Curriculum Vitae

Xiwen Cai
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EDUCATION

Ph.D.	1998	Wheat Genetics and Breeding, Washington State University, Pullman, WA
M.S.	1986	Wheat Cytogenetics, Nanjing Agricultural University, Nanjing, P. R. China
B.S.	1983	Agronomy, Huazhong Agricultural University, Wuhan, P. R. China

POSITIONS HELD

Research Geneticist	2021 – present	USDA-ARS
Professor	2014 – 2021	North Dakota State University
Associate Professor	2008 – 2014	North Dakota State University
Assistant Professor	2002 – 2008	North Dakota State University
Postdoctoral Scientist	1998 – 2001	Washington State University
Graduate Research Assistant	1995 – 1998	Washington State University
Visiting Scientist	1994 – 1994	USDA-ARS, Pullman, WA
Lecturer/Assistant Professor	1986 – 1993	Huazhong Agricultural University, China
Graduate Research Assistant	1983 – 1986	Nanjing Agricultural University, China

RESEARCH EXPERIENCE & CAREER HIGHLIGHTS

2021-present: Full time, Research Geneticist, USDA-ARS, Wheat, Sorghum and Forage Research Unit, University of Nebraska-Lincoln East Campus, Lincoln, NE

- *Research activities*
  - Gene discovery and characterization for resistance to Fusarium head blight and other diseases and insects in wheat and barley.
  - Developing wheat and barley germplasm/varieties by exploring the primary, secondary, and tertiary gene pools.
  - Enriching and diversifying the genetic variability of wheat and barley by chromosome engineering-based gene introgression.
  - Performing homoeologous recombination-based genome studies in wheat, barley, and related grass species.
  - Investigating haploidization and polyploidization in wheat, barley, and related grass species using genomics and cytogenetics resources and technologies.
  - Developing effective doubled haploid systems to accelerate breeding in wheat and barley.
  - Developing new strategies and methodologies of generating and capturing favorable haplotypes in wheat and barley breeding.

2002-2021: Full time, Assistant-Associate-Full Professor, Leader of the Wheat Genetics and Cytology Program at North Dakota State University, Fargo, ND

- *Research activities*
  - Identifying and characterizing novel sources of resistance to Fusarium head blight (FHB) and other major diseases/insects in the region, and tolerance to adverse environmental conditions (e.g. drought, salt, and waterlogging) in wheat and its relatives.
  - Incorporating novel genes for resistance to FHB and other major diseases into adapted wheat genotypes to diversify and strengthen host resistance to the important diseases.
  - Harnessing the genetic diversity of wheat ancestors and related wild grasses to enrich and diversify the wheat genome by genomics-enabled chromosome engineering.
  - Performing homoeologous recombination-based gene introgression for germplasm development and developing unique genomic resources for genome study in wheat and its relatives.
  - Mapping, cloning, and manipulating economically and biologically important genes for wheat improvement using the genomics resources/tools currently available in wheat, other Triticeae species, and models.
  - Characterizing and transferring relevant genes from barley to wheat for the development of effective haploid production systems.
  - Understanding and manipulating the mitotic and meiotic processes to improve the efficacy and throughput of wheat breeding.

- *Major accomplishments:*
  - Obtained federal (USDA-NIFA, NSF, and USWBSI), state, and commodity grants totaling over 3.2 million dollars as PI and $531,959 as co-PI to support his research on wheat genetics, genomics, and germplasm development.
  - Published 70 papers in peer-reviewed journals, one germplasm registration article (peer-reviewed), three peer-reviewed book chapters, 12 peer-reviewed proceeding papers, 82 conference abstracts, one non-refereed article, and two manuscripts under preparation.
  - Developed 167 FHB-resistant hard red spring wheat and 59 FHB-resistant durum wheat germplasm lines with diverse agronomic characteristics. Some of them are also resistant to rusts, tan spot, and Septoria nodorum blotch. They have been provided to the wheat breeding programs for uses in variety development.
  - Developed a large diverse gene pool of wheat with the genes derived from wheat ancestors and relatives.
  - Developed a new genomics-enabled chromosome engineering pipeline with significantly improved efficacy and throughput in alien gene introgression and genome mapping.
  - Bridged gene flow from the wild species *Aegilops speltoides* and *Thinopyrum elongatum*, a rich gene source for wheat improvement, into the wheat genome by inducing meiotic homoeologous recombination.
  - Revealed new insight into the origin of the wheat B genome, which ancestor remains obscure, using integrated genomics and molecular cytogenetics technologies.
  - Constructed a unique physical framework of the wheat B genome by homoeologous recombination-based chromosome mapping.
  - Enabled gene introgression from wild species directly into modern U.S. wheats for wheat improvement by implementing the *ph1b* genetic system in the major classes of U.S. wheats.

- Cloned the homoeoalleles of the gene for the meiotic cohesion protein (Rec8) in polyploid wheat and revealed their differential expression patterns under polyploid condition.
- Uncovered the subcellular mechanism of unreductional meiotic cell division that leads to unreduced gametes and chromosome doubling in wheat.

➢ *Management and supervision*
- Leading a diverse research team to perform research on wheat genetics, genomics, molecular cytogenetics, gene introgression, and germplasm development.
- Fostering a cooperative work environment for the research team.
- Supervising and training graduate students (10), postdoctoral research fellows (7), visiting scientists (5), research specialists (3), undergraduate research assistants (15), and high school research assistants (4).
- Managing research facilities, resources, and funding in the projects.

➢ *Collaboration and professional service*
- Built a productive collaboration network with national and international researchers in wheat breeding, genetics, genomics, bioinformatics, statistics, pathology, entomology, agronomy, soil science, and computer science.
- Provided leadership and professional service to the plant research community and federal funding agencies by serving on the Executive Committee, Steering Committee, Coordinated Project Committees, Research Area Committee of the U.S. Wheat & Barley Scab Initiative (USWBSI), Editorial Boards of the scientific journals, Review Panels for USDA-NIFA and NSF.
- Chaired and organized the national workshop "Searching for Alien Genes to Enhance Resistance of Wheat and Barley to Fusarium Head Blight" in Fargo, ND, August 14, 2006.
- Served on the organization committee of the international scientific conference "The 22nd International Triticeae Mapping Initiative and 4th Natl. Wheat Genomics Committee Joint Workshop" in Fargo, ND, June 24-29, 2012.
- Participated in multiple visits of Capitol Hill in Washington, D.C. with the National Association of Wheat Growers and National Wheat Improvement Committee to promote wheat research.
- Invited to give oral presentations of his work in the national and international conferences, and international universities/research institutions.
- Chaired and served on the multiple Faculty/Postdoc/Research Specialist search committees, and many other institutional committees at NDSU.

1994-2001: Visiting Scientist (full time)/Graduate Research Assistant (half time)/Postdoctoral Scientist (full time), Washington State University and USDA-ARS, Pullman, WA
- Developed over 60 advanced soft white winter wheat breeding lines from the wide crosses between wheat and its relatives.
- Developed over 140 perennial wheat breeding lines from the wide crosses between wheat and its perennial relatives.

- Published 6 peer-reviewed journal articles, 2 peer-reviewed proceeding papers, and 5 proceeding abstracts.
- Managed the perennial wheat genetics and breeding project.

1986-1993: Lecturer and Researcher (full time), Huazhong Agricultural University, China

- Led the Plant Cytogenetic Project with research emphasis on the genome analysis of wheat and its relatives and cytogenetic characterization of apomixis in rice.
- Published 4 peer-reviewed journal articles and 1 peer-reviewed proceeding paper.

1983-1986: Graduate Research Assistant (half time), Nanjing Agricultural University, China

- Received training in plant cytogenetics, alien introgression for wheat germplasm development, and professional skills as a researcher.
- Performed cytogenetic studies on wheat and its relatives.
- M.S. thesis research was published in Theor. Appl. Genet. 1989.

PUBLICATIONS

Peer-reviewed journal articles

1. Gill, B. K., Klindworth, D. L., Rouse, M. N., Zhang, J., Zhang, Q., Sharma, J. S., Chu, C., Long, Y., Chao, S., Olivera, P. D., Friesen, T. L., Zhong, S. , Jin, Y., Faris, J. D., Fiedler, J. D., Elias, M. E., Liu, S., Cai, X., and Xu, S. S. 2021. Function and evolution of allelic variations of Sr13 conferring resistance to stem rust in tetraploid wheat (Triticum turgidum L.). The Plant Journal 106:1674–1691, DOI: 10.1111/tpj.15263.

2. Talukder, Z. I., Underwood, W., Misar, C. G., Seiler, G. J., Liu, Y., Li, X., Cai, X., and Qi, L. 2021. Unraveling the Sclerotinia basal stalk rot resistance derived from wild *Helianthus argophyllus* using a high-density SNP linkage map. Front Plant Sci. 2021;11:617920. Published 2021 Feb 3. doi:10.3389/fpls.2020.617920.

