

## FACULTY PROFILE FORMAT

1. **Full Name:** Wricha Tyagi
2. **Designation:** Professor
3. **Department / School:** School of Crop Improvement
4. **Official Email id:** wtyagi.cau@gmail.com
5. **Profile Photo:** Submitted
6. **Areas of Specialization:** Plant Molecular Biology/Biotechnology
7. **Research Interests:** Plant molecular biology/genomics/molecular breeding
8. **Highest Educational Qualifications:**

Sl. No.	Degree	Subject	University
1	B.Sc. (Hons.)	Microbiology (Hons)	Delhi University, Gargi College (1997)
2	M.Sc.	Life Sciences	Jawaharlal Nehru University (1999)
5	Ph.D.	Life Sciences with specialization in plant molecular biology	International Centre of Biotechnology and Genetic Engineering (ICGEB), New Delhi, India in collaboration with JNU (2004) (CSIR fellowship holder)

9. **Professional Experience:**

Research & teaching

Sl. No.	Position	Institution/Place	Duration	
1	Principal Scientist and Cluster leader (IRS position)	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India	01-08-22	31-07-25
2	Professor	Central Agricultural University (Imphal), College of Post-Graduate Studies Campus, Umiam, Meghalaya	17-2-15	Till date
3	Associate Professor	Central Agricultural University (Imphal), College of Post-Graduate Studies Campus, Umiam, Meghalaya	17-2-09	16-2-15
4	Postdoctoral Associate	Cornell University, Ithaca, NY, USA	1-5-06	24-9-08
5	Research Associate	University of Hyderabad, Hyderabad	1-11-05	31-3-06
6	Research Associate	International Centre for Genetic Engineering and Biotechnology, New Delhi	1-9-04	30-6-05

## Research Management experience

Sl. No.	Position	Institution/Place	Duration	
1	Principal Scientist and Cluster leader (RMC position)	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India	Aug 2022	July 2025
2	Dean (incharge)	Central Agricultural University (Imphal), College of Post-Graduate Studies Campus, Umiam, Meghalaya	Feb 2021	July 2022
3	Incharge, School of crop improvement	Central Agricultural University (Imphal), College of Post-Graduate Studies Campus, Umiam, Meghalaya	Nov 2019	March 2021
4	Postdoctoral Associate	Cornell University, Ithaca, NY, USA	1-5-06	24-9-08
5	Research Associate	University of Hyderabad, Hyderabad	1-11-05	31-3-06
6	Research Associate	International Centre for Genetic Engineering and Biotechnology, New Delhi	1-9-04	30-6-05

## 10. Research Projects:

Till date eight projects have been successfully completed. The focus has been to provide long term solutions to problematic soils particularly acid soils where amelioration and amendment measures are not able to offer long lasting solutions. The genetic solutions contemplated are likely to pay dividends in crop improvement of cereals, legumes and oilseeds.

Sl. No.	PI/Co-PI/other	Title	Year of sanction	Amount	Funding Agency	Status of project
1	CoPI	Enhancing regeneration and editing efficiency in groundnut and pigeonpea for trait improvement (Legume Efficient GE)	2024	262.6 lakhs (INR)	DBT, GOI	Fund released

Till date eight projects have been successfully completed.

Sl. No.	PI/Co-PI/other	Title	Year of sanction	Amount	Funding Agency	Status of project
1.	PI	Taking Pearl Millet Flour Mainstream through Gene Editing	2023	699.111 USD	NovoNordisk Foundation, Denmark	Completed
2.	PI	Understanding phosphorus deficiency and iron toxicity	2017	122.08 lakhs (INR)	DBT, GOI	Completed

		tolerance in rice under acidic soils of North East Hill Region				
5.	Co-PI	Establishment of Institutional Biotech Hubs	2012	19 lakhs (INR) for three years followed by 4-5 lakhs/yr for next 2 yrs	DBT, GOI	Completed

