Resume of Professor Zhengbin Zhang

1. EDUCATION

1999.4-2001.4，Institute of Crop Germplasm Resources, Chinese Academy of Agricultural Sciences , Post-doctorate.

1995.9-1998.9，Northwest Sci-tech Agricultural and Forest University, Doctor degree.

1987.9-1990.9，Institute of Soil and Water Conservation, Chinese Academy of Sciences, Master degree.

1980.9-1984.7，Department of agronomy, Northwest Sci-tech Agricultural and Forest University, Bachelor degree.

2. PROFESSIONAL EXPERIENCE

2001—present, Center for agricultural resource research, Institute of genetics and biology development, Chinese academy of sciences, Professor.

1990.9-1999.4，Institute of soil and water conservation, Chinese academy of sciences, Associate Professor (1996), Assistance researcher (1991), Member of the standing of crop societies in Shaanxi province.

1984.7-1987.9，Shangluo Normal School, Shaanxi province, teacher.

3. HONORS AND ACADEMIC AWARDS（2009-2013）

（1） 2009，Utilization and selection of winter wheat new variety and germplasm innovation of drought resistance and water saving in the north of China. The second award of science and technology of China. Unite ranked the third.

（2） 2012，Popularizing and selection of drought resistance and eurytopic new wheat variety Jinmai 79. The second award of science and technology of Shanxi province. Unite ranked the second.

（3） 2011，Application and selection of drought resistance and high quality special wheat varieties. The second award of science and technology of Shanxi province.

Unite ranked the second.

（4） Person of the 2010 year of scientific Chinese

（5） Grain increase in northeast China under climatic change. Chinese Journal of Eco-Agriculture. Frontrunner 5000 top articles in outstanding sciences and technology journals of China, 2012.

4. MAJOR RESEARCH INTERESTS，SELECTED RESEARCH PROJECTS，RESEARCH BACKGROUND, MAJOR RESARCH ACHIEVEMENTS, CURRENT RESEARCH AND FUTURE DIRECTION

We majorly study on drought resistance and water high efficient use genetics and breeding in wheat, we also interest in dryland and water saving agriculture and modern agriculture. In recent five years, we have published more than eighty papers, there are nineteen SCI papers among them, wrote one book, and join edited two books. We breed one drought resistance and water-saving wheat variety; apply for three invention patents, one international patent. We have got the second award of science and technology of China once, and the second award of science and technology of Shanxi province twice. There are eleven important consulting reports suggested by Professor Zhengbin Zhang that approved by nation and province leadership, some suggestions were adopted by the first central file, that supply important instruction role for drought resistance and ensuring water resource and food security in China.

Research advance on genetic regulation mechanism of drought resistance and water use efficiency in wheat. In recently five years, 14 genes that related with drought resistance and water saving were cloned in wheat and registered in gene bank by our laboratory, such as one water channel protein gene（*TaAQP1a*），three wax genes（*TaCer1, TaCer5, TaCer6*）, two malic dehydrogenase genes（*TaNADP-me1, TaNADP-me2*）and eight WRKY transcription factors (*TaWRKY1*、*2*、*13*、*14*、*16*、*17*、*19, 27)* and other genes. Some of these genes were transferred in tobacco and *Arabidopsis* to indentify their function for drought resistance and other stress resistance. The results showed that transgenic *Arabidopsis* plants over expressing *TaWRKY2* exhibited salt and drought tolerance compared with controls. Over expression of *TaWRKY19* conferred tolerance to salt, drought and freezing stresses in transgenic plants. *TaWRKY2* enhanced expressions of *STZ* and *RD29B*, and bound to their promoters. *TaWRKY19* activated expressions

of *DREB2A*, *RD29A*, *RD29B* and *Cor6.6*, and bound to *DREB2A* and *Cor6.6* promoters. The two TaWRKY proteins may regulate the downstream genes through direct binding to the gene promoter or via indirect mechanism. Manipulation of *TaWRKY2* and *TaWRKY19* in wheat or other crops should improve their performance under various abiotic stress conditions. [Refer：C.F. Niu, W, Wei, Q.Y. Zhou, A.G. Tian, Y.J. Hao, W.K. Zhang, B. Ma, Q Lin, **Z. B. Zhang***, J.S. Zhang*, S.Y. Chen*, Wheat *WRKY* genes *TaWRKY2* and *TaWRKY19* regulate abiotic stress tolerance in transgenic *Arabidopsis* plants. Plant, Cell & Environment. 35, 1156–1170 (2012)]. Supported by Important special projects for breeding transgenic organism new variety（2009ZX08009-079B）.

