

FEW ECOLOGICAL ASPECTS OF THE BEET LEAFHOPPER (*CIRCULIFER TENELLUS* BAKER) IN THE LOWER COLUMBIA BASIN

A.F. Murphy and S.I. Rondon

Oregon State University, Hermiston Agricultural Research and Extension Center

2121 South First Street, Hermiston, OR 97838

Phone (541) 567-8321

alexzandra.murphy@oregonstate.edu; silvia.rondon@oregonstate.edu

The beet leafhopper, *Ciculifer tenellus* Baker, is widely distributed throughout the western United States (Cook 1942). Beet leafhoppers (BLH) can be a severe pest of tomatoes in California where they are known to vector curly top virus (Chen et al. 2010). In California, large populations of infected BLH migrate from weedy breeding areas to agricultural fields (Severin 1930, Cook 1942, Chen et al. 2010). According to Hills (1937) and Cook (1942), the Columbia Basin is a breeding area for BLH. In fact, the sugar beet industry that was originally established in the Columbia Basin in the early 1900's was essentially abandoned as a result of high BLH populations that vectored beet curly top disease (Hills 1937). Less than a century later, in 2002, the BLH became a pest of potatoes in the Columbia Basin (Munyaneza et al. 2005).



Beet leafhoppers transmit a phytoplasma that causes purple top disease in potatoes (Munyaneza et al. 2005). This phytoplasma was formally identified as beet leafhopper-transmitted virescence agent (BLTVA) (Crosslin et al. 2005). BLTVA can significantly reduce potato yields and have a negative impact on tuber quality (Munyaneza et al. 2005). The disease produces aerial tubers, shortened internodes, and causes the upper foliage of the plant to turn purple (Crosslin et al. 2005, Munyaneza et al. 2005). The BLH spends a majority of the year feeding on weed hosts located in the Columbia Basin, but during the summer months most of these hosts die, and BLH are forced into irrigated crops, like potatoes (Cook 1942). We have limited information regarding the role that these alternative, early-season hosts play in BLH movement later in the season, and moreover, we do not know if weeds serve as a reservoir for the diseases transmitted by BLH. As little research has been done on this insect since the

1930's, we are currently investigating several aspects of BLH ecology and biology. A brief overview of the current research regarding BLH in the Columbia Basin is provided below.

1. **BLH/BLTVA complex.** Approximately 30% of BLH collected from the field transmit BLTVA. Phytoplasmas enter the insect's body through the stylet, move through the intestine, and are then absorbed into the haemolymph. Once established, phytoplasmas will be found in most major organs of an infected insect host. Where, when and how BLH acquire the phytoplasma in the Columbia Basin is unknown. This spring we will be studying the overwintering aspects of the phytoplasma and the role of weeds in BLH overwintering and transmission.
2. **Identifying the economic threshold for BLH in potatoes.** This research has been underway since 2009. Timing of insecticide sprays targeted against the BLH and developing treatment (action) thresholds are currently being evaluated.
3. **BLH population dynamics.** Using a combination of BLH monitoring data and weather variables, we have been able to investigate some of the environmental factors that influence BLH populations.

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