3. Zhang, M., Zhang, W., Zhu, X., Sun, Q., Chao, S., Yan, C., Xu, S.S., Fiedler, J. D., and Cai, X. 2020. Dissection and physical mapping of wheat chromosome 7B by inducing meiotic recombination with its homoeologues in *Aegilops speltoides* and *Thinopyrum elongatum*. Theor Appl Genet 133:3455–3467. https://doi.org/10.1007/s00122-020-03680-3

4. Zhang, M., Zhang, W., Zhu, X., Sun, Q., Chao, S., Yan, C., Xu, S.S., Fiedler, J. D., and Cai, X. 2020. Partitioning and mapping of wheat chromosome 3B and its homoeologue in *Thinopyrum elongatum* by homoeologous recombination. Theor Appl Genet 133:1277–1289.

5. Talukder, Z. I., Underwood, W., Ma, G., Seiler, G. J., Misar, C. G., Cai, X., and Qi, L. 2020. Genetic dissection of phomopsis stem canker resistance in cultivated sunflower using high density SNP linkage map. Int J Mol Sci 21, 1497; doi:10.3390/ijms21041497.

6. Ibba, M. I., Zhang, M., Cai, X., and Morris, C. F. 2019. Identification of a conserved ph1b-mediated 5DS-5BS crossing over site in soft-kernel durum wheat (*Triticum turgidum* subsp. *durum*) lines. Euphytica 215: 200 (doi: 10.1007/s10681-019-2518-y).

7. Morris, C. F., Kiszonas, A. M., Murray, J., Boehm Jr., J., Ibba, M. I., Zhang, M., and Cai, X. 2019. Re-evolution of durum wheat by introducing the hardness and *Glu-D1* loci. Frontiers in Sustainable Food Systems 3 (103).

8. Zhang, W., Zhu, X., Zhang, M., Shi, G., Liu, Z., and Cai, X. 2019. Chromosome engineering-mediated introgression and molecular mapping of novel *Aegilops speltoides*-derived resistance genes for tan spot and Septoria nodorum blotch diseases in wheat. Theor Appl Genet 132:2605–2614

9. Gyawali, Y., Zhang, W., Chao, S., Xu, S. S., and Cai, X. 2019. Delimitation of wheat *ph1b* deletion and development of *ph1b*-specific DNA markers. Theor Appl Genet 132:195–204.

10. Szabo-Hever, A., Zhang, Q., Friesen, T. L., Zhong, S., Elias, E. M., Cai, X., Jin, Y., Faris, J. D., Chao, S., and Xu, S. S. 2018. Enhanced resistance to Fusarium head blight in synthetic hexaploid wheats derived from *Aegilops tauschii* and diverse *Triticum turgidum* subspecies. Front Plant Sci; https://doi.org/10.3389/fpls.2018.01829.

11. Niu, Z., Chao, S., Cai, X., Whetten, R., Breiland, M., Cowger, C., Chen, X., Friebe, B., Gill, B. S., Rasmussen, J., Klindworth, D. L., and Xu, S. S. 2018. Molecular and cytogenetic characterization of six wheat-*Aegilops markgrafii* disomic addition lines and their resistance to rusts and powdery mildew. Front Plant Sci 9: 1616; doi: 10.3389/fpls.2018.01616.

12. Ma, G., Zhang, W., Liu, L., Chao, W. S., Gu, Y., Qi, L., Xu, S. S., and Cai, X. 2018. Cloning and characterization of the homoeologous genes for the Rec8-like meiotic cohesin in polyploid wheat. BMC Plant Biology 18:224; https://doi.org/10.1186/s12870-018-1442-y.

13. Zhang, W., Zhu, X., Zhang, M., Chao, S., Xu, S. S., and Cai, X. 2018. Meiotic homoeologous recombination-based mapping of wheat chromosome 2B and its homoeologues in *Aegilops speltoides* and *Thinopyrum elongatum*. Theor Appl Genet 131:2381–2395.

14. Zhang, W., Zhang, M., Zhu, X., Cao, Y., Sun, Q., Ma, G. Chao, S., Yan, C., Xu, S. S., and Cai, X. 2018. Molecular cytogenetic and genomic analyses reveal new insights into the origin of the wheat B genome. Theor Appl Genet 131: 365–375.

15. Fan C, Feng S, Huang J, Wang Y, Wu L, Li X, Wang L, Tu Y, Xia T, Li J, Cai X, Peng L. 2017. AtCesA8 driven OsSUS3 expression leads to largely enhanced biomass

saccharification and lodging resistance by distinctively altering lignocellulose features in rice. Biotechnol Biofuels10: 221.

16. Boehm, J. D., Zhang, M., Cai, X., and Morris, C. F. 2017. Molecular and cytogenetic characterization of the 5DS-5BS chromosome translocation conditioning soft kernel texture in durum wheat. Plant Genome 10: 1-11.

17. Somo, M., Pirseyedi, S.-M., Cai, X., and Marais, F. 2017. Modified versions of the Lr62 translocation of wheat. Crop Sci. 57: 1898–1905.

18. Zhang, W., Cao, Y., Zhang,M., Zhu, X., Ren, S., Long, Y., Gyawali, Y., Chao, S., Xu, S. S., and Cai, X. 2017. Meiotic homoeologous recombination-based alien gene introgression in the genomics era of wheat. Crop Sci 57: 1189-1198 (Crop Wild Relatives Special Section).

19. Curwen-McAdams, C., Arterburn, M., Murphy, K., Cai, X., and Jones, S.S. 2017. Toward a taxonomic definition of perennial wheat: A new species ×*Tritipyrum* aaseae described. Genetic Resources and Crop Evolution 64: 1651–1659.

20. Liu, Z., Seiler, G. J., Gulya, T.J., Feng, J., Rashid, K. Y., Cai, X., Jan, C. C. 2017. Triploid production from interspecific crosses of two diploid perennial Helianthus with cultivated sunflower. G3 (Genes, Genomes, Genetics) 7: 1097-1108.

21. Somo, M., Pirseyedi, S.-M., Cai, X., Poudel, R., Chao, S., and Marais, F. 2016. Mapping of *Lr56* translocation recombinants in wheat. Plant Breed 135: 413-419.

22. Zhu, X., Zhong, S., Chao, S., Gu, Y., Kianian, S., Elias, E., and Cai, X. 2016. Toward a better understanding of the genomic region harboring Fusarium head blight resistance QTL Qfhs.ndsu-3AS in durum wheat. Theor Appl Genet 129:31-43.

23. Zhu, X., Zhong, S., and Cai., X. 2016. Effects of D-genome chromosomes and their A/B-genome homoeologs on Fusarium head blight resistance in durum wheat. Crop Sci 56:1049-1058.

24. Qi, L. L., Foley, M. E., Cai, X., and Gulya, T. J. 2016. Genetics and mapping of a novel downy mildew resistance gene, *Pl18*, introgressed from wild *Helianthus argophyllus* into cultivated sunflower (*Helianthus annuus* L.). Theor Appl Genet 129: 741-752.

25. Pirseyedi, S.-M., Somo, M., Poudel, R., Cai, X., McCallum, B., Saville, B., Fetch, T., Chao, S., and Marais, F. 2015. Characterization of recombinants of the Aegilops peregrina-derived *Lr59* translocation of common wheat. Theor Appl Genet 128: 2403-2414.

26. Zhang, J., Zou, W., Li, Y., Feng, Y., Zhang, H., Wu, Z., Tu, Y., Wang, Y., Cai, X., Peng, L. 2015. Silica distinctively affects cell wall features and lignocellulosic saccharification with large enhancement on biomass production in rice. Plant Sci 239: 84-91.

27. Wu, Z., Hao, H., Zahoor, Tu, Y., Hu, Z., Wei, F., Liu, Y., Zhou, Y., Wang, Y., Xie, G., Gao, C., Cai, X., Peng, L., Wang, L. 2014. Diverse cell wall composition and varied biomass digestibility in wheat straw for bioenergy feedstock. Biomass Bioenergy 70: 347-355.

28. Zhang, Q., Axtman, J. E., Faris, J. D., Chao, S., Zhang, Z., Friesen, T. L., Zhong, S., Cai, X., Elias, M. E., and Xu, S. S. 2014. Identification and molecular mapping of quantitative trait loci for Fusarium head blight resistance in emmer and durum wheat using a single nucleotide polymorphism-based linkage map. Mol Breed 34: 1677–1687.

29. Carter, A. H., Jones, S. S., Cai, X., Lyon, S. R., Balow, K. A., Shelton, G. B., Higginbotham, R. W., Chen, X. M., Engle, D. A., Baik, B., Guy, S. O., Murray, T. D., Morris, C. F. 2014. Registration of 'Puma' Soft White Winter Wheat. Journal of Plant Registrations 8: 273–278.

30. Liu, Z., Cai, X., Seiler, G. J., Jan, C. C. 2014. Interspecific amphiploid-derived alloplasmic male sterility with defective anthers, narrow disk florets, and small ray flowers in sunflower. Plant Breeding 133: 742–747.

31. Niu, Z., Klindworth, D. L., Yu, G., Friesen, T. L., Chao, S., Jin, Y., Cai, X., Ohm, J.-B., Rasmussen, J. B., Xu, S. S. 2014. Development and characterization of wheat lines carrying stem rust resistance gene Sr43 derived from Thinopyrum ponticum. Theor Appl Genet 127:969–980.

32. Mohamed, S., Chao, S., Acevedo, M., Zurn, J., Cai, X., and Marais, F. 2014. A genomic comparison of homoeologous recombinants of the Lr19 (T4) translocation in wheat. Crop Sci 54:565–575.

