Management of Insect Pests Using Baculovirus Based Biopesticides in India

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Abstract : The gypsy moth (Lymantria obfuscata) and tent caterpillar (Malacosoma indicum) are serious pests that attack a wide range of fruit and forest trees in Jammu & Kashmir range of North-Western Himalayas in India. Investigations were carried out to isolate and bioprospect naturally occurring nucleopolyhedroviruses (NPVs) as potent biopesticides against these pests. The biological and molecular characterization of NPV isolates from different ecosystems was conducted, and the polh, lef-8 and lef-9 genes were sequenced and subjected to phylogenetic analysis. The L. obfuscata NPV was more closely related to the L. dispar NPV, whereas M. indicum NPV was more closely related to the M. californicum NPV in the NCBI taxonomy database. Among different isolates, Bhaderwah isolates exhibited highest virus activity (LD_{50} = 250 POBs/larvae) and speed of kill (ST_{50} = 6.80 days) against L. obfuscata whereas Mahor isolates proved most virulent against M. indicum, with lowest LD_{50} (257 POBs/larva) and ST_{50} (6.80 days). The in vivo mass production for highest productivity and quality revealed that the optimum yield was obtained when 3rd instar larvae were inoculated with a viral dose of 1.44 × 105 POBs/larva and allowed to incubate for nine days for L. obfuscata. However, for M. indicum larvae, a viral dose of 2.88×10^6 POBs/larva and incubation period of 10 days were found optimum. It was found that harvesting of moribund larvae yields good quality NPV. The field application of L. obfuscata NPV and M. indicum NPV against the respective host populations on apple and willow with the pre-standardized dosage of 1×10^{12} POBs/acre reduced the larval population density up to 25-63%.

Keywords : baculoviruses, biopesticides, Lymantria obfuscata, Malacosoma indicum
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