The background of the slide is a photograph of a vast field of yellow oilseed rape (canola) flowers in full bloom. The flowers are densely packed, creating a textured sea of yellow. In the upper portion of the image, a clear blue sky is visible. Two blue rectangular text boxes are overlaid on the image: one at the top center containing the title, and another at the bottom center containing the presenter's name and location.

# **Washington Oilseed Cropping Systems Research 2019**

**Timothy Paulitz, USDA-ARS  
Pullman, WA**

# Research

- **Diseases- Blackleg. Recent outbreaks in Oregon and Idaho. Collaborating with Lindsey du Toit, Jim Davis, and Kurt Schroeder.**
- **Conducted surveys in 2018**















**Surveyed 15 locations in Ritzville,  
Paha, Odessa, Pomeroy, and  
Genesee.**

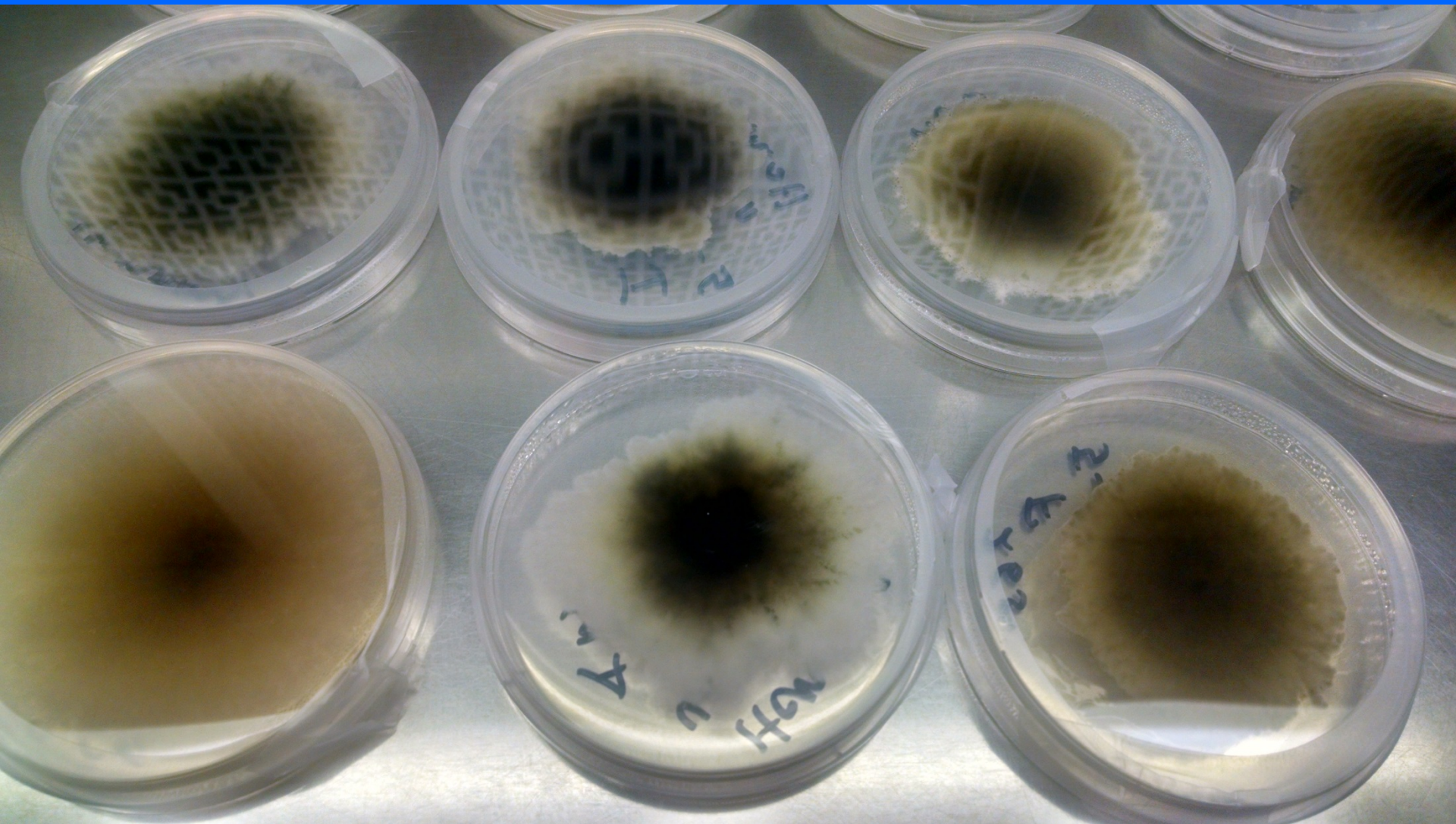
**Isolated and plated out and  
sequenced cultures**



