Light Brown Apple Moth Pest Profile

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

Distribution in California Counties: The following thirteen counties are considered to have one or more infested areas and are therefore under quarantine: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano and Sonoma.

Figure 1. LBAM adults, female (left) and male (right). Photo courtesy of SARDI, Greg Baker.

Background: This moth is originally from Australia, and has become established in New Zealand, New Caledonia, Hawaii and the British Isles. Its discovery in California is a new record for the Americas.

Description: Adults are light brown, yellowish moths with varying amounts of darker brown, with a wingspan of 16-25 mm (Fig. 1). Females are larger than males, and usually have less distinct markings, but often have a distinct spot in the middle when the wings are closed. Eggs are pale white and deposited slightly overlapping each other in groups of 20-50. Larvae are green, about 18 mm long at maturity. They are superficially similar to other native tortricid larvae and DNA analysis is necessary to confirm their identity. Pupae are brown, about 11 mm long.

Hosts: LBAM has been associated with many plants representing 290 genera (USDA 2008). These genera contain over 2000 species, and many of these species that are not already known to be hosts could prove to be hosts as LBAM becomes exposed to them. Some notable trees recorded as hosts are apple, pear, peach, apricot, nectarine, citrus, persimmon, cherry, almond, avocado, oak, willow, walnut, poplar, cottonwood, Monterey pine and eucalyptus. Some common shrub and herbaceous hosts are grape, kiwifruit, strawberry, berries (blackberry, blueberry, boysenberry, and raspberry), corn, pepper, tomato, pumpkin, beans, cabbage, carrot, alfalfa, rose, camellia, pittosporum, jasmine, chrysanthemum, clover, lupine and plantain.

Life Cycle and Damage: Development is continuous, with no true dormancy (Venette et al. 2003). In Australia, this moth typically has three generations per year and over-winters as a larva. Life cycle projections for the areas of California where it has been found indicate that four to five generations are possible. Females deposit egg masses containing 20-50 eggs on the upper leaf surface or on fruit. Fecundity varies considerably, and females are capable of laying up to 1496 eggs in their lifetime, but the average has been recorded variously as 118 to 462. Larvae disperse and construct silken shelters on the underside of leaves, usually near a midrib or large vein. Older larvae roll together leaves and buds or fruit with webbing. Damage to fruit occurs as surface feeding by the larvae. Larvae will occasionally enter the fruit to feed. Pupation takes place within the larval nests.

Survey Methods: There is a pheromone lure for the males, namely a 95:5 mixture of (E)-11-Tetradecenyl acetate: (E,E)-9,11-Tetradecadienyl acetate, that can be used in sticky traps.

Management: Mating disruption, parasitoids and various insecticides have been used to control LBAM elsewhere.

Economic Impact: The impact on production costs for LBAM hosts could top $100 million. It was estimated for Australia that LBAM causes AU$21.1 million annually in lost production and control costs, or about 1.3% of gross fruit value, for apples, pears, oranges and grapes (Sutherst 2000). Applying this percentage to the 2005 gross value of these same crops in California of $5.4 billion (USDA NASS 2006), the estimated annual production costs would be $70.2 million. This estimate does not include economic costs to the nursery industry nor to other significant host crops in California such as apricots, avocados, kiwifruit, peaches and strawberries. If the same level of costs were incurred by these as for the previous four crops, the additional costs would be $63.1 million, based on their 2005 gross value of $4.8 billion. Therefore, the total lost production and control costs in California could be $133 million for all of the crops mentioned above.

Exact economic impacts on international and domestic exports are uncertain at this time. California is the nation's leader in agricultural exports and in 2003 shipped more than $7.2 billion in both food and agricultural commodities around the world (CASS 2004). Some countries have specific regulations against this pest, and many others consider it a regulated pest that would not be knowingly allowed to enter. Additional measures, such as preharvest treatments and postharvest disinfestation, would likely have to be taken to ensure that shipments to these countries are free from LBAM. In addition, LBAM is an exotic pest; i.e., it is not established in the continental United States and, therefore, other states within the U.S. would likely impose restrictions on the movement of potentially infested fruits, vegetables and nursery stock. These restrictions could severely impact the domestic marketing of California agricultural products.