Research advance on wheat breeding of drought resistance and high water use efficiency. Bio-water-saving is the core of the water-saving agriculture, enhance water use efficiency (WUE), more crops for every drop is crop breed aim of drought resistance and high WUE. We defined the concepts of water use efficiency at different levels, research WUE genetic variation by wheat evolution materials of genetics and breeding, the leaf WUE and per plant WUE have the same increased tendence in wheat evolution, which is the base for high grain yield evolution. We also found some WUE increasing genes that were located on A group chromosomes. The results from the study on WUE molecular marker and quantitative trait loci (QTL) show that there were some major loci that controlling WUE were located on 3AS（short arm）, 5AS and 7AS and other genomes，these WUE molecular markers have been identified from many typical irrigated land and dryland wheat varieties and new variety ,include Jinmai 91 selected by our group and some high generation lines , so these WUE molecular markers can be used in molecular marker assistant selection breeding. We also review the advance of gene cloning and transgenic plant for improving WUE and drought resistance. [Refer：（1）**Z.B. Zhang**, P. Xu, H.B. Shao, M.J. Liu, Z.Y. Fu， L.Y. Chu. Advance and prospects: biotechnologically improving crop water use efficiency. Critical reviews in biotechnology. 3, 281-293 (2011).（2） H.X. Cao, **Z.B. Zhang** *, C.X. Sun, H.B. Shao，W.Y. Song, P. Xu. Chromosomal location of traits associated with wheat seedling water and phosphorus use efficiency under different water and phosphorus stresses. International Journal of Molecular Sciences. 9, 4116-4136 (2009)]. Supported by the knowledge innovation important direction project of China academy of sciences, breed new wheat variety and high efficient utilization of resources（KSCX2-EW-N-02），and the strategic guide science and technology special project of China academy of sciences (A class）:

molecular module design breeding of water high efficient use in wheat （XDA0803010703）.

Advance on research wheat acclimatization breeding. The results show that company with active accumulate temperature increasing, in wheat evolution, there was a decreased tendence of heading period, growth period, plant height and spike number of per plant, while there was a increased tendence of the percentage of reproductive stage and whole growth stage, harvest index, thousand seed weight and grain weight of per plant. The yield of control variety also has a increased tendence in irrigation land in Huanghuai and North winter wheat regional trial. But company with climate warming, the yield of control variety has a decreased tendence in dryland in Huanghuai and North winter wheat regional trial. This suggests that under climate warming condition, more irrigation would cause increased crop yield in China. Company with climate warming，seedling date and mature date of control variety was postpone gradually, that result in winter wheat was seeded lately and summer maize was harvest lately also. [Refer: (1) H.M. Gao, **Z.B. Zhang***, P. Xu, Y.F. Yang, Y.Z. Wei, X.Y. Liu. Changes of winter wheat growth period and yield in northern China from 2001-2009. Scientia Agricultura Sinica. 2013,46 (11):2201-2210. （2）X.T. Wu, **Z.B Zhang***, P. Xu, Y.J. Qi, Y.Y.Wang, X.P. He, H.M. Gao. Agronomic traits development and evolution of winter wheat in Huanghuai basin. Scientia Agricultura Sinica. 2013,46 (18):3930-3938. （3）L.Y. Zhang, Z.B. Zhang*, P. Xu, Y.Z. Wei. X.J. Liu. Evolution of agronomic traits of wheat and analysis of the mechanism of agronomic traits controlling the yield traits in the Huang-Huai Plain. Scientia Agricultura Sinica, 2014, 47 (5):1013-1028. Supported by the National Basic Research Program of China (2010CB951501).

Advance on dryland and water saving agriculture and modern agriculture research. We published the book< Water and food security and modern agricultural development in China> in Chinese Science Publishing. Professor Zhengbin Zhang proposed eleven import reports and approved by nation and province leadership. For example, < Countermeasure for drought resistance in China suggested by expert of Chinese academy of sciences> approved by vice-premier Liangyu Hui. <Controlling wheat vigorous growth and preventing freeze injury early in Huanghuai region suggested by expert of Chinese academy of sciences> get national leadership instructions. <Establishing biotechnology modern agriculture> was reported and read by Central leadership. < Suggestion for ensuring food security and controlling diseases and insects pests by deep tillage field in China>, <Selecting and popularizing crop variety that can be planted in

irrigation land and dryland> and < Detailing drought resistance emergency plan according with crops characters> was adopted by internal reference of People's Daily and send to provinces and departments. <Suggestion for ensuring food security by deep tillage field in Hebei province>, <Report for controlling wheat vigorous growth and preventing freeze injury in Hebai province> and <Suggestion for scientific and effective copying with drought resistance in Hebei province> were approved by vice-governor of Hebei province.

