

Dr. RAGIBA MAKANDAR

Professor, Dept. of Plant Sciences
F-66, School of Life Sciences, University of Hyderabad
Prof. C. R. Rao Road, Gachibowli,
Hyderabad-500046; Telangana
Telephone (O): 91-40-23134514
Email: mragiba@uohyd.ac.in
http://sls.uohyd.ac.in/new/fac_details.php?fac_id=89

**CURRENT POSITION:**

Dec 2016 Professor, School of Life Sciences, University of Hyderabad

PREVIOUS POSITIONS:

Jan 2012- Dec 2016 Associate professor, Dept. of Plant Sciences, School of Life Sciences, UoH
Dec 2008- Dec 2011 Reader, Dept. of Plant Sciences, School of Life Sciences, UoH, Hyderabad
May – July, 2009 Visiting Scientist, ASU Biodesign Institute, ASU, Tempe, Arizona, US
Aug 2007 – Nov 2008 Research Assistant Professor, University of North Texas, Denton TX 76201
Aug 2003 – Jul 2007 Postdoctoral Research Associate, KSU, Manhattan, Kansas, US
Sep 2002 – Aug 2003 Postdoctoral Research Associate, HARC, Aiea, HI US
Feb 2001 – Sep 2002 Research Associate, NRCPB, IARI, New Delhi
Nov 1998 – Jun 1999 Assistant Professor, College of Agriculture, Bapatla, ANGRAU, Bapatla
Apr 1995 – Jul 1996 Research Associate, Division of Genetics, IARI, Pusa, New Delhi
Jun 1994 – Mar 1995 Post Graduate Apprentice, National Watershed Project, Chittoor, A.P.

EDUCATION:

Ph.D. Genetics 2001 Indian Agricultural Research Institute (IARI), New Delhi
M.Sc. Agri. (Genetics) 1992 Andhra Pradesh Agricultural University (APAU), Hyderabad
B.Sc. Agriculture 1990 Andhra Pradesh Agricultural University (APAU), Hyderabad

AWARDS:

Nov 2012 – Apr 2013 DBT-CREST Research Fellowship to conduct research at UNT, Denton, USA

FUNDED RESEARCH PROJECTS:**Institute of Eminence (IOE)-MHRD funded project**

Identification, molecular mapping and pyramiding of powdery mildew gene(s) in garden pea; Institution of Eminence (IOE)-MHRD; University of Hyderabad ([IOE-UoH-RC3-21-020](#))

Department of Science and Technology (DST), New Delhi, India: POWER-SPG

Delineating fungicidal tolerance of the fungal pathogen, *Fusarium graminearum* by analyzing Tebuconazole induced responses; POWER grant; [SPG/2021/001819/2021](#);

Department of Biotechnology (DBT), New Delhi, India:

Identification and characterization of Pathogen Associated Molecular Patterns (PAMPs) and candidate effector genes in Powdery mildew fungus (*Erysiphe pisi*) through transcriptome profiling; BT/PR1264/PBD/16/848/2009;

Department of Science and Technology (DST), New Delhi, India: SERB-CRG Grant

Identification and molecular tagging of virulence and pathogenesis genes of powdery mildew fungus (*Erysiphe pisi*) using genomic tools SR/SO/BB02/2010;

Indian Council of Agricultural Research (ICAR)-NFBSFARA, New Delhi, India:

Deciphering molecular mechanism of induction of biotic stress tolerance by *Trichoderma* spp. in castor (*Ricinus communis* L.); ICAR-NFBSFARA/BS-3007/ 2012;

University Grants Commission (UGC)-University of Potential Excellence (UPE-II):

Physicochemical detection of bio-molecules in *Erysiphe pisi* with potent immune responses using molecular and computational studies; Universities with Potential for Excellence; (UPE Phase II; UH/UGC/UPE Phase-2/Interface Studies/research projects/R-29);

PEER REVIEWED PUBLICATIONS [2015 to 2022]:

