

Robert S. Brueggeman, PhD

Department of Crop and Soil Sciences
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EDUCATION AND TRAINING

2009 Washington State University, Pullman, WA, **Ph.D.** Crop Sciences
2004 Washington State University, Pullman, WA, **M.S.** Crop Sciences
1998 Washington State University, Pullman, WA, **B.S.** Genetics and Cell Biology,
minors in Microbiology and Molecular Cell Biology
1994 Spokane Falls Community College, Spokane, WA, **A.A** degree

PROFESSIONAL EXPERIENCE

2020 – present Molecular Plant Sciences Program Faculty, WSU
2019 – present Robert A. Nilan Endowed Chair in Barley Research and Education, WSU
2019 – present Associate Professor, Department of Crop and Soil Sciences, WSU
2018 – 2019 Dr. Charles Mode Endowed Chair in Genomics Research, North Dakota State
University (NDSU)
2016 – 2019 Associate Professor, Barley Pathology/Molecular Genetics, NDSU
2016 – 2019 Genomics and Bioinformatics Program Faculty, NDSU
2010 – 2016 Assistant Professor, Department of Plant Pathology, NDSU
2004 – 2009 Barley Molecular Genetics Research Supervisor / Lab Manager, Department of
Crop and Soil Sciences, WSU

SYNERGISTIC ACTIVITIES

Chair of the National Barley Improvement Committee (NBIC), 2010-2016
Chair of for the U.S. wheat and barley scab initiative barley coordinated project Committee,
2012-2014
Served on seven National Science Foundation (NSF) Division of Integrative Organismal
Systems in the Biology Directorate Symbiosis Defense and Self Recognition Grant Review
Panels, Dec., 2019, Oct., 2015, April, 2015, Nov., 2014, April-May, 2014, April, 2013, and
Nov., 2013.
Served on three USDA-NIFA, Grant Review Panels, Plant Disease Panel (Dec. 2017),
Pathogen Interaction Panel (Feb. 2017), Understanding Plant Associated Microorganisms Panel
(June 2013)
Co-Chair of the Local Organizing Committee of the International Triticeae Mapping Initiative
and 4th National Wheat Genomics Joint Workshop 2012
Ad hoc reviewer for manuscripts submitted to refereed journals
Reviewed seventy-seven manuscripts submitted to twenty-three refereed journals. 2010-present

Biographical Sketch

MEMBERSHIPS IN SCIENTIFIC SOCIETIES

American Phytopathological Society

Gamma Sigma Delta Honorary Society of Agriculture, NDSU Chapter, 2012

HONORS AND AWARDS

Named the **Robert A. Nilan Endowed Chair in Barley Research and Education**, WSU, 2019

Named the **Dr. Charles J. Mode Endowed Professor of Genomics Research**, NDSU, 2018

Awarded the **Larson/Yaggie Excellence in Research Award**, NDSU, 2016

Molecular Plant Microbe Interactions Editor's Pick: Wang et al. (2013) *Mol Plant Microbe In* 26(4):407-418

Notable Student Publication Award (Proc. Natl. Acad. Sci. (2008) 105:14971-14975). 2009

Integrated Plant Sciences Retreat, Washington State University. Pullman, WA.

Publications in refereed journals (46 in the last 5 years)

