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Electron Microscopy of the Reserves Mobilization in Germinating Common Bean (*Phaseolus vulgaris* L.) Seeds

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Abstract:

The ultrastructure of the reserves mobilization in common bean cotyledon parenchyma cells during germination was investigated using scanning and transmission electron microscopes. At the first germination stage, the ultrastructural changes in cotyledon parenchyma cells were observed with the formation of small vacuoles from the protein bodies (about 5 μ m in diameter). These vacuoles developed to large vacuoles by fusing with each other. Large vacuoles were surrounded by developed rough endoplasmic reticulum (RER) and high electron-dense vesicles. During the middle germination stage, most of the parenchyma cells were filled with large vacuoles, and these cells had numerous high electron-dense vesicles and small vesicles. By observation with a transmission electron microscope, starch grain breakdown rapidly proceeded in amyloplasts from the middle germination stage. Additionally, the young plastids had small starch grains, and few inner membranes were observed during the middle germination stage. By the last germination stage, starch grains became smaller and eventually disappeared, and the young plastids progressed into mature chloroplasts. From the observations by scanning and transmission electron microscopes, the developed RER system, developed large vacuoles and numerous small vesicles seem to be closely related to the protein breakdown during the germination of common bean seed. In addition, starch breakdown proceeded to the last from the middle germination stage. The newly formed plastids with developed inner membranes were observed in the cotyledon with starch breakdown.

Keywords:

Common bean, Cotyledon, Electron microscopy, Germination, Plastid, Reserves mobilization

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