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Electron Microscopy of the Lipid Accumulation in the Developing Cotyledon of Peanut (*Arachis hypogaea* L.)

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Abstract:

Fine structures in peanut cotyledons during development were observed using scanning and transmission electron microscopes. Lipids began to accumulate in the cotyledon at an early stage. The parenchyma cells contained large central vacuoles, small lipid bodies and rough endoplasmic reticulum (RER). In the middle stage, the small lipid bodies and RER rapidly appeared in cytoplasm and continued to increase until the final stage.

Developed RER formed a three-dimensional network structure. In a part of the developed RER network, dilated structures developed with numerous small vesicles. The observed dilated structures had RER terminals on the surface area with an average diameter of about $2 \sim 4 \times 1 \sim 2 \mu\text{m}$. Between the middle stage to the final mature stage, the small vesicles developed directly from the RER terminals and grew into lipid bodies. In addition, these small vesicles were seen to increase as a result of lipid accumulation within the parenchyma cells; however, the number of vesicles decreased in the final mature stage. Additionally, reserve proteins were deposited in smaller vacuoles formed by the subdivision process of the central vacuole. In the final stage, smaller vacuoles became protein bodies through the packing of proteinaceous materials. Numerous plastids containing starch grains were apparent from the early stage. By the final last stage, the amyloplast diameters were smaller than those of a broad bean. From the observations by scanning and transmission electron microscopes, developed RER networks, RER terminals and numerous small vesicles seem to be involved in lipid accumulation. We believe that the formation of lipid bodies occurs from the developed RER. In addition, calcium chloride was utilized for the fixation of peanut cotyledon tissue in this electron microscopical study.

Keywords:

Cotyledon, Lipid accumulation, Lipid body, Peanut, Rough endoplasmic reticulum, Ultrastructure

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