Kavita Dubey, Ph.D.

Research Fellow
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Current responsibility

In vitro gynogenesis for induction of maternal haploids and doubled haploids (DHs) in marigold (*Tagetes erecta* L.)- A novel approach for accelerated breeding.

Education

AKTU, Lucknow, India (2014-2022)
Dept. of Engineering and technology
Ph.D. Biotechnology
(**Title**: *Molecular cloning and functional characterization of Novel Heat Responsive Transcription factor from Wheat (Triticum aestivum L.) under Heat stress*

AMITY University, NOIDA, India (2010-2012)
Dept. of Biotechnology
Master of Science in Biotechnology (84%)

Guru Nanak Dev University, Amritsar, India (2007-2010)
Dept. of Biotechnology,
Bachelor of Science in Biotechnology (85%)

Research Experiences

- **Junior Research Fellow**- (Sep2020 -Present): Division of floriculture and Landscaping, IARI, PUSA, INDIA

The project aims to develop double haploids in Marigold by *in vitro* gynogenesis. We are also doing the microspore culturing for the development of maternal haploids. In addition, protoplast culturing is also being carried out.

Additional duties: Carry out all the tissue culture techniques, standardization of hormone concentration and protocols for in vitro plant development, microspore isolation and culturing for development of maternal haploid straining of Master students and demonstrating them the protocols for microspore isolation and protoplast isolation.

- **Junior research fellow** (Sep2019-march2020**): Division of biochemistry, IARI, PUSA**

The project aims developing thermotolerant mutant of wheat by augmenting source and sink through mutagenesis**.**

• **Junior Research fellow** (2014-2017): **Division of Biochemistry**, **IARI, PUSA, INDIA**

Projects:

(1) *Exploring Heat-stable Rubisco Activase from cereals for augmenting the activity of Rubisco in wheat (Triticum aestivum L.) under the heat stress*
(2) *Identification and Characterization of Heat Responsive Novel Transcription Factors in Wheat (Triticum aestivum L.)*

The projects aim in studying the effect of heat stress on wheat cultivars. We carried out the molecular and proteomic techniques in identification of heat responsive transcription factors (HSFs) under terminal heat stress. Through SSH library construction we identified 205 ESTs, most of the EST's codes for stress associated genes and 5 ESTs corresponds to HSF coding gene. We successfully cloned those HSF coding gene and the sequences are submitted to NCBI. The functional validation of those genes was carried out in Arabidopsis thaliana by Real Time PCR and we got positive lines. The southern and northern blotting of many stress associated gene was also done during this project.

We have developed a thermostable RCA enzyme in wheat by site directed mutagenesis that can withstand the temperature of 42ºC.Through heterologous expression I was able to isolate and purify the RCA protein from wheat and subsequently the antibody was built to carry out the western blotting.

Additional duties: Research paper writing, Training of scientist from all over India, poster and presentation preparations, dissertation of students

Scholarships and Awards

- Best poster award in 25th national conference at SKRAU, Bikaner (2016).
- Best presentation award in first international symposium on Cereals for food security and climate resilience at IIWBR, Karnal. (2022)
- ICAR- NET (2015-2016)
- Scholarships from Army Welfare Society.
- Gold medallist in academics in 2nd year of graduation
- Member of National symposium on HIV AIDS held at AMITY University (March 2012)

BIO-TECHNICAL SKILLS

- **Common Wet Lab Skills**: D.N.A. and R.N.A. Isolation, Library construction and cloning, cDNA Synthesis, semi quantitative and Quantitative
  PCR, Restriction and Gateway based cloning, Protein isolation, Purification and Western Blotting, SDS PAGE, Southern, Northern blotting PCR, Bacterial and Agrobacterium transformation
- **Generation of Transgenic:** Generation of Arabidopsis transgenic, their confirmation and validation.
- **Plant tissue culture techniques**: Protoplast culturing, microspore isolation and culturing, in vitro gynogenesis, standardization of plant tissue culture protocol.
- **Microscopy:** Stereo zoom microscopy; phase contrast microscopy.
- **Bioinformatics:** In silico characterization of Gene using STRING, ProtPram, CD search, NetPhos for phosphorylation site identification etc.

