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**Risk Assessment: Exemption of
Anigozanthos flavidus, *Anthurium
andraeanum*, *Echeveria sp.*, *Eucalyptus
pulverulenta*, *Freesia alba*, *Gerbera
jamesonii*, *Narcissus sp.* and
Zantedeschia aethiopica from Regulated
Status in the Light Brown Apple Moth
Federal Quarantine Order Based on
Production Practices**

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1. Background

From the time light brown apple moth, *Epiphyas postvittana*, was discovered in California in 2006, APHIS and the California Department of Food and Agriculture (CDFA) have taken steps to prevent its spread by implementing the *E. postvittana* Federal Domestic Quarantine Order (APHIS, 2007). This Federal Order defines quarantine areas and restricts the movement of numerous agricultural commodities.

For some of the regulated commodities, the likelihood of spreading *E. postvittana* may be sufficiently low to justify exempting these commodities from the quarantine, based on host status and specific industry practices.

Previous Plant Protection and Quarantine (PPQ) documents (PPQ, 2012a, 2012b, 2013) have led to the exemption of several commodities from the Light Brown Apple Moth (LBAM) program requirements. This current document is in response to a request from the California Cut Flower Commission to exempt cut flowers from all intrastate regulatory requirements contained in Title 3, Division 4, Chap. 3, Sect. 3434 *E. postvittana* Interior Quarantine (Cronquist, 2015). Since its discovery in California, APHIS and the California Department of Food and Agriculture (CDFA) have taken steps to prevent the light brown apple moth from becoming widely established by enforcing quarantine areas and implementing certain restrictions on movement of agricultural produce out of quarantine areas. In addition to the program requirements, specific production practices for each commodity may reduce the risk of moving light brown apple moth out of the quarantine areas.

2. Scope

It has already been established that the consequences of introducing LBAM to new areas of the United States are unacceptable, so this document will focus only on the likelihood of introduction. This document considers the chain of events that must occur for the light brown apple moth to move outside of the quarantine area on a commodity and become established in new locations, and the likelihood of their occurrence.

1. The commodity must serve as a host for LBAM, and larvae must be present with the commodity as it is produced
2. LBAM larvae must be associated with the harvested commodity and remain with it through harvest
3. LBAM larvae must remain with the commodity through inspection and packing
4. LBAM larvae must survive shipment and arrive in a suitable area in which to escape for establishment
5. Escaped larvae must complete development
6. The resulting adults must mate
7. Mated females must find new hosts on which to oviposit
8. The resulting eggs must hatch and larvae develop through to adulthood in quantities sufficient to produce a breeding population

Production practices or commodity attributes that prevent any one of these steps from taking place will successfully prevent the light brown apple moth from leaving the quarantine areas with an agricultural commodity.

When provided, standard industry practices are listed in this report. Risk assessments presented in the following analyses are based on the assumption that standard industry practices are consistently followed. Alteration, cessation, or augmentation of production practices could have a major effect on risk.

3. Assessment of Cut Flower Species' Risks

According to the draft *International Standard for Phytosanitary Measures: International Movement of Cut Flowers* (IPPC, 2015), moths can be considered low risk pests in the cut flower pathway. The standard states:

Moths (e.g. Noctuidae, Geometridae, Tortricidae). Mobile adults rarely occur in the cut flower pathway. Immature stages of these pests may be much more common on the commodity, but these are relatively immobile and unlikely to complete their development within the short vase life of cut flowers. Many species require pupation in soil. For these reasons, moths seem highly unlikely to escape the pathway in large enough numbers to emerge as adults and successfully find mates.

Based on this information, genera of cut flowers can be assumed to be low risk, unless evidence shows a strong host association and high likelihood of larval survival throughout the production and delivery chain. Individual genera are examined below.

3.1. African daisy (*Gerbera jamesonii* Adlam)

Host Status –Light brown apple moth has never been intercepted on African daisy by PPQ at any port of entry (PestID, 2015). A comprehensive search of the literature produced a single reference that lists *Gerbera* sp. as a host of light brown apple moth in Australia (Geier and Briese, 1981). This reference was a personal communication to the Queensland Department of Primary Industries. We found no scientific studies that supported this claim, so African daisy is suspect as a host.

Harvest and packing – In California, African daisy is harvested by twisting stems off at the base of attachment. No leaves are attached to the stem. The bottom of each stem is cut approximately 10 cm and put into a solution of 40 ppm hypochlorite to improve vase life (Reid, 2004). A rapid pulse treatment of 100 ppm silver nitrate is used to help alleviate postharvest problems. Most growers pack each African daisy individually in a shallow cardboard container designed for support. Flowers are stored at -1 °C, but for no longer than one week (Reid, 2004), which is below the light brown apple moth developmental threshold of 7 °C (Danthanarayana, 1975).

Conclusion –Light brown apple moth larvae are almost always associated with plant leaves (Danthanarayana, 1975). Since African daisies are shipped without leaves, larvae are highly unlikely to move with commercial shipments. Additionally, the host status of African daisy is uncertain and storage conditions are not conducive to development.

