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A note on the abnormal developments in an oil palm

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MOST palms are arboreal and possess an unbranched columnar stem ending in a crown of leaves. An interesting oil palm, *Elaeis guineensis*, growing in the premises of the Central Coconut Research Station Kasaragod is seen to be producing branches, Figs. 1 and 2 and is described below.

THE STEM

Blatter (1926) has described the stem of oil palm as unbranched, erect and clothed with old petioles. Sayeed (1955) has made some preliminary study of the oil palms planted in Coconut Research Stations at Kasaragod, Pilicode and Nileshwar. There are in all four oil palms growing at the Central Coconut Research Station, Kasaragod of which only one is exhibiting branching. The palm is more than twentyfive years old.

The stem has attained a height of nearly two and half metres and a diameter of half a metre. It is covered with old petiole bases. The palm at present possesses six branches arising from all around the stem at different levels. The cut ends of seven branches can be spotted out on the lower part of the stem. On the whole thirteen branches have appeared so far on the tree. The branches arise from the axils of leaves on the main stem. They are formed in acropetal succession with the younger ones towards the apex. The growth of the main stem is rather slow towards the apex and hence the branches are crowded at the top. The branches are short, the longest branches now present being 45 cms. in length and 30 cms. in girth. The development and persistence of the branches might have caused the retardation in growth of the main stem. Domination by the lateral axes and subordination of parent shoots to lateral ones are not quite uncommon in plants, Arber (1950). Each branch in this palm is polycarpic and is capable of producing

inflorescence from the axils of the leaves. The terminal part of the branches continues to grow producing new leaves, and up to 43 functioning leaves have been noticed in one of the branches.

INFLORESCENCE OF AN ORDINARY OIL PALM

In the oil palm, as is the case with many other palms, the inflorescence is produced from the axil of the leaf on the main stem subtended by two spathes, the outer being larger and broader and the inner smaller. The spathes are tough and coriaceous and they cover the inflorescence in the younger stage. The inflorescences are generally unisexual though bisexual ones also occur. The male spadix (Fig. 3 A) is robust, the flowering part forming an ovoid mass rarely oblong or spherical and often compressed. It is 15 to 25 cms. long, 13 to 18 cms. broad and 7 to 10 cms. thick with many spikes bearing densely imbricate flowers. Spikes are brown, cylindrical or flattened by mutual compression and are 10 to 15 cms. long. Flowers are very numerous, densely arranged in longitudinal rows. The peduncle of the female spadix (Fig. 3B) is shorter than that of the male, inflorescence more massive and sometimes more spherical, though slightly compressed and 15 to 45 cms. long and 10 to 15 cms. broad. Flowers are much larger than the male. Branches are about 100 to 150 each bearing 6 to 40 flowers. Bracts are small whitish yellow or greenish, about 6 millimetres long and terminated by a spine which reaches beyond the flowers.

ABNORMAL FEATURES OF THE INFLORESCENCE IN THIS PALM

Inflorescences in this palm are produced on the branches from the axils of the leaves. Very rarely they are produced on the main stem also. Both the male and female inflorescences are much smaller, being nearly half the size of that of a normal palm. Each inflorescence is subtended by two spathes. The peduncle is clothed with bracts. But the spathes give an appearance of reduced and deformed leaves. They are slightly foliaceous (Fig. 4). The basal part of the spathe forms a sheath around the peduncle. The middle region is solid, short, stalk-like, while the apical part spreads to the sides forming a laminar region. The lamina is split up into numerous rudimentary leaflet-like structures which are arranged in a plicate manner. The whole lamina has a corrugated appearance. Each 'leaflet' has got a small slender mid-rib. The margins

of the 'leaflet' are slightly united in the earlier stages, but they separate themselves later on. Some of the bracts towards the lower part of the peduncle also have a similar appearance though the others are long and acute. The outermost bracts in the male spadix in some cases are found to subtend a secondary spadix (Fig. 5) in the axil, thereby making the spadix a compound one. As we pass towards the inner region, the place of the secondary spadix has been occupied by a single spike of male flowers. There is no notable difference between the spadix produced on the main stem and that produced on a branch as both exhibit similar abnormalities.

Three types of spadix occur in this palm. Some are male, some female and the remaining ones monoecious with male spikes at the base and female spikes towards the apex. The male bunches produced are many times greater than the number of female bunches. Though a larger number of female flowers are produced in a female bunch, nearly 70 to 80 per cent. of them remain undeveloped and barren. A mature, well developed nut is a little smaller than an arecanut.

BRANCHING IN PALMS

Branching, though a rare phenomenon in palms, has already been recorded in palms like coconut, palmyra, arecanut and date. More than one shoot may arise from the nut consequent on the fertility of all the carpels in the nut when it is polycarpy or on the development of more than one embryo in the ovule when it becomes a case of poly-embryony. In these cases the shoots arise from the seed itself. Branches in soboliferous species may be produced from lateral buds formed one after another. Here the buds are produced at the base and the tree on the whole will have the appearance of a bush. Suckering has been recorded in certain cases of coconut also, Davis (1956) and Aiyadurai (1959). In all the above cases the branches are restricted to the underground portion of the stem or produced from the basal part of the stem near the surface of the earth. Branching is not confined to the basal part of the stem, but they occur on the aerial parts also. Entire spadices and individual flowers of some palms proliferate sometimes to produce vegetative shoots-bulbils. It consists in the metamorphosis of an inflorescence into a shoot. Petch and Gadd (1923) are of the opinion that this conversion of the inflorescence into an axis bearing normal leaves is not uncommon but these abnormal inflorescences

die soon. Dichotomous branching among *Hyphoene*, an African palm, is a well-known fact. Real ramification has been noticed in coconut, palmyra, date and arecanut palms by Davis (1950). Branching in palms may be due either to hereditary factors or accidental happenings.

BRANCHING AND ITS ADVANTAGES

There are instances of palms where lateral branches are produced through axillary buds even though apical original stems are uninjured and continue their normal growth, Morris (1892), Ridley (1907). The mode of branching in some species of *Hyphoene* is due to the occasional growth of single axillary bud, the development of which soon equals that of the parent axis and causes the deflection of the latter so as to give a forked appearance. Davis (1950a) and (1956) described the branching of coconut palm consequent on the development of the axillary buds at close intervals one on either side of the main stem. In almost all monocots the basal part of each leaf forms a sheath which surrounds part of the stem above the node to which the leaf is attached. In many cases the sheath is very rigid and protects the stem which it surrounds. There is a bud at each of the closely packed basal nodes. In bearing palms, the buds develop into inflorescences. In very rare instances the axillary buds instead of growing into flower bunches develop into small seedling-like shoots–bulbils, Davis (1948) (1948a). These bulbils die and fall off though after a considerably long stay. They do not develop into permanent branches. Holttum (1955) suggests that single stemmed palms must be propogated by seeds, but if one could stimulate the suppressed basal buds to develop, vegetative propogation would be possible and this might be of great assistance in the breeding of such palms, two of which are of great importance in world economy – coconut and African oil palm. In the tree discussed here, some of the axillary buds have become active due to some undetected reason and branches have developed from them. Lower ones have developed more or less into permanent branches which have attained sufficient growth and are productive also. They have already passed 8 to 10 years and are continuing their growth producing numerous leaves and flower bunches.

One of the bunches is aerial-layered for separation of it for vegetative propogation.

Branching in palms is a very interesting phenomenon which is

economically desirable also. Increase in yield can be obtained with less planting space. The palm is under detailed study for further observations on the peculiar phenomena of branching, incidence of multispatheate condition and formation of foliaceous bracts.

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