

Title Climacteric level during fruit ripening influences lipid peroxidation and enzymatic and non-enzymatic antioxidative systems in Japanese plums (*Prunus salicina* Lindell)

Author Sukhvinder Pal Singh, Zora Singhand Ewald E. Swinny

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Abstract

Fruit of Japanese plum (*Prunus salicina* Lindell) cultivars show diversity in climacteric behaviour during ripening. Our objective was to study the influence of cultivar-specific climacteric behaviour on lipid peroxidation and antioxidative metabolism during fruit ripening in Japanese plums. Contrasting cultivars, ‘Blackamber’ (highly climacteric), ‘Amber Jewel’ (moderately climacteric), and ‘Angeleno’ (suppressed-climacteric), were harvested at commercial maturity and allowed to ripen at 21 ± 1 °C for 8 d. The lipid peroxidation, indicated by the increase in activity of lipoxygenase (LOX) and concentration of thiobarbituric acid reactive substances (TBARS), was lower in ‘Angeleno’ compared to ‘Blackamber’ and ‘Amber Jewel’ during the first 6 d of fruit ripening. Superoxide dismutase (SOD) activity showed an overall decrease during fruit ripening in all cultivars, but it remained lower in ‘Angeleno’ than in the other cultivars. In contrast, peroxidase (POD) activity was significantly higher in ‘Blackamber’ and ‘Amber Jewel’ than in ‘Angeleno’ during 4–8 d of fruit ripening. The advancement of fruit ripening caused oxidation of the redox buffers such as ascorbate (AA) and glutathione (GSH) resulting in increased concentrations of dehydroascorbate (DHA) and oxidized glutathione (GSSG) leading to a decline in the ratios of AA:DHA and GSH:GSSG, respectively. The activities of key enzymes involved in the ascorbate–glutathione cycle, ascorbate peroxidase (APX), monodehydroascorbate reductase (DHAR), dehydroascorbate reductase (DHAR), and glutathione reductase (GR) were also determined. The data suggest that the climacteric-type cultivars, ‘Blackamber’ and ‘Amber Jewel’, showed a faster decline in the enzymatic and non-enzymatic antioxidative systems, parallel to the faster rate of ripening and senescence, as compared to the suppressed-climacteric cultivar, ‘Angeleno’.