Publications

- **Dubey Kavita**, Goswami Suneha, Kumar Narendra, Kumar Ranjeet R., Niraj Ravi Ranjan Kumar, Singh Khushbu, Verma Pooja and Singh Jyoti Prakash., 2019.Cloning and in silico characterization of Heat shock factor (Hsf) from Wheat (Triticum aestivum L.). Research Journal of Biotechnology, Vol.14(7)
- **Kavita Dubey**, Suneha Goswami, Narendra Kumar, Ranjeet R. Kumar, Shelly Praveen. Characterization of Putative Heat Shock Transcription Factor (Hsf2) Gene Involved in regulating the Expression of HSP90 In Wheat under Terminal heat stress. Journal of Experimental Biology and Agricultural Sciences. Volume – 8(6) page 765 – 773, 2020.
- Kumar, Ranjeet R., Kavita Dubey, Suneha Goswami, Sumedha Hasija, Rakesh Pandey, Pradeep K. Singh, Bhupinder Singh et al. "Heterologous expression and characterization of novel manganese superoxide dismutase (Mn-SOD)–A potential biochemical marker for heat stress-tolerance in wheat (Triticum aestivum)." International Journal of Biological Macromolecules 161 (2020): 1029-1039.
- Kumar, Ranjeet R., Kavita Dubey, Kirti Arora, Monika Dalal, Gyanendra K. Rai, Dwijesh Mishra, Krishna K. Chaturvedi et al. "Characterizing the putative mitogen- activated protein kinase (MAPK) and their protective role in oxidative stress tolerance and carbon assimilation in wheat under Terminal heat stress". Biotechnology Reports 29 (2021): e0059
- Kumar, Ranjeet R., Suneha Goswami, Khushboo Singh**, Kavita Dubey**, Gyanendra K. Rai, Bhupinder Singh, Shivdhar Singh et al. "Characterization of novel heat- responsive transcription factor (TaHSFA6e) gene involved in regulation of heat shock proteins (HSPs)—A key member of heat stress-tolerance network of wheat." *Journal of biotechnology* 279 (2018): 1-12.
- Goswami, Suneha, Ranjeet R. Kumar, **Kavita Dubey**, Jyoti P. Singh, Sachidanand Tiwari, Ashok Kumar, Shuchi Smita et al."SSH analysis of endosperm transcripts and characterization of heat stress regulated expressed sequence tags in bread wheat." *Frontiers in plant science* 7 (2016): 1230.
- Kumar, Ranjeet R., Suneha Goswami, Khushboo Singh, **Kavita Dubey**, Shweta Singh, Renu Sharma, Neeraj Verma et al. "Identification of putative RuBisCo Activase (TaRca1)—the catalytic chaperone regulating carbon assimilatory pathway in wheat (Triticum aestivum) under the heat stress." *Frontiers in plant science* 7 (2016): 986.
- Kumar, Ranjeet R., Suneha Goswami, Mohammad Shamim, **Kavita Dubey**, Khushboo Singh, Shweta Singh, Yugal K. Kala et al. "Exploring the heat-responsive chaperones and microsatellite markers associated with terminal heat stress tolerance in developing wheat." *Functional & integrative genomics* 17, no. 6 (2017): 621-640.
- Kumar, Ranjeet Ranjan, Suneha Goswami, **Kavita Dubey**, Khushboo Singh, Jyoti P. Singh, Ashok Kumar, Gyanendra Kumar Rai et al. "RuBisCo activase—a catalytic chaperone involved in modulating the RuBisCo activity and heat stress-tolerance in wheat." *Journal of plant biochemistry and biotechnology* 28, no. 1 (2019): 63-75.
- Kumar, Ranjeet Ranjan, Suman Bakshi, **Kavita Dubey**, Sumedha Hasija, Gyanendra K. Rai, Neelu Jain, Sanjay Jambhulkar, Bhupinder Singh, Gyanendra Pratap Singh, and Shelly Praveen. "Insight into the mechanisms of terminal HS-tolerance in wheat mutant with improved nutritional quality through de novo transcriptome sequencing." (2021).

Conference Papers

- Kumar, Ranjeet & Goswami, Suneha & **Dubey, Kavita** & Jain, Monika & Praveen, Shelly. (2016). —Heterologous and homologous expression of wheat Ribulose-1, 5 bisphosphate carboxylase/oxygenase activase gene suggests its role during oxidative burst and heat stress-tolerancell. Plant Biology Research.
- Singh, Jyoti & Kumar, Ranjeet & Goswami, Suneha & Ali, Ansheef & **Dubey, Kavita** & Singh, Gyanendra & Singh, Siddhant & Chinnusamy, Viswanathan & Praveen, Shelly. (2016). Chaperone Regulator Characterization the Role of Heat-Responsive Transcription Factor Gene in Augmenting the Expression of HSPs and Total Antioxidant Potential of Wheat under Heat Stress. AFHABEC.

