Faculty Details proforma for DU Web-site

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Title	Professor	First Name	Vishnu	Last Name	Bhat	Photograph
Designation		Professor				
Address		Department of Botany, University of Delhi, North Campus, Delhi-110007				
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Educational Qualifications

Degree	Institution	Year
Ph.D.	Forest Research Institute, Dehradun-6	1998
PG	University of Agricultural Sciences, Bangalore-65	1990
UG	University of Agricultural Sciences, Bangalore-65	1986

Career Profile

August, 2009 onwards - Professor
July, 2006 – August, 2009: Associate Professor, Department of Botany, University of Delhi.
August, 2003 – July, 2006: Reader, Department of Botany, University of Delhi.
February, 1999 - August, 2003: Scientist (Sr. Scale), Indian Grassland and Fodder Research Institute, Jhansi.
February, 1995 – 1999: Scientist, Indian Grassland and Fodder Research Institute, Jhansi.

Administrative Assignments

2007- 2010: Coordinator (Botany), College Affairs, University of Delhi.
2014- Participated in Antardhwani which won third prize for the Department of Botany

Areas of Interest / Specialization

Genetic and molecular mechanisms controlling apomixis in plants
Plant developmental biology

Subjects Taught

Developmental Biology of Plants for M.Sc. Previous
Reproductive Biology of Flowering Plants for M.Sc. Final
Developmental Biology for Ph.D. students

Time table of the subjects taught during the current semester

S.No.	Subject	Days	Time	Classroom
1.	Bot-Core-2002 Developmental Biology of plants	i) Tuesday (Theory & Practical)	Theory: 15.30-17.30pm Practical: 11.00am - 15.30pm	Theory: #37 Practical: #26
		ii) Thursday (Theory & Practical)	Theory: 8.45am-10.45am Practical: 11.00am-15.30pm	Theory:37 Practical:#26
		iii) Friday (Practical)	8.45am-13.00pm	Practical: #26

2.	**Bot .402 Reproductive Biology of flowering plants**	**Wednesday (Theory & Practical)**	**Theory: 8.45-10.35am Practical: 10.35am - 4.05pm**	**Theory: #207 Practical: #22**
3.	**Bot. 409 Dissertation**	**Saturday**	**10..00am-1.00pm**	**Room# 104**
4.	**Ph.D. El-04 Developmental Biology**	**Wednesday (Theory)**	**2.30pm-4.00pm**	**#41**

Research Guidance

1. Supervision of awarded Doctoral Thesis

1. Dwivedi, Krishna Kumar. 2005. Isolation, cloning and characterization of genes associated with apomixis in *C. ciliaris*.

2. Upadhyay, Chandrama Prakash. 2008. Studies on genetic transformation of *Vigna mungo* (black gram) for abiotic stress tolerance.

3. Sharma, Roopam 2010 Embryological and molecular investigation of apomixis in F2 individuals of *C. ciliaris*.

4. Chaurasia, Anjana Rustagi nee Chaurasia. 2010. Investigations on genetic manipulation of *Musa* species.

5. Mahalakshmi, C. 2011. Elucidation of reproductive pathways in selected angiosperm taxa, and study of differential expressions of orthologues of meiotic regulatory gene DYAD at key developmental stages in an Apo- and a diplosporous taxa.

6. Jha, Pooja 2011. *In-vitro* genetic manipulation of *Pennisetum glaucum.*

7. Yadav, Chandrabhan. 2012. Genetic linkage and linkage disequilibrium mapping of apomixis specific genomic region in *Cenchrus ciliaris* using molecular markers.

8. Shashi 2014. Developmental morphogenesis and *in vitro* genetic manipulation of *Cenchrus ciliaris* L.

9. Dwivedi, Anuj 2016. Analysis of putative candidate genes associated with apomictic and sexual modes of reproduction in *Cenchrus ciliaris* L. using transcriptomic, *in situ* hybridization and phylogenetic approaches.

10. Agnihotri, Pankaj Kumar 2018. Isolation of promoters of *NUCELLIN* gene from *Hordeum vulgare* L. and *KINASE INTERACTING PROTEIN* gene from *Cenchrus ciliaris* L. and characterization of *NUCELLIN* promoter activity in *Arabidopsis thaliana* (L.) Heynh.

