Potato Progress

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Andrew Jensen, Editor. Submit articles and comments to: ajensen@potatoes.com
108 Interlake Rd., Moses Lake, WA 98837; Fax: 509-765-4853; Phone: 509-765-8845.

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Western Flower Thrips in Potatoes

Alan Schreiber, Agriculture Development Group, Inc., and Andy Jensen, WSPC

One of the least known insect groups is thrips – not the sort of insect that kids learn about in elementary school, or that is covered in general biology. Thrips are mostly very small insects, with highly specialized rasping-sucking mouthparts. Many thrips are plant feeders, extracting the contents of individual plant cells. Many other thrips are predators of small soft-bodied insects, spider mites, and eggs of various things. Many thrips, including the common pest species western flower thrips, feed on both plants and insects/mites. The thrips life cycle is unusual in that there are two active feeding stages followed by two inactive stages and finally the adult. The inactive stages are hidden in the soil or leaf litter.

Photos: A feeding immature thrips (left), a potato leaf showing minor thrips damage – the small shiny depressions in the leaf surface, and an adult western flower thrips.

The common thrips species on potatoes in Washington is the western flower thrips. This insect has a very broad host range, occurring on most crops in the Pacific Northwest. As its name implies, it is often found in flowers, but it also feeds on leaves, as in the case of potato.

Historically, thrips were not thought of as a pest of potatoes. However, now there are thousands of acres of potatoes treated in Washington each year. We estimate that between 10 and 25% of potato acres are treated depending on the year. The pest is most commonly a problem in longer season potatoes because the thrips have more time to build up to higher levels.

The distribution of fields treated for thrips ranges from the southern Basin to north of Moses Lake. However, some areas of the state seem to perennially not have problems with thrips. The

leading theory on why thrips have become known as a pest in potatoes is related to the shift in insecticides used on potatoes. Formerly, most potatoes in Washington were treated with carbamate (Temik, Furadan) and organophosphate (Monitor, dimethoate, Di-Syston, etc) insecticides. These products have efficacy against thrips. In the last ten years, product removals (e.g. Di-Syston), product use restrictions (e.g. Furadan) and new product introductions have significantly reduced the amount of these products used on potatoes. The widespread use of neonicotinoid insecticides, such as Admire, Platinum, CruiserMaxx and Belay and highly selective insecticides such as Beleaf and Fulfill has possibly allowed thrips populations to surge that formerly had been controlled by broad spectrum insecticides.

Thrips' small size and cryptic nature, life cycle characteristics, and recent appearance as a pest means that virtually no research has been conducted on this insect. The publication "*Integrated Pest Management Guidelines for Insects and Mites in Idaho, Oregon and Washington Potatoes*" by Schreiber, Jensen, Pike, Alvarez and Rondon contains the official recommendations for management tactics for potato insects in Washington, Oregon and Idaho (to see these recommendations, go to http://www.potatoes.com/pdfs/PNWPotatoInsectandMiteManagement2010.pdf)

There exist no control recommendations for thrips due to the lack of information on the pest. One product that is commonly used for thrips control is Monitor, which is no longer being manufactured and growers may only use existing stocks. There exists very little information on what products are effective against thrips. Following are some observations that may be useful for controlling thrips in potatoes.

- A heavy thrips population in potatoes is not controllable by any means. Growers should treat before thrips numbers are high—but there is no threshold for when to treat.
- You will never kill all of the population due to thrips life cycle and behavior.
- Because you cannot kill all of the population and their short generation time, the pest can rebound quickly.
- Thrips seem to be less of a problem when growers have deployed a beet leafhopper control problem in the first half of the season.
- Likelihood of success at controlling thrips will increase with repeated applications at shorter intervals, such as 14 days, and tank mixes of products with efficacy against thrips.
- Most insecticidal products have a range in rates for use on potatoes; when targeting thrips, select a use rate at the higher end of the rate range.

I (Alan Screiber) have conducted limited efficacy research on products that will be effective in controlling thrips. Products with known efficacy against western flower thrips on potatoes include Assail, Belay, Monitor, Mustang Max, and Success. Based on information in other crops, some pyrethroid insecticides are known to have some activity against thrips including Asana, Battalion, Baythroid, and Warrior.

Based on work conducted against thrips in onions, tank mixtures have been demonstrated to have increased efficacy against the pest. In one trial on potatoes in Washington, a tank mix of imidacloprid (Provado) and lambda cyhalothrin (Warrior), was the most effective treatment at reducing thrips populations.

When using insecticides to target thrips it is important to keep in mind the impact your selection of insecticides has on your overall pest management and agronomy programs. For example, pyrethroid insecticides are known to flare aphids and mites in potatoes. Assail and Belay are neonicotinoid insecticides and cannot be used if any other Group 4 neonicotinoid has been used at planting time. In general, it is recommended that growers rotate modes of action of insecticides

when controlling insect pests on potatoes. For more assistance with rotating insecticides and implementing resistance management programs in potatoes, go to http://www.potatoes.com/Research-IPM.cfm.

