CURRICULUM VITAE

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Research interests

- Clone novel soybean abiotic/biotic stress tolerance gene and dissect the gene function by integrating molecular biology and genomic approaches after QTL mapping and fine-mapping study
- Dissect Brassinosteroid signaling pathway related gene functions in soybean.

Education

- **Ph. D. in Genetics** 09/2003~02/2007 Supervisor: Hongwei Xue (薛红卫)
  Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, Shanghai, China
- **M.S. in Cell biology** 09/2000~05/2003 Supervisor: Zhanjing Huang(黄占景)
  College of Life Science, Hebei Normal University, Shijiazhuang, China
- **B.S. in Biology** 09/1996~05/2000
  College of Life Science, Hebei Normal University, Shijiazhuang, China

Specific Training

- TASSEL GBS workshop, University of Missouri, USA, April 9-11, 2015
- Digital PCR application, Thermo Fisher Scientific Inc, USA, May09-15, 2014
- Confocal theory and application, Shanghai Institute of Plant Physiology and Ecology, China, Oct28-31. 2008

Employment

- **Senior. Research Associate 09/2016-present**

Division of Plant Sciences, University of Missouri, Columbia, MO, 65211 USA

- **Research Associate 07/2011~09/2016**

Division of Plant Sciences, University of Missouri, Columbia, MO, 65211 USA

- **Associate Professor 12/2009~07/2011**

Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, Shanghai, China

- **Assistant professor 02/2007~12/2009**

Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, Shanghai, China

Research experience

2011-present, Research associate/Senior Research Associate, Division of Plant Sciences, University of Missouri, USA

❖ **Soybean drought and water logging tolerance, nematodes resistance, root system architecture during drought and water logging**:

1) Identify genetic resources that correlated with drought and water logging tolerance, nematodes resistance, root system architecture during drought and water logging
2) Characterize natural genetic variations occurring in soybean different trait and their relations to yield production under stressed environments.
3) Cloning and validation the candidate gene that control drought, flooding, cyst nematodes (SCN) tolerance gene through forward or reverse genetic method; Developing soybean binary vector for transgenic Analysis; Developing transgenic soybean by using hairy root method and test the gene function under certain stress condition; Analysis Rhg1 and Rhg4 gene copy number variation of in different varieties;
4) Using an integrated approach collaborating with soybean breeders to utilize genetic resource, molecular markers and genomic platform to support sustainability of soybean production.
5) Identification and utilization of identified root traits are then incorporated into high yielding germplasm with developed markers to help widen the genetic base of stress tolerance in soybean.
6) Link the genetically diverse Glycine max germplasm with root system architecture and stress tolerance under greenhouse and field conditions.
7) High throughput genotyping to support the soybean breeding program.

❖ **Soybean BZR1 gene function:**

1) Identify the soybean Brassinosteroid signaling transgenic key factor BZR1 for functional analysis
2) A series of gene expression profiles were established in soybean leaf under absence or presence with exogenous higher or lower concentration BRs to provide a global view of BR regulated gene expression.
3) The downstream target genes of GmBZR1-1 were identified through the Chip-seq technology.

2007-2011 Assistant professor/Associate professor, Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, Shanghai, China

❖ Investigating the mechanisms how MSBP1 involved the negative regulation of BR sensitivity and photomorphogenesis during the dark-light transition.
❖ Hormone cross talk between BR and auxin in Arabidopsis hypocotyl growth and photomorphogenesis.
❖ Using genome-wide method analysis Rice hybrid weakness to facilitate the understanding of the underlying mechanisms controlling the reproductive isolation and hybrid weakness.