11. Supervision of Doctoral Thesis, under progress

1. Ms. Sazda Abdi. Development of EST-SSR and intron length polymorphism markers for genetic linkage mapping of Apospory Specific Genomic Region in *C. cilliaris* L. and assessment of genetic variation among *Cenchrus* and *Pennisetum* species and their allies

(Thesis submitted during 2019).

2. Ms. Laishram Sundari. Genetic manipulation of apomictic pathways in *Cenchrus ciliaris* by down-regulating *CcEZ1* and *CcKIP1* genes.

3. Ms. Priyanka Rathore. Study of epigenetic regulation of apomixis associated retrotransposons in *Cenchrus ciliaris.*

4. Ms. Shipra Goyal. Characterization of *KIP1* and *Nucellin* gene promoters in *C.ciliaris*

12. ***Supervision of awarded M. Phil. dissertations***

1. Jha, Pooja. 2005. *In vitro* plant regeneration through somatic embryogenesis and direct shoot organogenesis in *Pennisetum glaucum*.
2. Yadav, Chandrabhan. 2005. In vitro plant regeneration through somatic embryogenesis and direct shoot organogenesis in *Cenchrus ciliaris*.
3. Shashi. 2008. *In vitro* plant regeneration through somatic embryogenesis and direct organogenesis in apomictic *Dichanthium annulatum* and *Pennisetum pedicellatum*.
4. Alok Arun. 2009. Isolation and characterization of a Polycomb group gene, *CCEZ1* from apomictic *C. ciliaris*.
5. Pandey, Indresh Kumar. 2010. Isolation, cloning and expression analysis of a Polycomb group gene, *Ccez1* from apomictic *C. ciliaris*.
6. Mamgain, Akshay. 2010. Development of a genetic linkage map for drought tolerance using RAPD based markers in tea.
7. Krati Vikram. 2013. Development of RNAi vectors for CCSMC and CCEZ1 genes isolated from apomictic *Cenchrus ciliaris L.*
8. Saxena, Ramit. 2013. Female gametophyte development and fertilization

Publications Profile

List against each head(If applicable) (as Illustrated with examples)

1. *Books/Monographs (Authored/Edited): Nil*

2. *Research papers published in Refereed/Peer Reviewed Journals*

Abdi, S., Dwivedi, A., Shashi, Kumar, S. and Bhat, V., 2019. Development of EST-SSR markers in *Cenchrus ciliaris* and their applicability in studying the genetic diversity and cross-species transferability. *J. Genet*, 98, 101 (doi.org/10.1007/s12041-019-1142-x).

Yadav, CB, Dwivedi, A., Kumar, S. and Bhat, V., 2019. AFLP-based genetic diversity analysis distinguishes apomictically and sexually reproducing *Cenchrus* species. *Braz. J. Bot.*, 42: 361-371.

Rustagi, A., Shekhar, S., Kumar, D., Lawrence, K., Bhat, V. and Bhalla Sarin, N., 2019. High speed regeneration via somatic embryogenesis in elite Indian banana cv. Somrani monthan (ABB). *Vegetos* 32: 39–47.

Agnihotri, PA, Jha Maity, P., Dwivedi, KK and Bhat, V., 2018. Isolation of Nucellin gene promoter from *Hordeum vulgare* and its characterization in *A.thaliana. The International J. of Plant Reproductive Biology*, 10(2): 151-156.

Upadhyaya, C.P., Pandey, N., Bhat,V. and Bhalla-Sarin, N., 2016. Alleviation of transplantation shock of tissue cultured raised black gram (*Vigna mungo* L. Hepper) by inoculation with Arbuscular Mycorrhizal fungi and rhizobium. *European J. Biotech & Biosciences*, 4 (9), 59-65.

Rustagi, A., Shekhar, S., Kumar, D., Jayaswal, A., Bhat, V. & Sarin, NB, 2016. *Genetic Fidelity of In Vitro Cultures of an Elite Indian Musa (Aa) Variety Matti, Adv. in Plants & Agriculture Res.,* 4(3) DOI: 10.15406/apar.2016.04.00141.

Jha Maity, P., Shashi, Kulkarni, VM and Bhat, V, 2016. Thiadiazuron-induced multiple shoot regeneration and *in vitro* flowering in *Pennisetum glaucum* (L.) Br. *Phytomorphology*, 66 (1&2): 45-50.

Khanduri, P., Sharma, R., Bhat, V. and Tandon, R., 2016. Isolation, Expression and Evolution of *FERTILIZATION INDEPENDENT ENDOSPERM* 1 Homologs in Podostemaceae. *J. Plant Res.*, 129 (2): 241-250 (DOI 10.1007/s10265-015-0771-2).

