash on the other hand takes some time to influence yields but it has very beneficial effects on nut characteristics. Phosphoric acid has no pronounced effects on yield or quality of the produce.

Regular intercultivation of the coconut garden is very necessary to get maximum benefits out of manuring. Under West Coast conditions regular intercultivation by itself is able to increase yields even in the absence of manuring.

Among the different methods by which coconut gardens are intercultivated, the practice of piling mounds in August-

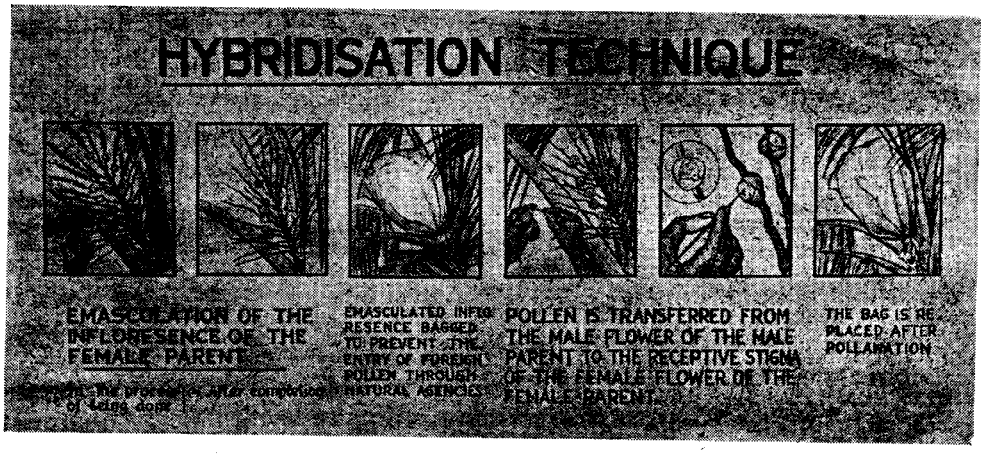

Fig. 3. The hybridisation technique as practised at the Station

September and levelling them in December-January is found to be more effective in increasing yields than digging, ploughing or forming basins, in red loam and sandy soils. Ploughing is, however, the cheapest of the operations.

Burying of dry coconut husks at 1,000 husks per tree in trenches 6′ wide and 15″ deep dug in between coconut palms has been found to be a very useful method of improving coconut yields under dry system of cultivation even in the absence of manuring. The effect of burying husks once lasts for about six years and the practice is remunerative in places where husk can be had cheap.

In littoral sandy soil areas along the sea coast, sea water can be used for irrigating coconut palms during summer months with very pronounced beneficial effects. No bad effects whatever have been noticed on the palms.

In sandy soil areas which are subject to considerable drought during summer months and where provision of irrigation facilities during such periods is a difficult problem, wilting of newly transplanted seedlings is of common occurrence. It has been shown that by burying husks in seedling pits at the time of planting or by mulching the pits with coir dust or saw dust according to availability, it is possible to reduce to a great extent the bad effects of drought. Provision of porous mud pots which need be filled up with water only occasionally as a source of moisture for newly planted seedlings has been demonstrated to be useful and to result in economy in the use of water.

A number of annual and perennial crops were introduced and studied for their suitability for being grown as green manure crop in coconut plantations. Among the annuals *Crotalaria striata* was