3.2. Eucalyptus baby blue (*Eucalyptus pulverulenta* Sims)

Host Status –Light brown apple moth has never been intercepted on Eucalyptus baby blue by PPQ at any port of entry (PestID, 2015), but *Eucalyptus* sp. are a host of light brown apple moth in New Zealand (Withers, 2001) and Tasmania (Evans, 1937).

Harvest and packing – Eucalyptus branches are harvested with leaves and are stored at 0 to 1 °C (Reid, 2014), which is below the light brown apple moth developmental threshold of 7 °C (Danthanarayana, 1975).

Postharvest – If instars or pupae are present on *E. pulverulenta* branches after harvest, refrigeration would suppress development. Once *E. pulverulenta* arrive at a floriculture facility, any unfavorable leaves would be culled or entire stems would be discarded if they are not usable. This would include any leaves that may contain life stages of the light brown apple moth.

Conclusion – Refrigeration and culling practices make it highly unlikely that any light brown apple moth larvae would be moved out of the quarantine area with *E. pulverulenta*.

3.3. Anthurium, Calla lily, Daffodil, Echeveria, Freesia and Kangaroo paws

We found no evidence that the following cut flower species/genera are hosts of light brown apple moth:

- Anthurium, *Anthurium andraeanum* Linden ex André
- Calla lily, *Zantedeschia aethiopica* (L.) Spreng.
- Daffodil, *Narcissus* sp.
- Echeveria, *Echeveria* sp.
- Freesia, *Freesia alba* (G. L. Mey.) Gumbel.
- Kangaroo paws, *Anigozanthos flavidus* Redouté

Therefore, we think they can be exempted from the light brown apple moth quarantine restrictions.

4. Conclusions

We think *G. jamesonii* is eligible for exemption based on industry practices, since the host is not shipped with leaves.

We also think that *E. pulverulenta* is eligible for exemption based on industry practices and culling of unwanted leaves and stems at floriculture centers.

We concluded that the following cut flowers are eligible based on non-host status: Anthurium, calla lily, daffodil, echeveria, freesia and kangaroo paws.

5. References

- APHIS. 2007. Federal Domestic Quarantine Order, *Epiphyas postvittana* (Light Brown Apple Moth), DA-2007-42, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Riverdale, MD.
- Cronquist, K. 2015. CCFC Exemption Request for Cut Flower Varieties Personal communication to J. Cook on August 26, 2015, from Cronquist, K., California Cut Flower Commission.
- Danthanarayana, W. 1975. The bionomics, distribution and host range of the light brown apple moth, *Epiphyas postvittana* (Walk.) (Tortricidae). Australian journal of zoology 23(3):419-437.
- Evans, J. W. 1937. The light-brown apple moth (*Tortrix postvittana* Walker). Supplement to the Tasmanian Journal of Agriculture 8(3):1-18.

- Geier, P. W., and D. T. Briese. 1981. The light-brown apple moth, *Epiphyas postvittana* (Walker); a native leafroller fostered by European settlement. Pages 131-155 in R. L. Kitching and R. Jones, (eds.). *The Ecology of Pests. Some Australian Case Histories*. CSIRO Australia.
- IPPC. 2015. International Standards For Phytosanitary Measures Draft: International Movement of Cut Flowers (2008-005). Food and Agriculture Organization of the United Nations, Secretariat of the International Plant Protection Convention. 11 pp.
- PestID. 2015. Pest Identification Database (PestID). United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine. <https://aqa.aphis.usda.gov/aqa/>. (Archived at PERAL).
- PPQ. 2012a. Risk Assessment: Exemption of Citrus, Stone Fruits, Apples, and Pears from Regulated Status in the Light Brown Apple Moth Federal Quarantine Order Based on Production Practices. Raleigh, NC, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Center for Plant Health Science and Technology, Raleigh, NC.
- PPQ. 2012b. Risk Assessment: Exemption of Kiwi Fruit, Blueberries, Persimmons, Green Beans, and Daikon Radish (with or without tops) from Regulated Status in the Light Brown Apple Moth Federal Quarantine Order Based on Production Practices, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Center for Plant Health Science and Technology, Raleigh, NC.
- PPQ. 2013. Risk Assessment: Exemption of Cherries from Regulated Status in the Light Brown Apple Moth Federal Quarantine Order Based on Production Practices, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Center for Plant Health Science and Technology, Raleigh, NC.
- Reid, M. S. 2004. Gerbera, Transvaal Daisy: Recommendations for Maintaining Postharvest Quality. Department of Plant Sciences, University of California, Davis.
- Reid, M. S. 2014. Cut Flowers and Greens. in K. C. Gross, C. Y. Wang, and M. Saltveit, (eds.). *The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks: Agriculture Handbook Number 66 (HB-66)*. United States Department of Agriculture-Agricultural Research Service.
- Withers, T. M. 2001. Colonization of eucalypts in New Zealand by Australian insects. *Austral Ecology* 26(5):467-476.