

Salah F. Abou-Elwafa, Ph.D

Personal Details

Name: Salah Fatouh Abou-Elwafa
Place of birth: Egypt
Nationality: Egyptian
Gender: Male
Position: Professor of Crop Molecular Breeding and Genetics, Assiut University, Egypt.
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Education

2011 Dr. sc. agr. in plant molecular genetics and breeding, Plant Breeding Institute, Christian-Albrechts University of Kiel, Germany.
Dissertation: “Novel Genetic Factors Affecting Bolting and Floral Transition Control in *Beta vulgaris*” (**Summa Cum Laude**).
2002 M.Sc. in Agronomy and plant breeding, Faculty of Agriculture, Assiut University, Egypt.
1997 B.Sc. in Agronomy and plant breeding (with honor degree), Faculty of Agriculture, Assiut University, Egypt.

Academic Career

2021-present Professor at the Agronomy Dept., Assiut University, Egypt.
2016-2021 Assistant Professor at the Agronomy Dept., Assiut University, Egypt.
2011-2016 Associate Professor at the Agronomy Dept., Assiut University, Egypt.
2011-2014 Postdoctoral research associate and group leader at the Plant Breeding Institute, CAU-Kiel, Germany.
2006-2011 Research assistant and Ph.D. student at the Plant Breeding Institute, CAU-Kiel, Germany.
1998-2006 Professor assistant at the Agronomy Dept., Assiut University, Egypt.

Administrative career

2021-present Vice-Dean for Graduate Studies & Research at Faculty of Sugar and Integrated Industries Technology, Assiut University, Egypt.

- 2019-2021 Vice-Dean for Education and Student Affairs at Faculty of Sugar and Integrated Industries Technology, Assiut University, Egypt.
- 2017-2019 Head of Department of Science and Technology of Sugar Industry (Agriculture), Faculty of Sugar and Integrated Industries Technology, Assiut University, Egypt.

Honors and Scientific Awards

- 2011 The Faculty prize for the best PhD thesis in the CAU-Kiel, Germany.
- 2011 Postdoctoral fellowship from the German Federal Ministry for Education and Research (BMBF) at the Plant Breeding Institute, CAU-Kiel.
- 2006 Four years Ph.D. scholarship from the Ministry of Higher Education, Egypt.

Professional Activities and Affiliations

- Member of the German Plant Breeding Society (GPZ) since 2006.
- Honorary membership of the Arab Science and Technology Foundation (ASTF) since 2009.

List of Publications

1. Jiana Chen, **Salah Fatouh Abou-Elwafa**, Min Huang. Dynamic changes in the fossil energy use efficiency in crop production: A case study from Hunan province of China. *Journal of Cleaner Production* (2022).
2. Rui Pan, **Salah Fatouh Abou-Elwafa**, Sebastian Buitrago, Wenying Zhang. Adventitious root formation after cuttings and its regulation by transcriptome analysis. In: *Environmental, Physiological and Chemical Controls of Adventitious Rooting in Cuttings* (2023).
3. Jili Xu, Zhiyuan Gao, Shuo Liu, **Salah F Abou Elwafa**, Hui Tian. A multienvironmental evaluation of the N, P and K use efficiency of a large wheat diversity panel. *Field Crops Research* (2022).
4. Sami A Al-Dhumri, Mobarak S Al Mosallam, Wenying Zhang, Saif Alharbi, **Salah F Abou-Elwafa**. Application of Molasses as an Eco-Innovative Approach Substitutes Mineral Nitrogen Fertilization and Enhances Sugar Beet Productivity. *Waste and Biomass Valorization* (2022).
5. Jiana Chen, Fangbo Cao, Yu Liu, Zui Tao, Tao Lei, **Salah Fatouh Abou-Elwafa**, Min Huang. Comparison of Short-Duration and Long-Duration Rice Cultivars Cultivated in Various Planting Densities. *Agronomy Journal* (2022).
6. Fahad S Alotaibi, Rahmah N Al-Qthanin, Maha Aljabri, Tariq Shehzad, Mohammed Albaqami, **Salah Fatouh Abou-Elwafa**. Identification of genomic regions associated with agronomical traits of bread wheat under two levels of salinity using GWAS. *Plant Molecular Biology Reporter* (2022).
7. Rui Pan, Sebastian Buitrago, Ying Peng, **Salah Fatouh Abou-Elwafa**, Kui Wan, Yi Liu, Rongsun Wang, Xinsun Yang, Wenying Zhang. Genome-wide identification of cold-tolerance genes and functional analysis of IbbHLH116 gene in sweet potato. *Gene* (2022).
8. Ni-qing He, Guang-ping Zhan, Feng-huang Huang, **Salah Fatouh Abou-Elwafa** and Dewei Yang. Fine mapping and cloning of a major QTL *qph12*, which simultaneously affects the plant height, panicle length, spikelet number and yield in rice (*Oryza sativa* L.). *Frontiers in Plant Science* (2022).