**Positive finds of *L. maculans* in  
Odessa, Ritzville, Pomeroy,  
Genesee and Paha.**

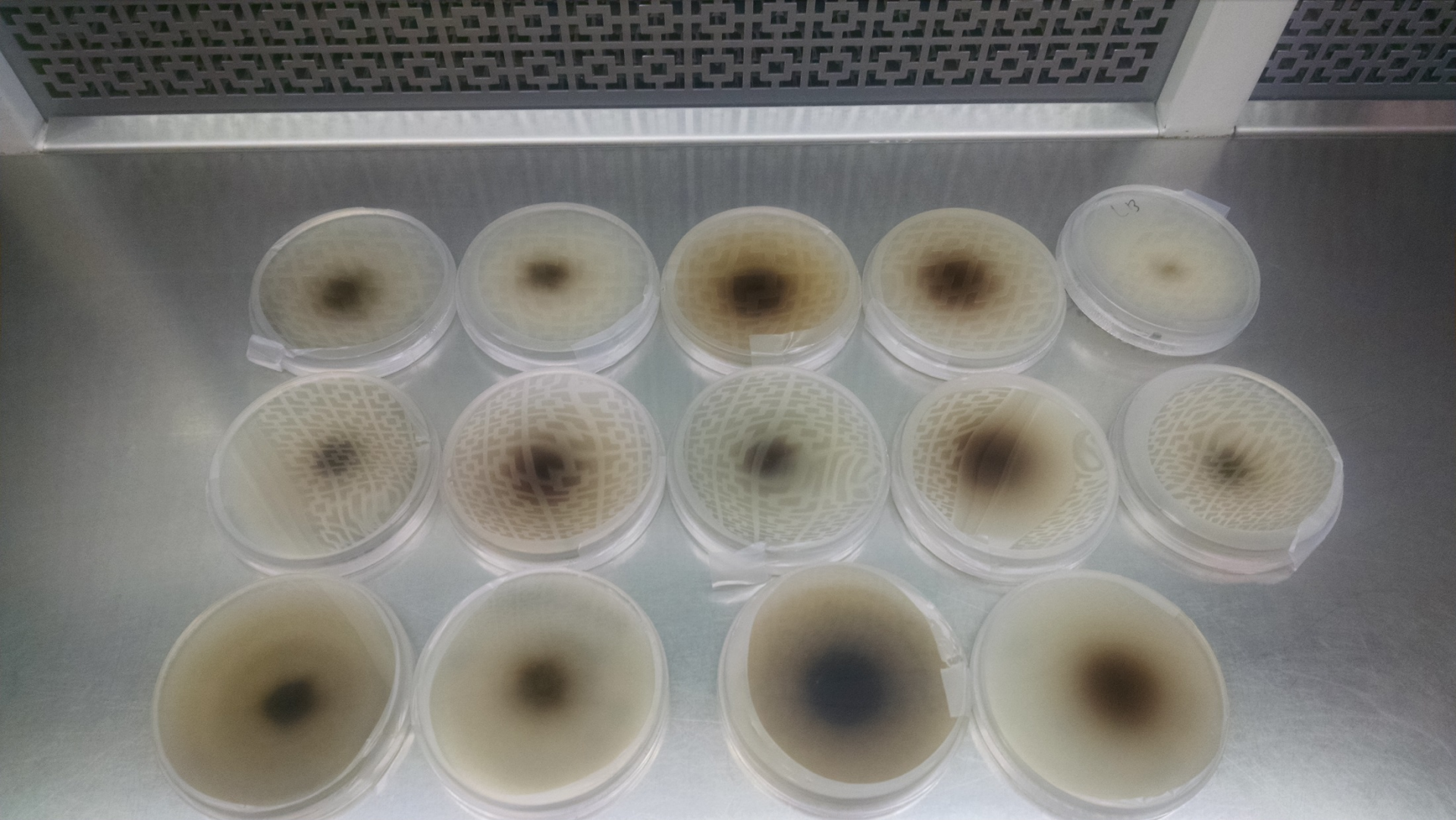
**Similar results to last year-  
appears to be established in  
these areas, although disease  
severity is low.**





*Leptosphaeria maculans*





***Leptosphaeria biglobosa***



Have a collection of over 100 isolates, to be give to Kurt Schroeder, who has a student starting to work on *Leptosphaeria* population genetics

