

CURRICULUM VITA

Arron H. Carter

Associate Professor and O.A. Vogel Endowed

Chair of Wheat Breeding and Genetics

Department of Crop and Soil Sciences, P.O. Box 646420

Washington State University, Pullman, WA 99164-6420

Phone: (509) 335-6198, Fax: (509) 335-8674, E-mail: ahcarter@wsu.edu

EDUCATION:

- JUNE 2006-MAY 2009: Ph.D. Degree. Department of Crop and Soil Sciences, Washington State University, Pullman, WA. Dissertation Advisor: Dr. K. Kidwell
Dissertation: Identification of Quantitative Trait Loci and Molecular Markers for Disease, Insect, and Agronomic Traits in Spring Wheat (*Triticum aestivum* L.).
- JAN. 2004-MAY 2006: M.S. Degree. Department of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID. Thesis Advisor: Dr. R. Zemetra.
Thesis: Improvement of Soft White Winter Wheat (*Triticum aestivum* L.) in the Pacific Northwest through Development of Herbicide Resistant Wheat and Development of a Recombinant Inbred Line Population.
- AUG. 1997-MAY 1998: B.S. Degree. Department of Plant, Soil, and Entomological Sciences,
AUG. 2000-DEC. 2003: University of Idaho, Moscow, ID.

PROFESSIONAL POSITIONS:

- JUNE 2016-PRESENT: O.A. VOGEL ENDOWED CHAIR IN WINTER WHEAT BREEDING AND GENETICS, Department of Crop and Soil Sciences; Washington State University, Pullman, WA
- JULY 2015-PRESENT: Associate Professor of Plant Breeding and Genetics, Department of Crop and Soil Sciences; Washington State University, Pullman, WA
- JULY 2009- JUNE 2015: Assistant Professor of Plant Breeding and Genetics, Department of Crop and Soil Sciences; Washington State University, Pullman, WA
- JUNE 2006-JUNE 2009: Research Assistant, Department of Crop and Soil Sciences; Washington State University, Pullman, WA
- JAN. 2004-MAY 2006: Research Assistant, Department of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID
- AUG. 2000-AUG 2001; Undergraduate Lab/Field Assistant, PI: Dr. Robert Zemetra,
AUG. 2002-DEC. 2003: Department of Plant, Soil, and Entomological Sciences, University of Idaho, Moscow, ID
- SEPT 2001-JULY 2002: Internship, Potato and Onion Production PI: Dr. Brad Geary, Department of Plant, Soil, and Entomological Sciences, University of Idaho, Parma, ID

RESEARCH ACTIVITIES:

FIELD OF RESEARCH

- Winter wheat breeding and genetics leading to cultivar development
- Gene/Trait discovery for essential wheat characteristics
- PCR and SNP based molecular markers for application in selection
- High-throughput phenotyping methods for selection

CURRENT RESEARCH TOPICS

- Winter wheat cultivar development
- Identifying QTL/genes for stripe rust resistance
- Genomic selection in applied breeding programs
- Spectral reflectance measurements as related to drought and heat tolerance in wheat

PEER REVIEWED PUBLICATIONS (Underline=WSU mentored Graduate Student or Post-Doctoral Researcher; Italics=Undergraduate Research Student)

- Footnotes:
1. Developed the initial idea
 2. Obtained or provided funds/resources
 3. Collected data
 4. Analyzed data
 5. Wrote/created product
 6. Edited product

1. Sandhu KS, Mihalyov PD, Lewien MJ, Pumphrey MO, **Carter AH** (2020) Combining genomic and phenomic information for predicting grain protein content and grain yield in spring wheat. *Frontiers in Plant Science* **Submitted (1,2,3,4,5,6)**
2. Dixon LS, Bellinger B, **Carter AH** (2020) A gravimetric method to monitor plant transpiration under water stress conditions. *Plos ONE* **Submitted (1,2,3,4,5,6)**
3. Horgan A, Garland-Campbell KA, **Carter AH**, Steber CM (2020) Genotypic effects on seedling elongation responses to GA seed treatments in wheat (*Triticum aestivum* L.). *Agrosystems, Geosciences, and Environment* **In revision (1,2,3,4,5,6)**
4. Lozada DN, **Carter AH**, Mason RE (2020) Unlocking yield potential of wheat: influence of major growth habit and adaptation genes. *Crop Breeding, Genetics and Genomics* **In Revision (1,2,3,4,5,6)**
5. Sandhu KS, Lozada DN, Zhang Z, Pumphrey MO, Carter AH (2020) Deep learning for predicting complex traits in spring wheat. *Frontiers in Plant Science* **Early View** doi:10.3389/fpls.2020.613325
6. Merrick LF, Lyon SR, Balow KA, Murphy KM, Jones SS, **Carter AH** (2020) Evolutionary plant breeding in a conventional winter wheat breeding program. *Sustainability* 12:9728. Doi:10.3390/su12229728 **(2,3,4,6)**
7. Sjoberg SM, **Carter AH**, Steber C, Garland-Campbell KA (2020) Application of the factor analytic model to assess wheat falling number performance and stability in multi-environment trials. *Crop Science* **Early View** doi:10.1002/csc2.20293 **(2,6)**
8. Sjoberg, SM, **Carter AH**, Steber CM, Garland-Campbell KA (2020) Unravelling complex traits in wheat: approaches for analyzing genotype by environment interactions in a multi-

- environment study of falling numbers. *Crop Science* 60:3013-3026 doi:10.1002/csc.2.20133 (1,2,3,4,5,6)
9. Kruse EB, Revolinski S, Aplin J, Skinner DZ, Murray TD, Edwards C, **Carter AH** (2020) Gene Expression and Carbohydrate Accumulation in Winter Wheat Lines with Different Levels of Snow Mold and Freezing Cold Tolerance. *Plants* 9:1416 doi:10.3390/plants9111416 (1,2,3,4,5,6)
 10. **Carter AH**, Allan RE, Shelton G, Burke A, Balow K, Hagemeyer K, Chen XM, Engle D, Garland-Campbell KA, Morris C, Murray T, Paulitz T, Clare SJ, Klarquist EF (2020) How 'Madsen' has shaped Pacific Northwest wheat and beyond. *Journal of Plant Registrations* 14:223-233 doi:10.1002/plr.2.20049 **Selected featured article in the September 2020 CSA News** (1,2,3,4,5,6)
 11. **Carter AH**, Rath BB, Gorzowski EP, Qadri SB (2020) Evaluation of Silica content in winter wheat chaff. *Agriculture and Environmental Letters* 5:e20025 doi:10.1002/ael.2.20025 (1,2,3,4,5,6)
 12. Lozada DN, Ward BP, **Carter AH** (2020) Gains through selection for grain yield in a winter wheat breeding program. *PLoS ONE* 15(4):e0221603 doi:10.1370/journal.pone.0221603 (1,2,3,4,5,6)
 13. Lozada DN, **Carter AH** (2020) Genomic selection in winter wheat breeding using a recommender approach. *Genes* 11:779 doi:10.3390/genes11070779 (1,2,3,4,5,6)
 14. Lozada DN and **Carter AH** (2020) Insights into the genetic architecture of phenotypic stability traits in winter wheat. *Agronomy* 10:368 doi:10.3390/agronomy10030368 (1,2,3,4,5,6)
 15. Nazarov T, Chen X, **Carter A**, See D. (2020) Fine mapping of high-temperature adult-plant resistance to stripe rust in wheat cultivar Louise. *Journal of Plant Protection Research* 60:126-133 doi:10.24425/jppr.2020.132213 (2,3,6)
 16. Faris F, Overlander ME, Kariyawasam GK, **Carter AH**, Xu SS, Liu Z (2020) Identification of a major dominant gene for race-nonspecific tan spot resistance in wild emmer wheat. *Theoretical and Applied Genetics* 133:829-841 (1,2,3,4,5,6)
 17. Lozada DN, Godoy JV, Ward BP, **Carter AH** (2019) Genomic prediction and indirect selection for grain yield in US Pacific Northwest winter wheat using spectral reflectance indices from high-throughput phenotyping. *International Journal of Molecular Science* 21:165 doi.org/10.3390/ijms21010165 (1,2,3,4,5,6)
 18. Kruse EB, Klos K, Marshall J, Murray TD, Ward BP, **Carter AH** (2019) Evaluating marker assisted selection in breeding for tolerance to snow mold in winter wheat. *Agrosystems, Geosciences, and Environment* 2:190059 doi:10.2134/age2019.07.0059 (1,2,3,4,5,6)
 19. Lozada DN, Godoy JV, Murray TD, Ward BP, **Carter AH** (2019) Genetic dissection of snow mold tolerance in US Pacific Northwest winter wheat through genome-wide association study and genomic selection. *Frontiers in Plant Science* 29 October 2019 doi.org/10.3389/fpls.2019.01337 (1,2,3,4,5,6)
 20. Dixon LS, Godoy JV, **Carter AH** (2019) Evaluating the utility of carbon isotope discrimination as a selection criterion for wheat cultivar development. *Plant Phenomics* Volume 2019, Article ID 4528719 doi.org/10.34133/2019/4528719 (1,2,3,4,5,6)
 21. Nielsen N, Stubbs TL, Garland-Campbell K, and **Carter AH** (2019) Rapid estimation of wheat straw decomposition constituents using near-infrared spectroscopy. *Agronomy* 9(8):462 doi.org/10.3390/agronomy9080462 (1,2,3,4,5,6)

22. Dixon LS and **Carter AH** (2019) Toward a new use for carbon isotope discrimination in wheat breeding. *Agronomy* 9(7), 385 doi:10.3390/agronomy9070385 (1,2,3,4,5,6)
23. Fitria, Ruan H, Fransen SC, **Carter AH**, Tao H, Yan B (2019) Selecting winter wheat straw for cellulosic ethanol production in Pacific Northwest, USA. *Biomass and Bioenergy* 123:59-69 (1,2,3,4,5,6)
24. Gizaw SA, Godoy J, Garland-Campbell K, **Carter AH** (2018) Genome-wide association study of yield and component traits in Pacific Northwest winter wheat (*Triticum aestivum* L.). *Crop Science* 58:2315-2330 (1,2,3,4,5,6)
25. Gizaw SA, Godoy JG, Pumphrey MO, **Carter AH** (2018) Spectral reflectance for indirect selection and genome-wide association analyses of grain yield and drought tolerance in North American spring wheat (*Triticum aestivum* L.). *Crop Science* 58:1-13 doi:10.2135/cropsci.2017.11.0690 (1,2,3,4,5,6)
26. Godoy J, Gizaw S, Chao S, Blake N, **Carter A**, Cuthbert R, Dubcovsky J, Hucl P, Kephart K, Pozniak C, Prasad PVV, Pumphrey M, Talbert L (2018) Genome-wide association study (GWAS) of agronomic traits in a spring planted North American elite hard red spring wheat panel. *Crop Science* 58:1838-1852 (1,2,3,4,5,6)
27. Zhang J, Gizaw SA, Bossolini E, Hegarty JM, **Carter AH**, Chao S, Akhunov E, Dubcovsky J (2018) Identification and validation of QTL for grain yield and plant water status under contrasting water treatments in fall-sown spring wheat. *Theoretical and Applied Genetics* 131:1741-1759 (1,2,3,4,5,6)
28. Lewien MJ, Murray TD, Jernigan KL, Garland-Campbell KA, **Carter AH** (2018) Genome-wide association mapping for eyespot disease in US Pacific Northwest winter wheat. *PLoS ONE* April 2, 2018 <https://doi.org/10.1371/journal.pone.0194698> (1,2,3,4,5,6)
29. Gizaw SA, Godoy JGV, Garland-Campbell K, **Carter AH** (2018) Using spectral reflectance as proxy phenotypes for genome-wide association studies of yield and yield stability in Pacific Northwest winter wheat. *Crop Science* 58:1232-1241 **Selected featured article in the May 2018 CSA News** (1,2,3,4,5,6)
30. Jernigan KL, Godoy J, Huang M, Zhou Y, Morris CF, Garland-Campbell KA, Zhang Z, **Carter AH** (2018) Association mapping for end-use quality in Pacific Northwest adapted soft white winter wheat. *Frontiers in Plant Science* 09 March 2018 <https://doi.org/10.3389/fpls.2018.00271> (1,2,3,4,5,6)
31. Martinez SA, Godoy J, Huang M, Zhang Z, **Carter AH**, Garland-Campbell K, Steber CM (2018) Genome-wide association mapping for tolerance to preharvest sprouting and low falling numbers in wheat. *Frontiers in Plant Science* 14 February 2018 <https://doi.org/10.3389/fpls.2018.00141> (1,2,3,4,5,6)
32. Liu W, Naruoka Y, Miller K, Garland-Campbell K, **Carter AH** (2018) Characterizing and validating stripe rust resistance loci in US Pacific Northwest winter wheat accessions (*Triticum aestivum* L.) by genome-wide association and linkage mapping. *Plant Genome* 11:170087. doi:10.3835/plantgenome2017.10.0087 (1,2,3,4,5,6)
33. Aramrak A, Lawrence NC, DeMacon VL, **Carter AH**, Kidwell KK, Burke IC, Steber CM (2018) Isolation of mutations conferring increased glyphosate resistance in spring wheat, *Triticum aestivum* (L.). *Crop Science* 58:84-97 (1,2,3,4,5,6)
34. Jernigan KL, Morris CF, Zemetra R, Chen J, Garland-Campbell K, **Carter AH** (2017) Genetic analysis of soft white wheat end-use quality traits in a club by common wheat cross. *Journal of Cereal Science* 76:148-156 <https://doi.org/10.1016/j.jcs.2017.06.005>