9. Bo Li, Caixian Yang, Bingzhuang An, Hongpan Wang, Mohammed Albaqami, **Salah Fatouh Abou-Elwafa**, Le Xu, Yanhao Xu. Comparative transcriptomic and epigenetic analyses reveal conserved and divergent regulatory pathways in barley response to temperature stresses. *Physiologia Plantarum* (2022).
10. Rui Pan, Sebastian Buitrago, Zhenbao Feng, **Salah Fatouh Abou-Elwafa**, Le Xu, Chengdao Li, Wenying Zhang. *HvbZIP21*, a Novel Transcription Factor from Wild Barley Confers Drought Tolerance by Modulating ROS Scavenging. *Frontiers in Plant Science* (2022).
11. Zhixue Liu, **Salah Fatouh Abou-Elwafa**, Jiarong Xie, Yajing Liu, Siyuan Li, Maha Aljabri, Dongling Zhang, Fengran Gao, Lili Zhang, Zhiyong Wang, Chongyu Sun, Bingqi Zhu, Miaomiao Bao, Xiaomeng Hu, Yanhui Chen, Lixia Ku, Zhenzhen Ren, Li Wei. A Nucleoporin NUP58 modulates responses to drought and salt stress in maize (*Zea mays* L.). *Plant Science* (2022).
12. Deka Reine Judesse Soviguidi, Yi Liu, Rui Pan, **Salah Fatouh Abou-Elwafa**, Wen-Ying Zhang, Xin-Sun Yang. Genotypic variations in GST genes reveal a regulatory role in the accumulation of caffeoylquinic acids in leafy sweet potato (*Ipomoea batatas*). *Plant Cell, Tissue and Organ Culture (PCTOC)* (2022).
13. Chunrong Zhao, Xiaohong Yin, Jiana Chen, Fangbo Cao, **Salah Fatouh Abou-Elwafa**, Min Huang. Effect of rapeseed straw-derived biochar on soil bacterial community structure at tillering stage of *Oryza Sativa*. *Canadian Journal of Microbiology* (2022).
14. Liqin Hu, Jialin Cao, Yu Liu, Zhengwu Xiao, Mingyu Zhang, Jiana Chen, Fangbo Cao, Anas Iqbal, **Salah Fatouh Abou-Elwafa**, Min Huang. Multidimensional Relationships of Starch Digestibility with Physicochemical, Pasting and Textural Properties of 30 Rice Varieties. *Agronomy* (2022).
15. Deka Reine Judesse Soviguidi, Yi Liu, Rui Pan, **Salah Fatouh Abou-Elwafa**, Li-Ping Rao, Sefasi Abel, Wen-Ying Zhang, Xin-Sun Yang. Role of sweet potato GST genes in abiotic stress tolerance revealed by genomic and transcriptomic analyses. *Crop Breeding and Applied Biotechnology* (2022).
16. Zhiyong Wang, Xiang Zhao, Zhenzhen Ren, **Salah Fatouh Abou-Elwafa**, Xiaoyu Pu, Yingfang Zhu, Dandan Dou, Huihui Su, Haiyang Cheng, Zhixue Liu, Yanhui Chen, Ertao Wang, Ruixin Shao, Lixia Ku. *ZmERF21* directly regulates hormone signaling and stress-responsive gene expression to influence drought tolerance in maize seedlings. *Plant, Cell & Environment* (2022).
17. Mingming Zhang, Xiong Zhong, Mengjiao Li, Xiuming Yang, **Salah F Abou Elwafa**, Mohammed Albaqami, Hui Tian. Genome-wide analyses of the Nodulin-like gene family in bread wheat revealed its potential roles during arbuscular mycorrhizal symbiosis. *International Journal of Biological Macromolecules* (2022).
18. Mengjiao Li, Tian Wang, Hui Zhang, Shuo Liu, Wenhui Li, **Salah F Abou Elwafa**, Hui Tian. *TaNRT2. 1-6B* is a dual-affinity nitrate transporter contributing to nitrogen uptake in bread wheat under both nitrogen deficiency and sufficiency. *The Crop Journal* (2022).
19. Huihui Su, Zhihui Chen, Yahui Dong, Lixia Ku, **Salah Fatouh Abou-Elwafa**, Zhenzhen Ren, Yingying Cao, Dandan Dou, Zhixue Liu, Huafeng Liu, Lei Tian, Dongling Zhang, Haixia Zeng, Shengbo Han, Fangfang Zhu, Chunguang Du, Yanhui Chen. Identification of *ZmNF-YC2* and its regulatory network for maize flowering time. *Journal of Experimental Botany* (2021).
20. Rui Pan, Hui Han, Milca Banda Medison, **Salah Fatouh Abou-Elwafa**, Yi Liu, Xinsun Yang, Wenying Zhang. Aerenchyma formation in the root of leaf-vegetable sweet potato: Programmed cell death initiated by ethylene-mediated H₂O₂ accumulation. *Physiologia plantarum* (2021).