Professor Zhengbin Zhang said in paper < Suggest water conservancy and water resource high efficient use should be as the basic state policy>, at present, water conservancy is not only the lifeblood for agriculture, but also the lifeline for city, industry and nation. In book <Development of modern agriculture and water resource and food safety in China>, he suggested that, in future, the vital task for solving China's water resource safety would be changed from water resources management into water resource high efficient use, in this way can ensure flood control safety, drought resistance safety, food safety, water supply safety, drinking water safety, ecology safety, economy safety and social safety. These suggestions were adopted in the first central file <The decision of accelerating water conservancy reform development>, the file point out that, accelerating water conservancy reform development, not only related with agriculture and rural development, but also related with economic society development overall situation; not only related with flood control safety, water supply safety, food safety, but also related with economic safety, ecology safety, national security. He suggested to accelerate the development of semiarid land agriculture in the south of China. Under the constantl appeal made by Lun Shan academician and him, semiarid land agriculture water high efficient use and other key technologies were adopted in national 'the 12^{th} Five-Year Plan' science and technology development planning.

Above these important suggestions, supply decision basis for nation government to copy with drought resistance, antifreeze, fight natural calamities; develop water conservancy and modern agriculture, and make some contributions for scientific developing dryland and water-saving agriculture, ensuing water resource and food security in China.

5. FUNDING AND LABORATORY PERSONNEL（2009-2013）

In recent five years, we undertook ten science research projects, the sum fund is about 530 ten thousand Yuan (RMB).

（1） The strategic guide science and technology special project of China academy of sciences (A class): molecular module design breeding of water use high efficiency in wheat （XDA0803010703），60.44 ten thousand Yuan, 2013-2014.

（2） The knowledge innovation important direction project of China academy of sciences, Research on germplasm innovation of wheat stress resistance and high yield (KSCX2-EW-J-5)，37.5 ten thousand Yuan, 2011-2015.

（3） The knowledge innovation important direction project of China academy of sciences, breed new wheat variety and high efficient utilization of resources.（KSCX2-EW-N-02），60 ten thousand Yuan, 2011-2015.

（4） The achievement award special project of Chinese academy of sciences, Utilization and selecting of winter wheat new variety and germpalsm innovation of drought resistance and water saving in north of China（Y009033208），50 ten thousand Yuan, 2010-2012.

（5） The national basic research program of China (973 plan)，project 1, Research on influence mechanism of climate change for grain productive resource elements in China（2010CB951501），100 ten thousand Yuan, 2010-2014.

（6） The knowledge innovation project of China academy of sciences，Demonstration project of sustainable high efficient modern agriculture in northeast of China（KSCX1-YW-09-07），15 ten thousand Yuan, 2010.

（7） The special project for supporting the poor of Chinese academy of sciences, Research on target system of green agriculture in China. 30 ten thousand Yuan, 2009-2011.

（8） The important special projects for breeding transgenic organism new variety, The functional identification gene cloning of wheat drought resistance and rice thermosensitive sterility（2009ZX08009-079B），126 ten thousand Yuan, 2009-2012.

（9） The special fund project of national natural sciences fund, Study on grain safety

and modern agriculture in Huanghuaihai（30949008）, 5 ten thousand Yuan, 2009.

（10） The 11th five-year plan national sci-tech support plan important project, demonstration and research for technology integration of salt water safe irrigation in circum-Bohai-sea plain, project 1, study on germplasm innovation and variety selection of salt-tolerant plants（2009BADA3B01）, 50 ten thousand Yuan, 2009-2011.

Lab Staff

Staff:

Mr. Wensheng Zhang, Associate professor

Ms. Ping Xu, Engineer

Graduate Students

Doctor: Yan Zheng，Huiming Gao

Master: Liying Zhang, Cong Dong, Xiao Meng，Hongliang Zhang

6. ACHIEVEMNTS (SELECTED PUBLICATIONS, PATENTS GRANTED，VARIETIES OBTAINED, MAJOR INVITED INTERNATIONAL CONFERENCE TALKS）（2009-2013）

PAPERS

（1） X.Y. Zheng, **Z.B. Zhang***, H.B. Shao, H.B. Zhao, P. Xu, Y.F. Yang, Plant aquaporins for controlling crop nutrition transport under abiotic stress conditions. Journal of Food, Agriculture & Environment. 3&4, 1019-1025 (2013).

