

Pest Risk Assessment for the State of Oregon

Epiphyas postvittana (Walker) – Light Brown Apple Moth (LBAM)

Pest Identity

Scientific Name: *Epiphyas postvittana* (Walker)
Order: Lepidoptera
Family: Tortricidae
Common Name: Light Brown Apple Moth (LBAM)

Risk Rating Summary

Relative Risk Rating: Very High

Numerical Score: 16 (maximum 20)

Uncertainty: Low

Pest Background

The light brown apple moth (LBAM), *Epiphyas postvittana* (Lepidoptera, Tortricidae) is a tortricid leafroller moth native to Australia and originally associated with native Acacia and other evergreen species. LBAM has extended its host range to a wide range of orchard and other habitats in its origin, Australia, and New Zealand, the first country LBAM invaded. LBAM is considered a highly polyphagous pest attacking a long list of fruits and plants, with more than 150 plant genera in over 70 families, including nursery stock, cut flowers, stone and pome fruit, grapes, and citrus. LBAM has also been found on understory perennial weeds in pine forests, on willow and other plants along riparian systems, and on a wide range of garden plants. Major hosts include the following genera and species of plants: *Actinidia* (Gooseberry), *Chrysanthemum*, *Citrus*, *Cotoneaster*, *Crataegus* (hawthorne), *Eucalyptus*, *Humulus* (hop), *Jasminum*, *Malus* spp., *Medicago sativa*, *Persea americana* (avocado), *Pinus radiata* and other *Pinus* spp., *Populus*, *Prunus*, *Pyrus*, *Ribes* (currants), *Rosa*, *Rubus*, *Solanum tuberosum*, *Trifolium* (clovers), *Vaccinium*, *Vicia faba*, and *Vitis* spp. Its current extension includes New Zealand, United Kingdom (England and Wales), Ireland and Hawaii, and recently California.



Figure 1. Life stages of *Epiphyas postvittana*: (top left) eggs; (top right) larva; (bottom left) pupa, (bottom right) adults, male is on the left. (Photos from <http://www.hortnet.co.nz/key/keys/info/lifecycle/lba-desc.htm>)

LBAM generally shows three generations per year in southern Australia and 2 to 4 in New Zealand. Damage is caused by the larvae feeding on foliage, buds, shoots and fruits of host plants.

In California, LBAM has become a highly controversial subject with CDFA (California Department of Food and Agriculture) trying to implement an eradication program following the first detection of LBAM in 2006. A small number of activists launched a massive social network campaign to question CDFA and USDA APHIS' analysis of the LBAM regulatory status and subsequent eradication decision. In particular, activists questioned two specific points, the economic evaluation of LBAM as a major crop pest and the time of LBAM invasion of California. CDFA and USDA APHIS based their decision to classify LBAM as a major crop pest on yield loss data and peer-reviewed literature from Australia and New Zealand. The question on how long LBAM has been in California is still hotly debated between researchers on both sides. It is a fact that no LBAM specimen has been found in any official or private collection across California and no LBMA was caught in any organized CDFA survey prior to 2006. Based on CDFA and USDA APHIS' analysis, LBAM is still considered an actionable and reportable quarantine pest despite efforts of a few non-entomological petitioners to have LBAM's classification as a regulatory pest changed.

Spread Potential to Oregon: High (numerical score 4)

Justification

In a Pest Risk Analysis (PRA) conducted by USDA APHIS and the University of Minnesota, the likelihood of establishment in the US was determined to be high considering the climate suitability and host range availability. However, the number of international interceptions of LBAM into the US is very low, predominately associated with international airline passengers. According to CABI International, one of the important pathways for immature LBAM stages is growing medium accompanying plants and leaves. Oregon receives a considerable amount of nursery material with growing medium, which significantly increases the risk of spreading LBAM from California into Oregon.

Establishment Potential in Oregon: Very High (numerical score 5)

Justification

LBAM's preferred climate zone can be characterized as temperate, tropical, or dry with temperatures ranging between 7.5°C (45°F) and 31°C (88°F). Based on climate models, LBAM could survive and establish in most Oregon counties, including the Willamette Valley and most areas in Eastern Oregon. LBAM is considered a highly polyphagous pest with a host range of over 150 plant genera in over 70 families. The preferred hosts are in the families of Compositae, Leguminosae, Polygonaceae, and Rosaceae, including important crops such as alfalfa, stone fruits, berry fruits, vegetable crops (broccoli, carrot, cauliflower, Brussels sprouts, cabbage), grape, cottonwood and other deciduous trees, and cut flowers.