Bali, S., Mamgain, A. , Raina, SN , Yadava, SK, Bhat, V. , Das, S., Pradhan A.K. and Goel, S., 2015. Construction of a genetic linkage map and mapping of drought tolerance trait in Indian beveragial tea. *Mol. Breeding*, 35: 112 (DOI 10.1007/s11032-015-0306-5).

Rustagi, A., Jain, S., Kumar D., Shekhar S., Jain M., Bhat, V. and Sarin, NB, 2015. High Efficiency Transformation of Banana [Musa acuminataL. cv. Matti (AA)] for Enhanced Tolerance to Salt and Drought Stress Through Overexpression of a Peanut Salinity-Induced Pathogenesis-Related Class 10 Protein, *Mol. Biotechnol*, 57:27-35. (DOI 10.1007/s12033-014-9798-1).

Khanduri, P., Tandon, R., Uniyal, P., Bhat, V. and Pandey, AK, 2015. Comparative morphology and molecular systematics of Indian Podostemaceae. *Plant Syst and Evol.* 301: 861-882 (DOI 10.1007/s00606-014-1121-x).

Sharma, R., Geeta, R., Bhat, V., 2014. Asynchronous male/female gametophyte development in facultative apomictic plants of *Cenchrus ciliaris* (Poaceae). *South African J. of Botany*, 91: 19-31.

Bali, S., Raina, SN, Bhat, V., Aggarwal, RK, Goel, S., 2013. Development of a set of genomic microsatellite markers in tea (*Camellia* L.) (Camelliaceae). *Mol Breed.* 32: 735-741.

Dwivedi, KK, Bhat, V, Bhat, BV, Gupta, MG, 2013. Identification of ovule specific proteins associated with apomixis and sexuality in *Cenchrus ciliaris*. *Range Mgmt. & Agroforestry*, 34(1): 82-87.

Kumar S, Bhat, V., 2012. High frequency direct plant regeneration *via* multiple shoot induction in an apomictic forage grass *Cenchrus ciliaris* L. *In vitro cell and dev. biol.-Plant*, 48: 241-48.

Raina, SN,…….Bhat, V.,……..Mandi, SS (31 authors), 2012. Genetic structure and diversity of India hybrid tea. *Genet Resour Crop Evol*, 59: 1527-41.

Yadav, CB, Anuj, Kumar, S., Gupta, M.G., Bhat, V., 2012. Genetic linkage maps of the chromosomal regions associated with apomictic and sexual modes of reproduction in *Cenchrus ciliaris*, *Mol. Breed*. 30: 239-250.

Raina SN, Jain S, Sehgal D, Kumar A, Dar TU, Bhat V, Pandey V, Vaishnavi S, Bhargav A, Singh V, Rani V, Tandon R, Tewari M, Mahmoudi A 2012. Diversity and relationships of multipurpose seabuckthorn (*Hippophae* L.) germplasm from the Indian Himalayas as assessed by AFLP and SAMPL

markers. *Genet Resour and Crop Evol*, 59: 1033-53.

Srivastava, MK, Yadav, CB, Bhat, V., Kumar, S., 2011. Cloning and characterization of cDNA encoding xyloglucan endotransglucosylase in *Pennisetum glaucum* L. *African Journal of Biotechnology,* Vol. 10(46), pp. 9242-9252.

Jha, P., Shashi, Rustagi, A., Agnihotri, PK, Kulkarni, VM, Bhat, V., 2011. Efficient *Agrobacterium*-mediated transformation of *Pennisetum glaucum* (L.) R. Br. using shoot apices as explant source. *Plant Cell Tiss Organ Cult,* 107(3):501-512.

Yadav, C B, P Jha, C Mahalakshmi, A Vanamala and V Bhat. 2009. Somatic embryogenesis and regeneration in apomictic and sexual genotypes of *Cenchrus ciliaris* from immature inflorescence explants. *Biologia plantarum*. 53(4): 603-609.

Jha, P, C B Yadav, A Vanamala and V Bhat. 2009. In- vitro plant regeneration through somatic embryogenesis and direct shoot organogenesis in *Pennisetum glaucum*. *In vitro cell and dev. biol.-Plant*. 45(2):145-154.

Bhat, B V, V Bhat, M G Gupta and S Gupta. 2007. Isozyme based genetic similarity in Cenchrus (Poaceae).*Range Mgmt. & Agroforestry.* 28(2): 285-286.

