## Oral toxicity of fusion protein containing insecticidal spider venom toxin against aphid (*Mizus persicae*)

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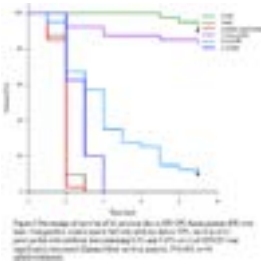
Synthetic insecticides have been widely applied to reduce agricultural crop loss. However, they can result in adverse effects on non-target organisms, the environment and human health. More recently, insecticides derived from biological molecules have been developed as an alternative strategy. Arachnid venom peptides are highly specific antagonists of receptors found in the central nervous system (CNS). They act by blocking the action potential and inhibit muscular activity. They are highly toxic to insects yet display no mammalian toxicity, but toxicity relies on delivery to the insect haemocoel. Therefore, if used as a biopesticide they must be fused to a carrier peptide capable of crossing the insect gut. This study demonstrates the oral toxicity of a novel fusion protein towards *Mizus persicae*. The fused spider venom neurotoxin (SFI) and carrier molecule (CP2) was expressed in *Pichia pastoris*. The efficacy of the purified protein was tested against *M. persicae* using an artificial diet bioassay. The SFI/CP2 fusion protein was toxic and significantly reduced survival in a dose dependent manner. Survival of aphids fed artificial diet containing 0.05% (w/v) fusion protein was reduced to 35% after four days and 10% after nine days; the higher concentration (0.1%) reduced aphid survival to 20% after three days with no survival after four days. The fusion protein induced mortality in *M. persicae* with LC50 of 0.043 % (0.43 mg/ml) after four days. These results indicate that the CP2 molecule is able to transit the insect gut and deliver the neurotoxic venom peptide to the CNS of *M. persicae*. This proteinaceous biopesticide could be developed either as a sprayable compound or expressed *in planta*.



### Recent Publications

1. Kanokratana P., Chanapan S., Pootanakit K., and Eurwilaichitr. (2004) Diversity and abundance of Bacteria and Archaea in the Bor Khlueng Hot Spring in Thailand. J. Basic Microbiol. 44, 430-444.
2. Chanapan, S., Tontiworachai, B., Deewatthanawong, R. and Suwanagul, A. (2017). Cloning and sequence analysis of chalcone synthase gene in *Curcuma alismatifolia*. Acta Hortic. 1167, 299-304.
3. Deewatthanawong, R., Chanapan, S. and Suwanagul, A. (2017). Evaluation of methyl bromide alternatives to control thrips in orchid cut-flowers. Acta Hortic. 1167, 393-398.

### Biography

Supavadee Chanapan graduated from the Universities for a bachelor degree of B.Sc. in biology (Khon Kaen University,Thailand) in 2001 and a master degree of M.Sc. in Molecular Genetics and Genetic Engineering (Mahidol University, Thailand) in 2004. Then, she has been working as a researcher in Thailand Institute if Scientific and Technological research (TISTR) from 2004 to present. She is a PhD candidate at Newcastle University. Her research work presented in this conference is in 'Crop Protection and Entomology' that is based on application fusion protein technology as alternative approach to control insect pest.

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