2019 WSU Extension Onion Cultivar Demonstration & Field Day

Thursday, August 29th, 2019
9 a.m. to 1 p.m.
L & L Ag. Production, Connell, WA

  

WASHINGTON STATE UNIVERSITY EXTENSION

PACIFIC NORTHWEST VEGETABLE ASSOCIATION

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Sponsored by: WSU Extension & the Pacific Northwest Vegetable Association

Hosted by: L & L Ag. Production • Planted by: Bejo Seeds, Inc.

Organized by: Tim Waters, WSU Franklin-Benton Co., 509-545-3511, twaters@wsu.edu
Carrie Wohleb, WSU Grant-Adams Co., 509-707-3510, cwohleb@wsu.edu

BBQ luncheon following the field day is sponsored by:

American Takii, Inc. • Bejo Seeds, Inc.
Crookham Company • Enza Zaden • Gowan Seeds • Hazera Seeds
Keithly-Williams Seeds • Logan-Zenner Seeds • Nunhems USA – BASF
Sakata Seed America, Inc. • Seminis Vegetable Seeds
Columbia Basin Onion Research Committee

2019 WSU Onion Cultivar Trial - List of Entries

Seed Company	Cultivar	Plot Number			Seed Company	Cultivar	Plot Number		
American Takii	Centerstone	101	237	306	Enza Zaden	Elyse	125	244	339
American Takii	Frontier	102	203	321	Enza Zaden	Monastrell	126	222	334
American Takii	Grand Perfection	103	224	346	Nunhems	Airoso	127	213	308
American Takii	Highlander	104	216	319	Nunhems	Arcero	128	217	344
American Takii	Milestone	105	238	336	Nunhems	Granero	129	234	309
American Takii	Ridgeline	106	201	330	Nunhems	Joaquin	130	245	312
American Takii	Traverse	107	214	317	Nunhems	Marenge	131	219	314
American Takii	Trekker	108	232	323	Nunhems	Montero	132	236	322
Bejo Seeds	Bridewhite	109	246	345	Nunhems	Oloroso	133	207	315
Bejo Seeds	Crockett	110	247	343	Nunhems	Ranchero	134	212	302
Bejo Seeds	Gunnison	111	205	320	Nunhems	Vaquero	135	211	318
Bejo Seeds	Hamilton	112	220	327	Sakata Seed	Aruba	136	210	304
Bejo Seeds	Legend	113	239	307	Sakata Seed	Dulce Reina	137	208	311
Bejo Seeds	Red Mountain	114	209	328	Sakata Seed	Ovation	138	223	338
Bejo Seeds	Redwing	115	226	310	Sakata Seed	Spanish Medallion	139	240	324
Bejo Seeds	Tamara	116	229	342	Sakata Seed	Yosemite	140	221	305
Crookham Co.	Caldwell	117	230	316	Sakata Seed	Yukon	141	243	337
Crookham Co.	Caliber	118	225	335	Seminis Veg. Seeds	16000	142	241	329
Crookham Co.	Oracle	119	202	347	Seminis Veg. Seeds	Red Nugent	143	231	313
Crookham Co.	Purple Haze	120	218	333	Seminis Veg. Seeds	SV4058NV	144	242	325
Crookham Co.	Scorpion	121	204	340	Seminis Veg. Seeds	SV4643NT	145	233	331
Crookham Co.	Scout	122	227	341	Seminis Veg. Seeds	SV6672NW	146	235	332
Crookham Co.	Trident	123	206	326	Seminis Veg. Seeds	Tucannon	147	228	303
Crookham Co	White Cap	124	215	301					

2019 WSU Onion Cultivar Trial - Planting Arrangement

PLANTED: April 10, 2019

COOPERATOR: L & L Ag. Production

LOCATION: Connell, WA

IRRIGATION: Drip

ENTRIES: 47 entries, from 7 seed companies

PLOT SIZE: 40 inches x 30 feet, two double-rows per plot, 5-foot alleys between plots

REPLICATIONS: 3 in a randomized complete block design

FIELD CULTIVAR: Airoso

			347	346	345	344	343	342	341	340	339	338	337	336	335	334	333
315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332
314	313	312	311	310	309	308	307	306	305	304	303	302	301	247	246	245	244
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
225	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	208
137	138	139	140	141	142	143	144	145	146	147	201	202	203	204	205	206	207
136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120	119
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118

