

Expression of genes encoding manganese peroxidase and laccase of *Ganoderma boninense* in response to nitrogen sources, hydrogen peroxide and phytohormones

ABSTRACT

Ganoderma produces lignolytic enzymes that can degrade the lignin component of plant cell walls, causing basal stem rot to oil palms. Nitrogen sources may affect plant tolerance to root pathogens while hydrogen peroxide (H₂O₂), salicylic acid (SA) and jasmonic acid (JA) play important roles in plant defense against pathogens. In this study, we examined the expression of genes encoding manganese peroxidase (MnP) and laccase (Lac) in *Ganoderma boninense* treated with different nitrogen sources (ammonium nitrate, ammonium sulphate, sodium nitrate and potassium nitrate), JA, SA and H₂O₂. Transcripts encoding MnP and Lac were cloned from *G. boninense*. Of the three GbMnP genes, GbMnP_U6011 was up-regulated by all nitrogen sources examined and H₂O₂ but was down-regulated by JA. The expression of GbMnP_U87 was only up-regulated by JA while GbMnP_35959 was up-regulated by ammonium nitrate but suppressed by sodium nitrate and down-regulated by H₂O₂. Among the three GbLac genes examined, GbLac_U90667 was up-regulated by ammonium nitrate, JA, SA and H₂O₂; GbLac_U36023 was up-regulated by JA and H₂O₂ while GbLac_U30636 was up-regulated by SA but suppressed by ammonium sulphate, sodium nitrate, JA and H₂O₂. Differential expression of these genes may be required by their different functional roles in *G. boninense*.

Keyword: *Ganoderma*; Hydrogen peroxide; Laccase; Manganese peroxidase; Nitrogen; Phytohormones