Dwivedi, K K, S R Bhat, V Bhat, B V Bhat and M G Gupta. 2007. Identification of a SCAR marker linked to apomixis in buffelgrass (*Cenchrus ciliaris*). *Plant Science.* 172(4): 788-795.

Chandra, Atika, Mukesh Jain, Vishnu Bhat, Jyoti Vora, Sanjay Ghawna and Paramvir S Ahuja. 2007. Frontiers of plant biology research, Meeting Report. *Current Science*. 92(11): 1131-1135.

Gupta, S, S Gupta, V Bhat and M G Gupta. 2006. Somatic embryogenesis and *Agrobacterium* mediated genetic transformation in Indian accessions of Lucerne (*Medicago sativa*). *Indian J. Biotechnology*. 5(3): 269-275.

Kumar, J, S M Shukla, V Bhat, S Gupta and M G Gupta. 2005. In-vitro plant regeneration and genetic transformation of *Dichanthium annulatum*. *DNA and Cell Biology*. 24(11): 270-279.

Jha, G, V Bhat and A Vanamala. 2005. Plant growth-promoting activity of rhizobacterial strains, *Bacillus* and fluorescent *Pseudomonas*, on tomato plants. *Indian Phytopathology*. 58(4): 462-465.

Bhat, V, K K Dwivedi, J P Khurana and S K Sopory. 2005. Apomixis: An enigma with potential applications. *Current Science*. 89(11): 1879-1893.

Dalton, S, A Bettany, V Bhat, M G Gupta, Catharine, E Timms and P Morris. 2003. Genetic transformation of *Dichanthium annulatum*- an apomictic forage grass. *Plant Cell Rep*. 21(10): 974-980.

Gupta, M G, V Bhat, B V Bhat, C N Neeraja and S Gupta. 2003. Phylogenetic relationships in tetraploid agamospecies of *Dichanthium* complex based on isozyme phenotypes. *J. Pl. Biol*. 30(1): 61-64.

Mojumdar, A, G P Shukla, V Bhat and K S Kohli. 2003. Variability for quality traits in forage alfalfa (*M. sativa*). *Range Mgmt. & Agroforestry*. 24(2): 164-166.

Thakur, J K, M R Malik, V Bhat, M K Reddy, S K Sopory, A K Tyagi and J P Khurana. 2003. A POLYCOMB group gene of rice, OsiEZ1, codes for a nucleolocalised protein expressed preferentially in

young seedlings and during reproductive development. *Gene*. 314(18th September): 1-13.

Kumar, S, V Bhat, B V Bhat and M G Gupta. 2002. *Agrobacterium* mediated transformation of Lucerne (Medicago sativa Linn.): Optimizing biological and physical parameters. *Ind. J. Biotech*. 1(3): 298-300.

Ortiz, J P A, S C Pessino, V Bhat, N Hayward and C L Quarin. 2001. A genetic map of diploid Paspalum notatum, an apomictic forage grass. *Crop Sci*. 41(3): 823-830.

Gupta, S, M G Gupta, B V Bhat and V Bhat. 2001. Status of apomixis and sexuality in four species of Cenchrus. *J. Plant Biol*. 28(2): 153-159.

Kumar, S, M G Gupta, V Bhat and B V Bhat. 2001. *Agrobacterium* mediated transformation of Lucerne. *Crop Improv*. 28(2): 163-166.

Bhat, V, S Dalton, S Kumar, B V Bhat, M G Gupta and P Morris. 2001. Particle in flow gun mediated genetic transformation of buffel grass (*Cenchrus ciliaris*): Optimizing biological and physical parameters. *J. Appl. Genet*. 42(4): 405-412.

Gupta, M G, B V Bhat and V Bhat. 2000. Effect of chemical mutagens on Sesbania sesban. *Range Mgmt. & Agroforestry*. 21(2): 145-152.

Mishra, U S, V Bhat and D S Katiyar. 1999. Strategies for utilization of the germplasm of a tropical apomictic buffel grass. *Indian J. Pl. Genet. Resources*. 12(1): 81-85.

Gupta, S, B V Bhat, V Bhat, M G Gupta and S T Ahmed. 1998. Estimation of facultative apomixis in the somaclones of *Dichanthium annulatum*. *Range Mgmt. & Agroforestry*. 19(2): 149-153.

