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Abstract

Baculoviruses are invertebrate-specific pathogens that have been shown to be important in controlling populations of insects in natural epizootics and have long been considered potentially useful microbial agents for insect pest control. Because each of baculovirus strains has narrow host range and do not replicated in vertebrates, they have been awarded the specific, environment benign and safe insect biocontrol agents and considered as an environmentally acceptable alternative to chemical insecticides. Although the safety and specificity are strong points of biocontrol agents, the usage of baculovirus has some limitations that have restricted its' development on commercial pursuit. The major defect is the speed of killing the insect hosts that can still cause considerable quantities of damage on crops before insect hosts are killed by the infected baculoviruses., The recombinant baculovirus, however, express limitless potential following understanding of the characteristics of Autographa californica nucleopolyhedrovirus (AcMNPV) and vigorous study on genetic engineering. By this way, recombinant virus can reduce the time required to kill the pest insect and prevent them from further feeding.

My thesis was consisted of two sets of project. The first project was intended to take the responsibility for evaluating the biocontrol ability of Lymantria xylina nucleopolyhedrovirus (Lyxy NPV) and strengthen the biocontrol ability of Lyxy NPV in formulation of the applied product. The biocontrol efficiency of wild type virus and two in vitro reproductive strains (N81 and G) generated from LD-652Y cells were evaluated by feeding second instar larvae of Lymantria xylina with these virus. The result showed that the biopesticide potential in wild type virus was much better than the two in vitro reproductive strains. The median lethal concentration (LC50) and median lethal time (LT50) of wild type of Lyxy NPV were estimated as a 1.4 X 105 PIBs/ml of LC50 and 2.74 day of LT50 from X 104 PIBs/ml. We also found that UV protector was promoted the control ability of Lyxy NPV.

The second project of my thesis was subjected to evaluate the cytopathic effect (CPE) or killing effect of recombinant AcMNPV, the vAcKDN, which harbored the deoxyribonuclease (DNase, EC 3.1.21.1) gene, kdn, of Klebsiella pneumoniae. The results showed that different cytopathic effect (CPE) was observed in Sf9 cells infected with vAcKDN that little or no occlusion bodies (OBs) were formed in the infected cells. The recombinant vAcKDN showed an increased killing effect on the diamondback moth Plutella xylostella. The median lethal concentration (LC50) of wild type of AcMNPV and vAcKDN were estimated as 3.7 X 103 and 1.8 X 103 respectively. The median lethal

time (LT50) of wild type AcMNPV and recombinant vAcKDN were estimated as 7 days and 5.12 days respectively. Together, our results showed that the DNase gene from Klebsilla neumornia is a good candidate for the development of high efficiency of insecticide.
Advisory Committee Song-Tay Lee - advisor

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