

Integration of Transcriptomics & Functional Verification Analysis Reveals Chemosensory Genes in *Odontothrips Loti* (Thysanoptera: Thripidae)

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To identify odors in complex environments accurately, insects have evolved multiple olfactory proteins. These proteins allow the organism to recognize volatile cues that confer the capacity to feed, mate and defend against predators. In our study, various olfactory proteins of *Odontothrips loti*, a oligophagous pest that primarily affects alfalfa (*Medicago L.*), were explored in an attempt to establish a link between olfactory mechanisms and odor-induced behavior. Forty-three putative olfactory candidate genes were identified in the antennae transcriptome of *O. loti*, including 6 odorant-binding proteins (OBPs), 9 chemosensory proteins (CSPs), 7 sensory neuron membrane proteins (SNMPs), 7 odorant receptors (ORs), and 14 ionotropic receptors (IRs). PCR analysis further confirmed that all candidate genes existed in *O. loti* adults, and tissue and developmental stage are important factors of genes differential expression. The analyses demonstrated that *OlotOBP1*, *OlotOBP4* and *OlotOBP6* were specifically expressed in the antennae, and all the three genes had a male-biased expression pattern, suggesting that they had potential functions in olfactory recognition and mating behavior. In addition, both fluorescence competitive binding assay and molecular docking showed that 2-methyl-5-(1-methylethenyl)-cyclohexanone, a component from the volatiles of the host, had strong binding ability with *OlotOBP6*, suggesting that *OlotOBP6* played a role in host localization. Our results may provide insights into the mechanism of their odor-evoked behavior and the development of a highly specific and sustainable approach for thrip management.

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