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ORIGINAL PAPER

Effect of salicin on induction and carbon catabolite repression of endoxylanase synthesis in *Penicillium janthinellum* MTCC 10889

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Amongst various carbon sources, xylan was found to be the sole inducer of endoxylanase production by *Penicillium janthinellum* MTCC 10889 in submerged cultivation. Endoxylanase synthesis by a xylan induced culture was initially repressed after a simultaneous addition of xylose, probably by the inducer exclusion mechanism, but it was resumed and achieved its highest level at a much later stage of growth (at 120 h). Xylose added after 30 h of growth cannot exert its full repressive effect. Although glucose was proved to be a more potent repressor than xylose, supplementation of salicin, an alcoholic β-glycoside containing D-glucose, with pure xylan resulted in an about 3.22 fold increase in the enzyme synthesis at 72 h followed by constant high production of the enzyme at least until the 144th h of growth. Inducing capacity of salicin in a xylan induced culture was significantly reduced when it was added after 30 h of growth. Addition of salicin and xylan help to partially overcome the repressive effect of xylose and glucose. Failure of salicin in recovering the endoxylanase synthesis in actinomycin D and cyclohexamide inhibited the xylan induced culture indicating that salicin cannot initiate the de novo synthesis of the enzyme.

Keywords: endoxylanase, induction, *Penicillium janthinellum*, salicin, repression

Introduction

Xylan, consisting of xylose units, is the most abundant hemicellulosic compound (Michelin et al., 2011). Breakdown of hemicellulose is accomplished by the synergistic action of endoxylanase (1,4-β-D-xylan xylanohydrolase, EC 3.2.1.8) and β-xylosidase (β-D-xyloside xylohydrolase, EC 3.2.1.37) (Biswas et al., 1988) of which the former cleaves β-1,4-linked xylan backbone producing xylooligosaccharides.

From a commercial point of view, xylanase represents an important group of enzymes and microbial xylanases have aroused great interest recently due to their potential application in many industrial processes including the food, feed, fuel, textile, detergents, paper and pulp industries and waste treatment (Goyal et al., 2008; Dhiman et al., 2008; Pal & Khanum, 2010). Fermentation of hemicellulose and hemicellulose hydrolysates has been a major subject of research mostly in connection with the production of ethanol (Dodd & Cann, 2009)

The most important pre-requisite for industrial production of an enzyme is its bulk production which can be achieved either by using a very hyper productive strain or by enhancing the expression of the enzyme protein through selective use of suitable inducers. To achieve the second option, regulation of enzyme synthesis in the presence of an inducer and the role of carbon catabolite repression have to be understood. The regulation of xylanases has been extensively studied (Mandal et al., 2012). In many cases, basal constitutive synthesis was detected in the absence of an added inducer, leading to the formation of easily metabolisable compounds (Mandal et al., 2012). Xylan was found to be the best inducer of most microbial endoxylanases (Khucharoenphaisan et al., 2010; Joshi & Khare, 2012) followed by other oligosaccharides like xylose and arabinose (Mandal et

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