

Xuming Liu, Ph.D.
Research Assistant Professor

USDA Wheat Insect Genetics Lab
Department of Entomology
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SUMMARY

- Multidisciplinary training and experience in Entomology, Plant Breeding, Genetics, Molecular Biology, Plant Protection, Plant Pathology, Insecticides, Toxicology, Ecology, and Statistics;
- Strong background in Host Plant Resistance to Insects and Integrated Pest Management (IPM);
- Familiar with both crop system and insect system of corn, cotton, soybean, rice, and wheat;
- Skillful in both field biological trials and laboratory molecular technologies;
- Experienced in evaluation of crop germplasm and host plant resistance to insects, gene identification, PCR, qRT-PCR, microarray, molecular cloning, molecular markers, gene mapping, marker-assisted selection in plant breeding, transient virus induced gene silencing (VIGS), & transgenic stable RNAi;
- Proficient in database, spreadsheet software, SAS, ProStat, and bioinformatics.

EDUCATION

Ph. D. in Entomology / Molecular Biology / Plant Resistance to Insects, 2001

Kansas State University, Manhattan, Kansas, USA

Dissertation: Genetic characterization and molecular mapping of Russian wheat aphid (*Diuraphis noxia*) resistance genes in wheat

M. S. in Entomology / Integrated Pest Management and Plant Resistance to Insects, 1989

China Agricultural University, Beijing, China

Thesis: Mechanisms of cotton resistance to cotton aphid (*Aphis gossypii*)

B. S. in Plant Protection (Entomology, Plant Pathology, and Crop Science), 1984

Hunan Agricultural University, Hunan, China (graduated at the age of 19)

Thesis: Life table of the rice case worm (*Chaphalocrocis medinalis*)

EMPLOYMENT

Sr. Research Scientist / Research Assistant Professor (11/2006-present)

Department of Entomology, Kansas State University, Manhattan, Kansas

(Molecular mechanisms of plant-insect interactions and plant resistance to insects)

Postdoctoral Research Associate (01/2002-10/2006)

USDA Wheat Insect Genetics Laboratory / Department of Entomology, KSU, Manhattan, Kansas

(Molecular biology and genetics of host plant resistance to insects)

Assistant Research Scientist (08/1991-12/1997)

Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing, China

(Evaluation and characterization of wheat, corn, and soybean germplasms for resistance to insects)

Agronomist / Extension Specialist (07/1989-08/1991)

Beijing Plant Protection Station, Beijing, China

(Integrated pest management of wheat, corn, and soybean insects, diseases, and weeds)

Instructor (07/1984-09/1986)

Chenzhou Agricultural Institute, Hunan, China

(Courses Taught: Applied Entomology, Pesticides, and Plant Protection)

FUNDED RESEARCH PROJECTS

- 4/1/2011-3/31/2014 (Extended to 3/31/2015). **Insect Effectors and Molecular Plant-Insect Interaction**. USDA-NIFA AFRI Competitive Grant. Total: \$453,658. KSU Portion: \$139,364, Subcontract from Purdue University. (Co-Principal Investigator; Lead Investigator in KSU Portion). Award #: BG2623; Project account #: GAEN602059. Prime Award No. 11-67013-30211; Subaward No. 8000041988-AG
- 2008-2013. **Molecular Mechanisms of Wheat Resistance to the Hessian Fly**. USDA Specific Cooperative Project. (Participant)
- 2008-2013. **Genetic Enhancement for Resistance to Biotic and Abiotic Stresses in Hard Winter Wheat**. USDA Appropriated Project. (Co-Investigator)
- 2009-2012. **Molecular Genetic Interactions of Wheat Resistance and Hessian Fly Avirulence**. USDA-NRI. \$129,728, Subcontract from Purdue University. (Co-Investigator)
- 2006-2011. **Arthropod Genomic Center: KSU Targeted Excellence Project**. \$2,000,000. (Team Member)
- 2006-2009. **Phenotypic Analysis of Grass Resistance Genes and Hessian Fly Avirulence Genes**. USDA-NRI Project. Total: \$396,205. KSU portion: \$70,205, Subcontract from North Dakota State University. (Participant)
- 2004-2007. **Functional Genomics of Hessian Fly Virulence in Wheat**. USDA-NRI Project. \$202,864, Subcontract from Purdue University. (Co-Investigator)
- 2003-2005. **Signal Transduction in Wheat-Hessian Fly Interaction**. KSU Plant Biotechnology Center (PBC) Project. \$60,000. (Co-Investigator)
- [2013-2014. Pending: **Developing Insusceptible Crop Plants against Insect Pests**. Bill Melinda Gates Foundation, Grand Challenges Explorations. (PI)]

