Growth temperature influences postharvest glucosinolate concentrations and hydrolysis product formation in first and second cuts of rocket salad

Jake Jasper, Carol Wagstaff and Luke Bell

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Abstract

Rocket salad species (*Diplotaxis tenuifolia* and *Eruca sativa*; also known as *E. vesicaria*) are known for their high concentrations of health-related isothiocyanates, which are derived from secondary metabolites called glucosinolates. Increases in temperature due to climate change and extreme weather event frequencies over the coming decades are likely to influence not only the growth of leafy vegetables, but also their nutritional density. It is therefore essential to determine the impacts of these in order to mitigate crop losses and nutritional decline in future. Our data show there is a strong influence of pre-harvest growth temperatures on glucosinolate biosynthesis and formation of glucosinolate hydrolysis products postharvest, and that this is genotype dependent. High growth temperature (40 °C) severely retarded germination, growth, regrowth, and survival of rocket plants. Highest glucosinolate concentrations were observed in first and second cuts at 40 °C, but did not correspond to highest isothiocyanate concentrations (observed at 30 °C, second cut). Hydrolysis product formation is proportionately not as great as glucosinolate increases at 40 °C, possibly due to inhibition of enzyme function(s) at higher temperatures. These data indicate that high growth temperatures increase glucosinolate accumulation, but growth and productivity is significantly reduced. Much greater emphasis is needed for breeding cultivars tolerant to high growth temperatures in order to maximise nutritional benefits imparted by temperature stress.