Characterization and Evaluation of Potential Utilization of *Hear*NPV and *Plxy*GV Baculoviruses Isolates for Management of African Bollworm, *Helicoverpa armigera* and Diamondback Moth, *Plutella xylostella* in Kenya

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ABSTRACT

Diamondback moth and African bollworm are serious lepidopteran pests of the Cruciferae family of crops. They are a major challenge in the production of the crops they attack. Resistance by these pests to commonly used pesticides has occasioned the need for development of alternative methods of management including the use of biological control agents. Widespread use of biological control in developing countries has been hampered by lack of cheap and efficient systems of mass producing bio-control agents. This study was, therefore, carried out to develop a system for the production of baculoviruses and to evaluate the virulence of Kenyan isolates of baculoviruses for management of Diamondback moth and African bollworm. The baculovirus isolates that were evaluated, *Plutella xylostella* GV (PlxyGV) and *Helicoverpa armigera* NPV (HearNPV), were produced within the bodies of their natural host reared on artificial diets. Rearing insects on imported diet is expensive and therefore diets were developed from locally available materials and evaluated to determine their ability to support growth of Diamondback moth and African bollworm. Three Kenyan baculovirus isolates, PlxyGV F4, PlxyGV I0 and HearNPV F1 from wild Diamondback moth and African bollworm larvae exhibiting virus symptoms were characterized. Bioassays were done to determine the lethal dose and the lethal time of the three isolates. Further, the efficacy of the PlxyGV I0 isolate was evaluated in field experiments. The average survival rates of African bollworm and diamondback moth reared on the modified multi-species southland and modified pieris diets were 95% and 97% in respectively compared to 90% survival rates of both insects on the multi-species southland diet. This revealed superiority of the modified diets over the standard. Morphology, biological activity and DNA make-up of

the baculovirus isolated from Kenya was similar to isolates reported in literature. The size of occlusion bodies from light microscopy was approximately 0.15 x 0.35 µm for granulovirus isolates and 0.5-5 µm for nucleopolyhedrovirus indicating that they were true baculovirus isolates. The total estimated genome length of the PlxyGV isolate is 93.3 kb while there was similarity in overall pattern and size between the Kenyan HearNPV isolate and the main genotype of the Chinese isolate indicating that they were true baculovirus isolates. In field trials, the Kenyan isolates of PlxyGV caused up to 97% mortality in DBM population compared to 95% caused by a chemical standard (Tracer 480SC). The findings in this study indicate potential for utilization of the Kenyan isolates of baculoviruses in the management of Diamondback moth and African bollworm pests.