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Histological studies on inflorescence development in coconut (*Cocos nucifera* L.)

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Coconut, a monocotyledonous crop with a very long life span, starts flowering 4-6 years after field planting. A palm produces a spadix at each leaf base splitting one per each month. Selection of explants (anther, microspore and ovule) at the correct maturity stage for haploid culture is extremely difficult, without a thorough knowledge on the events that take place during inflorescence development. Thus a detailed histological study on inflorescence development in coconut was undertaken to have a better understanding of the fundamental aspects of the formation of anther, pollen, ovary and ovule. A series of inflorescences from -1 (most mature but unopened) to -26 (most immature) maturity stages were collected from two coconut palms of the variety Sri Lanka Tall for histological analysis. The development of inflorescence in coconut is a very long process and the present study revealed that the developmental process comprises of a series of individual events. At -26 stage, the inflorescence primordial was present at its subtending leaf base. Within 4 months, the primary architecture of the inflorescence is complete with the formation of external and internal spathes and main rachis. Then the development of primary bracts (the protective organ of the rachilla) was continued for 5 months (-22 to -18), which was followed by the formation of rachilla, subtended by primary bracts. Floral primordia were visible in -14 stage and further growth of these primordia takes place in -12 and -11 stages. Once all the floral primordia were formed, the small inactive cell clumps present in them become mitotically active and initial stage of floral organ differentiation could be observed in -9 stage. The formation of perianth segments takes place in -8 and -7 stages. In -6 stage, initiation of sexual organ differentiation could be observed. Up to -5 stage, both pistillate and staminate flowers have identical features with highly active cells in the sexual organs (anther and ovary). The determination of the sex of individual flower buds takes place at -4 stage. At -3 stage, the development of carpels and ovules could be observed in the ovary where as the formation of anther and filament takes place in the stamen. The results revealed that fully developed ovules could be excised from pistillate flowers at -1 stage whereas anthers at -1 stage contain microspores with haploid nuclei. These findings are very useful in selecting suitable explants (at the correct developmental stage) for haploid culture in coconut.