2019 WSU Onion Cultivar Trial - Late Season Comparisons

ONION CULTIVAR	POWDERY MILDEW (0-4) Aug 16	BOLTING (#) Aug 16	TOPS DOWN (%) Aug 16	ONION CULTIVAR	POWDERY MILDEW (0-4) Aug 16	BOLTING (#) Aug 16	TOPS DOWN (%) Aug 16
Centerstone	2.0 bcd	0.0 e	10.0 g-j	Elyse	1.7 cd	0.3 de	80.0 abc
Frontier	1.7 cd	0.0 e	75.0 a-d	Monastrell	2.3 a-d	0.0 e	51.7 b-i
Grand Perfection	1.3 cd	0.3 de	5.0 j	Airoso	1.3 cd	0.0 e	21.7 f-j
Highlander	2.0 bcd	0.0 e	98.3 a	Arcero	3.0 abc	0.0 e	10.0 g-j
Milestone	2.3 a-d	0.0 e	35.0 c-j	Granero	2.3 a-d	2.0 b-e	15.0 f-j
Ridgeline	1.7 cd	0.0 e	86.7 ab	Joaquin	1.7 cd	4.7 abc	8.3 hij
Traverse	2.0 bcd	0.0 e	55.0 a-g	Marenge	2.3 a-d	0.0 e	25.0 e-j
Trekker	2.0 bcd	0.0 e	88.3 ab	Montero	1.7 cd	2.0 b-e	56.7 a-f
Bridewhite	1.3 cd	1.3 cde	6.7 ij	Oloroso	1.7 cd	0.0 e	6.7 ij
Crockett	2.0 bcd	0.0 e	8.3 hij	Ranchero	1.0 d	1.0 cde	6.7 ij
Gunnison	2.7 a-d	0.3 de	70.0 a-e	Vaquero	1.0 d	0.0 e	20.0 f-j
Hamilton		2.3 b-e	5.0 j	Aruba	1.0 d	3.3 a-e	18.3 f-j
Legend	1.3 cd	0.0 e	18.3 f-j	Dulce Reina	1.0 d	7.0 a	13.3 f-j
Red Mountain	2.0 bcd	0.0 e	6.7 ij	Ovation	2.7 a-d	0.0 e	13.3 f-j
Redwing	1.7 cd	0.0 e	5.0 j	Spanish Medallion	2.0 bcd	0.3 de	46.7 b-j
Tamara	1.3 cd	0.0 e	43.3 b-j	Yosemite	2.0 bcd	0.3 de	40.0 c-j
Caldwell	1.3 cd	1.0 cde	8.3 hij	Yukon	1.7 cd	1.0 cde	11.7 f-j
Caliber	4.0 a	0.3 de	5.0 j	16000	1.7 cd	5.3 ab	13.3 f-j
Oracle	1.3 cd	3.0 c-f	8.3 hij	Red Nugent	1.7 cd	0.0 e	43.3 b-j
Purple Haze	2.0 bcd	0.0 e	11.7 f-j	SV4058NV	1.0 d	3.0 b-e	5.0 j
Scorpion	1.3 cd	0.3 de	53.3 a-h	SV4643NT	1.3 cd	0.7 de	31.7 d-j
Scout	3.0 abc	1.0 cde	20.0 f-j	SV6672NW	1.7 cd	1.3 cde	13.3 f-j
Trident	2.0 bcd	2.3 b-e	20.0 f-j	Tucannon	3.7 ab	2.0 b-e	15.0 f-j
White Cap (W)	1.7 cd	4.0 a-d	11.7 f-j				
All results are the average from three replicate plots. Values in a row with the same letter are not significantly different according to Tukey's HSD test at p<0.01.				**MEAN**	**1.85**	**1.08**	**28.12**
				LSD P=0.01	**1.02**	**2.15**	**25.93**

2019 WSU Extension Onion Field Day

August 29, 2019

Update on Iris yellow spot virus management

Hanu R. Pappu, Professor, Department of Plant Pathology, WSU, Pullman, WA.

E-mail: hrp@wsu.edu

Thanks to the strong support from the onion stakeholders, a grant proposal submitted to USDA NIFA's Specialty Crop Research Institute was funded beginning last fall (2018). The project's goals are to develop environmentally friendly, integrated management of thrips, Iris yellow spot virus (IYSV), and white rot. Project period is for four years and the Season 1 of the four years is the current (2019) production season.

The team consisted of research and extension professionals from several universities, USDA ARS and the College of Idaho, and is led by Dr. Hanu Pappu and, from WSU, is joined by Dr. Tim Waters.

One of the ongoing efforts is to better understand the diversity of IYSV strains from different parts of the country and their evolution compared to those reported from other parts of the world. Results show that the virus exists as two distinct genotypes on a worldwide basis and the relative proportions of these two genotypes varies in different parts of the world. Information on the strain diversity of the virus would be useful in screening onions for virus resistance.

Research addressing Objectives 1 to 3 was initiated in the current production season and data collected is being analyzed. Screening for resistance to IYSV is one of the major focus areas of the SCRI-funded project. As part of this effort, several cultivars and breeding lines were evaluated in the field for their response to IYSV infection under natural conditions. Plant phenotype was recorded based on the symptoms and severity. Additionally, the relative virus levels are being determined using lab tests to better delineate the resistant/tolerant lines from those that are susceptible.

Another project funded by the WSDA Specialty Crop Block Grant Program is supporting research on understanding the onion-thrips-IYSV complex at biological, genetic, and molecular levels in order to aid in developing virus resistant onion cultivars.