PENDING PATENT

Ming-Shun Chen, **Xuming Liu**, Harold Trick. Plant Susceptibility Gene Strategy Leads to Durable Resistance against Hessian Fly, Powdery Mildew, and Potentially Other Pests. Patent protection in USA was filed in July 2013 to the U.S. Patent and Trademark Office. Reference Number: 09-21. Link: <http://www.k-state.edu/tech.transfer/technologies/09-21.html>

MANUSCRIPT IN PROGRESS

1. **Liu, X. M.** and M. S. Chen. Glutathione metabolism involved in the induced wheat resistance and manipulated susceptibility towards the Hessian fly infestation. (Under internal review, for *Plant Physiology*). **Note: Activities of enzymes and expression levels of related genes responsible for glutathione metabolism are highly regulated in resistant or susceptible wheat plants in response to the Hessian fly attacks, and play important roles in the induced wheat resistance and manipulated susceptibility towards the Hessian fly.**
2. **Liu, X. M.** and M. S. Chen. Molecular and ecological mechanisms of phenotype variation of 30 wheat resistance genes in response to Hessian fly attack under different temperatures. (In preparation for *Plant Journal*, or *Scientific Reports*). **Note: most known R genes in wheat are temperature-sensitive and lose resistance to Hessian fly under elevated temperatures. Heat stress induction of a family of small heat-shock protein genes, including the susceptibility gene *Mds-1*, are highly associated with the compromises of the Hessian fly resistance genes.**
3. **Liu, X.M.**, L. Huang, H. N. Trick, B. S. Gill, J. J. Stuart, and M. S. Chen. Molecular cloning and characterization of the Hessian fly-resistance gene *Hdic* in wheat. (In preparation for *PNAS*). **Note:**

wheat resistance gene *Hdic* is the 3rd insect-R gene cloned from plants, and it is a typical NBS-LRR resistance gene encoding a 920 aa protein. Transgenic plants show high resistance.

4. Liu, X. M., L. Huang, B. S. Gill, and M. S. Chen. Phenylpropanoid metabolism pathway is critical for wheat defense against the Hessian fly infestation. (In preparation for *PNAS*). **Note: phenylpropanoid-related genes are critically required for wheat defense. Silencing of the related genes with RNAi compromised the R-gene-mediated wheat resistance to the Hessian fly.**
5. Chen, M. S., H. Chen, X. M. Liu, and J. J. Stuart. Dramatic expansion of putative effector gene families in the Hessian fly genome. (In preparation for *Genome Research*). **Note: A total of 1,687 genes were found to encode putative effector proteins, so called secreted salivary gland proteins (SSGPs). The SSGP-encoding genes may play potential roles for Hessian fly larvae to evade host plant surveillance system for defense and to manipulate host plant metabolisms.**

PUBLICATIONS

(Summary: Three book chapters on integrated pest management, more than 30 oral and poster presentations in national and international conferences, and 36 peer-reviewed journal papers on host plant resistance to insects published in Nature Communications, Theoretical and Applied Genetics, Plant Physiology, Crop Science, Molecular Plant-Microbe Interactions, Insect Biochemistry and Molecular Biology, Insect Molecular Biology, Journal of Economic Entomology, BMC Genomics, BMC Evolutionary Biology, and Chemical Ecology.)

