Western Flower Thrips and Alaska

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Figure 1: Western flower thrips (*Frankliniella occidentalis*) by Jack T. Reed, Mississippi State University (https://www.invasive.org/browse/detail.cfm?imgnum=5370035).

Western flower thrips (Pergande, 1895) (WFT, *Frankliniella occidentalis*) is a highly destructive pest of greenhouse crops around the world (Cloyd, 2010). It originated in western North America and spread worldwide via horticultural material in the 1970's and 1980's (Kirk and Terry, 2003). The presence of WFT poses challenges to farmers who wish to export their crops internationally. Some importing countries may restrict or prohibit from entry imported commercial crops which contain WFT. Depending upon the importing country, growers may need to officially certify their crop prior to export and take proper safeguarding measures to ensure commodities remain free from WFT. The first recorded occurrence of WFT in Alaska was in 1956 (Bryan and Smith, 1956). In recent surveys, including Cooperative Agricultural Pest Surveys (CAPS), WFT has been found throughout Alaska. The majority of the surveys that found WFT were conducted in peony fields, but they have also been found in botanical gardens (Curtis Knight, unpublished data and Arctos saved search http://arctos.database.museum/saved/AlaskaFrankliniellaoccidentalis).

WFT is considered a highly destructive pest because of its wide host range, damage to crops, ability to vector disease, various environmental and physical adaptations, parthenogenesis, high reproductive potential, lack of obligate diapause, and cryptic habit (Kirk and Terry, 2003). WFT feeds on over 240 host species in over 60 families. Hosts include peony, pea, tomato, pepper, strawberry, rose, cucumber, bean, carrot, onion, and lettuce (Tommasini and Maini, 1995). They cause rasping feeding damage and oviposition scars that permanently mark the plant. In addition to feeding and oviposition damage, WFT is also capable of vectoring tospoviruses, ilarviruses, and carmoviruses. WFT is a major vector for Tomato spotted wilt virus (Jones, 2005). It is believed that they have two ecotypes: one thrives in hot/dry environments and the other thrives in cool/moist environments (Brunner and Frey, 2010). This adaptation allows the WFT to establish in almost any environment. They have a haplo-diploid breeding system which means unfertilized eggs develop into males and fertilized eggs develop into females (Cloyd, 2010).

WFT goes through several developmental stages in its lifecycle. The length of each stage is influenced by the temperature. In ideal conditions (80-85°F), WFT will develop in less than 10 days. Eggs are laid in plant tissue. WFT has two larval stages and two pupal stages. WFT are voracious feeders during the larval stage. The larvae develop beneath terminal foliage or at the petal attachment. In the first larval stage, WFT are small and white. WFT move to the soil for the pupal stages and are fairly inactive. Pupal WFT are soft bodied and develop wings. Adult WFT are generally 1–2 mm long. They have unusual wings that are sparsely covered in long hairs, short, straight antennae, two dark eyes, and are light yellowish to brown in coloring (Swier, 2016). Thrips often overwinter as pupae or adults under leaf litter (Cloyd, 2010).

Little is known about the WFT lifecycle in Alaska. In 2015, Holloway and Gerdeman (2016) conducted research to determine the impact and management of thrips in Alaska peony production. They found that thrips overwintered inside and outside of the fields, concentrating in soil near trees. In Fairbanks, thrips had one full generation and a partial second generation in one season. On the Kenai Peninsula, they observed two full generations and a partial third generation in one season. The number of generations can increase or decrease each year depending on the weather. Longer, warmer summers may result in increased generations per year (Holloway and Gerdeman, 2016).

There are several options for managing WFT in a field and greenhouse. Creating and utilizing an integrated pest management plan will help prevent new WFT introductions to the crops and manage current WFT infestations to keep them at manageable levels. Following are some

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management practices to consider adding to an integrated management plan:

- Buy stock from WFT free locations or nurseries to prevent introducing WFT to your fields (McDougall and Tesoriero, 2011).
- Inspect plants for WFT before bringing them into your greenhouse (Swier, 2016).
- Maintain a high level of farm hygiene (Plant Health Australia, 2012).
- Control weeds (Plant Health Australia, 2012).
- Use mesh and double door entries to greenhouses (Plant Health Australia, 2012).
- Monitor crops routinely for presence of pests. Yellow sticky traps are an excellent monitoring tool for WFT (Plant Health Australia, 2012). Recommended times for setting yellow sticky cards for monitoring thrips in the Fairbanks region are late April/early May (Holloway and Gerdeman, 2016).
- Foliar insecticide spray to control WFT (Plant Health Australia, 2012). WFT develop resistance to pesticides easily, so there are few chemical control options available. Consult a professional to develop a chemical control plan (McDougall and Tesoriero, 2011).

Figure 2: Western flower thrips (*Frankliniella occidentalis*) by David Cappaert (`https://www.invasive.org/browse/detail.cfm?imgnum=5422728`).

The Alaska CAPS program is beginning a three year nursery survey in Alaska in summer 2017. The goal of this survey is to identify what harmful exotic pests are being brought into the state, determine the origin of plant material entering the state, and whether or not imported plant material is acting as a vector to bring in harmful exotic pests. The survey will focus on searching for a variety of pests, including WFT, Asian Longhorned Beetle, European Black Arion Slug, Vineyard Snail, Sudden oak death, stubby root nematode, Tomato spotted wilt virus, and Tobacco rattle virus.

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Orthosia hibisci (Guenée), the speckled green fruitworm: confirmed causing extensive hardwood defoliation in Southcentral and Western Alaska

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Introduction

In 2016, the speckled green fruitworm, *Orthosia hibisci*(Gueni£¡e) (Figure 3), was confirmed to be contributing to extensive hardwood defoliation in parts of the Alaska and northern Aleutian Ranges and is suspected as the cause of comparable defoliation in areas of Western Alaska (FS-R10-FHP, 2017). *Orthosia hibisci* was also suspected as having caused widespread defoliation in the aforementioned areas in 2014 and 2015 (Figure 2). This defoliation event was initially documented via aerial surveys, during which the cause of the damage was suspected of being the related species, *Sunira verberata*(Smith), battered sallow moth (FS-R10-FHP, 2016). That moth was thought to be the primary pest in the same area from 2000-2006 (FS-R10-FHP, 2007), but defoliation over those years may have been exacerbated by other species such as *O. hibisci*.

The Defoliation

In 2014, approximately 9,500 acres of willow, alder, and birch defoliation were observed during the forest health aerial detection surveys along the Upper East and West Forks of the Yentna River, as well as on the eastern side of Mystic Pass (Figure 1). At the time, the damage agent was unknown.

During the 2015 field season, more than 180,000 acres of hardwood defoliation similar to that observed in 2014 were documented in the Alaska and northern Aleutian Ranges and Western Alaska. Also in 2015, numerous reports of damage were received from across the impacted areas. National Park Service (NPS) staff and volunteers forwarded damage reports from Lake Clark National Park and Preserve(LCNP) to Forest Health Protection (FHP) staff and also reported extensive defoliation on the east end of Telaquana Lake. Defoliation was reported in the Shell Hills area of the Susitna River valley and up the Skwentna River by a private citizen. Additional damage was also reported and mapped in the following locations: Lake Chakachamna, upper East and West Forks of the Yentna River, Yenlo Hills, Chakachatna and McArthur Rivers area, Nerka Lake in Wood-Tikchik State Park, and along the Innoko and Yukon Rivers near Holy Cross.

Figure 1: Defoliation caused by *Orthosia hibisci* along the upper Yentna in summer of 2016 J. Moan, AKDOF.

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