SEX LIFE OF THE COCONUT PALM*

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TWO methods of improvement of the coconut palm are by selection and controlled pollination. A large amount of work has been already done on palm selection and seedling selection and the results have been published elsewhere. It has been demonstrated that there is a definite response to seedling selection and that the yield of copra per acre of selected palms out-weighs a similar area of unselected palms. This method of improvement has its own limitations. It is known that every seedling is not similar to the mother-palm from which the seedling was derived. If ten nuts of a single bunch are planted out, the resultant seedlings are not all alike. A visual difference in young seedlings is the variation in colour of the leaf stalks. These differences are related to the behaviour of sexual phases in the palm and how they are brought about are explained in this paper.

In the breeding of either animals or plants certain desirable characters can be transmitted to the progeny and adapted to a wide variety of uses by controlled mating or pollination. Controlled pollination requires the introduction of pollen from the male flowers on to the female flowers by artificial methods.

As a preliminary step in undertaking controlled pollination work, three types of palms commonly grown in the island were examined for the behaviour of their flowers. The dwarf, King Coconut and the tall variety palms are all distinct in habit. The dwarf, locally known as " Kundira," has a short trunk and first flowers in 3½ to 4½ years and the economical life period is not more than 30 years. The tall type takes 6 to 7 years to flower and remains productive for over 70 years. The King Coconut, commonly called " Thembili," is intermediate in habit between these two types and is largely grown for the pleasant beverage, derived from the tender nuts.

The Inflorescence or Fruiting Branch

In flowering plants, sexual reproduction is carried out in the flower. In the coconut palm these flowers are grouped together to form an inflorescence, enclosed in a spathe, which appears in the axil of every leaf. Spathes open at four-weekly intervals in succession, the older ones first and the younger ones later. Thus every year approximately twelve inflorescences open. Each inflorescence carries both male and female flowers on spikelets; the former are at the upper end of each spikelet and the latter at the base (Fig. 1 A). The number of female flowers per fruiting branch varies from 0 to 100 ; 20 to 30 being quite common. Normally only about 30% of these female flowers develop into nuts, and the remainder drop off prematurely.

The Male Flowers.—In the tall palms, a few male flowers open soon after the bursting of the spathe, but in dwarf and King Coconuts, instances have occurred when the first flower did not bloom until a week after the opening of spathe. Open male flowers do not remain on an inflorescence for more than one day ; generally they open in the early hours of the day and are shed the same evening. The male flowers near the apex of each spikelet open earlier than those in the middle. The male phase, when pollen is available, is the period from the opening of the first male flower to that of the last within an inflorescence. In all the three varieties examined the male phase lasted from 18-22 days.