21. Huihui Su, Jiachen Liang, **Salah Fatouh Abou-Elwafa**, Haiyang Cheng, Dandan Dou, Zhenzhen Ren, Jiarong Xie, Zhihui Chen, Fengran Gao, Lixia Ku, Yanhui Chen. ZmCCT regulates photoperiod-dependent flowering and response to stresses in maize. *BMC plant biology* (2021).
22. H Han, R Pan, S Buitrago, **SF Abou-Elwafa**, Y Peng, Y Liu, WY Zhang, XS Yang. The physiological basis of genotypic variations in low-oxygen stress tolerance in the vegetable sweet potato. *Russian Journal of Plant Physiology* (2021).
23. Jiana Chen, Fangbo Cao, Mohammed Albaqami, Min Huang, **Salah F Abou-Elwafa**. Differentially expressed proteins implicated in grain filling at early ripening stage of rice: a proteomic study. *Journal of Plant Growth Regulation* (2021).
24. Zhanyao Hu, Zheli Ding, Hatim M Al-Yasi, Esmat F Ali, Mamdouh A Eissa, **Salah F Abou-Elwafa**, Mohammed Abdelaziz Sayed, Mohamed Tharwat Said, Alaa A Said, Khaled AM Ibrahim, Alhosein Hamada. Modeling of Phosphorus Nutrition to Obtain Maximum Yield, High P Use Efficiency and Low P-Loss Risk for Wheat Grown in Sandy Calcareous Soils. *Agronomy* (2021).
25. Yancui Zhao, Wenying Zhang, **Salah Fatouh Abou-Elwafa**, Sergey Shabala, Le Xu. Understanding a Mechanistic Basis of ABA Involvement in Plant Adaptation to Soil Flooding: The Current Standing. *Plants* (2021).
26. Maha Aljabri, Saif Alharbi, Rahmah N Al-Qthanin, Fekry M Ismaeil, Jiana Chen, **Salah Fatouh Abou-Elwafa**. Recycling of beet sugar byproducts and wastes enhances sugar beet productivity and salt redistribution in saline soils. *Environmental Science and Pollution Research* (2021).
27. Wei Jiang, Rui Pan, Sebastian Buitrago, Chu Wu, **Salah Fatouh Abou-Elwafa**, Yanhao Xu, Wenying Zhang. Conservation and divergence of the TaSOS1 gene family in salt stress response in wheat (*Triticum aestivum* L.). *Physiology and Molecular Biology of Plants* (2021).
28. Fahad Alotaibi, Atif A Bamagoos, Fekry M Ismaeil, Wenying Zhang, **Salah Fatouh Abou-Elwafa**. Application of beet sugar byproducts improves sugar beet biofortification in saline soils and reduces sugar losses in beet sugar processing. *Environmental Science and Pollution Research* (2021).
29. Mahmoud A Elattar, Benjamin Karikari, Shuguang Li, Shiyu Song, Yongce Cao, Muhammed Aslam, Aiman Hina, **Salah Fatouh Abou-Elwafa**, Tuanjie Zhao. Identification and Validation of Major QTLs, Epistatic Interactions, and Candidate Genes for Soybean Seed Shape and Weight Using Two Related RIL Populations. *Frontiers in Genetics* (2021).
30. Fanguo Chang, Wenhuan Lv, Peiyun Lv, Yuntao Xiao, Wenliang Yan, Shu Chen, Lingyi Zheng, Ping Xie, Ling Wang, Benjamin Karikari, **Salah Fatouh Abou-Elwafa**, Haiyan Jiang, Tuanjie Zhao. Exploring genetic architecture for pod-related traits in soybean using image-based phenotyping. *Molecular Breeding* (2021).
31. Chang Tian, Xuan Zhou, Qiang Liu, Jianwei Peng, Zhenhua Zhang, Haixing Song¹, Zheli Ding, Mostafa A. Zhran, Mamdouh A. Eissa, Ahmed S. Kheir, Ahmed E. Fahmy, **Salah F. Abou-Elwafa**. Increasing Oil Yield, Quality and Economic Profits of Winter Oilseed Rape Under Combined Fertilizing Levels and Planting Densities. *Crop Pasture Sci.* (in press).
32. Hengdong Zhang, Jiana Chen, Shuanglü Shan, Fangbo Cao, Guanghui Chen, Yingbin Zou, Min Huang, **Salah F. Abou-Elwafa**. Proteomic profiling reveals differentially expressed proteins associated with amylose accumulation during rice grain filling. *BMC Genomics* (2020).

