Title An increase in the activity of 1-aminocyclopropene 1-carboxylic acid (ACC) oxidase is associated with yellowing of lime fruit (*Citrus aurantifolia*, Swingle cv. 'Paan')

Authors T.O. Win, V. Srilaong, K.L. Kyu and S. Kanlavanarat

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Abstract

The biochemical links between 1-aminocyclopropene 1- carboxylic acid (ACC) oxidase activity and chlorophyll degradation in lime fruit (*Citrus aurantifolia*, Swingle) are largely unknown. ACC oxidase importantly stimulates the deoxygenase step of chlorophyll degradation, especially at the onset of yellowing in lime peel. In this study, the activity of ACC oxidase was measured in the peel of lime harvested at 4 maturity stages during storage at 28±2°C and 72-81% RH and 13°C and 80-90 % RH storage. Exogenous application of ethylene, 10 $\mu L \cdot L^{-1}$ significantly enhanced ACC oxidase activity at the beginning of peel yellowing. Trace amount of ethylene 0.1 or 1.0 $\mu L \cdot L^{-1}$ also effectively stimulated ACC oxidase activity. The potent ethylene inhibitor, 1-methylcyclopropene (1-MCP) at 250 or 500 $nL \cdot L^{-1}$ suppressed ACC oxidase activity throughout storage. Treatments of lime with plant growth regulators, BAP (6-benzylaminopurine), GA_3 (gibberellic acid) and 2, 4-D (2, 4- dichlorophenoxy acetic acid) down regulated ACC oxidase activity. In contrast, IAA (indole 3 acetic acid) and IBA (indole 3 butyric acid) enhanced ACC oxidase activity from the deep green to the beginning of yellowing but its activity declined in completely yellow peel. Relative humidity had no influence on ACC oxidase activity at 28±2°C. A significant correlation between ACC oxidase and chlorophyll to chlorophyllide ratio in flavedo tissue of lime peel was observed in present work.