

#### Abstract:

Total tissue peroxide levels, lipid soluble antioxidant levels and antioxidant enzyme activities were monitored in 'Spartan' apples during treatment in air (21 kPa oxygen), 1 kPa oxygen and 100 kPa oxygen. Total peroxide levels were lowest and lipid soluble antioxidant levels were highest in apples during treatment under 100 kPa oxygen. The 100 kPa oxygen treatment also resulted in an increase in catalase (CAT) activity and reduced activities of peroxidase (POD), polyphenol oxidase (PPO) and superoxide dismutase (SOD) in crude extracts from whole apples. Slices made from this treatment developed the lowest level of browning and had the best firmness retention as compared with slices made from apples from the other two treatments. Apples held in the air treatment showed lower catalase activity, higher POD and SOD activities and similar PPO activity as compared with the 100 kPa oxygen treated apples. The 1 kPa oxygen treatment resulted in lowest catalase activity, high SOD activity, intermediate POD activity and the low PPO activity compared with the control treatment. A model is presented to relate these responses to effects on deteriorative processes responsible for quality loss in apple slices which were made from treated apples. The hypothesis is that short duration pretreatment with high oxygen induces an antioxidant acclimation in the tissue against active oxygen species thus preventing cellular breakdown after cutting into slices. This results in lower levels of cut surface browning.