CYTOLOGY OF AN ABNORMAL COCONUT PALM

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A COCONUT palm (*Cocos nucifera* L.) showing defective fruit set was subjected to cytological analysis. This paper reports the deviations from normal cytological behaviour of this palm during meiosis.

MATERIALS AND METHODS

An abnormal plam in the progeny of a self-pollinated New Guinea palm at the Central Plantation Crops Research Institute, Kasaragod, was used for this study. The palm is fourteen years old, but no fruit set was recorded in this palm. Feulgen squashes of the root tip chromosomes pretreated with 0·002 M 8-hydroxy quinoline was used for the study of somatic chromosomes. For the study of meiosis, flower buds from the third inflorescence above the one that has opened were fixed in Carnoy's fixative (6 : 3 : 1) containing a trace of iron acetate. Analyses were carried out from temporary acetocarmine preparations. Pollen sterility estimates were based on acetocarmine stainiability.

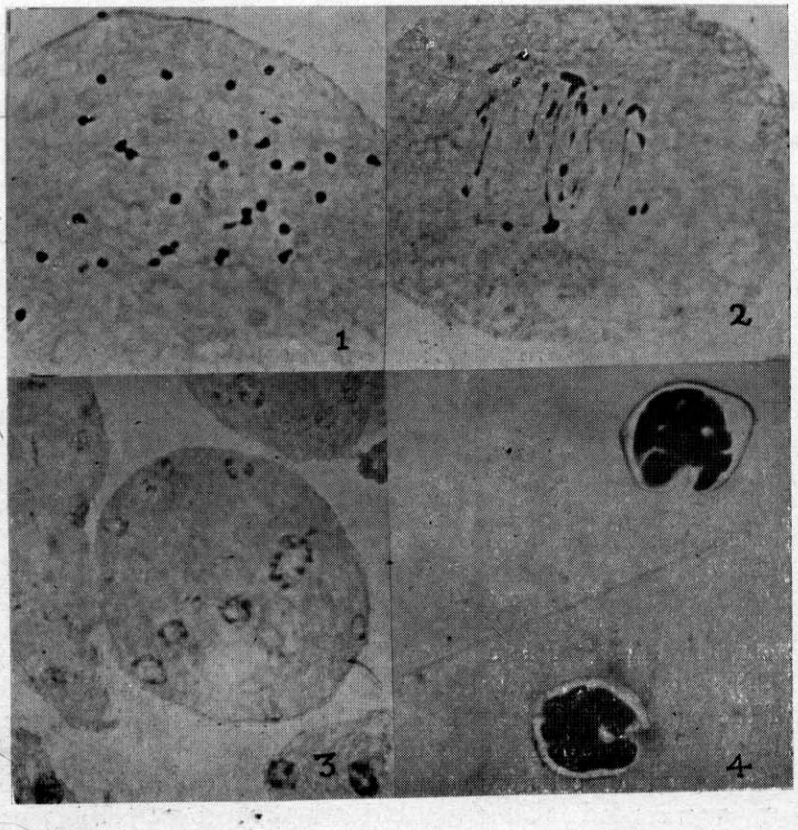
RESULTS AND DISCUSSION

The chromosome complement of *Cocos nucifera* is n=16 as reported by Santos (1929) and subsequently confirmed by several workers. Root tip squashes of the palm investigated showed 32 chromosomes. Thus, the somatic cells showed a normal chromosome complement.

The pollen mother cells underwent both the meiotic divisions; however, aberrations were recorded at all stages and in nearly all the pollen mother cells examined.

Deviations from normal pairing was observed at pachytene. At diakinesis and metaphase I, about 65% of the cells showed 32 univalents (Fig. 1) and 28 per cent exhibited 3 or 4 bivalents with the rest as univalents. Of the total number of cells examined, 5% were having 32 bivalents. About 2% of cells showed stickiness of chromosomes at metaphase I.

These abnormalities in the early stages of division were reflected in subsequent stages also. At anaphase I, 71·7% of the cells showed sticky bridges (Fig. 2), whereas inversion bridge was noticed in only one cell. At anaphase I and II, 23·4% of the cells contained laggards and 4·7% exhibited irregular spindle formation. During telophase II, almost all the cells showed more than four daughter nuclei (Fig. 3). Up to 25 daughter nuclei were observed in telophase II. At the end of meiosis, 28·2% of the pollen mother cells contained more than eight spores (Fig. 4). Octads (23·7%), heptads (18·9%), hexads (15·8%) and pentads (9·5%) were of common occurrence. About 3·4%



A note on the cytology of an abnormal coconut palm.

FIG. 1. A cell with 32 univalents at metaphase I. × 2000.

FIG. 2. Multiple bridge at anaphase I × 2000.

FIG. 3. Telophase II showing more than four daughter nuclei. × 760.

FIG. 4. Sporads with more than four spores. × 760.

of the cells showed monads also. Tetrads were observed (0·4%), but all the spores in one tetrad were not uniform in size. All the pollen grains were sterile.

One of the interesting facts noted here is that the plam under study is the selfed progeny of a selfed plant of New Guinea variety. Another progeny of the same mother palm also showed complete meiotic irregularities as well as complete pollen sterility (unpublished data). The mother palm itself, which is in the generation S_1, showed a high degree of meiotic irregularity (unpublished data). These irregularities in this naturally cross-fertilized species can be ascribed to inbreeding depression. Meiotic irregularities accompanying inbreeding in a normally cross-pollinated species have also been reported in many

plant species such as rye (Lamm, 1936; Muntzing and Akdik, 1948), *Dactylis glomerata* (Myers and Hill, 1943) and coconut (Nambiar and Swaminathan, 1960).

Summary

Studies on the course of microscoporogenesis in the progeny of a self-pollinated New Guinea palm revealed highly aberrant meiosis. The sterility in this palm has been attributed to inbreeding.

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