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KRIENGSAK LIRDPRAPAMONGKOL : FUNCTION AND APPLICATION OF
ROTENOID β -GLUCOSIDE AND ITS β -GLUCOSIDASE ENZYME FROM THAI
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A β -glucosidase enzyme (EC 3.2.1.21) and its natural substrate, rotenoid β -glucoside (dalcochinin glucoside), were isolated from the seeds of Thai Rosewood. Dalcochinin (aglycone part) was prepared by hydrolysis of dalcochinin glucoside with the purified Thai Rosewood β -glucosidase. Bioactivity tests of dalcochinin and dalcochinin glucoside, in comparison to rotenone, were studied by mitochondrial inhibition test, larvacidal activity test, antimalarial activity test, and antimicrobial activity test. Rotenone, dalcochinin, and dalcochinin glucoside were found to be toxic to rat liver mitochondria and mosquito larva, but they did not affect malarial parasite or microbial cultures. With mitochondria and mosquito larva, dalcochinin was less toxic than rotenone, but more toxic than dalcochinin glucoside. Transglycosylation activity of the enzyme towards alcohols and phenolic compounds was performed by using p-nitrophenyl- β -D-glucopyranoside (pNP- β -D-Glc) as glucosyl-donor substrate. Glucoside products were separated and detected by TLC analysis, and quantitated by scanning densitometry. The enzyme showed ability to synthesize glucoside products from reactions with alcohols and diols, except for tert-alcohol and glycerol. The reactions with phenolic compounds did not yield glucoside product, except for compounds containing alcoholic group. The enzyme was able to synthesize dalcochinin glucoside and dalcochinin galactoside by transglycosylation using pNP- β -D-Glc and p-nitrophenyl- β -D-galactopyranoside (pNP- β -D-Gal) as glycosyl-donor substrates, respectively. Test for effect of organic solvents on transglycosylation showed that protic solvent favored hydrolysis of pNP- β -D-Glc rather than transglycosylation, whereas aprotic solvents preferred the transglycosylation, but the rate of the reaction was decreased. NMR structural determination confirmed that ethyl β -D-glucoside was the glucoside product from the reaction with ethanol.