35. Kruse EB, Carle SW, Wen N, Skinner DZ, Murray TD, Garland-Campbell KA, **Carter AH** (2017) Genomic regions associated with tolerance to freezing stress and snow mold in winter wheat. *Genes|Genomes|Genetics*:G3 7:775-780 (1,2,3,4,5,6)
36. Gizaw S, Garland-Campbell K, and **Carter AH** (2016) Use of spectral reflectance for indirect selection of yield potential and stability in Pacific Northwest winter wheat. *Field Crops Research* 196:199-206 (1,2,3,4,5,6)
37. Gizaw S, Garland-Campbell K, and **Carter AH** (2016) Evaluation of agronomic traits and spectral reflectance in Pacific Northwest winter wheat under rain-fed and irrigated conditions. *Field Crops Research* 196:168-179 (1,2,3,4,5,6)
38. Froese PS and **Carter AH** (2016) Single nucleotide polymorphisms in the wheat genome associated with tolerance of acidic soils and aluminum toxicity. *Crop Science* 56:1662-1677 (1,2,3,4,5,6)
39. Froese PS, Murray TD, and **Carter AH** (2016) Quantitative Cephalosporium stripe disease resistance mapped in the wheat genome. *Crop Science*: 56:1586-1601 (1,2,3,4,5,6)
40. Kariyawasam G, **Carter AH**, Rasmussen J, Faris J, Xu S, Mergoum M, Liu Z (2016) Genetic relationships between race-nonspecific and race-specific interactions in the wheat-Pyrenophora tritici-repentis pathosystem. *Theoretical and Applied Genetics* 129:897-908 (1,2,3,4,5,6)
41. Carter BP, Galloway MB, Campbell GS, **Carter AH** (2016) Changes in the moisture permeability of grain at the critical water activity from dynamic dewpoint isotherms. *American Society of Agricultural and Biological Engineers* 59:1023-1028 (1,2,3,4,5,6)
42. Klarquist E, Chen XM, **Carter AH** (2016) Novel QTL for stripe rust (*Puccinia striiformis* f. sp. *tritici*) resistance on chromosomes 4A and 6B from soft white winter wheat (*Triticum aestivum*). *Agronomy* 6:4 (1,2,3,4,5,6)
43. Kuhn J, Stubbs T, **Carter AH** (2016) Effect of the Gpc-B1 allele in hard red winter wheat (*Triticum aestivum* L.) in the Pacific Northwest of the US. *Crop Science* 56:1009-1017 (1,2,3,4,5,6)
44. Khot LR, Sankaran S, **Carter AH**, Johnson DA, Cummings TF (2016) UAS imaging-based decision tools for arid winter wheat and irrigated potato production management. *International Journal of Remote Sensing*, 37:125-137 (1,2,3,4,5,6)
45. Matute MM, **Carter AH**, Sherman J (2015) Nematode composition and soil conditions in plots under a wheat crop in Colfax, Washington State. *Journal of Agricultural Science* 7:76-89 (1,2,3,4,5,6)
46. Sankaran S, Khot LR, **Carter AH** (2015) Field-based crop phenotyping: Multispectral aerial imaging for rapid evaluation of winter wheat emergence and spring stand. *Computers and Electronics in Agriculture* 118:372-379 (1,2,3,4,5,6)
47. Carter BP, Galloway MB, Campbell GS, **Carter AH** (2015) The critical water activity from dynamic dewpoint isotherms as an indicator of pre-mix powder stability. *Journal of Food Measurement and Characterization* 9:479-486 (1,2,3,4,5,6)
48. Carter BP, Galloway MB, Campbell GS, **Carter AH** (2015) The critical water activity from dynamic dewpoint isotherms as an indicator of crispness in low moisture cookies. *Journal of Food Measurement and Characterization* 9:463-470 (1,2,3,4,5,6)
49. Carter BP, Galloway MB, Morris CF, Weaver GL, **Carter AH** (2015) The case for water activity as a specification for wheat tempering and flour production. *Cereal Food World* 60:166-170 (1,2,3,4,5,6)

50. Sankaran S, Khot LR, Espinoza CZ, Jarolmasjed S, Sathuvalli VR, Vandemark GJ, Miklas PN, **Carter AH**, Pumphrey MO, Knowles NR, Pavek MJ (2015) Low-altitude, high-resolution aerial imaging systems for row and field crop phenotyping: A review. *European Journal of Agronomy* 70:112-123 (1,2,3,4,5,6)
51. Naruoka Y, Garland-Campbell KA, and **Carter AH** (2015) Genome-wide association mapping for stripe rust (*Puccinia striiformis* f. sp. *tritici*) in US Pacific Northwest winter wheat (*Triticum aestivum* L.). *Theoretical and Applied Genetics* 128:1083-1101 (1,2,3,4,5,6)
52. Squires CC and **Carter AH** (2014) A less lethal sodium hydroxide test for determining seed coat color in wheat. *Seed Science and Technology* 42:274-278 (1,2,3,4,5,6)
53. Squires CC, See DR, and **Carter AH** (2014) Sources of seed coat color variation in certified wheat seed. *Seed Science and Technology* 42:247-259 (1,2,3,4,5,6)
54. Higginbotham R, Froese P, **Carter AH** (2014) Tolerance of wheat (*Triticum aestivum* L.) seedlings to wireworm (Coleoptera: Elateridae). *Journal of Economic Entomology* 107:833-837 (1,2,3,4,5,6)
55. Case AJ, Skinner DZ, Garland-Campbell KA, **Carter AH** (2014) Freezing tolerance-associated QTL in the Brundage x Coda wheat recombinant inbred line population. *Crop Science* 54:982-992 (1,2,5,6)
56. **Carter, AH**, Cambron SE, Ohm HW, Bosque-Pérez N, Kidwell KK. (2014) Identifying molecular markers associated with Hessian fly (*Mayetiola destructor* [Say]) resistance in the spring wheat (*Triticum aestivum*) cultivar 'Louise'. *Crop Science* 54:1-11 (1,2,3,4,5,6)
57. Case AJ, Naruoka Y, Chen X, Garland-Campbell KA, Zemetra RS, **Carter AH** (2014) Mapping stripe rust resistance genes in a BrundageXCoda winter wheat population. *PlosONE* 9(3):e91758 doi: 10.1371/journal.pone.0091758 (1,2,5,6)
58. Higginbotham R, Jones SS, **Carter AH** (2013) Wheat cultivar performance and stability between no-till and conventional tillage systems in the Pacific Northwest of the United States. *Sustainability* 5:882-895 (2,3,4,6)
59. Cavanagh CR, Chao S, Wang S, Huang BE, Stephen S, Kiani S, Forrest K, Saintenac C, Brown-Guedira GL, Akhunov A, See D, Bai G, Pumphrey M, Tomar L, Wong D, Kong S, Reynolds M, Lopez da Silva M, Bockelman H, Talbert L, Anderson JA, Dreisigacker S, Baenziger PS, **Carter A**, Korzum V, Morrell PL, Dubcovsky J, Morell MK, Sorrells ME, Hayden M, Akhunov E (2013) Genome-wide comparative diversity uncovers multiple targets of selection for improvement in hexaploid wheat landraces and cultivars. *Proc Natl Acad Sci* 100:8057-8062 doi:10.1073/pnas.1217133110 (2,3,4,6)
60. Flowers M, Hamm PB, **Carter AH**, Murray TD (2012) Reaction of winter wheat cultivars and breeding lines to soilborne wheat mosaic. *Plant Disease Management Reports* 6:CF025 (3,5)
61. Lanning, SP, Hucl P, Pumphrey M, **Carter AH**, Lamb PF, Carlson GR, Wichman DM, Kephart KD, Spaner D, Martin JM, Talbert LE (2012) Agronomic performance of spring wheat as related to planting date and photoperiod response. *Crop Science* 52:1633-1639 (3,6)
62. Poole GJ, Smiley RW, Paulitz TC, **Carter AH**, See DR, Garland-Campbell K (2012) Identification of microsatellite markers *Xgwm247* and *Xgwm299* linked to quantitative trait loci for resistance to *Fusarium crown rot* (*Fusarium pseudograminearum*) in two spring wheat populations. *Theoretical and Applied Genetics* 125:91-107 (4,6)

63. Beecher BS, **Carter AH**, See DR (2012) Genetic mapping of a new family of seed-expressed polyphenol oxidase genes in wheat (*Triticum aestivum* L.). *Theoretical and Applied Genetics* 124:1463-1473 **(3,4,5,6)**
64. **Carter AH**, Santra DK, Kidwell KK (2012) Assessment of the effect of the *GPC-B1* allele on senescence rate, grain protein concentration and mineral content in hard red spring wheat (*Triticum aestivum* L.) from the Pacific Northwest region of the USA. *Plant Breeding* 131:62-68 **(3,4,5,6)**
65. **Carter AH**, Garland-Campbell K, Morris C, Kidwell KK (2012) Chromosomes 3B and 4D are associated with several milling and baking quality traits in a soft white spring wheat (*Triticum aestivum* L.) population. *Theoretical and Applied Genetics* 124:1079-1096 **(1,2,3,4,5,6)**
66. Higginbotham RW, Jones SS, **Carter AH** (2011) Adaptability of wheat cultivars to a late-planted no-till fallow production system. *Sustainability* 3:1224-1233 **(2,3,4,6)**
67. **Carter AH**, Garland-Campbell K, Kidwell KK (2011) Genetic mapping of quantitative trait loci associated with important agronomic traits in the spring wheat (*Triticum aestivum* L.) cross 'Louise' by 'Penawawa'. *Crop Science* 51:84-95 **(1,3,4,5,6)**
68. **Carter AH**, Chen XM, Garland-Campbell K, Kidwell KK (2009) Identifying QTL for high-temperature adult-plant resistance to stripe rust (*Puccinia striiformis* f. sp. *tritici*) in the spring wheat (*Triticum aestivum* L.) cultivar 'Louise'. *Theoretical and Applied Genetics* 119:1119-1128 **(3,4,5,6)**
69. Murphy KM, **Carter A**, Zemetra RS, Jones SS (2008) Karyotype and ideogram analyses of four wheatgrass cultivars for use in perennial wheat breeding. *Journal of Sustainable Agriculture* 31:137-149 **(6)**
70. Leonard J, Watson C, **Carter A**, Hansen J, Zemetra R, Santra D, Campbell K, Riera-Lizarazu O (2008) Identification of a candidate gene for the wheat endopeptidase *Ep-D1* locus and two other STS markers linked to the eyespot resistance gene *Pchl*. *Theoretical and Applied Genetics* 116:261-270 **(3,6)**
71. **Carter AH**, Hansen J, Koehler T, Thill DC, Zemetra RS (2007) The effect of Imazamox application timing and rate on imazamox resistant wheat cultivars in the Pacific Northwest. *Weed Technology* 21:895-899 **(1,3,4,5,6)**

VARIETY/GERMPLASM RELEASE

1. Garland-Campbell K, Allan RE, Carter AH, DeMacon P, Klarquist E, Wen N, Chen X, Steber CM, Morris C, See D, Esser A, Engle D, Higginbotham R, Mundt C, Murray TD (2020) Registration of 'Castella' soft white winter club wheat. *Journal of Plant Registrations Submitted* **(2,3,6)**
2. Strauss NM, Wiersma A, DeMacon P, Klarquist E, **Carter AH**, Garland-Campbell KA, Olson E (2020) Registration of the Wheat D-Genome Nested Association Mapping Population. *Journal of Plant Registrations Early View* doi:10.1002/plr2.20078 **(2,3,6)**
3. Gill KS, Kumar N, Randhawa HS, Murphy K, **Carter AH**, Morris CF, Higginbotham RW, Engle DA, Guy SO, Lyon D, Murray TD, Chen XM, Schillinger WF (2020) Registration of 'Resilience CL+' soft white winter wheat. *Journal of Plant Registrations Early View* doi:10.1002/plr2.20118 **(3,6)**
4. **Carter AH**, Balow KA, Shelton GB, Burke AB, Hagemeyer KE, Stowe A, Worapong J, Higginbotham RW, Chen XM, Engle DA, Murray TD, Morris CF (2020) Registration of

