

# Identification of key genes involved in the two lignifications in stored king oyster mushrooms (*Pleurotus eryngii*) and their expression features

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## Abstract

The enzyme genes involved in two lignifications of stored *Pleurotus eryngii* remain unclear. Here, we investigated the lignification profiles and associated gene expression by RNA-seq, molecular clone and qRT-PCR analysis to identify the key structural genes and reveal their expression features under different conditions. A total of 2803 differentially expressed genes (DEGs) were identified in samples at 1 °C compared to those at 4 °C, and 56 DEGs were annotated to lignification-related gene families. Ten lignification-related structural genes were cloned and only the expression patterns of *PePAL1*, *Pe4CL1*, *Pe4CL3* and *PePOD* were proportionate to the change of lignification indexes of mushrooms during 4 °C storage. Their expression profiles at key time points during mushrooms growing, development, and two lignifications presented their consistency with that of lignin contents and implied relatively high expression in two lignifications. Expression profiles under cold and no-wounding treatments also showed correlation with two lignifications and presented their expression features. Namely, *PePAL1* and *PePOD* could be stimulated by cold stress during the first lignification and triggered by wounding stress during the whole storage, meanwhile *Pe4CL1* and *Pe4CL3* could be induced by wounding stress during the first lignification and irritated by cold stress at the time point of the second lignification. These results showed that *PePAL1*, *Pe4CL1*, *Pe4CL3* and *PePOD* were the key genes involved in two lignifications of stored *P. eryngii* and could be stimulated by wounding and cold stress at different time points of storage.