

Title Correlation of leaf senescence and gene expression/activities of chlorophyll degradation enzymes in harvested Chinese flowering cabbage (*Brassica rapa* var. *parachinensis*)

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Citation Journal of Plant Physiology, Volume 168, Issue 17, 15 November 2011, Pages 2081-2087

Keywords Chlorophyll degradation; Chlorophyllase; Mg-dechelataase; Pheophytinase; Senescence

Abstract

Chinese flowering cabbage is one of the main leafy vegetables produced in China. They have a rapid leaf yellowing due to chlorophyll degradation after harvest that limits their marketing. In the present study, leaf senescence of the cabbages was manipulated by ethylene and 6-benzyl aminopurine (6-BA) treatment to investigate the correlation of leaf senescence and chlorophyll degradation related to gene expression/activities in the darkness. The patterns of several senescence associated markers, including a typical marker, the expression of *senescence-associated gene SAG₁₂*, demonstrated that ethylene accelerated leaf senescence of the cabbages, while 6-BA retarded this progress. Similar to the trends of *BrSAG₁₂* gene expression, strong activation in the expression of three chlorophyll degradation related genes, pheophytinase (*BrPPH*), pheophorbide a oxygenase (*BrPAO*) and red chlorophyll catabolite reductase (*BrRCCR*), was detected in ethylene treated and control leaves during the incubation, while no evident increase was recorded in 6-BA treated leaves. The overall dynamics of Mg-dechelataase activities in all treatments displayed increasing trends during the senescence process, and a delayed increase in the activities was observed for 6-BA treated leaves. However, chlorophyllase activity as well as the expression of *BrChlase1* and *BrChlase2* decreased with the incubation in all treatments. Taken together, the expression of *BrPPH*, *BrPAO* and *BrRCCR*, and the activity of Mg-dechelataase was closely associated with the chlorophyll degradation during the leaf senescence process in harvested Chinese flowering cabbages under dark conditions.