- ‘Stingray CL+’ soft white winter wheat. Journal of Plant Registrations **Early View**
doi:10.1002/plr2.20109 **(1,2,3,4,5,6)**
5. **Carter AH**, Balow KA, Shelton GB, Burke AB, Hagemeyer KE, Stowe A, Worapong J, Higginbotham RW, Chen XM, Engle DA, Murray TD, Morris CF (2020) Registration of ‘Devote’ soft white winter wheat. Journal of Plant Registrations **Early View**
doi:10.1002/plr2.20079 **(1,2,3,4,5,6)**
 6. **Carter AH**, Balow KA, Shelton GB, Burke AB, Hagemeyer KE, Stowe A, Worapong J, Higginbotham RW, Chen XM, Engle DA, Murray TD, Morris CF (2020) Registration of ‘Scorpio’ hard red winter wheat. Journal of Plant Registrations **Early View**
doi:10.1002/plr2.20076 **(1,2,3,4,5,6)**
 7. **Carter AH**, Kidwell KK, DeMacon V, Shelton G, Burke A, Balow K, Herr A (2020) Registration of ‘Louise’/‘Penawawa’ Spring Wheat Recombinant Inbred Line Mapping Population. Journal of Plant Registrations 14:474-480 doi:10.1002/plr2.20077 **(1,2,3,4,5,6)**
 8. **Carter AH**, Balow KA, Shelton GB, Burke AB, Hagemeyer K, Worapong J, Higginbotham RW, Chen XM, Engle DA, Murray TD, Morris CF (2020) Registration of ‘Purl’ soft white winter wheat. Journal of Plant Registrations 14:398-405
doi:10.1002/plr2.20069 **(1,2,3,4,5,6)**
 9. Gill KS, Kumar N, Randhawa HS, **Carter AH**, Yenish J, Morris CF, Baik B, Higginbotham RW, Guy SO, Engle DA, Chen XM, Murray TD, Burke IC, Lyon D (2020) Registration of ‘Curiosity CL+’ soft white winter wheat. Journal of Plant Registrations 14:377-387 doi:10.1002/plr2.20066 **(3,6)**
 10. Gill KS, Kumar N, Randhawa HS, **Carter AH**, Yenish J, Morris CF, Baik B-K, Higginbotham RW, Guy SO, Engle DA, Chen XM, Murray TD, Lyon D (2020) Registration of ‘Mela CL+’ soft white winter wheat. Journal of Plant Registrations 14:144-152 doi:10.1002/plr2.20006 **(3,6)**
 11. Balow K, Shelton G, Burke A, Hagemeyer K, Klarquist E, Froese P, Kruse EB, Carle SW, Roa A, Nielsen N, **Carter AH** (2019) Registration of the Finch-Eltan Winter Wheat Recombinant Inbred Mapping Population. Journal of Plant Registrations 13:287-293 **(1,2,3,4,5,6)**
 12. Wiersma AT, Whetten RB, Zhang G, Sehgal SK, Kolb FL, Poland JA, Mason RE, **Carter AH**, Cowger C, Olson EL (2018) Registration of two wheat germplasm lines fixed for *Pm58*. Journal of Plant Registrations 12:270-273 **(2,6)**
 13. **Carter AH**, Jones SS, Balow KA, Shelton GB, Burke AB, Lyon SR, Higginbotham RW, Chen XM, Engle DA, Murray TD, Morris CF (2017) Registration of ‘Jasper’ soft white winter wheat. Journal of Plant Registrations 11:263-268. **(1,2,3,4,5,6)**
 14. **Carter AH**, Jones SS, Lyon SR, Balow KA, Shelton GB, Burke A, Higginbotham RW, Schillinger WF, Chen XM, Engle DA, Morris CF (2017) Registration of ‘Sequoia’ hard red winter wheat. Journal of Plant Registrations 11:269-274. **(1,2,3,4,5,6)**
 15. **Carter AH**, Kidwell KK, Balow, KA, Burke A, Shelton GB, Higginbotham RW, DeMacon V, Lewien MJ, Chen XM, Engle DA, Morris CF (2017) Registration of ‘Earl’ hard white winter wheat. Journal of Plant Registrations 11:275-280. **(1,2,3,4,5,6)**
 16. Garland-Campbell K, **Carter AH**, Jones SS, Chen X, DeMacon P, Higginbotham R, Engle D, Guy SO, Mundt CC, Murray TD, Morris CF, See D (2017) Registration of ‘Pritchett’ Soft White Winter Club Wheat. Journal of Plant Registrations 11:152-158. **(3,6)**

17. **Carter AH**, Kidwell KK, DeMacon V, Shelton GB, Higginbotham RW, Balow KA, Hansen J, Chen XM, Engle DA, Baik B, Morris CF (2015) Registration of ‘Sprinter’ wheat. *Journal of Plant Registrations* 9:196-200. **(1,2,3,4,5,6)**
18. **Carter AH**, Jones SS, Cai X, Lyon SR, Balow KA, Shelton GB, Higginbotham RW, Chen XM, Engle DA, Baik B, Guy SO, Murray TD, Morris CF (2014) Registration of ‘Puma’ wheat. *Journal of Plant Registrations* 8:273-278. **(1,2,3,4,5,6)**
19. **Carter, AH**, Jones SS, Shelton GB, Higginbotham R, Lyon S, Balow K, Guy S, Baik B, Engle DA, Morris C, Chen XM (2013) Registration of ‘Otto’ wheat. *Journal of Plant Registrations* 7:195-200. **(1,2,3,4,5,6)**
20. Kidwell KK, Shelton GB, DeMacon VL, Kuehner JS, Baik B, Engle DA, Bosque-Pérez NA, Burke A, **Carter AH**, Chen XM (2009) Registration of ‘Whit’ wheat. *Journal of Plant Registration* 3:279-282. **(1,2,3,4,5,6)**
21. Kidwell KK, Shelton GB, DeMacon VL, Chen XM, Kuehner JS, Baik B, Engle DA, **Carter AH**, Bosque-Pérez NA (2009) Registration of ‘Kelse’ Wheat. *Journal of Plant Registrations* 3:269-272. **(3,6)**

INVITED BOOK CHAPTER

1. Murphy KM, **Carter AH**, Jones SS 2013. Evolutionary breeding and climate change. Chapter 9, pp 377-389. *In* C. Kole ed, *Genomics and Breeding for Climate-Resilient Crops*, Vol. 1 Concepts and Strategies. Springer-Verlag Berlin Heidelberg. **(5,6)**
2. **Carter AH**, Walker CA, Kidwell KK 2010. Chapter 2: Breeding for dual-purpose hard white wheat in the US: Noodle and Pan breads. pp 25-56. *In* G. Hou ed, *Asian Noodles: Science, Technology, and Processing*. John Wiley & Sons, Inc. **(1,5,6)**

INVITED ORAL PRESENTATIONS-PI

1. Invited speaker, NAPB Grad Student Working Group, Virtual Webcast: **2019**
2. Invited speaker, Wheat Improvement Team, Central America: **2018**
3. Invited speaker, ASA and CSSA Early Career Symposia; Baltimore, MD: **2018**
4. Invited speaker, Wheat Crop Quality Tour, Central America: **2018**
5. Invited speaker, North Asia Marketing Conference, Kota Kinabalu, Malaysia: **2018**
6. Keynote speaker, Pioneer Symposium, The Ohio State University: **2018**
7. Invited speaker, Tomato Breeding Roundtable, The Ohio State University: **2018**
8. Invited speaker, Horticulture Department, The Ohio State University: **2018**
9. Invited speaker, ASA C8 division Symposium on High-Throughput Phenotyping, Tampa, FL: **2017**
10. Invited speaker, USDA PI meeting, Davis, CA: **2017**
11. Invited Speaker, Eastern Wheat Workers and Southern Small Grains Meeting “Utilizing Marker-Assisted Selection in Wheat Breeding”, Purdue University, **2017**
12. Invited Speaker, Oklahoma Wheat Commission, Oklahoma City, OK: **2017**
13. Keynote Speaker, Nordic Plant Phenotyping Network Annual Meeting, Bastad, Sweden, **2016**
14. Invited Speaker, ASA-CSSA-SSSA Annual International Meeting, Phoenix, AZ: **2016**
15. Invited Speaker, 12th International Conference in Precision Agriculture, Sacramento, CA: **2014**
16. Invited Speaker, 2nd International Stripe Rust Symposium, Izmir, Turkey: **2014**
17. Invited Speaker, University of Arkansas-Pine Bluff, Pine Bluff, AR: **2014**

18. Invited Speaker, 3rd Annual PNW Climate Change Conference, Boise, ID: **2012**
19. Invited Speaker, PNW Direct Seed Association, Kennewick, WA: **2012**
20. Invited Speaker, ITMI meeting, Fargo, ND: **2012**

CONFERENCE PROCEEDINGS CO-PI

1. Zhou J., Zhang C., Sankaran S., Khot L.R., Pumphrey M.O., **Carter A.H.** 2019 Crop height estimation in wheat using proximal sensing techniques. ASABE Conference Proceedings doi:10.13031/aim.20152188566
2. Matute, M.M., **Carter, A.H.**, and Sherman, J. 2018. Relatedness among soil nutrient levels, nematode populations, and nematode ecosystem functions in wheat agroecosystems. Journal of Nematology 50(4):647
3. Sankaran, S., Slaughter, D.C., **Carter, A.H.**, Kalcsits, L.A., Okamuro, J.K., Kirchhoff, H., and Poland, J. 2016. Integrating science and engineering to address needs in high-throughput phenotyping. Paper No. 2472820, 2016 ASABE AIM, Orlando, FL, 17-20 July 2016
4. Sankaran, S., **Carter, A.H.**, Kalcsits, L.A., Okamuro, J.K., Slaughter, D.C., Kirchhoff, H., and Poland, J. 2016. Challenges and opportunities in high-throughput field phenotyping. Plant and Animal Genome Conference XXIV, San Diego, CA, 9-13 January 2016
5. Sankaran, S., **Carter, A.H.**, Slaughter, D.C., Kirchhoff, H., Okamuro, J.K., Poland, J., and Kalcsits, L.A. 2016. Conference summary report on ‘Advances in field-based high-throughput phenotyping and data management: grains and specialty crops’. Link: https://labs.wsu.edu/sankaran-phenomics/wp-content/uploads/sites/1041/2016/06/WhitePaperAFRI_HTP_Spokane-2.pdf
6. Zhou, J., Sankaran, S., Khot, L.R., Pumphrey, M.O., and **Carter, A.H.** 2015. Crop height estimation in wheat using proximal sensing techniques. Paper No. 2188566, 2015 ASABE AIM, New Orleans, LA, 26-29 July 2015
7. Khot, L., Sankaran, S., Cummings, T., Johnson, D., **Carter, A.**, Serra, S., and Musacchi, S. 2014. Applications of unmanned aerial system in Washington State agriculture. 12th ICPA, Sacramento, CA, 20-23 July 2014
8. Sankaran, S., Khot, L.R., **Carter, A.H.**, and Garland-Campbell, K. 2014. Unmanned aerial systems based imaging for field-based crop phenotyping: winter wheat emergence evaluation. 2014 ASABE AIM, Montreal, Quebec, Canada, Montreal, Quebec, Canada, 13-16 July 2014

POSTER ABSTRACT PRESENTATIONS

1. ASA-CSSA-SSSA Annual International Meeting, Virtual: **2020**
2. ASA-CSSA-SSSA Annual International Meeting, Virtual: **2020**
3. ASA-CSSA-SSSA Annual International Meeting, Virtual: **2020**
4. National Association of Plant Breeders, Lincoln, NE: **2020**
5. National Association of Plant Breeders, Lincoln, NE: **2020**
6. National Association of Plant Breeders, Lincoln, NE: **2020**
7. Western Society of Crop Science, Fort Collins, CO: **2020**
8. Western Society of Crop Science, Fort Collins, CO: **2020**
9. Western Society of Crop Science, Fort Collins, CO: **2020**
10. PNW Wheat Quality Council, Spokane, WA: **2020**
11. PNW Wheat Quality Council, Spokane, WA: **2020**
12. PNW Wheat Quality Council, Spokane, WA: **2020**

13. Plant and Animal Genome XXV meeting; San Diego: **2020**
14. ASA-CSSA-SSSA Annual International Meeting, San Antonio, TX: **2019**
15. Western Society of Crop Science, Tri-Cities, WA: **2019**
16. Phenome 2019, Tucson, AZ: **2019**
17. PNW Wheat Quality Council, Portland, OR: **2019**
18. PNW Wheat Quality Council, Portland, OR: **2019**
19. PNW Wheat Quality Council, Portland, OR: **2019**
20. PNW Wheat Quality Council, Portland, OR: **2019**
21. Plant and Animal Genome XXVI meeting; San Diego: **2019**
22. Plant and Animal Genome XXVI meeting; San Diego: **2019**
23. ASA-CSSA-SSSA Annual International Meeting, Baltimore, MD: **2018**
24. ASA-CSSA-SSSA Annual International Meeting, Baltimore, MD: **2018**
25. ASA-CSSA-SSSA Annual International Meeting, Baltimore, MD: **2018**
26. NAPB Annual Meeting, Toronto, Canada: **2018**
27. NAPB Annual Meeting, Toronto, Canada: **2018**
28. Symposium of Biotechnology for Fuels and Chemicals, Clearwater Beach, FL: **2018**
29. Society of Nematologists Annual Meeting, Albuquerque, NM: **2018**
30. WSU Showcase for Undergraduate Research and Creative Activities; Pullman, WA: **2018**
31. WSU Showcase for Undergraduate Research and Creative Activities; Pullman, WA: **2018**
32. Western Society of Weed Science; Arlington, VA: **2018**
33. Western Society of Weed Science; Arlington, VA: **2018**
34. USDA Data Driven Ag Workshop; Arlington, VA: **2018**
35. Plant and Animal Genome XXV meeting; San Diego, CA: **2018**
36. ASA-CSSA-SSSA Annual International Meeting, Tampa, FL: **2017**
37. NAPB Annual Meeting, Davis, CA: **2017**
38. NAPB Annual Meeting, Davis, CA: **2017**
39. NAPB Annual Meeting, Davis, CA: **2017**
40. ASPB Annual Meeting, Honolulu, HI: **2017**
41. ASHS Annual Meeting, Waikoloa, Hawaii: **2017**
42. ASA-CSSA-SSSA Annual International Meeting, Phoenix, AZ: **2016**
43. ASA-CSSA-SSSA Annual International Meeting, Phoenix, AZ: **2016**
44. Plant and Animal Genome XXIV meeting; San Diego: **2016**
45. ASA-CSSA-SSSA Annual International Meeting, Minneapolis, MN: **2015**
46. ASA-CSSA-SSSA Annual International Meeting, Minneapolis, MN: **2015**
47. BGRI Annual Conference, Sydney, Australia: **2015**
48. 12th International Conference on Precision Agriculture, Sacramento, CA: **2014**
49. ASA-CSSA-SSSA Annual International Meeting, Long Beach, CA: **2014**
50. ASABE Annual International Meeting, Montreal, Canada: **2014**
51. 2nd International Stripe Rust Symposium, Izmir, Turkey: **2014**
52. BGRI Annual Conference, Ciudad Obregon, Mexico: **2014**
53. Plant and Animal Genome XXII meeting; San Diego: **2014**
54. 21st Biennial International Plant Resistance to Insects Workshop: **2014**
55. AACC International Meeting, Albuquerque, NM: **2013**
56. 12th International Wheat Genetics Symposium, Yokohama, Japan: **2013**
57. American Society of Agronomy Annual Meeting, Tampa Bay, FL: **2013**
58. American Society of Agronomy Annual Meeting, Tampa Bay, FL: **2013**