1. Liu, X. M., C. Khajuria, J. R. Li, H. N. Trick, L. Huang, B. S. Gill, G. R. Reeck, G. Antony, F. F. White, and M.S. Chen. 2013. Wheat *Mds-1* encodes a heat-shock protein and governs susceptibility towards the Hessian fly gall midge. *Nature Communications*. June 24, 2013, 4: Online article # 2070. <http://www.nature.com/ncomms/2013/130624/ncomms3070/full/ncomms3070.html>
2. Khajuria, C., H. Wang, X. M. Liu, S. Wheeler, J. C. Reese, M. E. Bohssini, R. J. Whitworth, M. S. Chen. 2013. Mobilization of lipids and fortification of cell wall and cuticle are important in host defense against Hessian fly. *BMC Genomics*. 14:423
3. Zhu, L., X. M. Liu, H. Wang, C. Khajuria, J. C. Reese, R. J. Whitworth, R. Welti, and M. S. Chen. 2012. Rapid mobilization of membrane lipids in wheat leaf sheathes during incompatible interactions with Hessian fly. *Molecular Plant-Microbe Interactions*. 25 (7) : 920-930
4. Chen, M. S., X. M. Liu, Z. H. Yang, H. X. Zhao, R. H. Shukle, J. J. Stuart, and S. Hulbert. 2010. Unusual conservation among genes encoding small secreted salivary gland proteins from a gall midge. *BMC Evolutionary Biology* 2010, 10: 296. <http://www.biomedcentral.com/1471-2148/10/296>
5. Smith, C. M., X. M. Liu, L. J. Wang, X. Liu, M. S. Chen, S. Starkey, and J. F. Bai. 2010. Aphid feeding activates expression of a transcriptome of oxylipin-based defense signals in wheat involved in resistance to herbivory. *Journal of Chemical Ecology*. 36: 260-276.
6. Liu, X. M., C. E. Williams, J. A. Nemacheck, H. Wang, S. Subramanyam, C. Zheng, and M. S. Chen. 2010. Reactive oxygen species are involved in plant defense against a gall midge. *Plant Physiology*. 152:985-999.
7. Chen, M.S., X. M. Liu, H. Wang, and M. El Bouhssini. 2009. Hessian fly (*Mayetiola destructor*) interactions with barley, rice, and wheat seedlings. *Journal of Economic Entomology*. 102(4): 1663-1672.
8. Wu, J. X., X. M. Liu, S. Z. Zhang, Y. C. Zhu, R. J. Whitworth, and M. C. Chen. 2008. Differential Responses of Wheat Inhibitor-Like Genes to Hessian Fly, *Mayetiola destructor*, Attacks During Compatible and Incompatible Interactions. *Journal of Chemical Ecology*. 34: 1005-1012.
9. Chen, M. S., H. X. Zhao, Y. C. Zhu, B. Scheffler, X. M. Liu, X. Liu, S. Hulbert, J. J. Stuart. 2008. Analysis of transcripts and proteins expressed in the salivary glands of Hessian fly (*Mayetiola destructor*) larvae. *Journal of Insect Physiology*. 54: 1-16.

