

**APPENDIX D**  
**SAES-422**  
**Format for Multistate Research Activity**  
**Accomplishments Report**

**Project/Activity Number:** WERA97: diseases of cereals

**Project/Activity Title:** Cereal Disease Working Group

**Period Covered:** 2021-2022

**Date of This Report:** Aug 1, 2022

**Annual Meeting Date(s):** June 21-22, 2022 (meeting dates change annually)

**Participants:** \* institution information not obtained at time of registration. If email is not present below, then it was not obtained at time of registration

Adams, Curtis curtis.b.adams@usda.gov

Barroso, Judit

Calderon, Francisco francisco.calderon@oregonstate.edu

Chen, Xianming xianming.chen@usda.gov

Christensen, Scott Scott.christensen@nutrien.com

Clark, Dale dale.clark@nutrien.com

Clinesmith, Marshall

Coltrain, Josh josh.coltrain@syngenta.com

Cook, Jason jason.cook3@montana.edu

Crebessa, Mary crebessa11@gmail.com

DeMacon, Tricia patricia.demacon@wsu.edu

Djibo Waziri, Aichatou

Dudley, Garrett garrett.dudley@idahowheat.org

Flick, Gabe flickfarms@gmail.com

Garland-Campbell, Kim

Gourlie, Jennifer jennifer.gourlie@oregonstate.edu

Graebner, Ryan ryan.graebner@oregonstate.edu

Hagerty, Christina Christina.Hagerty@oregonstate.edu

Hagerty, Momma shagerty@samhealth.org

Harri, James james.harri@mcgregor.com

Hoey, Amanda ahoey@oregonwheat.org

Hunt, Matthew matthew.hunt@oregonstate.edu

Klarquist, Emily

Krause, Margaret margaret.krause@usu.edu

Larson, David "Moose" david.larson@oregonstate.edu

Low, Richard rlow@graincraft.com

Lozier, David daisy.rudometkinodell@oregonstate.edu

Marshall, Juliet jmarshall@uidaho.edu

Mayad, Hassen elhassan.mayad@wsu.edu

Mundt, Chris chris.mundt@oregonstate.edu

Murray, Tim tim.murray@wsu.edu

Namdar, Grayson grayson.namdar@oregonstate.edu

Paulitz, Timothy timothy.paulitz@usda.gov

Peery, Sarah

Plunkett, Rachael plunketr@oregonstate.edu

Powell, Jacob jacob.powell@oregonstate.edu

Pumphrey, Mike m.pumphrey@wsu.edu

Ramirez Cisterna, Paulina paulina.ramirezcisterna@oregonstate.edu

Shelton, Chad Chads@albaughllc.com

Smiley, Richard richard.smiley@oregonstate.edu

Stanger, Trenton trenton.stanger@bayer.com

Steber, Camille csteber@wsu.edu

Sutor, Debbie debbie.sutor@oregonstate.edu

Taylor, Sydney sydney.taylor@mcgregor.com

Wen, Nuan

Wernsing, Alan

Whitener, Alix alix.whitener@fmc.com

Williams, Chris chris.williams@q.com

Wood, Daisy daisy.rudometkinodell@oregonstate.edu

Wysocki, Don

Zemetra, Robert robert.zemetra@oregonstate.edu

## Brief summary of minutes of annual meeting:

<https://oregonstate.box.com/s/l3y4wtuh6npv307im0kzoxpf50f86sjs>

### Accomplishments:

WERA-97 accomplishments include:

1. New developments in floral and foliar disease dynamics, particularly with regards to fungicide resistance and the ecological and genetic approaches to addressing these expanding threats to cereal production.
2. The effects of climate change on disease distributions, identify factors associated with regional expansion, and adapted management strategies to local conditions.
3. The intersection of soil and residue borne pathogens and soil health. Understand how production and disease management practices affect microbial community ecology and the long-term consequences of these effects on disease management.
4. Identify and characterize new disease resistances from exotic plant materials, advance disease resistance genes into locally adapted cultivars and breeding materials. Determine mechanisms involved in expression of disease resistance.

**Short term Outcomes:** Training the next generation of plant pathologists through graduate research assistantships and training post-docs

**Outputs:** Sharing of protocols and discoveries to improve cereal pathology programs across the PNW.

**Activities:** Extension education events and gatherings of WERA-97 members at other conferences including the American Phytopathological Society

### Milestones:

**Impacts:** By providing a regional awareness of emerging diseases and the methods successfully deployed to manage them, WERA-97 has proven instrumental in the disease management success of the western region. Over the last 20 years, several important cereal diseases have emerged in the western United States that required timely responses. These include but are not limited to Fusarium head blight (FHB), stripe and leaf rusts, and root lesion nematodes. In 2004, Fusarium head blight first spread from the corn-belt states and Northern Great Plains into Inter-mountain regions of the Western U.S., causing millions of dollars in lost production. Spreading into new areas, affected producers experienced mycotoxin levels (deoxynivalenol, DON) in their grain in excess of US tolerances, presenting them with catastrophic losses.

