

UNIVERSIDAD DE LA FRONTERA

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales



**MOLECULAR AND FUNCTIONAL CHARACTERIZATION OF
AN ALDEHYDE OXIDASE FROM THE GREATER WAX
MOTH (GALLERIA MELLONELLA) AS ODORANT
DEGRADING ENZYME**

**DOCTORAL THESIS IN FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE
DOCTOR OF SCIENCES IN NATURAL
RESOURCES**

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TEMUCO-CHILE

2022

“Molecular and functional characterization of an aldehyde oxidase from the greater wax moth (*Galleria mellonella*) as odorant degrading enzyme”

Esta tesis fue realizada bajo la supervisión del director de tesis, Dra. Ana Mutis del Departamento de Ciencias Químicas y Recursos Naturales de la Universidad de la Frontera y ha sido aprobada por los miembros de la comisión examinadora.

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Thesis summary

Odorant degrading enzymes (ODEs) play an important role in the insect olfactory system as a reset mechanism. The inhibition of these enzymes could incapacitate this system and, consequently, disrupt chemical communication promoting and complementing the integrated pest management. The objective was to characterize at molecular and functional level an ODE from the greater wax moth (*Galleria mellonella*), as an alternative target for further control strategies. Here, putative sequences for ODEs were obtained from antennal transcriptomes. Volatile organic compounds were trapped from honeycombs and the identification was made by GC-MS to unravel the profile of volatiles that *G. mellonella* must be faced, and to be used to evaluate the enzyme activity of antennal extracts. Two genes were obtained and classified as GmelAOX2 and GmelAOX3. GmelAOX2 showed a sex-biased expression and both GmelAOX2 and GmelAOX3 performed a higher relative expression in males rather than females according to RT-PCR and RT-qPCR, respectively. Moreover, 74 compounds were identified and antennal extracts had the strongest enzymatic activity to undecanal compared to benzaldehyde (control). Our data suggest that these enzymes have a crucial role for metabolizing aldehydes compounds, which are related to honeycombs and the life cycle of *G. mellonella*.