**Diagnosis of a seed cabbage  
sample from Whitbey Island- sent  
by the Washington State Dept. of  
Agriculture**





2018/07/05



2018/07/05





2018/07/05



2018/07/05





2018/07/05



2018/07/05



**Was not able to isolate or identify  
*Leptosphaeria*, but did find  
*Botrytis***



2018/07/05



# **Additional Research with Bill Schillinger**

- **Spring wheat after winter canola or winter wheat-Reardan (Hal Johnson)**
- **Consistent yield drag after WC.**
- **Why? Contrary to most literature.**

# **Additional Research with Bill Schillinger**

- **Difference in water use?**
- **Difference in N?**
- **Herbicides?**
- **Residue?**
- **Pathogens? Root lesion  
nematodes- Winter canola a  
good host for *P. neglectus***



# **Looked at Microbial Communities**

- **Sampling by Jeremy Hansen in Ritzville, Washtucna and Mansfield**
- **Sampled rhizosphere of winter canola and spring wheat**
- **Did PLFA analysis**
- **PhD thesis defended in 2018**

# **Looked at Microbial Communities**

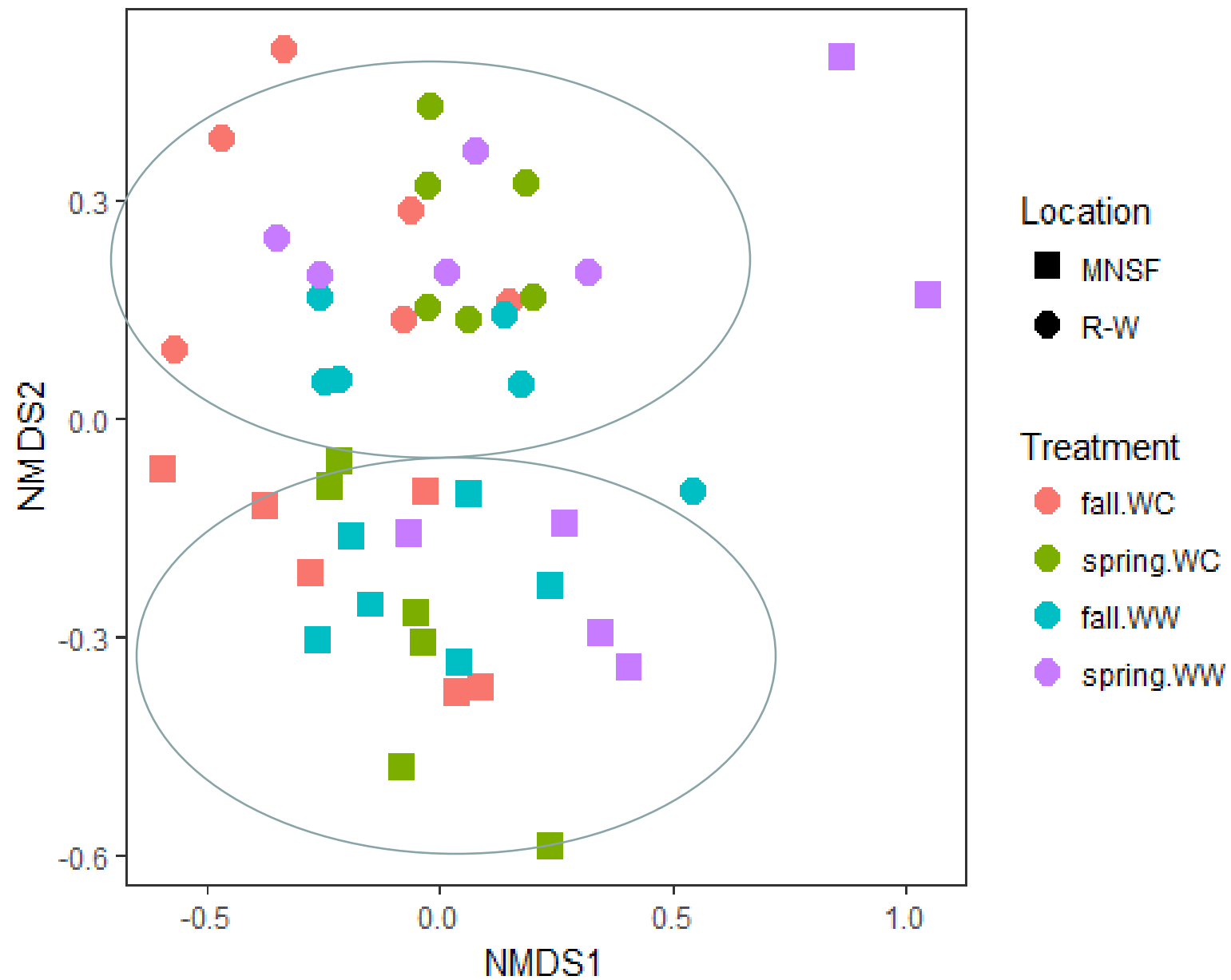
- **With Dan Schlatter, did next-generation sequencing on DNA from same samples- bacteria and fungi with MiSeq**