（2） Z.F. Guo, **Z.B. Zhang***, P. Xu, Y.N. Guo, Analysis of nutrient compositions of purple wheats in China. Cereal Research Communications. 2, 293-303 (2013)

（3） Z. F. Guo, P. Xu, **Z.B Zhang** *, Y.N. Guo, Segregation ratios of colored grains in F1 hybrid wheat. Crop Breeding and Applied Biotechnology. 12, 126-131 (2012)

（4） M.Y Zhao, **Z.B. Zhang** *, S.Y. Chen*, J.S. Zhang, H.B. Shao*, WRKY transcription factor superfamily: structure, origin and function. African Journal of Biotechnology. 32, 8051-8059 (2012)

（5） C.F. Niu, W, Wei, Q.Y. Zhou, A.G. Tian, Y.J. Hao, W.K. Zhang, B. Ma, Q Lin, **Z. B. Zhang***, J.S. Zhang*, S.Y. Chen*, Wheat *WRKY* genes *TaWRKY2* and *TaWRKY19*

regulate abiotic stress tolerance in transgenic *Arabidopsis* plants. Plant, Cell & Environment. 35, 1156–1170 (2012)

（6） **Z.B. Zhang**, Z.Y. Duan，H.B. Shao , P. Chen, P. Xu, Establishing a biotech-modern-agriculture for China. African Journal of Biotechnology. 72, 16113-16119 (2011)

（7） Z.F. Guo, P. Xu, **Z.B Zhang***, D.W. Wang，J. Miao, A.P Teng, Segregation ratios of colored grains in crossed wheat. Australian Journal of Crop Science. 5, 589-594（2011）

（8） **Z.B.Zhang**, P.Xu, H.B.Shao. M.J. Liu, Z.Y.Fu，L.Y. Chu. Advance and prospects: biotechnologically improving crop water use efficiency. Critical reviews in biotechnology.3,281-293(2011)

（9） Z.Y. FU，**Z.B.Zhang***，Z.H. Liu, X.J. Hu , Ping Xu. The effects of abiotic stresses on the NADP-dependent malic enzyme in the leaves of the hexaploid wheat. Biologia Plantarum.1, 96-200. (2011)

（10） **Z.B. Zhang**, Z.Y. Duan, Z.B Chen, P. Xu, G.Q. Li, Food Security of China: The Past, Present and Future. Plant Omics Journal. 6, 183-189 (2010)

（11） **Z.B. Zhang,** P Xu, J. Z Jia, R.H. Zhou, Quantitative trait loci for leaf chlorophyll fluorescence traits in wheat. Australian Journal of Crop Science. 8, 571-579（2010）

（12） X.J. Hu, **Z.B. Zhang***, Z.Y. Fu, P. Xu, W.Q. Li, Significance of a β-ketoacyl-CoA synthase gene expression for wheat tolerance to adverse environments. Biologia Plantarum. 3, 575-578 (2010)

（13） H.B. Zhao, **Z.B. Zhang***, P. Xu, Enhanced aquaporin activity of two different genotypes of drought-resistant wheat (*Triticum aestivum* L.) cultivars facilitate their adaptation to drought stress. Journal of Food, Agriculture & Environment.2,1158-1161（2010)

（14） X.J. Hu, **Z.B. Zhang***, P. Xu, Z.Y. Fu, W.Y. Song, Multifunctional genes: the cross-talk among the regulation networks of abiotic stress responses. Biologia Plantarum.2, 213-223 (2010)

（15） X.J. Hu, **Z.B Zhang***, Z.Y. Fu, P. Xu, W.Y Song, W.Q. Li, Isolation and Characterization of an ABC-transporter cDNA Clone from Wheat (*Triticum*

aestivum L.). Molecular Biology. 6, 946-953 (2009）

（16) X.J. Hu, **Z.B. Zhang***, W.Q. Li, Z.Y Fu, S.X. Zhang, P. Xu. Cloning and expression analysis of a putative decarbonylase-encoding gene *TaCer1* from wheat (*Triticum aestivum L.*) . Acta Physiologiae Plantarum. 31,1111–1118 (2009)