33. Jiana Chen, Fangbo Cao, Hailin Li, Shuanglü Shan, Zui Tao, Tao Lei, Yu Liu, Zhengwu Xiao, Yingbin Zou, Min Huang, **Salah Fatouh Abou-Elwafa**. Genotypic variation in the grain photosynthetic contribution to grain filling in rice. *J. Plant Physiol* (2020).
34. Jiana Chen, Ruichun Zhang, Fangbo Cao, Xiaohong Yin, Yingbin Zou, Min Huang, **Salah Fatouh Abou-Elwafa**. Evaluation of Late-Season Short-and Long-Duration Rice Cultivars for Potential Yield under Mechanical Transplanting Conditions. *Agronomy-Basel J* (2020).
35. **Salah F. Abou-Elwafa** and Tariq Shehzad. Genetic diversity, GWAS and prediction for drought and terminal heat stress tolerance in bread wheat (*Triticum aestivum* L.). *Genetic Resources and Crop Evolution* (2020).
36. **Salah F. Abou-Elwafa**, Abu El-Eyuoon A. Amin and I. Eujayl Shehzad. Genetic diversity of sugar beet under heat stress and deficit irrigation. *AGRON J* (2020).
37. Zhaobing Liu, Xionghui Ji, Yunhe XIE, Jianwei Peng, Ahmed E. Fahmy, Mamdouh A. Eissa, **Salah F. Abou-Elwafa**. Effect of Continuous Liming on Remediation, Immobilization and Accumulation of Cadmium Rice in Acid Paddy Soils. *J SOIL SCI PLANT NUT* (2020)
38. **Salah F. Abou-Elwafa**, Abu El-Eyuoon A. Amin and Tariq Shehzad. Genetic mapping and transcriptional profiling of phytoremediation and heavy metals responsive genes in sorghum. *Ecotoxicol Environ Saf.* (2019).
39. **Salah F. Abou-Elwafa** and Tariq Shehzad. Genetic Identification and Expression Profiling of Drought Responsive Genes in Sorghum. *Environ Exp Bot* (2018).
40. Amer F. Mahmoud, **Salah F. Abou-Elwafa** and Tariq Shehzad. Identification of Charcoal Rot Resistance Quantitative Trait Genes (QTGs) in Sorghum using. *J. Appl. Gent.* (2018).
41. **Salah F. Abou-Elwafa**. Identification of genes associated with drought tolerance in barley. *Biologia Plantarum* (2017).
42. **Salah F. Abou-Elwafa**. Association Mapping for Drought Tolerance in Barley (A short communication). *Gene Technol* (2016).
43. Nour Ibrahim, **S.F. Abou-Elwafa**, H. Mahrous, A.A. Ismail, E. E. Mahdy. Efficiency of Single and Multiple Traits Selection for Yield and Its Components in Varietal Maintenance of Giza 90 Egyptian Cotton Variety. *World Journal of Agricultural Research* (2016).
44. Eid M. Mehareb, **S.F. Abou-Elwafa** and M. Galal. Comparative performance of sugarcane genotypes for ratoonability in early clonal selection stages. *J. Sugarcane Res* (2016).
45. **Salah F. Abou-Elwafa**. Association mapping for yield and yield-contributing traits in barley under drought conditions with genome-based SSR markers. *C. R. Biologies* (2016).
46. **Salah F. Abou-Elwafa** and K. A. Amein. Genetic Diversity and Potential High Temperature Tolerance in Barley (*Hordeum vulgare*). *World Journal of Agricultural Research* (2016).
47. **Salah F. Abou-Elwafa**. Genetic Association Mapping for Drought Tolerance in Barley at Reproductive Stage. *C.R. Biologies* (2016).
48. **Salah F. Abou-Elwafa**. A New Locus Suppresses Bolting under Shortening Daylength in Sugar Beet. *World Journal of Agricultural Research* (2015).
49. **Salah F. Abou-Elwafa**. Genetic Analysis of Bolting Tendency in *Beta vulgaris* ssp. *maritima*. *Russian Agricultural Sciences* (2015).
50. Ahmed Galal, S. Sharma, **S. F. Abou-Elwafa**, S. Sharma, F. Kopisch-Obuch, E. Laubach, D. Perovic, F. Ordon and C. Jung. Comparative QTL Analysis of Root Lesion Nematode Resistance in Barley. *Theor Appl Genet.* (2014).