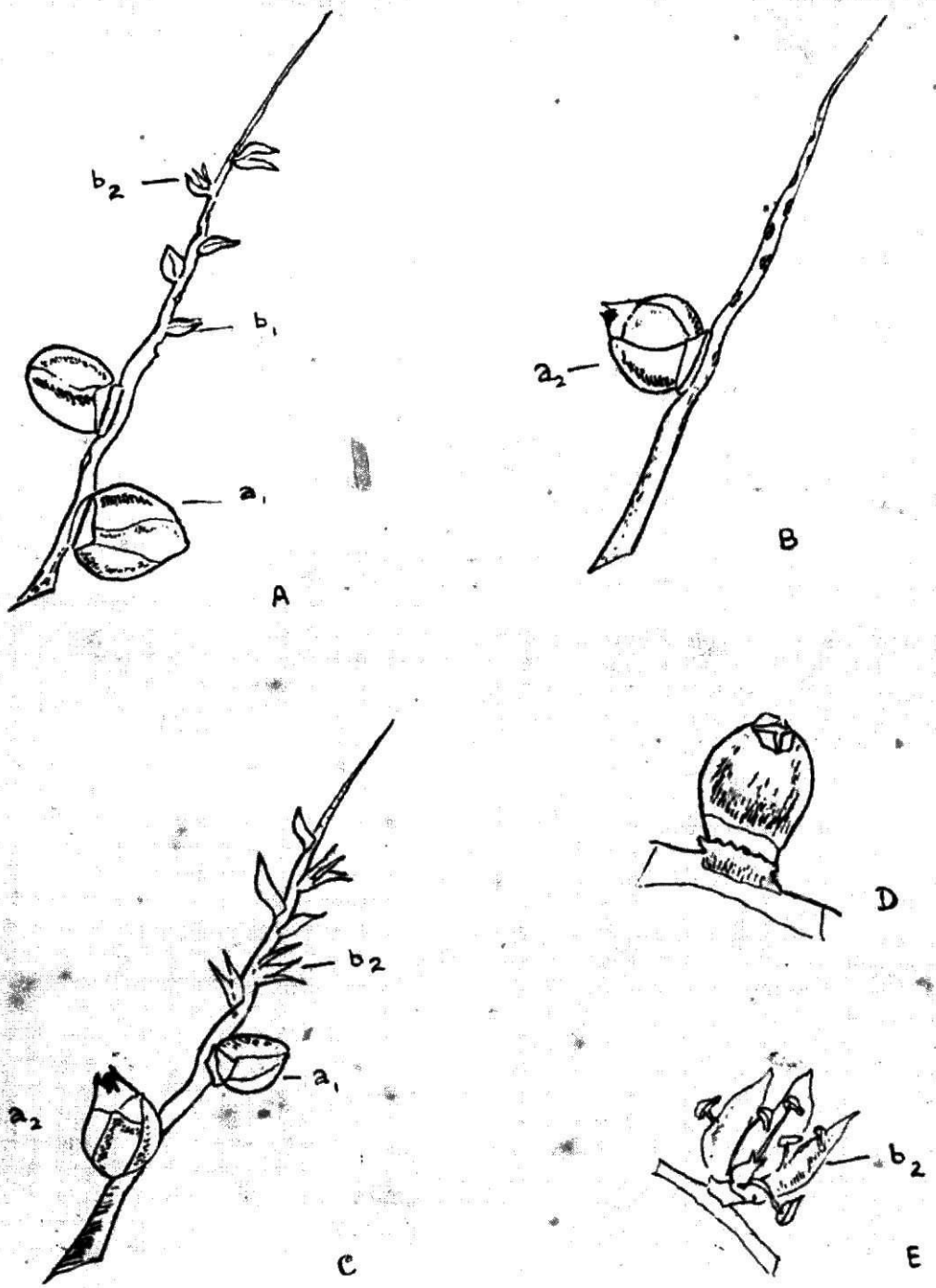

Fig. 1. **Coconut Flowers.** A & B: spikelets of tall variety palms; C: spikelet of King Coconut palm: D: receptive ovary (after removal of surrounding lobes); E: open male flower.

a_1—unreceptive female flower,

a_2—receptive female flower,

b_1—close male flower,

b_2—open male flower.

The Female Flowers.—The essential part of a female flower, the ovary, which generally develops into a nut is enclosed within six lobes at an earlier stage of the flower. As the flower matures, the ovary emerges through these lobes, and subsequently a juice is excreted through three short white protusions, called stigmas (Fig. 1D). It is at this stage that the female flower is prepared to receive pollen from the male flowers. With the completion of this phase, the colour of the stigmas change from a whitish to a brownish shade and simultaneously exudation of the fluid ceases. About eleven months later the nut is ready to be picked ; in other words, approximately twelve months after the opening of the spathe.

The receptivity of individual female flowers of dwarf, King Coconut and tall variety palms varies from 2 to 4 days. The receptive period of the whole inflorescence, however, lasts from 5 to 7 days in the tall variety palms and from 10 to 16 days in the other two types. In the King Coconut and dwarf, female flowers become receptive from the date of bursting of spathe, whereas in the tall variety palm, the receptivity of female flowers occurs nearly 21 days after opening of spathe.

The Overlapping of Male and Female Phases

This phase of development is very important in any plant for on it would depend to a large extent the quality of progeny. In the tall variety palms, as indicated earlier, the male phase lasts about 18 days but the female phase commences only about 21 days after opening of spathe. In other words, by the time the female flowers on an inflorescence are receptive the male flowers have been completely shed and thus no pollen is available for their pollination from the *same* inflorescence. (Fig. 1—A and B). Further, the next spathe generally opens a few days later, by which time the female flowers of previous inflorescence have passed the receptive stage. The female flowers thus have to look to another palm for the male parentage. Pollen carried by air would stick on to the wet stigmas of female flowers. This pollen is cosmopolitan, *i.e.* derived from many inflorescences. Thus all female flowers on one inflorescence do not receive pollen from a single palm. Hence the nuts are of mixed origin and the resultant seedlings would vary considerably. This explains why the seedlings from selected high-yielding palms are not always true to type.

Dwarf and King Coconuts are quite different. The male and female phases occur at the same time ; female flowers become receptive soon after the opening of spathe when pollen is available from the open male flowers of the *same* inflorescence (Fig. 1—C). The male phase is completed only after all the female flowers have passed receptivity. Thus both male and female parentage are of the same stock and the progeny would be more true to type.

Yet contamination also occurs in these two varieties as coconut pollen is carried by insects and air. This explains why when the golden yellow coloured King Coconuts are planted, some seedlings may turn out to be of the green variety. It is possible that the receptive female flower on the King Coconut palm may be fertilised with pollen, either insect or wind-borne, derived from a neighbouring green tall variety palm. This nut may produce a seedling distinct from the female parent. Such seedlings are generally healthier than the self-pollinated ones and exhibit what is called " hybrid vigour."

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* This paper is the popular edition of an article by the author on "Preliminary Studies on the Floral Biology of Coconut Palms," appearing in the Tropical Agriculturist—4th Quarter 1949.