Central Oregon Potato Extension Program

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Abstract

Aphids, tuberworm moths, potato psyllids, and beet leafhoppers were collected and counted weekly in Jefferson County from June 23 to September 9, 2015. Counts were conducted to monitor pest populations and assess potential risk of disease transmission. Collection methods included fifteen water pans for aphid collection, 15 delta traps for potato tuberworm moth, and 15 yellow sticky traps each for psyllid and beet leafhopper. Weekly findings were distributed to growers, fieldmen and industry representatives through reports and website postings. Aphid numbers were low during the first week of monitoring followed by a spike for 2 weeks into a moderately high level at the end of June. Numbers then remained low until rising in August and continued at a high level until trap removal on September 9, 2015. In contrast to 2014, potato tuberworm moths were detected only sporadically and in low numbers during two weeks in August. Potato psyllids were present in increasing numbers starting the week of August 5 until vine kill. Specimens were tested for Lso (Candidatus Liberibacter solanacearum) and all tested negative. Beet leafhoppers were included in the 2015 protocol for the first time in the history of this project and were found mostly in single digit numbers. Specimens trapped after August 5th were tested for the presence of BLTVA phytoplasma and all tested negative. Early blight prediction modeling and crop water use data provided helpful information for seed potato management and weekly monitoring continues to be a significant source of information for integrated pest management in central Oregon potato fields.

Materials and Methods

Aphid, Potato Tuberworm, Psyllid, and Beet Leafhopper trapping IPM project

Aphids. Aphids are important pests in potato crops and can affect yield by removing nutrients from plants, stunting growth, or transmitting disease. Aphids are known vectors for several viruses, with the most important for our area being potato virus Y (PVY). Pan traps are used to determine when aphid populations are increasing and when field treatment becomes necessary.

Fourteen yellow water traps were used to collect winged aphids in commercial potato fields throughout Central Oregon, in addition to one at a potato test plot at the Central Oregon Agricultural Research Center (COARC). Traps were distributed on June 16, 2015 with final collection occurring on September 9, 2015. Trapped aphids were collected by straining the aphids from the water using a fish net and collecting trapped insects in 4 ounce specimen cups. Cups were transported to the COARC laboratory and kept refrigerated until examination. Aphids were separated from other insects using a microscope and identified as green peach aphids, potato aphids or other aphids. Aphids were stored in vials filled with alcohol for one week unless samples were sent to the Hermiston Agricultural Research and Extension Center (HAREC) for confirmation or research purposes. Date and location were used to identify aphid movement in area.

Potato Tuberworm. The potato tuberworm (PTW) is one of the most important pests that infest potatoes worldwide. Potato tuberworm moths appeared in the area in 2013 and have the potential to impact production due to larvae mining in tubers. In the past, the presence of potato tuberworm in central Oregon was sporadic but increased to weekly detection in 2014.

Pheromone delta traps were placed at a distance of about 5 feet from the edge of planted ground in fourteen commercial potato fields and one potato test plot at COARC from June 16 to September 9. Delta traps consist of a triangle shaped trap, removable sticky liner bottom, and a lure impregnated with the pheromone of the female potato tuberworm moth. Sticky liners were removed weekly and inspected for presence of male moths. Pheromone lures were replaced every 4 weeks.

Potato Psyllid. The Pacific Northwest potato industry has been alerted of the finding of the zebra chip (ZC) disease in 2011. The pathogen causing ZC is 'Candidatus Liberibacter solanacearum' (Lso), a type of bacterium vectored by the potato psyllid (Bactericera cockerelli Sulc).

On June 16, 2015 fifteen yellow sticky traps were distributed in commercial fields and a COARC potato test plot and left until September 9, 2015. Double sided yellow sticky traps measuring 4"x6" were placed 5 to 10 feet inside the circle of planted potatoes at canopy height and replaced weekly for potato psyllid activity monitoring.

Beet Leafhopper. Beet leafhoppers are a growing concern for the potato industry. According to information provided by the Washington State Potato Commission, beet leafhoppers transmit the disease called potato purple top disease which is caused by the beet leafhopper-transmitted virescence agent phytoplasma, or BLTVA phytoplasma. Terminal leaves of infected plants turn reddish or purplish and curl, causing infected plants to die early. In addition, nodes swell and turn purplish, internodes are shortened, and aerial tubers may form. The disease is likely transmitted mostly in early summer. This project included monitoring for this pest and testing for BLTVA of beet leafhoppers that were located.

