Title Efficacy and persistence of Indian meal moth granulovirus applied to nuts.

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Abstract

The Indian meal moth (IMM, *Plodia interpunctella*) granulovirus (GV) was first isolated and characterized in 1968 by Arnott and Smith. As a group, the Baculoviridae are considered to be safe. A number have been registered worldwide for control of production pests. In the late 1960s, interest increased in the use of microbial agents to control stored-product pests in durable commodities. Numerous studies have demonstrated efficacy against IMM infestations in raisins, almonds, and walnuts. A production/formulation method for IMM-GV was later patented. The GV was combined with controlled atmospheres for initial disinfestation of IMM populations in unshelled walnuts followed by treatment with the GV for long-term storage. The IMM-GV provided excellent protection of walnuts even with severe IMM pressure for a period of four months. Similar tests were conducted with almonds. After the tests described above were complete, we determined the persistence/efficacy of GV on treated nuts through a period of two years. Immediately after the initial 3-4 months, treated and control walnuts and almonds were frozen to kill any IMM remaining in the commodities. Thereafter, walnuts or almonds were removed and placed in sealed storage at 26.7 deg C. Samples were removed bimonthly, placed in 3.8-litre jars, infested with approximately 1000 IMM eggs, and incubated at 26.7 deg C for six weeks. The tests were replicated twice in time. Following incubation the nuts were observed for numbers of IMM adults and damage (pin hole, moderate, and severe). Although efficacy was determined, the primary objective of this study was to determine persistence. Results of these studies showed that IMM-GV would persist for at least two years. Survival and damage to walnuts exceeded that of almonds. Infestation rates used in these tests are unreasonably high and bias the data towards more damage than would likely occur commercially. Our grading procedures are also likely to be more rigid than would be used commercially. The virus is now registered with the United States Environmental Protection Agency and California Environmental Protection Agency.