1. Pamei, I and **Makandar, R***. 2022. Comparative Transcriptome Provides a New Insight into Floral Regulation and Defense Response against Phytoplasma in Sesame (*Sesamum indicum* L.). **Plant Mol Biol Rep**, 1-12 (2022). <https://doi.org/10.1007/s11105-022-01335-9>. (*Corresponding Author).
2. Pamei, I., **Makandar, R***. 2022. Comparative proteome analysis reveals the role of negative floral regulators and defense-related genes in phytoplasma infected sesame. **Protoplasma**, 1-13. <https://doi.org/10.1007/s00709-022-01737-2>. (*Corresponding Author).
3. Alam, S., Sarowar, S., Mondal, H., **Makandar, R.**, Chowdhury, Z., Louis, Joe and Jyoti, S. Opposing effects of MYZUS PERSICAE-INDUCED LIPASE 1 and jasmonic acid influence the outcome of *Arabidopsis thaliana*-*Fusarium graminearum* interaction. 2022. **Mol. Plant Pathol.** 2022;00:1-13, DOI: 10.1111/mpp.13216.
4. Bhosle S.M. and **Makandar, R*** 2021. Comparative proteomic analysis reveals molecular differences between incompatible and compatible interaction of *Erysiphe pisi* in garden pea. **Microbiol. Res.** Print MICRES_126736. Published: 5 March 2021; 1-40. (*Corresponding Author); <https://doi.org/10.1016/j.micres.2021.126736>
5. Bhosle S.M. and **Makandar, R*** 2021. Comparative transcriptome of compatible and incompatible interaction of *Erysiphe pisi* and garden pea reveals putative defense and pathogenicity factors. **FEMS Microbiol. Ecol.** Print fiab006. Published: 20 January 2021; 1-42. (*Corresponding Author); <https://doi.org/10.1093/femsec/fiab006>;
6. Bhosle S.M., Marathe N., **Makandar, R***. 2020. Biological Host Response: A Paradigm and Strategy to Overcome Biotic Stress Caused by Powdery Mildew Causal Agents in Plants. In: Rakshit A., Singh H., Singh A., Singh U., Fraceto L. (eds) **New Frontiers in Stress Management for Durable Agriculture**. Springer Nature, Singapore. Print ISBN978-981-15-1321-3; 389-424. (*Corresponding Author); <https://link.springer.com/book/10.1007%2F978-981-15-1322-0>
7. Sheetal M. Bhosle, Nitinkumar Marathe, Malathi Bheri, **Makandar, R***. 2019. Detection of putative pathogenicity and virulence genes of *Erysiphe pisi* using genome-wide in-silico search and their suppression by *er2* mediated resistance in garden pea. **Microbial Pathogenesis**, 136, November 2019, 103680103680. (*Corresponding Author); <https://doi.org/10.1016/j.micpath.2019.103680>
8. Sheetal M. Bhosle, Nitinkumar Marathe and **Makandar, R***. 2019. The *er2* gene resistance against powdery mildew infection is associated with enhanced antioxidative protection and defense gene expression. **Physiological and Mol. Plant Pathol.** 106: 253-262. (*Corresponding Author); <https://doi.org/10.1016/j.pmpp.2019.02.008>
9. Malathi Bheri, SM Bhosle, **Makandar, R***. 2019. Shotgun proteomics provides an insight into pathogenesis-related proteins using anamorphic stage of the biotroph, *Erysiphe pisi* pathogen of garden pea. **Microbiol. Res.** 222: 25-34; (*Corresponding Author); <https://doi.org/10.1016/j.micres.2019.02.006>
10. S Sarowar, ST Alam, **Makandar, R**, H Lee, HN Trick, Y Dong, J Shah. 2019. Targeting the pattern-triggered immunity pathway for enhancing resistance to *Fusarium graminearum*. **Mol. Plant Pathol.** 20 (5): 626-640. 1-15. <https://doi.org/10.1111/mpp.12781>
11. Pamei, I and **Makandar, R***. 2016. Association of 16SrII-D phytoplasma with phyllody disease in sesame (*Sesamum indicum* L.) in Telangana from Southern India. **Plant Disease**. 100 (8): 1774. <http://dx.doi.org/10.1094/PDIS-11-15-1348-PDN> (Corresponding Author).
12. Malathi, B, Fareeda, G and **Makandar, R***. 2016. Assessing host specialization of *Erysiphe pisi* on garden pea germplasm through genotypic and phenotypic characterization. **Euphytica**. 212 :1-14. (<http://link.springer.com/article/10.1007%2Fs10681-015-1511-3> (Corresponding Author).
13. Malathi, B, Fareeda, G and **Makandar, R***. 2016. Erratum to: Assessing host specialization of *Erysiphe pisi* on garden pea germplasm through genotypic and phenotypic characterization **Euphytica**. 212:1-14. (<http://link.springer.com/article/10.1007%2Fs10681-015-1511-3> (Corresponding Author).
14. **Makandar, R**, Vamsi J. Nalam, Zulkarnain Chowdhury, Sujon Sarowar, Guy Klossner, Hyeonju Lee, Dehlia Burdan, Harold N. Trick, Enrico Gobbato, Jane E. Parker, and Jyoti Shah. 2015. The Combined Action of ENHANCED DISEASE SUSCEPTIBILITY1, PHYTOALEXIN DEFICIENT4, and SENESCENCE-ASSOCIATED101 Promotes Salicylic Acid-Mediated Defenses to Limit *Fusarium graminearum* Infection in *Arabidopsis thaliana*. **Mol. Plant-Microbe Interact.** (doi:

