



CBORC Funding Awarded (2017-2023)	\$293,959
Additional Matching Funds Leveraged	<u>\$228,098</u>
Total Project Funding	\$522,057

* Does not include in-kind donations

2017 - \$42,890 CBORC / \$24,833 Matching Funds

Onion Pest and Disease Monitoring Network and WSU Onion Alert System- Carrie Wohleb, Tim Waters, WSU - \$4,104

Produced and sent six *WSU Onion Alert* e-mails featuring information on several problems (insect, weed, pathogen and abiotic) that were either anticipated or observed during the growing season. 485 subscribers were sent content, based on a pre-existing WSU database.

Evaluation of New Chemical Technologies for Common Groundsel Weed Control in Onion Production Systems – Scott Lukas / Joel Felix, OSU – \$9,772

The plot area used for the tests did not have groundsel or the “common” excepted weeds experienced by onion growers in the area. Control treatments normally used by onion growers were not included for comparison. (If resubmitted, the issues must be resolved).

Improving IPM of Insects in Onions Produced in the Columbia Basin:

Focus on Thrips, Seedcorn Maggot and Leafminer
Tim Waters, WSU - \$15,061 – Matching \$15,061

Evaluated and increased producer awareness of seed treatments that have proven efficacy against seed corn maggot. Treated seed was planted in commercial fields to demonstrate efficacy against seedcorn maggot. Demonstrated which thrips control products worked the best and when they are best utilized during growing season. Overall the project has achieved good results and is essential for continued control of Thrips feeding and the spread of IYSV.

Evaluation of Irrigation Management and ManKocide Application for control of Onion Internal Dry Scale and associate Bacterial Bulb Rots – Lindsey du Toit / Tim Waters - \$13,953

Onion plots irrigated excessively ('wet' plots) produced fewer jumbo bulbs and more culled bulbs than plots that received optimal irrigation ('dry' plots). Plots inoculated with bacteria had fewer jumbo bulbs and less total bulb yield, but more medium bulbs and culled bulbs. ManKocide applications did not effectively control bacteria nor positively affect bulb yield (size, culled, or total yield.)

2018 - \$36,933 CBORC / \$17,250 Matching Funds

Onion Pest and Disease Monitoring Network and WSU Onion Alert System

Carrie Wohleb/Tim Waters/Lindsey du Toit, WSU - \$4,929 (Year 2)

Subscriber list was increased to 604 from 485 in year 1 of the project. WSU Onion Alerts contained information about - yellow or white banding, possible causes of poor stands and stunting, downy mildew, thrips, onion smut, managing fungal diseases in the PNW, nematodes, bolting, black mold, and other important issues.

Evaluation of Fungicides for Control of Downy Mildew of Onions in the Columbia Basin - Lindsey du Toit/Tim Waters, WSU - \$3,500

Spreader plants were infected with downy mildew and were placed in the test plots, but environmental conditions were no longer conducive for the development of downy mildew. Onion leaf health did improve with all the fungicidal products, but not to the level that they improved yield or size profile in the absence of the disease.

Improving IPM of Insects in Onions Produced in the Columbia Basin:

Focus on Thrips, Seedcorn Maggot and Leafminer

Tim Waters, WSU - \$14,000 (year 2)

Evaluated and increased producer awareness of seed treatments that have proven efficacy against seed corn maggot. Pressure by seedcorn maggot was high and yield increases were observed with insecticide seed treatments. Insecticides were evaluated for control of onion thrips. We were able to determine which products work best and when they are best utilized during the growing season. Resistance of thrips to Lannate and Vydate were detected in commercial onion fields. On farms where resistance was detected, management plans were suggested to improve the situation.

Alternative Management Approaches for Seed Corn and Onion Maggot

Silvia Rondon/Stuart Reitz, OSU - \$14,504

Evaluated different seed treatment and at-planting insecticides for management of onion and seedcorn maggot (SCM). SCM damage was low in all treatments including the untreated check despite the presence of adults in the trials. Although SCM pressure was low, the insecticide treatments tended to have numerically higher yields than the controls.

2019 - \$46,948 CBORC / \$39,483 Matching Funds

Onion Pest and Disease Monitoring Network and WSU Onion Alert System

Carrie Wohleb/Tim Waters/Lindsey du Toit, WSU - \$3,970 (Year 3)

Issued eight WSU Onion Alerts and increased to 625 subscribers. Four alerts were sent to warn onion growers about incidences of downy mildew, iris yellow spot, and powdery mildew in the region. Two issues focused on education; one on the effective use of fungicides, and one on irrigation onions with precision to avoid poor yield and quality, as well as meeting notices and onion-related research projects.