59. Western Society of Crop Science, Pendleton, OR: **2013**
60. Plant and Animal Genome XXI meeting, San Diego, CA: **2013**
61. Plant and Animal Genome XXI meeting, San Diego, CA: **2013**
62. American Association of Cereal Chemists, Hollywood, FL: **2012**
63. American Association of Cereal Chemists, Hollywood, FL: **2012**
64. American Society of Agronomy Annual Meeting, Cincinnati, OH: **2012**
65. American Society of Agronomy Annual Meeting, Cincinnati, OH: **2012**
66. American Society of Agronomy Annual Meeting, San Antonio, TX: **2011**
67. REACCH PNA Launch Meeting, Moscow, ID: **2011**
68. American Society of Agronomy Annual Meeting, Long Beach, CA: **2010**
69. American Society of Agronomy Annual Meeting, Long Beach, CA: **2010**
70. American Society of Agronomy Annual Meeting, Long Beach, CA: **2010**
71. Pacific Branch, Entomological Society of America, Boise, ID: **2010**
72. Plant and Animal Genome XVII Meeting, San Diego, CA: **2010**
73. American Society of Agronomy Annual Meeting, Houston, TX: **2008**
74. 5th International Weed Science Congress, Vancouver, Canada: **2008**
75. Plant and Animal Genome XVI Meeting, San Diego, CA: **2008**
76. Plant and Animal Genome XV Meeting, San Diego, CA: **2007**
77. American Society of Agronomy Annual Meeting, New Orleans, LA: **2007**
78. American Society of Agronomy Annual Meeting, Indianapolis, IN: **2006**
79. American Society of Agronomy Annual Meeting, Indianapolis, IN: **2006**
80. American Society of Agronomy Annual Meeting, Salt Lake City, UT: **2005**
81. Western Society of Crop Science Annual Meeting, Bozeman, MT: **2005**

EXTENSION REPORTS

1. **Carter, A.**, K. Balow, A. Burke, K. Hagemeyer, G. A. Stowe, and J. Worapong. 2020. Winter Wheat Breeding and Genetics at WSU. p. 56. *In* Crow, S. and Schillinger W. (eds). “2020 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.
2. **Herr, A.**, and **A. Carter**. 2020. Picture This: Using a Bird’s-Eye View to Improve Genetic Gain in a Wheat Breeding Program. p. 61. *In* Crow, S. and Schillinger W. (eds). “2020 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.
3. **Merrick, L.F.**, **A.H. Carter**, X. Chen, and B.P. Ward. 2020. Genomic Selection of Stripe Rust Resistance in a Wheat Breeding Program. p. 64. *In* Crow, S. and Schillinger W. (eds). “2020 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.
4. **Sandhu, K.**, P. Mihalyov, M. Lewien, M. Pumphrey, and **A. Carter**. 2020. Integrating Spectral Information and Genomic Selection for Predicting Grain Protein Content in Wheat. p. 66. *In* Crow, S. and Schillinger W. (eds). “2020 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.

5. Wigen, J., S. Sjoberg, K.G. Campbell, **A.H. Carter**, and C.M. Steber. 2020. Mapping of Genes/Loci Controlling Preharvest Sprouting and Emergence in Northwest Wheat. p. 69. *In* Crow, S. and Schillinger W. (eds). "2020 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.
6. Merrick, L.F., **A.H. Carter**, and B.P. Ward. 2020. Genomic Selection of Seedling Emergence in a Wheat Breeding Program. p. 70. *In* Crow, S. and Schillinger W. (eds). "2020 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 20-1.
7. **Carter, A.**, G. Shelton, K. Balow, A. Burke, K. Hagemeyer, T. See, and A. Kondratiuk. 2019. Winter Wheat Breeding and Genetics at Washington State University. p. 46. *In* Crow, S. and Schillinger W. (eds). "2019 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 19-1.
8. Dixon, L., B. Bellinger, and **A. Carter**. 2019. A Gravimetric Method to Monitor Plant Transpiration Under Water Stress Conditions. p. 49. *In* Crow, S. and Schillinger W. (eds). "2019 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 19-1.
9. Sjoberg, S., C. Steber, and **A. Carter**. 2018. Examining the Relationship Between Seedling Emergence and Coleoptile Length in Pacific Northwest Breeding Lines. p. 17. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
10. Dixon, L., J. Godoy, and **A. Carter**. 2018. Genome-Wide Association Study of Carbon Isotope Discrimination in an Elite Panel of Pacific Northwest Winter Wheat Genotypes. p. 19. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
11. Kruse, E., T. Murray, D. Skinner, and **A. Carter**. 2018. Winter Wheat that Weathers the Winter. p. 22. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
12. **Carter, A.**, K. Balow, A. Burke, J. Godoy, K. Hagemeyer, A. Kondratiuk, T. See, and G. Shelton. 2018. Winter Wheat Breeding and Genetics at Washington State University. p. 13. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
13. Horgan, A., **A. Carter**, K. Campbell, C. Steber. 2018. Interaction of Gibberellins-A Seed Application, Dwarfing Alleles, and Innate Varietal Emergence Capabilities on Wheat Seedling Emergence. p. 14. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
14. Godoy, J. M. Huang, Z. Zhang, and **A. Carter**. 2018. Genomic Selection for End-Use Quality Traits in Soft White Wheat (*Triticum aestivum* L.) p. 16. *In* Crow, S. and

- Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
15. Roa, A.N., N.S. Nielsen, J. Godoy, E.B. Kruse, T.L. Stubbs, and **A.H. Carter**. 2018. Predicting Winter Wheat Straw Decomposition p. 31. *In* Crow, S. and Schillinger W. (eds). "2018 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 18-1.
 16. Sjoberg, S., C. Steber, K. Garland-Campbell, and **A. Carter**. 2017. The Low Falling Number Problem of Wheat: Applying Knowledge about Seed Biology to a Real-World Issue p. 24. *In* Crow, S. and Schillinger W. (eds). "2017 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 17-1.
 17. Martinez, S. S. Beck, D. Skinner, D. See, **A. Carter**, K. Garland-Campbell, and C. Steber. 2017. Identification of a Locus Corresponding to the Preharvest Sprouting Tolerance Gene ERA8 in Wheat (*Triticum aestivum* L.) p. 30. *In* Crow, S. and Schillinger W. (eds). "2017 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 17-1.
 18. **Carter, A.**, G. Shelton, K. Balow, and A. Burke. 2016. Winter Wheat Breeding and Genetics. p. 56. *In* Crow, S. and Schillinger W. (eds). "2016 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 16-1.
 19. Martinez, S., R. Parveen, K. Garland-Campbell, **A. Carter**, and C. Steber. 2016. Looking at Falling Numbers and Sprouting Scores to Determine Preharvest Sprouting Susceptibility and Tolerance in PNW Winter Wheat. p. 58. *In* Crow, S. and Schillinger W. (eds). "2016 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 16-1.
 20. Kumar, N, H.S. Randhawa, A. Carter, C. Morris, B. Baik, R. Higginbotham, D. Engle, S. Guy, T. Murray, I. Burke, D. Lyon, X. Chen, and K. Gill. 2015. Two-Gene Clearfield Soft White Winter Wheat Varieties: Curiosity CL+ and Mela CL+. p. 56. *In* Crow, S. and Schillinger W. (eds). "2015 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 21. Martinez, S., R. Parveen, K. Garland-Campbell, M. Pumphrey, **A. Carter**, and C. Steber. 2015. Preharvest Sprouting Tolerance and Susceptibility in PNW Winter Wheat. p. 66. *In* Crow, S. and Schillinger W. (eds). "2015 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 22. Stubbs, T., A. Kennedy, and **A. Carter**. 2015. Residue Decomposition Potential of a Finch x Eltan Breeding Population. p. 65. *In* Crow, S. and Schillinger W. (eds). "2015 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 23. Jernigan, K., C. Morris, M. Pumphrey, K. Garland-Campbell, and **A. Carter**. 2015. Genetic Mapping of Quantitative Trait Loci Associated with End-Use Quality Traits in Soft White Winter Wheat. p. 64. *In* Crow, S. and Schillinger W. (eds). "2015 Dryland Field Day

- Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
24. Carle, S., **A. Carter**, and K. Garland-Campbell. 2015. Finding the Genetic Causes of Freezing-Tolerance in Washington Winter Wheat. p. 60. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 25. **Carter, A.**, G. Shelton, K. Balow, A. Burke, and T. Stubbs. 2015. Winter Wheat Breeding and Genetics. p. 55. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 26. Klarquist, E., and **A. Carter**. 2015. 6B and 4A QTLs for Stripe Rust (*Puccinia striiformis* f. sp. *tritici*) Resistance in Soft White Winter Wheat (*Triticum aestivum* L.) Varieties ‘Finch’ and ‘Eltan’. p. 68. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 27. Gizaw, S., K. Garland-Campbell, and **A. Carter**. 2015. Characterization of Pacific Northwest Winter Wheat for Drought Adaption and Yield Potential Using Agronomic Traits and Spectral Reflectance Indices. p. 63. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 28. Kruse, E., T. Murray, D. Skinner, and **A. Carter**. 2015. Mold & Cold: The Solution is Sweet in Winter Wheat. p. 55. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 29. Stubbs, T., V. DeMacon, M. Wang, S. Sankaran, M. Pumphrey, and **A. Carter**. 2015. High-Throughput Field Phenomics Project. p. 57. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 30. Tuttle, K., T. Harris, **A. Carter**, M. Pumphrey, and C. Steber. 2015. Late Maturity Alpha-Amylase (LMA): Reducing the Risk of Low Falling Numbers. p. 57. *In* Crow, S. and Schillinger W. (eds). “2015 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 15-1.
 31. **Carter, A.**, G. Shelton, R. Higginbotham, K. Balow, and A. Burke. 2014. Winter Wheat Breeding and Genetics. p. 23. *In* Crow, S. and Schillinger W. (eds), “2014 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.
 32. Kumar, N., H.S. Randhawa, **A. Carter**, C. Morris, B. Baik, R. Higginbotham, D. Engle, S. Guy, T. Murray, I. Burke, D. Lyon, X. Chen, and K. Gill. 2014. ‘Curiosity CL+’ and ‘Mela CL+’: Two New 2-Gene Imi Soft White Winter Wheat Varieties. P. 24. *In* Crow, S. and Schillinger W. (eds), “2014 Dryland Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.

33. Tuttle, K., T. Harris, **A. Carter**, M. Pumphrey, and C. Steber. 2014. Cold-induced LMA in Spring Wheat: A Potential Cause of Low Falling Numbers. p. 26. *In* Crow, S. and Schillinger W. (eds), "2014 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.
34. Jernigan, K.L., C.F. Morris, M.O. Pumphrey, K.A. Garland-Campbell, and **A.H. Carter**. 2014. Genetic Mapping of Quantitative Trait Loci Associated with Important End-Use Quality Traits in Soft White Wheat. p. 29. *In* Crow, S. and Schillinger W. (eds), "2014 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.
35. Klarquist, E.F., and **A.H. Carter**. 2014. Identification of QTL for Stripe Rust Resistance in the PNW Cultivars Finch and Eltan. p. 30. *In* Crow, S. and Schillinger W. (eds), "2014 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.
36. Martinez, S.A., T.J. Harris, R.S. Parveen, K. Garland-Campbell, **A.H. Carter**, M.O. Pumphrey, S.O. Guy, and C.M. Steber. 2014. Determining Preharvest Sprouting Tolerance and Falling Numbers in Soft White Wheat. p. 32. *In* Crow, S. and Schillinger W. (eds), "2014 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 14-1.
37. **Carter, A.**, G. Shelton, R. Higginbotham, K. Balow, and A. Burke. 2013. Winter Wheat Breeding and Genetics. p. 24. *In* Warriner, C. and Schillinger W. (eds), "2013 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 13-1.
38. Martinez, S.A., K. Garland-Campbell, **A.H. Carter**, M.O. Pumphrey, S.O. Guy, and C.M. Steber. 2013. Genetic Variation in Preharvest Sprouting. p. 29. *In* Warriner, C. and Schillinger W. (eds), "2013 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 13-1.
39. Jernigan, K.L., C.F. Morris, M.O. Pumphrey, K.A. Garland-Campbell, and **A.H. Carter**. 2013. Genetic Mapping of Quantitative Trait Loci Associated with Important End-Use Quality Parameters in Soft White Winter Wheat. p. 32. *In* Warriner, C. and Schillinger W. (eds), "2013 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 13-1.
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42. **Carter, A.**, G. Shelton, R. Higginbotham, K. Balow, and J. Hansen. 2010. Winter Wheat Breeding and Genetics. p. 16. *In* Marsh, D. and Huggins, D. (eds), "2010 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 10-2.

