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Dimethylformamide is a novel nitrilase inducer in *Rhodococcus rhodochrous*

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Chhiba, Varsha P
Mathiba, Kgama
Van der Westhuyzen, Christiaan W
Steenkamp, Paul A
Rashamuse JK
Stoychev, Stoyan H
Bode ML
Brady D

ABSTRACT:

Nitrilases are of commercial interest in the selective synthesis of carboxylic acids from nitriles. Nitrilase induction was achieved here in three bacterial strains through the incorporation of a previously unrecognised and inexpensive nitrilase inducer, dimethylformamide (DMF), during cultivation of two *Rhodococcus rhodochrous* strains (ATCC BAA-870 and PPPPB BD-1780), as well as a closely related organism (*Pimelobacter simplex* PPPPB BD-1781). Benzonitrile, a known nitrilase inducer, was ineffective in these strains. Biocatalytic product profiling, enzyme inhibition studies and protein sequencing were performed to distinguish the nitrilase activity from that of sequential nitrile hydratase-amidase activity. The expressed enzyme, a 40-kDa protein with high sequence similarity to nitrilase protein Uniprot Q-03217, hydrolyzed 3-cyanopyridine to produce nicotinic acid exclusively in strains BD-1780 and BD-1781. These strains were capable of synthesising both the vitamin nicotinic acid as well as β -amino acids, a compound class of pharmaceutical interest. The induced nitrilase demonstrated high enantioselectivity (> 99%) in the hydrolysis of 3-amino-3-phenylpropanenitrile to the corresponding carboxylic acid.