# **Looked at Microbial Communities**

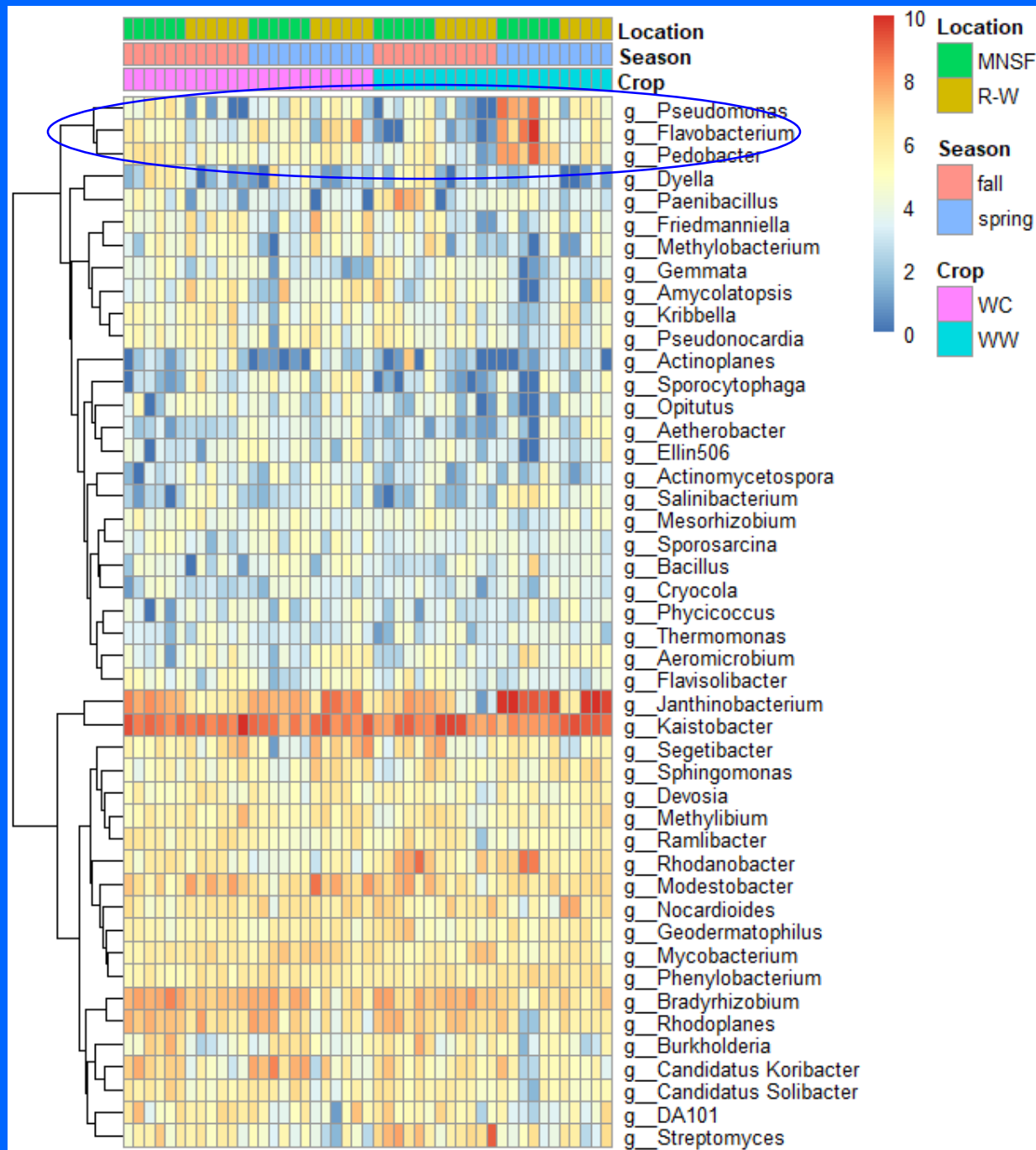
- **Question- is there a difference in the rhizosphere communities of winter wheat and winter canola that would explain this yield drag?**

