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Effects of carbon, nitrogen and ambient pH on patulin production and related gene expression in *Penicillium expansum*

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ABSTRACT

Patulin, a potent mycotoxin which can cause serious health concerns, is mainly produced in foods by *Penicillium expansum*. Environmental factors play important roles in regulating biosynthesis of mycotoxins; however, information about the effects of environmental factors on patulin production and the involved mechanisms in *P. expansum* is limited. Here, we investigated the effects of different carbon (C), nitrogen (N) sources, and ambient pH on patulin production in three *P. expansum* strains T01, M1 and Pe21, and the expression profile of 15 genes involved in patulin biosynthetic pathway. It was found that C, N sources and pH had great influence on patulin production in *P. expansum*. In general, patulin production of all three *P. expansum* strains showed similar trends under different C and N sources and pH conditions, though there were some differences in the optimal conditions among these strains. Glucose-containing sugars, complex N sources, and acidic conditions were favorable conditions for patulin production. The results of RT-qPCR showed that the relative expressions of most of the patulin genes were up-regulated under patulin-permissive conditions, indicating that patulin biosynthesis was mainly regulated at transcriptional level by these environmental factors. These findings will