Dr. Meenu Kapoor

Professor, *FNASc.*

University School of Biotechnology, Guru Gobind Singh Indraprastha University, Sector 16C Dwarka New Delhi-110078; Tel: +91-11-25302310**;** Email: meenukapoor@me.com; meenukapoor@ipu.ac.in

Professional Preparation

Miranda House, Delhi University	Botany	B.Sc.	1986-89
University of Delhi, South Campus	Plant Molecular Biology	M.Sc.	1989-91
Nagoya University, Japan	Plant Molecular Biology	Ph.D.	1992-97
National Institute of Agrobiological Sciences (NIAS), Tsukuba Japan	Developmental Biology	Scientist	1997-2004

Academic Appointments and Work Experience

2010-present	Professor, University School of Biotechnology (USBT), GGSIPU
2007-2010	Associate Professor, University School of Biotechnology, GGSIPU
2004-2007	Reader, University School of Biotechnology, GGSIPU, New Delhi.
2004	Scientist, Department of Plant Molecular Biology, University of Delhi South Campus

Awards

Elected fellow of National Academy of Sciences, Allahabad

Awarded **Dr. P. Sheel Memorial (Young Woman Scientist) Lecture Award** from National Academy of Sciences (NASI), India

Publications

1. Parihar V, Dangwal M, Arya D, Kapoor S, **Kapoor M** (2019) Decrease in DNA Methylation 1 interacts with chromomethylase and like heterochromatin protein 1 in *Physcomitrella patens*. FEBS Lett. 593:2686-2697.

2. Parihar V, Arya D, Walia A, Tyagi V, Dangwal M, Verma V, Khurana R, Boora N, Kapoor S, **Kapoor M** (2019) Functional characterization of LIKE HETEROCHROMATIN PROTEIN 1 in the moss Physcomitrella patens: its conserved protein interactions in land plants, **The Plant J.** 97:221-239 **(*Cover page image*)**

3. Polycomb Repressive Complex 1 and links to RNA processes in Physcomitrella patens. **Research Highlight. The Plant J.** (2019) 97, 219–220.

4. Sirohi G, Khandelwal A and **Kapoor M** (2019) High-throughput sequencing and differential expression analysis of miRNAs in response to Brassinosteroid treatment in Arabidopsis thaliana. **Functional & Integrative Genomics** 19:597-615.

5. Arya D, Kapoor S and **Kapoor M** (2016) Physcomitrella patens DNA Methyltransferase 2 is Required for Recovery from Salt and Osmotic Stress. **FEBS J**. 283:556-570.

6. Protein clue into rice seed development gene. Research Highlight in **Nature India**. doi:10.1038/nindia.2014.107.

7. Nayar S, **Kapoor M** and Kapoor S (2014) Post-translational regulation of rice MADS29 function: Homodimerization or binary interactions with other seed-expressed MADS proteins modulate its translocation into the nucleus. **J. Exp. Bot.** 65: 5339-5350

8. Dangwal M, Kapoor S and **Kapoor M (2014)** The *PpCMT* chromomethylase affects cell growth and interacts with the homolog of LIKE HETEROCHROMATIN PROTEIN 1 in the moss *Physcomitrella patens*. The **Plant J**. 77:589-603.

9. Dangwal M, Malik, G, Kapoor S and **Kapoor M. (2013)** De novo methyltransferase, OsDRM2, interacts with the ATP-dependent RNA helicase, OseIF4A, in rice. **J. Mol. Biol**. 425:2853-66.

10. Malik, G, Dangwal M, Kapoor S and **Kapoor M** (2012) Role of DNA methylation in growth and differentiation in Physcomitrella patens and characterization of cytosine DNA methyltransferase gene family. **FEBS J** (***cover page image***).

11. Kapoor S and **Kapoor M**. (2010) Epigenome and Abiotic Stress Tolerance in Plants. In Omics and Plant Abiotic Stress Tolerance Volume 1 (Eds: Narender Tuteja, Sarvajeet Gill and Renu Tuteja. doi: 10.2174/978160805058111101010121 pp.121-127.