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45. Kidwell, K., G. Shelton, V. DeMacon, W. Nyongesa and **A. Carter**. 2009. Improving spring wheat varieties for the Pacific Northwest. p. 20. *In* Guy, S., Huggins, D. and Marsh, D. (eds), "2009 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 09-1.
46. **Carter, A.**, D.R. See, K. Kidwell and K. Garland-Campbell. 2009. Marker Development and Marker-Assisted Selection for Improved Pest Resistance and End-Use Quality in Pacific Northwest Wheat. p. 26 *In* Guy, S., Huggins, D. and Marsh, D. (eds), "2009 Dryland Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 09-1.
47. Kidwell, K., G. Shelton, V. DeMacon and **A. Carter**. 2008. Improving spring wheat varieties for the Pacific Northwest. p. 30. *In* Burns, J. (ed), "2008 Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 08-1.
48. Santra, D., M. Santra, V. DeMacon, G. Shelton, **A. Carter** and K. Kidwell. 2008. Application of biotechnology to spring wheat variety improvement. p. 31. *In* Burns, J. (ed), "2008 Field Day Abstracts: Highlights of Research Progress". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 08-1.
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50. **Carter, A.**, D. See, K. Kidwell and K. Campbell. 2007. Wheat applied genomics: Marker-assisted selection for improved disease resistance and end use quality in Pacific Northwest wheat. p. 20. *In* Burns, J. (ed), "2007 Field Day Abstracts: Highlights of Research Progress: Novel Solutions to Traditional Problems". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 07-1.
51. Kidwell, K., G. Shelton, V. DeMacon and **A. Carter**. 2007. Improving spring wheat varieties for the Pacific Northwest. p. 19. *In* Burns, J. (ed), "2007 Field Day Abstracts: Highlights of Research Progress: Novel Solutions to Traditional Problems". Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 07-1.
52. Santra, D., M. Santra, V. DeMacon, G. Shelton, **A. Carter** and K. Kidwell. 2007. Application of biotechnology to spring wheat variety improvement. p. 21. *In* Burns, J.

(ed), “2007 Field Day Abstracts: Highlights of Research Progress”. Cooperative Extension, Washington State University, Dept. of Crop and Soil Sciences, Technical Report 07-1.

GRANT SUPPORT: Current and Past: \$47,517,710; \$8,615,491 to Carter Lab/Projects

Footnotes: 1. Provided initial idea
 2. Developed research design and hypothesis
 3. Authorship of grant application
 4. Developed and/or managed budget
 5. Managed personnel and project activities

Current:

USDA NIFA

Principal Investigator: Josh Hegarty Co-PI: Arron Carter, Jorge Dubcovsky

“Cultivar Development: Commercialization of Triticale Cultivars with Superior Forage Yield”

10/1/20-9/30/23 at \$299,973/3 years **(2,3,4,5)**

I will be planting triticale plots in Washington as part of this grant.

USDA NIFA

Principal Investigator: Zhiwu Zhang, Co-PI: Arron Carter, Mike Pumphrey, Camille Steber, Janardhan Doppa

“FACT: Predicting Wheat Hagberg Falling Number from Near-Infrared Spectrometers”

7/1/20-6/30/23 at \$499,660/3 years **(2,3,4,5)**

I will be providing germplasm from field grown experiments to undergo testing using NIR to see if correlations can be made for predicting the falling number.

USDA-NIFA

Principal Investigator: Sindhuja Sankaran; Co-PI: Strong Z, Carter AH, Gupta S, Kalyanaraman A, Evans K, Devetter L, Ficklin S, Pumphrey M.

“FACT: Research Experience for Undergraduates on Phenomics Big Data Management”

1/1/20-12/31/23 at \$399,993/4 years **(2,3,5)**

This REU is led by Dr. Sankaran. I will be hosting one student during the summer months and working with them to collect phenomics data from the breeding program and then they will be working with a data scientist to learn how to manage and analyze the data.

USDA-NIFA

Principal Investigator: Zhang, Z.; Co-PI: Pumphrey, MO, Carter AH, Sankaran S.

“Genomics-Enabled Satellite Phenomics For Wheat Breeding In The Palouse”

2/15/19-2/15/22 at \$500,000/3 years **(2,3,4,5; \$150,000 to Carter)**

My contribution to this project will be collecting all the field level data so that it can be correlated back to the satellite data to understand the connection between ground based, UAV, and satellite data.

USDA-NIFA

Principal Investigator: Dubcovsky J; Co-PI: Pumphrey, MO, Carter AH, See D, et al.

“Validation, characterization and deployment of QTL for grain yield components in wheat”

12/1/16-12/1/21 at \$10,000,000/5 years **(2,3,4,5; \$588,570 to WSU)**

The portion which comes to WSU is split between the wheat breeding programs and the USDA genotyping laboratory. Dr. Pumphrey leads the WSU effort. Our goal is to identify genes which are associated with increase grain yield potential, using germplasm developed and identified in a previous grant as having high grain yield.

USDA-NIFA

Principal Investigator: Carter AH; Co-PI: Pumphrey M, Garland-Campbell K, McGee R, Murphey K, Evans K, Hulbert S, See D, Zhang Z, Sanakaran S.

“Next Generation Variety Development and Education for Grains, Apples, Alternative Crops, and Cool Season Legumes”

2/15/16-2/15/21 at \$3,000,000/4 years **(1,2,3,4,5; \$500,000 to Carter)**

I am the principle lead on this grant. I manage all aspects of the grant and submit the annual progress reports. Specific to my program, we use the grant resources to incorporate both genomics and phenomics into the breeding program, then evaluate the efficiency of these technologies in applied breeding.

O.A. Vogel Research Foundation

Principal Investigator: Carter AH

“Genomic Selection in Winter Wheat”

5/1/19-5/1/22 at \$150,000/3 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)

3019-3193 (Renewed) Principal Investigator – Carter AH

“Hard red/hard white winter wheat breeding”

FY10: \$112,000

FY11: \$148,868

FY12: \$144,000

FY13: \$144,000

FY14: \$143,848

FY15: \$143,830

FY16: \$143,540

FY17: \$81,000

FY18: \$91,916

FY19: \$96,255

FY20: \$96,880

FY21: \$96,880

7/1/10-6/30/21 \$1,443,017/12 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)

3019-5195 (Renewed) Principal Investigator – Carter AH

“Biotechnology for wheat improvement”

FY10: \$115,000

FY11: \$132,363

FY12: \$132,000

FY13: \$132,000

FY14: \$132,058
FY15: \$131,892
FY16: \$131,712
FY17: \$121,744
FY18: \$160,800
FY19: \$163,916
FY20: \$172,388
FY21: \$172,388
7/1/10-6/30/20 \$1,698,261/12 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)
3019-6195 (Renewed) Principal Investigator – Carter AH
“Field breeding soft white winter wheat”

FY10: \$111,000
FY11: \$130,482
FY12: \$130,000
FY13: \$130,000
FY14: \$129,672
FY15: \$129,606
FY16: \$129,853
FY17: \$172,394
FY18: \$248,626
FY19: \$257,105
FY20: \$264,965
FY21: \$257,533
7/1/10-6/30/20 \$2,091,238/12 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)
3019-5389 (Renewed) Principal Investigator –Pumphrey M; Co-PI: Carter AH
“End-Use Quality Assessment of Washington State University Wheat Breeding Lines”

FY17: \$41,400
FY18: \$51,668
FY19: \$51,668
FY20: \$52,956
FY21: \$52,956
7/1/14-6/30/20 \$250,648/4 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)
3019-5389 Principal Investigator – Steber C, Pumphrey M, Carter AH
“Developing Washington Wheat with Resistance to Late Maturity Alpha-Amylase”

FY17: \$37,800
FY18: \$42,685
FY19: \$82,800
FY20: no funding request made; project still active
7/1/16-6/30/20 \$163,285/4 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)
3019-3675 (Renewed) Principal Investigator – Zhiwu Zhang; Co-PI: Carter AH, Pumphrey MO,
Campbell KG

“Intelligent Prediction and Association Tool to Facilitate Wheat Breeding”

FY16: \$71,002

FY17: \$66,170

FY18: \$76,143

FY19: \$83,554

FY20: \$86,576

FY21: \$50,000

7/1/15-6/30/18 \$433,445/6 years **(1,2,3,4,5)**

I provide data sets and feedback into the development of this tool to improve its efficiency in breeding programs.

Past Grant Support

USDA-NIFA

Principal Investigator: Carter AH; Co-PI: Steber C, Zhang Z.

“Improving Preharvest Sprouting in White Wheat”

11/1/15-10/14/20 at \$422,000/5 years **(1,2,3,4,5)**

I co-lead this grant with Dr. Steber from the USDA. Our goal is to identify the genetics controlling pre-harvest sprouting in white wheat. I manage all the field portions of the grant, whereas Dr. Steber is in charge of the laboratory and greenhouse based experiments.

Western SARE

Principal Investigator: AH Carter and NS Nielsen

“Rapid Estimation of Straw Residue Decomposition in Winter Wheat”

4/1/18-3/31/19 at \$24,627/1 year **(1,2,3,4,5)**

CAHNRS-ERI

Principal Investigator: Ian Burke; Co-PI: Arron Carter

“Development of procedures and techniques to utilize CRISPR/Cas9 technology in wheat research”

1/15/16-1/15/18 at \$71,122/2 years **(2,3,4,5)**

I provided germplasm and resources for the completion of this grant.

CSANR BIOAg Program

Principal Investigator: Arron Carter

“Rapid evaluation of winter wheat residue decomposition potential”

5/1/16-5/31/18 at \$39,774/2 years **(1,2,3,4,5)**

CAHNRS-ERI

Principal Investigator: Mike Pumphrey; Co-PI: Arron Carter, David Gang, Camille Steber

“Late Maturity Alpha-Amylase, an emerging cause of low falling numbers in PNW wheat”

2/10/17-6/30/19 at \$50,000/2 years **(3,5)**

I provided germplasm and field resources for the completing of this grant.

Washington Grain Commission

Principal Investigator: Mike Pumphrey; Co-PI: Arron Carter, David Gang, Camille Steber
“Late Maturity Alpha-Amylase, an emerging cause of low falling numbers in PNW wheat”
2/10/17-6/30/19 at \$20,000/2 years (Match to the CAHNRS-ERI grant of same title) **(3,5)**
I provided germplasm and field resources for the completing of this grant.

Otto and Doris Amen Dryland Research Endowment

Principal Investigators: Carter AH

“Developing winter wheat specifically for emergence from deep planting”

CY10: \$3,500

CY11: \$3,500

CY12: \$3,500

CY13: \$3,500

CY14: \$3,500

CY15: \$3,500

CY16: \$3,500

CY17: \$3,500

1/1/10-12/31/17 at \$28,000/8 years **(1,2,3,4,5)**

Otto and Doris Amen Dryland Research Endowment

Principal Investigators: Carter AH

“Testing winter wheat varieties adapted to late-planted no-till production”

CY18: \$3,500

CY19: \$3,500

CY20: \$3,500

1/1/18-12/31/20 at \$10,500/3 years **(1,2,3,4,5)**

The Washington Grain Commission and Idaho Wheat Commission (co-funded)

3061-3675 Principal Investigator – Tim Murray; Co-PI: Carter AH

“Enhancing Resistance to Snow Mold Disease in Winter Wheat”

FY17: \$32,719+\$17,920

FY18: \$35,280+\$17,377

FY19: \$36,786+\$18,118

7/1/16-6/30/19 \$158,200/3 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)

3019-5238 and 3673 Principal Investigator – Carter AH

“Increasing Genetic Opportunities for Stripe Rust Resistance in Wheat”

FY12: \$80,000

FY13: \$80,000

FY14: \$80,000

FY15: \$80,000

FY16: \$60,130

FY17: \$40,000

7/1/11-6/30/17 \$420,130/6 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)

3019-3234 Principal Investigator – Carter AH
“Graduate Student Training”

FY11: \$28,000

FY12: \$28,000

FY13: \$30,000

FY14: \$31,500

FY15: \$31,500

FY16: \$33,765

7/1/10-6/30/16 \$182,765/6 years **(1,2,3,4,5)**

The Washington Grain Commission (WGC)

3019-6238 Principal Investigator – Carter AH

“Evaluation of Winter Wheat under Irrigated Production”

FY12: \$11,000

FY13: \$11,000

FY14: \$11,000

7/1/11-6/30/14 \$33,000/3 years **(1,2,3,4,5)**

Washington State Crop Improvement Association

3019-6239 Principal Investigator – Carter AH

“Red Seed Coat Color Variation in Certified Seed”

11/1/11-6/30/13 \$53,751/2 years **(1,2,3,4,5)**

USDA-NIFA Conference Grant

3028-6821 Principal Investigator – Sankaran S; Co-PI: Carter AH et al.

