D201

Differences in Chemical Compositions between Vascular Bundles and Non-Vascular Bundles of Cacao (*Theobroma cacao* L.) Hulls

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Cacao hulls were physically separated into vascular bundles (VB) and non-vascular bundles (NVB) to investigate their chemical compositions. Xylose content of VB was significantly higher (13.1%) than that of NVB (2.8%). Non-vascular bundles were composed of relatively high proportions of rhamnose, arabinose, and galactose and significantly rich in uronic acid (12.9%), suggesting less secondary walls in NVB. These data suggest that the high amount of glucose (21.4%) together with remarkable amount of xylose (13.1%) in VB is correlated with development of secondary wall formation. The pyrogram of VB clearly showedhigh intensities of guaiacol and 4-vinylguaiacol which are particularly characterized by guaiacyl units of lignin, together with low intensities of catechol and 4-methylcatechol which are the main products of condensed tannins. On the other hand, that of NVB showed opposite trends. These results were confirmed by alkaline nitrobenzene oxidation. In conclusions, predominant polyphenolic compounds in VB would be composed of lignin, while NVB might be tannin-like compounds. Therefore, the accumulation of different polyphenolic compounds in cacao hull is strongly relying on cell types, which have correlated with development of secondary wall.

D202

Crenate Leaf Development in *Salvia rutilan* L.

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Through the use of scanning electron microscopy, crenate leaf pattern, particularly abaxial surface, was studied in *Salvia rutilans* L. (Scrophulariaceae) to follow the formation of leaf margin and its surface features. In immature leaves, numerous folded leaf buttresses were formed regularly along the margin of the abaxial surface where crenate margins were to be developed. At each buttress, several types of trichomes and anomocytic stomata were distributed more or less randomly, whereas the abaxial leaf surface was heavily covered with many types of trichomes. Upon leaf blade expansion, however, the leaf buttresses soon unfolded and connected to each other through rapid cell division at the buttress bases. Once the leaf margin began to exhibit the crenation, early stage epidermal surface that were densely covered with an enormous amount of multicellular trichomes revealed the stomata and the ordinary epidermal cells with various glandular, as well as non-glandular branched trichomes. Transmission electron microscopy has been carried out to reveal the ontogeny and the nature of the leaf buttress at the cellular level.

D203

The Absence of Salt Excretion Structures in Four Chenopod Halophytes

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High concentrations of salts usually cause an ion imbalance and a hyperosmotic stress in most plants. Plants maintained at high soil salinity generally develop certain structures either to tolerate or to survive such an adverse environment. Excretion of ions by special salt glands or any excretion structures in this matter are mechanisms well-known for regulating the mineral content of many halophytic plants. However, four chenopod halophytes; *Sueda japonica*, *S. maritima*, *S. asparagoides*, and *Salicornia herbacea*, exhibited no signs of salt excretion structures internally or externally as inhabitants of high saline soils. Therefore, the current study has attempted to examine their ultrastructure and to reveal the cellular characteristics during their growth in salt tolerance. The most noticeable feature has been found in the epidermal surfaces. Cutinization has shown to be the heaviest on the outer walls of the upper epidermal surface where those walls are characterized by cutinized or suberized nature. Numerous vesicles and membranous invagination have been the most common feature in the cytoplasm. Traces of salts have barely been detected in most cases. Salt tolerance mechanisms in plants are to be discussed with respect to different plant modification to improve salt tolerance in various ways.

D301

The Ultrastructure of Spermatozoa of the Slender Catfish, *Paeudobagrus brevicorpus* (Teleostei, Siluriformes, Bagridae)

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The morphology of the spermatozoa from the testes of the catfish *Pseudobagrus brevicorpus* was studied by transmission and scanning electron microscopy. The spermatozoa of *P. brevicorpus* are approximately 82.250.06 ㎛ in length and relatively simple cells composed of a spherical head, a short midpiece and a tail as in most Siluriformes. The nucleus measuring about 2.000.02 ㎛ in length is depressed with a deep nuclear fossa of about 1.050.03 ㎛ in length, three-fifths of the nuclear diameter. The nuclear fossa contains the proximal and distal centrioles. The two centrioles are oriented approximately 150 to each other. The mitochondria are arranged in two layers and their number is 10 or more. They are separated from the axoneme by the cytoplasmic canal.The axoneme is the 9+2 microtubular pattern and has inner but no outer dynein arms as in other bagrids. The axonemal fins were the closed to axonemal doublet 3 and 8. The axonemal fins and lost outer dynein arm are shared in Bagridae and the deep nuclear fossa is shared in Siluriformes. The axonemal fins observed in Bagridae and Amblycipitidae of Siluriformes might be the apomorphic character in Ostariophysi.