

2010 Orchard Pest Detection Survey Final Report

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Introduction: Utah has a highly productive fruit industry, with over 370 operations growing at least 6,885 acres of cherries, peaches, apples, cane berries, and other fruits (NASS, 2006). There are several non-native insect species that have recently been introduced to other states that could potentially spread to Utah, with dire consequences to the tree fruit and small fruit industries. In 2010, a survey of Utah orchards was conducted in an attempt to detect three such species: *Epiphyas postvittana*, *Lobesia botrana*, and *Drosophila suzukii*.

Epiphyas postvittana (Lepidoptera: Tortricidae) (Fig. 1) is a highly polyphagous pest known commonly as light brown apple moth. This species has a host range of over 120 plant genera representing more than 50 families, including Utah crops from genera such as *Malus* (apple), *Prunus* (apricot, cherry, peach), *Pyrus* (pear), and *Rubus* (blackberry, raspberry) (Venette et al., 2003b).

Epiphyas postvittana is native to Australia, and populations have established in New Zealand, New Caledonia, Hawaii, and Great Britain (Hoffman and Dowell, 2009). Since 2007, this species has also established in California and Hawaii, and was found in Oregon in 2010. In its native range it is known to have three generations annually, but it has been projected that up to five generations may be possible in California. Females lay 20-50 eggs at a time, with estimates of average lifetime fecundity ranging from 118 to 462 eggs. This leafroller moth overwinters as a larva, and it is larval feeding that damages fruit (Fig. 2) (Hoffman and Dowell, 2009). *Epiphyas postvittana* closely resembles several other tortricid moths, making identification dependent on molecular diagnostics or examination of genitalia (Venette et al., 2003b). Although the entry potential of this species was rated low, the likelihood of U.S. establishment upon introduction was rated high, with a high level of damage to U.S. agricultural and natural ecosystems probable. It has been estimated that 80% of the United States, including Utah, consists of the dry, tropical, or temperate habitat suitable for this pest. Its leafrolling ability and its apparent resistance to insecticides makes it particularly difficult to control (Venette et al., 2003b). Now that *E. postvittana* has established in California, it is even more important to diligently monitor Utah for this pest, if early detection and control are to be accomplished before heavy losses are experienced.

Lobesia botrana (Lepidoptera: Tortricidae) (Fig. 3) is a pest of grapes, berries, and similar fruits from approximately 27 different



Figure 1. *Epiphyas postvittana* adult¹.



Figure 2. *Epiphyas postvittana* larva on apple².

families. Hosts include important Utah crops such as cherries and blackberries. Its common names include European grape vine moth, grape leaf-roller, grape vine moth, grape moth, and vine moth. *Lobesia botrana* is a polyvoltine species, with one to five generations possible, depending on environmental conditions of the area. Females lay up to 35 eggs per day, and over 300 eggs each in a lifetime. These moths have five larval instars and overwinter as pupae. Damage results from larval feeding on flowers and fruits (Venette et al., 2003a; Sullivan et al., 2010).



Figure 3. *Lobesia botrana* adult³.

Lobesia botrana populations are found in Africa, Asia, and Europe. The first introduction to the western hemisphere was reported in Chile in 2008 (Sullivan et al., 2010). Subsequently, this species was found in California in 2009. The likelihood of entry into the U.S. had been considered low, but the likelihood of *L. botrana* establishment if introduced to the United States has been rated as high, with severe consequences predicted. Therefore, the introduction and spread of *L. botrana* in California is of great concern, especially to nearby states. Other tortricid species are similar in appearance to *L. botrana*, necessitating identification by molecular methods or by examination of genitalia (Venette et al., 2003a). Protection of Utah's fruit industry requires vigilant monitoring for this troublesome pest.

Drosophila suzukii (Diptera: Drosophilidae) (Fig. 4) is a major pest of many tree fruits and small fruits that are grown in Utah, including cherry, raspberry, blackberry, peach, and others. This polyphagous species is commonly known as cherry drosophila in Japan and as spotted wing drosophila in the U.S. In addition to the challenges created by *D. suzukii*'s broad host range, two other characteristics of the females cause great concern: the propensity to lay eggs on ripe (as opposed to overripe) fruit and the serrated ovipositor which enables oviposition on unripe fruit (Fig.5). Estimated to have up to 11 generations, this species overwinters as an adult in its native range. Oviposition wounds fruit, facilitating secondary infections by other insects and by pathogens, and feeding by the three larval instars causes extensive fruit damage (Fig. 6) (Walsh et al., in press).