33. Liu, Z., Wang, D., Feng, J., Seiler, G. J., Cai, X., Jan, C. C. 2013. Diversifying sunflower germplasm by integration and mapping of a novel male fertility restoration gene. Genetics 193: 727-737.

34. Feng, J., Liu, Z., Cai, X., Jan, C. C. 2013. Toward a molecular cytogenetic map for cultivated sunflower (*Helianthus annuus* L.) by landed BAC/BIBAC clones. G3 (Genes, Genomes, Genetics) 3: 31-40.

35. McArthur, R. I., Zhu, X., Oliver, R. E., Klindworth, D. L., Xu, S. S., Stack, R.W., Wang, R. R. -C., Cai, X. 2012. Homoeology of *Thinopyrum junceum* and *Elymus rectisetus* chromosomes to wheat and disease resistance conferred by the *Thinopyrum* and *Elymus* chromosomes in wheat. Chromosome Research 20: 699-715.

36. Klindworth, D. L., Niu, Z., Chao, S., Friesen, T. L., Jin, Y., Faris, J. D., Cai, X., Xu, S. S. 2012. Introgression and characterization of a goatgrass gene for a high level of resistance to Ug99 stem rust in tetraploid wheat. G3 (Genes, Genomes, Genetics) 2: 665-673.

37. Yu, G., Wang, T. Anderson, M. K., Harris, M. O., Cai, X., Xu, S. S. 2012 Evaluation and haplotype analysis of elite synthetic hexaploid wheat lines for resistance to Hessian fly. Crop Sci 52: 752-763.

38. Niu, Z., Klindworth, D. L., Friesen, T. L., Chao, S., Jin, Y., Cai, X., Xu, S. S. 2011. DNA marker-assisted chromosome engineering of wheat carrying stem rust resistance gene *Sr39* derived from *Aegilops speltoides*. Genetics 187: 1011-1021.

39. Cai, X., Xu, S. S., Zhu X. 2010. Mechanism of ploidy-dependent unreductional meiotic cell division in polyploid wheat. Chromosoma 119:275–285.

40. Yu, G., Williams, C. E., Harris, M. O., Cai, X., Mergoum, M., Xu, S. S. 2010. Development and validation of molecular markers closely linked to *H32* for resistance to Hessian fly in wheat. Crop Sci 50: 1325–1332.

41. Yu, G., Zhang, Q., Klindworth, D. L., Friesen, T. L., Knox, R., Jin,Y., Zhong, S., Cai, X., Xu, S. S. 2010. Molecular and cytogenetic characterization of wheat introgression lines carrying the stem rust resistance gene *Sr39*. Crop Sci 50:1393–1400.

42. Yue, B., Vick, B. A. Cai, X., Hu, J. 2010. Genetic mapping for the *Rf1* (fertility restoration) gene in sunflower (*Helianthus annuus* L.) by SSR and TRAP markers. Plant Breeding 129: 24-28.

43. Xu, S. S., Jin, Y., Klindworth, D. L., Wang, R. R. -C., Cai, X. 2009. Evaluation and characterization of seedling resistance to stem rust Ug99 races in wheat-alien species derivatives. Crop Sci. 49: 2167–2175.

44. Yu, G., Cai, X., Harris, M. O., Xu, S. S. 2009. Saturation and comparative mapping of the genomic region harboring Hessian fly resistance gene *H26* in wheat. Theor. Appl. Genet. 118: 1589-1599.

45. Yue, B., Cai, X., Yuan, W. Vick, B. A., Hu, J. 2009. Mapping quantitative trait loci (QTL) controlling seed morphology and disk diameter in sunflower (*Helianthus annuus* L.). HELIA 32: 17-36.

46. Yue, B., Cai, X., Vick, B. A., Hu, J. 2009. Genetic characterization and molecular mapping of a chlorophyll deficiency gene in sunflower (*Helianthus annuus* L.). J. Plant Physiol. 166: 644-651.

47. Yue, B., Cai, X., Vick, B. A., Hu, J. 2009. Genetic diversity and relationship among 177 public sunflower inbred lines assessed by TRAP markers. Crop Sci. 49: 1242-1249.

48. Faris, J. D., Xu, S. S., Cai, X., Friesen, T. L., Jin, Y. 2008. Molecular and cytogenetic characterization of a durum wheat-*Aegilops speltoides* chromosome translocation conferring resistance to stem rust. Chromosome Research 16: 1097-1105.

49. Yue, B., Radi, S. A., Vick, B. A., Cai, X., Tang, S., Knapp, S. J., Gulya, T. J., Miller, J. F., Hu, J. 2008. Identifying quantitative trait loci for resistance to Sclerotinia head rot in two USDA sunflower germplasms. Phytopathology 98: 926-931.

50. Oliver, R. E., Cai, X., Wang, R. Xu, S. S., Friesen, T. L. 2008. Resistance to tan spot and Stagonospora nodorum blotch in wheat-alien species derivatives. Plant Disease 92: 150-157.

51. Chen, X., Faris, J. D., Hu, J., Stack, R., Adhikari, W. T., Elias, M. E., Kianian, S. F., Cai, X. 2007. Saturation and comparative mapping of a major Fusarium head blight resistance QTL in tetraploid wheat. Molecular Breeding 19: 113-124.

52. Oliver, R. E., Stack, R. W., Miller, J. D., Cai, X. 2007. Reaction of wild emmer wheat accessions to Fusarium head blight. Crop Sci 47: 891-897.

53. Cai, X., Xu, S.S. 2007. Meiosis-driven genome variation in plants. Current Genomics 8: 151-161.

54. Oliver, R. E., Cai, X., Friesen, T. L. Halley, S., Stack, R. W., Xu, S. S. 2007. Evaluation of Fusarium head blight resistance in tetraploid wheat (*Triticum turgidum* L.). Crop Sci 48: 213-222.

55. Li, J., Klindworth, D. L., Shireen, F., Cai, X., Hu, J., Xu, S. S. 2006. Molecular characterization and chromosome-specific TRAP marker development for Langdon durum D-genome disomic substitution lines. Genome 49: 1545-1554.

56. Wang, T., Xu, S. S., Harris, M. O., Hu, J. Liu, L., Cai, X. 2006. Genetic characterization and molecular mapping of Hessian fly resistance genes derived from *Aegilops tauschii* in synthetic wheat. Theor Appl Genet 113: 611-618.

57. Oliver, R. E., Xu, S. S., Stack, R. W., Friesen, T. L., Jin, Y., Cai, X. 2006. Molecular cytogenetic characterization of four partial wheat-*Thinopyrum ponticum* amphiploids and their reactions to Fusarium head blight, tan spot, and Stagonospora nodorum blotch. Theor Appl Genet 112: 1473-1479.

58. Xu, S. S., Faris, J. D., Cai, X., Klindworth, D. L. 2005. Molecular cytogenetic characterization and seed storage protein analysis of 1A/1D translocation lines in durum wheat. Chromosome Research 13: 559-568.

59. Oliver, R. E., Cai, X., Xu, S. S., Chen, X., Stack, R. W. 2005. Wheat-alien species derivatives: A novel source of resistance to Fusarium head blight in wheat. Crop Sci 45: 1353-1360.

60. Cai, X., Chen, P. D., Xu, S. S., Oliver, R. E., Chen, X. 2005. Utilization of alien genes to enhance Fusarium head blight resistance in wheat: A review. Euphytica 142: 309-318.

61. Lammer, D., Cai, X. Arterburn, M., Chatelain, J., Murray, T., Jones, S. 2004. A single chromosome addition from perennial *Thinopyrum elongatum* confers a polycarpic, perennial habit to annual wheat. Journal of Experimental Botany 55: 1715-1720.

62. Cai, X., Jones, S. S., Murray, T. D. 2001. Molecular cytogenetic characterization of *Thinopyrum* genomes conferring perennial growth habit in wheat-*Thinopyrum* amphiploids. Plant Breeding 120: 21-26

63. Scheinost, P. L., Lammer, D. L., Cai, X., Murray, T. D., Jones, S. S. 2001. Perennial wheat: The development of a sustainable cropping system for the Pacific Northwest. American Journal of Alternative Agriculture 16: 147-151.

64. Cai, X., Jones, S. S., Murray, T. D. 1998. Molecular cytogenetic characterization of *Thinopyrum* and wheat-*Thinopyrum* translocated chromosomes in a wheat-*Thinopyrum* amphiploid. Chromosome Research 6:183-189.

65. Cai, X., Jones, S. S. 1997. Direct evidence for high level of autosyndetic pairing in hybrids of *Thinopyrum intermedium* and *Th. ponticum* with *Triticum aestivum*. Theor Appl Genet 95: 568-572.

66. Cai, X., Jones, S. S., Murray, T. D. 1996. Characterization of an *Agropyron elongatum* chromosome conferring resistance to Cephalosporium stripe in common wheat. Genome 39: 56-62.

67. Cai, X. 1994. Chromosome translocation in the common wheat variety 'Amigo'. Hereditas 121:199-202.

68. Cai, X. 1994. Chromosome analysis and C-banded karyotype of 'Jingzhou-heimai' (*Secale cereale* L.). J Huazhong Agri Univ 13: 90-92.

