

Effects of Temperature and pH on Myrosinase Activity and Gluconasturtiin Hydrolysis Products in Watercress

ABSTRACT

Watercress (*Nasturtium officinale*) is a rich source of phenyl ethyl glucosinolate (PEGLS) (or gluconasturtiin). Depending on various factors, PEGLS is hydrolyzed enzymatically by the endogenous myrosinase into phenyl ethyl isothiocyanate (PEITC) and/or phenyl ethyl nitrile (PEN). Unlike PEN, PEITC is reported to possess anticancer activities. This paper described the effects of temperature (25, 45 and 65°C) and pH (3, 7 and 9) on myrosinase activity and hydrolysis products of PEGLS in watercress. The watercress samples were harvested from Kota Belud, Sabah. The hydrolysis products were extracted with dichloromethane and then analyzed with gas chromatography-mass spectrometry (GC-MS). While myrosinase activity was calculated based on the reduction of standard sinigrin concentration (as substrate) after 20 mins of endogenous enzymatic reaction. The unreacted sinigrin was then extracted with pure water and analyzed with high performance liquid chromatography-ultra violet (HPLC-UV). The results show that myrosinase activities were in the range of 1.21 – 1.23 mM min⁻¹ with relatively higher at 45°C (1.23 mM min⁻¹). Meanwhile, under the different pH (7 and 9), the myrosinase activities were slightly higher (1.35 – 1.36 mM min⁻¹). As for the hydrolysis products, the highest concentrations of PEITC were recorded at 25°C (601.1 ppm) and pH 9 (561.1 ppm). PEITC concentration was much higher than PEN in all these conditions. The results suggest that mild temperature and neutral to slightly alkaline are favourable for myrosinase activity and formation of PEITC. These findings are especially relevant since food preparations often involved heating and addition of additives that may alter the final pH.