12. Sharma R, **Kapoor M**, Tyagi AK and Kapoor S (2010) Comparative transcript profiling of TCP family genes provide insight into Gene functions and diversification in rice and Arabidopsis. **Journal of Plant Molecular Biology and Biotechnology** 1: 24-38.

13. Sharma R, Mohan Singh R.K., Malik G, Deveshwar P, K. Tyagi A.K, Kapoor S and **Kapoor M** (2009) Rice Cytosine DNA Methyltransferases: Gene Expression Profiling during Reproductive Development and Abiotic Stress. **FEBS J** 276: 6301-6311.

14. Raghuvanshi S, **Kapoor M**, Tyagi S, Kapoor S, Khurana P, Khurana J and Tyagi A (2009) Rice Genomics Moves Ahead. **Molecular Breeding** 26: 257-273.

15. **Kapoor M**., Arora A., Lama T., Nijhawan A., Khurana J.P., Tyagi A.K. and Kapoor S. (2008) Genome-wide Identification, Organization and Phylogenetic Analysis of Dicer-like, Argonaute and RNA-dependent RNA Polymerase Gene Families and their Expression Analysis during Reproductive Development and Stress in Rice. **BMC Genomics** 9:451 (*Highly accessed paper*).

16. **Kapoor M,** Baba A, Kubo K, Shibuya K, Matsui K, Tanaka Y and Takatsuji H (2005) Transgene-triggered, epigenetically regulated ectopic expression of a flower homeotic gene *pMADS3* in *Petunia***. Plant Journal** 43 : 649 – 661.

17. **Kapoor M,** Tsuda S, Tanaka Y, Mayama T, Okuyama Y, Tsuchimoto S and Takatsuji H (2002) Role of petunia *pMADS3* in determination of floral organ and meristem identity, as revealed by its loss of function**. Plant Journal** 32:115-127.

18. Wakasugi T, Nagai T, **Kapoor M**, Sugita M, Ito M, Ito S, Tsudzuki J, Nakashima K, Tsudzuki T, Suzuki Y, Hamada A, Ohta T, Inamura A, Yoshinaga K and Sugiura M (1997) Complete nucleotide sequence of the chloroplast genome from the green alga *Chlorella vulgaris* C-27: The existence of genes possibly involved in chloroplast division. **Proc. Natl. Acad. Sci. USA** 94:5967-5972.

19. **Kapoor M**, Nagai T, Wakasugi T, Yoshinaga K and Sugiura M (1997) Organization of chloroplast ribosomal RNA genes and *in vitro* self-splicing activity of the large subunit rRNA intron from the green alga *Chlorella vulgaris* C-27. **Curr. Genet**.: 31: 503-510.

20. **Kapoor M**, Wakasugi T, Yoshinaga K and Sugiura M (1996) The chloroplast *chlL* gene of the green alga *Chlorella vulgaris* C-27 contains a self- splicing group I intron. **Mol. Gen. Genet**.: 250:655-664.

International patents

1. **European patent #** EP1357188 Improvement of plant flower type targeting MADS box gene**. Inventor:** Hiroshi Takatsuji and **Meenu Kapoor.** Publication date: 10/29/2003
2. **United States of America patent #** 7282622 Plant flower type targeting MADS box gene

   Inventor: Hiroshi Takatsuji and **Meenu Kapoor.** Publication date: October 16, 2007

   Publication number: US 2004/0255349 A1
3. **Australian Patent # 766333** Improvement of flower morphology of plants by targeting MADS-box gene. **Inventor: Meenu Kapoor** and Hiroshi Takatsuji. Publication date: 2000