10. Zhu, L. C., **X. M. Liu**, X. Liu, R. Jeannotte, J. C. Reese, M. Harris, J. J. Stuart, and M. C. Chen. 2008. Hessian fly (*Mayetiola destructor*) attack causes a dramatic shift in carbon and nitrogen metabolism in wheat. *Molecular Plant-Microbe Interactions*. 21: 70-78.
11. **Liu, X. M.**, J. F. Bai, L. Huang, L. C. Zhu, X. Liu, N. Y. Weng, J. C. Reese, M. Harris, J. J. Stuart, and M. S. Chen. 2007. Gene expression of different wheat genotypes during attack by virulent and avirulent Hessian fly (*Mayetiola destructor*) larvae. *Journal of Chemical Ecology*. 33: 2171-2194.
12. Zhao, H. X., **X. M. Liu**, and M. -S. Chen. 2006. *H22*, a major resistance gene to the Hessian fly (*Mayetiola destructor*), is mapped to the distal region of wheat chromosome 1DS. *Theoretical and Applied Genetics*. 113:1491-1496.
13. Maddur, A.A., **X. M. Liu**, Y. C. Zhu, J.P. Fellers, B. Oppert, Y. S. Park, J. Bai, G. E. Wilde and M.-S. Chen. 2006. Cloning and characterization of protease inhibitor-like cDNAs from the Hessian fly, *Mayetiola destructor* (Say). *Insect Molecular Biology*. 15(4): 485-496.
14. **Liu, X. M.**, G. L. Brown-Guedira, J. H. Hatchett, J. O. Owuoche, and M. S. Chen. 2005. Genetic characterization and molecular mapping of a Hessian fly resistance gene *Hdic* transferred from *T. turgidum* ssp. *dicoccum* to common wheat. *Theoretical and Applied Genetics*. 111:1308-1315.
15. **Liu, X. M.**, B. S. Gill, and M. S. Chen. 2005. Hessian fly resistance gene *H13* mapped to a distal cluster of R genes in chromosome 6DS of wheat. *Theoretical and Applied Genetics*. 111:243-249.
16. **Liu, X. M.**, A. K. Fritz, J. C. Reese, G. E. Wilde, B. S. Gill, and M. S. Chen. 2005. *H9*, *H10*, and *H11* compose a cluster of Hessian fly-resistance genes in the distal gene-rich region of wheat chromosome 1AS. *Theoretical and Applied Genetics*. 110:1473-1480.
17. **Liu, X. M.**, C. M. Smith, B. R. Friebe, and B. S. Gill. 2005. Molecular mapping and allelic relationships of Russian wheat aphid resistance genes. *Crop Science*.45: 2273-2280.
18. Brown-Guedira G. L., J. H. Hatchett, **X. M. Liu**, A. K. Fritz, J. O. Owuoche, B. S. Gill, R. G. Sears, T. S. Cox, and M. S. Chen. 2005. Registration of KS99WGRC42 Hessian fly-resistant hard red winter wheat germplasm. *Crop Science*. 45:804-805.
19. **Liu, X. M.**, J. P. Fellers, G. E. Wilde, J. J. Stuart, and M.S. Chen. 2004. Characterization of two genes expressed in the salivary glands of the Hessian fly [*Mayetiola destructor* (Say)]. *Insect Biochemistry and Molecular Biology*. 34(3):229-237.
20. Chen, M. S., J. P. Fellers, J. J. Stuart, J. C. Reese, and **X. M. Liu**. 2004. A group of related cDNAs encoding secreted proteins from Hessian fly [*Mayetiola destructor* (Say)] salivary glands. *Insect Molecular Biology*. 13(1):101-108.
21. **Liu, X. M.**, C. M. Smith, and B. S. Gill. 2002. Identification of microsatellite markers linked to Russian wheat aphid resistance genes *Dn4* and *Dn6*. *Theoretical and Applied Genetics*. 104: 1042-1048.
22. **Liu, X. M.**, C. M. Smith, B. S. Gill, and V. Tolmay. 2001. Microsatellite markers linked to six Russian wheat aphid resistance genes in wheat. *Theoretical and Applied Genetics*. 102: 504-510.
23. Zheng, D. S., C. H. Song, S. C. Liu, M. Y. Chen, X. M. Wang, F. C. Dai, **X. M. Liu**, and Y. L. Li. 1999. Improvement of powdery mildew-resistant but late wheat germplasm. *Crop Genetic Resources*. 1999 (4): 33-35.
24. Wang, X. M., **X. M. Liu**, and S. M. Wang. 1998. Germplasm resources, production and biotic problems of dry bean, *Phaseolus vulgaris* L. in China. *Annual Report of the Bean Improvement Cooperatives* (Michigan State University). 41: 196-197.
25. **Liu, X. M.**, D. S. Jin, X. Z. Cheng, X. F. Wu, and S. H. Wang. 1998. Evaluation of mungbean germplasm for resistance to adzuki bean weevil, *Callosobruchus chinensis* L. *Crop Genetic Resources*. 1998(2): 35-37.
26. **Liu, X. M.** and D. S. Jin. 1998. A new biotype (CHN-1) of greenbug, *Schizaphis graminum*, identified in Beijing. *Acta Entomologia Sinica*. 41(2): 141-144.
27. **Liu, X. M.** and D. S. Jin. 1995. The ecological principle and referential role of control varieties used in the evaluation of crop germplasm resistance to insects. *Plant Protection*. 21(3): 36-37.

