

Title Lentinula edodes tlg1 encodes a thaumatin-like protein that is involved in lentinan degradation and fruiting body senescence

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Abstract

Lentinan is an antitumor product that is purified from fresh *Lentinula edodes* fruiting bodies. It is a cell wall component, comprising beta-1,3-glucan with beta-1,6-linked branches, which becomes degraded during postharvest preservation as a result of increased glucanase activity. In this study, we used N-terminal amino acid sequence to isolate tlg1, a gene encoding a thaumatin-like (TL) protein in *L. edodes*. The cDNA clone was approximately 1.0 kb whereas the genomic sequence was 2.1 kb, and comparison of the two indicated that tlg1 contains 12 introns. The tlg1 gene product (TLG1) was predicted to comprise 240 amino acids, with a molecular mass of 25 kD and isoelectric point value of 3.5. The putative amino acid sequence exhibits approximately 40% identity with plant TL proteins, and a fungal genome database search revealed that these TL proteins are conserved in many fungi including the basidiomycota and ascomycota. Transcription of tlg1 was not detected in vegetative mycelium or young and fresh mushrooms. However, transcription increased following harvest. Western-blot analysis demonstrated a rise in TLG1 levels following harvest and spore diffusion. TLG1 expressed in *Escherichia coli* and *Aspergillus oryzae* exhibited beta-1,3-glucanase activity and, when purified from the *L. edodes* fruiting body, demonstrated lentinan degrading activity. Thus, we suggest that TLG1 is involved in lentinan and cell wall degradation during senescence following harvest and spore diffusion.