1. Restrepo-Montoya, D., **Brueggeman, R.S.**, McClean, P., and Osorno, J.M. (2020) Computational identification of receptor-like kinases “RLK” and receptor-like proteins “RLP” in legumes. *BMC Genomics* 21(1) DOI: 10.1186/s12864-020-6844-z.
2. Solanki, S., Ameen, G., Zhao, J., Flatten, J., Borowicz, P., and **Brueggeman, R.S.** (2020) Visualization of spatial gene expression in plants by modified RNAscope fluorescent in situ hybridization. *Plant Methods* 16(1) DOI: 10.1186/s13007-020-00614-4
3. Sanyal, D., Solanki, S., Ameen, G., **Brueggeman, R.S.** and Chatterjee, A. (2020) Understanding the expression dynamics of symbiont rhizobial nifH and nitrogen assimilatory NR and GS genes in dry bean (*Phaseolus vulgaris* L.) genotypes at various growth stages. *Legume Science* DOI: 10.1002/leg3.26
4. Gyawali, S., Reda, A., Verma, R.P.S., **Brueggeman, R.S.**, Rehman, S., Belqadi, L., Arbaoui,vcM., Tamang, P., and Singh, M., (2020) Seedling and adult stage resistance to net form of net blotch (NFNB) in spring barley and stability of adult stage resistance to NFNB in Morocco. *Journal of Phytopathology* 168(39) DOI: [10.1111/jph.12887](https://doi.org/10.1111/jph.12887).
5. Abraham. N., Chitampalam, P., Nelson, B.D., Sharma Poudel, R., Chittem, K., Borowicz, P., **Brueggeman, R.S.**, Jain. S., and LeBoldus, J.M. (2019) Microscopic, Biochemical, and Molecular Comparisons of Moderately Resistant and Susceptible Populus Genotypes Inoculated with *Sphaerulina musiva*. *Phytopathology* 109(12) DOI:10.1094/PHYTO-03-19-0105-R
6. Haque, M.E., Bloomquist, M., Bhuiyan, M.Z.R., Gross, T., Hakk, P., Leng, Y., Liu, Y., Zhong, S., **Brueggeman, R.S.** Sharma Poudel, R., and Kahn, M. (2019) First Report of Alternaria Leaf Spot Caused by *Alternaria tenuissima* on Sugar Beet (*Beta vulgaris*) in Minnesota, USA. *Plant Disease* DOI:10.1094/PDIS-03-19-0603-R
7. Aoun, M., Kolmer, J.A., Breiland, M., Richards, J., **Brueggeman, R.S.**, Szabo, L.J., and Acevedo, M. (2019) Genotyping-by-Sequencing for the Study of Genetic Diversity in *Puccinia triticina*. *Plant Disease* 104(3) DOI:10.1094/PDIS-09-19-1890-RE