To trap Beet Leafhoppers (BLH) yellow sticky cards were placed at the edge of fourteen commercial fields and a COARC potato test plot outside the circle of planted potatoes and out of reach of irrigation water, preferably near weeds. Yellow sticky cards were collected and changed on a weekly basis.

Generate early blight prediction model and weekly water use data information.
Weekly early blight prediction models were published using June 1 and June 10 emergence dates. The model predicts the first seasonal rise in the number of spores of the early blight fungus based on the accumulation of 300 physiological days (P-days) from green row. Once 300 P-days have accumulated, the first fungicide for early blight control should be applied. This usually occurs when rows have closed. Potato is a moisture sensitive crop with a shallow active root zone compared to cereals and forages. Availability of moisture in the root zone is crucial for high yields and is influenced by soil properties such as texture and percent organic matter. Moisture demand increases as the crop begins to develop after emergence and peaks 7-9 weeks later during the tuber bulking growth stage.

Create seasonal, weekly newsletter to provide growers with insect and disease updates. A weekly newsletter was sent to potato industry participants from June 23 to September 16 that included the early blight prediction model, weekly water use, weekly aphid identification and population numbers, and notification of potato tuberworm moth, potato psyllid, and beet leafhopper presence. Location of trap sites and population numbers were identified for grower use only. Weekly reports were posted onto the OSU-COARC website and can be found at http://oregonstate.edu/dept/coarc/aphid-trap-reports, providing immediate access for our targeted audience.

Results

Aphids. Aphid populations in central Oregon ranged between 0 and 29 aphids per trap in 2015. Overall, aphid populations were low all season long with a small peak for two weeks at the end of June and another increase toward the end of the season in August, continuing through trap removal. Average green peach aphid numbers were very low ranging from a mean of 0 to 4 aphids per trap until mid-August through the end of monitoring, when the mean ranged from 5.2 to 29 per trap. Identification and reporting remains a helpful tool in controlling vectors.

Potato Tuberworm. In 2013, first identification of potato tuberworm moth occurred on August 27 and was confirmed by the OSU-HAREC Entomology Lab. In 2014, PTW moths were found each week (at least one but no greater than 3) starting July 22 until trap removal on September 17 prior to harvest. In 2015, initial detection of a tuberworm moth occurred on August 19th and was verified by the OSU-HAREC Irrigated Entomology Program Laboratory, Hermiston, OR. The following week, 2 additional fields showed presence of potato tuberworms (one specimen per field). After this date, no additional potato tuberworms were located during the 2015 growing season.

Potato Psyllid. Two psyllids were initially found in the week of August 5, 2015 (one psyllid in two separate fields). Specimens were sent to OSU-HAREC for confirmation and testing. Both tested negative for Lso. In the following weeks, the incidence of psyllids increased, both in number of fields and number of psyllids per field. In the last two weeks of the monitoring period, the weeks of September 2 and 9, the number of potato psyllids trapped on sticky cards per field ranged from 1 to 13. All specimens detected were sent to OSU-HAREC for Lso testing and all tested negative.

Beet leafhopper. Throughout the monitoring period, beet leafhoppers (BLH) were found in multiple fields with the highest number of fields testing positive (9 out of 15) during the weeks of July 7 and 14 with a steady decline of affected sites starting the week of August 19 (5 and fewer). The number of BLH per sticky card remained in the single digits with only one exception (13 specimens in one trap during the week of August 5). Starting the week of August 5, all BLH samples were sent to HAREC for BLTVA phytoplasma testing and all tested negative.

Discussion

Weekly aphid reports were sent to growers, fieldmen and industry participants by email and were made available on the Central Oregon Agricultural Research Center Website. Weekly information provides opportunity for efficient and economical control of pests and disease. Trapping continues to be an important tool for potato seed producing areas to monitor pests capable of transmitting diseases.

The yearly survey assists in the prediction of crop water use which is important to proper crop management throughout the growing season and during maturation to assist with harvest and prevent storage rot. Use of the early blight prediction model assisted growers and fieldmen as they time fungicide sprays to efficiently prevent disease outbreak.

