Time Lag in Response of Coconuts to Fertilizer Application.

A. E. CHARLES,
Economic Botanist, D.A.S.F., Port Moresby.

Statements in the literature on coconuts frequently imply that no improvement in yield of mature palms can be expected in less than two to three years from fertilizer application.

A typical statement is that " in the case of a plant like the coconut palm, an increase in yield as a result of fertilizer application is manifested only from two-and-a-half to three years after application " (Menon and Pandalai, 1958). This statement is supported by arguments presented by Copeland (1931), although Copeland himself acknowledges that some response to fertilizer may show up earlier. He suggests that fertilizing may improve the vitality of the tree, and could thus influence yield in the first instance by the production of larger nuts, perhaps within six months of application. A second effect might be an increase in the number of nuts per bunch, which could show up after nine months. A third effect could be the production of a greater number of bunches of nuts, or in other words a more rapid succession of bunches. He then proceeds to show that there is a time lag of about two years and nine months from initiation of leaf and flower primordia to harvesting of ripe fruit, and deduces that maximum fertilizer response could not show up in a period shorter than this. He concludes that " data as to the effectiveness of application of any fertilizer are incomplete unless carried on for more than three years after the application ".

Copeland's arguments are sound, but they do not on their own warrant the conclusion that yield response will be evident *only* after two-and-a half to three years. Some components of yield could show a response much earlier.

Increase in the quantity of copra per nut would theoretically be possible within a few months of fertilizer application. This factor could increase yield quite substantially, since Ziller and Fremond (1961) have reported such increases of the order of 20 per cent. or more, although the data presented in their paper do not show how early this response became evident.

Increase in number of nuts per bunch should be possible in less than twelve months, since a proportion of shedding of fertilized female flowers seems always to occur in the first few months after setting. Menon and Pandalai (1958) review evidence as to whether fertilizing can reduce the proportion of button shedding, but information on this point is scanty. One report is quoted which indicated that fertilizer increased the number of female flowers per bunch rather than the proportion of fruit set. This report appears to have been based on observations some years after the commencement of fertilizing, when long-term effects would be established. It would therefore not preclude a short-term improvement in fruit setting during the period before flower numbers could be influenced.

Increase in frequency of bunch production might also be possible within a fairly short period. Trials on young palms shave shown increases in frequency of frond production resulting from cultural practices (Green and Foale, 1961 ; Ziller and Fremond, 1961). If the same effect occurred in mature palms it would be accompanied by increased frequency of bunch production.

Turning from theoretical considerations to practical results, there is substantial evidence that yield response can occur earlier than the third year after application of fertilizers. In experiments in Papua and New Guinea yield estimates have been made by six-monthly counts of maturing nuts on the palms, that is, of nuts which would fall and be harvested in the following six months. Some response to potassium fertilizing was evident in counts made twelve months after fertilizer application (Charles, 1959 ; Charles and Douglas, 1965) and the response reached statistical significance, and apparently its maximum level , in counts eighteen months after fertilizing. In experiments at Port Bouet (Ziller and Fremond, 1961) there was definite response in nut numbers in the second year after fertilizing,

and possibly some response even in the first year, since all plots receiving potassium showed higher nut numbers than the unfertilized controls. In a series of experiments in the British Solomon Islands Protectorate (Green and Foale, personal communication) where fertilizers were applied in August or October, significant increases in quantity of copra per nut and total copra production occurred in the calendar year following application of nitrogen in two experiments, and in another experiment significant increases in quantity of copra per nut, number of nuts harvested and total copra yield occurred in the calendar year following NPK application. In other experiments, significant responses to nitrogen, phosphorus or potassium showed up in the second calendar year after fertilizer application.

It is therefore evident that coconuts can show appreciable yield response to fertilizer treatments as early as the second year after application, and there is some indication that response to a given level of fertilizer may reach its maximum by the end of the second year. In practice, the stage at which response is detected would depend to some extend on the method of yield recording used, as shown in the diagram.

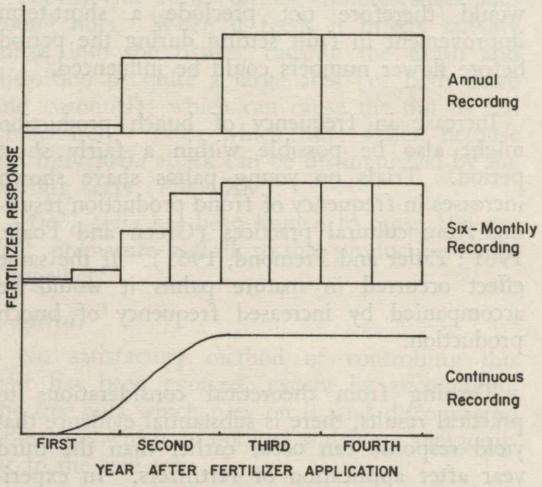

Diagram to show influence of recording frequency on time lag in detecting fertilizer response.

From this it may be deduced that initiation of flower primordia must be of little or no importance in at least some cases of fertilizer response. For the producer, the significant aspect is that he can expect some return from investment in fertilizers in the second year after application.

Summary.

Evidence is presented that coconuts can and do show yield responses within two years of fertilizer application.

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