# Bacteria

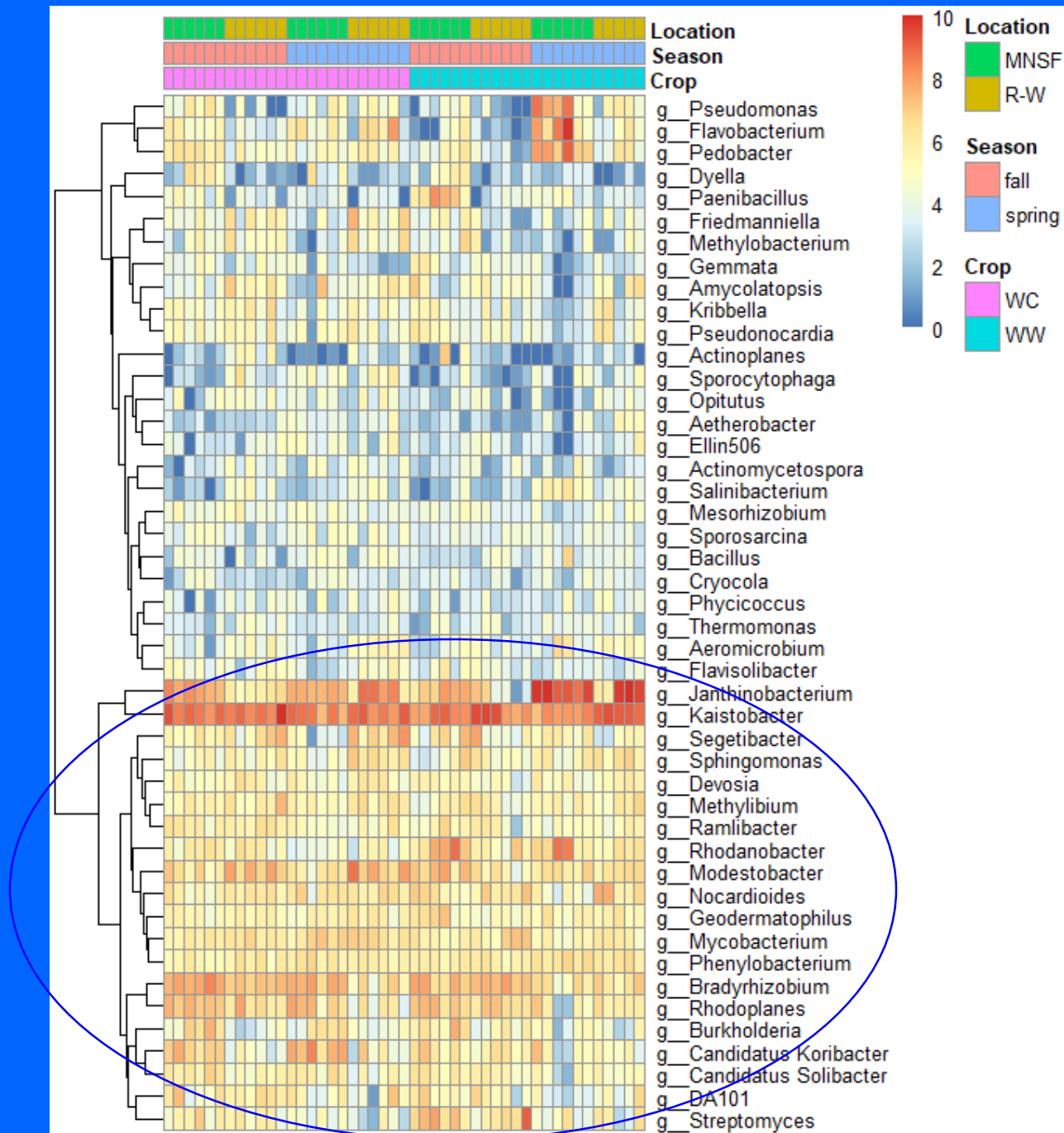




		<b>p-</b> <b>value</b>
<b>Bacteria</b>	<b>r2</b>	
<b>Season</b>	0.07	0.001
<b>Location</b>	0.12	0.001
<b>Crop</b>	0.04	0.003
<b>Season x Crop</b>	0.04	0.001
<b>Location x Crop</b>	0.05	0.001
<b>Location x Season</b>	0.02	0.09
<b>Location x Season x Crop</b>	0.02	0.11