DBT: Department of Biotechnology, GOI; BRNS: Board of Research in Nuclear Sciences, Dept. of Atomic Energy (DAE), BARC) GOI

### Inter-Institutional Teamwork

Sl. No.	PI/Co-PI/other	Title	Institutions	Duration	Amount	Funding Agency	Status of project
1.	PI	Bioprospecting of genes and allele mining for abiotic stress tolerance	35 institutes	5 years (2009-14)	210.0 lakhs	NAIP (component -IV), ICAR	Completed
2.	PI	Phenomics of moisture deficit and low temperature stress tolerance in rice	9 institutes IARI; NRCPB; IASRI; IIT (D); DU (south campus); IGKV; ICAR-NEH; NRRI; CAU (I)	5 years (2011-2015)	168.57 lakhs	NASF, ICAR, GOI	Completed
3.	PI	Development of pod borer resistant transgenic pigeon pea and chickpea	9 institutes NRCPB; St. Xavier's College; IIT (K); Bose Institute; IIT (G); UAS, Dharwad; IIPR; AAU; CAU (I)	6 years (2011-2017)	69.04 lakhs	NASF, ICAR, GOI	Completed
4.	CoPI	Deciphering and Deploying Low Phosphorus Tolerance and Nitrogen Use Efficiency in Rice Using Targeted Genomics Approach	5 institutes CAU (I); ICAR-IIRR; ICAR-NEH; NRRI, ICAR-IIAB	3 years (2022-2025)	252.27 lakhs	NASF, ICAR, GoI	Ongoing (was CoPI till March 11, 2024)

NASF: National Agricultural Science Fund (Formerly National Fund for Basic, Strategic and Frontier Application Research in Agriculture (NFBSFARA), ICAR, GOI; NAIP: National Agriculture Innovation Project (component-IV)

## 11. Selected Publications: Best 25 recent publications

1. Keisham M, Moin M, Meetei NT, Rai M, **Tyagi W\*** (2026) Quantitative gene expression analysis across contrasting linseed genotypes identifies new candidates for aluminum toxicity and low-phosphorus tolerance. *Plant, Cell & Environment*. <https://doi.org/10.1111/pce.70447>
2. Bezil M, Magudeeswari P, Keisham M, Behera A, Kumar A, **Tyagi W**, Rai M\* (2025) Genetic diversity, combining ability and stability analysis of Linseed (*Linum Usitatissimum*) under acidic soil conditions in the North-Eastern region of India. *Agric Res*. <https://doi.org/10.1007/s40003-025-00903-1>
3. Moin M, Vasanthrao T, **Tyagi W\*** (2025) Lipid signalling components identified as key targets for generating new alleles to improve grain-quality traits in pearl millet. *Journal of Cereal Science* 126:104308. <https://doi.org/10.1016/j.jcs.2025.104308>.
4. Moin M, **Tyagi W\***, Sreevarshitha G (2025) A simple seed-piercing transformation protocol for pearl millet and finger millet, *AoB PLANTS* 17: 5: plaf050, <https://doi.org/10.1093/aobpla/plaf050>
5. Moin M, Rai M, **Tyagi W\*** (2025) Allelic value in gene regulation—implications for gene editing, *Annals of Botany*, 136:4. 683–697. <https://doi.org/10.1093/aob/mcaf072>
6. Kadiyala K\*, Konjengbam NS\*, Rai M, **Tyagi W**, Mahato AK (2025) Molecular signatures that translate across omics layers and crops under high aluminium and low phosphorus stress facilitate the identification of reliable molecular targets for genotyping in lentil. *Functional & Integrative Genomics* 25:1-17.
7. Debnath S, Rai M, **Tyagi W**, Majumder, S, Ng Meetei T\* (2025) Lower vicine content reduces the reproductive yield performance in faba bean (*Vicia faba* L.). *Scientific Reports*. 15:311.
8. Meitei AL, Yogendra K, Sanivarapu H, Meetei NT, Rai M, **Tyagi W\*** (2025). Metabolite profiling reveals differential accumulation of secondary metabolites related to flavour and colour across four heirloom chilli landraces. *Physiology and Molecular Biology of Plants*. 31(3): 477-491. DOI :10.1007/s12298-025-01576-4.
9. Debnath S, **Tyagi W**, Rai M, Singh K, Majumder S, Duhan N, Ng Meetei T\* (2025) Discovery of potential haplotypes associated with varying levels of vicine content due to the InDel1. 4 and a coding-SNP in the VC1 gene in faba bean (*Vicia faba* L.). *Plant Gene*. 41:100481. **(eISSN:2352-4073)**
10. Kar A, Debnath S, Rai M, **Tyagi W**, Ng Meetei T\* (2024) Exploring altitude-driven diversity: morphological, biochemical, and genetic diversity analysis of Khasi mandarin (*Citrus reticulata* Blanco) in Meghalaya, India. *Genetic Resources and Crop Evolution*. 72(5): 5581-5591. DOI:10.1007/s10722-024-02287-7.
11. James M, **Tyagi W**, Magudeeswari P, Neeraja CN, Rai M\* (2024). Genome-wide association-based identification of alleles, genes and haplotypes influencing yield in rice (*Oryza sativa* L.) under low-phosphorus acidic lowland soils. *International Journal of Molecular Sciences*. 25(21):11673.
12. Alekhya C, Avuthu T, Gadeela H, Bomma N, Gangashetty P, **Tyagi W\***, Yogendra K\* (2024). Identification and evaluation of *BAG* (B-cell lymphoma-2 associated athanogene) family gene

