

Keerti S. Rathore

Professor

Dept. of Soil and Crop Sciences, Texas A&M University, College Station, Texas

Education/Training

1981 PhD Plant Physiology, Imperial College, Univ. of London, UK
1976 MS Plant Sciences, Gujarat University, India
1973 BS Botany, Zool., Chem., Rajasthan University, India

Positions and Employment

2012-pres. Professor, Dept. of Soil & Crop Sciences, Texas A & M University
2003-2012 Associate Professor, Dept. of Soil & Crop Sciences, Texas A & M University
1997-2002 Assistant Professor, Dept. of Soil & Crop Sciences, Texas A & M University
1995-1997 Assistant Research Scientist, Dept. of Soil & Crop Sciences, Texas A & M University

Program Overview

My current research interests are in the genetic improvement of important dicot (cotton and tomato) and monocot (rice and sorghum) crops. Protocols for efficient delivery of genes, optimal expression of transgenes, and rapid recovery of transgenic cotton, rice, and sorghum plants have been established in my laboratory. These procedures are being used to conduct both basic and applied research pertaining to crop improvement. Projects include regeneration from cell & tissue cultures, use of new reporter and selectable marker genes to understand and improve the transformation process, promoter analysis, enhancement of disease resistance in plants, conferring draught tolerance to crop plants, conferring insect resistance to crop plants, improving nutritional quality of seeds, and production of recombinant antibodies and vaccines in plants.

Significant 5 Year Accomplishments

My major focus has been on a project that involves RNAi-mediated elimination of the toxin, gossypol from the cottonseed. The gossypol level in some of the ultra-low gossypol cottonseed (ULGCS) lines is below what FDA considers safe for human consumption. If ULGCS is adopted by cotton growers around the world, it can make available enough protein to meet the basic protein requirements of 500 million people. We are in the final stages of completing molecular/biochemical analyses and multi-location field trials to collect agronomic data on two of the ULGCS events for submission of a petition to the USDA-APHIS and FDA for deregulation. Another project involving RNAi silencing is yielding promising results against reniform nematodes. We have also demonstrated the utility of *AtNPR1* overexpression in conferring broad-spectrum resistance to several fungal pathogens and reniform nematodes in cotton plants. Two other projects involved promoter characterization in sorghum and efforts to improve nitrogen use efficiency in sorghum. Recently, a project on genome editing has also been initiated in my laboratory. I have acquired \$1,968,185 for my research program. Team-taught BIOT 601/602, a Masters-level, laboratory course to students in the Professional Program in Biotechnology. Supervised or co-supervised 6 postdoctoral research associates, 2 PhD students, and 2 MS students.

Publications

Ten most recent publications (43 Peer-reviewed and six invited book chapters)

1. Urriola, J. & Rathore K. S. (2015) Overexpression of a glutamine synthetase gene affects growth and development in sorghum. *Transgenic Res.* 24: 397-407.

2. Urriola, J. & Rathore K. S. (2014) Temporal and spatial activities of a rice glutelin promoter in transgenic sorghum. *Plant Cell Tiss Organ Cult.* 116: 227-234.
3. Palle, S. R., Campbell, L. M., Pandeya, D., Puckhaber, L., Tollack, L. K., Marcell, S., Sundaram, S., Stipanovic, R. D., Hinze, L., Wedegaertner, T.C. & Rathore, K. S. (2013) RNAi-mediated Ultra-low Gossypol Cottonseed Trait: Performance of Transgenic Lines under Field Conditions. *Plant Biotech J.* 11: 296-304.
4. Kumar, V., Joshi, S. G., Bell, A. A. & Rathore K. S. (2013) Enhanced resistance against *Thielaviopsis basicola* in transgenic cotton plants expressing Arabidopsis NPR1 gene. *Transgenic Res.* 22: 359-368.
5. Kumar, V., Parkhi, V., Joshi, S., Christensen, S., Kolomiets, M. & Rathore K. S. (2012) A novel, conditional, lesion mimic phenotype in cotton cotyledons due to the expression of an endochitinase gene from *Trichoderma virens*. *Plant Science* 183: 86-95.
6. Rathore, K. S., Sundaram, S., Sunilkumar, G., Campbell, L. M., Puckhaber, L., Marcell, S., Palle, S. R., Stipanovic, R. D. & Wedegaertner, T.C. (2012) Ultra-low gossypol cottonseed: generational stability of the seed-specific, RNAi-mediated phenotype and resumption of terpenoid profile following seed germination. *Plant Biotech J.* 10: 174-183.
7. Kumar, V., Campbell, L. M. & Rathore K. S. (2011) Rapid recovery- and characterization of transformants following *Agrobacterium*-mediated T-DNA transfer to sorghum. *Plant Cell Tiss. Organ Cult.* 104: 137-146.
8. Parkhi, V., Kumar, V., Campbell, L. M., Bell, A. A., Shah, J. & Rathore K. S. (2010) Resistance against various fungal pathogens and reniform nematode in transgenic cotton plants expressing Arabidopsis NPR1. *Transgenic Research* 19: 959-975.
9. Kumar, V., Parkhi, V., Kenerley, C. & Rathore K. S. (2009) Defense-related gene expression and enzyme activities in transgenic cotton plants expressing an endochitinase gene from *Trichoderma virens* in response to interaction with *Rhizoctonia solani*. *Planta* 230: 277-291.
10. Parkhi, V., Kumar, V., Sunilkumar, G., Campbell, L. M., Singh, N. K. & Rathore K. S. (2009) Expression of apoplastically secreted tobacco osmotin in cotton confers drought tolerance. *Molecular Breeding* 23: 625-639.

Awards and Honors

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| 2011 | Cotton Genetics Research Award |
| 2011 | U.S. Patent #7,999,148: Cotton plant with seed-specific reduction in gossypol |
| 2009 | U.S. Patent #7,626,081: Cotton alpha-globulin promoter for seed-specific expression of transgenes |

Professional Experience

- Guest Editor - *Plant Science*, Special Edition, Disease Resistance: Molecular Mechanisms and Biotechnological Applications (2014)
- International Workshops Conducted: INTA, Argentina, 2011 (Cotton Transformation); ESPE, Ecuador, 2014 (Plant Biotechnology: Theory and Practice)
- Review Panel member for NSF/SBIR/Biofuels (2010)
- Review Panel member for NSF/SBIR/Agriculture Biotechnology (2002-2009)
- Training of seven International Scientists from Ecuador, India, Mozambique, Pakistan, Portugal & Tanzania