

EFFECT OF ASCORBIC ACID AND GLUTATHIONE ON THE PRODUCTION OF NITRILES BY MYROSINASE

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Biofumigation is based on the use of glucosinolate-containing plants for the control of soil-borne pest and diseases. Upon tissue damage, glucosinolates are hydrolyzed by endogenous enzymes (myrosinase) and a range of biologically active compounds are formed. Isothiocyanates (ITCs) are the quantitatively dominating products formed at neutral pH. Most of these compounds are volatile and only sparingly soluble in aqueous systems, and depending on the R-group structure and the presence of nucleophiles, further transformation of ITCs occurs. At lower pH and in the presence of certain molecules able to deliver two redox equivalents, the proportion of nitriles increases at the expense of ITC.

The effect of ascorbic acid and glutathione on the production of nitriles at pH 5 was investigated by micellar electrokinetic capillary chromatography (MECC). The presence of 0.25 μmol ascorbic acid increased the production of nitriles although at higher concentrations the proportion of nitriles decreased. Increasing amounts of GSH favored the production of nitriles (40% of the total degradation products were nitriles in the presence of 2 μmol GSH). The oxidation of GSH gives the redox equivalents needed for the liberation of the sulfur from the unstable intermediate of the glucosinolate hydrolysis leading to the formation of the nitrile.