**Activities:** US-Wheat and Barley Scab Initiative

**Milestones:** Continuation of federal support for US Wheat and Barley Scab Initiative

**Indicators:** Growers have access to FHB resistant cultivars and cultural management strategies to avoid FHB infection.

### Publications:

[Enzyme activities distinguish long-term fertilizer effects under different soil storage methods](#)

CL Reardon, AM Klein, CJ Melle, CH Hagerty, ER Klarer, S Machado, ...  
Applied Soil Ecology 177, 104518

2022

[Occurrence of Mummy Berry Associated with Huckleberry \(\*Vaccinium membranaceum\*\) Caused by \*Monilinia\* spp. in Oregon](#)

2022

C Hagerty, S Gardner, DR Kroese, C Yin, TC Paulitz, JW Pscheidt  
Plant Disease 106 (2), 357-359

[Impacts of lime application on soil bacterial microbiome in dryland wheat soil in the Pacific Northwest](#)

C Yin, DC Schlatter, DR Kroese, TC Paulitz, CH Hagerty  
Applied Soil Ecology 168, 104113

9 2021

[Rhizosphere community selection reveals bacteria associated with reduced root disease](#)

C Yin, JM Casa Vargas, DC Schlatter, CH Hagerty, SH Hulbert, TC Paulitz  
Microbiome 9 (1), 1-18

44 2021

[Phosphorus Supply Does Not Affect Fusarium Crown Rot of Winter Wheat](#)

CH Hagerty, KR McLaughlin, DR Kroese, LK Lutcher  
PhytoFrontiers™ 1 (4), 354-358

2021

[Detection of Soilborne wheat mosaic virus using hyperspectral imaging: From lab to field scans and from hyperspectral to multispectral data](#)

M Haagsma, C Hagerty, D Kroese, J Selker  
PHYTOPATHOLOGY 111 (9)

2021

[Hyperspectral reflectance data of wheat in situ and lab scans infected with soilborne wheat mosaic virus](#)

M Haagsma, CH Hagerty, DR Kroese, ER Jachens

2021

[Diagnostic Guide: Fusarium crown rot of winter wheat](#)

CH Hagerty, T Irvine, HM Rivedal, C Yin, DR Kroese  
Plant Health Progress 22 (2), 176-181

3 2021

[Baseline and Temporal Changes in Sensitivity of \*Zymoseptoria tritici\* Isolates to Benzovindiflupyr in Oregon, U.S.A., and Cross-Sensitivity to Other SDHI Fungicides](#)

CH Hagerty, AM Klein, CL Reardon, DR Kroese, CJ Melle, KR Graber, ...  
Plant Disease 105 (1), 169-174

9 2021

[Rhizosphere community selection reveals bacteria associated with reduced root](#)

C Yin, JMC Vargas, DC Schlatter, CH Hagerty, SH Hulbert, TC Paulitz

2021

[Reaction of winter wheat and barley cultivars to \*Fusarium pseudograminearum\*-inoculated fields in the dryland Pacific Northwest, USA](#)

CH Hagerty, L Lutcher, K McLaughlin, P Hayes, K Garland-Campbell, ...  
Agrosystems, Geosciences & Environment 4 (2), e20173

2021

[Responses of soil fungal communities to lime application in wheat fields in the pacific northwest](#)

C Yin, DC Schlatter, DR Kroese, TC Paulitz, CH Hagerty  
Frontiers in Microbiology, 1193

[Comparing the efficacy of control strategies for infectious disease outbreaks using field and simulation studies](#)

B Chaulagain, JB Contina, K Mills, RL Seibel, CC Mundt  
Ecological Applications, e2631