Research Projects

Completed

S. No.	Title of Project	Funding Agency	Date of completion
1.	Molecular Mechanisms Underlying Interaction between Transgenes and Homologous Endogenous Genes in Transgenic Petunia Plants" (Principle Investigator)	Department of Science and Technology (DST)	2005-2008
2.	Role of Epigenetic Elements in Controlling Floral-organ Development by Methylome Profiling Using High Density Microarrays in Rice; *Collaborative project between UDSC and GGSIPU* (Co-Principle Investigator)	Department of Science and Technology (DST)	2008-2011
3.	Functional Characterization of Cytosine DNA Methyltransferases to Understand the Role of Epigenetic Elements in Regulating Reproductive Development in Rice (Principle Investigator)	Department of Biotechnology, Govt. of India (DBT)	2011-2014
4.	Understanding the cytosine DNA methyltransferase interactome in *Physcomitrella patens* (Principle Investigator)	Council for Scientific and Industrial Research (CSIR)	2011-2014
5	Functional Characterization of Components of DNA Methylation Machinery in the moss *Physcomitrella patens* (Principle Investigator)	Department of Science and Technology (SERB)	2011-2014
6	Characterization of Interaction of Cytosine DNA Methyltransferase, PpCMT, with a putative component of Polycomb Repressive Complex I (PRCI) in *Physcomitrella patens* (Principle Investigator)	Department of Science and Technology (SERB)	2013-2016
7	Understanding the roles of duplicated MEL1 gene s in rice reproductive development (Principle Investigator)	Department of Biotechnology, Govt. of India (DBT)	2013-2016
8	Functional Characterization of	Council for	

	Homologs of *OseIF4A* in *Physcomitrella patens* and to Understand its Role in RNA directed DNA Methylation (Principle Investigator)	Scientific and Industrial Research (CSIR)	2014-2017
9	Gene Expression Analysis and Study of Protein-Protein Interactions between Components of DNA Methylation Machinery and Polycomb Repressor Complex 1 and 2 in *Physcomitrella patens*	Faculty Research Grant Scheme (GGSIPU)	2016-17
10	Bilateral research project entitled "Molecular-physiological Characterization of Epigenetic Components Affecting Plant Development Under Drought and High Temperature Stress"	Funded by Academy of Scientific Research and Technology (ASRT), Egypt and Department of Science and Technology (DST), India,	2016-2018
11	Transcriptome Analysis of Gene Knockout mutants defective in DNA Methylation in *Physcomitrella patens*	Faculty Research Grant Scheme (GGSIPU)	2017-18
12	Identification and Characterization of interacting partners of the nucleosome remodeler protein DDM1 in *P. patens*	Faculty Research Grant Scheme (GGSIPU)	2018-19

Ongoing

Sl No.	**Title of Project**	**Funding Agency**	**Duration**
1.	Identification and Validation of Proteins Interacting with *PpDNMT2* Under Stress in *Physcomitrella patens* (Principle Investigator)	Department of Science and Technology (SERB)	2017-2020
2.	Functional Delineation of a Cytosine DNA Methyltransferase (*DNMT2*) for its Role in Salt and Osmotic Stress Tolerance Using *Physcomitrella* system	Department of Biotechnology, Govt. of India (DBT)	2017-2020

	(Principle Investigator)		
3.	Transcriptome Analysis of Single and Double Gene-Knockout Mutants of *PpeIF4A* in *Physcomitrella patens* (Principle Investigator)	Council for Scientific and Industrial Research (CSIR)	2019-2021

Presentations at International/National Conferences/Symposia

1. **Kapoor M**, Parihar V, Tyagi V, Walia A and Arya D (2019) Network of Epigenetic Regulators in *Physcomitrella patens*. Conference of IAB, iMOSS and SEB held from July 9-12th, 2019 at the Royal Botanical Garden (RBG) at Madrid, Spain. (***Invited lecture; session chair***).

2. Vidhi Tyagi and **Meenu Kapoor (2019)** Functional Characterization of eIF4A Genes in the Basal Land Plant *Physcomitrella patens*. EMBO Workshop on Chromatin and Epigenetics, 1-4th May 2019 at Heidelberg, Germany.

3. Vimala Parihar and **Meenu Kapoor** (2019). Regulatory roles of chromatin remodelling and chromatin modifying proteins in *Physcomitrella patens*. EMBO Workshop on Chromatin and Epigenetics 1 -4th May 2019. Heidelberg, Germany.

4. Vidhi Tyagi and **Meenu Kapoor (2018).** Functional characterization of homologs of rice DEAD box Helicases in the basal land plant *Physcomitrella patens***. 4th International Plant Physiology Congress**, 2-5th December 2018 at Lucknow, India.