Book Chapters

Goswami, Suneha, **Kavita Dubey**, Khushboo Singh, Gyanendra K. Rai, and Ranjeet Ranjan Kumar. "Heat Shock Proteins: Role and Mechanism of Action." In *Abiotic Stress Tolerance Mechanisms in Plants*, pp. 127-142. CRC Press, 2021.

Published nucleotide sequence in Genbank

- ACCESSION **MT197089** [Kumar, R.R., Dubey, K., Goswami, S., Hasija, S., Aggarwal, M., Chinnusamy, V. and Praveen, S Molecular Cloning and Characterization of Putative Fructose bis-phosphate Aldolase from Wheat for Characterizing the Carbon Assimilatory Pathway
- ACCESSION-**MT227814** [Kumar, R.R., Dubey, K., Goswami, S., Ahuja, S., Aggarwal, M., Chinnusamy,and Praveen,S. Molecular Cloning and Characterization of Putative Catalase-3 from Wheat under Terminal Heat Stress
- ACCESSION **KT943502** [Goswami, S., Dubey, K., Singh., Sharma, R., Kumar, N., Singh, S., Kumar, A., Tiwari, S., Kumar, R.R. and Rai, R.D. Identification and cloning of putative ribulose bisphosphate carboxylase activase B gene from Triticum aestivum cv. hd2985
- ACCESSION **KY026207** [Kumar, R.R., Dubey, K., Goswami, S., Singh, K., Niraj, R.R. and Praveen, S. Characterizing the role of ribosomal protein S2 from wheat (Triticum aestivum) under heat stress
- ACCESSION **KP257297** [Goswami, S., Shamim, M., Dubey, K., Verma, P., SIngh, K., Singh, J.P., Kumar, M., Kumar, R.R. and Rai, R.D. Molecular cloning and characterization of heat responsive Transcription factor (TaHSFA2h) from HD2985 cultivar of wheat
- ACCESSION **MT023008** [Kumar, R.R., Dubey, K., Goswami, S., Hasija, S., Aggarwal, M., Yadav, R., Singh, J.P., Chinnusamy, V. and Praveen, S. Molecular Cloning and Characterization of putative Mitogen-Activated Protein Kinase Gene from Wheat under Heat Stress.
- ACCESSION **KT835664** [Tiwari, S., Singh, K., Kumar, A., Dubey, K., Singh, S., Verma, N., Sharma, R., Goswami, S., Kumar, R.R. and Rai, R.D. Identification and cloning of putative Mitogen-Activated Protein Kinase (MAPK) from wheat under heat stress.

- ACCESSION **MT023009** [Kumar, R.R., Aggarwak, M., Dubey, K., Hasija, S., Singh, J.P., Goswami, S., Chinnusamy, V. and Praveen, S. Molecular cloning and characterization of putative Mitogen-Activated Protein Kinase gene from wheat cv. HD2967
- ACCESSION **KP259293** [Singh, J.P., Kumar, R.R., Verma., Kumar., Singh, K., Dubey, K., Goswami, S., Pathak, H. and Rai, R.D. De novo approach for the identification of novel heat responsive transcription factor in HD2967 cultivar of wheat (Triticum aestivum)]
- ACCESSION **MG644379** [Kumar, R.R., Singh, K., Goswami, S., Dubey, K., Singh, J.P., Rai, G.K., Singh., Chinnusamy, V. and Praveen, S. Molecular cloning and characterization of putative peptidyl-prolyl isomerase-like gene specific to pollination stage of wheat cv. HD2967]
- ACCESSION **KP259294** [Singh, J.P., Kumar, R.R., Kumar, M., Verma, P., Singh, K., Dubey, K., Goswami, S., Shamim, M., Pathak. and Rai, R.D. Identification and cloning of

putative heat-responsive transcription factor from HD2985 cultivar of wheat using de novo approach]

- ACCESSION **KP259293** [Singh, J.P., Kumar, R.R., Verma, P., Kumar, M., Singh, K., Dubey, K., Goswami, S., Pathak, H.and Rai, R.D. De novo approach for the identification of novel heat responsive transcription factor in HD2967 cultivar of wheat (Triticum aestivum)