Differences in expression of two endoxylanase genes (*xynA* and *xynB*) from *Penicillium purpurogenum*

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Abstract

A number of xylanolytic microorganisms secrete to the medium several molecular forms of endoxylanases. The physiological function of these isoforms is not clear; one possibility is that they are produced under different growth conditions. To study this problem, we have used two endoxylanases (XynA and XynB) produced by the fungus *Penicillium purpurogenum*. These enzymes have been previously purified and characterized; they belong to family 10 and 11 of the glycosyl hydrolases, respectively. The promoters of the *xynA* and *xynB* genes have been sequenced; both present consensus sequences for the binding of the carbon catabolite repressor CreA, but otherwise show substantial differences. The *xynB* promoter has eight boxes in tandem for the binding of the XlnR activator and lacks the consensus sequence for the PacC pH regulator. On the other hand, the *xynA* promoter contains one XlnR box and three PacC consensus sequences. To investigate if these differences are reflected in gene expression, Northern blot assays were carried out. The *xynA* gene is transiently expressed when oat spelt xylan is used as carbon source, but negligible expression was observed with birchwood xylan, xylose or xylitol. In contrast, *xynB* is broadly induced by all these carbon sources; this may be related to the presence of several XlnR boxes. Similar results were obtained by zymogram analysis of the expressed proteins. The different induction capabilities of birchwood and oat spelt xylan may be due to differences in their composition and structure. Expression assays carried out at different pH reflects that, despite the lack of PacC binding sites in the *xynB* promoter, this gene is tightly regulated by pH. The findings described here illustrate new and important differences between endoxylanases from families 10 and 11 in *P. purpurogenum*. They may help explain the production of multiple endoxylanase forms by this organism.