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Characterization of the Glucosinolates and Isothiocyanates in Mustard (*Brassica juncea* L.) Extracts and Determination of Its Myrosinase Activity and Antioxidant Capacity

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Abstract: The research investigated the properties of glucosinolates in mustard (*Brassica juncea* L.) samples including a chemical analysis of the major components in the edible parts, and the activity of their hydrolytic products. HPLC studies showed that raw seeds contain the highest levels of glucosinolates among the samples analyzed. Sinigrin was identified by LC-MS analysis of desulfated sample as the major glucosinolate in the mustard leaves, while sinigrin and gluconapin was found in mustard seeds, confirming previously published work on mustard. Further evidence for the identity of the major compound was seen in the hydrolysis products which were obtained from an optimized procedure. Allyl isothiocyanate was found as the major breakdown product in the reaction catalysed by exogenous myrosinase. Significant amounts of isothiocyanates were detected in seeds and leaves. These may be inherent in the samples or may have been formed during a sample preparation step. The values however markedly increased when samples were made to undergo hydrolysis in the presence of an active hydrolytic enzyme myrosinase, as evidenced by the ability of its extract to catalyze the hydrolysis of sinigrin. The enzyme has a K_M of 0.0436 mM and Vmax of 0.296 g^{-1} min^{-1} for sinigrin. The ability of mustard extracts to scavenge free radicals was measured using the DPPH assay. In this study, the scavenging potential was seen to increase with increased amounts of extract.

Key Words: mustard; glucosinolates; isothiocyanates; myrosinase; DPPH assay