28. Wu, X. Q., D. S. Jin, and **X. M. Liu**. 1995. Study on the utilization of near-infrared reflectance spectroscopy to identify insect resistance in crops. *Scientia Agricultura Sinica*. 28(6): 92.
29. Jin, D. S. and **X. M. Liu**. 1994. Studies on screening the millet germplasm resources for resistance to Asian corn borer (*Ostrinia furnacalis*). *Millet Crops*. (2): 31-32.
30. Jin, D. S. and **X. M. Liu**. 1993. Identification of resistance to corn spider mite (*Tetranychus truncatus*) in corn germplasm resources. *Plant Protection*. 19(4): 26.
31. **Liu, X. M.** and Q. H. Yang. 1993. The relationships between physiological / biochemical mechanisms of cotton resistance to aphid and the population dynamics of cotton aphid. *Acta Phytopylacica Sinica*. 20(1): 25-29.
32. Wu, R. J. and **X. M. Liu**. 1991. Key techniques to control wheat lodging with rational use of the plant growth retardant Paclobutrazol. *Beijing Agriculture Magazine*. 1991(2): 10.
33. **Liu, X. M.** and Q. H. Yang. 1991. The role of free proline in variety resistance of cotton to *Aphis gossypii*. *Acta Agric. Universitatis Pekinensis*. 17(3): 77-80.
34. Yang, Q. H., Ming-Tsang Cheo, J. Z. Zhao, Q. W. Zhang, C. Z. Wang, C. B. Bi, **X. M. Liu**, L. W. Cha, Z. S. Ma, B. L. Li, S. Feng, and Q. Hang. 1990. Techniques of cotton pest management system in North China. In: Q. Y. Chen, D.M. Li and C.Y. Cao (eds.) *Recent Advances in IPM Research on Cotton in China*. Chinese Agric. Science-tech Press, Beijing. pp. 26-31.
35. **Liu, X. M.** and Q. H. Yang. 1990. Biochemical bases of resistance to cotton aphid (*Aphis gossypii* Glover) in Non-Gossypol cotton varieties. In: Q. Y. Chen, D.M. Li and C.Y. Cao (eds.) *Recent Advances in IPM Research on Cotton in China*. Chinese Agricultural Sciencetech Press, Beijing. pp. 296-299.
36. **Liu, X. M.** and Q. H. Yang. 1990. The improved techniques for evaluating the resistance of cotton varieties to cotton aphid. *Plant Protection*. 16 (sup.): 50-51.