Environmental Impact: Establishment of this moth could cause direct environmental damage via increased pesticide use statewide by commercial and residential growers and via adverse feeding impacts on native plants. Populations of threatened and endangered plant species could be severely threatened or extirpated should this moth adapt to feeding on them.

Methods of Artificial Spread: The most significant route of artificial spread is likely to be on live plants sold through nurseries and destined for commercial, ornamental and garden plantings. Other methods of spread are on fresh produce, green waste and conveyances.

Literature Cited

CASS. 2004. California Agricultural Statistics 2003. California Agricultural Statistics Service, Sacramento, California. 92 pp.

Sutherst, R. W. 2000. Pests and Pest Management – Impact of Climate Change. Rural Industries Research and Development Corporation. Publication No. 00/16, Project No. CSE-76A. 34 pp.

USDA. 2008. Treatment program for light brown apple moth in California. Environmental Assessment, February 2008. 46 pp.

USDA NASS. 2006. California County Agricultural Commissioners' Data, 2005. United States Department of Agriculture, National Agricultural Statistics Service, California Field Office, Sacramento, California. 80 pp.

Venette, R. C., E. E. Davis, M. DaCosta, H. Heisler, and M. Larson. 2003. Mini Risk Assessment. Light brown apple moth, *Epiphyas postvittana* (Walker) [Lepidoptera: Tortricidae]. USDA CAPS PRA. 38 pp.

Revised by Bob Dowell, 03/20/09
Prepared By: Kevin Hoffman, Primary State Entomologist

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LBAM Host List - Horticulture

Aaron's Beard	*Hypericum calycinum*
Acacias	*Acacia spp*
African Daisy	*Arctotis stoechadifolia*
Amaranths	*Amaranthus spp.*
Angel's Trumpet, Jimson Weed, Thorn Apple	*Datura spp.*
Arrow Grass	*Triglochin spp.*
Arrowwoods	*Viburnum spp.*
Astartea	*Astartea spp.*
Asters	*Aster spp.*
Australian Bluebells, Bluebell Creeper	*Sollya spp.*
Australian Fuchsia	*Correa spp.*
Baby's Breath	*Gypsophila paniculata*
Banana Passionflower, Passionfruit, Poka	*Passiflora mollissima*
Black Alder/European Alder	*Alnus glutinosa*
Black Locust	*Robinia pseudoacacia*
Black Thorns	*Bursaria spp.*
Bleeding Heart Vine, Bowers, Tubeflower, and Turk's Turban	*Clerodendron spp.*
Boronias	*Boronia spp.*
Bottle Brush	*Callistemon spp.*
Brake, Dish Fern, Table Fern	*Pteris spp.*
Broadleaf Dock	*Rumex obtusifolius*
Broomheaths	*Monotoca spp.*
Brooms	*Genista spp.*
Buck Brush, Wild Lilac	*Ceanothus spp.*
Bull Thistle	*Cirsium vulgare*
Buttercups, Crowfoot	*Ranunculus spp.*
Butterfly Bush	*Buddleia spp.*
Cabbage Tree	*Cordyline australis*
Calendula	*Calendula spp.*
Camellia	*Camellia japonica*
Canada Goldenrod	*Solidago canadensis*
Canada Thistle	*Cirsium arvense*
Capeweeds, Cape Dandelion	*Arctotheca spp.*
Carolina Jessamine	*Gelsemium spp.*
Cedar	*Cedrus spp.*
Chrysanthemums	*Chrysanthemum spp.*
Clematis, Virgin's Bower, Lather Flower, Vase Vine	*Clematis spp.*
Columbines	*Aquilegia spp.*
Common Sheep Sorrel	*Rumex acetosella*
Common Sowthistle	*Sonchus oleraceus*
Common Yarrow	*Achillea millefolium*
Cotoneaster	*Cotoneaster spp.*
Cottonwood, Poplar	*Populus spp.*