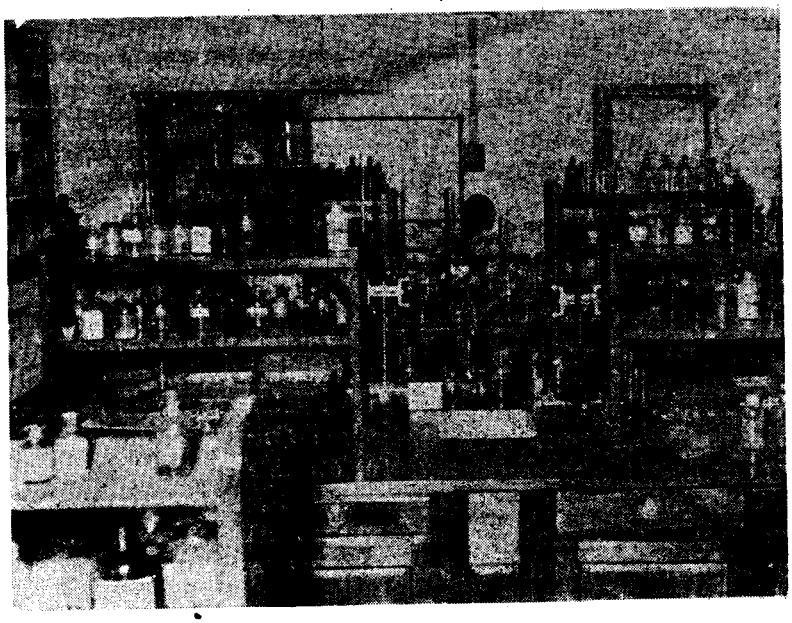

Fig. 4. Inside the Chemistry Laboratory

Fig. 5. Cultural operations in coconut gardens

found to be the best for growing in the plantations. *Gliricidia*, the quick growing green manure bush was found to be the most suitable for raising on the borders of the coconut plantation. Both have the very desirable property of not being relished by cattle. As a green manure cover crop *Calopogonium mucnoides* was found to be very promising.

Studies on the optimum pruning cycle of *Gliricidia* bush showed three months period to be the optimum on the West Coast. Pruning done in the months of June and September can be applied to the coconut palms while that of December can be put in cattle manure pits to prepare green leaf composts.

Storage studies of ripe coconuts showed that to store nuts without driage of nut water for a long period, the nuts are better stored in sand in the unhusked condition with the stalk end facing upwards. It was shown that husked coconuts can be stored up to eight months without driage by giving a thick coating of paraffin.

Common salt which is very widely used by coconut growers for application to coconut soils as well as to tops mixed with a little ash appeared from the results of both laboratory and field experiments to be without any significant influence on moisture conservation in the soil at the concentration at which it is usually applied. However, it does appear to benefit the soil by releasing some potash from the soil in an available form. Salt is not harmful to the coconut in any way when used in these concentrations.

Investigations on foliar yellowing in the coconut have shown that there is general improvement and amelioration in the case of trees which are supplied with a balanced manure application including N, P, K, Ca and the micronutrients.

Coconut materials such as leaves, petioles, spadices, trunks, etc., when left exposed to rain lose a good part of their valuable potash content due to leaching and so should be protected from rain when stored for fuel purposes so that the ash may retain its valuable potash moiety.

Studies on the mechanical drying of coconuts showed that the drying occurred in the falling rate period and a maximum of 70°C can be employed for producing good quality copra.

Sulphuring the copra was found to help to preserve the natural colour of coconuts and give at least partial protection from mould and insect attack and the sulphured copra had better preserving quality.

Studies on the 'rationale' of various household methods of storing coconut oil have shown that heating the oil after addition of substances like salt, jaggery, ripe plantain or cooked rice, etc., helped to minimise the development of free fatty acid in the oil during storage, and preserved better.

Other Activities

Besides regular research work, certain specialised units of studies are also attached to the different sections. Thus the soil survey unit is engaged in soil survey of coconut growing areas and giving useful advice to coconut growers. The coconut survey unit attempts to collect new and promising varieties and types from other coconut producing states in India. The meteorology unit regularly collects weather data from the Meteorology observatory attached to the Station. The statistical unit besides giving advice in the layout of experiments, collection, analysis and the interpretation of data, is also engaged in investigating the methodology of experimentation on the coconut crop. Under a Seednut Procurement Scheme about 2 to 3 lakhs of high quality seednuts are being collected every year from the Badagara and Tripura States. About 20,000 good quality seedlings are also being produced on the Station itself for supply to growers.

The Station is maintaining close liaison with the Community Development Departments and takes part in exhibitions, seminars and conferences organised by them from time to time. Short term training courses are also arranged both for technical people and laymen according to requirements. A popular advisory service is helping the growers to learn more about improved method of coconut cultivation. The findings of research are regularly published in the *Coconut Bulletin* and the *Indian Coconut Journal*.

The Station is thus actively engaged in a multi-phased programme of work to help to step up the production of coconut and make the country as far as possible self-sufficient.