69. Cai, X. 1993. Karyotypic evolution of common wheat and hexaploid triticale. J Huazhong Agri Univ 12: 535-543.

70. Cai, X. and Liu, D. 1989. Identification of an 1B/1R wheat-rye chromosome translocation. Theor Appl Genet 77: 81-83.

Wheat germplasm release article (peer-reviewed)

1. Xu, S. S., Cai, X., Wang, T., Harris, M. O., Friesen, T. L. 2006. Registration of two synthetic hexaploid wheat germplasms resistant to Hessian fly. Crop Sci 46: 1401-1402.

Manuscripts under preparation

1. Gyawali, Y., Zhang, W., Zhang, M., and Cai, X. 2020. Molecular marker-assisted introgression of 'Chinese Spring' wheat *ph1b* deletion into modern wheat varieties. Intended submission to Molecular Breeding.

2. Zhang, W. and Cai, X. 2020. Reciprocal expression analysis of *Aegilop speltoides*-derived gene for stunted growth on chromosome 2S and its homoeologue on wheat chromosome 2B. Intended submission to Plant J.

Book chapters (peer-reviewed)

1. Zhang, W., and Cai, X. 2019. Alien Introgression and breeding of synthetic wheat. In: Advances in Breeding Techniques for Cereal Crops. Ed by Frank Ordon and Wolfgang Friedt. Burleigh Dodds Science Publishing, pp3-30.

2. Xu, S. S., Liu, Z., Zhang, Q., Niu, Z., Jan, C. C., Cai, X. 2016. Chromosome painting by GISH and multi-color FISH. Methods Mol Biol 1429: 7-21.

3. Xu, S. S., Friesen, T. L., Cai, X. 2004. Sources and genetic control of resistance to Stagonospora nodorum blotch in wheat. p. 449-469. In S.G. Pandalai (ed.) Recent Research Developments in Genetics & Breeding, Research Signpost Press, India.

Refereed Research Articles in Proceedings

1. Morris, C. F., Kiszonas, A. M., Murray, J., Boehm, J., Ibba, M. I., Zhang, M., and Cai, X. 2018. RE-evolution of durum wheat by introducing the Hardness and *Glu-D1* loci. The Proceedings of the International Conference "From Seed to Pasta III", Bologna, Italy. September 19-21, 2018.

2. Liu, Z., Cai, X., Seiler, G. J., Gulya, T. J., Rashid, K. Y., Jan, C. C. 2010. Transferring Sclerotinia resistance genes from wild *Helianthus* species into cultivated sunflower. The 32nd Sunflower Research Workshop, January 13-14, 2010, Fargo, ND. Available: http://www.sunflowernsa.com/research/research-workshop/documents/Liu_ResistanceGenes_10%20.pdf

3. Feng, J., Liu, Z., Cai, X., Seiler, G. J., Gulya, T. J., Rashid, K. Y., Jan, C. C. 2009. Transferring Sclerotinia resistance genes from wild Helianthus into cultivated sunflower. Proceedings 31st Sunflower Research Workshop, National Sunflower Association, January 13-14, 2009, Fargo, ND.

4. Cai, X., Xu, S. S., Oliver, R. E., Zhang, Q., Stack, R. W., Zhong, S., Friesen, T. L., Halley, S., Elias, E. M. 2008. Alien Introgression for FHB Resistance in Wheat - Challenges and Strategies. p. 716-718. In: Proc. 11th Intern. Wheat Genet. Symp. (Eds.) R. Appels, R. Eastwood, E. Lagudah, P. Langridge, M. Mackay, L. McIntye, and P. Sharp. Sydney University Press, Brisbane, Australia. Aug. 24-29, 2008.

5. Xu, S. S., Dundas, I. S., Pumphrey, M. O., Jin, Y., Faris, J. D., Cai, X., Qi, L. L., Friebe, B. R., Gill, B. S. 2008. Chromosome engineering to enhance utility of alien species-derived stem rust resistance. p. 12-14. In: Proc. 11th Intern. Wheat Genet. Symp. (Eds.) R. Appels, R. Eastwood, E. Lagudah, P. Langridge, M. Mackay, L. McIntye, and P. Sharp. Sydney University Press. Brisbane, Australia. Aug. 24-29, 2008.

6. Yue, B., Vick, B. A., Miller, J. F., Cai, X., Hu, J. 2008. Construction of a linkage map with TRAP markers and identification of QTL for four morphological traits in sunflower (*Helianthus annuus* L.). p. 655-660. In: Velasco L (ed.), Proc. 17th Intern. Sunflower Conference, Cordoba, Spain, June 8-12, 2008.

7. Feng, J., Seiler, G. J., Gulya, T. J., Cai, X., Jan, C. C. 2008. Incorporating Sclerotinia stalk

rot resistance from diverse perennial wild *Helianthus* species into cultivated sunflower. In: Proc. 30th annual NSA Research Forum (http://www.sunflowernsa.com/research/research-workshop/documents/Feng_etal_StalkRot_08.pdf), Fargo, North Dakota, Jan. 10-11, 2008.

8. Yue, B., Cai, X., Yuan, W., Vick, B. A., Hu, J. 2008. Mapping the quantitative trait loci (QTL) controlling seed morphology in sunflower (*Helianthus annuus* L.). In: Proc. 30th annual NSA Research Forum (http://www.sunflowernsa.com/research/research-workshop/documents/Feng_etal_StalkRot_08.pdf), Fargo, North Dakota, Jan. 10-11, 2008.

9. Chen, J., Miller, J., Gulya, T., Vick, B. A., Cai, X., Hu, J. 2004. Searching for DNA markers associated with *Sclerotinia* tolerance in cultivated sunflower. p. 631-636. In: G.J. Seiler (ed.) Proc. 16th Intern. Sunflower Conference, Fargo, ND. Aug. 29 - Sep. 2, 2004.

10. Duan, L., Cai, X., Li, Z., Tian, X., He, Z. 2004. Effects of 20% paclobutrazol·mepiquat chloride micro-emulsion on lodging resistance and yield of wheat. p. 67-75. In: D.J. Barcel (ed.) Proc. 16th Annual Conference of Western Plant Growth Regulator Society, Sacramento, CA. Jan. 14-15, 2004.

11. Lammer, D., Cai, X., Li, H., Arterburn, M., Chatelain, Greco, J. A., Lyon, S., Gollnick, M., Murray, T.D., and Jones, S.S. 2003. Utilization of *Thinopyrum* spp. in breeding winter wheat for disease resistance, stress tolerance, and perennial habit. Proceedings of the First Central Asian Wheat Conference, Almaty, Kazakhstan. June 10-13, 2003. Ed by A. Morgounov, A. McNab, K.G. Campbell, and R. Parada. pp 147-151

12. Cai, X, Stack, R. W., Froberg, R. C, Maan, S. S. 2003. Genetic characterization of Fusarium head blight resistance in spring wheat. p.1108-1110. In: Proc. 10th Intern. Wheat Genet. Symp. Italy, S.I.M.I., Roma, Italy. Sept. 1-6, 2003.

13. Cai, X., Lammer, D., Murray, T. D., Jones, S. S. 2001. Perennial wheat development and genetic characterization of perennial growth habit. p.163-165. In: Proc. Intern. Wheat Genet. and Breed. Symp.-Prospects of Wheat Genetics and Breeding for the 21st Century. China Agri. Scientech Press, Beijing, China. May 9-11, 2001.

14. Cai, X., Jones, S. S., Murray, T. D. 1998. Identification and manipulation of *Thinopyrum ponticum* chromatin conferring resistance to Cephalosporium stripe disease and perennial habit in wheat. p.29-31. In: Proc. 9th Intern. Wheat Genet. Symp., Univ. Ext. Press, Univ. of Saskatchewan, Saskatoon, Canada. Aug. 2-7, 1998.

15. Cai, X. 1993. Production and cytogenetics of hybrid and amphiploid between *Triticum tauschii* and *Secale cereale*. p.361-363. In: Proc. 8th Intern. Wheat Genet. Symp., China Agri. Sci. Press, Beijing, China. July 20-25, 1993.

Abstracts/posters in Proceedings/Conferences

1. Ren, S., Zhu, X., Leng, Y., Zhang, W., Talukder, Z., Zhong, S., Fiedler, J., Qi, L., and Cai, X. 2020. Toward a better understanding of the hexaploid wheat-derived Fusarium head blight

resistance in durum wheat. 2020 National Fusarium Head Blight Forum, Virtual Forum via Zoom, December 7-11, 2020.

2. Zhang, M., Zhang, W., Zhu, X., Sun, Q., Chao, S., Yan, C., Fiedler, J., Xu, S. S., and Cai, X. 2020. Partitioning and physical mapping of wheat chromosome 3B and its homoeologue 3E in *Thinopyrum elongatum* by inducing homoeologous recombination. Plant and Animal Genome XXVIII Conference, San Diego, CA. January 11-15, 2020.

3. Zhang, W., Zhang, M., Zhu, X., Ren, S., Fiedler, J., Xu, S. S., and Cai, X. 2020. Dissection and cytological mapping of an *Ae. speltoides*-originated gene for stunted growth in wheat. Plant and Animal Genome XXVIII Conference, San Diego, CA. January 11-15, 2020.

4. Danilova, T. V., Zhang, W., Zhang, M., Zhu, X., Poland, J., Fiedler, J., Friebe, B., Cai, X. 2020. Development and application of genome-specific SNP markers for tracing alien introgressions in polyploid wheat genome. Plant and Animal Genome XXVIII Conference, San Diego, CA. January 11-15, 2020.

