

Title Effect of curing at different temperatures on biochemical composition of onion (*Allium cepa* L.) skin from three freshly cured and cold stored UK-grown onion cultivars

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Abstract

Onions are cured in order to form a complete, dry, outer skin which reduces water loss and suppresses incidence of disease, and can promote a darker skin finish. Currently in the UK, standard curing practises for onions involves heating at 28 °C for six weeks (65–75% RH), however, reducing curing temperatures may help to reduce energy usage. There is little empirical data on the effects of curing temperature on flavonol concentration in the skin of brown onions and on flavonol and anthocyanin concentration in the skin of red onions. Therefore, the aim of this study was to elucidate the compounds responsible for the change in onion skin colour when cured at different temperatures. Brown cvs. Sherpa and Wellington, and red onions cv. Red Baron, were cured at 20, 24 or 28 °C for six weeks. Replicated skin samples were analysed immediately after curing and after seven months cold storage at 1 ± 0.5 °C. Measurement of objective colour showed that skin of cvs. Sherpa and Wellington was darker and had a lower hue angle (H°) immediately after being cured at 28 °C compared to 20 °C. In contrast, skin of cv. Red Baron had a higher H° but no change in lightness (L^*) when cured at 28 °C compared to 20 °C. Fructose, sucrose and glucose concentrations were analysed as they are thought to play a role in regulating the synthesis of flavonols and anthocyanins, both coloured compounds found in onion skin; however no significant correlations were found between colour data and sugar concentrations. Flavonols were measured in the skin of all cvs. and anthocyanins in the skin of cv. Red Baron. Quercetin glucoside and anthocyanin concentrations in the skin of onions cv. Red Baron immediately after curing were higher in those cured at 20 °C. Total flavonols and total anthocyanins were negatively correlated with H° in the skin of onions cv. Red Baron, but there was no similar correlation between total flavonols and H° for onion cvs. Sherpa and Wellington. This suggests that anthocyanins and flavonols may play a major role in varying skin colour of red onions cv. Red Baron cured at different temperatures; however, the difference between curing temperatures may not have been sufficient to represent a correlation between darkening of cvs. Sherpa and Wellington and flavonol concentration. Further investigation is therefore required to fully elucidate the compounds responsible for colour changes observed in brown onions.