Gupta, S, B V Bhat, V Bhat, M G Gupta and Bhag Mal. 1998. Somaclonal variation for facultative apomixis in Marvel Grass (*Dichanthium annulatum*, Forssk. Stapf.). *Forage Research.* 24(2): 111-114.

Gupta, M G, S Gupta, B V Bhat and V Bhat. 1997. *In-vitro* regeneration and somaclonal variation in a tropical pasture grass, *Dichanthium annulatum*. *Range Mgmt. & Agroforestry*. 18(1): 25-30.

Publications in the Last one year

Research papers:

Abdi, S., Dwivedi, A., Shashi, Kumar, S. and Bhat, V., 2019. Development of EST-SSR markers in *Cenchrus ciliaris* and their applicability in studying the genetic diversity and cross-species transferability. *J. Genet*, 98, 101 (doi.org/10.1007/s12041-019-1142-x).

Yadav, CB, Dwivedi, A., Kumar, S. and Bhat, V., 2019. AFLP-based genetic diversity analysis distinguishes apomictically and sexually reproducing *Cenchrus* species. *Braz. J. Bot.*, 42: 361-371.

Rustagi, A., Shekhar, S., Kumar, D., Lawrence, K., Bhat, V. and Bhalla Sarin, N., 2019. High speed regeneration via somatic embryogenesis in elite Indian banana cv. Somrani monthan (ABB). *Vegetos* 32: 39–47.

Conference Organization/ Presentations (in the last three years)

Sazda Abdi and Vishnu Bhat,2017, Development of Co-dominant Intron Length Polymorphism Markers Associated with Apomixis in *Cenchrus ciliaris.,* Proceedings of International conference on "Technological Advancement for Sustainable Agriculture and Rural Development" held at National Agricultural Science Complex (NASC), New Delhi, India from February 20th -22nd , 2017, pp. 236.

Sazda Abdi and Vishnu Bhat, 2017, Morphological and Embryological Trait Diversity in F_3 Segregating Population of *Cenchrus ciliaris.,* Proceedings of International conference on " XXVII Annual Conference of Indian Association for Angiosperm Taxonomy & International Symposium on Plant Systematics : Priorities and Challenges" held at Department of Botany, University of Delhi, Delhi, India from November 10th -12th 2017, pp.130.

P. Rathore and V. Bhat, 2017. Identification and characterization of retrotransposons associated with mode of reproduction in *Cenchrus ciliaris*. Poster proceeding of the International conference on technological advancement for sustainable agriculture and rural development, India, 20-22 February, 2017 pp. 239-40.

Pankaj Kumar Agnihotri & Vishnu Bhat, 2017. Isolation of *Nucellin* promoter from *Hordeum vulgare* and its characterization in *Arabidopsis thaliana*, Poster proceeding of the "National Conference on Interdisciplinary aspects of Plant Sciences" held at SMVDU, Katra, J&K from 2-4 November, 2017 (Awarded Best poster).

P. Rathore, S.Kumar and V. Bhat, 2018. Differential methylation pattern of retrotransposons associated with apomixis in *Cenchrusciliaris*, Poster proceeding of the National Symposium on Plant Biotechnology and 39th Annual meeting of Plant Tissue Culture Association, pp. 101.

Laishram Sundari Devi, Lingrui Zhang, Vishnu Bhat & Jian-Kang Zhu, 2018. Development of *CRISPR* vector for a Polycomb gene CcEZ1 gene isolated from apomictic *Cenchrus ciliaris.* Proc. of First National Genetic Congress on Genetics for Sustainable Food, Health and Nutrition Security, IARI, Pusa Campus, New Delhi. (Oral presentation by Ms. L. Sundari Devi).

Research Projects (Major Grants/Research Collaboration)

DAE-BRNS funded research project entitled "Induction of autonomous endosperm development in *Pennisetum* species by down-regulating a Polycomb gene *CCEZ1* using RNAi approach" for the duration 2016-2020.

Awards and Distinctions

Award of Best Research Paper published from Indian Grassland & Fodder Research Institute, Jhansi during 2001

Member, Editorial Board, Journal of Genetics, 2008-2009

Association With Professional Bodies

Life Member, Delhi University Botanical Society, Delhi.
Life Member, Range Management Society of India, Jhansi.
Life Member, Indian society of Plant Genetic Resources, New Delhi.
Life Member, Society of Plant Biochemistry and Biotechnology, New Delhi.

Other Activities

Signature of Faculty Member
(Vishnu Bhat)
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