5. Vibha Verma, Neelima Boora, Saraswati Nayar, **Meenu Kapoor** and Sanjay Kapoor (2018) OsMADS29 interacts with calcium sensor calmodulin which regulates its cellular localization. 4th International Plant Physiology Congress,2018. 2nd- 6th December 2018. CSIR-NBRI, Lucknow, INDIA.

6. Vimala Parihar, **Meenu Kapoor** and Sanjay Kapoor (2018) Functional Characterization of the Arabidopsis DDM1 homolog in the moss, Physcomitrella patens. 4th International Plant Physiology Congress,2018. 2nd- 6th December 2018. CSIR-NBRI, Lucknow, INDIA.

7. Vimala Parihar, Akanksha Walia, Vidhi Tyagi, Deepshikha Arya, Sanjay Kapoor and **Meenu Kapoor.** "**Insight into Conserved Roles of Chromatin Remodeling and Chromatin Modifying Proteins in the Early Land Plant, *Physcomitrella patens*"** 4th International Plant Physiology Congress December 2nd-5th, 2018 CSIR-NBRI Lucknow UP India. (*Invited Lecture*).

8. Meenu Kapoor, Meenakshi Dangwal, Sanjay Kapoor and Deepshikha Arya. Regulatory Network of *Physcomitrella patens* LIKE HETEROCHROMATIN PROTEIN, PpLHP1. Annual conference of Society of Biological Chemists of India (SBC-2017) at JNU from 16-19 November 2017 (*Invited Lecture*).

9. **Meenu Kapoor**, Deepshikha Arya, Kathakali Banerjee and Vimala Parihar. 'Components of DNA Methylation Machinery and PRC1 Regulating Growth and Development in the Moss, *Physcomitrella patens*. Moss 2016 at University of Leeds 2nd to 5th September 2016 (*Invited Lecture*).

10. **Meenu Kapoor,** Vimala Parihar and Deepshikha Arya (2015) **'**Cytosine DNA Methyltransferases and Components of PRC1 Complex Regulate Growth, Development and Abiotic Stress Tolerance in the Moss, *Physcomitrella patens*'3rd International Plant Physiology Congress (ISPPC) held at JNU, New Delhi from 11th to 14th December, 2015 (*Invited Lecture*).

11. **Meenu Kapoor**, Deepshikha Arya and Vimala Parihar (2015) 'Functional Genomic Studies in the Versatile Moss, *Physcomitrella patens*'. International Conference **"AgriGenomics India"** held at **Hotel Shivalikview, Chandigarh, India 20 – 21 August 2015** (*(Invited Lecture).*

12. Meenu Kapoor and Deepshikha Arya (2015) '**Regulation of Growth, Development and Salt Stress Tolerance by Cytosine DNA Methyltransferases in the Early Land Plant *Physcomitrella patens'***. Cold Spring Harbor Asia meeting: Frontiers of Plant Biology: Epigenetics and Development 07-12 June, 2015, Suzhou Beijing. *(Invited Lecture).*

13. Meenu Kapoor (2015) **Abiotic Stress Management and Cytosine DNA Methyltransferases in the early land plant, *Physcomitrella patens*.** National Conference on Biodiversity & Bioresource Utilization, March17-18, 2015 at Department of Biosciences, Saurashtra University, Rajkot 360 005, Gujarat *(Invited Lecture).*

14. Meenu Kapoor and Deepshikha Arya (2014) **Role of the Methyltransferase, *PpDNMT2* as a Stress Associated Gene in *Physcomitrella patens*** 17th Annual Moss International Conference (Moss 2014) held at Capital Normal University, Beijing China, September 25-28, 2014 *(Invited lecture).*

15. Kapoor M, Kapoor S, Malik G and Dangwal M (2013) **Conserved Interaction Between the *De-novo* Methyltransferase, OsDRM2, and the ATP-dependent RNA helicase, eIF4A, in Rice and *Arabidopsis*** ISRFG New Delhi (*Invited lecture).* 11th International Symposium on Rice Functional Genomics (ISRFG) November 20-23, 2013 New Delhi *(Invited lecture).*

16. Malik G. and Kapoor M. (2013) **Functional Characterization of Cytosine DNA Methyltransferases in Rice** *(Oryza sativa)* 11th International Symposium on Rice Functional Genomics (ISRFG) November 20-23, 2013 New Delhi *(Poster presentation).*

