

## Functional Characteristics of Chemosensory Proteins in the Sawyer Beetle *Monochamus alternatus* Hope

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**Abstract :** The Japanese pine sawyer, *Monochamus alternatus* Hope (Coleoptera: Cerambycidae), is a major pest of pines and it is also the key vector of the exotic pinewood nematode in China. In the present study, we cloned, expressed, and purified a chemosensory protein (CSP) in *M. alternatus*. We surveyed its expression in various developmental stages of male and female adult tissues and determined its binding affinities for different pine volatiles using a competitive binding fluorescence assay. A CSP known as CSP5 in *M. alternatus* was obtained from an antennal cDNA library and expressed in *Escherichia coli*. Quantitative reverse transcription polymerase chain reaction results indicated that the CSP5 gene was mainly expressed in male and female antennae. Competitive binding assays were performed to test the binding affinity of recombinant CSP5 to 13 odour molecules of pine volatiles. The results showed that CSP5 showed very strong binding abilities to myrcene, (+)- $\beta$ -pinene, and (–)-isolongifolene, whereas the volatiles 2-methoxy-4-vinylphenol, p-cymene, and (+)-limonene oxide have relatively weak binding affinity at pH 5.0. Three volatiles myrcene, (+)- $\beta$ -pinene, and (–)-isolongifolene may play crucial roles in CSP5 binding with ligands, but this needs further study for confirmation. The sensitivity of insect to host plant volatiles can effectively be used to control and monitor the population through mass trapping as part of integrated pest management programs.

**Keywords :** olfactory-specific protein, volatiles, competitive binding assay, expression characteristics, qPCR

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