5. Zhang, J., Long, Y., Gill1, B. K., Sharma, J. S., Zhang, Q., Klindworth, D. L., Cai, X., Friesen, T. L., Faris, J. D., Xu, S. S. 2020. Development and validation of semi-thermal asymmetric reverse PCR markers for Ug99-effective stem rust resistance genes in wheat. Plant and Animal Genome XXVIII Conference, San Diego, CA. January 11-15, 2020.

6. Ren, S., Zhu, X., Leng, Y., Zhang, W., Talukder, Z., Zhong, S., Fiedler, J., Qi, L., and Cai, X. 2019. Molecular mapping of hexaploid wheat-derived Fusarium head blight resistance in durum wheat (poster). 2019 National Fusarium Head Blight Forum, Milwaukee, Wisconsin. December 8-10, 2019.

7. Cai, X., Zhang, W., Zhang, M., Gyawali, Y., Zhu, X., Cao, Y., Naraghi, S. M., Ren, S., Long, Y., Shi, G., Zhang, Q., Ma, G., Sun, Q., Liu, Z., Chen, X., Yan, C., Xu, S. S., and Fiedler, J. 2019. Genomics-enabled chromosome engineering for alien introgression and genome characterization in wheat (*invited talk*). The Joint NIFA-AFRI PD Meeting and 2019 National Association of Plant Breeders Meeting, August 25-29, 2019, Georgia.

8. Cai, X., Zhang, W., Zhang, M., Gyawali, Y., Zhu, X., Cao, Y., Naraghi, S. M., Ren, S., Long, Y., Shi, G., Zhang, Q., Sun, Q., Ma, G., Liu, Z., Yan, C., Chao, S., and Xu, S. S. 2019. Diversification and understanding of the wheat B genome by homoeologous recombination and comparative genome analysis (poster). Proc. 1st Intern. Wheat Congress, Saskatoon, Canada. July 21-26, 2019.

9. Zhang, Q, Long, Y., Friesen, T. L., Jin, Y., Rouse, M. N., Cai, X., Dykes, L., Xu, S. S. 2019. Elimination of yellow pigment gene tightly linked to stem rust resistance gene *Sr43* derived from *Thinopyrum ponticum*. Proc. 1st Intern. Wheat Congress, Saskatoon, Canada. July 21-26, 2019.

10. Long, Y., Sun, Q., Cai, X., Faris, J. D., Harris, M. O., and Wulff, B. B. H., Lagudah, E., and Xu, S. S. 2019. Nested loop PCR (NL-PCR) for amplification of large DNA fragments with complex structures in wheat. Proc. 1st Intern. Wheat Congress, Saskatoon, Canada. July 21-26, 2019.

11. Ibba, M. I., Boehm, J. D., Kiszonas, A. M., Zhang, M., Cai, X, Morris, C. F. 2019. Identification of a conserved *ph1b*-mediated 5DS-5BS crossing over site in soft-kernel durum wheat (*Triticum turgidum* subsp. *durum*) lines. Proc. 1st Intern. Wheat Congress, Saskatoon, Canada. July 21-26, 2019.

12. Zhang, W., Zhu, X., Zhang, M., Shi, G., Liu, Z., and Cai, X. 2019. Chromosome engineering-mediated molecular mapping and introgression of novel *Aegilops speltoides*-derived resistance genes for tan spot and Septoria nodorum blotch diseases in wheat (poster). Plant & Animal Genome XXVII, San Diego, CA, January 12-16, 2019.

13. Gyawali, Y., Zhang, W., and Cai, X. 2018. Delimitation of wheat *ph1b* deletion and development of the *ph1b*-specific DNA markers (poster). Plant & Animal Genome XXVI, San Diego, CA, January 13-17, 2018.

14. Zhang, W., Zhang, M., Zhu, X., Cao, Y., Sun, Q., Ma, G., Chao, S., Yan, C., Xu, S.S., and Cai, X. 2018. Genome-wide homology analysis reveals new insights into the origin of the wheat B genome (poster). Plant & Animal Genome XXVI, San Diego, CA, January 13-17, 2018.

15. Zhang, W., Zhang, M., Cao, Y., Zhu, X., Ren, S., Long, Y., Gyawali, Y., Chao, S., Xu, S.S., and Cai, X. 2017. Enriching and understanding the wheat B genome by meiotic homoeologous recombination. Joint Conference of the National Association of Plant Breeders Annual Meeting and the USDA/NIFA Annual PD Workshop, UC at Davis, CA, August 7-10, 2017.

16. Zhang, W., Zhang, M., Zhu, X., Cao, Y., Ren, S., Long, Y., Gyawali, Y., Chao, S., Xu, S.S., and Cai, X. 2017. Alien Gene Introgression in the Genomics Era of Wheat (poster). Plant & Animal Genome XXV, San Diego, CA, January 14-18, 2017.

17. Cao, Y., Zhang, M., Zhang, W., Zhu, X., Ren, S., Chao, S., Xu, S.S., and Cai, X. 2016. Enriching and understanding the wheat Genome by inducing homoeologous meiotic recombination (poster). Plant & Animal Genome XXIV, San Diego, CA, January 9-13, 2016.

18. Gill, B.K., Niu, Z., Klindworth, D.L., Chao, S., Friesen, T.L., Jin, Y., Rouse, M.N., Cai, X., Zhang, Q., and Xu, S.S. 2016. Introgression of a new Ug99-resistant gene from Thinopyrum junceum into wheat (poster). Plant & Animal Genome XXIV, San Diego, CA, January 9-13, 2016.

19. Zhu, X., Zhong, S., and Cai, X. 2015. Cytogenetic dissection of A, B, and D genome provides new insights into Fusarium head blight resistance in durum wheat (poster). 2015 National Fusarium Head Blight Forum, St. Louis, MO, December 6-8, 2015.

20. Zhang, W., Zhang, M., Zhu, X., Chao, S., Xu, S. S., Cai., X. 2015. Homoeologous pairing and molecular genotyping reveal new evolutionary evidence of wheat B genome (poster). Plant & Animal Genome XXIII, San Diego, CA, January 9-14, 2015.

21. Xu, S. S., Friesen, T. L., Chao, S., Jin, Y, Rouse, M. N., Faris, J. D., Cai, X. 2015. Targeted introgression of stem rust Ug99 resistance from wheatgrasses into pasta and bread wheat (poster). Plant & Animal Genome XXIII, San Diego, CA, January 9-14, 2015.

22. Xu, S. S., Zhang, Q. J., Klindworth, D. L., Jin, Y., Rouse, M. N., Friesen, T. L., Cai, X., Faris, J. D. 2014. New germplasm development through synthetic and other approaches to transfer stem rust resistance from tetraploids into hexaploids. BGRI 2014 Technical Workshop, March 22-25, 2014, Obregon, Mexico.

23. Zhu, X., Zhong, S., Xu, S. S., Elias, E., Jyoti, J., Cai, X. 2014. Effects of durum wheat background on the expression of hexaploid wheat-derived Fusarium head blight resistance genes. 2014 National Fusarium Head Blight Forum, St. Louis, MO, December 7-9, 2014.

24. Zhu, X., Zhang, W., Zhang, M., Chao, S., Somo, M., Ma, G., Xu, S.S., Cai, X. 2014. Homoeologous recombination-based gene introgression and genome mapping in wheat (poster). Plant & Animal Genome XXII, San Diego, CA, January 11-15, 2014.

25. Zhu, X., Zhong, S., Chao, S., Elias, E., Cai, X. 2013. Fine mapping of the genomic region harboring the Fusarium head blight resistance QTL *Qfhs.ndsu-3AS* in durum wheat. *In* Proc. 2013 National Fusarium Head Blight Forum, Milwaukee, WI, December 3-5, 2013. p. 48.

26. Xu, S. S., Zhang, Q. J., Jin, Y., Rouse, M. N., Liu, Z. H., Friesen, T. L., Pumphrey, M. O., Cai, X., Faris, J. D. 2013. Synthetic hexaploids derived from under-exploited tetraploids as a new resource for disease resistance in wheat. The 12th Intern. Wheat Genet. Symp. September 8-14, 2013, Yokohama, Japan.

27. Xu, S. S., Niu, Z., Klindworth, D. L., Zhang, Q., Chao, S., Friesen, T. L., Faris, J. D. Jin, Y., Cai, X. 2013. Chromosome engineering for alien gene introgression in wheat: Progress and prospective. Triticeae Cytogenetics: Past, Present and Future Workshop. September 15-16, 2013. Kyoto, Japan.

28. Zhu, X., Zhong, S., Xu, S. S., Cai, X. 2012. Fusarium head blight reactions of Langdon durum D-genome disomic substitution lines. In Proc. 2012 National Fusarium Head Blight Forum, Orlando, FL, December 4-6, 2012. p. 110.

29. Ma, G., Chao, W. S., Liu, L., Gu., Y. Q., Xu, S. S., Cai, X. 2012. Wheat meiotic cohesin gene TtRec8 and its role in the haploidy-dependent unreductional meiotic cell division. In Proc. 22nd Intern. Triticeae Mapping Initiative and 4th Natl. Wheat Genomics Committee Joint Workshop, Fargo, ND, June 24-29, 2012. p. 52.