This project identified continued incidences of potato psyllid detection in Jefferson County. Specimens were sent to OSU-HAREC for confirmation and were tested for Lso (Candidatus Liberibacter solanacearum); all tested negative. Early blight prediction modeling and crop water use data, provide helpful information for seed potato management. Weekly monitoring continues to be a significant source of information for integrated pest management in Central Oregon potato fields.

Monitoring potato pests in the area can be used to alert industry of increased populations of pests that may affect other crops as well. Virus control efforts center on reducing the source of the virus and controlling potential vectors. Insect monitoring reports are available to central Oregon growers of other crops where aphids are considered pests.

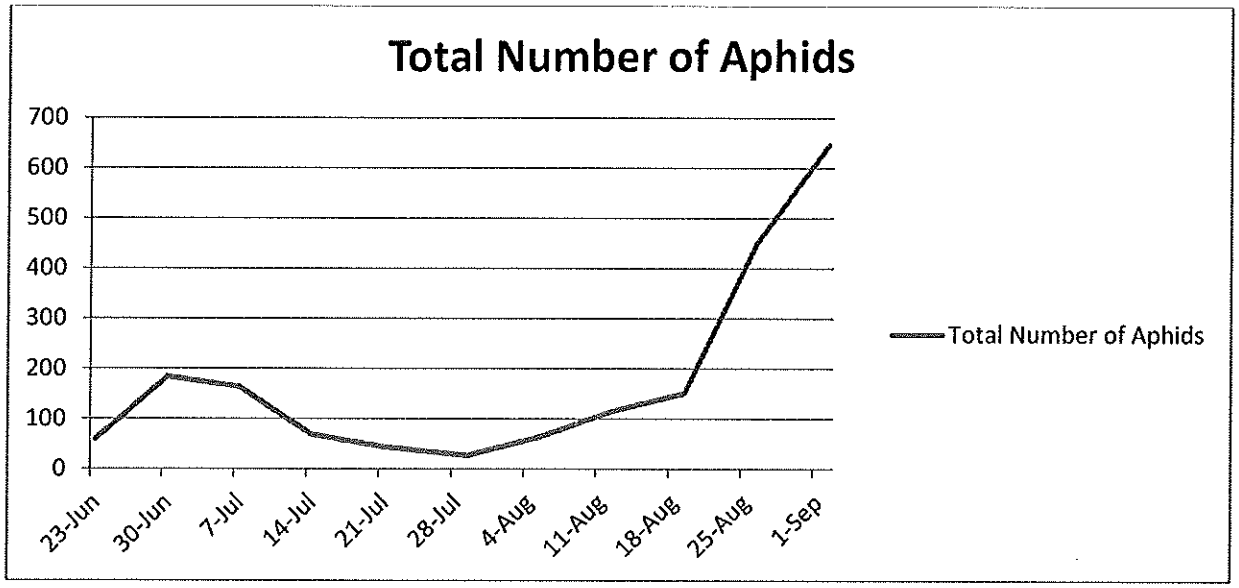

Fig. 1. Total number of aphids trapped in commercial fields in Jefferson County, Oregon 2015

