

the annual holidays of the school, refresher courses could be conducted for the benefit of agricultural extension workers, with a view to give them opportunities to be in touch with the latest developments. Even other arts and science college staff-members and students can undergo this summer extension course. Besides all these activities in the school itself, there should be a regular set up of people attached to the school, and equipped with all the necessary propaganda material to go into the villages and explain the latest advancements in a popular language.

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## Recent Advances in Agriculture — their Importance to Coconut Industry

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**Introduction:** Considerable research work is being pursued on the theoretical and practical aspects of agriculture in the different countries of the world and results of practical importance are getting accumulated from year to year. Only careful study of individual problems can however reveal to what extent the results would be of practical applicability for the improvement of the crop concerned.

Systematic long-range applied research on coconut is of recent origin. Copeland has, in his well-known book, described the work done in the Philippines on the physiology of coconut in the earlier years. The four coconut Research Stations in the Madras State have contributed much valuable information on the development of the crop. A research Scheme on coconut was initiated in Ceylon in 1933. In 1929 the Department of Agriculture, Straits settlements and Federated Malaya States started research on Coconut products. Entomological work in Fiji has provided good examples of biological control. Research Stations in Indonesia carried out much work on coconut palms.

There is shortage of oils and fats in our country due to industrial advancement. It has been accepted that the main source of expansion in world fat supplies lies in extended development of the scientific cultivation of appropriate oilbearing plants. Coconut is one of the major oilseed crops of India. Hence the extension of research and the wide application of present knowledge to existing coconut lands would result in increased production of coconuts.

1. **Breeding:** In the principal coconut growing countries seednuts are selected from high-yielding mother palms that have other desirable economic characters. Because the male parent is unknown, and because the female parent is itself heterozygous, there is no guarantee that the performance of a high-yielding palm will be reproduced in its progeny. Selected palms should therefore be subjected to extensive progeny tests and subsequently crosses between proved parent trees should be planted, establishing a garden with pedigree trees. The value of this work is two fold. When the palms are established, the day to day requirements of planting materials of more superior geno-type than are supplied now can be released and simultaneously by a process of modified mass selection, a superior strain of coconut is evolved. With this end in view progenies of selected mother palms have been planted both in the Coconut Research Stations in the State and ryots' holdings to observe their plantation performance. In the meanwhile one can only recommend the use of seednuts from selected high yielding mother palms with other desirable characters; such nuts having at least a somewhat greater chance of giving superior progeny. It is on this basis that a large scale production of selected coconut seedlings has been undertaken at the Government Coconut Nurseries for meeting the large requirements of the growers in the State.

In the Coconut, two distinct varieties are met with viz., the Tall and the Dwarf. The Tall variety is a very desirable multipurpose palm yielding nuts, copra, oil and fibre of good quality, but it comes to bearing in about 7 to 8 years after planting. The Dwarf variety on the other hand, begins to yield early (i. e. 3 to 4 years after planting) but its nuts are small and the copra is of inferior quality. In order to synthesise new forms combining the desirable features of both the varieties, inter-varietal hybridisation had been carried out at the Coconut Research Stations in the State and a study of the progeny has shown that the hybrids of certain select parents are very vigorous and early bearers yielding nuts and copra of good quality. The production of such hybrid seedlings from select parents, though done on a small scale, is a regular feature of the Coconut Research Stations in this State at present. Besides the Tall variety of the west coast there are desirable exotic varieties like Andaman ordinary, Laccadive ordinary, Cochin China etc., which also possess economic characters and these are also being used for evolving new forms.

2. **Nursery:** An investigation under the coconut Research Scheme in Ceylon showed that there is little difference in weight, whether of total or of dry matter between a 7 months old seedling ready for transplantation and the original seednut. The carbon compounds in the food reserves of the seed are adequate up to the transplantation stage; the plant is also self-supporting in Nitrogen. By the time the roots of the seedling pierce the husk and reach the soil much of the potash salts get leached out if

there had been heavy rains and the residual potash would be inadequate. It was observed that application of potash fertilizers to nurseries at a convenient stage had a marked effect on seedlings growth.

Coconut nurseries are not generally manured as it is believed that the intrinsic qualities of the seedlings would be masked by extra nutrition due to manuring. However, nurseries raised in West-Coast where the rainfall is heavy need application of potash fertilisers to make available adequate quantity of potash for the satisfactory growth of the seedlings.

3. **Intercultivation:** Regular intercultivation (i. e. ploughing or digging with mammutty) is very necessary for coconut gardens as it has been proved at the Coconut Research station in Madras that it improves the yield of the trees to a remarkable extent. Conservation of soil moisture in the coconut soil is an important problem facing the coconut growers. Long periods of drought have been observed to affect the yield of coconut considerably. Studies made at the Central Coconut Research Station, Kasaragod have shown that the moisture content of the soil was more at all depths in the manured and intercultivated plot when compared to that of the "No manure, No cultivation" plot. It was also observed that the soil moisture went down to very low levels in the littoral sandy soil as the summer progressed. It is, therefore, very necessary to intercultivate the coconut gardens properly and regularly for increased production of coconuts. Recent experiments at the Coconut Research Station, Nilleshwar have shown that by growing *Calapogonium mucunoides* as a green manure cum cover-crop in the coconut gardens the soil moisture is greatly conserved and the trees do not suffer much during the hot-weather period.