Improving Conventional Sequences and Establishing Organic Thrips Control

in Onions Produced in the Columbia Basin – Tim Waters, WSU - \$12,500 (year 3)

All conventional insecticide sequences that were used significantly reduced the number of onion thrips per plant. Plant health was significantly increased where insecticides were used compared to the untreated check, with plant damage in the untreated check plots being around 80%, the treated plots contained damage from 10-35%. Organic insecticides were not as successful, but did decrease thrips populations, especially with Entrust.

Alternative Management Approaches for Seed Corn and Onion Maggot Silvia Rondon/Stuart

Reitz, OSU - \$14,504 (year 2)

At the Hermiston site, it was determined that planting into cool wet soils with wheat residue resulted in significant damage by seedcorn maggot. Even after two plantings, plant stands didn't approach a commercially acceptable level. In Ontario, imidacloprid in furrow was more effective than commercially used seed treatments.

Efficacy of Chemigated vs. Shank Applications of Metam Sodium for

Nematode, Disease and Weed Control in Onion Production in the

Columbia Basin – Lindsey du Toit/Tim Waters, WSU - \$15,974

Two sites were selected with grower assistance and metam sodium was applied by chemigation and by ground to compare to each other and an untreated check. Where moisture was not adequate, low concentrations of metam sodium were recovered, but where moisture was adequate, proper concentrations were detected, reminding applicators that soil moisture is critical.

2020 - \$35,381 CBORC / \$37,842 Matching Funds

Quantifying the Level of Resistance to Commonly Used Insecticides in Onion Crops in the Columbia Basin, Tim Waters/Doug Walsh, WSU - \$10,000

Unfortunately, the assays in 2020 were inconclusive. Specifically, all of the thrips in the assay arenas quickly died including thrips in non-treated vials and low pesticide concentrations. The assays were repeated numerous times and we were not able to make the assays work. Eight field trips were made, each attempting to improve the assays with no success. Future work will be done with a different assay.

Developing New Nematicides for Onions, Alan Schreiber, Ag Development Group - \$8,000

This is the first year's work by ADG on developing new nematicides in onions. Although without direct data on onion damage from nematode infestation, promising yield protection/promotion from treatments was observed. Onions were transplanted and will be direct seeded in coming years to more closely mimic grower practices.

Revisiting Nitrogen Management Recommendations in the Context of Onion Bacterial Diseases, Gabriel LaHue/Tim Waters, WSU - \$17,381

Unfortunately, the site used for this study contains high nitrate groundwater; therefore, the lowest N rate used was 194 lbs/A. There was no reduction in yield with the lowest rate evaluated compared to the untreated check, future work will elucidate if less N can be used to grow onions than is currently recommended.

Efficacy of Chemigated vs. Shank Applications of Metam Sodium for Nematode, Disease, and Weed Control in Onion Production in the Columbia Basin, Lindsey du Toit, WSU Mount Vernon NWREC (Final Report – funded in 2019/20)

The objective was to evaluate chemigation versus shank application for control of weeds, soilborne disease and nematodes at two sites in the Columbia Basin. In Pasco, there was more metam sodium detected when shanked compared to chemigated, partially due to the excessively dry soils. Fusarium and pink root were not affected by fumigation in this study. Plots with shank application had more weeds than control plots. Nematode damage occurred in the field near Othello, and fumigation did not affect nematode damage to the onions. Fumigation with metam sodium did not reduce weeds, disease, or nematodes in this study.

2021 - \$31,677 CBORC / \$27,842 Matching Funds

Developing New Nematicides for Onions, Alan Schreiber, Ag Development Group - \$10,000

Comparison among treatments with same chemicals but different application timings, indicate that different chemicals have various efficacy by timing interactions. So timing is critical. There is a dose effect from similar treatments, where higher rate is resulting in higher yield. Results are based on yield and not nematode damage ratings. Yields are still rather low, but direct seeded, which is an improvement to mimicking commercial production.