8. Wyatt, N., Richards, J., Brueggeman, R., and Friesen, T. (2019) A Comparative Genomic Analysis of the Barley Pathogen *Pyrenophora teres* f. *teres* Identifies Subtelomeric Regions as Drivers of Virulence. *Molecular Plant-Microbe Interactions* 33(2) DOI:10.1094/MPMI-05-19-0128-R
9. Clare, S., Wyatt, N., **Brueggeman, R.S.** and Friesen, T. (2019) Research advances in the *Pyrenophora teres*–barley interaction. *Molecular Plant Pathology* 21(2) DOI:10.1111/mpp.12896
10. Sharma Poudel, R., Richards, J., Shestha, S., Solanki, S., and **Brueggeman, R.S.** (2019) Transcriptome-wide association study identifies putative elicitors/suppressor of *Puccinia graminis* f. sp. *tritici* that modulate barley *rpg4*-mediated stem rust resistance. *BMC Genomics* 20(1) doi: 10.1186/s12864-019-6368-7.
11. Solanki, S., Ameen, G., Borowicz, P., and **Brueggeman, R.S.** (2019) Shedding light on penetration of cereal host stomata by wheat stem rust using improved methodology. *Scientific reports* 9 (1), 7939.
12. Abbasov, M., **Brueggeman, R.**, Raupp, J., Akparov, Z., Aminov, N., Bedoshvili, D., Gross, T., Gross, P., Babayeva, S., Izzatullayeva, V., Mammadova, S.A., Hajiyev, E., Rustamov, K., and Gill B.S. (2019) Genetic diversity of *Aegilops* L. species from Azerbaijan and Georgia using SSR markers. *Genetic Resources and Crop Evolution* 66 (2), 453-463.
13. Khan, M.F., Haque, M.E., **Brueggeman, R.**, Zhong, S., Bhuyian, M.Z.R., Sharma Poudel, R., Gross, T., Hakk, P., and Liu, Y. (2019) First Report of *Geotrichum candidum* causing Postharvest Rot of Sugarbeet (*Beta vulgaris*. L) Roots in Minnesota and North Dakota. *Plant Disease* <https://doi.org/10.1094/PDIS-05-19-1000-PDN>
14. Solanki, S., Richards, J., Ameen, G., Wang, X., Khan, A., Ali, H., Stangel, A., Tamang, P., Gross, T., Gross, P., Fetch, T.G., and **Brueggeman, R.S.** (2019) Characterization of genes required for both *Rpg1* and *rpg4*-mediated wheat stem rust resistance in barley. *BMC Genomics* 20:495.
15. Tamang, P., Richards, J.K., Alhashal, A., Sharma Poudel, R., Horsley, R.D., Friesen, T.L., and **Brueggeman, R.S.** (2019) Mapping of Barley Susceptibility/Resistance QTL against Spot Form Net Blotch caused by *Pyrenophora teres* f. *maculata* using RIL populations. *Theoretical and Applied Genetics* 132(7), 1953-1963.
16. Daba, S.D., Horsley, R., **Brueggeman, R.**, Chao, S., and Mohammadi, M. (2019) Genome-wide association study and candidate gene identification for leaf scald and net blotch in barley (*Hordeum vulgare* L.). *Plant Disease* 105(5), 880-889.
17. Sharma Poudel, R., Alhashel, A., Gross, T., Gross, P., and **Brueggeman, R.S.** (2018) Pyramiding *rpg4* and *Rpg1*-mediated stem rust resistance in barley requires the *Rrr1* gene for both to function. *Frontiers in Plant Science* doi: 10.3389/fpls.2018.01789.
18. Elakhdar, A., Kumamaru, T., Qualset, C.O., **Brueggeman, R.S.**, Amer, K., and Capochichi, L. (2018) Assessment of genetic diversity in Egyptian barley (*Hordeum vulgare* L.) genotypes using SSR and SNP markers. *Genetic Resources and Crop Evolution* 65(7), 1937-1951.
19. Jin, Z., Gillespie, J., Barr, J., Wiersma, J.J., Sorrells, M.E., Zwinger, S., Gross, T., Cummings, J., Bergstrom G.C., **Brueggeman, R.**, Horsley, R.D., and Schwarz, P.B. (2018) Malting of *Fusarium* Head Blight-Infected Rye (*Secale cereale*): Growth of *Fusarium graminearum*, Trichothecene Production, and Impact on Malt Quality. *Toxins* 10(9), 369. <http://doi.org/10.3390/toxins10090369>