2003-2007, Research Assistant, Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, Shanghai, China

- ❖ Investigating the roles of Arabidopsis Membrane Steroid Binding Protein (MSBP1) gene how to involve in Brassinosteroid signaling pathway through interact with co-receptor.
- ❖ Identify the mechanism about MSBP1 involved in root gravitropism by enhancing the cycling of PIN2-containing vesicles to stimulate the auxin redistribution under gravi-stimulation

Research Skills

- **Molecular biology**

Gene cloning, PCR amplification, Tail-PCR, Real-Time PCR, Plasmid construct, Genomic DNA and RNA isolation, promoter analysis, Southern and Northern blots, in situ hybridization, RNAi, Protoplast transformation; analysis of gene expression pattern, protein sub-cellular localization, transgenic and mutants analysis,

- **Soybean Mapping, Phenotyping and Genotyping**

Soybean planting and crossing; phenotyping for different trait, including root, seed, abiotic stress (drought and flooding) and SCN; developing KASP assay marker and Taqman assay marker; familiar with LC480, ABI3310, ABI7900HT, digital PCR instruments.

- **Biochemistry**

Expression and purification of recombinant proteins from bacteria, SDS-PAGE electrophoresis, Western blotting; Co-Immunoprecipitation; yeast two hybrid; protein-DNA interaction: yeast one hybrid, EMSA and ChIP.

- **Microscopy**

Bright-field, Phase contrast, Florescence microscopy and laser scanning confocal microscopy, Scanning and transmission electron microscopy.

- **Bioinformatics**

TASSEL, EMMA, GAPPIT, Microarray, RNA-seq and ChIP-seq data analysis, MapMan, dCHIP, MEGA7.0

- **Cell culture**

Rice and Arabidopsis plant and transformation, soybean hairy root transformation for gene function validation.

Publications

(Google Scholar: https://scholar.google.com/citations?user=dC6AVKEAAAAJ&hl=en)

1. **Song L**, Prince S, Valliyodan B , Joshi T, Maldonado dos Santos J, Wang JJ, Lin L, Wan JR, Wang YQ, Xu D, and Nguyen HT. Genome-wide transcriptome analysis of soybean primary root under varying water-deficit conditions. **2016** ***BMC Genomics***. 17: 57.
2. **Li Song**, Na Nguyen, Rupesh K. Deshmukh, Gunvant Patil, Silvas Prince, Babu Valliyodan, Raymond, Mutava, Sharon Pike, Walter Gassmann, and Henry T Nguyen*. Soybean TIP gene family analysis and characterization of GmTIP1; 5 and GmTIP2;5 water transport activity. **2016** ***Front. Plant Sci.*** 21. 01564.
3. Babu Valliyodan*, Heng Ye*, **Li Song***, MacKensie Murphy*, J. Grover Shannon*, Henry T. Nguyen* Genetic diversity and genomic strategies for improving 1 drought and waterlogging tolerance in soybean. **2016** ***Journal of Experimental Botany***. **accepted (Review, *contributed equally)**
4. Jinrong Wan, **Li Song**, Yalei Wu, Pius Brzoska, David Keys, Caifu Chen, Babu Valliyodan, J.Grover Shannon, Henry T. Nguyen*. Application of Digital PCR in the Analysis of Transgenic Soybeans. **2016** ***Advances in Bioscience and Biotechnology***. 7: 403-417.
5. Babu Valliyodan*, Dan Qiu*, Gunvant Patil*, Peng Zeng*, Jiaying Huang *, Lu Dai*, Chengxuan Chen*, Liang Zeng, Trupti Joshi, **Song Li**, Tri Vuong, Theresa Musket, Dong Xu, J.G. Shannon, Cheng Shifeng, Xin Liu, and Henry T. Nguyen. Landscape of genomic diversity and trait discovery in soybean. **2016** ***Scientific reports***. 31; 6:23598.
6. Chen W, Yao Q, Patil GB, Agarwal G, Deshmukh RK, Lin L, Wang B, Wang Y, Prince SJ, **Song L**, Xu D, An YC, Valliyodan, B, Varshney RK, and Nguyen HT. Identification and Comparative Analysis of Differential Gene Expression in Soybean Leaf Tissue under Drought and Flooding Stress Revealed by RNA-Seq. **2016** ***Front. Plant Sci***. 7:1044.
7. Prince SJ*, **Song L***, Qiu D, Maldonado Dos Santos JV, Chai C, Joshi T, Patil G, Valliyodan B, Vuong TD, Murphy M, Krampis K, Tucker DM, Biyashev R, Dorrance AE, Maroof MA, Xu D, Shannon JG, and Nguyen HT*****. Genetic variants in root architecture-related genes in a Glycine soja accession, a potential resource to improve cultivated soybean. **2015** ***BMC Genomics***. 16:132. (* **contributing equally**)
8. Manavalan LP, Prince SJ, Musket TA, Chaky J, Deshmukh R, Vuong TD, **Song L**, Cregan PB, Nelson JC, Shannon JG, Specht JE, and Nguyen HT. Identification of novel QTL governing root architectural traits in an interspecific soybean population. **2015** ***PLoS One***. 10(3):e0120490.
9. Silvas J. Princea, Trupti Joshib, Raymond N. Mutavaa, Naeem Syedc, Maldonado dos Santos Joao Vitora, Gunvant Patila, **Li Song**, JiaoJiao Wangb, Li Lina, Wei Chena, J. Grover Shannona, Babu Valliyodana, Dong Xub, c, Henry T. Nguyen. Comparative analysis of the drought-responsive transcriptome in soybean lines contrasting for canopy wilting. **2015** ***Plant Science***. 240: 65–78.