“Advances in High-Throughput Crop Phenotyping”

11/1/15-6/30/16 \$48,184/1 year **(3,5)**

I took part in organizing the phenomics conference and writing the summary afterward.

USDA-NIFA

Principal Investigator: Dubcovsky J; Co-PI: Pumphrey, MO, Carter AH, et al.

“Triticeae CAPS Project”

12/1/16-12/1/21 at \$25,000,000/5 years **(2,3,4,5; \$1,410,424 to WSU)**

The contribution of WSU to this grant will be to lead the effort to identify new resistance genes and mechanism of wheat and related germplasm to stripe rust. Efforts will be undertaken to screen germplasm in the field and develop mapping panels to identify new sources of resistance to mitigate pathogen changes expected to come about through global climate change. We also will screen NIL populations for drought tolerance and related traits for the western region in collaboration with other western universities.

USDA-AFRI

Principal Investigator – Schillinger WF; Co-PI: Carter AH et al.

“PM10 Particulate Emission Prediction and Control from Agricultural Lands in the Pacific Northwest, Columbia Plateau”

7/1/10-6/30/12 at \$37,627/1 year to Carter program **(3,4,5)**

Otto and Doris Amen Dryland Research Endowment

Principal Investigators: Carter AH

“Winter Wheat Productivity”

CY10: \$3,500

CY11: \$3,500

CY12: \$3,500

1/1/10-12/31/12 at \$10,500/3 years **(1,2,3,4,5)**

Vogel Wheat Research Foundation

Principal Investigator –Carter AH

“Characterization of Wireworm Resistance in Cultivated Wheat”

7/1/10-6/30/13 at \$28,947/3 years **(1,2,3,4,5)**

WSU Office of Research-RAGE Equipment Grant

Principal Investigator – Kramer, D; Co-PI: Carter AH et al.

“Photosynthetic Phenotyping Array (PPA): a critical step in a new direction for plant sciences at WSU”

2/10/10-6/30/11 at \$246,000/1 year **(3)**

I took part in writing the grant to get funds for equipment for the phenomics center.

Goldsworthy Endowment

Principal Investigator – Herr A (Graduate Student); Co-PI: Carter AH (Advisor)

“High-Throughput Phenotyping in Wheat”

7/1/19-6/30/20 at \$1,600/1 year **(3)**

Goldsworthy Endowment

Principal Investigator – Lewien M (Graduate Student); Co-PI: Carter AH (Advisor)

“Genome-wide Nested Association Study Water Use”

7/1/16-6/30/17 at \$1,600/1 year **(3)**

Goldsworthy Endowment

Principal Investigator – Sjoberg S (Graduate Student); Co-PI: Carter AH (Advisor)

“Preharvest Sprouting Evaluation in Winter Wheat”

7/1/17-6/30/18 at \$2,000/1 year **(3)**

Equipment Grant Support (Either as PI or Co-PI): \$803,836

Washington Wheat Foundation: \$5,000 for purchase of 2D LiDAR equipment (2016)

Washington Wheat Foundation: \$5,861 for purchase of falling numbers equipment (2016)

Washington Wheat Foundation: \$2,875 for purchase of tablet computers (2013)

Washington Wheat Foundation: \$4,500 for purchase of octocopter (2013)

Washington Wheat Foundation: \$6,000 for purchase of a JAZ unit (2012)

Washington Wheat Foundation: \$1,600 for head thrasher purchase (2012)

Washington Wheat Commission: \$50,000 for purchase of hyperspectral camera (2013)

Washington Wheat Commission: \$10,000 for test weight module for NIR (2012)

Washington Wheat Commission: \$28,000 for purchase of a crawler tractor (2011)

Washington Wheat Commission: \$50,000 for purchase of GPS units (2011)

Washington Wheat Commission: \$60,000 for purchase of Sequenom (2011)
Washington Wheat Commission: \$450,000 for purchase of two Zurn Combines (2011)
Washington Wheat Commission: \$80,000 for purchase of tractor and no-till planter (2011)

INTERVIEWS FOR POPULAR PRESS ARTICLES

News Paper:

1. WSU News, “New global fellowship program grows discoveries, partnerships in ag research” August 2019
2. Lewiston Tribune, “Mastering wheat from a bird’s-eye view” July 2019
3. WSU Magazine “Giving rust a rest” Spring 2019
4. Moscow-Pullman Daily News Farm and Ranch Edition “Great year for winter wheat in Washington” December 2018
5. BioAg update “Rapid evaluation of winter wheat residue decomposition potential” December 2018
6. Spokesman Review “WSU scientists experimenting with paper mill waste to fight soil disease” September 2018
7. Capital Press “Wheat Researchers Crack Genetic Code” September 2018
8. Spokesman Review “Aluminum toxicity a problem in WA wheat production” July 2018
9. Moscow-Pullman Daily News Farm and Ranch Edition “Drones may soon track wheat yields’ June, 2018
10. Moscow-Pullman Daily News and Lewiston Tribune Special Edition “Invented Here”, “125 years of wheat breeding” May, 2018
11. WSU News, “WSU’s Otto wheat breaks records, earns fifth in national yield contest” February, 2018
12. Capital Press “Otto top wheat variety planted in Washington” October 2015
13. Capital Press “PNW wheat industry eyes possible sprout, high protein” July 2015
14. Capital Press “US wheat breeders to meet with Asian customers” April 2015
15. Capital Press “New WSU variety performs well under stress, breeder says” March 2015
16. WSU News, “Rock Doc: High technology meets fields of wheat” May 2014
17. The Daily Evergreen, “Cold tolerance in wheat” January 2014
18. Capital Press, “LMA” September 2013
19. Farm Journal, “Wheat Breeding in the PNW” August 2013; Ben Potter
20. Capital Press, “Private Sector GMO research” October, 2012
21. Capital Press, “New Cultivar Releases” October, 2012
22. Syngenta Seed, “Certified Seed” June, 2012
23. Capital Press, July 2012
24. Capital Press, “Researchers: Consider stripe rust resistance” Aug 18, 2011
25. Capital Press, “Columbia Plateau PM10 Project Update”, December 8, 2010.
26. Capital Press, “Wireworm Resistance Scrutinized”, October 7, 2010.
27. Lewiston Tribune, 8-13-09.
28. Capital Press, “Growers question Xerpha Quality”, September 24, 2009.
29. Capital Press, “Wheat growers to emphasize hope at conference”, November 12, 2009.
30. Capital Press, “Tall orders await breeders”, November 25, 2009.
31. Capital Press, “Xerpha quality issue left up to growers”, December 3, 2009.
32. Capital Press, “Monsanto moves West with wheat, alfalfa”, December 17, 2009.
33. Capital Press, “Research chronicles Asia’s noodles”, December 24, 2009.

Radio:

1. Wheat all about it Podcast, November, 2020
2. Wheat Beat Podcast on Wheat Herbicide Resistance 2019
3. Wheat Beat Podcast with Lav Khot on High-Throughput Phenotyping 2019
4. Seedworld Podcast, August, 2018: <http://seedworld.com/how-a-69-corvette-stingray-led-arron-carter-to-become-a-plant-breeding-mentor/>
5. Wheat Beat Podcast, March, 2018
6. Wheat all about it Podcast, January, 2018
7. Washington Ag Today, October 11, 2011.
8. Washington Ag Today, July 12, 2011.
9. Washington Ag Today, September 27, 2010.
10. Washington Ag Today, September 20, 2010.
11. Washington Ag Today, July 10, 2009.
12. Washington Ag Today, December 28, 2009.

Television:

1. CAHNRS Faculty Friday 2019-- <https://www.youtube.com/watch?v=Ntrn6QoDMKk>
2. Washington Grain Commission 2018--“Wheat Journey”
3. CAHNRS 2018 Recruitment Video--<https://www.youtube.com/watch?v=1oiqwIXsxuQ>
4. Shepherd’s Grain—Promotional video interview regarding the process of how cultivars are developed to be used in their production systems: 2018
5. Stornoway Communications—interviewed regarding wheat breeding and production, from cross to export for inclusion in a series depicting where food comes from: 2011
6. CEV—Interviewed regarding breeding systems, wheat, and production concerns for inclusion in educational multimedia: 2011
7. Portland Public Broadcasting System—videotaped laboratory, doubled haploid lab, and greenhouse to be used in an upcoming story on wheat production in the PNW: 2010
8. KLEW Interview-Wheat production systems: 2010

Magazine:

1. Wheat Life, “Game Changer: Advances in Molecular Technology Open New Doors in Breeding” July 2019
2. WSU CAHNRS News “Images from space could help farmers grow better wheat varieties” May 2019 <http://news.cahnrs.wsu.edu/article/images-from-space-could-help-farmers-grow-better-wheat-varieties/>
3. Seedworld “Secrets to Success from the Next Generation”, Oct 2018
4. Wheat Life, “Hard red wheats grow their PNW profile”, April 2018
5. Wheat Life, “Making breeders look good”, June 2016
6. Wheat Life, “Answer: Quality, quality, quality”, Sept 2015
7. Wheat Life, “Varieties for all conditions”, June 2014
8. Wheat Life, “Farmer Field Day Participation”, April 2014
9. Wheat Life, “Sprinter Wheat”, March 2014
10. Wheat Life, “Double or nothing”, Dec 2013
11. Wheat Life, “In winter wheat breeding, it’s all about the traits”, Oct 2012
12. BASF Clearfield Wheat Stewardship Bulletin-University Corner, April 2012

13. Wheat Life, “The highway of life”, Nov 2011
14. Wheat Life, “A what’s what of Eastern Washington wheat diseases”, 2011
15. Wheat Life, “A Greener House”, Dec 2010
16. Cereals Marker Update by Syngenta, written by Lauren Renner, Gibbs & Soell Publications, Articles related to cereals markets and breeding for added-value to end users, Dec 2010
17. Wheat Life, “Getting a Jump on the Market”, Nov 2010
18. Wheat Life, “Heating Up”, Nov 2010
19. Wheat Life, “Wheat Marketing and Wheat End-Use Quality”
20. Successful Farming, interviewed by Ed Hagg about no-till production, latest cultivar releases and how they would fit into this system.

INVITED STAKEHOLDER PRESENTATIONS

1. Washington State University Virtual Field Tours, 2020: Lind, Dayton, Pullman (<https://www.youtube.com/user/WSUCAHNRS/videos>)
2. Adam’s County Grain Growers, Ritzville, WA (105): 2020
3. Washington State University Field Tours, 2019: Connell, Ritzville, Reardan, Eureka, LaCrosse, St. John, Farmington, Lamont, Dayton, Walla Walla, Asotin (over 250 participants)
4. Franklin County wheat growers, Connell, WA (50): 2019
5. Walla Walla County wheat growers, Walla Walla, WA (15): 2018
6. Franklin County wheat growers, Kahlotus, WA (45): 2018
7. Washington State University Field Tours, 2018: Connell, Ritzville, Harrington, Lind, Reardan, Eureka, LaCrosse, St. John, Farmington, Lamont, Dayton, Walla Walla (over 520 participants)
8. Franklin County wheat growers, Connell, WA (15): 2017
9. WSU Wheat Academy, Pullman, WA (75): 2017
10. Franklin County wheat growers, Kahlotus, WA (40): 2017
11. Reardan Seed Plant grower meeting, Reardan, WA (60): 2017
12. Washington State University Field Tours, 2017: (over 400 participants)
13. Washington State University Field Tours, 2016: (over 360 participants)
14. WSU Wheat Academy, Pullman, WA (60): 2016
15. WSU Wheat Academy, Pullman, WA (52): 2015
16. Washington State University Field Tours, 2015: (over 400 participants)
17. Franklin County wheat growers, Kahlotus, WA (28): 2014
18. Washington State University Field Tours, 2014: Horse Heaven, Connell, Ritzville, Harrington, Lind, Reardan, Spillman, St. John, Farmington, Lamont, Dayton, Walla Walla (over 420 participants)
19. Connell Grain Growers/Walla Walla Co-op, Pasco, WA (75): 2014
20. Davenport Union Warehouse, Davenport, WA (80): 2014
21. Franklin County wheat growers, Kahlotus, WA (30): 2013
22. PNW Tri-State Grain Growers Convention, Spokane, WA (200): 2013
23. WSCIA annual meeting, Walla Walla, WA (100): 2013
24. Washington State University Field Tours, 2013: Horse Heaven, Connell, Ritzville, Lind, Almira, Reardan, Mayview, Spillman, St. John, Farmington, Colton, Dusty, Dayton, Walla Walla (over 400 participants)