15. Vamsi J. Nalam, Syeda Alam, Jantana Keereetaweeep, Barney Venables, Dehlia Burdan, Hyeonju Lee, Harold N Trick, Sujon Sarowar, **Makandar, R**, Jyoti Shah. 2015. Facilitation of *Fusarium graminearum* Infection by 9-lipoxygenases in Arabidopsis and Wheat. **Mol. Plant-Microbe Interact.** (doi: <http://dx.doi.org/10.1094/MPMI-04-15-0096>)

PUBLICATIONS FROM PREVIOUS YEARS:

16. **Makandar, R**. A book chapter under Plant Pathology section. 2014. **e-Pathashala** of UGC/MHRD: Biochemical and Physiological changes in plants in response to pathogens. 1-22.
17. **Makandar, R**. A book chapter under Host-Pathogen Interaction. 2014. **e-Pathashala** of UGC/MHRD: Pathogenesis and virulence of fungal pathogens infecting plants. 1-17.
18. **Makandar, R**, Nalam V J, Lee, H, Trick, H N, Dong, Y and Jyoti Shah. 2012. Salicylic Acid Regulates Basal Resistance to Fusarium Head Blight in Wheat. **Mol. Plant-Microbe Interact.** **25** (3): **431-439**.
http://www.apsnet.org/publications/mpmi/2012/March/Pages/25_3_431.aspx
19. **Makandar, R** and Shah, J. 2011. Functional genomics play significant role in disease signaling and defense response against fungal pathogen (*Fusarium graminearum*) in plants. In: Genomics and Crop Improvement: Relevance and Reservations, pages 195-201; Proceedings of the National Symposium held at Institute of Biotechnology, ANGRAU, Hyderabad from February 25-27, 2010.
20. **Makandar, R**, Nalam, V, Chaturvedi, R, Jeannotte, R, Sparks, A. A and Shah, J. 2010. Involvement of Salicylate and Jasmonate Signaling Pathways in *Arabidopsis* Interaction with *Fusarium graminearum*. **Mol. Plant-Microbe Interact.** **23** (7): **861-70**. http://www.apsnet.org/publications/mpmi/2010/July/Pages/23_7_861.aspx
21. **Makandar, R** and Prabhu, K. V. 2009. Identification of RAPD markers associated with HLB disease resistance in wheat. **Indian J. of Genetics**, 69 (3): 1-7. (*Corresponding Author).
22. **Makandar, R** and Prabhu, K. V. 2009. Inheritance of resistance to spot blotch in wheat. **Indian J. of Genetics**, 69 (3): 8-12. (*Corresponding Author).
23. Ratnesh Chaturvedi*, Kartikeya Krothapalli*, **Makandar, R**, Ashis Nandi, Alexis A. Sparks, Mary R. Roth, Ruth Welti and Jyoti Shah, 2008. Genetic and biochemical approaches to identify the phloem-mobile signal in systemic acquired resistance. **Plant Journal**, 54 (1): 106-117. *Equal contribution. <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1365-3113.2007.03400.x>