17. Meenakshi Dangwal and Meenu Kapoor (2013) **Chromo methyltransferase, *PpCMT*, Regulates Growth and Differentiation of Gametophyte and Interacts *in vivo* with Homolog of *Arabidopsis* LIKE HETERCHROMATIN PROTEIN 1, PpLHP1, in *Physcomitrella patens*.** 16th Annual Moss International Conference (Moss 2013) that will be held at The Masaryk Congress Centre, Prague, Czech Republic from June 17-19, 2013 *(Invited lecture).*

18. Dangwal, M, Malik, G and Kapoor M. (2013). **Interacting Partners of cytosine DNA Methyltransferases in *Oryza sativa* and *Physcomitrella patens*.** Indraprastha International Conference on Biotechnology (IICB-2013) October 22-25 at GGSIPU New Delhi.

19. Malik G, Dangwal M and Kapoor M (2012) **DNA methylation machinery in *Physcomitrella patens*: insight into conservation and diversification of molecular components**. International conference on Plant Biotechnology for Food security, PUSA, February 2012, New Delhi

20. Malik G, Dangwal M, Upadrasta S and Kapoor M (2011) **Identification and Characterization of Molecular Components of DNA Methylation Machinery in Moss (Physcomitrella patens).** BIOEPOCH, April 2011, JNU, New Delhi, India.

21. Malik G, DangwaL M and Kapoor M. (2011) **Identification and Characterization of Molecular Components of DNA Methylation Machinery in Moss (Physcomitrella patens).** Plant Genome Evolution Conference, 4-6 September 2011, Amsterdam, The Netherlands.

22. R.K. Mohan Singh, Garima Malik, Meenakshi Dangwal, Sanjay Kapoor and Meenu Kapoor. (2011) **DNA Methylation Dynamics in Developing Rice Anthers and Evolutionary Conservation of Components of Eukaryotic DNA Methylation Machinery Among Land Plants.** National Symposium on Current Trends in Biochemical, Biomedical and Environmental Sciences, February 22, 2011. Aligarh Muslim University *(Invited lecture)*.

23. Mohan Singh R.K., Malik G., Sharma R., Deveshwar P., Tyagi, A.K. Kapoor M**.** and Kapoor S. (2009) **Understanding the role of epigenetic elements and RNAi in regulating reproductive development in rice**. Presentation at the 6th International Symposium of Rice Functional Genomics. Jeju KOREA.

24. Kapoor M*. (2008) **Role of Epigenetic Elements and RNA-mediated Gene Regulatory Mechanisms in Controlling Reproductive Development in Plants** 2nd International Conference on Trends in Cellular and Molecular Biology, School of Life Sciences, Jawahar Lal Nehru University, New Delhi, INDIA. (*Invited lecture)*

25. Kapoor M., Arora A., Lama T., Nijhawan A., Khurana J.P., Tyagi A.K. and Kapoor S. (2007) **Genome-wide Expression Analysis of Genes Involved in RNA-mediated Gene Silencing Mechanism in Rice** (*Oryza sativa* L.ssp.*indica*) Presentation at "The 5th International Symposium of Rice Functional Genomics. Tsukuba, JAPAN.

26. Kapoor M and Takatsuji H (2005) at "The Annual Meeting of The American Society of Plant Biologists", Plant Biology 2005, held at Seattle, Washington from July 16-29, 2005. *(Poster presentation)***.**

27. Kapoor M and Takatsuji H (2003) **Transgene-induced and developmentally regulated epigenetic modification of *pMADS3* expression in petunia**. 7th International Congress of Plant Molecular Biology. Barcelona, Spain.

28. Kapoor M and Takatsuji H (2002) **Epigenetically-regulated changes in the expression of petunia *pMADS3*: Silenced gene begins to express ectopically after aging**. 25th Annual meeting of Japanese Molecular Biology Society, Yokohama, Japan.

29. Kapoor M and Takatsuji H (2001) **Petunia *pMADS3* plays a role in maintaining the identity of floral meristem**. 24th Annual meeting of Japanese Molecular Biology Society, Yokohama, Japan.