25. Walla Walla Farmers Co-Op Meeting, Walla Walla, WA (60): 2013
26. AgVentures Northwest Meeting, Davenport, WA (100): 2013
27. Connell/Walla Walla Grain Growers Meeting, Pasco, WA (60): 2013
28. Walla Walla County Grain Growers Meeting, Walla Walla, WA (55): 2012
29. Washington State University Field Tours, 2012: Horse Heaven, Connell, Ritzville, Moses Lake, Harrington, Lind, Almira, St. Andrews, Reardan, Mayview, Spillman, St. John, Lamont, Dusty, Dayton, Walla Walla (over 450 participants)
30. NWGG Pre-harvest Meeting, Walla Walla, WA (50): 2012
31. CWGG Winter Meeting, Waterville, WA (50): 2012
32. Adams Conservation District Grower Meeting, Ritzville, WA (100): 2012
33. AgVentures NW Seed Meeting, Harrington, WA (28): 2012
34. PNW Wheat Quality Council "Update on Molecular Marker Technology", San Diego, CA (50): 2012
35. AgVentures NW Seed Meeting, Odessa, WA (25): 2012
36. Washington State University Field Tours, 2011: Connell (50), Moses Lake (1), Ritzville (30), Lind (224), Almira (20), Weeds Tour (30), Mayview (20), Anatone (20), Walla Walla (40), Spillman Field Day (200), Pullman (5), Farmington (7), Lamont (30), St. John (25)
37. Union Elevator (Lind, WA) Grower Meeting (40): 2011
38. Waterville Wheat Growers Meeting, Waterville, WA (25): 2011
39. Walla Walla County Wheat Growers Meeting, Walla Walla, WA (50): 2010
40. Washington State Crop Improvement Association/Washington North Idaho Seed Association Annual Meeting, Walla Walla, WA (75): 2010
41. Washington Grain Commission, Spokane, WA: 2010
42. Washington State University Field Tours, 2010: Horse Heaven Hills (25), Connell (45), Moses Lake (7), Walla Walla (50), Pullman (3), Farmington (2), St. John (20), Lamont (25), and Ritzville (20)
43. Lincoln/Adams County Grain Growers Meeting, Ritzville, WA: 2010
44. Pacific Northwest Direct Seed Association Annual Meeting, Kennewick, WA (35): 2010
45. Columbia County Grain Growers, Dayton, WA (40): 2010
46. Connell Grain Growers/Walla Walla Co-op, Pasco, WA (40): 2010
47. Franklin County Wheat Growers Meeting, Kahlotus, WA (45): 2009
48. Walla Walla County Wheat Growers Meeting, Walla Walla, WA (50): 2009
49. Washington State Crop Improvement Association/Washington North Idaho Seed Association Annual Meeting, Moscow, ID (75): 2009
50. Washington Grain Commission, Spokane, WA: 2009
51. Washington Association of Wheat Growers, Spokane, WA (60): 2009
52. PNW Wheat Marketing and End-Use Quality Tour, Portland, OR: 2009

TEACHING ACTIVITIES:

INSTRUCTION/CLASSES

- **Crop Science 445**, Plant Breeding, 4 credits, Spring Semester 2020 (25), 2018 (21), 2017 (5), 2016 (24), 2015 (15), 2014 (16), 2013 (13), 2012 (22), 2011 (19). Instructor, Washington State University.

- **Crop Science 498**, Research Internship, 1-3 credits, Spring 2020 (2), Summer 2019 (5), Fall 2018 (3), Summer 2018 (4), Summer 2016 (6), Spring 2016 (2), Fall 2015 (1), Spring 2014 (4), Fall 2013 (4), Summer 2013 (5), Spring 2013 (2), Fall 2012 (5), Fall 2011 (4). Instructor, Washington State University.
- **Crop Science 435**, Interdisciplinary Solutions in Plant Science [CAPS], Spring Semester 2019 (19), 2017 (13). Instructor, Washington State University.
- **Horticulture 425**, Trends in Horticultural Science [CAPS], Spring Semester 2019 (30). Instructor, Washington State University.
- **Crop Science 512**, Field Plant Breeding, 3 credits, Fall 2020 (), Summer/Fall Semester 2017 (8), 2016 (7). Instructor, Washington State University.
- **Crop Science 412**, Undergraduate Seminar, 1 credit, Spring Semester 2017 (38), 2010 (20). Instructor, Washington State University.
- **Crop Science 510**, Graduate Seminar, 1 credit, Spring 2015 (9), Fall 2014 (9), Spring 2011 (6), Fall 2010 (5). Instructor, Washington State University.
- **Crop Science 512**, State Tour, 1 credit, Summer/Fall Semester 2012 (42); Summer/Fall Semester 2011 (35). Instructor, Washington State University.
- **Crop Science 512**, Introduction to Genetic Linkage Map Construction and QTL Analysis Software, 1 credit, Spring Semester 2010 (8). Instructor, Washington State University.
- **Plant Science 102**, Introduction to Plant Science, 3 credits, Fall Semester 2004, 2005. Laboratory Instructor, University of Idaho.
- **Genetics 314**, Genetics, 3 credits, Spring Semester 2005, 2006. Teaching Assistant, University of Idaho.
- **Plant Cytogenetics 520**, Plant Cytogenetics, 3 credits, Spring Semester, 2006. Teaching Assistant and Laboratory Instructor, University of Idaho.

GUEST LECTURES

- Agriculture and Food Systems 101, 3 credits, Fall Semester 2020, 2019, 2018, 2017. Guest Lecturer, Washington State University.
- Crop Science 102, Cultivated Plants, 3 credits, Fall Semester 2020, 2018, 2017, 2016, 2014, 2010. Guest Lecturer, Washington State University.
- Landscape Architecture 150, Landscapes of the Palouse, 3 credits, Fall Semester 2020. Guest Lecturer, Washington State University.

- Crop Science 202, Crop Growth and Development, 3 credits, Spring Semester 2016; 2014; 2013; 2012; 2011; 2010, Guest Lecturer, Washington State University.
- Crop Science 511, Science Writing Workshop, 2 credits, Spring Semester 2019; 2018; 2017, Guest Lecturer, Washington State University.
- Biology 521, Quantitative Genetics, 3 credits, Spring Semester 2019; 2012; 2010, Guest Lecturer, Washington State University.
- Crop Science 505, Advanced Classical and Molecular Breeding, 3 credits, Fall Semester 2017; 2013; 2011; Guest Lecturer, Washington State University.

WORKSHOPS

1. “Wheat Breeding v2.017: New tools to support variety genetic improvement” Washington Wheat Academy, 2017.
2. “Greenhouse tour and wheat crossing” Washington Wheat Academy, 2016.
3. “Wheat variety development” Washington Wheat Academy, 2015.
4. “DNA to Z” Presented to 30 FFA students and advisors on May 13th, 2012 in conjunction with the State FFA convention held at WSU.
5. Undergraduate STEM mentor group February 17th, 2012—Gave a tour of the wheat quality lab to 10 students and mentors in the STEM program.
6. 2011 Association of College Union International conference Oct. 28th, 2011—Gave hands-on workshop regarding the role of plant breeding and DNA technology to the development of a more sustainable food production system.
7. Hosted representatives from the Nippon Flour Mill in Japan Sept 21st, 2011—Gave updates on wheat breeding efforts in the PNW specific to the export market.
8. Hosted Middle East Journalism Students July 6th, 2011 18 participants—Gave an introduction to wheat production and breeding in Washington to Middle East journalism students who were then required to write a popular press article for release in their home country on the introduced topic.
9. Destination WSU April 15th, 2011—Gave hands-on workshop in conjunction with academic coordinator about the new IPS and AFS majors, as well as what to expect in a cross-disciplinary degree.
10. Junior preview October 22nd, 2010 3 participants—Gave hands-on workshop in conjunction with academic coordinator about the new IPS and AFS majors, as well as what to expect in a cross-disciplinary degree.
11. “Wheat Cultivar Development at WSU” July 19th, 2010 40 participants—Gave hands-on field tour demonstration as part of a ‘Farm to Table’ tour originating from Spokane, WA.

12. “Insiders Tour” July 8th, 2010 15 participants—Gave hand-on field and laboratory tour to distinguished guests (prominent retired faculty, prominent alumni, scholarship donors, etc) regarding wheat cultivar development efforts at WSU.
13. Crop Diagnostic Clinic July 29th, 2010 150 participants—Gave hands-on clinic about determining the difference between stripe rust infection and physiological leaf spot to area farmers, field advisors, and chemical representatives as part of a day-long event.
14. “Stripe Rust Overview” May 28th, 2010 50 participants—Gave a hands-on discussion about stripe rust, its life cycle, diagnosis, treatment, forecast, and resistance to wheat producers in Walla Walla during a critical epidemic.
15. WSCIA Seed School May 24th and 25th, 2010 40 participants—Discussed the process of breeding new wheat cultivars as well as the new technology available to enhance breeding efforts at WSU.
16. Fall Preview 20 participants Sept 19th 2009—Gave hands-on workshop in conjunction with academic coordinator about the new IPS and AFS majors, as well as what to expect in a cross-disciplinary degree.
17. April 25th, 2009 Future Cougar Day 10 participants—Toured students through a molecular marker/breeding laboratory and demonstrated techniques used to identify superior breeding lines.
18. Junior preview April 10th, 2009 20 participants—Toured students through a molecular marker/breeding laboratory and demonstrated techniques used to identify superior breeding lines.
19. “CSI Plant Style: From the Laboratory to Your Lunch Tray” Presented to 60 FFA students and advisors on May 10th, 2007; May 16th, 2008; May 14th, 2009; May 13, 2010, May 12, 2011 in conjunction with the State FFA convention held at WSU.
20. “CSI Plant Style: From the Laboratory to the Wheat Field” Presented to 20 farmers/farm consultants on July 12th, 2007 in conjunction with the WSU Spillman Field Day.
21. “From Problem to Solution: Breeding Stripe Rust Resistant Spring Wheat” Presented to 30 wheat breeders, researchers, and extension workers on June 20th, 2007 in conjunction with the Western Wheat Workers meeting.
22. “Breeding Methodologies Used to Develop Tara 2002 and its Role in Shepherd’s Grain” Presented to tour operators from the Western U.S. in 2007 as part of a sustainable agriculture forum hosted by the Davenport Hotel, Spokane, WA.

POST-DOCTORAL RESEARCH ASSOCIATES

1. Dr. Stephanie Sjoberg 1/20-7/20
2. Dr. Dennis Lozada 8/18-7/20
3. Dr. Jayfred Godoy 8/16-9/18
4. Dr. Weizhen Liu 8/16-8/17
5. Dr. Yukiko Naruoka 8/12-2/16
6. Dr. Sindhu Nair 8/11-8/13

GRADUATE RESEARCH STUDENTS

1. Savannah Phipps—MS student, CSS (2020-)
 - i. Genetic mapping of snow mold tolerance
2. Jason Wigen—MS student, Co-Advisor with Camille Steber, CSS (2020-)
 - i. Genomic selection for PHS in winter wheat
3. Andrew Herr—PhD student (ARCS), MPS (2019-)
 - i. High-throughput phenotyping as a selection tool in winter wheat
4. Samuel Revolinski—PhD student, Co-Advisor with Ian Burke, CSS (2017-)
 - i. Population structure of downy brome populations in wheat
5. Lance Merrick—PhD student (ARCS), CSS (2019-)
 - i. Genomic selection in winter wheat
6. Karansher Sandhu—PhD student, CSS (2017-)
 - i. Genetic dissection of dormancy and grain protein content in wheat
7. Nikayla Strauss—PhD student (ARCS), Co-Advisor with Kim Campbell (2017-)
 - i. Genetic dissection of the D genome in wheat
8. Stephanie Sjoberg—PhD student, Co-Advisor with Camille Steber, CSS (2016-2019)
 - i. Genetic dissection of wheat LMA and low falling numbers
9. Carmen Swannack—MS student, Co-advisor with Kim Campbell (2018-2019)
 - i. QTL analysis in a Cara/Xerpha DH population
10. Tara Burke—PhD student (ARCS), Co-Advisor with Ian Burke, CSS (2015-2019)
 - i. Herbicide tolerance in wheat
11. Nathan Nielsen—MS student, CSS (2017-2019)
 - i. Wheat straw fiber analysis and residue decomposition
12. Erika Kruse—PhD Candidate (ARCS), MPS (2014-2019)
 - i. Cold and Mold tolerance and interactions in wheat
13. Liam Dixon—MS student, CSS (2017-2019)
 - i. CID in winter wheat
14. Alejandra Roa—MS student, CSS (2017-2018)
 - i. Wheat straw fiber analysis and residue decomposition
15. Jacob Lamkey—MS student, Co-Advisor with Kim Campbell, CSS (2016-2018)
 - i. Mapping the club wheat gene
16. Andy Horgan—MS student, Co-advisor with Kim Campbell, CSS (2016-2018)

- i. Genetic understanding of cold tolerance and dormancy
- 17. Shantel Martinez—PhD Candidate, Co-Advisor with Camille Steber, MPS (2015-2018)
 - i. Genetic and hormonal mechanisms controlling grain dormancy and preharvest sprouting tolerance in white wheat
- 18. Megan Leiwen—PhD Candidate, CSS (2012-2017)
 - i. Heat and drought stress phenomics in spring wheat
- 19. Emily Klarquist—MS Student, CSS (2013-2015)
 - i. Genetic mapping of end-use quality and stripe rust resistance
- 20. Kendra Jernigan—PhD Candidate (ARCS), CSS (2013-2015)
 - i. Genetic assessment of soft white wheat end-use quality
- 21. Shiferaw Gizaw—PhD Candidate, CSS (2012-2015)
 - i. Association mapping of drought tolerance in winter wheat
- 22. Brady Carter—PhD Candidate (funded by Decagon Devices), CSS (2010-2015)
 - i. Isothermic properties of grain and end-use quality products
- 23. Paul Froese—MS Student, CSS (2013-2014)
 - i. Association mapping of Aluminum tolerance and Cephalosporium stripe
- 24. Caleb Squires—MS Student (funded by WSCIA/private donations), CSS (2011-2013)
 - i. Seed variation in certified class of wheat
- 25. Jonathan Schnore—MS Student (funded by Jacklin Seed Company), CSS (2010-2013)
 - i. Heritability analysis of rhizomes in Tall Fescue
- 26. Austin Case—MS Student, CSS (2010-2012)
 - i. QTL mapping of stripe rust resistance and cold tolerance