10. Suhas Kadam, Tri D. Vuong, Dan Qiu, Clinton G. Meinhardt, **Li Song**, Rupesh Deshmukha, Gunvant Patil, Jinrong Wan, Babu Valliyodan, Andrew M. Scaboo, J.Grover Shannon, Henry T. Nguyen, Genomic-assisted phylogenetic analysis and marker development for next generation soybean cyst nematode resistance breeding. **2015** ***Plant Science***. 242: 342-350.

11. Naeem H. Syed, Silvas J. Prince, Raymond N. Mutava, Gunvant Patil, **Song Li**, Wei Chen,Valliyodan Babu, Trupti Joshi, Saad Khan and Henry T. Nguyen* Core clock, SUB1, and ABAR genes mediate flooding and drought responses via alternative splicing in soybean. **2015** ***Journal of Experimental Botany***. 66: 7129-7149

12. Gunvant Patil, Babu Valliyodan, Rupesh Deshmukh, Silvas Prince, Bjorn Nicander, Mingzhe Zhao, Humira Sonah, **Li Song**, Li Lin, Juhi Chaudhary, Yang Liu, Trupti Joshi, Dong Xu and Henry T. Nguyen* Soybean (Glycine max) SWEET gene family: insights through comparative genomics, transcriptome profiling and whole genome re-sequence analysis. **2015** ***BMC Genomics***. 16:520

13. Mutava, R.N., K.J.S. Prince, N.H. Syed, **L. Song**, B. Valliyodan, C. Wei, and H.T. Nguyen. Understanding abiotic stress tolerance mechanisms in soybean: A comparative evaluation of soybean response to drought and flooding stress. **2014** ***Plant Physiology and Biochemistry***. 86C:109-120.

14. Xiao-Yi Zhou, **Li Song**, Hong-Wei Xue. Brassinosteroids Regulate the Differential Growth of Arabidopsis Hypocotyls through Auxin Signaling Components IAA19 and ARF7. **2013** ***Molecular Plant***. 6:887-904.

15. Qiu-Ming Shi, Xi Yang, **Li Song** and Hongwei Xue*. Arabidopsis MSBP1 Is Activated by HY5 and HYH and Is Involved in Photomorphogenesis. **2011** ***Molecular Plant*** 4:1092-1104.

16. **Li Song**, Qiu-Ming Shi, Xiao-Hua Yang, Zhi-Hong Xu, Hong-Wei Xue*. MSBP1 negatively regulate brassinosteroid signaling through interacting with BAK1. **2009** ***Cell Research*** 19: 864-876.

17. **Li Song**, Xiao-Yi Zhou, Li Li, Liang-Jiao Xue, Xi Yang, and Hong-Wei Xue* Genome-Wide Analysis Revealed the Complex Regulatory Network of Brassinosteroid Effects in Photomorphogenesis. **2009** ***Molecular Plant***. 2: 755-772.

18. Xi Yang, **Li Song**, Hong-Wei Xue* Membrane Steroid Binding Protein 1 (MSBP1) Stimulates Tropism by Regulating Vesicle Trafficking and Auxin Redistribution. **2008** ***Molecular Plant***. 1: 1077-1087.