（17) H.X. Cao, **Z.B. Zhang** *, C.X. Sun, H.B. Shao，W.Y. Song , P. Xu. Chromosomal location of traits associated with wheat seedling water and phosphorus use efficiency under different water and phosphorus stresses. International Journal of Molecular Sciences. 9, 4116-4136 (2009)

（18) **Z.B. Zhang**，H.B Shao，P. Xu，M.Y. Hu，W.Y. Song，X.J. Hu, Focus on agricultural biotechnology: Prospective for bio-watersaving theories and their applications in the semi-arid and arid areas . African Journal of Biotechnology. 12, 2779-2789 (2009)

（19) Z.Y. Fu**, Z.B. Zhang***，X.J. Hu, P. Xu, Cloning, identification, expression analysis and phylogenetic relevance of two NADP-dependent malic Enzyme genes from hexaploid wheat. Comptes Rendus Biologies. 332, 591–602 (2009)

BOOK

(1) **Zhang Zhengbin**, Duan Ziyuan. Water and food security and modern agricultural development in China. Chinese Science Publishing, Beijing, 2010，1

PATENTS

（1） Shouyi Chen, Jinsong Zhang, **Zhengbin Zhang**, Mingyu Zhao, Wanke Zhang, Biao Ma, Qing Lin. Application and coding gene of transcription factor TaWRKY16 (EU665428) that related with stress tolerance in plant, application number：201210288652.0, application date：2012.8.14

（2） Jinsong Zhang, Shouyi Chen, Canfang Niu, Biao Ma, Wanke Zhang, **Zhengbin Zhang**, Genes conferring stress tolerance in plants and uses thereof (TaWRKY2 & TaWRKY19). Application date:2010.2.24, Application No. PCT/CN2010/070736. PCT international application.

（3） Shouyi Chen, Jinsong Zhang, Canfang Niu, Biao Ma, Qing Lin. **Zhengbin Zhang,** Application and coding gene of transcription factor TaWRKY1 that related with stress tolerance in plant. Application number：[P].CN200910090496.5. Application

date：2009-08-13. Publication number CN101993479A, Patent for invention.

VARIEITY

(1) Jinmai 91 (numerous authorized by Shanxi province, 2011005)，has good drought resistance, green dry resistance , has good yellow in mature stage, good yield ability, is widely plant about 100 ten thousand hectare or in dryland in Shanxi province and Shaanxi province.

IMPORTMENT CONSULTING REPORTS

（1） Controlling wheat vigorous growth and preventing freeze injury early in Huanghuai region suggested by expert of Chinese academy of sciences, < Special information of Chinese academy of sciences>, 159, 2011; Adopted by the journal <Special information> of General office of the state council, and get National leadership instructions in Feb.2 2012

（2） Establishing biotechnology modern agriculture, reported and read by Central leadership，2012-2-1.

（3） Suggestion for ensuring food security and controlling diseases and insects pests by deep tillage field in China supplied by professor Zhengbin Zhang in Chinese academy of sciences. Internal reference of People's Daily (1169)，send to provinces and departments, July 19, 2012.

（4） Suggestion for ensuring food security by deep tillage field in Hebei province, approved by vice-governor of Hebei province, July 5, 2012

（5） Report for controlling wheat vigorous growth and preventing freeze injury in Hebai province, approved by vice-governor of Hebei province, 2011-12-20

（6） Many suggestions for drought resistance and water-saving, supplied by professor Zhengbin Zhang in center for agriculture resource research, institute of genetics and biological development, were put attention by nation government, <Important information> of Chinese academy of science, 16 , 2011

（7） Suggestion for scientific and effective copying with drought resistance in North China suggested by expert of Chinese academy of sciences, < Special information of Chinese academy of sciences>, 12, 2011

（8） Suggestion for scientific and effective copying with drought resistance in Hebei province, approved by vice-governor of Hebei province, 2011-1-12

（9） Countermeasure for drought resistance in China suggested by expert of Chinese academy of sciences, < Special information of Chinese academy of sciences>, 32, 2010, adopted by the journal <Special report> of general office of central committee, approved by vice-premier Liangyu Hui.

（10） Expert suggests selecting and popularizing crop variety that can be planted in irrigation land and dryland. Internal reference of People's Daily. 2009-4-9.

（11） Detailing drought resistance emergency plan according with crops characters, Internal reference of People's Daily, 1283，send to provinces and departments, 2009-9-1.

7. **Editorial duties**

8. **Conference organization**