THESIS COMMITTEES

- **Aichatou Waziri (Advisor: Kim Garland-Campbell)**
- **Tricia DeMacon (Advisor: Kim Garland-Campbell)**
- **Worosit Sangjan (Advisor: Sindhuja Sankaran)**
- **Johnathan Schnore (Advisor: Michael Neff)**
- **Tavin Schneider (Advisor: Mike Pumphrey)**
- Liu Lu (Advisor: Xianming Chen)
- Shelby Westenskow (Advisor: Michael Neff)
- Yvonne Thompson (Advisor: Kim Garland-Campbell)
- Jeanette Rodriguez (Advisor: Ian Burke)
- Caleb Squires (Advisor: Ian Burke)
- Dylan Larkin (Advisor: Kim Garland-Campbell)
- Kristina Knebel (Advisor: Candis Carraway)

- Bikash Ghimire (Advisor: Karen Sanguinet)
- Virginia Nichols (Advisor: Rebecca McGee)
- Weizhen Liu (Advisor: Mike Pumphrey)
- Aaron Mahoney (Advisor: Scot Hulbert)
- Kebede Muleta (Advisor: Mike Pumphrey)
- Gaganjot Sidhu (Advisor: Kulvinder Gill)
- Attawan Amarak (Advisor: Ian Burke)
- Brennan Goodman (Advisor: Stephen Guy)
- Ivan Milosavljevic (Advisor: David Crowder)
- Blessing Oraguzie (Advisor: Phil Miklas)
- Ben Brimlow (Advisor: Stephen Guy)

UNDERGRADUATE RESEARCH PROJECTS

1. “Effect of vernalization on spring wheat” (2019-2020)
Student: Henry Stodick (High School Student)
Mentor: Arron Carter
2. “Selection for low polyphenol oxidase activity in wheat” (2019)
Student: Jesus Soto (High School Student)
Mentor: Arron Carter
3. “Detecting LMA in winter wheat” (2018)
Student: Sarah Ellis (Washington State University)
Mentor: Stephanie Sjoberg/Arron Carter
4. “Sensor-based phenotyping for yield predictions” (2018)
Student: Jason Wigen (Washington State University)
Mentor: Arron Carter
5. “Using small scale end-use quality screening for hard winter wheat selection” (2018)
Student: Kyler Jacobs (Washington State University)
Mentor: Arron Carter
6. “Using small scale end-use quality screening for soft winter wheat selection” (2018)
Student: Madisyn Beaudoin (Washington State University)
Mentor: Arron Carter
7. “Detecting LMA in winter wheat” (2017)
Student: Grace Murkarete (Washington State University)
Mentor: Stephanie Sjoberg/Arron Carter
8. “Spectral reflectance as a predictor in winter wheat yield trials” (2017)
Student: Jessica Hartman (Washington State University)
Mentor: Jeff Godoy/Arron Carter
9. “Development of high-throughput MAS procedures for wheat breeding (2016)
Student: Carmen Swannack (Washington State University)
Mentor: Adrienne Burke
10. “Effect of *Rht* alleles to exogenous application of GA3” (2016)
Student: Macy Hagler (Washington State University)
Mentor: Arron Carter
11. “Analysis of Yr17 and genetic mapping of stripe rust resistance” (2016)
Student: Kaitlin Miller (Washington State University)
Mentor: Arron Carter

12. “Spectral reflectance in a spring NAM population as a predictor of drought stress” (2016)
Student: Jessica Hartman (Washington State University)
Mentor: Megan Lewien/Arron Carter
13. “Analysis of wheat straw breakdown for no-till cropping systems” (2015)
Student: Alejandra Roa (Washington State University)
Mentor: Tami Stubbs/Arron Carter
14. “Analysis of wheat end-use quality in early generation breeding materials” (2014)
Student: Dolores Covarrubias (Washington State University)
Mentor: Arron Carter
15. “Analysis of the *Gpc-B1* gene on GPC of winter wheat” (2013-2014)
Student: John Kuhn (Washington State University)
Mentor: Arron Carter
16. “Analysis of wheat falling number on currently cultivated wheat varieties” (2013-2014)
Student: Carissa Corrigan (Washington State University)
Mentor: Arron Carter and Mike Pumphrey
17. “Fabrication and Implementation of Global Positioning System (GPS) to Control Auto-trip Mechanisms for Research Plot Seeders” (2011-2012)
Students: Eric Hille, Sawyer Werner, and Collin Mikkilburg (Washington State University)
Mentors: Jim Durfey and Arron Carter
18. “End-use quality of winter wheat” (2012 and 2013)
Student: Avery Skinner (Brigham Young University)
Mentor: Arron Carter
19. “Wheat Breeding in the Pacific Northwest” (2013)
Student: Shakuemie McShan (University of Arkansas-Pine Bluff)
Mentor: Arron Carter
20. “Wheat Breeding in the Pacific Northwest” (2012)
Student: Yvonne Thompson (University of Arkansas-Pine Bluff)
Mentor: Arron Carter
21. “Wheat Breeding in the Pacific Northwest” (2012)
Student: Mariam Kaleem (University of Arkansas-Pine Bluff)
Mentor: Arron Carter
22. “Wheat Breeding in the Pacific Northwest” (2012)
Student: Anthony Graham (University of Arkansas-Pine Bluff)
Mentor: Arron Carter
23. “Wheat Breeding in the Pacific Northwest” (2012)
Student: Jasmine Gaston (University of Arkansas-Pine Bluff)
Mentor: Arron Carter
24. “QTL mapping for cold tolerance” (2012)
Student: Ben Brimlow (Washington State University)
Mentor: Arron Carter

STUDENT AWARDS (italics indicates undergraduate students)

- Lance Merrick—CSSA 3rd Place Oral/Poster Presentation, 2020
- Lance Merrick—CSSA C-1 Division 1st Place Oral/Poster Presentation, 2020

- Karan Sandhu—CSSA C-1 Division 2nd Place Oral/Poster Presentation, 2020
- Karan Sandhu—ASA-CSSA-SSSA Diversity Award, 2020
- Karan Sandhu—NAPB Diversity Scholar Award, 2020
- Karan Sandhu—Western Society of Crop Science 2nd place oral competition, 2020
- Karan Sandhu—Western Society of Crop Science 3rd place poster competition, 2020
- Liam Dixon—Nomination for WAGS Master’s Thesis Award in STEM, 2019
- Karan Sandhu—Western Society of Crop Science 3rd place oral competition, 2019
- Stephanie Sjoberg—NAPB Borlaug Scholar, 2019
- Nikayla Strauss—2nd place WSU Wiley Research Expo, 2019
- Nathan Nielsen—1st place Poster Competition, BIOAg Symposium, 2019
- *Jessica Hartman*—1st place Crimson Award, SURCA, 2018
- *Jessica Hartman*—1st place New Investigator Award, SURCA, 2017
- Stephanie Sjoberg—2nd place UC Davis Plant Science Symposium Poster Competition, 2017
- Stephanie Sjoberg—1st place GSPA Research Exposition, Ag and Natural Sciences, 2017
- Tara Lewis—1st Place WSWS Oral/Poster Competition, 2017
- Megan Lewien—1st place CSSA C01 Poster Competition, 2016
- Kendra Jernigan—1st place CSSA C01 Poster Competition, 2015
- Erika Kruse—1st place Plant Graduate Student Oral Presentation, Western Society of Crop Science, 2015
- Kendra Jernigan—1st place Plant Graduate Student Oral Presentation, Western Society of Crop Science, 2014
- Yukiko Naruoka—Women in Triticum award presented by the Borlaug Global Rust Initiative, 2012
- *John Kuhn*—SURCA Crimson Award for best overall poster in the area of applied sciences, 2014
- Shiferaw Gizaw—3rd place, WSU Global Case Competition, 2013

VISITING SCIENTISTS

- Dr. Siroos Mahfoozi (Seed and Plant Improvement Institute, Iran), 2012
 - Identification of cold tolerance genes in three recombinant inbred line populations

COLLABORATIVE PROJECTS

- Dr. Martin Matute (University of Arkansas-Pine Bluff), 2011-2015
 - Analysis of wheat-nematode relationships in Washington and Arkansas

ADVISEES

- Integrated Plant Sciences Academic Advisor 2009-2013; 34 total advisees.

UNDERGRADUATE EMPLOYEES

- Current: 10
- Past: 61

AWARDS

- October 2019: WSU Technology with Impactful Contribution to Society
- November 2017: Assessment Excellence in IPS and AFS Degree Programs
- December 2014: Early Career Excellence Award for CAHNRS
- October 2012: Award of Excellence in recognition of the WERA-1009 program:
Systems to Improve End-Use Quality of Wheat
- MAY 2007: Harry E. Goldsworthy Wheat Research Fund Award Recipient
- MARCH 2007: Seminar Award, Honorable Mention, Washington State University
Graduate Student Expo
- FEB. 2006: Seminar Award, Excellence in Presentation, University of Idaho Graduate
Research Expo
- JUNE 2005: Seminar Award, Honorable Mention, Western Society of Crop Science
- DEC. 2003: University of Idaho Alumni Award for Excellence

PROFESSIONAL SERVICE ACTIVITIES

International

- Guest Editor; Frontiers in Genetics; “Genetics and Genomics to Enhance Crop
Production, Towards Food Security”, 2019-2020
- Guest Editor; Agronomy; “QTL Identification in Plant Species”, 2017-2018
- Thesis reviewer, Arid Agriculture University, Pakistan 2017
- BARD proposal reviewer; 2013, 2015, 2017
- Gave scientific input on iPlant Collaborative; 2010
- Gave scientific input on development of IB Fieldbook for Generation Challenge
Programme; 2010

National

- National Wheat Improvement Committee PNW Representative, 2017-2019
- Promotion and Tenure External Review, 2017; 2018; 2019; 2020
- Editor for Journal of Plant Registrations 2020-2022
- Associate Editor for Journal of Plant Registrations, 2018-2019
- CSSA C7 Board Representative, 2016-2018; 2019-2021
- Ad-Hoc Grant Review, April 2019

- USDA Grant Panel, November 2017
- USDA Grant Panel, April 2016
- USDA Grant Panel, June 2013
- National Association of Plant Breeders Borlaug Scholar Mentor, 2018; 2019
- National Association of Plant Breeders Education Committee, 2012-present; Vice-President 2015-2016; President 2016-2017
- President, WERA-97, 2011-2012
- Vice-President, WERA-97, 2010-2011
- National Wheat Improvement Committee ‘Fly-In’, Washington DC, 2011; 2018; 2019

University and College of Agricultural, Human, and Natural Resource Sciences

- CSS Search Committee Chair for Barley Breeding Position (2019)
- CSS Executive Committee (2014-2019)
- CSS Space Allocation Committee (2014-2015)
- CSS Search Committee Chair for Farm Manager Position (2014)
- CAHNRS Search Committee for Quantitative Geneticist (2013)
- CAHNRS Search Committee for Biosensors position (2012)
- Greenhouse Committee (2012-2015)
- Greenhouse Space Allocation Committee (2009-2015)
- Doubled Haploid Laboratory Steering Committee (2010-2017)
- AFS and IPS Curriculum Committee (2010-present)
- CAHNRS Scholarship Reviewer (2010-present)
- AFS and IPS Steering Committee (2010-present)
- AFS and IPS Assessment Committee (2010-present)
- CSS Search Committee for Ag Education position (2010-2011)
- Numerous Facility Tours highlighting wheat breeding programs

Reviewer of Manuscripts

- Theoretical and Applied Genetics
- Journal of Applied Genetics
- Crop Science
- Genome
- Journal of Plant Registrations
- Breeding Science
- Phytopathology

- Photosynthesis Research
- Crop Protection
- Journal of Cereal Science
- Frontiers
- PLoS ONE
- Agronomy

Note: Reviewed 2 manuscripts in 2009; 4 in 2010; 4 in 2011; 4 in 2012; 2 in 2013; 6 in 2014; 3 in 2015; 4 in 2016; 5 in 2017; 5 in 2018; 5 in 2019; 4 in 2020.

PROFESSIONAL DEVELOPMENT:

- Provost Leadership Academy, Washington State University, 2017-2018.
- Attended “Advisor Training 101” on April 11th, 2011.
- Attended “NSF CAREER proposal workshop” on March 29, 2011.
- Attended the “Elluminate 101” training on Nov. 2010 regarding utilizing the Elluminate program to deliver distance courses.
- Attended the Fall 2010 CAHNRS Community Building Workshop “Enhancing Our Workplace by Improving Our Life Skills”, a series of 4 workshops on interpersonal communication, reaching consensus, and navigating conflict.

PROFESSIONAL AFFILIATIONS:

- **National Association of Plant Breeders** (2012-present). This group gathers plant breeders from multiple different crops into one organization to share ideas and techniques of plant breeding and associated research.
- **Member of the American Society of Agronomy and Crops Science Society of America** (2006 – Present). This group of organizations is dedicated to coordinating agricultural research and education in the United States.
- **Gamma Sigma Delta Agricultural Honors Society.**
- **Phi Sigma Biological Honors Society.**