Book Chapters and Review Articles

37. **Liu, X. M.** 1999. The guiding principles and methods of plant protection. In: Beijing Plant Protection Station (ed.) *IPM Handbook for Plant Doctors* (total 930 pages). China Agriculture Press, Beijing, China, pp 1-5.
38. **Liu, X. M.** 1999. The basic principles and ways in the extension of technologies for plant protection. In: Beijing Plant Protection Station (ed.) *IPM Handbook for Plant Doctors* (total 930 pages). China Agriculture Press, Beijing, China, pp 5-10
39. Wang, X. M. and **X. M. Liu**. 1999. Diseases and insect pests of mungbean and adzuki bean. In: Beijing Plant Protection Station (ed.) *IPM Handbook for Plant Doctors* (total 930 pages). China Agriculture Press, Beijing, China, pp 91-122.
40. **Liu, X. M.** 1988. A review of the genetic bases of insect-plant interaction and plant resistance to insects. In: *Proceedings of Entomological Symposium at Beijing Agricultural University*. 2:12-26.
41. Ye, Z. C., **X. M. Liu** and D. S. Jin. 1996. A review of soybean and soybean insect pests in China - Background information for a cooperative IPM project between China and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Full article was collected by the Kansas State University "Soybean Aphid Literature Translation Project (Phase II): Comprehensive bibliography of soybean aphid research". (Available Online: <http://www.k-state.edu/issa/aphids/reporhtml/trans20.htm>)

HONORS

- **The Second Place of President's Prize** (2001): Poster presentation "Molecular mapping of the Russian wheat resistance genes *Dn4* and *Dn6*" in the Student Competition at the Annual Meeting of the Entomological Society of America (ESA) at San Diego, California, Dec. 9-12, 2001

- **IPRI Student Travel Grant Award** (2002): The 15th Biennial International Plant Resistance to Insects (IPRI) Workshop, Feb. 24-27, 2002, Baltimore, Maryland, USA
- **IPRI Student Travel Grant Award** (2000): The 14th Biennial International Plant Resistance to Insects (IPRI) Workshop, Feb.28-Mar.2, 2000, Fort Collins,Colorado, USA
- **Three KSU Don C. Warren Genetic Scholarship Awards** (1998-1999, 1999-2000, 2000-2001): for outstanding graduate student in genetic research at Kansas State University
- **The Third Place of the 2nd Session of National Excellent Academic Paper Prizes from the Entomological Society of China** (1994): “The relationships between physiological / biochemical mechanisms of cotton resistance to aphid and the population dynamics of cotton aphid” published in *Acta Phytophylacica Sinica*
- **The Third Place of the Scientific and Technological Prize from Beijing Government** (1991): The research and extension work on Regulation and Control of **Wheat Lodging**
- **The Third Place of the Scientific and Technological Prize from Beijing Government** (1990): The Forecast and Control of **Wheat Powdery Mildew**