20. Muchero, W., Franco-Coronado, J., Chen, J.-G., Singan, V., Yang, Y., **Brueggeman, R.S.**, Dunnell, K.L., Abraham, N., Weisberg, A.J., Chang, J.H., Lindquist, E., Berry, K., Ranjan, P., Jawdy, S., Schmutz, J., Tuskan, G.A., and LeBoldus, J.M. (2018) Association mapping, transcriptomics, and transient expression identify candidate genes mediating plant-pathogen interactions in a tree. *Proceedings of the National Academy of Sciences, USA*, doi: 10.1073/pnas.1804428115.
21. Gyawali, S., Amezrou, R., Verma, R.P.S., **Brueggeman, R.**, Rehman, S., Belqadi, L., Arbaoui, M., Tamang, P., and Singh, M. (2018) Seedling and adult stage resistance to spot form of net blotch (SFNB) in spring barley and stability of adult stage resistance to SFNB in Morocco. *European Journal of Plant Pathology*. DOI 10.1007/s10658-018-1575-8
22. Leng, Y., Zhao, M., Wang, R., Steffenson B.J., **Brueggeman R.S.**, and Zhong, S. (2018) The gene conferring susceptibility to spot blotch caused by *Cochliobolus sativus* is located at the *Mla* locus in barley cultivar Bowman. *Theoretical and Applied Genetics* DOI: 10.1007/s00122-018-3095-5
23. Amezrou, R., Verma, R.P.S., Chao, S., **Brueggeman R.**, Belqati, L., Arbaoui, M., Rehman, S., and Gyawali, S. (2018) Genome-wide association studies of net form of net blotch resistance at seedling and adult plant stages in spring barley collection. *Molecular Breeding* 38(5). doi: 10.1007/s11032-018-0813-2
24. Abbasov, M., Akparov Z.I., Gross, T., **Brueggeman R.S.** (2018) Genetic relationship of diploid wheat (*Triticum* spp.) species assessed by SSR markers. *Genetic Resources and Crop Evolution* doi: 10.1007/s10722-018-0629-2
25. Jin Z., Zhou B., Gillespie J., Gross T., Barr J., Simsek S., **Brueggeman R.**, and Schwarz P. (2018) Production of deoxynivalenol (DON) and DON-3-glucoside during the malting of Fusarium infected hard red spring wheat. *Food Control* 85, 6-10
26. Wyatt N.A., Richards J.K., **Brueggeman R.S.**, and Friesen T.L. (2017) reference Assembly and Annotation of the *Pyrenophora teres* f. *teres* Isolate 0-1. *G3: Genes| Genomes| Genetics*, g3. 300196.2017.
27. Koladia, V. M., Richards J.K., Wyatt N.A., Faris, J. D., **Brueggeman, R. S.**, and Friesen, T. L. (2017) Genetic analysis of virulence in the *Pyrenophora teres* f. *teres* population BB25xFGOH04Ptt-21. *Fungal Genetics and Biology* 107, 12-19.
28. Elakdar A., Kumamaru T., Smith K.P., **Brueggeman R.S.**, Capo-chichi L.J.A. and Solanki S. (2017) Genotype by environment interactions (GEIs) for the barley grain yield under salt stress conditions. *J. Crop Science and Biotechnology* 20(3) 193-204.
29. Carlsen S.A., Neupane, A., Wyatt, N.A., Richards J.K., Faris J. D., Xu, S. S., **Brueggeman, R.S.**, Friesen T. L. (2017) Unraveling the Complexities of the *Pyrenophora teres* f. *maculata* – Barley Interaction Using Pathogen Genetics. *G3: Genes| Genomes| Genetics* 7(8), 2615-2626.
30. Richards, J., Chao, S., Friesen T., and **Brueggeman R.** (2017) Association mapping of net form net blotch using a world barley core collection. *Theor Appl Genet* 130 (5), 915-927
31. Koladia, V. M., Faris, J. D., **Brueggeman, R. S.**, Chao S., and Friesen, T. L. (2016) Genetic analysis of net form net blotch resistance in CI5791 and Tifang barley lines against a global collection of *P. teres* f. *teres* isolates. *Theoretical and Applied Genetics* DOI: 10.1007/s00122-016-2801-4
32. Shi, G., Zhang Z., Friesen T.L., Raatz, d., Fahima T., **Brueggeman R.S.**, Lu S., Trick H.N., Liu, Z., Chao, W., Frenkel, Z., Xu S.S., Rasmussen J.B., and Faris J.D. (2016) Title: The hijacking of a disease resistance pathway by a wheat fungal pathogen leads to disease. *Science Advances* 2:e1600822.