30. Xu, S. S., Niu, Z., Klindworth, D. L., Zhang, Q., Chao, S., Friesen, T. L., Faris, J. D., Jin Y.,

Cai, X. 2012. DNA marker-assisted chromosome engineering for efficient alien gene introgression of stem rust resistance in wheat. In Proc. 22nd Intern. Triticeae Mapping Initiative and 4th Natl. Wheat Genomics Committee Joint Workshop, Fargo, ND, June 24-29, 2012. p. 5.

31. Somo, M., Marais, F., Cai, X. 2012. A genomic study of homoeologous recombinants of the *Lr19* (T4) translocation in wheat. In Proc. 22nd Intern. Triticeae Mapping Initiative and 4th Natl. Wheat Genomics Committee Joint Workshop, Fargo, ND, June 24-29, 2012. p. 45.

32. Yu, G., Cai, X., Harris, M. O., Luo, M., Gu, Y. Q., Xu, S. S. 2012. Towards map-based cloning of Hessian-fly resistance gene *H26* derived from *Aegilops tauschii*. In Proc. 22nd Intern. Triticeae Mapping Initiative and 4th Natl. Wheat Genomics Committee Joint Workshop, Fargo, ND, June 24-29, 2012. p. 38.

33. Ma, G. J., Liu, L. W., Chao, W. S., Gu, Y. Q., Xu, S. S., Cai, X. 2012. Cloning and characterization of the meiotic gene *TtRec8* in tetraploid wheat. International Plant & Animal Genome XX, San Diego, CA, January 14-18, 2012.

34. Zhang, Q. J., Klindworth, D. L., Friesen, T. L., Chao, S., Jin, Y., Cai, X., Xu, S. S. 2012. Development and characterization of wheat lines with *Sr37* for stem rust resistance derived from wild Timopheev's wheat. International Plant & Animal Genome XX, San Diego, CA, January 14-18, 2012.

35. Zhang, X., Kong, F., Zhao, J., Li, A., Cai, X., Kong, L. 2012. Genetic variation of nitrogen-use efficiency in *Aegilops tauschii*. International Plant & Animal Genome XX, San Diego, CA, January 14-18, 2012.

36. Xu, S. S., Klindworth, D. L., Niu, Z., Zhang, Q., Chao, S., Friesen, T. L., Jin, Y., Zhong, S. Faris, J. D., Cai, X., Larkin, P. J. 2012. Introgression of alien genes for resistance to UG99 stem rust in wheat. The 13th International Cereal Rust and Powdery Mildew Conference, August 28-31, 2012, Beijing, China.

37. Xu, S. S., Niu, Z., Klindworth, D. L., Chao, S. Friesen, T. L., Faris, J. D., Jin, Y., Cai, X., Harris, M. O. 2012. Integration of DNA markers with chromosome engineering for efficient introgression of resistance genes from wild grasses into wheat. *In* Proc. 20th International Plant Resistance to Insects, 20th Biennial Workshop, April 1-4, 2012, Minneapolis, MN. p15.

38. Cai, X., Elias, E., Xu, S. S., Kianian, S., Zhong, S., Chao, S. 2011. Fusarium head blight resistance in durum wheat – progress and challenge. *In* Proc. 2011 National Fusarium Head Blight Forum, St. Louis, MO, December 4-6, 2011. p. 12.

39. Xu, S. S., Yu, G. T., Cai, X., Harris, M. O. 2011. Molecular and genetic characterization of Hessian fly-resistance genes in synthetic hexaploid wheat. International Plant & Animal Genomes XIX Conference, San Diego, CA, January 15-19, 2011. http://www.intl-pag.org/19/abstracts/W67_PAGXIX_426.html.

40. Niu, Z., Klindworth, D. L., Friesen, T. L., Chao, S., Jin, Y., Cai, X., Xu, S. S. 2011. DNA marker-assisted chromosome engineering of wheat carrying stem rust resistance gene Sr39 derived from *Aegilops speltoides*. *In* Proc. Plant & Animal Genome XIX Conference, San Diego, CA, January 15-19, 2011. http://www.intl-pag.org/19/abstracts/P04_PAGXIX_222.html

41. Klindworth, D. L., Niu, Z., Chao, S., Friesen, T. L., Faris, J. D., Jin, Y., Cai, X., Xu ,S. S. 2011. Chromosome engineering of wheat stem rust resistance gene *Sr47* in a tetraploid wheat background. *In* Oral Presentations and Poster Abstracts, 2011 BGRI Technical Workshop, June 13 – 16, St. Paul, Minnesota. p. 182.

42. Cai, X., McArthur, R. I., Zhang, Q., Oliver, R. E., Zhong, S., Chao, S., Hareland, G. A., Berzonsky,W., Mergoum, M., Hanson, B., Dong, Y., Xu, S. S. 2010. Development of advanced spring wheat lines with FHB resistance through alien introgression. *In* Proc. 2010 National Fusarium Head Blight Forum, Milwaukee, WI, December 7-9, 2010. p. 136.

43. Xu, S. S., Chu, C., Friesen, T. L., Chao, S., Zhong, S., Halley, S., Cai, X., Elias, E. 2010. Introgression of two major FHB-resistance QTLs into durum and hard red spring wheat [abstract]. *In* Proc. 2010 National Fusarium Head Blight Forum, Milwaukee, WI, December 7-9, 2010. p. 172.

44. Yu, G. T., Xu, S. S., Harris, M. O., Cai, X., Willams, C. C., Gu, Y.-Q., Luo, M.-C. 2010. Development of PCR-based markers for marker-assisted selection of *H26* and *H32* for Hessian fly resistance. *In* Proc. 8th Intern. Wheat Conference, 1-4 June, 2010, St. Petersburg, Russia. p. 328-329.

45. Liu, Z., Cai, X., Seiler, G. J., Gulya, T. J., Rashid, K. Y., Jan, C. C. 2010. Transferring Sclerotinia resistance genes from wild *Helianthus* species into cultivated sunflower [abstract]. The 8th Annual Sclerotinia Initiative Meeting, January 20-22, 2010, Bloomington, MN. p. 23.

46. Liu, Z., Cai, X., Seiler, G. J., Gulya, T. J., Rashid, K. Y., Jan, C. C. 2010. Developing *Sclerotinia* resistant sunflower germplasm utilizing wild perennial *Helianthus* species [abstract]. The 8th European Sunflower Biotechnology Conference, March 1-3, 2010, Antalya, Turkey. p. 26.

47. Pumphrey, M., Dundas, I., Xu, S. S., Jin, Y., Faris, J., Cai, X. Liu, W. X., Qi, L. L., Friebe, B., Gill, B. S. 2009. Cytogenetic manipulation to enhance the utility of alien resistance genes. p29. *In* Full Papers and Abstracts for the Presented Talk of Borlaug Global Rust Initiative (BGRI) 2009 Technical Workshop, Cuidad Obregon, Sonora, Mexico, March 17-20, 2009.

48. Yu, G., Harris, M. O., Cai, X., Xu, S. S. 2009. Fine Mapping of Hessian fly resistance gene *H26* in an *Aegilops tauschii* population. *In* Proc. Plant & Animal Genomes XV Conference, January 10-14, 2009. San Diego, CA.

49. Zhu, X., Chao, S., Gu, Y. Q., Elias, E., Kianian, S., Cai, X. 2009. Comparative mapping of the chromosomal region harboring the Fusarium head blight resistance QTL *Qfhs.ndsu-3AS* in durum wheat. In Proc. 2009 National Fusarium Head Blight Forum, Orlando, FL, December 7-9, 2009. p. 165.

50. Xu, S. S., Friesen, T. L., Chu, C. G., Halley, S., Zhong, S., Cai, X. 2009. Development of durum wheat germplasm with enhanced resistance to Fusarium head blight derived from emmer wheat. In Proc. 2009 National Fusarium Head Blight Forum, Orlando, FL, December 7-9, 2009. p. 160.

51. Chu, C., Chao, S., Cai, X., Zhong, S., Xu, S. S. 2008. Haplotype analysis of genes for Fusarium head blight resistance in tetraploid wheat germplasm. p.156 (abstr.). *In* Proc. 2008 National Fusarium Head Blight Forum, Indianapolis, IN, December 2-4, 2008.

52. Zhang, Q., Oliver, R. E., McArthur, R. I., Chao, S., Stack, R. W., Zhong, S., Xu, S. S., Cai, X. 2008. Introgression of FHB Resistance from Alien Species-Derived Lines into Spring Wheat. p.219 (abstr.). *In* Proc. 2008 National Fusarium Head Blight Forum, Indianapolis, IN, December 2-4, 2008.

53. Yu, G., Harris, M. O., Cai, X., Xu, S. S. 2008. Saturation mapping of Hessian fly resistance gene *H26* in synthetic wheat (abstr.). Proc. Plant & Animal Genomes XVI Conference, January 12-16, 2008. San Diego, CA.

54. Yu, G., Williams, C. E., Harris, M. O., Cai, X., Xu, S. S. 2008. Molecular characterization of the chromosomal region harboring the Hessian fly-resistance genes *H32* and *H26* in wheat. National Wheat Genome Conference, December 4-6, 2008, Indianapolis, IN. Annual Wheat Newsletter 55: 30. http://wheat.pw.usda.gov/ggpages/awn/55/TEXTFILES/NWGC_S16-P01.pdf.