Coyote Brush, Desert Broom	*Baccharis spp.*
Curled Dock	*Rumex crispus*
Curry plant, Licorice Plant, Straw Flower	*Helichrysum spp.*
Cypress	*Cupressus sp.*
Dahlia	*Dahlia spp.*
Douglas fir	*Pseudotsuga menziesii*
Dusty-miller, Groundsels	*Senecio spp.*
Escallonias	*Escallonia spp.*
Eucalyptus, Gum trees	*Eucalyptus spp.*
Euonymus	*Euonymus spp.*
Fat-hen	*Chenopodium album*
Fiddle Dock	*Rumex pulcher*
Fire Thorn	*Pyracantha spp.*
Flax	*Linum spp.*
Fleabane	*Conyza bilbaoana*
Fleece Flower, Knotweed, Smartweed	*Polygonum spp.*
Florist's Geraniums	*Pelargonium spp.*
Forsythias	*Forsythia spp.*
Fox's Brush, Heliotrope, Valerian	*Centranthus spp.*
Garden Sorrel, Spinach Dock	*Rumex acetosa*
Geebung	*Persoonia spp.*
Golden Shower, Pink Shower, Rainbow Shower and Gold Medallion Tree	*Cassia spp.*
Gorse	*Ulex europ aeus*
Grand Fir	*Abies grandis*
Greenbrier, Jacob's Ladder, Wild Sarsaparilla	*Smilax spp.*
Hawthorn	*Crataegus spp.*
Hebe	*Hebe spp.*
Hedge Mustard	*Sisymbrium spp.*
Holly	*Ilex sp.*
Honey Myrtle, Bottlebrush	*Melaleuca spp.*
Honeysuckles	*Lonicera spp.*
Hop Bush, Hopseed Bush	*Dodonaea spp.*
Hummingbird Bush, Grevilleas	*Grevillea spp.*
Ice Plant	*Mesembryanthemum spp.*
Ivy	*Hedera spp.*
Japanese Douglas Fir	*Pseudotsuga japonica*
Japanese Pieris or Andromeda	*Pieris japonica*
Japanese Zelkova	*Zelkova serrata*
Jasmine	*Jasminum spp.*
Jerusalem Artichoke	*Helianthus tuberosus*
Kamahi	*Weinmannia racemosa*
Lady's Sorrel, Redwood Sorrel, Wood Sorrel	*Oxalis spp.*
Lancewood	*Pseudopanax sp.*
Lavenders	*Lavendula spp.*
Lawson's Cypress	*Chamaecyparis lawsoniana*
Lilac Vine	*Hardenbergia spp.*