Biographical Sketch

33. Gao, Y., Liu, Z., Faris, J.D., Richards, J., **Brueggeman, R.S.**, Li, X., Oliver, R.P., McDonald, B.A., and Friesen, T.L. (2016) Validation of genome wide association studies (GWAS) as a tool to identify virulence factors in *Parastagonospora nodorum*. *Phytopathology* 106 (10), 1177-1185.
34. Richards, J., Chao, S., Friesen T., and **Brueggeman R.** (2016) Fine Mapping of the Barley Chromosome 6H Net Form Net Blotch Susceptibility Locus. *G3: Genes| Genomes| Genetics*, G3. 116.028902.
35. Secor, G., Rivera-Varas, V., **Brueggeman, R.**, Metzger, M., Rengifo J., and Richards, J., (2016) First report of field decay of sugar beet caused by *Pectobacterium carotovorum* subsp. *brasiliensis*. *Plant Disease* 100 (10), 2160-2160.
36. Gill, U., **Brueggeman, R.**, Nirmala, J., Chai, Y., Steffenson, B. and Kleinhofs, A. (2016) Molecular and genetic characterization of barley mutants required for *Rpg1*-mediated resistance against stem rust; High-resolution genetic and physical mapping of mutant *rpr2*. *Theoretical and Applied Genetics* 129(8) DOI: 10.1007/s00122-016-2721-3
37. Jain, S., Chittam, K., **Brueggeman R.**, Osorno J.M., Richards, J., and Nelson, B. (2016) Comparative Transcriptome Analysis of Resistant and Susceptible Common Bean Genotypes in Response to Soybean Cyst Nematode Infection. *PLoS One* 11 (7), e0159338.
38. Jiang, H., Hao, J., Johnson , S., **Brueggeman, R.**, and Secor, G. (2016) First report of *Dickeya dianthicola* on potato in Maine. *Plant Disease* DOI: 10.1094/PDIS-12-15-1513-PDN
39. Steffenson, B.J., Solanki S., and **Brueggeman R.S.** (2016) Landraces from mountainous regions of Switzerland are sources of important genes for stem rust resistance in barley. *Alpine Botany* DOI 10.1007/s00035-015-0161-3.
40. Marshall, J., Kinzer, K., and **Brueggeman, R.*** (2015) First Report of *Pyrenophora teres* f. *maculata* the cause of spot form net blotch of barley in Idaho. *Plant Disease*, 99:12 1860.
41. LeBoldus, J.M., Kinzer, K., Ya, Z., Yan, C., Friesen, T. L., and **Brueggeman, R.*** (2015) Genotype-by-sequencing of the plant pathogenic fungi *Septoria musiva* and *Pyrenophora teres* utilizing ion torrent sequence technology. *Molecular Plant Pathology*, DOI: 10.1111/mpp.12214.
42. Mamo, B. E., Smith, K. P., **Brueggeman, R.**, and Steffenson, B. J. (2015) Genetic characterization of wheat stem rust resistance in landrace and wild barley accessions identifies *rpg4/Rpg5* locus. *Phytopathology*, 105(1):99-109.
43. Liu, Z., Holmes, D., Faris, J.D., Chao, S., **Brueggeman, R.S.**, Edwards, M.C., and Friesen, T.L. (2015) QTL mapping reveals effector-triggered susceptibility underlying the barley-*Pyrenophora teres* f. *teres* interaction. *Molecular Plant Pathology* DOI: 10.1111/mpp.12172.
44. Tamang, P., Neupane, A., Mamidi, S., Friesen, T., and **Brueggeman, R.*** (2015) Association mapping of seedling resistance to Spot Form Net Blotch in a worldwide collection of barley. *Phytopathology*, 105 (4) 500-508.
45. Neupane, A., Tamang, P., **Brueggeman, R.S.**, and Friesen, T. L. (2015) Evaluation of a barley core collection for spot form net blotch reaction reveals distinct genotype specific pathogen virulence and host susceptibility. *Phytopathology*, 105 (4) 509-517.
46. Zurn, J.D., Dugyala, S., Borowicz, P., **Brueggeman, R.**, and Acevedo, M. (2015) Unraveling the Wheat Stem Rust Infection Process on Barley Genotypes through Relative qPCR and Fluorescence Microscopy. *Phytopathology* 105 (5) 707-712.