51. **Salah F. Abou-Elwafa**, A. Hamada, E. M. Mehareb. Genetic Identification of a Novel Locus (LB2) Regulates Bolting Time in *Beta vulgaris*. *Int. J. Agr. Sci. and Tech.* (2014).
52. **Salah F. Abou-Elwafa**, H.M.Abdel-Rahim, A.M.Abou-Salama, and E.A.Teama. Effect of Root Age and Day-Length Extension on Sugar Beet Floral Induction and Fertility. *World Journal of Agricultural Research* (2013).
53. **Salah F. Abou-Elwafa**, B.Büttner, F.Kopisch-Obuch, C.Jung and AE.Müller. Genetic identification of a novel bolting locus in *Beta vulgaris* which promotes annuality independently of the bolting gene B. *J Mol Breeding* (2012).
54. **Salah F. Abou-Elwafa**, B.Büttner, T.Chia, G.Schulze-Buxloh, U.Hohmann, E.Mutasa-Göttgens, C.Jung and AE.Müller. Conservation and divergence of the autonomous pathway of flowering time regulation in *Beta vulgaris*. *J Exp Bot.* (2011).
55. Büttner, B., **S.F.Abou-Elwafa**, W.Zhang, C.Jung, and AE.Müller. A survey of EMS-induced biennial *Beta vulgaris* mutants reveals a novel bolting locus which is unlinked to the bolting gene B. *Theor Appl Genet.* (2010).
56. **Salah F. Abou-Elwafa**, H.M.Abdel-Rahim, A.M.Abou-Salama, and E.A.Teama. Sugar Beet Floral Induction and Fertility: Effect of Vernalization and Day-length Extension. *Sugar Tech* (2006).