The likely number of LBAM generations for Oregon may be between 2-4 based on biology data from Australia (average three generations) and New Zealand (average four generations). *Epiphyas postvittana* does not diapause, so populations are less influenced by photoperiod and may considerably overlap in Oregon.

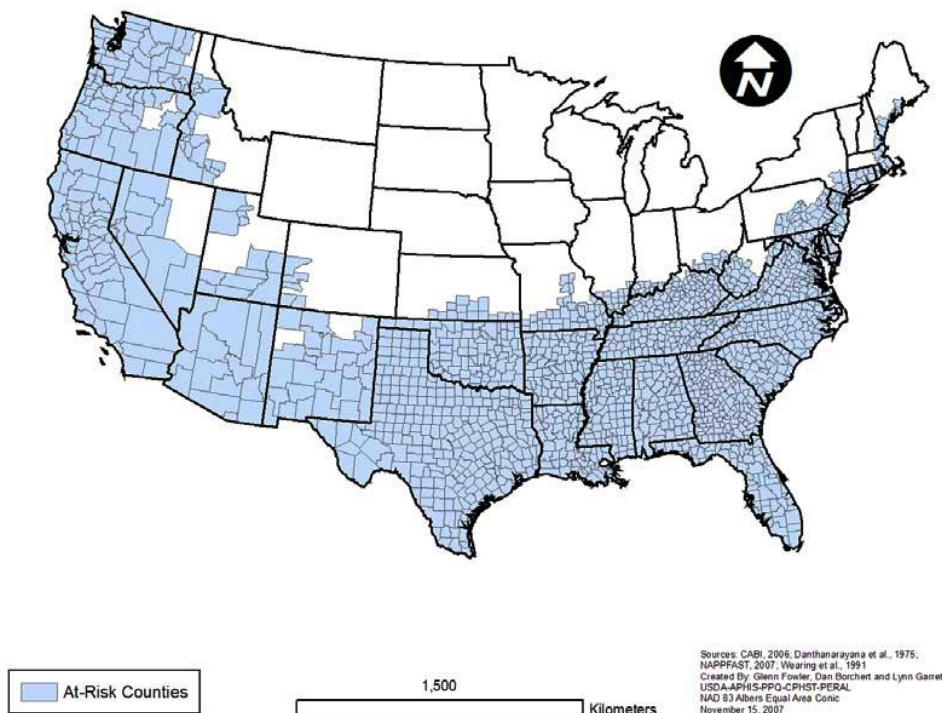


Figure 2: Counties at risk for LBAM introduction based on climate match.

Environmental Impact Potential to Oregon: Low (numerical score 2)

Justification

Being considered an important crop pest, there is little information and data available on LBAM's impact on the general environment and sensitive riparian habitats. However, LBAM is known to attack a long list of deciduous, such as cottonwood, oak, willow, English walnut, but also coniferous trees, including pine. LBAM reportedly has colonized a wide range of artificial and natural habitats in its origin and in New Zealand where it was found in pine forests on understorey perennial weed, on willows and other plants along riparian areas. In New Zealand LBAM seems to have limited success in penetrating native forest vegetation.

Economic Impact Potential to Oregon: Very High (numerical score 5)

Justification

APHIS and CDFA's evaluation of the potential economic impact caused by LBAM is in the center of the hotly debated LBAM saga in California. In an economic analysis study by APHIS literature is cited that considers LBAM a significant agricultural and nursery pest in Australia and New Zealand. LBAM feeding damage occurs on the leaves, fruits, and stems of a variety of hosts that can result in both internal and external fruit damage. In field studies, LBAM damage on grape was evaluated in New Zealand showing that feeding damage depends on the timing of LBAM infestations. In conclusion, the study shows that direct damage of LBAM may be minimal compared to the indirect losses by making the grape bunches more susceptible to diseases. In other studies, yield losses in Australia are estimated to be at about \$18 million per year from a range of commodities. We attempted to evaluate the potential economic impact for Oregon considering the potential annual economic losses to the main host plants, and the resulting control and quarantine costs. If LBAM would be detected in Oregon a potential annual economic loss of \$23 million could occur (Fig. 4). It will be critical to look at California to get a better idea of the economic impact LBAM causes to the US agricultural setting, including the

influence of existing crop management programs on LBAM populations, as it is very difficult to evaluate the potential damage caused by a new invasive species.