Recognizing the lack of information on thrips biology and management in potatoes, the Washington State Potato Commission has funded research in 2010 to address this need.

Mite Control in Potatoes

Alan Schreiber, Agriculture Development Group, Inc., and Andy Jensen, WSPC

Most economic infestations of mites (two-spotted spider mites) on potatoes occur in the Columbia Basin of Washington and Oregon. All potatoes in the Columbia Basin should be sampled for mites. Applications of miticides (Acramite, Onager, Comite and Oberon) should be made upon early detection of mites. All potatoes should be surveyed for the presence of mites and mite eggs.

Photo: Two-spotted spider mite and eggs on potato leaf. The mite is less than 0.1 inch long.

Sampling for mites requires a close visual inspection of leaves from differing levels of the plants. Shaking suspected infested leaves above a piece of white paper helps to determine the presence of mites. They will dislodge from the leaves and the mites are visible as tiny spots moving on the paper. Use of at least a 10x hand lens is important for detecting mites in low numbers. There are no registered miticides available that will provide full control or serve as rescue treatments once mite populations reach outbreak levels. Application of miticides should begin before populations reach 2 mites per leaf; this is close to the detection limit for the pest. Thorough coverage is essential for good control. Foliage should be dry at the time of application. Do not irrigate potatoes for 24 hours after application if possible.

In most cases, a single application of a miticide will suffice for a growing season; however, in about 10% of mite outbreaks a second application of a miticide is required. Retreatment with a different miticide should be considered as a resistance prevention strategy. Mites on potatoes have never demonstrated increased tolerance to miticides; however, two-spotted spider mite is well known for its ability to develop resistance and rotation of miticides is desirable.

Based on research supported by the Washington State Potato Commission inclusion of surfactants that improve coverage has been shown to significantly improve efficacy of miticides.

Acramite (bifenazate Group 25) is a newly registered miticide that may be applied by air, chemigation or ground. Acramite should be applied at 16 to 24 ounces per acre. Apply the higher rate to higher populations of mites. Use at least 20 gallons of water when applying by ground and at least 5 gallons of water when applying by air. Only one application allowed per season. The preharvest interval is 14 days.

Oberon (spiromesifen Group 23) is a broad-spectrum miticide that may be applied by air, ground, or chemigation equipment. Good coverage of the foliage is necessary for best control. An adjuvant may be used to improve coverage and control. Oberon is most effective against the egg and nymphal stages of mites. Control should be directed at these stages. Oberon can be applied at 8-16 fluid ounces per acre. Apply when mites first appear and prior to leaf damage or discoloration. Apply in adequate water for uniform coverage with ground or aerial application equipment, or by chemigation as per the use label. If needed, repeat an application of Oberon at a 7- to 10-day interval. There is a limit of two applications per season. Applications of Oberon at the 8.0 oz rate are not recommended by air or chemigation except for situations where mite pressure is low or when applied sequentially as a split application following higher rates of Oberon as needed. Based on observations of field applications, applications via chemigation have been more effective than by air.

Comite (propargite, Group 12C) is effective against the nymphal and adult stages of spider mites when applied by air, ground, or chemigation. Chemigation is permitted in Washington and Oregon only under a Section 24c (possession of the 24c is required for this type of application.) Comite is applied at 1.5 to 2.5 pints product as a foliar treatment. Do not exceed two applications per season. The preferred method of application is by air or ground. Aerial applications of Comite should be applied in a minimum of 10 gallons of water. The addition of an adjuvant has been shown to improve coverage. Comite has a 14-day retreatment interval for Washington, Oregon, and Idaho.

Onager (hexythiazox, Group 10) is effective against mite eggs and immature mites. It may be applied by air or by ground at 16 – 24 ounces per acre. When applying by air, use a minimum of 5 gallons of water. The product may only be used in Idaho, Oregon and Washington. Do not apply within 21 days of harvest. It is critical to use Onager prior to adult mite buildup as the product will not control adult mites. Use higher rates on moderate to high mite infestations or for larger plants with a dense canopy. Do not plant rotational crops other than those on the Section 3 label within 120 days of this application.

Two-spotted spider mite resistance management. While the species of spider mite attacking PNW potatoes has demonstrated the ability to readily develop resistance to miticides, there appears to be no evidence of this problem in potato-feeding mites in our area. However, with the availability of new miticides, potato growers should consider taking some basic steps that could prevent or delay onset of resistance in mites. If growers apply more than one miticide per season, consider applying a different miticide for the second application. All four miticides registered on potatoes have different modes of action and can be rotated with each other. While research has shown some differing levels of efficacy among the products, all four products have repeatedly been shown to provide commercially acceptable levels of control when applied early enough in the outbreak cycle.