24. **Makandar, R**, Harold Trick, Julian S. Essig, Melissa A. Schapaugh and Jyoti Shah, 2006. Genetically engineered resistance to Fusarium leaf blight in wheat by expression of Arabidopsis NPR1 gene. **Mol. Plant-Microbe Interact.** 19(2), 123-129
<http://www.apsnet.org/mpmi/+toc/2006/mfe06tp.htm>
25. The Rice Chromosomes 11 and 12 Sequencing Consortia (**M. Ragiba** as one of the authors). 2005. The sequence of rice chromosomes 11 and 12, rich in disease resistance genes and recent gene duplications. **BMC Biol**, 3:20, <http://www.biomedcentral.com/1741-7007/3/20>
26. Zhiyong Liu, Paul H. Moore, Hao Ma, **Makandar, R**, Qingyi Yu Heather M. Pearl, Minna S. Kim, Joseph W. Charlton, John I. Stiles, Francis T. Zee, Andrew H. Paterson, and Ray Ming, 2004. A Primitive Y chromosome in Papaya Marks the Beginning of Sex Chromosome Evolution. **Nature**, 427. <http://www.nature.com/nature/journal/v427/n6972/index.html#Letter>
27. **Ragiba, M.**, Prabhu, K.V. and Singh, R.B. 2004. Recessive genes controlling resistance to *Helminthosporium* leaf blight in synthetic hexaploid wheat. **Plant Breeding**, 123 (4): 389
<http://www.blackwell-synergy.com/toc/pbr/123/4>. (*Corresponding Author).
28. **Ragiba, M.**, Prabhu, K.V., and Singh, R.B, 2004. Monosomic analysis of *Helminthosporium* leaf blight resistance genes in wheat (*Triticum aestivum* L. em Thell.). **Plant Breeding**, 123: 405-409 <http://www.blackwell-synergy.com/toc/pbr/123/5>. (*Corresponding Author).
29. **Ragiba, M.**, Prabhu, K.V. and Singh, R.B. (2001). Characterization of wheat germplasm against *Helminthosporium* leaf blight (HLB). **Indian J. of Phytopathol.** 54 (3): 149-152. (*Corresponding Author).

30. **Ragiba, M.** (2000). Germination and early seedling growth of Sesame (*Sesamum indicum* L.) as affected by salinity. **Ann. of Agril. Res.** 21 (2): 303-304. (*Corresponding Author).
31. **Ragiba, M.** and Mishra, S.K. (2000). Genetics of Plant Embryogenesis - a review. **Ann. of Agril. Res.** 21 (3): 424-434. (*Corresponding Author).
32. **Ragiba, M** and Raja Reddy, C. (2000). Combining ability in diallel cross of Sesamum (*Sesamum indicum* L.). **Ann. of Agril. Res.** 21 (1): 123-128. (*Corresponding Author).
33. **Ragiba, M.** and Raja Reddy, C. (2000). Heterosis and inbreeding depression in Sesame (*Sesamum indicum* L.). **Ann. of Agril. Res.** 21 (3): 338-341. (*Corresponding Author).
34. **Ragiba, M.** and Mishra, S.K. (2000). Genetic control of Morphogenesis and patterning during root development. **Ann. of Agril. Res.** 21 (4): 1-12. (*Corresponding Author).