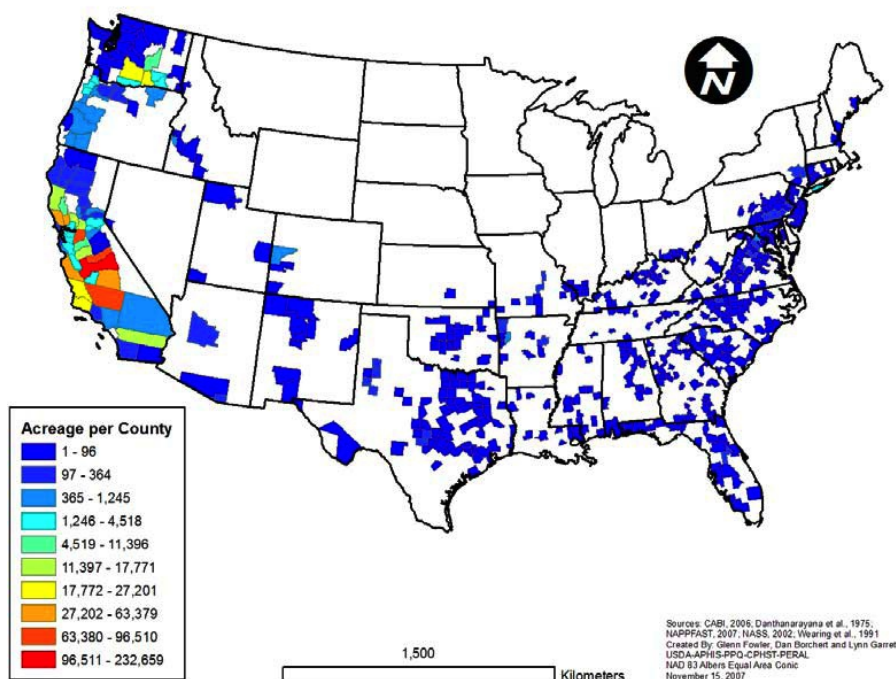


Fig 3: Grape acreage in counties at risk for LBAM introduction.

The economic analysis conducted by APHIS estimated the average total costs if LBAM were introduced in the at-risk areas in the US to be \$105 million.

Crop/Commodity	Acres Planted	Production Value	Estimated Crop Damage Costs**	Estimated Quarantine Costs***	Total Economic Impact
Nurseries	51,800	966,000,000	15,456,000	1,236,480	16,692,480
Pears (all varieties)	17,230	89,600,000	1,433,600	114,688	1,548,288
Grapes	15,600	60,200,000	963,200	77,056	1,040,256
Caneberries	10,960 *	54,100,000	865,600	69,248	934,848
Blueberries	3,640	53,000,000	848,000	67,840	915,840
Sweet cherries	14,100	47,900,000	766,400	61,312	827,712
Apples	4,990	29,700,000	475,200	38,016	513,216
Hops	5,000 *	23,000,000	368,000	29,440	397,440
Strawberries	2,550	15,900,000	254,400	20,352	274,752
Clover (all)	19,910 *	11,500,000	184,000	14,720	198,720
Total	\$ 145,780	\$ 1,350,900,000	\$ 21,614,400	\$ 1,729,152	\$ 23,343,552

* Acres harvested

** Product of production value multiplied by .016 (damage estimate)

*** Product of estimated crop damage costs multiplied by .08 (estimated proportion for quarantine costs)

Fig. 4: Economic impact of LBAM on major Oregon host crops

Conclusion

Considering the recent detection in California, the high probability of introduction into and establishment in Oregon, and the potential high economic impact, the light brown apple moth is

considered a high-risk pest for Oregon. Although the environmental impact will likely be minimal, the presence of an established LBAM population in Oregon would adversely affect our economic trading relationships with other national and international trading partners and cause direct damage to many commodities.

Literature consulted

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