

#### Abstract:

'Braeburn' apple fruit were held in low oxygen (0.5 kPa O<sub>2</sub> +0.05 kPa CO<sub>2</sub>) controlled atmosphere (CA) at 0 °C for two months, or sealed in polyethylene bags (Pa) at 20 °C for 10 days to obtain anaerobic conditions. Control fruit (CK) were stored in air at 0 or 20 °C. Activity of xanthine oxidase (XOD), NADH and NADPH oxidase, superoxide dismutase (SOD) and the incidence of physiological disorders were investigated. The activities of XOD, NADH oxidase were highest in apples stored in CA or Pa. SOD activity was similar in CA and CK fruit, but lower in Pa apples. Acetaldehyde (AA) treatment (120 ppm, at 0 °C for 24 h) prior to CA or addition of AA (1 ml of a 1% solution) to polyethylene bags stimulated NAD(P)H oxidase activity. AA pre-treatment resulted in lower SOD activity, and this response was detectable through two months storage in CA. The physiological disorder, internal browning, occurred in apples stored in CA or Pa, and the disorder development was enhanced by AA treatments. The results suggest that development of internal browning in 'Braeburn' apples may be associated with superoxide accumulation due to enhanced activity of XOD and NAD(P)H oxidase with reduced SOD activity under low oxygen or anaerobic conditions.