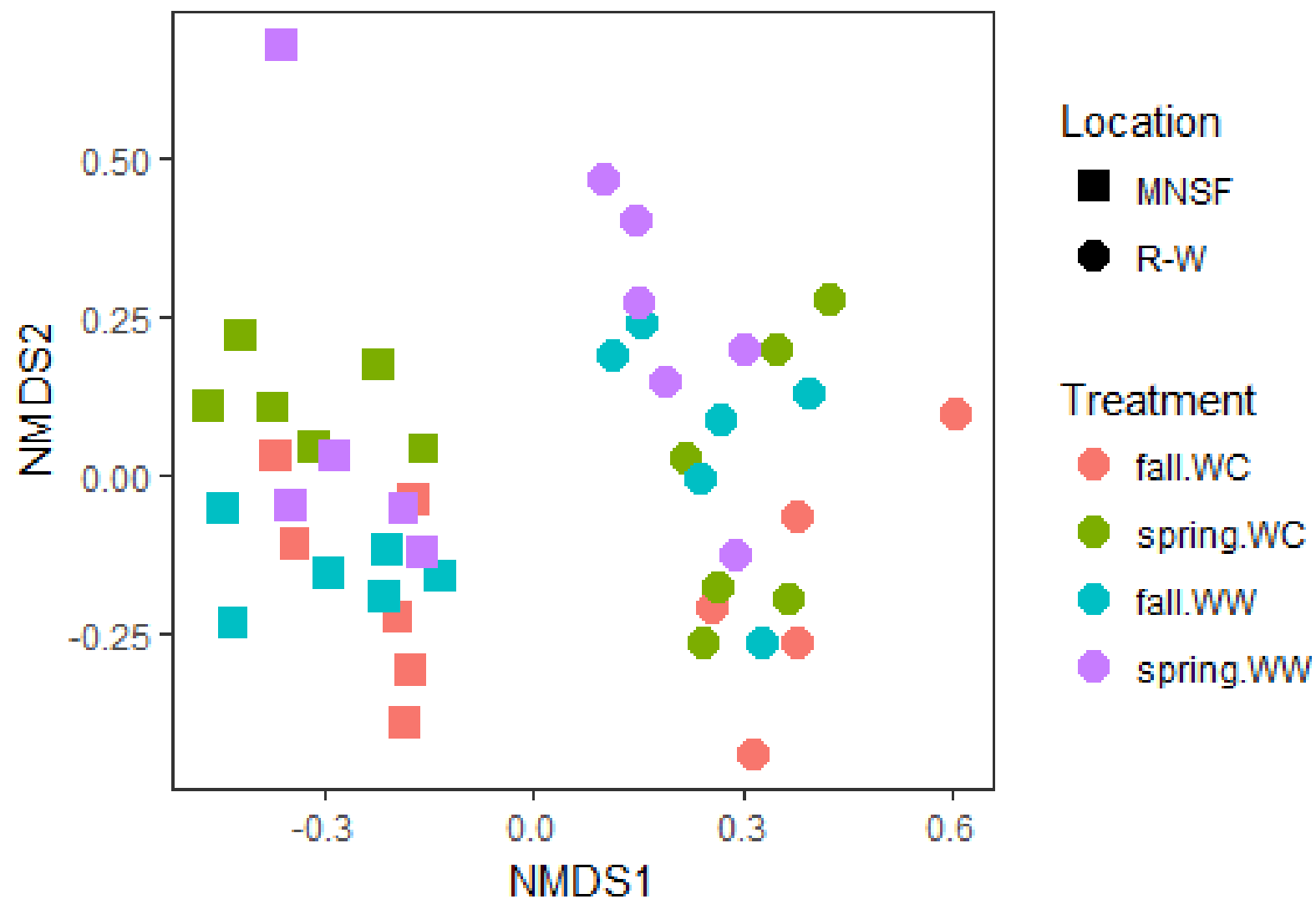




# Was a strong seasonal influence on wheat

- Fall- mostly Actinobacteria and Acidobacteria- oligotrophs, slow growing, survived the hot, dry summer
- Spring- copiotrophs- *Pseudomonas*, Oxalobacteria, Flavobacteria, Sphingobacteria

# Fungi





<b>Fungi</b>	<b>r2</b>	<b>p-value</b>
<b>Season</b>	0.05	0.002
<b>Location</b>	0.15	0.001
<b>Crop</b>	0.038	0.008
<b>Season x Crop</b>	0.014	0.7
<b>Location x Crop</b>	0.05	0.001
<b>Location x Season</b>	0.015	0.64
<b>Location x Season x Crop</b>	0.015	0.66