30. Kapoor M, Tsuda S, Tanaka Y and Takatsuji H (2000) **Silencing of *pMADS3* affects floral organ and floral meristem identity in petunia**. 23rd Annual meeting of Japanese Molecular Biology Society, Kobe, Japan.

31. Tsudzuki J, Nakashima K, Tsudzuki T, Horihata M, Satoh K, Yoshinaga K, Wakasugi T, Nagai T, Kapoor M and Sugiura M (1995) **Chloroplast genome structure of unicellular green alga *Chlorella vulgaris* C-27**. Xth International Photosynthesis congress, Montpellier, France.

32. Kapoor M, Horihata M, Ito M, Wakasugi T and Sugiura M (1995) **Self-splicing group I introns in the *chlL* gene of the green alga *Chlorella vulgaris* C-27**. 35th symposia of the Japanese Society of Plant Physiologists, Matsue, Japan.

33. Nagai T, Ito M, Kapoor M, Horihata M, Tsudzuki J, Yoshinaga K, Wakasugi T and Sugiura M (1995). **Structural analysis of the Chloroplast genome structure from unicellular green alga *Chlorella vulgaris* C-27**. 35th symposia of the Japanese Society of Plant Physiologists, Matsue, Japan.

34. Wakasugi T, Nagai T, Kapoor M, Horihata M, Sugiura M, Ito M, Tsudzuki J and Yoshinaga K (1994) **Physical and gene maps of the chloroplast genome from the unicellular green alga *Chlorella ellipsoidea* C-27**. 4th International Congress of Plant Molecular Biology, Amsterdam, The Netherlands.

35. Nagai T, Ito M, Kapoor M, Horihata M, Tsudzuki J, Yoshinaga K, Wakasugi T and Sugiura M (1994). **Physical map and gene organization of chloroplast genome from unicellular green algae *Chlorella ellipsoidea* C-27**. 34th symposia of the Japanese Society of Plant Physiologists, Tsukuba, Japan.

Administrative Assignments/Experience

1. Faculty-In charge, University Day Care Center, 2012 to present
2. Coordinator, M.Tech. (Food Processing and Technology), University School of Biotechnology (2015-to present).
3. Nominated member of Academic Council, GGSIPU (2008-2011; 2015- to present)
4. Member of the core team for Organizing Indraprastha International Conference on Biotechnology (IICB-2013) 22-25 October, 2013 at GGSIPU.
5. Member, committee constituted for updating profile of the university, preparing evaluative reports and making preparations for the visit of NAAC team for Re-accreditation of the university (April, 2013)

6. Participated in Organization of International Conference on Academic Libraries (ICAL-2013) at GGSIPU as member of Logistics, IT Application and Floor management team (February, 2013)

7. Member Students Grievances Committee, University School of Biotechnology (2012)

8. Faculty-In charge, Facilities for Women funded by UGC (Day Care Center and Women's Gymnasium) 2012

9. Member Anti-ragging Squad of GGSIPU (2011, 2012, 2013; 2019)

10. Member, Steering committee constituted for preparation of NAAC report for GGSIPU (2012)

11. Member, University Complaints Committee (2007-2012)

12. Convener, Joint Inspection of Affiliated Institutes, JAC (2007, 2008, 2012)

13. Member, Organizing committee for Annual Convocation (GGSIPU-2007, 2008, 2009, 2010, 2011, 2012, 2015; 2017; 2019)

14. Member, Institutional Biosafety Committee (IBSC), GGSIPU. (2008-till date).

15. Convener, Academic Audit cell (2009, 2011, 2012, 2015)

16. Member, Core team for Organizing Annual Cultural Festival of GGSIPU- Anugoonj (2011)

17. Center Superintendent for conducting End term examinations of University School of Studies, (2010, 2011)

18. Member, Indraprastha Centre for Women Studies (IPCWS) Committee

19. Member, Committee constituted to look into criteria for grant of child-care leave (2009).

20. U-Focus (A Tri–Annual Newsletter of the University) coordinator for University School of Biotechnology (2008)

21. Protocol officer during visit of NAAC team (2007)

22. Center Superintendent, Spot Evaluation Center (2006, 2009).

23. Admission officer for USBT (2005)

24. Observer for conduct of CET examination 2006 onwards.