RELATED MEDIA REPORTS

- **USDA-ARS News and Events** (October 23, 2013). Gene Discovery Could Unlock Door to Wheat with Durable Hessian Fly Resistance. (Achievement with Dr. M. S. Chen). Written by Jan Suszkiw, USDA-ARS Public Affairs Specialist. <http://www.ars.usda.gov/is/noi/131023.htm>
- **K-State Media Relations** (Nov. 24, 2008). K-State Entomologists Studying Wheat Plant Genes Affected by Aphids to Create Low-Risk Method of Pest Management. (Research Achievement with Dr. C. M. Smith). Story by: Kristin Hodges. <http://www.k-state.edu/media/newsreleases/>, http://www.safetybio.agri.kps.ku.ac.th/index.php?option=com_content&task=view&id=4104&Itemid=42
- **Seed Quest-Global Information Services for Seed Professionals** (News Section, Nov. 24, 2008). K-State Entomologists Studying Wheat Plant Genes Affected by Aphids to Create Low-Risk Method of Pest Management. (Research Achievement with Dr. C. M. Smith). Story by: Kristin Hodges. <http://www.seedquest.com/News/releases/2008/november/24365.htm>
- **USDA-ARS Agricultural Research Magazine** (Jan. 2007, Vol. 55, No. 1. Pages 4-7). Once Again...Waiting in the Wings: Hessian Flies! (Achievements with Dr. M. S. Chen and other USDA scientists). Story by Erin Kendrick-Peabody, and other USDA Public Affairs Specialists. <http://www.ars.usda.gov/is/AR/archive/jan07/flies0107.htm>
- **USDA-ARS News and Events** (Oct. 17, 2003). New Defense against Hessian Fly May Lie in Insect’s Saliva (in English and Spanish. Research Achievement with Dr. M. S. Chen). Story by Erin Kendrick-Peabody, USDA Public Affairs Specialist. <http://www.ars.usda.gov/is/pr/2003/031017.htm>
<http://www.ars.usda.gov/is/espanol/pr/2003/031017.es.htm>
- **Seed Quest-Global Information Services for Seed Professionals** (News Section, Oct. 17, 2003). New Defense against Hessian Fly May Lie in Insect’s Saliva (in English and Spanish). (Achievements with Dr. M. S. Chen). Written by Erin Kendrick-Peabody. <http://www.seedquest.com/News/releases/2003/october/6796.htm>
- **FAO Plant Breeding News** [Food and Agriculture Organization (FAO) of the United Nations, Edition 142, Oct. 24, 2003]. New Defense against Hessian Fly May Lie in Insect’s Saliva. (Research Achievement with Dr. M. S. Chen). Story by Erin Kendrick-Peabody. <http://www.fao.org/ag/agp/AGPC/doc/services/pbn/pbn-142.htm>
- **K-State AgReport** (Fall 2002). Entomology Students Bring Home Top Honors (Three graduate students won ESA President’s Prize, in Dec. 2001). http://www.ag.k-state.edu/doc/reports/agrep_fall02.pdf

- **K-State Research and Extension News** (March 8, 2001). Ancestor May Help Wheat Evolve...Again (Research Achievement with Dr. C. M. Smith). Story by: Kathleen W. Ward, Communications Specialist, Kansas State Research and Extension.
<http://www.ksre.ksu.edu/news/>
- **The Manhattan Mercury** (newspaper, March 11, 2001, page C3). Wheat's Evolution (Research Achievement with Dr. C. M. Smith). Written by: Kathleen W. Ward.
<http://www.themercury.com>
- **K-State Research and Extension News** (March 2, 2001). K-State Making Big Gains in Russian Wheat Aphid Resistance (Achievement with Dr. C. M. Smith). Story by: Kathleen W. Ward.
http://www.ksre.ksu.edu/news/sty/2001/aphid_resistance.htm
- **Successful Farming** (Iowa edition; March, 2001, Vol. 99, Issue 4, page 33). Kansas State Scientists Find Insect-Resistance Genes (Research Achievement with Dr. C. M. Smith). Story by: Kathleen W. Ward, K-State Communications Specialist.
<http://search.proquest.com/docview/205419905>
<http://business.highbeam.com/1131/article-1G1-72299384/kansas-state-scientists-find-insectresistance-genes>

JOURNAL EDITOR

- Scientific Reports (Nature Publishing Group)

JOURNAL AND FUND REVIEW

- Arthropod-Plant Interactions (Germany)
- Canadian Journal of Plant Science (Canada)
- Crop Science (USA)
- European Journal of Entomology (Czech)
- Journal of Economic Entomology (USA)
- Journal of Insect Physiology (Netherlands)
- Journal of Plant Interactions (United Kingdom)
- Molecular Plant-Microbe Interactions (USA)
- National Natural Science Foundation of China (NSFC) (China)
- Phytopathology (USA)
- Plant Breeding (Germany)
- Proceedings of Indian National Science Academy-Part B (PINSAB-Biological Sciences) (India)
- Theoretical and Applied Genetics (Germany)

PROFESSIONAL MEMBERSHIPS

- Sigma Xi, the Scientific Research Society (2001-present)
- Entomological Society of America (1999-present)