WSU Onion Entomology Update 2019

Tim Waters, Jennifer Darner, Don Kinion WSU Extension
Doug Walsh and Adekunle Adesanya WSU Entomology

Funding Provided by the WSCPR and CBORC

Evaluating Insecticide Resistance in Onion Thrips:

Introduction: Onion thrips, *Thrips tabaci*, are the key insect pest of onions. Thrips feeding results in economic loss by reducing onion quality and size. Onion thrips also vector a tospovirus (IYSV) that is the causal agent of Iris Yellow Spot disease. The pest management strategy for most commercial onion farms focusses on the application of different chemistries of insecticides to reduce the infestation of onion thrips. A previous study by the Walsh lab at IAREC Prosser, documented the universal incidence of resistance to pyrethroids among onion thrips populations in Washington State. The source of resistance is through mutations in the voltage-gated sodium channel; the target site of pyrethroids such as lambda-cyhalothrin. Another class of insecticide commonly used for thrips control in onion fields is the carbamates oxamyl (Vydate ®) and methomyl (Lannate® LV). The goal of this study is to characterize the resistance status of onion thrips populations in Washington onion fields to carbamates, specifically methomyl and oxamyl. Detailed herein are our results for methomyl and oxamyl resistance status. Methomyl and oxamyl are often applied multiple times to individual onion fields over the course of the growing season and both methomyl and oxamyl have been in used on onions for over 25 years. Due to regulatory and environmental issues, the rate of development of insecticide resistance typically far outpaces the discovery and registration of new chemistries/products. Hence, following insecticide resistance management practices are essential to preserve the efficacy of the currently available insecticides.

Materials and Methods: Full dose response bioassays were performed on onion thrips larvae from five commercial onion fields (one organic and four conventional) in central Washington in 2018. The bioassays were performed in situ in the fields for a more precise resistance/susceptibility quantification using a protocol adapted from a previous study. Thrips were collected using a 2-cycle handheld blower/vac (Craftsman ®) coupled with flexible PVC pipes. Prior to field visits, 1.5 mL Eppendorf tubes were pretreated with varying doses (0, 10.8, 53.9, 107.8, 269.5, 539, 808.9, 1078 and 1617 ppm a.i.) of methomyl and (0, 12, 120, 300, 900, 1200 ppm a.i.) of oxamyl for 8 hours and allowed to dry in the fume hood for 4 hours. A tiny hole was made at the bottom of the tubes to serve as an entry point for the thrips. Sugar solution (10%) treated with a red dye (USDA red dye #4) was used as an alternative source of food for the thrips by filling the cap of the tube with the sugar solution and sealing with Parafilm. The red food colorant is added to the food to facilitate determining whether the Parafilm membrane breaks and the solution contaminates the vial. The flexible cap only serves as a container for the solution and to seal the vial. Each dose tested was replicated 3 times and the number of thrips collected in each tube ranged between twelve and twenty thrips. After collecting the thrips into the centrifuge tubes, the caps were gently closed and holes sealed with a Parafilm. The tubes were kept at 4°C for 48 hours before mortality of the thrips was assessed under a dissecting light microscope.

Results and Discussion: The thrips population from the organic onion farm was the most susceptible to oxamyl and methomyl with 100% mortality at the labeled rate of both insecticides (Tables 1 and 2). We observed significantly reduced efficacy of oxamyl and methomyl in thrips populations from conventional onion farms. The resistance ratio of the conventional onion thrips populations relative to the organic population ranges between 11-14.6 (RR50) and 3.1-8.1 fold (RR90) for oxamyl (Table 1) and between 2.7—6.3 fold (RR50) and 3.98-16.8(RR90) for methomyl (Table 2) respectively.

The field labeled Conventional 2 was the WSU Research Farm in Pasco. That farm represents relatively new onion ground as it has only had two nearby onion crops in the last 15 years. The level of control in that field by both oxamyl and methomyl was less than the organic field, but better than the other conventional fields evaluated. Conventional fields 3 and 4 were from the same farm, which has had an extended period of onion production, and extensive use of methomyl, but not much use of oxamyl. Percent mortality rates of 58% on Conventional fields 3 and 4 to methomyl indicate serious overuse of the product and resistance that needs to be addressed. Conventional field 1 also has a long history of onion production, and with only 71% control with methomyl, there is significant concern to address with relation to resistance to this insecticide. The low level of thrips control with oxamyl at Conventional field 1 is likely the result of widespread use of oxamyl on that farm. Other crops in rotation in that field would receive oxamyl applications where the crop rotation at Conventional fields 3 and 4 do not receive oxamyl applications explaining the increased sensitivity to oxamyl in those fields. These results clearly demonstrated that methomyl has been overused in conventional onion fields and that new strategies need to be developed to achieve thrips control without development of further resistance.