19. ApexG. Stefano Mancuso, Anna Maria Marras, Sergio Mugnai, Markus Schlicht, Viktor Žársky, Gang Li, **Li Song**, Hong-Wei Xue, František Baluška. Phospholipase Dζ2 Drives Vesicular Secretion of Auxin for Its Polar Cell-Cell Transport in the Transition Zone of the Root. **2007** ***Plant Signaling & Behavior***. 4: 240-244.

20. **Li Song**, Li Li, Zhaoqin Chu, Hongwei Xue* Brassinosteroids Signal Transduction in Arabidopsis. **2006** ***Chinese Bulletin of Botany***. 23 (5):556-563. Review (in Chinese).

21. Zhaoqing Chu, Li Li, **Li Song**, Hongwei Xue* Advances on Brassinosteroid Biosynthesis and Functions. **2006** ***Chinese Bulletin of Botany***. 23(5):543-555. Review (in Chinese)

First or co-author paper under submission

1. **Li Song***, Wei Chen*, Biao Wang, Qiuming Yao, Babu Valliyodan, Mingyi Bai, Yongqin Wang, Mingzhe Zhao, Zhiyong Wang, Henry T. Nguyen. Functional Insights of soyben BZR1-1 in brassinosteroid signaling pathway. ((* **contributing equally**) **Will be submit to scientific report. 2016**
2. **Li Song**, Babu Valliyodan, Silvas Prince Jinrong Wan, Yongqin Wang, Mackensie Murphy, Chenglin Chai, Raymond Mutava, Yalei Wu, Pius, Brzoska, David, Keys, Caifu Chen, Henry T Nguyen. Soybean Xyloglucan endo-transglycosylases/hydrolase gene family analysis and overexpressed AtXTH31 in soybean showed flooding tolerance phenotype. **Will be submit to Plant cell and environment. 2016**
3. **Li Song**, Jinrong Wan, Babu Valliyodan, Henry T Nguyen. Genome-wide analysis of KRP family in soybean and functional identification of GmKRP2a involvement in root elongation. **Will be submit to BMC plant biology. 2016**
4. Silvas J Prince, Babu Valliyodan, Wei Chen, Ming Yang, Shuaishuai Tai, Wushu Hu, Li Lin, Mackensie Murphy, Lorellin A Durnell, Dan Qiu, **Li Song**, Trupti Joshi, Yan Liu, Jan Van de Velde, Klaas Vandepoele, Henry T Nguyen. High density genome-wide association study implicates a cortex cell shape modulating gene in soybean to enhance lateral root number. **Plant physiology submitted, Under revision**
5. Li Lin, Jinrong Wan, Jan Van de Velde, Yong-qiang An, Silvas Prince, **Li Song**, Mackensie C Murphy, Eiru Kim, Insuk Lee, Genevieve Pentecost, Garima Kushwaha,Trupti Joshi, Wei Chen, Gunvant Patil, Raymond Mutava, Babu Valliyodan, Dong Xu, Klaas Vandepoele and Henry T. Nguyen. Conserved motif associated networks assisted the prioritization of key transcription factors involved in root growth maintenance under water deficits in soybean. **Cell (submitted, 2016).**
6. Dan Qiu*, Babu Valliyodan*, Juexin Wang*, Jiaying Huang, Lu Dai, Tri Vuong, Jinrong Wang, **Li Song**, Peng Zeng, Chengxuan Chen, Clinton Meinhardt, J.Grover Shannon, Robert Stupar, Xin Liu, Dong Xu and Henry T. Nguyen. Genome-wide haplotype and structural analysis of SCN resistance loci by re-sequencing soybeans. **Plant Journal (submitted, 2016)**.

Oral Presentation

Li Song, Jinrong Wan, Babu Valliyodan, Yalei Wu, Pius Brzoska, David Keys, Caifu Chen, and Henry T. Nguyen. Application of digital PCR in analyzing transgenic soybeans. 2015 Plant and Animal Genome Conference XXIII, San Diego. CA.

