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Risk Assessment: Exemption of Table Grapes from Regulated Status in the Light Brown Apple Moth Federal Quarantine Order Based on Production Practices

Agency Contact:
Plant Epidemiology and Risk Analysis Laboratory
Center for Plant Health Science and Technology

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
1730 Varsity Drive, Ste. 300
Raleigh, NC 27606

Introduction

This document was requested by the Pest Management unit of PPQ's Plant Health Programs in regard to the light brown apple moth, (*Epiphyas postvittana*, LBAM), Federal Domestic Quarantine Order (APHIS, 2007). The purpose of this document is to present technical justification for exempting table grapes (*Vitis vinifera*) from the LBAM regulated article list.

PPQ's previous document, "**Risk Assessment: Exemption of Selected Commodities from Regulated Status in the Light Brown Apple Moth Federal Quarantine Order, 2012**", provided background information and listed several commodities that were exempted from program requirements for interstate movement based on host status and whether LBAM infested the harvested commodity (APHIS, 2012). This document describes the decision to exempt commercially produced table grapes, grown and harvested according to industry practices, from the LBAM program interstate movement requirements.

Background

Since 2007, APHIS and the California Department of Food and Agriculture have conducted a suppression program to prevent LBAM from becoming widely established by enforcing quarantine areas and implementing restrictions on movement of agricultural products (APHIS, 2007; APHIS, 2012a; APHIS, 2012b; APHIS, 2013). In addition to program requirements, specific production practices may further reduce the likelihood of LBAM moving out of the quarantine areas on agricultural products.

Conditions necessary for LBAM to spread

LBAM larvae damage grapes by feeding directly on bunches, causing early-season fruit drop, and by giving rise to secondary fungal infection through feeding injury. Larvae create nests by webbing leaves to each other or to fruit. Pupation occurs within the larval nest (Danthanarayana, 1975). Adult moths do not feed on fruit and typically oviposit on the upper surface of grape leaves (Buchanan, 1977). Thus, the LBAM life stages that could be associated with fruit are the larval and the pupal stages.

The LBAM program focuses regulatory and control activities to suppress the population in California and to minimize the potential spread of LBAM into non-infested areas. LBAM may spread from the quarantine area through flight. Suckling et al. (1994) captured female moths 275 m from release points, but the recapture rate was very low, and farther flights could occur. LBAM may also spread through unintentional movement of propagative material out of the quarantine area.

In comparison to flight or movement of propagative material, the probability that LBAM would form new populations by moving on consumable commodities like table grapes is lower. In California, table grapes are produced under well-established protocols using monitoring and treatment protocols designed to detect and minimize the impacts of grape pests (Bentley et al.

2009). Grapes produced under these protocols are not likely to harbor pests. In addition, field and packing house inspections eliminate any damaged, infested or otherwise defective fruit (K. Nave 2012, Nelson 1985, Luvisi et al, 1995). Storage and transport occurs under near 0° C temperatures which do not favor larval development (Nelson 1985, Luvisi et al, 1995). At the end point, grapes are stored under cold conditions in markets and consumers' homes until consumed. Under these conditions, the probability of LBAM being present in grapes destined for inter-state commerce is low and the probability of establishment at final market locations is lower.

For LBAM to be spread outside of the quarantine area on table grape bunches and become established in a new location, viable life stages must complete the following events:

1. be present on grape bunches in the field at the time of harvest;
2. remain on the fruit through harvest, inspection and packing;
3. survive cold storage and shipment;
4. arrive in an area suitable for establishment and escape into the environment;
5. complete development to the adult stage;
6. find and mate with a partner of the opposite sex. Furthermore,
7. the mated female must find a host plant on which to oviposit; and
8. eggs must hatch and larvae develop to adulthood in numbers sufficient to produce a breeding population.

Production practices, cold storage, shipping conditions, and environmental or biological conditions that prevent any one of these steps will prevent LBAM from becoming established outside the quarantine areas.

Justification for exemption of table grapes

California grape producers practice integrated pest management (IPM) to control several major insect pests including LBAM and other similar tortricid pests (Bentley et al. 2009). Several products routinely used in table grape IPM against tortricids and other lepidopteron pests include methoxyfenozide, *Bacillus thuringiensis* ssp. *Kurstaki*, spinosad and spinetoram (Bentley et al., 2009).

In untreated vineyards larval populations decline as the season progresses toward harvest, but at that time a greater number of larvae may feed on grape bunches (Buchanan, 1977). According to current industry practices, California table grapes are hand-picked, and then inspected and cleaned of insects and insect debris. Damaged or moldy berries are trimmed off and destroyed (Nelson 1985, Luvisi et al, 1995). Larvae feeding within grape bunches might be difficult to detect, but feeding is often associated with rot (Buchanan, 1977), which is more obvious at inspection.

Once packaged, grapes are stored at approximately -0.5°C. Throughout shipping, the temperature is maintained at 1.1°C (Luvisi, et al, 1995, Nave, 2012). Given that temperatures below 10°C prevent LBAM development (Danthanarayana, 1975), emergence of adults during storage or

shipping will not occur. The movement of LBAM on commercially produced table grapes is reduced by IPM and harvesting practices.

Conclusion

Table grapes, *Vitis vinifera*, when commercially produced according to the above stated production practices, have a low likelihood of spreading LBAM beyond the quarantine area.

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