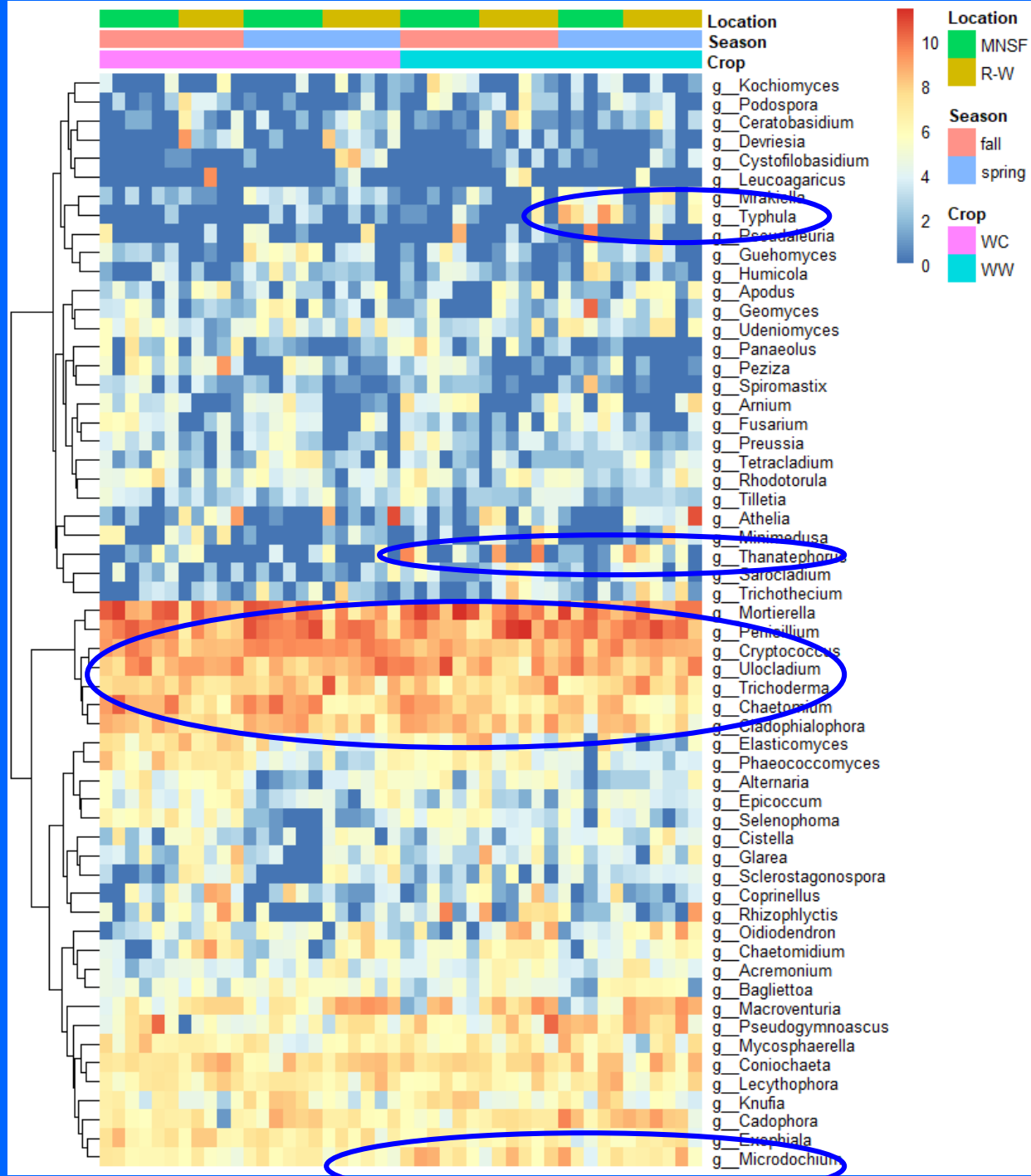
# Fungal Communities

- Found 936 OTUs or species
- Large overlap between canola and wheat fungi
- However, many cereal pathogens consistently higher in winter wheat

# Fungal Communities

- *Thanatephorus cucumerinum* (*Rhizoctonia solani*)
- *Ceratobasidium* (could be *R. cerealis*)
- Snow molds- *Typhula*
- *Microdochium*





← Wheat

**Chytrids higher  
on canola roots.  
These are  
primitive fungi,  
no report of  
pathogens  
on canola roots**

Canola →

# Conclusions

- So far, no “smoking gun” of a bacteria or fungus that could be responsible for yield drag
- Canola and wheat share a large group of common bacteria and fungi in the soil



# Publications

- Schlatter, D. C., Hansen, J. C., Schillinger, W. F., Sullivan, T. S. and Paulitz, T. C. 2019. Common and unique microbial rhizosphere communities in wheat and canola in semiarid Mediterranean environments. *Soil Biology and Biochemistry*: in revision.
- Hansen, J. C., Schillinger, W. F., Sullivan, T. S. and Paulitz, T. C. 2018. Soil microbial community response with canola introduced into a long-term monoculture wheat rotation. *Applied Soil Ecology*. 130:185-193.