INTERNATIONAL PAPER PRESENTATIONS

1. Nalam, V, **Makandar R**, McAfee, D, Juliane E, Lee, H, Trick, H and Shah, J. 2010. Engineering Defense Regulatory Genes and Host Susceptibility Factors for Enhancing FHB Resistance. National Fusarium Head Blight Forum, USWBSI, Milwaukee, Wisconsin, USA. December 7-9, 2010.
2. Nalam, V, **Makandar R**, Dehlia McAfee, Juliane Essig, Hyeonju Lee, Harold N. Trick and Jyoti Shah. 2009. Host Factors Contributing to Resistance/Susceptibility to *Fusarium graminearum*. National Fusarium Head Blight Forum, December, 2009, Wyndham Orlando Resort, Orlando, Florida.
3. Nalam, V, **Makandar R**, Harold N. Trick and Jyoti Shah. 2008. National Fusarium Head Blight Forum. Identifying Plant Genes and Mechanisms that Contribute to Defense and Susceptibility to *Fusarium graminearum*. December, 2008, Crowne Center Hotel, Indianapolis, Indiana.
4. Chaturvedi, Ratnesh, Krothapalli, Kartikeya, **Makandar R**, Welti, Ruth and Shah, Jyoti. 2008. Long distance signaling in systemic acquired resistance. Plant Biology 2008 conference, June 26-July 1, 2008 Siglo XXI Convention Centre Mérida, Mexico. <http://abstracts.aspb.org/pb2008/public/P26/P26002.html>.
5. Jyoti Shah, **Makandar R**, Nalam, V and Harold N. Trick. 2007. Targeting Scab with Defense Regulatory Genes. 5th Canadian Workshop on Fusarium Head Blight/Colloque Canadian Sur La Fusariose, November 27 – 30, 2007, Delta Winnipeg, Winnipeg, Manitoba, Canada. <http://www.grainscanada.gc.ca/Pubs/fusarium/workshop/2007/5thCWFHB.pdf>.
6. Jyoti Shah, **Makandar R**, and Nalam, V. 2007. Enhancing Fusarium head blight resistance in wheat by manipulating mechanisms contributing to host resistance and susceptibility. National Fusarium Head Blight (NFHB) Forum, December 12-15, 2007, Kansas City, MO. http://www.scabusa.org/pdfs/forum05_proc_get.pdf
7. **Makandar R**, Nalam, V, Juliane S. Essig, Melissa A. Schapaugh, Harold Trick, William Bockus, Ruth Dill-Macky and Jyoti Shah. 2006. Enhancing resistance to *Fusarium graminearum* by expression of *Arabidopsis thaliana* *NPR1* in wheat. National Fusarium Head Blight (NFHB) Forum, December 10-12, 2006, Durham, North Carolina. http://www.scabusa.org/pdfs/forum07_proc_qder.pdf.
8. **Makandar R**, Nalam, V, Darcy Maier and Jyoti Shah. 2006. Plant signaling mechanisms associated with resistance / susceptibility to *Fusarium graminearum*. National Fusarium Head Blight (NFHB) Forum, December 10-12, 2006, Durham, North Carolina. http://www.scabusa.org/pdfs/forum06_proc_hpr-vd.pdf.
9. Nalam, V, **Makandar R**, Darcy Maier, and Jyoti Shah. 2006. Arabidopsis as a Model System to Study Plant Defense against *Fusarium graminearum*, the Causative Agent of Scab in Wheat and Barley. 287, 17th International Conference on Arabidopsis Research June 28- July 2, 2006, Madison, WI <http://www.arabidopsis.org/Posters.pdf>.
10. Maier, D, **Makandar R**, and Shah, J. 2006. *Fusarium graminearum* co-opts the *Arabidopsis thaliana* *LOX1* gene for pathogenicity. Plant Biology 2006, symposium, Boston, Massachusetts, August 5-9 2006.
11. Ratnesh Chaturvedi, Kartikeya Krothapalli, **Makandar R**, Ruth Welti and Jyoti Shah. 2006. Genetic and biochemical approaches to identify the phloem-mobile signal in systemic acquired resistance. Plant Biology 2006 symposium, Boston, Massachusetts, August 5-9 2006. <http://abstracts.aspb.org/pb2006/public/P37/>.
12. **Makandar R**, Jyoti Shah, Vamsi Nalam, Peter Morris and Harold N. Trick. 2005. Engineering Scab Resistance in Wheat with Plant Defense Signaling Genes. National Fusarium Head Blight (NFHB) Forum, December 11-12, 2005, Milwaukee, WI. http://www.scabusa.org/pdfs/forum05_proc_get.pdf.