Figure 4. *Drosophila suzukii* male⁴.

Drosophila suzukii is distributed throughout Asia. It was introduced to Hawaii in 1980, California in 2008, and Florida in 2009. By the end of 2010, this species had been found in 10 states, including Utah, as well as British Columbia. This pest prefers temperatures in the range of 20-30°C (68-86°F), but some individuals of all life stages can survive temperatures below freezing, meaning that *D. suzukii* may be able to overwinter in northern Utah. In 2009, yield losses were estimated to be as high as 80% (Walsh et al., in press). The suitability of Utah conditions to *D. suzukii*, coupled with the potential for huge economic impact, demand continuous monitoring and development of control strategies for this newly introduced pest.



Figure 5. Serrated ovipositor of female *Drosophila suzukii*⁵.

Objective: To protect the Utah fruit industry by surveying for *Epiphyas postvittana*, *Lobesia botrana*, and *Drosophila suzukii* in Northern Utah orchards.



Figure 6. *Drosophila suzukii* larva emerging from blueberry⁶.

Methods: In late May, Jackson sticky traps with pheromone lure specific for *E. postvittana* were placed in 10 locations in four Utah counties (Table 1, Fig. 7). A second Jackson trap with pheromone lure specific for *L. botrana* was placed in each location, distant from the traps with *E. postvittana* lure. Two McPhail traps containing yeast/sugar water solution and two McPhail traps containing apple cider vinegar were placed in different areas in all 10 locations.

Jackson traps remained in place until mid-September, with sticky liners and lures being changed every 4 weeks. Traps liners were pre-screened by Cory Stanley-Vorel at Utah State University. Trap liners possessing potential target moths were sent to Eric LaGasa at the Washington State Department of Agriculture for definitive identification.

Contents of McPhail traps were initially collected bi-weekly. In late June, we began collecting weekly. All samples were screened by Cory Stanley-Vorel at Utah State University. Vinegar traps were ineffective and were removed in mid-September. Yeast traps remained in place until mid-October, with the exception of those placed in Davis County. *Drosophila suzukii* was detected in Davis County, and therefore the number of yeast traps at that site was increased to 10. Yeast traps remained in place at the Davis County site until late November.

Results: In 2010, 10 orchard sites in four Utah counties were surveyed for *E. postvittana*, *L. botrana*, and *D. suzukii* (Table 1, Fig. 7 & 8). In total, 80 sticky traps were examined. Neither of the lepidopteran target species was identified from any of the Jackson traps.

On 18 August, a *Drosophila suzukii* was trapped at the Kaysille site (Davis County). The identification was confirmed by the USDA-APHIS-PPQ lab in Riverdale, Maryland. In total, 73 *D. suzukii* of both sexes were subsequently caught at that site (Fig. 7). Traps were removed from the Davis County site on 26 November.

NAPIS data entry: Survey data were entered into NAPIS on 17 December 2010 by Ryan Davis, Data Entry Manager.

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Image References

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² Department of Primary Industries and Water, Tasmania Archive, Bugwood.org.

³ Marc Epstein, California Department of Food and Agriculture, www.cdffa.gov.

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⁵ Cemariposa.ucdavis.edu/files/67726.pdf.

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Table 1. Utah trapping locations for *Epiphyas postvittana*, *Lobesia botrana*, and *Drosophila suzukii* in 2010.

