Abstract

This work characterizes the ripening physiology and postharvest behavior of saskatoon fruit. The efficacy of controlled atmosphere storage for slowing physiological and pathological deterioration of fruit was evaluated. A physicochemical characterization of saskatoons lead to the development of a nine stage maturity index system. The major carbohydrates in fruit were glucose, fructose and sorbitol, all of which increased during ripening. Succinate and malate were the predominant organic acids in immature and mature fruit, respectively.

Fruit ethylene content and ethylene evolution increased during ripening. Aminocyclopropane-1-carboxylic acid (ACC) application to fruit developing on the-plant hastened ripening, while application of inhibitors of ethylene synthesis delayed ripening. Ethylene synthesis in preclimacteric fruit was limited by ACC synthase and not ACC oxidase. Preharvest and postharvest changes in ethylene production during ripening differed but were consistent with that of climacteric fruit. Fruit displayed a respiratory climacteric on a whole-fruit basis while ripening on the plant.

An increase in oxidative metabolism accompanied ripening. The double bond index of polar lipid fatty acids fell as fruit developed from green to purple, reflecting a progressive increase in the saturation of membrane lipids. Products of lipid peroxidation, ethane and 2-thiobarbituric acid reactive substances increased in fruit during ripening. Lipoxygenase activity also increased, while superoxide dismutase and catalase activities decreased with development. Oxidized glutathione increased as a petcentage of total during ripening. Glutathione reductase and nansferase activities rose sharply during the final stages of ripening in response to the increasing oxidative stress.

Storage at 0.5°C was more effective than 4.0°C at slowing deterioration of ripe saskatoon fruit. A 2% O_2 atmosphere reduced ethylene production and respiration of nearly ripe to fully-ripe fruit. Of six atmospheres (0.035% and 5% CO_2 with 2%, 10%, or 21% O_2), 5% CO_2 with 21 or 10% O_2 were the most effective at maintaining fruit soluble solids, anthocyanins, firmness and fresh weight over eight weeks of storage at 0.5°C. Storage of fruit in 0.035% CO_2 and 21 or 10% O_2 resulted in the highest titratable acidity, lowest pH, and lowest ethanol concentrations. The high CO_2 atmosphere eliminated fungal colonization of fruit in all three O_2 treatments for at least eight weeks.