55. Yue, B., Cai, X., Vick, B., Hu, J. 2008. Mapping a major gene affecting leaf color in sunflower (*Helianthus annuus* L.) (abstr.). Proc. Plant & Animal Genomes XVI Conference, January 12-16, 2008. San Diego, CA.

56. Zhu, X., Chen, X., Faris, J. D., Hu, J., Stack, R. W., Adhikari, T., Elias, M. E., Kianian, S. F., Cai, X.,. 2007. Toward a better understanding of a major FHB resistance QTL in tetraploid wheat. Proc. National Wheat Genomics Conference (*invited talk*), November 30 – December 2, 2007. Kansas City, MO.

57. Li, J., Klindworth, D. L., Shireen, F., Cai, X., Hu, J., Xu, S. S. 2007. Molecular characterization of Langdon durum D-genome disomic substitution lines. Proc. Plant & Animal Genomes XV Conference, January 13-17, 2007. San Diego, CA.

58. Xu, S. S., Oliver, R. E., Cai, X., Friesen, T. L., Halley, S., Elias., E. M. 2007. Searching for new sources of FHB resistance in the relatives of wheat. p. 249. *In* Proc. 2007 National Fusarium Head Blight Forum, December 2-4, 2007, Kansas City, MO.

59. Xu, S. S., Cai, X., Harris, M. O. 2007. Identification and genetic characterization of Hessian fly resistance in synthetic wheat. 2007 ESA-NCB Annual Meeting, March 25-28, 2007, Winnipeg, Manitoba, Canada. http://esa.ent.iastate.edu/confreg/?gridaction=viewonepresentation&year=2007&presnum=063.

60. Yue, B., Radi, S., Miller, J., Vick, B., Cai, X., Gulya, T., Hu, J. 2007. Dissecting Quantitative Trait Loci for Head Rot Tolerance in Two Sunflower Lines with Partial Tolerance. Proc. Plant & Animal Genomes XV Conference, January 13-17, 2007. San Diego, CA.

61. Cai, X. and Xu, S. S. 2006. Meiotic restitution: a major mechanism of polyploidization in plants. Collaborative Plant Biology in the Rocky Mountain/Midwest: Impacts and Future Prospects for Plant Genomics (abstr.) (*invited talk*), University of Wyoming, Laramie, WY. June 1-3, 2006.

62. Oliver, R. E., Xu, S. S., Stack, R.W., Cai, X. Introgression and Genetic Characterization of Alien Fusarium Head Blight Resistance in Wheat (abstr.). *In* Proc. 2006 National Fusarium Head Blight Forum (abstr.), Durham, NC, December 10-12, 2006.

63. Yang, B., Xu, S. S., Oliver, R. E. McArthur, R., Guo, B., Cai, X. 2006. Meiosis in the absence of homologous chromosome pairing and recombination. p.155 (abstr.). Proc. Plant & Animal Genomes XIV Conference, January 14-18, 2006. San Diego, CA.

64. Chen, X., Faris, J. D., Hu, J., Stack, R. W., Adhikari, T., Elias, M. E., Kianian, S. F., Cai, X. 2006. Saturation mapping of the major FHB resistance QTL *Qfhs.ndsu-3AS* in tetraploid wheat. p. 174 (abstr.). Proc. Plant & Animal Genomes XIV Conference, January 14-18, 2006. San Diego, CA.

65. Cai, X., Xu, S. S., Oliver, R. E., Stack, R. W. 2005. The alien gene could be one of the 'fighters' against Fusarium head blight in wheat. p. 21 (abstr.). *In* S.M. Canty, T. Boring, J. Wardwell, L. Siler, and R.W. Ward (ed.) Proc. 2005 National Fusarium Head Blight Forum (abstr.) (*invited talk*), Milwaukee, WI. 11-13 Dec. 2005. Michigan State University, East Lansing, MI.

66. Oliver, R. E., Cai, X., Stack, R., Friesen, T., Halley, S., Xu, S. S. 2005. Fusarium head blight resistance in tetraploid wheat. p. 79 (abstr.). *In* S.M. Canty, T. Boring, J. Wardwell, L. Siler, and R.W. Ward (ed.) Proc. 2005 National Fusarium Head Blight Forum, Milwaukee, WI. 11-13 Dec. 2005. Michigan State University, East Lansing, MI.

67. McArthur, R. I., Oliver, R. E., Xu, S. S., Stack, R., Wang, R. R. C., Cai, X. 2005. Molecular characterization of wheat-alien species amphiploids and chromosome addition lines resistant to Fusarium head blight. p. 60 (abstr.). *In* S.M. Canty, T. Boring, J. Wardwell, L. Siler, and R.W. Ward (ed.) Proc. 2005 National Fusarium Head Blight Forum, Milwaukee, WI. 11-13 Dec. 2005. Michigan State University, East Lansing, MI.

68. Wang, T., Xu, S. S., Harris, M. O., Hu, J., Cai, X. 2005. Genetic characterization of Hessian fly resistance in two synthetic hexaploid wheat lines. *In* Agronomy Abstracts, ASA, Madison, WI.

69. Xu, S. S., Faris, J. D., Klindworth, D. L., Cai, X., Hu, J. 2005. Utilization of molecular markers in the characterization and development of germplasm and genetic stocks in wheat. p. 53 (abstr.). Proc. Plant & Animal Genomes XIII Conference, January 15-19, 2005. San Diego, CA.

70. Xu, S. S., Faris, J. D., Cai, X., Klindworth, D. L. 2005. Molecular cytogenetic characterization and seed storage protein analysis of 1A/1D translocation lines of durum wheat carrying Glu-D1d. p. 133 (abstr.). Proc. Plant & Animal Genomes XIII Conference, January 15-19, 2005. San Diego, CA.

71. Chen, X., Cai, X., Hu, J., Kianian, S. 2004. Saturation mapping of the Fusarium head blight resistance QTL *Qfhs-ndsu-3A* in durum wheat. p. 240. *In* S.M. Canty, T. Boring, K. Versdahl, J. Wardwell, and R.W. Ward (ed.) Proc. 2nd Int. Symp. on Fusarium Head Blight, Orlando, FL. 11-15 Dec. 2004. Michigan State University, East Lansing, MI.

72. Chen, X., Hernandez, J. G., Hu, J., Kianian, S., Cai, X. 2004. Comparative mapping of the Fusarium head blight resistance QTLs *Qfhs-ndsu-3AS* and *Qfhs-ndsu-3BS* in wheat. *In* Agronomy Abstracts (CD-ROM), ASA, Madison, WI.

73. Oliver, R. E., Cai, X., Xu, S. S., Stack, R. W., Jin, Y. 2004. Fusarium head blight reaction and cytogenetic characterization of four wheat-*Thinopyrum ponticum* amphiploids. *In* Agronomy Abstracts (CD-ROM), ASA, Madison, WI.

74. Oliver, R. E., Xu, S. S., Cai, X., Stack, R.W., Jin, Y. 2004. Fusarium head blight resistance in wheat-alien species derivatives. p. 139. *In* S.M. Canty, T. Boring, K. Versdahl, J. Wardwell, and R.W. Ward (ed.) Proc. 2nd Int. Symp. on Fusarium Head Blight, Orlando, FL. 11-15 Dec. 2004. Michigan State University, East Lansing, MI.

75. Oliver, R. E., Xu, S. S., Cai, X., Stack, R.W. 2004. Evaluation of tetraploid wheat germplasm for resistance to Fusarium head blight. p. 138. *In* S.M. Canty, T. Boring, K. Versdahl, J. Wardwell, and R.W. Ward (ed.) Proc. 2nd Int. Symp. on Fusarium Head Blight, Orlando, FL. 11-15 Dec. 2004. Michigan State University, East Lansing, MI.

76. Chen, X., Hu, J., Kianian, S., Cai, X. 2003. Saturation mapping of a major Fusarium head blight resistance QTL region in tetraploid wheat. p. 11. *In* S.M. Canty, J. Lewis, and R.W. Ward (ed.) Natl. FHB Forum Proc., Bloomington, MN. 13-15 Dec. Michigan State University, East Lansing, MI.

77. Oliver, R. E., Chen, X., Xu, S. S., Stack, R., Jin, Y., Cai, X. 2003. Identification of novel sources of Fusarium head blight resistance from wheat-alien species derivatives. p. 225. *In* S.M. Canty, J. Lewis, and R.W. Ward (ed.) Natl. FHB Forum Proc, Bloomington, MN. Michigan State University, East Lansing, MI.

78. Cai, X., Haydock, A. K., Jones, S. S., Murray, T. D. 2000. Perennialization of annual wheat using *Thinopyrum* chromatin. The 6th International Wheat Conference, Budapest, Hungary.

79. Cai, X., Jones, S. S., Murray, T. D. 1999. Chromosome constitutions of wheat-*Thinopyrum* amphiploids with perennial growth habit. p. 84 (abstr.). Plant and Animal Genome VII. San Diego, USA.

80. Cai, X., Jones, S. S. 1997. Genome analysis of *Agropyron intermedium* and decaploid *A. Elongatum* (abstr.). Plant and Animal Genome V. San Diego, USA.