County	Latitude	Longitude
Box Elder	41.478123	-112.016699
Box Elder	41.458253	-112.051353
Box Elder	41.422323	-112.032677
Davis	41.022851	-111.937230
Utah	39.965864	-111.795995
Utah	39.982365	-111.769780
Utah	39.993350	-111.825558
Weber	41.327723	-112.010240
Weber	41.199242	-112.046422
Weber	41.180175	-112.026712

Figure 7. Locations and densities of traps for 2010 Orchard Pests Survey, along with numbers of *Drosophila suzukii* caught at Davis County trapping site.⁷

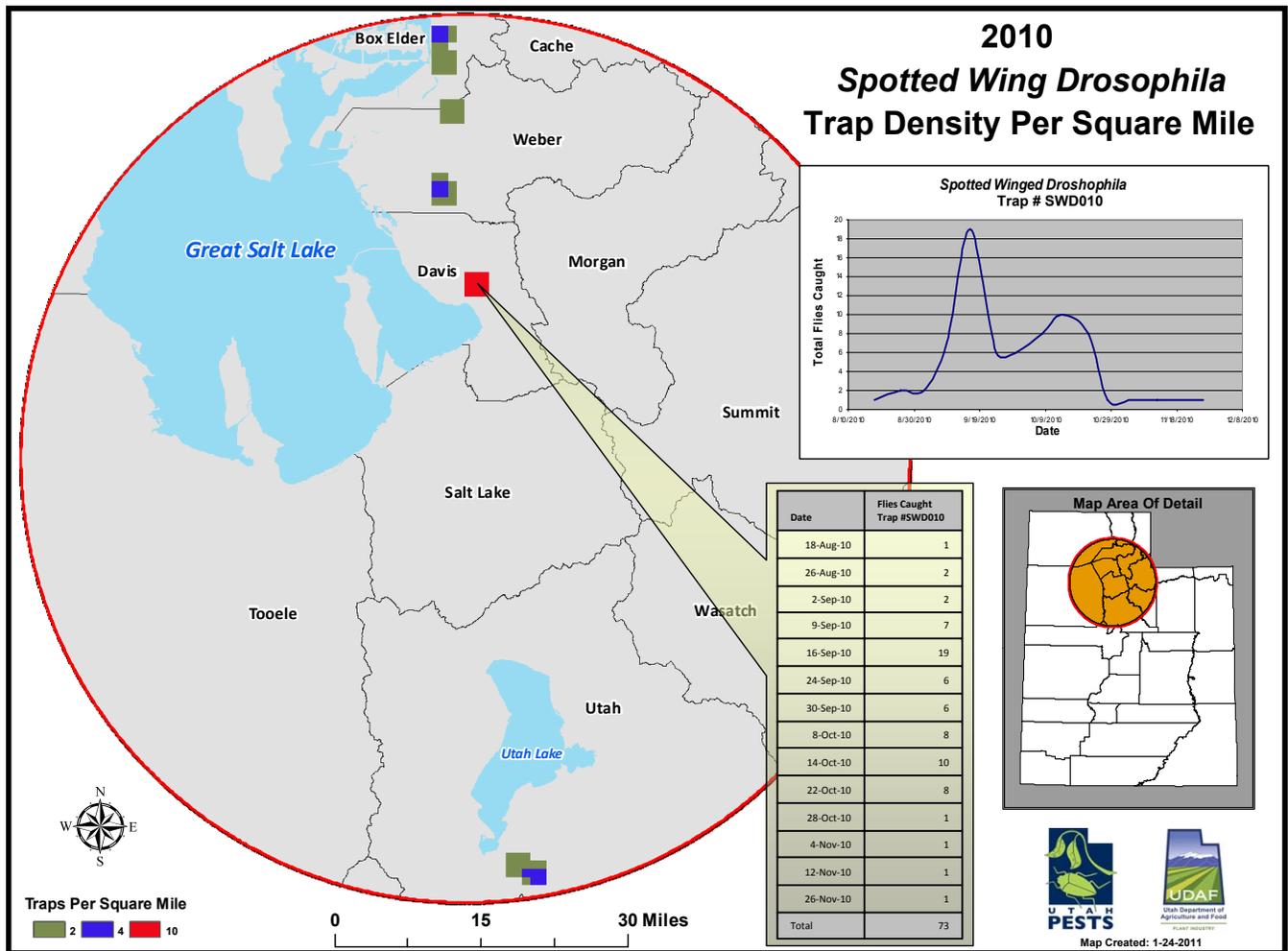


Figure 8. 2010 trapping locations and densities for *Epiphyas postvittana* (light brown apple moth) and *Lobesia botrana* (European grapevine moth).⁷