Table 1: Toxicity of oxamyl (Vydate) to *Thrips tabaci* populations from onion fields in Washington State

Population	N	[a]% mortality	LC_{50}(95% CI)	LC_{90} (95% CI)	Slope	χ^2(df)	RR50	RR90
Organic	330	100	55.1(19.3-102.7)	537.7(291.3-1471.8)	1.3±0.15	41.4(16)	1	1
Conventional 1	338	63.2	887.8(653.1-1178)	4117(2494-13505)	1.9±0.37	21.5(19)	16.1	7.7
Conventional 2	311	87.1	606(476.8-717.2)	1662(1271-2897)	2.9±0.58	4.2(16)	11	3.1
Conventional 3	350	86.3	624.7(454.2-838.8	4331.4(2593.4-11040)	1.5±0.25	16.2(19)	11.3	8.1
Conventional 4	397	78.6	803.7(578-1193)	1503(7180-52812)	1.1±0.13	11.4(19)	14.6	2.8

N: number of tested thrips

RR: resistance ratio i.e. $LC_{50/90}$ of conventional population/ $LC_{50/90}$ of organic population

[a]:% Mortality stands for the % mortality of thrips labelled rate of oxamyl

Table 2: Toxicity of methomyl (Lannate) to *Thrips tabaci* populations from onion fields in Washington State

Population	N	[a]% mortality	LC_{50}(95% CI)	LC_{90} (95% CI)	Slope	χ^2(df)	RR_{50}	RR_{90}
Organic	486	100	161.6(103-225)	1240(830-2285)	1.4±0.17	32.6(25)	1	1
Conventional 1	458	71.7	431.3(316-588)	4930(2907-10873)	1.2±0.12	31.4(25)	2.7	3.98
Conventional 2	428	80.2	362(242-541)	11001(4823-45352)	0.9±0.12	11.5(22)	2.2	8.9
Conventional 3	519	58.1	1025(859-1218)	3401(2485-5970)	2.5±0.39	8.6(25)	6.3	2.7
Conventional 4	466	58.2	575(402-852)	20829(9189-76022)	1.3±0.19	17.6(25)	3.6	16.8

N: number of tested thrips

RR: resistance ratio i.e. $LC_{50/90}$ of conventional population/ $LC_{50/90}$ of organic population

[a]:% Mortality stands for the % mortality of thrips labelled rate of methomyl

Thrips Insecticide Trials:

Introduction: Thrips cause crop damage by reducing bulb size and yield from feeding damage on the leaves and vectoring Iris Yellow Spot Virus (IYSV). Thrips are a common and persistent pest of dry bulb onions in the Pacific Northwest. Thrips feeding can result in a 15 to 35% decrease in bulb yield at harvest, depending on the cultivar. Onion thrips have also been identified as the primary vector for IYSV. In 2014 -2016, IYSV incidence in the Columbia Basin was greater than in previous seasons; affected bulb crops experienced a 25% reduction in yield as a result of IYSV infection. A 25% yield reduction resulted in $1,916 less profit per acre.

Materials and Methods: Thrips plots were planted April 1, 2018 in Pasco, WA. Individual plots were 2 beds by 25 feet in a randomized complete block design with four replications of each. Treatments were applied by ground application equipment at 30 gallons per acre, or overhead (pivot mimic) chemigation at 1/10 acre inch of water. Specific insecticides evaluated for conventional onions included Torac, Movento, Radiant, Lannate, Exirel, Beleaf, Warrior and Minecto Pro. A separate set of plots were established in the same methods as above to evaluate organic certified products for thrips control including Entrust, Celite, Ecotec, Venerate, and AzaDirect. Treatments were initiated when thrips were detected in the test plots and monitored weekly until the tops fell and the onions began to mature. Each insecticide was applied 6-8 times on weekly intervals. At maturity (late August), bulbs were harvested and grade and yield were determined by treatment. Foliar damage, thrips counts, and yields were evaluated for 9 conventional insecticides individually and 5 organic products.

Results and Discussion: The sum of thrips for the season did not differ for plots treated with Warrior, Torac, and Beleaf from the untreated check (Figure 3). Plots treated with Movento, Agrimek, Lannate, Radiant, Exirel and Minecto Pro all contained fewer thrips than the untreated check (Figure 3). The incidence of IYSV was reduced in plots treated with Agrimek, Lannate, Radiant, Exirel, Minecto Pro and Torac (Figure 4). Movento, Warrior, and Beleaf did not reduce IYSV incidence (Figure 4). Plant damage followed the same trend as IYSV incidence where plots treated with Agrimek, Radiant and Exirel had the least damage and plots treated with Movento, Lannate, Minecto Pro, and Torac had less damage than the untreated check, but more than the best treatments (Figure 4). Average thrips per plot by season highly correlates with the plant damage ratings, where plots with high thrips numbers also had high plant damage ratings. Plot grade and yield data is not highly significant by treatment this season even though plant damage was high (Figure 5). An early season wind storm severely impacted plant stands in the section of the field where this trial was conducted, and with the poor stands, there was a high degree of variability in the yield and grade data.