2022

- [Delays in Epidemic Outbreak Control Cost Disproportionately Large Treatment Footprints to Offset](#) 2022  
PM Severns, CC Mundt  
Pathogens 11 (4), 393
- [Phytoplankton biodiversity and the inverted paradox](#) 3 2021  
MJ Behrenfeld, R O'Malley, E Boss, L Karp-Boss, C Mundt  
ISME Communications 1 (1), 1-9
- [A population-level invasion by transposable elements triggers genome expansion in a fungal pathogen](#) 14 2021  
U Oggenfuss, T Badet, T Wicker, FE Hartmann, NK Singh, L Abraham, ...  
Elife 10, e69249
- [Registration of 'ARS Crescent'soft white winter club wheat](#) 2021  
K Garland Campbell, R Allan, A Burke, X Chen, P DeMacon, ...  
Journal of Plant Registrations 15 (3), 515-526
- [Registration of 'Castella'soft white winter club wheat](#) 2021  
K Garland Campbell, RE Allan, AH Carter, P DeMacon, E Klarquist, ...  
Journal of Plant Registrations 15 (3), 504-514
- [Baseline and Temporal Changes in Sensitivity of \*Zymoseptoria tritici\* Isolates to Benzovindiflupyr in Oregon, U.S.A., and Cross-Sensitivity to Other SDHI Fungicides](#) 9 2021  
CH Hagerty, AM Klein, CL Reardon, DR Kroese, CJ Melle, KR Graber, ...  
Plant Disease 105 (1), 169-174
- [Growing winter malting barley west of the Cascades](#) 2021  
CC Mundt, AG Hulting, P Hayes, BMA Meints, A MacLeod, D Carrijo, ...  
Pullman, Washington: Washington State University Extension
- [Enzyme activities distinguish long-term fertilizer effects under different soil storage methods](#) 2022  
CL Reardon, AM Klein, CJ Melle, CH Hagerty, ER Klarer, S Machado, ...  
Applied Soil Ecology 177, 104518
- [Occurrence of eyespot of cereals in Tunisia and identification of \*Oculimacula\* species and mating types](#) 2022  
S Gargouri, A Bouatrous, TD Murray, TC Paulitz, E Khemir, A Souissi, ...  
Canadian Journal of Plant Pathology 44 (3), 345-353
- [Fungal Pathogens Associated with Crown and Root Rot of Wheat in Central, Eastern, and Southeastern Kazakhstan](#) 2022  
T Bozoğlu, S Derviş, M Imren, M Amer, F Özdemir, TC Paulitz, ...  
Journal of Fungi 8 (5), 417
- [Biodiversity of Nematode Communities Associated with Wheat \(\*Triticum aestivum\* L.\) in Southern Morocco and Their Contribution as Soil Health Bioindicators](#) 1 2022  
SE Laasli, F Mokrini, R Lahlali, T Wuletaw, T Paulitz, AA Dababat  
Diversity 14 (3), 194
- [Occurrence of Mummy Berry Associated with Huckleberry \(\*Vaccinium membranaceum\*\) Caused by \*Monilinia\* spp. in Oregon](#) 2022  
C Hagerty, S Gardner, DR Kroese, C Yin, TC Paulitz, JW Pscheidt  
Plant Disease 106 (2), 357-359

- [Are microbial communities indicators of soil health in a dryland wheat cropping system?](#) 1 2022  
DC Schlatter, J Hansen, B Carlson, IN Leslie, DR Huggins, TC Paulitz  
Applied Soil Ecology 170, 104302
- [Monitoring of Host Suitability and Defense-Related Genes in Wheat to \*Bipolaris sorokiniana\*](#) 2 2022  
M Alkan, H Bayraktar, M İmren, F Özdemir, R Lahlali, F Mokrini, T Paulitz, ...  
Journal of Fungi 8 (2), 149
- [Interactions among cereal cyst nematode \*Heterodera filipjevi\*, dryland crown rot \*Fusarium culmorum\*, and drought on grain yield components and disease severity ...](#) 3 2022  
M Ahmadi, N Mirakhorli, G Erginbas-Orakci, O Ansari, HJ Braun, T Paulitz, ...  
Canadian Journal of Plant Pathology, 1-17
- [Impacts of lime application on soil bacterial microbiome in dryland wheat soil in the Pacific Northwest](#) 9 2021  
C Yin, DC Schlatter, DR Kroese, TC Paulitz, CH Hagerty  
Applied Soil Ecology 168, 104113
- [Phytoparasitic nematodes of organic vegetables in the Argan Biosphere of Souss-Massa \(Southern Morocco\)](#) 4 2021  
I Filali Alaoui, M Ait Hamza, H Benjlil, A Idhmida, A Braimi, E Mzough, ...  
Environmental Science and Pollution Research 28 (45), 64166-64180
- [Rhizosphere community selection reveals bacteria associated with reduced root disease](#) 44 2021  
C Yin, JM Casa Vargas, DC Schlatter, CH Hagerty, SH Hulbert, TC Paulitz  
Microbiome 9 (1), 1-18
- [First Report of Crown Rot Caused by \*Fusarium redolens\* on Wheat in Kazakhstan](#) 3 2021  
T Bozoğlu, G Özer, M Imren, TC Paulitz, AA Dababat  
Plant Disease 105 (10), 3302
- [Synthetic microbial consortia protect wheat against a soilborne fungal pathogen](#) 2021  
C Yin, TC Paulitz  
PHYTOPATHOLOGY 111 (10), 94-94
- [A rapid greenhouse screening method for cereal cyst nematode \(CCN\) resistance in wheat](#) 2021  
N Wen, N Strauss, K Garland-Campbell, T Paulitz  
PHYTOPATHOLOGY 111 (10), 59-59
- [Plant-Parasitic Nematodes Associated With Wheat in Central, Eastern, and Southeastern Kazakhstan](#) 2 2021  
M Imren, G Özer, TC Paulitz, A Morgounov, AA Dababat  
Plant Disease 105 (9), 2299-2305
- [Native yeast and non-yeast fungal communities of Cabernet Sauvignon berries from two Washington State vineyards, and persistence in spontaneous fermentation](#) 5 2021  
X Wang, DC Schlatter, DA Glawe, CG Edwards, DM Weller, TC Paulitz, ...  
International Journal of Food Microbiology 350, 109225
- [Solutions rhizosphériques: Isolats de \*Pseudomonas\* contre \*Botrytis cinerea\* de la tomate](#) 1 2021  
R Qessaoui, H Lahmyed, A Ajerrar, R Bouharroud, JN Furze, T Paulitz, ...  
African and Mediterranean Agricultural Journal Al Awamia