4. **Manuring:** Unlike in annual crops and other perennial trees the effect of manuring on the yield of the coconut is noticed only after a period of 2½ to 3 years since this period is required for the development of the nuts, from the primordial stage to full maturity. Therefore ordinary chemical methods to determine the requirements and choice of nutrients for application would take much time to yield results of practical utility. The technique of using Radio-active isotopes to study translocation of nutrients and the extent to which they are taken up and utilised by plants offers great scope for rapid estimation of the requirements of the coconut palm growing under varied conditions of climate and soil. Further the new method of spraying nutrients and micro-elements to induce better growth and correct deficiencies has opened a new field of investigation with regard to coconut. To study this aspect of nutrition, work on coconut has been taken up at the Central Coconut Research Station, Kayankulam. It was found that the thick cuticle nature of the coconut leaves does not help the full absorption of the nutrient sprayed and hence only softer and younger leaves will have to be treated in the

investigations. Better and quicker indications of the response to the treatments are expected by spraying the micro-nutrients on young seedlings.

Manurial experiments carried out in Ceylon have shown that Potash is a dominant requirement of the coconut palm. The husks and nut water from plots receiving potash show a content of this element significantly higher than those from plots receiving none. From the possibility of its use as a diagnostic, the nut-water potash has received particular attention. In the study of Potash accumulation in husk and nut-water carried out in Ceylon this method of potassium estimation was adopted and it was found that the potash content of the nut-water increased linearly with the doses of potash applied. In recent times, tissue-test method has proved useful in the diagnosis of mineral element deficiencies in a variety of crop plants. At the Central Coconut Research Station, Kayankulam this method was tried in the case of coconut and it has been found very helpful in the estimation of major plant food ingredients and micro-nutrients contents in the leaves.

5. **Pests and Diseases:** (a) *Pests:* The most serious pests of the coconut palm are the Rhinoceros beetle, Red-palm weevil and Black-headed caterpillar. Though some effective methods of combating these pests have been recommended the unwieldy height of the trees and the large size of the plantations to be dealt with stand in the way of the control measures being adopted on an extensive scale by the coconut growers. Therefore quick-acting and practicable control methods would satisfy the growers to a great extent. The injection of Pyrocone E (1 per cent strength) into the crowns of infected palms by the gravitational method of Roach has been found very effective for the control of the Red-palm weevil pest. This method of control on account of its simple nature and deadly effect is becoming very popular among the coconut growers.

(b) *Diseases:* Among the diseases affecting the coconut palm the serious ones are Bud-rot, Stem-bleeding and Root-rot. Though the popular fungicide Bordeaux mixture has been found effective in the treatment of the major diseases of the coconut it is recommended for administration more as a prophylactic measure.

The new approach to plant disease control through internal immunisation and chemical cure has found success in the treatment of plants affected with vascular diseases causing wilts and bleeding and virus diseases. The possibility of curing the 'Root diseases' and the Leaf-rot disease of coconut by injecting chemicals has been explored at the Central Coconut Research Station, Kayankulam. Injection through cut ends of matured roots has been found very effective in coconut palms. Hence the chemical control methods offer great promise in the treatment of diseases like the Bud-rot, stem-bleeding and Root-rot of coconut.

Scientific advancement is quite essential for national progress. For an agricultural country like India it is much more necessary. The recent advances in scientific work stated above hold promise of giving rise to practical developments which would be of great interest to those engaged in coconut growing and the coconut industry in general.

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## Studies on 'Anthracnose' of French Beans

by

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**Introduction:** *Colletotrichum lindemuthianum* (Sacc. and Magn.) Bri. and Cav., which is responsible for the disease known as 'anthracnose' affecting french bean (*Phaseolus vulgaris* L.), Scarlet runner bean (*P. multiflorus* L.) Cowpea (*Vigna catjang* L.) and *Dolichos lablab* L.) enjoys wide distribution almost in all countries. But whether the disease on these hosts is due to the same fungus or to different races of it, or to distinct but related species has not been definitely established (Butler and Jones, 1949).

In this state 'anthracnose' of french bean is prevalent on the Nilgiris and the Palnis.

In India 'anthracnose' of *D. lablab* has been reported by Butler (1917). Subramaniam (1953) has described the same from Coimbatore and has identified the pathogen as *Colletotrichum lindemuthianum* (*Glomerella lindemuthianum*).

In order to determine whether the pathogens causing the two diseases in this State belong to the same species, investigations were undertaken and the results of these studies are presented in this paper.