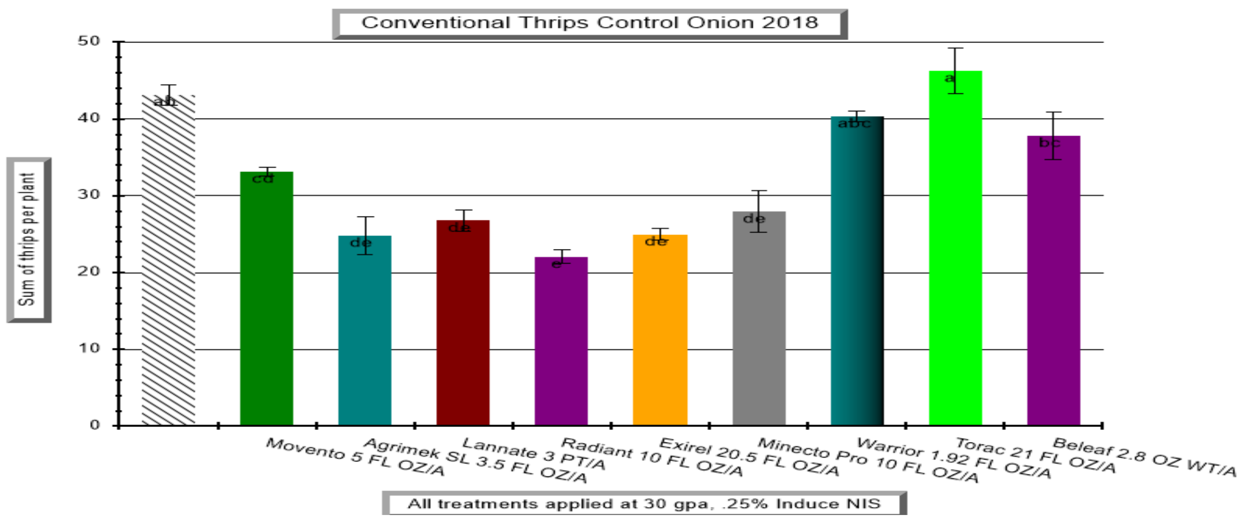

Figure 3. Sum of thrips per plant by treatment. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

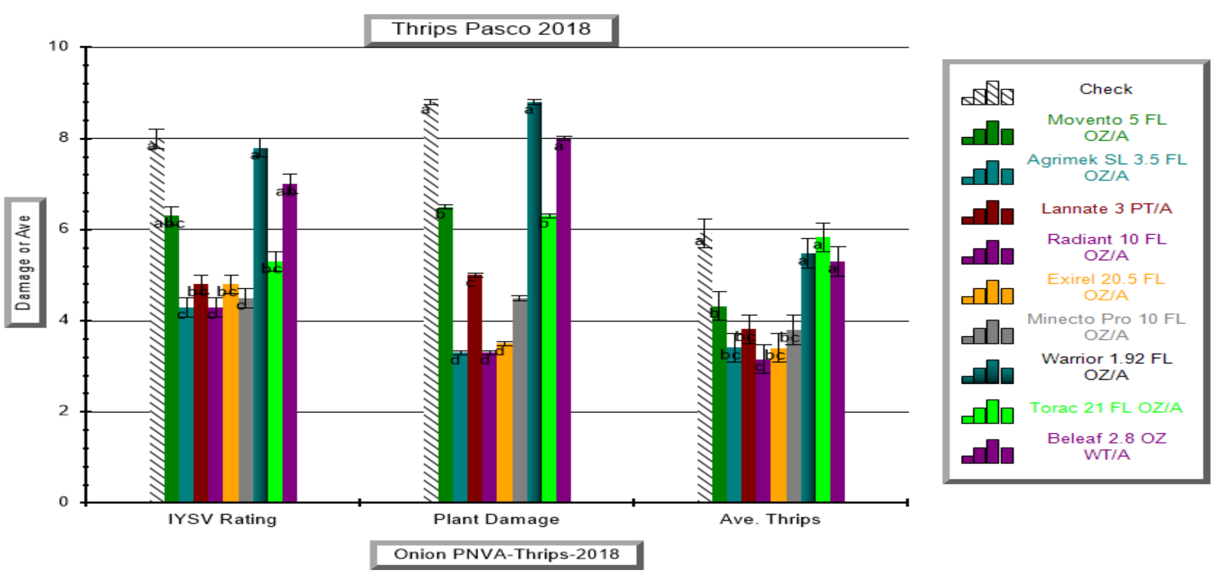

Figure 4. Iris Yellow Spot Virus, Plant Damage Ratings and Average thrips by treatment. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

