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[\[Full-text PDF \(4536K\) \]](#) [\[References \]](#)

Electron Microscopy of Plastid-Amyloplast System Involved in Starch Synthesis and Accumulation in Japanese Yam Tuber (*Dioscorea japonica*)

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Abstract:

The plastid-amyloplast system involved in starch synthesis and accumulation in the Japanese yam tuber was observed by electron microscopes. According to observation with a scanning electron microscope, the plastid was forming projections with localized stroma as plastid enlargement progressed. The amyloplast accumulated a starch grain, elongated and enlarged vertically to the projection. At harvest time, the projection sometimes contracted. According to observation with a transmission electron microscope, furrows or grooves were often observed at the surface of the starch grain adjacent to the stroma localized in the projection. In addition, the electron-lucent part was often detected between the starch grain and stroma in the projection. From the observations by electron microscopes, we suggest that amyloplast synthesizes starch and forms a starch grain in part of the projection. In the stroma, other structures could be found, such as invaginations of the inner membrane, high electron density membrane-bound inclusion bodies, crystalline inclusion bodies and aggregating granules. The invagination of the inner membrane is presumably associated with the transfer of assimilate into the stroma. We believe that these inclusion bodies contain the enzyme involved in starch synthesis, and that aggregating granules functions as temporary storage for assimilation products.

Keywords:

Amyloplast, Electron microscopy, Japanese yam, Plastid, Starch accumulation, Starch synthesis, Tuber

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