

Title Modelling the effect of water immersion thermal processing on polyacetylene levels and instrumental colour of carrot disks

Author A. Rawson, A. Koidis, A. Patras, M.G. Tuohy and N.P. Brunton

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Abstract

C₁₇ polyacetylenes are a group of bioactive compounds present in carrots which have recently gained scientific attention due to their cytotoxicity against cancer cells. In common with many bioactive compounds, their levels may be influenced by thermal processes, such as boiling or water immersion. This study investigated the effect of a number of water immersion time/temperature combinations on concentrations of these compounds and attempted to model the changes. Carrot samples were thermally treated by heating in water at temperatures from 50–100 °C and holding times of 2–60 min. Following heating, levels of falcarinol (FaOH), falcarindiol (FaDOH), falcarindiol-3-acetate (FaDOAc) and Hunter colour parameters (L^* , a^* , b^*) were determined. FaOH, FaDOH, FaDOAc levels were significantly reduced at lower temperatures (50–60 °C). In contrast, samples heated at temperatures from 70–100 °C exhibited higher levels of polyacetylenes ($p < 0.05$) than did raw unprocessed samples. Regression modelling was used to model the effects of temperature and holding time on the levels of the variables measured. Temperature treatment and holding time were found to significantly affect the polyacetylene content of carrot disks. Predicted models were found to be significant ($p < 0.05$) with high coefficients of determination (R^2).