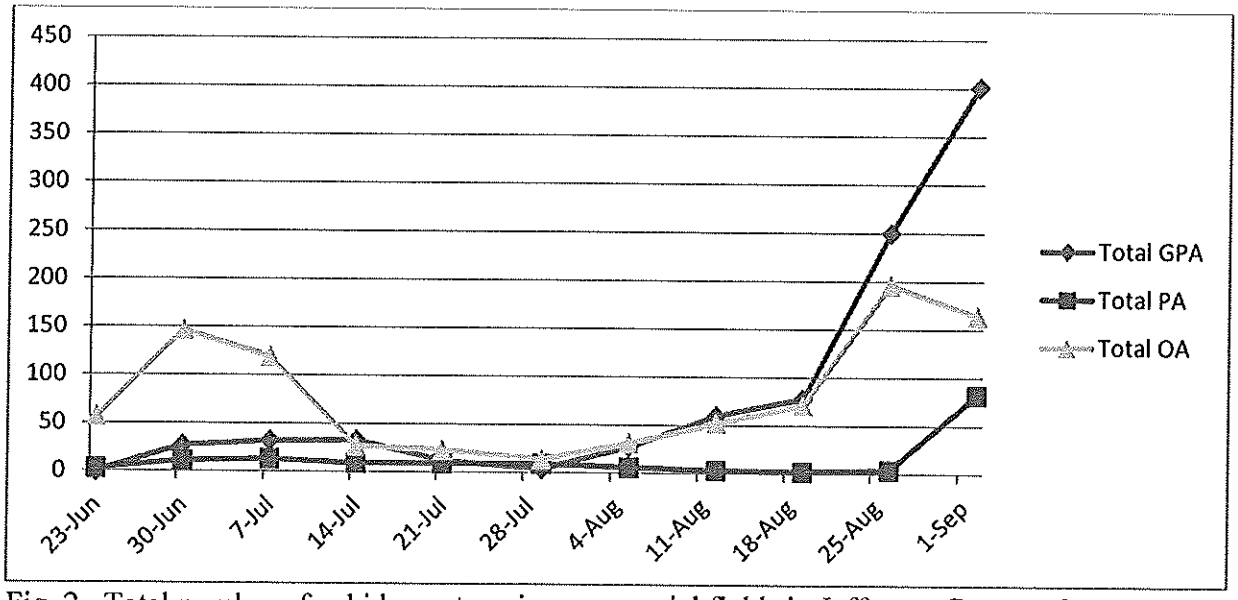

Fig. 2. Total number of aphids per type in commercial fields in Jefferson County, Oregon 2015 (GPA=Green Peach Aphids, PA=Potato Aphids, OA=Other Aphids)

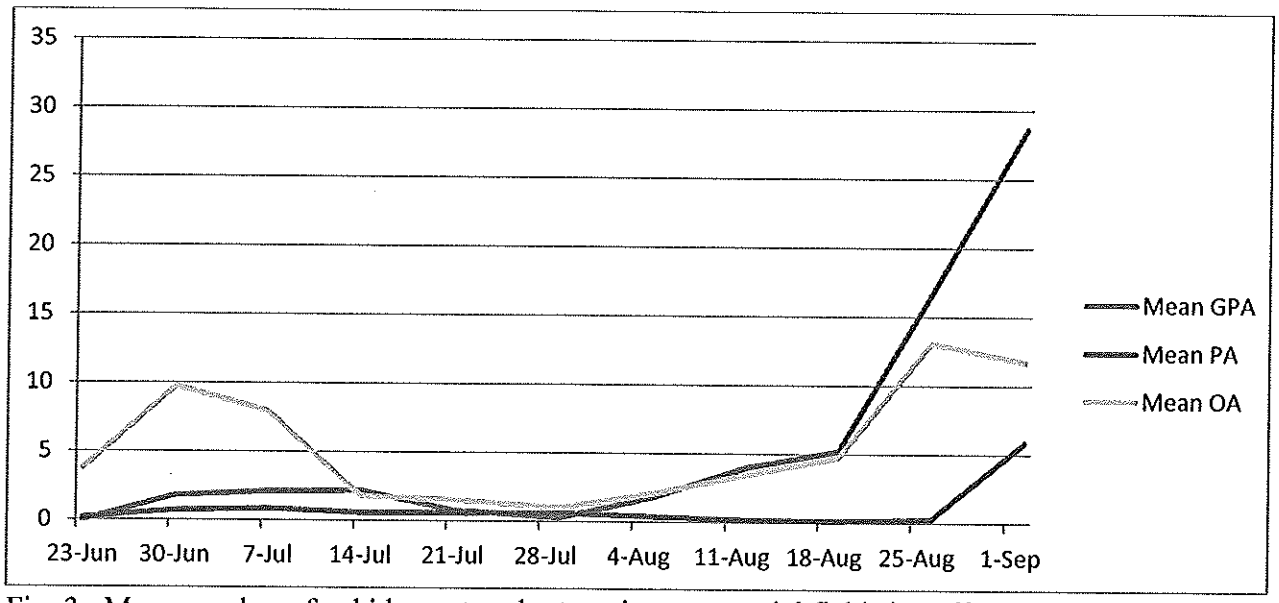

Fig. 3. Mean number of aphids per trap by type in commercial fields in Jefferson County, Oregon 2015 (GPA=Green Peach Aphids, PA=Potato Aphids, OA=Other Aphids)