81. Cai, X., Jones, S. S., Murray, T. D. 1995. *Agropyron elongatum* chromatin conferring resistance to Cephalosporium stripe in common wheat (abstr.). International Triticeae Mapping Initiative Workshop. JIC Norwich, UK.

82. Cai, X., Jones, S. S., Murray, T. D. 1994. Cephalosporium stripe resistance conferred by *Lophopyrum* spp. chromatin in wheat. Eighty-sixth Annual Meeting of ASA-CSSA-SSSA, Seattle, USA.

Non-refereed article

Cai, X. 2017. Meiotic homoeologous recombination-based alien gene introgression in wheat. Annual Wheat Newsletter 63:83.

INVITED ORAL PRESENTATIONS

1. "Genomics-enabled chromosome engineering for alien introgression and genome characterization in wheat", invited talk in the Joint Conference of 2019 National Association of Plant Breeders meeting and annual NIFA-AFRI PD meeting, Pine Mountain, GA, August 25-29, 2019.

2. "The footprint of goatgrass in the wheat B genome", invited seminar at Huazhong Agricultural University, Wuhan, China, April 14, 2017.

3. "Meiosis-driven genome variation and wheat improvement", invited seminar at Huazhong Agricultural University, Wuhan, China, June 4, 2016.

4. "Meiosis-driven genome variation and wheat improvement", invited seminar in the Biotechnology Center, China National Seeds Group Co. Ltd., Wuhan, China, June 7, 2016.

5. "Genetic engineering for crop improvement, invited seminar at Huazhong Agricultural University, China, May 31, 2015

6. "Homoeologous recombination-based genome mapping and gene introgression", invited seminar at Huazhong Agricultural University, China, March 16, 2014

7. “Chromosome biology: potentials and challenges for plant improvement”, invited seminar at Huazhong Agricultural University, China, June 8, 2014

8. “Manuscript preparation in biology: writing and data Analysis and interpretation”, invited seminar at Huazhong Agricultural University, China, June 9, 2014

9. “FHB resistance in durum wheat: progress and challenge”, invited seminar at Hubei Academy of Agricultural Sciences, China, June 9, 2013.

10. “Genetics: From Mendel to genome and epigenome”, invited seminar in the Biomass and Biofuel Research Center at Huazhong Agricultural University, Wuhan, China on June 6, 2013.

11. “Understanding and manipulating the wheat genome for wheat improvement”, invited seminar in the Life Science and Technology Center, China Seed Group Co., Ltd., Wuhan, China on October 16, 2012.

12. “Live a balanced life”, invited seminar in the Journal Club (professors-led student organization) at Huazhong Agricultural University, Wuhan, China on October 21, 2012.

13. “Biotechnology: Research and Teaching”, invited seminar at Hubei Vocational College of Biotechnology, Wuhan, China on October 26, 2012.

14. “Kinetochore orientation and haploidy-dependent unreductional meiotic cell division in wheat”, invited seminar in the National Key Laboratory of Crop Genetic Improvement at Huazhong Agricultural University, Wuhan, China on October 30, 2012.

15. “FHB resistance in durum wheat: progress and challenge”, invited seminar in the College of Pant Science and Technology at Huazhong Agricultural University, Wuhan, China on October 30, 2012.

16. “Fusarium head blight resistance in durum wheat – progress and challenge”, invited oral presentation in the 2011 National Fusarium Head Blight Forum, St. Louis, MO, December 4, 2011.

17. “Meiosis-based chromosome engineering for wheat improvement and genome mapping”, invited seminar at Huazhong Agricultural University, Wuhan, China, May 5, 2011.

18. “Molecular and cytological characterization of pest resistance and meiotic restitution in wheat and its relatives”, invited seminar at Shandong Agricultural University, Taian, China, May 7, 2011.

19. “Agricultural issues in China”, invited seminar at Concordia College, Moorhead, MN on October 8, 2009.

20. "Wheat genetics project: identification, characterization, and utilization of desirable genes", invited oral presentation in the ND State Board of Agricultural Research and Education and ND Wheat Commission joint conference on April 4, 2008.

21. "Toward a better understanding of a major FHB resistance QTL in tetraploid wheat", invited oral presentation in the 2007 National Wheat Genomics Conference, Kansas City, MO, November 30 - December 2, 2007.

22. "Meiotic restitution: a major mechanism of polyploidization in plants", invited oral presentation in the Impacts and Future prospects for Plant Genomics Symposium, National Science Foundation/University of Wyoming/Colorado State University, Laramie, June 1-3, 2006.

23. "The alien gene could be one of the 'fighters' against Fusarium head blight in wheat", invited oral presentation in the 2005 National Fusarium Head Blight Forum, Milwaukee, WI. Dec. 11-13, 2005.

24. "Toward a better understanding of meiotic restitution and polyploidization in wheat", invited seminar at Huazhong Agricultural University, Wuhan, China. May 25, 2005.

25. "Mapping and cloning of economically important genes in wheat", invited seminar at Hubei Academy of Agriculture, Wuhan, China. May 28, 2005.

26. "Utilization of alien genes for wheat improvement", invited oral presentation in the ND Wheat Commission County Representative Meeting, Fargo, ND. Dec. 6, 2004.

27. "Understanding and manipulating wheat genomes", invited seminar at Nanjing Agricultural University, Nanjing, China. Oct. 16, 2003.

PROFESSIONAL AND INSTITUTIONAL SERVICE

University, College, and Departmental

- University General Education Committee 2008-2011
- University Equal Opportunity Hearing Panel 2008-2010.
- University Senate 2004-2009.
- University Senate Grade Appeals Board 2007-2010.
- Undergraduate Student Recruitment Committee in the College of Agriculture, Food Systems, and Natural Resources 2003-2017.
- Departmental coordinator of student learning assessment for Crop and Weed Science major and graduate students 2009-present.
- Faculty advisor for the Association of Chinese Students and Scholars at NDSU 2003-2004.
- Departmental Recognition and Awards Committee 2003-2016.
- Departmental Scholarship Awards Committee 2003-present.
- Departmental Social Committee 2005-2009.
- Graduate Studies Committee 2012-present.

- Organized the bi-weekly meeting of the wheat research groups at NDSU and USDA-ARS in Fargo 2003-2005.

National and International

- Member of the Executive Committee, the US Wheat & Barley Scab Initiative (USWBSI), 2015-2018.
- Member of the USDA-NIFA International Wheat Yield Partnership Program Review Panel 2016.
- Chair of the Durum Coordinated Project Committee, USWBSI, 2008 – 2011.
- Member of the NSF-MRI (The Major Research Instrumentation Program) Review Panel 2009
- Vice-Chair of the Host Genetic Resources Research Area Committee in the USWBSI 2004-2007.
- Organizer of the international workshop on "Searching for Alien Genes to Enhance Resistance of Wheat and Barley to Fusarium Head Blight" in Fargo ND, August 14, 2006.
- Member of the Local Organization Committee for the 22nd International Triticeae Mapping Initiative (ITMI) and 4th National Wheat Genomics Committee Joint Conference. June 25-29, 2012, Fargo, ND.
- Participated in multiple visits of Capitol Hill in Washington, D.C. with the National Association of Wheat Growers and National Wheat Improvement Committee to promote wheat research.
- Associate editor of Crop Journal and Journal of Plant Registration.
- Proposal Reviewer for National Science Foundation, USDA-NIFA, USWBSI, Agriculture and Agri-Food Canada, and US-Israel Binational Agricultural Research and Development (BARD) Fund.
- Manuscript Reviewer for many international scientific journals.

SOCIETAL AND HONORARY MEMBERSHIPS

Crop Science Society of America
American Society of Plant Biologists
Gamma Sigma Delta

TEACHING AND ADVISING EXPERIENCE

North Dakota State University (2002-present)

- **Genetics (PLSC-ZOO-BOT-BIO 315)**, 3 credits, two sections each with an enrollment of about 120 students. This is an introductory genetics course offered to all majors across the campus.
- **Genetics Online (PLSC-ZOO-BOT-BIO 315 online)**, 3 credits, with an enrollment of about 30 students. This is a distance education course with a limit of 30 students. This course has been well-received by students from outside of North Dakota.
- **Genetics Laboratory (PLSC-ZOO-BOT-BIO 315L)**, 1 credit, seven sections each with an enrollment of about 30 students.
- **Intermediate Genetics (PLSC-ZOO-BOT 431/631)**, 3 credits, offered to both

undergraduate and graduate students.

- **Cytogenetics (PLSC 741)**, 3 credits, offered to graduate students.
- **Undergraduate/Graduate Students/Postdoc/Visiting Scientist Advising and Training**
  Ph.D. Students – 10
  M. S. Students – 4
  Undergraduate Students – 38
  Postdocs – 7
  Visiting Scientists – 6
  Advisory committee member for 22 graduate students
  Topic advisor of graduate students for the departmental seminar

Washington State University (1994-2001)

- Guest lecturer for **Plant Transmission Genetics (CropS 504)**
- Guest lecturer for **Plant Cytogenetic Techniques (CropS 520,** University of Idaho**)**
- Served on the advisory committee for two M.S. students in wheat breeding and genetics

Huazhong Agricultural University (1986-1993)

- **Plant Genetics** (undergraduate level course), 3 credits
- **Plant Chromosome Techniques** (graduate level course), 2 credits
- Served on the advisory committee for six M.S. students in plant breeding and genetics