

## Abstract

Red raspberry (*Rubus idaeus* L.) fruit is characterized by rapid deterioration and short shelf life. Success of procedures to improve quality and extend postharvest life is limited by lack of knowledge about the inherent qualities of the fruit. The objective of this work was to relate the biochemical and volatile composition of red raspberries to cultural, maturity and storage manipulations.

Seven-year old 'Skeena' red raspberry plants were pruned to retain 4, 6, 8 or 10 floricanes per hill. The effects of floricane retention on yield (kg/ha), cold hardiness (-10C to -70C) and berry quality (anthocyanin, soluble solids, pH and titratable acidity) were investigated. Yield increased with the number of floricanes retained. Quality parameters varied with the year of data collection and the date of harvest but were not affected by floricane retention. Cold hardiness differences, where detected, were not consistent.

During fruit maturation, biochemical (anthocyanin, soluble solids, pH, and titratable acidity) and volatile compound composition were studied. Anthocyanin content and soluble solids concentration increased with maturation, while titratable acidity decreased. pH was stable throughout maturation. Soluble solids concentration increased while anthocyanin content decreased with advancing harvest dates. The number and quantity of volatile components varied with maturity. Eight components were identified: 3 aldehydes--acetaldehyde, propanal, and 2-methyl butanal; 2 esters--ethyl acetate and propyl acetate; 1 ketone--acetone; 1 alcohol--ethanol and 1 hydrocarbon--hexane. Ethyl acetate and ethanol exhibited consistent increases in concentration with maturation. Ethanol was the most abundant component at all maturity stages. Propyl acetate appeared simultaneously with the peak in propanal concentration at the inception of ripening, and increased while propanal decreased with advancing maturity. Acetaldehyde and 2-methyl butanal increased with maturity while acetone concentration remained approximately the same. Hexane was detected only at the processing ripe stage but its concentration was considerable. The effects of reduced oxygen and elevated carbon dioxide on the biochemical and volatile composition of fruits stored for 20 days were determined. Carbon dioxide treatment reduced anthocyanin accumulation, but all other biochemical factors were unaffected by treatment. The volatile compounds identified were the same as in the maturity study with the exception of the absence of hexane. High concentrations of ethanol and acetaldehyde developed in all treatments. Low oxygen treatment enhanced anaerobic metabolism, resulting in the greatest accumulation of ethanol and acetaldehyde. High levels of ethyl acetate were also associated with this treatment. Carbon dioxide treatment reduced accumulation of ethanol, a major product of anaerobic metabolism.