# Publications

- Schillinger, W.F., and T.C. Paulitz. 2018. Canola versus wheat rotation effects on subsequent wheat yield. *Field Crops Research* 223:26-32.
- Hansen, J. C., Schillinger, W. F., Sullivan, T. S. and Paulitz, T. C. 2019. Soil Microbial Biomass and Fungi Reduced with Canola Introduced into Long-Term Monoculture Wheat Rotations. *Frontiers in Microbiology*: submitted

# Products

- **Fact Sheet/Grower Handout on Blackleg**
- **Will do a PNW Extension Bulletin in 2019**



## Blackleg in Canola and other Crucifers What You Need to Know

### THE FACTS:

- The WSDA Crucifer Quarantine now includes all counties of eastern WA
- Blackleg has been confirmed in northeast OR grower fields and at the Pendleton research station
- Lesions have been observed in ID canola and rapeseed fields; the disease has been described as 'common' but not severe
- Blackleg has been confirmed in Garfield Co. based on a few infected leaves of volunteer from the 2015 canola crop

### WHEN BUYING SEED:

- Buy ONLY tested and certified blackleg-free seed
- Look for the green WSDA tag on each seed bag indicating Crucifer Quarantine compliance (including cover crop mixtures)
- Ask your seed rep for varieties with MR (moderately resistant) or R (resistant) blackleg rating
- Apply seed treatment (most companies already do but double check that)

### AFTER EMERGENCE:

- Scout fields for any lesions on leaves and/or cankers on stems (see back for photos)
- Continue to monitor fields throughout the growing season

### SCOUTING PROTOCOL to avoid spreading blackleg

- Wear rubber boots
- When finished scouting/sampling a field, scrape and wash off any soil adhering to boots
- Spray boots with 70% alcohol (isopropyl alcohol works well)
- Remove boots and wear clean shoes until reaching the next field

### IF BLACKLEG IS OBSERVED (current crop or past crop residue)

- Place fresh leaves and/or stems in a ziploc bag. If they are wet, blot them dry on a paper towel.
- Mail (preferably overnight) or deliver samples to the WSU Plant Diagnostic Clinic, UI or OSU Plant Pathology departments (see contact info on next page)
- Follow recommendations for applying fungicide ONLY if blackleg is confirmed and at or above threshold levels

### HARVEST and TRANSPORTATION

- Make sure combine is set properly to reduce as much seed loss as possible
- Tarp trucks and seal up rear gates and belly dumps before delivery

### OTHER KEY RECOMMENDATIONS

- Control Brassica/crucifer volunteers and weeds in fields and field borders
- Rotate canola and other brassicas; grow no more than once every 3 years on the same field
- Learn how to identify blackleg symptoms; be vigilant in scouting fields



Note the black dots in the leaf lesion (pycnidia) that are the fruiting bodies of blackleg

#### WSU contacts:

**Tim Paulitz**  
USDA-ARS  
Room 363 Johnson Hall  
Pullman, WA 99164-6430  
509-335-7077 | 509-592-6401

**Rachel Bomberger**  
WSU Plant Pest Diagnostic Clinic  
316 Johnson Hall  
Pullman, WA 99164-6430  
509-335-0619

#### University of Idaho contact:

**Kurt Schroeder**  
PSES Dept. Ag Sci Bldg Rm 242  
Moscow, ID 83844  
208-885-5020

#### Oregon State University contact:

**Don Wysocki**  
509-278-4396 | 541-969-2014

#### Send samples to:

**Robert Cline**  
OSU Extension Plant Pathology Lab, HAREC  
2121 South 1st Street  
Hermiston, OR 97838

Stem canker, with pycnidia within the canker



Pyrenia on canola residue

# **Extension**

- **Presented talks on diseases of oilseeds at workshop in Colfax in Feb. 2018**

# Future Work

- PNW extension publication on black leg
- New project with Bill Schillinger on canola yield drag at Ritzville. Observing a similar phenomenon as Reardan
- Opportunity to do microbial community work and sequencing



A landscape photograph featuring a vast, bright yellow field in the foreground and middle ground. In the distance, a small white house with a dark roof is visible, surrounded by a few trees. Further back, there are rolling hills and a prominent, dark, conical hill under a clear blue sky. The word "Questions?" is overlaid in the center of the image in a bold, blue, sans-serif font, set against a yellow rectangular background.

**Questions?**