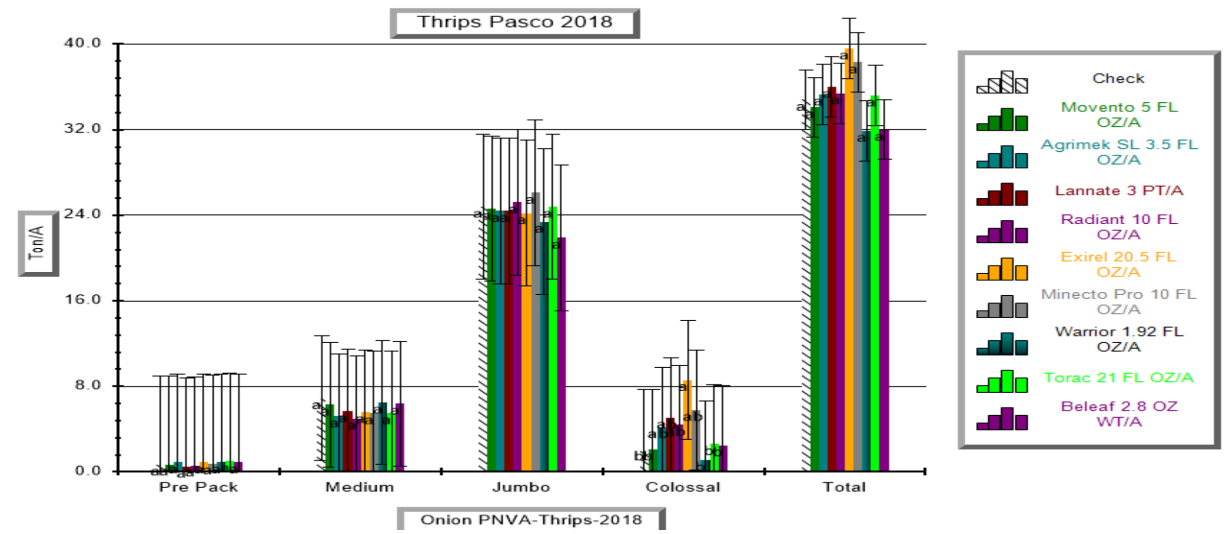

Figure 5. Grade and yield of plots by treatment. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

For the organic insecticides evaluated, the lowest sum of thrips per plant were recorded in plots treated with Entrust +AzaDirect and Entrust + Venerate (Figure 6). Celite, Venerate, and AzaDirect treated plots did not contain fewer thrips than the untreated check (Figure 6). IYSV incidence was high and not significantly reduced with any treatments compared to the untreated check. Overall plant health was increased in the final rating in all plots treated with Entrust: Entrust alone, Entrust+Venerate and Entrust+AzaDirect. Overall yield and sizing was improved most with plots treated with Entrust + Venerate; yields were higher than plots treated with Celite and AzaDirect, but not significantly more than the untreated check plots.

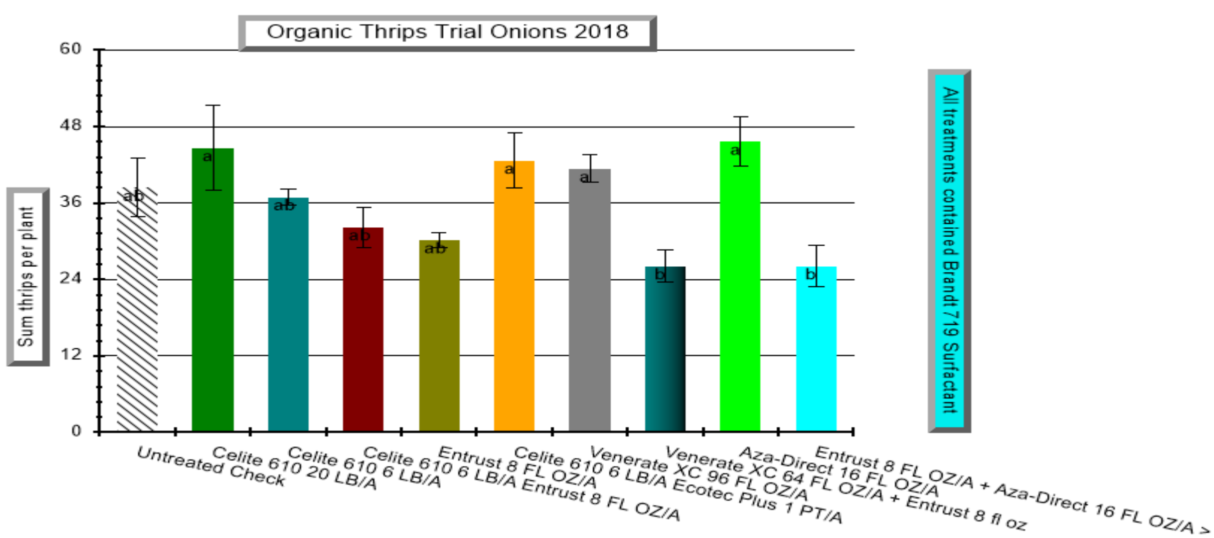

Figure 6. Sum of thrips per plant by treatment. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

WSU Pullman Plant Pest Diagnostic Clinic

Rachel Bomberger

The Plant Pest Diagnostic Clinic, located on the WSU-Pullman campus, provides diagnostic support to the agriculture industry, green industry, urban forestry, and homeowners. The clinic works closely with both extension faculty and researchers located across the state to solve plant problems.