13. **Makandar R**, Harold Trick and Jyoti Shah. 2004. Expression of Arabidopsis NPR1 in wheat confers resistance to Fusarium Head Blight. 2004. National Fusarium Blight forum proceedings, pp. 244. 2nd International Symposium on Fusarium Head Blight, 11-15 December, 2004 Orlando, FL, USA. http://www.scabusa.org/pdfs/isfhb2_vol1_ge.pdf.
14. **Makandar R**, Harold Trick and Jyoti Shah. 2003. NPR1: A candidate to broad-spectrum scab resistance in wheat. *2003 National Fusarium Blight forum proceedings*, pp 28. 2003, December 13-15, 2003, Bloomington, MN, USA. http://www.scabusa.org/pdfs/forum_03_proc_bio.pdf.
15. Zhiyong Liu, Paul H. Moore, Hao Ma, Minna S. Kim, **Makandar R** and Ray Ming. 2003. The genetic basis of sex determination in papaya. Paper presented in ASPB conference held in July 2003 at Honolulu, HI.
16. Rama Shankar, Fareeda G, Malathi Bheri, Alim Junaid, Sudarshan Babu T, Srinivas Naik M & **Makandar R***. Identification of avirulent (*Avr*) and pathogenesis genes of powdery mildew causing fungus, *Erysiphe pisi* through in-silico and in-vivo analyses. An International Symposium on Genomics and Biodiversity at 15th Annual ADNAT Convention held at Centre for Cellular and Molecular Biology, Hyderabad: Feb 23-25, 2011.

NATIONAL PAPER PRESENTATIONS AS INVITED SPEAKER

1. Invited speaker: "Genetic manipulation of host defense responses to enhance resistance to Fusarium Head Blight in wheat" at ADNAT symposium conducted at University of Hyderabad from 21-23rd February, 2015
2. Invited speaker, "Functional genomics play significant role in disease signaling and defense response against fungal pathogen (*Fusarium graminearum*) in plants at National Symposium on Genomics and Crop Improvement: Relevance and Reservations conducted by Institute of Biotechnology, ANGRAU, Hyderabad 25 to 27 February, 2010.
3. Paper presented as principal author titled, "Resistance to FHB disease through genetic manipulation of host defense responses" during National Symposium on Biology of infection, immunity and disease control in pathogen-plant interaction held at UoH from 2-4, December 2011.
4. Invited speaker to present a paper on 'Enhancing basal resistance to plant pathogens via genetic manipulation of defense signaling' on the inaugural day of "Chapter of Genetics and Plant Breeding (AP) by ANGRAU at Tirupati, AP on 28-07-2012.
5. Invited lecture under adjunct faculty Program, ANGRAU, AP on 'Functional genomics in crop improvement at S.V. Agrl. College, Tirupati, AP on 30-08-2012.
6. Invited lecture under adjunct faculty Program, ANGRAU, AP on 'Genomics: A preamble for Functional Genomics' at S.V. Agrl. College, Tirupati, AP on 31-08-2012.
7. Paper presented as corresponding author* titled, "The *er2* gene resistance against powdery mildew infection is associated with enhanced antioxidative protection and defense gene expression. 2020. Sheetal M. Bhosle, Nitinkumar Marathe and Ragiba Makandar* at National Conference in Plant Biology held at University of Hyderabad, Telangana, India from 31st Jan to 1st Feb 2020. <https://uohyd.ac.in/blog/events/frontiers-in-plant-biology/>
8. Paper presented as corresponding author* titled, "Elucidating disease signaling mechanism by *Fusarium graminearum*, the causal agent of Fusarium head blight (FHB) disease in wheat" 2019. Jyoti Shah and Ragiba Makandar* at National Symposium on Breeding for Biotic Stress Resistance in Potential Crops-ICAR Institute, Tamil Nadu, India from 7th – 8th December, 2019.
9. Paper presented as corresponding author* titled, "Analyzing host responses to target *Fusarium graminearum* infection in crop plants. 2019. Jyoti Shah and Ragiba Makandar* at XI International Conference on Biology of Yeasts and Filamentous Fungi held at UoH; 27th - 29th November 2019.