Revisiting Nitrogen Management Recommendations in the Context of Onion Bacterial Diseases, Gabriel LaHue/Tim Waters, WSU - \$21,677

This project has continued to make incremental progress. Higher than recommended N rates have not been shown to increase onion bacterial bulb rots in either year, though there were few colossal bulbs or bull necks, suggesting caution should be used if the results are extrapolated to situations where colossal bulbs and bull necks are more common. As higher N rates did not increase bacterial bulb rot, the economically optimum N rate after storage may differ from that at harvest.

2022 - \$51,085 CBORC / \$48,342 Matching Funds

Identifying Alternatives to Chlorpyrifos for Control of Seedcorn Maggot in Onions, Tim Waters, WSU - \$8,606

The objective of this study was to assess and collect performance data on alternative products to support potential future registrations to help manage the impacts of seedcorn maggot on onion production. This study concluded that Diazinon, Farmore FI-500 (with Spinosad) and Capture LFR can be used to reduce seedcorn maggot pressure so that onion growers can achieve adequate plant stands. Diazinon was still found to be effective as well. Several non-registered seed treatments were also tested with one providing very good efficacy.

Developing New Nematicides for Onions, Alan Schreiber, Ag Development Group - \$8,000

The direct soil nematode population assessment showed very good suppression potential by all tested products/programs, with statistically equivalent efficacy as traditional programs such as Vydate and MeloCon. Also observed was very interesting yield protection/promotion results, but those results were not statistically different from the untreated check, perhaps because the yields were very low.

Revisiting Nitrogen Management Recommendations in the Context of
Onion Bacterial Diseases, Gabriel LaHue/Tim Waters, WSU – \$22,682

The field being evaluated had poor plant stands and the decision was made to halt the trial. This research project was given a one-year no cost extension to complete the work in 2023 field trials.

Evaluation of Appropriate Rates for Pre-emergent Herbicides on
Onions in the Columbia Basin, Tim Waters/Ian Burke, WSU - \$11,797

We evaluated registered pre-emergent herbicides at their upper rate ranges on three cultivars of onions in two disparate soil textures in the Columbia Basin. No phytotoxicity, stand loss, or stunting that was associated with any of the herbicides applied to any of the three cultivars evaluated. Efficacy of weed species tested was similar for all treatments. Yields were numerically improved with all herbicide treatments.

2023 - \$49,045 CBORC / \$32,506 Matching Funds

Identifying Alternatives to Chlorpyrifos for Control of Seedcorn
Maggot in Onions, Tim Waters, WSU (year 2) - \$7,290

Multiple experimental plots were established for these studies. Stand counts from treated plots did not differ significantly at one site from the untreated check or each other on any assessment date. Weekly stand counts numerically demonstrated consistently improved stand counts with most insecticide treatments evaluated. At the site with significant seedcorn maggot damage, Lumiverd + Sepresto, Plinazolin + Cruiser, and pre plant incorporated Diazinon were the most effective treatments. Plinazolin is a new insecticide, not yet registered, but appears to have efficacy as good as entrust or Spinosad.

Evaluation of Appropriate Rates for Pre-emergent Herbicides on
Onions in the Columbia Basin, Tim Waters/Rui Liu, WSU (year 2) - \$12,131

A field experiment was conducted to evaluate six onion pre-emergent herbicides at low and high rates in the Columbia Basin environment. Results showed that all treatments at lower or higher labeled rates provided good to excellent control for puncturevine, redroot pigweed, and lambsquarter early in the season. The only herbicide that caused minor injury was Dacthal. Yields were quite low in plots treated with Dual, indicating that phytotoxicity was not obvious, but there was a negative impact on plant growth.

Revisiting Nitrogen Management Recommendations in the Context of
Onion Bacterial Diseases, Gabriel LaHue/Tim Waters, WSU - No Cost Extension

Bulb yields increased with increasing N rates up to 200 lbs per acre of total N. Bacterial rot also increased with increasing N rate, but that was counteracted by the increase in yield. More information will be developed after leaf and soil samples are completely analyzed.

Developing New Nematicides for Onions, Alan Schreiber,
Agriculture Development Group - \$12,000

The direct soil nematode population assessment showed very good suppression potential by all tested product/programs, especially some of the experimental products. The results indicate high potential of replacing or rotating with Vydate uses in the future. Telone treated plots had the highest yield followed by Velum Prime and two of the test products.

Cost of Onion Production in the Columbia Basin
Gina Greenway, Greenway Research - \$5,350