The clinic is able to provide disease and insect diagnostics as well as assist in abiotic and environmental problem identification. Management recommendations are included with the diagnostic service.

Frequent tests include:

- Fungi and bacteria culturing
- Virus testing (limited)
- Pest identification
- Soil tests for *Pythium, Phytophthora, Verticillium, Rhizoctonia* and *Fusarium*
- Fungicide resistance testing for Metalaxyl/Mefenoxam and Thiabendazole

To submit a sample, select plants that are symptomatic but not yet dead. Ideally, multiple plants samples showing various stages of disease, especially early symptoms. If possible also send a healthy plant. Submit whole plants whenever practical. Enclose roots and soil in a plastic bag to keep soil off of aboveground tissues. Fleshy material such as bulbs and tubers should be wrapped in dry paper towels or newspaper. If the plants are too large they can be split or cut into smaller pieces. Large trees can be submitted by selecting symptomatic branches that are 0.5 to 1 inch in diameter and 6 to 12 inches in length. Samples should be stored in a plastic bag; clean plastic trash bags work for large samples. Samples should be kept free of excess moisture and protected from extreme heat. Include the submission form, which can be found online at: **https://plantpath.wsu.edu/diagnostics/.** Mail samples as soon as possible after collecting. To avoid decay in transit samples should be sent early in the week. Samples should be packaged in sturdy container to prevent damage to sample. Specimens can also be dropped up at the WSU Pullman campus clinic.

For more information, please contact the diagnostic clinic at (509)335-3292 or visit or website at: https://plantpath.wsu.edu/diagnostics/

Send samples to:
Rachel Bomberger – Plant Pest Diagnostic Clinic
WSU Plant Pathology – Johnson Hall 345
PO Box 646430 – 100 Dairy Rd
Pullman, WA 99164-6430

WASHINGTON STATE UNIVERSITY EXTENSION

WSU ONION ALERTS

Hello Onion Industry Member: *WSU Onion Alerts* is an e-newsletter that provides information about issues affecting onion crops in the Columbia Basin. Pest and disease problems that are observed or anticipated based on weather conditions or historical incidences are reported in the *WSU Onion Alerts* along with management recommendations. The alerts give onion growers early warning about impending problems so they can make informed and timely management decisions. The *WSU Onion Alerts* are produced by Carrie Wohleb and Tim Waters, WSU Extension and by Lindsey du Toit, WSU Plant Pathology.

Previous issues of *WSU Onion Alerts* have covered…

- Onion thrips
- Downy mildew
- Yellow nutsedge
- Iris yellow spot
- Storm damage
- Powdery mildew
- Lightning injury
- Stemphylium leaf blight
- Botrytis neck rot
- Black mold
- Fusarium basal rot
- Onion cull disposal
- Yellow or white banding at the soil line
- Possible causes of poor stands and stunting
- Onion smut
- Nematodes
- Bolting
- Onions and air pollution
- Curing and storing onions

ACKNOWLEDGEMENTS: The *WSU Onion Alerts* e-newsletter is funded through a grant of the Columbia Basin Onion Research Committee. We appreciate the onion producers and crop consultants in the Columbia Basin who have shared information about pest and disease problems in their fields. This allows us to warn other growers to be on the alert for early signs and symptoms. The end goal is to minimize the impact of pest and disease outbreaks in the region.

WSU Onion Alerts are being sent to more than 600 subscribers via email. If you are interested in subscribing, please contact Carrie Wohleb at cwohleb@wsu.edu.

Stop the Rot:
Combating Onion Bacterial Diseases with Pathogenomic Tools & Enhanced Management Strategies

Lindsey du Toit, Washington State University, dutoit@wsu.edu or 360-848-6140

WHAT?

In July 2019, the **USDA** National Institute of Food & Agriculture (**NIFA**) Specialty Crop Research Initiative (**SCRI**) program recommended funding a 4-year proposal (# 2019-03171) led by Washington State University for **~$4 million (+ $4.2 million in matching funding)** to **mitigate the impact of bacterial diseases on onion production in the U.S.**

WHY?

Onion bulb crops are grown on ~140,000 acres/year in the U.S. at a farm-gate value of ~$925M. Bacterial pathogens cause >$60M in losses annually to this industry. Losses can be severe for stored bulbs as bacterial bulb rots typically develop in storage, after all production costs have been incurred. **Poor understanding of the diversity and epidemiology of bacterial pathogens, and the lack of systemic bactericides limit capacity to mitigate the losses.** This contrasts with what has been accomplished for many fungal diseases of onion.

WHEN? October 2019 – September 2023

HOW?