SERVICE

- Committee member of KSU Helping International Students (HIS) Association (2011-2012)
- Committee member of KSU Entomology Department Seminar Committee (2011-2012)
- Coordinator of the KSU Chinese Students and Scholars Association Committee (1998-1999)

SKILLS AND EXPERTISE

- **Strong background in:** Integrated Pest Management (IPM), Host Plant Resistance to Insects, and Insect-Plant Interactions at ecological, genetic, and molecular levels
- **Experienced in both crop system and insect system:** crop production, plant breeding, plant protection, and insect-control traits (plant resistance) of corn, cotton, soybean, rice, and wheat
- **Skillful in both field biological trials and laboratory molecular technologies:** experienced in evaluation and characterization of host plant resistance to insects in laboratory, greenhouse, and field
- **Practical experience in crop breeding:** crop germplasm evaluation; molecular marker, gene mapping, & marker-assisted selection (MAS) in breeding; transgenic resistant events; RNAi-based gene silencing for the development of novel transgenic plants. Developed more than 40 mapping populations by crossing between resistant and susceptible wheat plants, identified and characterized four new wheat resistance genes (*Dn8*, *Dn9*, *Dnx*, *Hdic*), mapped 20 resistance genes; provided services with marker assisted selection in wheat genotyping and breeding programs; cloned a wheat resistance gene *Hdic*, and a wheat susceptibility gene *Mds-1*; developed transgenic resistant wheat
- **Good knowledge and experience in transgenic *Bt* crops:** transgenic traits for insect control, mode of action of major classes of microbial *Bt* insecticidal proteins, major transgenic events against various insects, and strategies for insect resistance management; rich experiences in bioassays with plants, insects, artificial diets, and insecticides
- **Ahead the trends of next-generation transgenic resistant crops:** **1)** investigated proteins and genes specifically expressed in insect salivary gland and mid gut potentially associated with insect virulence (effector), feeding, digestion, and metabolism; knocked down some putative insect effector genes through transgenic RNAi in plants for potential resistance to insects; **2)** cloned a wheat susceptibility gene *Mds-1* (the first insect susceptibility gene identified in plants), which encodes a small heat-shock protein (HSP16.9) and is essentially required for Hessian fly infestation in wheat; created *Mds-1* RNAi knockdown constructs, and successfully developed transgenic RNAi resistant wheat by suppressing the *Mds-1* gene
- **Practical experience in various crop insects:** the chewing Lepidopteran insects (corn borer, cotton bollworm, rice case worm), Coleopterans (bean weevil, wheat wireworms), the sucking Dipterans (millet stem maggot, wheat Hessian fly), the piercing-sucking Hemipterans (soybean stink bug, cotton lygus bug), Thysanopterans (greenhouse thrips), Homopterans (cotton aphid, corn aphid, soybean aphid, various wheat aphids), and Acarina mites (corn spider mite)
- **Practical experience in insect rearing:** skillful in handling and maintaining insect colonies, proficient with insect rearing using live plants and artificial diets, good at in vitro and in planta bioassays on target insects. Reared and maintained colonies of bean weevil, Hessian fly, and various aphids with live plants, and corn borer and cotton bollworm using artificial diets
- **Experimental design and statistical analyses:** skillful in research from conception to completion, good at experimental design, implementation and execution, data capture, record keeping, statistical analysis, and data interpretation; familiar with database applications, spreadsheet software, and statistics software SAS and ProStat
- **Teaching and extension experience:** two-year full-time Instructor and two-year extension experience. Teaching assistant for Host Plant Resistance to Insects. Mentoring of graduate students, technicians, and visiting scientists
- **Work ethic:** hard-working and responsible, goal-motivated, detail-oriented. Good at independent work as well as team work, and enjoy a multidisciplinary, cross-functional, and multi-cultural environment. Excellent organizational, interpersonal, communication and problem-solving skills.