Lupines	*Lupinus spp.*
Madrone, Strawberry Tree	*Arbutus spp.*
Maidenhair Ferns	*Adiantum spp.*
Mexican Orange	*Choisya spp.*
Mexican Palo Verde	*Parkinsonia aculeata*
Mexican sunflower	*Tithonia spp.*
	Trema spp.
Michelia	*Michelia spp.*
Mignonette	*Reseda spp.*
Milkworts	*Polygala spp.*
Mock Orange	*Philadelphus spp.*
Montbretia	*Crocosmia spp.*
Mugwort, Sage brush, Tarragon, Worm Wood, etc.	*Artemesia spp.*
Mums	*Chrysanthemum x morifolium*
Musk Thistle	*Cardus nutans*
Myoporum	*Myoporum spp.*
Native Parsnip	*Platysace spp.*
Nettles	*Urtica spp.*
New Zealand Christmas tree	*Metrosideros excelsa*
New Zealand Flax	*Phormium tenax*
Norfolk Island Hibiscus	*Lagunaria patersonii*
Oak	*Quercus spp.*
Periwinkles	*Vinca spp.*
Photinia	*Photinia spp.*
Pines	*Pinus spp.*
Pittosporums	*Pittosporum spp.*
Plucaria	*Pulcaria spp.*
	Pyllanthus spp.
Privet	*Ligustrum spp.*
Redwood	*Sequoia sp.*
Rhododendron	*Rhododendron spp.*
Roses	*Rosa spp.*
Sages	*Salvia spp.*
Scotch Broom	*Cytisus scoparius*
Shore Sowthistle	*Sonchus kirkii*
Silver Tree	*Leucodendron spp.*
Snow Bush	*Breynia spp.*
Spanish Heath	*Erica lustanica*
Spiny Sowthistle	*Sonchus asper*
Spruce	*Picea spp.*
Sugi	*Cryptomeria japonica*
Sweet-amber	*Hypericum androsaemum*
Tea Trees	*Leptospermum spp.*
Trailing St. John's Wort	*Hypericum humifusum*
Transvaal Daisy	*Gerbera spp.*

Tree Tomato	*Cyphomandra betacea*
Trumpet Creeper, Trumpet Vine	*Campsis spp.*
Velvet Ash	*Fraxinus velutina*
Virginia Mallow	*Sida spp.*
Wax Flower	*Eriostemon spp.*
Western Red Cedar	*Thuja plicata*
White Tea Tree	*Kunzea ericoides*
Willow	*Salix spp.*
Wintersweet	*Chimonanthus sp.*
Woodbine, Virginia Creeper	*Parthenocissus spp.*

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LBAM Host List - Agriculture

Alfalfa	*Medicago sativa*
Almond	*Prunus amygdalus*
Apple	*Malus* spp.
Apricot	*Prunus armeniaca*
Avocado	*Persea americana*
Blackberry, Boysenberry, Raspberry	*Rubus* spp.
Blueberry	*Vaccinium sp.*
Broad Bean	*Vicia faba*
Broccoli, Cabbage, Cress, Mustard, Radish, and Turnip, ect.	*Brassica* spp.
California Black Walnut, Butternut	*Juglans* spp.
Carrot, Queen Anne's Lace	*Daucus* spp.
Celery	*Apium graveolens*
Chile Pepper	*Capsicum frutescens*
Chinese Gooseberry	*Actinidia chinensis*
Citrus	*Citrus* spp.
Clover	*Trifolium* spp.
Common Bean	*Phaseolus vulgaris*
Common Plantain	*Plantago major*
Corn	*Zea mays*
Cucumber	*Cucumis sativus*
Currant	*Ribes spp.*
Feijoa, Pineapple Guava	*Feijoa sellowiana*
Grape	*Vitis* spp.
Hops	*Humulus lupulus*
Kiwifruit	*Actinidia deliciosa*
Kumquats	*Fortunella* spp.
Litchi	*Litchi chinensis*
Loquat	*Eriobotrya* spp.
Macadamia	*Macadamia* spp.
Mango	*Mangifera* spp.
Mint	*Mentha* spp.
Narrowleaf Plantain	*Plantago lanceolata*
Nectarine	*Prunus persica* var *nectarina*
Olive	*Olea europaea*
Parsley	*Petroselinum* spp.
Passionfruit	*Passiflora edulis*
Pea	*Pisum sativum*
Peach	*Prunus persica*
Pear	*Pyrus* spp.
Persimmon	*Diospyros* spp.
Plum	*Prunus domestica*
Potato	*Solanum tuberosum*
Pumpkin	*Cucurbita* spp.
Quince	*Cydonia* spp.

St. John's Wort	*Hypericum perforatum*
Strawberry	*Fragaria* spp.
Sweet Cherry	*Prunus avium*
Sweet Pea	*Lathyrus* spp.
Tomatoes	*Lycopersicum* spp.
Wild Radish	*Raphanus spp.*