This project organizes **24 scientists from 12 states** (CA, CO, GA, ID, MI, NM, NY, OR, PA, TX, UT, WA) to research the complete system (host, pathogen, and environment) of bacterial diseases of onion in the U.S. The goal is to support profitability and sustainability of onion production using a coordinated, **national survey of bacterial pathogens affecting onion crops**, combined with a **stakeholder-focused**, systems approach to investigate how **production practices, inoculum sources, and environmental conditions can be managed** to develop effective, practical, economically-viable, and environmentally-sound strategies to limit losses to bacterial diseases.

1. Undertake a national survey of onion bacterial diseases (12 states for each of 3 seasons)
2. Develop a *National Onion Bacterial Strain Collection* (NOBSC)
3. Use this resource for genotypic characterization of onion bacterial pathogens across the U.S., and to design rapid, accurate, and robust methods for detecting and identifying these pathogens
4. Develop methods of screening onion germplasm for resistance to these bacteria
5. Integrate diagnostic and detection tools into comprehensive integrated disease management research trials based on irrigation practices, fertility practices, pesticide programs, cultural practices, post-harvest practices, and bacterial disease modeling
6. Generate predictive bacterial disease models across regions of onion production in the U.S.
7. Implement a dissemination plan to deliver results to constituents
8. A 12-person, nation-wide Stakeholder Advisory Panel (SAP) helped develop the priorities and approaches for the proposal, and will provide regular feedback/guidance over the next 4-years to ensure results are delivered to constituents and that solutions developed are viable economically and environmentally. Kerrick Bauman (L&L Farms) serves on the SAP to represent the PNW.

YOUR ROLE IN 'STOP THE ROT'?

If you would like to be involved in the 'Stop the Rot' project, e.g., the bacterial disease survey or disease management trials, or provide recommendations on the project, please contact **Lindsey du Toit**, (dutoit@wsu.edu, 360-848-6140), **Tim Waters** (twaters@wsu.edu, 509-545-3511), **Gabriel LaHue** (gabriel.lahue@wsu.edu, 360-848-6146), or **Kirti Rajagopalan** (kirtir@wsu.edu, 253-445-4626).

Efficacy of Bactericides for Control of Onion Bacterial Bulb Rots

Funding: IR-4 Minor Crops Program

Lindsey du Toit (dutoit@wsu.edu, 360-848-6140), **Tim Waters** (twaters@wsu.edu, 509-545-3511),
Jennifer Darner, **Don Kinion**, and **Michael Derie**, Washington State University;
Beth Gugino, Pennsylvania State University.

Objective: Evaluate the efficacy and crop safety (phytotoxicity) of diverse bactericides for control of bacterial leaf blight and bulb rots of onion.

2019 Field trials: Washington State University and Pennsylvania State University. WSU trial: Planted at WSU Extension Pasco Farm. Split plot, randomized complete block design of a factorial treatment design with 14 bactericide treatments + 1 control treatment, each applied to plants inoculated with *Burkholderia gladioli* pv. *alliicola* & *Pantoea agglomerans* and to non-inoculated plants (inoculated at night on Aug. 1st (onset of tops falling) & Aug. 15th after sprinkler irrigation of plots). Split plots are each 15 ft long x 1 bed wide.

Bactericide treatments:

1. Non-treated
2. ManKocide (mancozeb + copper hydroxide) applied 5 times at 7-day intervals at 2.25 lb/acre
3. Kocide 3000-O (copper hydroxide) applied 5 times at 7-day intervals at 1.5 lb/acre
4. Champ WG (copper hydroxide) applied 5 times at 7-day intervals at 1.5 lb/acre
5. Oxidate 2.0 (hydrogen dioxide + peroxyacetic acid) applied 7 times at 5-day intervals at 1.25 fl oz product/2 gal water
6. Kasumin 2L (kasugamycin) applied 4 times at 7-day intervals at 32 or 64 fl oz/acre
7. Non-MgO (Nano-magnesium oxide) applied 5 times at 7-day intervals at 200 and 1,000 ppm
8. GWN 10120 applied 5 times at 7-day intervals at 2 pt/acre
9. SP8010 applied 5 times at 7-day intervals at 17 fl oz/acre alone, mixed with Kocide 3000-O, or mixed with SP2700
10. Lifegard WG (*Bacillus mycoides*) applied 5 times at 7-day intervals at 4.5 oz/100 gal
11. Instill (copper sulfate pentahydrate) applied 3 times at 7-day intervals at 20 fl oz/100 gal

Treatments applied at 30-60 GPA with a tractor-mounted sprayer. Applications initiated on Jul. 24th for products applied 5 or 7 times, and Jul. 31st for products applied 3 or 4 times.

Evaluations:

1. Weekly foliar disease ratings
2. Weekly crop injury (phytotoxicity) ratings
3. Incidence of bacterial bulb rot at harvest (Sep. 2019)
4. Incidence of bacterial bulb rots after 5 months in storage (Feb. 2020)