- [Chickpea Seed Rot and Damping-Off Caused by Metalaxyl-Resistant \*Pythium ultimum\* and Its Management with Ethaboxam](#) 3 2021  
M Wang, S Van Vleet, R McGee, T Paulitz, L Porter, K Schroeder, ...  
Plant disease 105 (6), 1728-1737
- [Biological activities of essential oils and lipopeptides applied to control plant pests and diseases: A review](#) 28 2021  
K Basaid, B Chebli, EH Mayad, JN Furze, R Bouharroud, F Krier, ...  
International Journal of Pest Management 67 (2), 155-177
- [Biocontrol potential of nematophagous fungi against \*Meloidogyne\* spp. infecting tomato](#) 7 2021  
H Tazi, MA Hamza, A Hallouti, H Benjlil, A Idhmida, JN Furze, TC Paulitz, ...  
Organic Agriculture 11 (1), 63-71
- [Identification of snow mold tolerance QTL in a landrace winter wheat using linkage mapping](#) 2022  
SN Phipps, AB Burke, K Balow, J Smith, T Murray, AH Carter  
Crop Science 62 (4), 1415-1429
- [Occurrence of eyespot of cereals in Tunisia and identification of \*Oculimacula\* species and mating types](#) 2022  
S Gargouri, A Bouatrous, TD Murray, TC Paulitz, E Khemir, A Souissi, ...  
Canadian Journal of Plant Pathology 44 (3), 345-353
- [Identification of Snow Mold Tolerant QTL Using Linkage Mapping in a Landrace Winter Wheat](#) 2021  
SN Phipps, AB Burke, KA Balow, TD Murray, AH Carter  
ASA, CSSA, SSSA International Annual Meeting
- [Whole-genome mapping of eyespot resistance to \*Oculimacula yallundae\* and \*Oculimacula acuformis\* in winter wheat cultivar Madsen](#) 2021  
H Sheng, L Cui, D Qiu, H Li, TD Murray  
PHYTOPATHOLOGY 111 (10), 72-73
- [A novel agglutination assay to characterize the interaction between seed gall nematodes, \*Anguina tritici\*, \*Afrina sporoboliae\*, and \*Rathayibacter\* spp](#) 2021  
A Duarte, BK Scholz-Schroeder, TD Murray  
PHYTOPATHOLOGY 111 (10), 95-95
- [Registration of 'ARS Crescent' soft white winter club wheat](#) 2021  
K Garland Campbell, R Allan, A Burke, X Chen, P DeMacon, ...  
Journal of Plant Registrations 15 (3), 515-526
- [Registration of 'Castella' soft white winter club wheat](#) 2021  
K Garland Campbell, RE Allan, AH Carter, P DeMacon, E Klarquist, ...  
Journal of Plant Registrations 15 (3), 504-514
- [Registration of 'Resilience CL+' soft white winter wheat](#) 2021  
KS Gill, N Kumar, HS Randhawa, K Murphy, AH Carter, CF Morris, ...  
Journal of Plant Registrations 15 (1), 196-205
- [Registration of 'Stingray CL+' soft white winter wheat](#) 2021  
AH Carter, KA Balow, GB Shelton, AB Burke, KE Hagemeyer, A Stowe, ...

Journal of Plant Registrations 15 (1), 161-171

[Registration of 'Devote' soft white winter wheat](#)

AH Carter, KA Balow, GB Shelton, AB Burke, KE Hagemeyer, A Stowe, ...

[1](#) 2021

Journal of Plant Registrations 15 (1), 121-131

[Registration of 'Scorpio' hard red winter wheat](#)

AH Carter, KA Balow, GB Shelton, AB Burke, KE Hagemeyer, A Stowe, ...

2021

Journal of Plant Registrations 15 (1), 113-120

**Authorization:**