

https://dspace.org/

Evolution of myrosinase from drypetes

Letseka, Ntutu

2014-07-07
http://hdl.handle.net10539/14887

Downloaded from a DSpace repository. https://dspace.org/

ABSTRACT

Glucosinolates are a diverse group of molecules found in plants of the order Capparales and the genus *Drypetes*. Hydrolysis of glucosinolates is catalysed by a thioglucosidase, myrosinase. Myrosinase has not only been detected in almost all glucosinolate-containing plants but also in insect and microbial species. Phylogenetic analysis of glucosinolate-containing plants found that all were clustered together with the exception of the outlier genus *Drypetes*. The important question is whether myrosinase in *Drypetes* arose from the same ancestral gene as that in the Capparales, or whether it arose from a different source. Myrosinase-like activity was detected in *D. natalensis*. A candidate molecule for the observed activity was isolated and found to be a 50 kDa heterodimer with subunits of approximately 30 kDa and 20 kDa. This contrasts with Capparales myrosinases which are typically 130-150 kDa homodimers. A 1047 bp partial sequence corresponding to the larger subunit was obtained. Analysis of the nucleic acid and amino acid sequence showed that it was similar to the cupin superfamily of proteins which include the ubiquitous seed storage proteins. Phylogenetic analysis showed that the isolated protein was closely related to seed storage proteins. The results obtained here are suggestive of an independent origin of myrosinase activity in *Drypetes*. With the degree of functional plasticity observed in the cupin superfamily it is proposed that the isolated factor could have acquired myrosinase-like activity. However, purification and further characterisation of the enzyme responsible for the observed activity is still required to confirm the results