Conference Presentations

1. **Abou-Elwafa, S.F.** and Imad Eujayl. Experimental Sugar Beet Seed Production in Egypt. 9th Intl. Conference on Sugar and Integrated Industries. Luxor, Egypt; November 18-21, 2018.
2. **Abou-Elwafa, S.F.** Genetic Analysis of Bolting Tendency in *Beta vulgaris*. 7th Intl. Conference on Technology sugar industry. Aswan, Egypt; November 7-10, 2015.
3. **Abou-Elwafa, S.F.**, A. Galal, K. Xiao, E. Laubach, C. Jung. Candidate Genes for Root Lesion Nematode Resistance in Barley. *PLANT 2030 Status Seminar 14*, Potsdam, Germany; March 31-April 2, 2014.
4. **Abou-Elwafa, S.F.**, A. Galal, K. Xiao, E. Laubach, C. Jung. Genetic Fine Mapping of Root Lesion Nematode Resistance QTLs in Barley. 17. Conference of the Genome Research Working Group "Crop Genomics and Plant Breeding", Cologne, Germany; February 11-13, 2014.
5. **Abou-Elwafa, S.F.**, A. Galal, K. Xiao, E. Laubach, C. Jung. Genetic Fine Mapping of Root Lesion Nematode Resistance QTLs in Barley. *Fortschritte in der Krankheitsbekämpfung und Resistenzzüchtung bei landwirtschaftlichen Kulturpflanzen*, Fluda, Germany; Dec. 9-10, 2013.
6. **Abou-Elwafa, S.F.**, A. Galal, E. Laubach, C. Jung. Genetic Fine Mapping of QTLs Associated with Root Lesion Nematodes in Barley. *PLANT 2030 Status Seminar*, Potsdam, Germany; March 6-8, 2013.
7. Galal A., **S.F. Abou-Elwafa**, E. Laubach, C. Jung. Genetic Fine Mapping of QTLs Associated with Root Lesion Nematodes (RLN) in Barley. *Genome Research Working Group Conference of the GPZ*, Halle, Germany; September 18-20, 2012.
8. **Abou-Elwafa, S. F.** B. Büttner, C. Jung, A. E. Müller. Novel Genetic Factors Affecting Bolting Control in *Beta Vulgaris*. *Plant and Animal Genome XIX Program*, San Diego, CA, USA; January 10 – 14th, 2009.
9. **Abou-Elwafa, S.F.**, B.Büttner, T.Chia, G.Schulze-Buxloh, U.Hohmann, E.Mutasa-Göttgens, C.Jung and AE.Müller. Evolutionary conservation of gene function in the autonomous pathway of flowering time control in sugar beet. "Genomics-based breeding", Gießen, Germany; October 26-28th, 2010.

10. Jung, C., **S.F.Abou-Elwafa**, B.Büttner, G.Schulze-Buxloh, and AE.Müller. Identification of key regulators for flowering time control and their application in breeding of biennial crop species. *3rd International Conference on Plant Molecular Breeding. Beijing, China; September 5-9th, 2010.*
11. **Abou-Elwafa, S.F.**, B.Büttner, U.Hohmann, C.Jung and AE.Müller. Evolutionary conservation of a sugar beet FLK homolog (BvFLK1) in flowering time control. *Innovation in Breeding Methodology*, Freising-Weihenstephan, Germany; 15-17 March 2010.
12. Müller, AE. **S.F.Abou-Elwafa**, W.Zhang, B.Buettner, G.Schulze-Buxloh, S.Vogt, T.Chia, E.Mutasa-Gottgens, P.Winter and C. Jung. Functional Genomics of Floral Transition in Sugar Beet. Keystone Symposia on Molecular and Cellular Biology *Plant Sensing, Response and Adaptation to the Environment*, Silverthorne, Colorado, USA; September 11-16th, 2009.
13. Schulze-Buxloh,G. **S.F.Abou-Elwafa**, B.Büttner, F.Lejealle, B.Stich, G.Koch, M.Wolf, A.Schechert, C.Jung and AE.Müller.Towards Synchronization Of Flowering Time For Hybrid Seed Production: Genetic Mapping Of Floral Transition Genes And QTL In Sugar Beet (*Beta vulgaris*). *Plant and Animal Genome XVII Program, San Diego, CA, USA; January 10 – 14th, 2009.*
14. Büttner, B., **S.F.Abou-Elwafa**, C.Jung and AE.Müller. Flowering Time Control in Sugar Beet: Identification and Functional Analysis of Floral Transition Genes for Application in Plant Breeding. *Genome Analysis*, Göttingen/ Einbeck, Germany; November 10-11, 2008.

Professional Experiences and Skills

1. Strong understanding of research technology tools for bioinformatics including;
 - i. High-performance computing (HPC) and visualization including extensive experience with UNIX/Linux based systems
 - ii. Familiarity with next generation sequencing data management and processing
 - iii. Sequence analysis and annotation including; similarity, homology, gene regulation and structural analysis, phylogenetic analysis and protein functional analysis (Training on “Advanced Protein Domain Analysis”, Lyon, France, May 18-20th, 2008)
2. Deep understanding and solid experience in standard molecular biology techniques such as cloning, vector construction, plant transformation, transgenic, mutant analysis and gene expression analysis
3. Extensive experience in plant molecular breeding and QTL analysis including development of breeding materials, genetic analysis, genetic mapping using different molecular markers (AFLP, SNP, CAPS, etc) using JoinMap and QTL mapping using PLAB QTL and QTL Cartographer
4. Strong understanding of statistical analysis and experimental design
5. Computer skills: International Computer Driving License (ICDL)
6. Languages: Arabic, English and German