In vitro Inhibition of Carboxylesterases by Insecticides and Allelochemicals in Micromelalopha troglodyta (Graeser) (Lepidoptera: Notodontidae) and Clostera anastomosis (L.) (Lepidoptera: Notodontidae)¹

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ABSTRACT Both Micromelalopha troglodyta (Graeser) and Clostera anastomosis (L.), are important pests of poplar, and usually coexist during the period of poplar growth in China. The carboxylesterases have been recognized to play an important role in the detoxification of xenobiotics in the two Notodontidae species. In vitro inhibitory effects by insecticides and allelochemicals on carboxylesterase activity in M. troglodyta and C. anastomosis were studied. The results showed that three organophosphates (chlorpyrifos, phoxim and profenofos) were the best inhibitors of the enzymes among all compounds tested in M. troglodyta and C. anastomosis. Chlorpyrifos inhibited carboxylesterase activity in M. troglodyta and C. anastomosis to a similar degree, but phoxim and profenofos inhibited to different degrees. Furthermore, kinetic analyses of carboxylesterase inhibition by phoxim, chlorpyrifos and profenofos were also investigated. The results showed that phoxim inhibited carboxylesterase activity with respect to \( \alpha \)-naphthyl acetate (\( \alpha \)-NA) in a noncompetitive manner in M. troglodyta, while the inhibition of phoxim showed competitive to \( \alpha \)-NA in C. anastomosis. The inhibition of chlorpyrifos showed neither typical competitive nor noncompetitive to \( \alpha \)-NA both in M. troglodyta and C. anastomosis. Profenofos inhibited carboxylesterase activity with respect to \( \alpha \)-NA in a noncompetitive manner in M. troglodyta, while the inhibition of phoxim showed neither typical competitive nor noncompetitive to \( \alpha \)-NA in C. anastomosis. These results may contribute to the understanding of the sensitivity difference of M. troglodyta and C. anastomosis to pesticides, and could provide the basis for integrated pest management of the two Notodontidae species.

KEY WORDS Micromelalopha troglodyta (Graeser), Clostera anastomosis (L.), Lepidoptera, Notodontidae, carboxylesterases, allelochemicals, insecticides

Both Micromelalopha troglodyta (Graeser) and Clostera anastomosis (L.) are important pests of poplar, causing damage by direct feeding, and usually coexist during the period of poplar growth in China. The control of M. troglodyta and C. anastomosis is primarily dependent on the application of insecticides. Difference in the efficacy of insecticides between the two Notodontidae species has been

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