Meeting Abstract

1. Heng Ye, **Li Song**, Peng Cheng, Liakat Ali, Gunvant Patil, Babu Valliyodan, Tri D. Vuong, Mackensie Murphy, Silvas Prince, Dennis Yungbluth, J. Grover Shannon, Pengyin Chen,

Anne E. Dorrance, Henry T. Nguyen. Genetic Improvement of Flooding Tolerance and Understanding the Underlying Mechanism in Soybean. **2016** Molecular and Cellular Biology of the Soybean 15th Biennial Conference. Columbus, Ohio.

2. **Li Song**, Babu Valliyodan, Mamatha Hanumappa, Silvas Prince, Raymond Mutava, Mackensie Murphy, Jinrong Wan, Wei Chen, Tom Clemente and Henry T. Nguyen. Overexpression of GmLEA3-1 confers water-deficit tolerance in Arabidopsis and Soybean. **2014** Molecular and Cellular Biology of the Soybean 15th Biennial Conference. Minneapolis, Minnesota.
3. Silvas Prince, **Li Song**, Dan Qiu, Murphy MacKensie, Wei Chen, Theresa A. Musket, James E. Specht, Saghai Maroof, Trupti Joshi, Babu Valliyodan, J Grover Shannon, Henry T. Nguyen. Integration of genomic and genetic approaches to improve soybean root architecture. **2014** Molecular and Cellular Biology of the Soybean 15th Biennial Conference. Minneapolis, Minnesota.
4. Li Lin, Jinrong Wan, Garima Kushwaha, Trupti Joshi, Yong-qiang An, Genevieve Pentecost, Gunvant Patil, **Li Song**, Wei Chen, Jordan Mroz, Dong Xu, Babu Valliyodan, Henry T. Nguyen. Discovery of cis-trans regulation involved in drought signaling through screening of a drought stress responsive transcription factor library from soybean. **2014** Molecular and Cellular Biology of the Soybean 15th Biennial Conference. Minneapolis, Minnesota.
5. Rupesh Deshmukh, Raymond Mutava, Silvas Prince, **Li Song**, Theresa A. Musket, Babu Valliyodan, Henry T. Nguyen. Functional SNP markers and polymorphic transcripts for abioticstress tolerance gene in soybean. **2014** Molecular and Cellular Biology of the Soybean 15th Biennial Conference. Minneapolis, Minnesota.

Funding

1. United Soybean Boarder project: Genetic improvement of flooding tolerance and understanding the underlying tolerance mechanism in soybean. 2017.01-2019.12, $210,000.00
2. United Soybean Boarder project: Genetic evaluation and development of germplasm resistant to multi-nematodes in group III, IV, and V soybeans. 2015.01-2017.12, $210,000.00
3. Missouri Soybean Merchandising Council project: Soybean root system architecture under drought and flooding stress. 2014.06-2016.06, $240,000.00
4. Missouri Soybean Merchandising Council project: Translational genomics for drought tolerance in soybean. 2011.06-2014.06, $256,000.00
5. 主研国家自然科学基金重点项目：生长素和油菜素内酯的互作机制及其调控光形态建成和细胞分裂的机理研究/90717001. 2008.1-2011.12. 经费：140万元
6. 主持农业部转基因生物新品种培育重大专项”超级稻93-11叶形QTL的克隆及分子设计育种水稻卷叶控制机理研究” 子课题 “叶形态建成主效基因/QTL分子调控机理”2009.01-2010.12, 经费：125万元
7. 主持上海生科院优秀青年人才领域前沿项目: “油菜素内酯调控植物光形态建成机制的研究”2009.06—2011-06. 经费：21万元

8. 主持中国科学院生命科学领域优秀青年科技专项: 拟南芥甾类激素结合蛋白基因家族生理功能研究, 2011.01-2013.12. 经费：国家80万元, 上海生科院匹配80万元
9. 子课题负责人-973植物减数分裂过程中染色体相互作用的分子机理, 2011.01-2012.12. 经费：45万元

Honours

1. The first class fellowship of excellent graduate student, 2001-2002, College of Life Science, Hebei Normal University
2. Outstanding Staff Award, 2010, Institute of Plant Physiology and Ecology, CAS

References

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