# Light-induced ultrastructure changes of amyloplasts and effect of nitrogen fertilization on greening in potato tubers (*Solanum tuberosum* L.)

**Haiqing Zhang, Zhuqing Zhao, Botao Song, Ping Du and Xinwei Liu**

Postharvest Biology and Technology, Volume 168, October 2020, 111275

## Abstract

Tuber greening causes potato quality decline and economic loss. We investigated physiological mechanisms of greening by fluorescence and transmission electron microscopy. We then explored the effect of nitrogen level (0, 210, and 315 kg N $ha^{-1}$) on starch granule size and tuber greening of three commercial cultivars. Results showed that chlorophyll content of tuber skin increased (5–8 times) in a quadratic manner with increasing duration of light exposure (0–7 d) in all cultivars. Light-induced greening occurred in cortical parenchyma 0–1.5 mm below the periderm, where chloroplast auto-fluorescence was evident under ultraviolet light. The greening process involved membrane lose, starch granule dissolution, and grana formation in amyloplasts, along with chloroplast development. Formation of grana lamellae was observed around amyloplasts with a diameter of 9–30 μm. Nitrogen application increased the percentage of small granule starch (<30 μm) in tuber skin and thereby promoted tuber greening under light in all cultivars. This study provides new evidence for the mechanisms of tuber greening and nitrogen management in potato.