- expression in pigeonpea (*Cajanus cajan*) under terminal heat stress. *Frontiers in Genetics*. 15, 1418380.
13. Yogendra K, Sanivarapu H, Avuthu T, Gupta SK, Durgalla P, Banerjee R, Raman A, **Tyagi W\*** (2024). Comparative metabolomics to unravel the biochemical mechanism associated with rancidity in pearl millet (*Pennisetum glaucum* L.). *International Journal of Molecular Sciences*. 25(21):11583.
  14. Pandey A, Lap B, Aochen C, Kumar A, **Tyagi W\***, Rai M (2024). Assessment of genetic variability in Job's Tears (*Coix lacryma-jobi* L.) germplasm from Indian NEH region using morpho-physiological traits and SSR markers. *Plant Molecular Biology Reporter*. 43 (2): 447-457. 10.1007/s11105-024-01506-w.
  15. Debnath A, Sumpi H, Lap B, Bhutia KL, Behera A, **Tyagi W\***, Rai M\* (2024). Multi-population analysis for leaf and neck blast reveals novel source of neck blast resistance in rice. *Plants*. 13(17):2475.
  16. Khisti M, Avuthu T, Yogendra K, Kumar Valluri V, Kudapa H, Reddy PS, **Tyagi W\*** (2024). Genome-wide identification and expression profiling of growth-regulating factor (*GRF*) and GRF-interacting factor (*GIF*) gene families in chickpea and pigeonpea. *Scientific Reports*. 14(1):17178.
  17. Moin M, Bommineni PR, **Tyagi W\*** (2024). Exploration of the pearl millet phospholipase gene family to identify potential candidates for grain quality traits. *BMC genomics*. 25(1):581.
  18. Lap B, Magudeeswari P, **Tyagi W**, Rai M\* (2024). Genetic analysis of purple pigmentation in rice seed and vegetative parts—implications on developing high-yielding purple rice (*Oryza sativa* L.). *Journal of Applied Genetics*. 65(2):241-54.
  19. Prasad K, Gadeela H, Bommineni PR, Reddy PS, **Tyagi W**, Yogendra K\* (2024). CRISPR/Cas9-mediated mutagenesis of phytoene desaturase in pigeonpea and groundnut. *Functional & Integrative Genomics*. 2:57.
  20. Debnath S, Majumder S, **Tyagi W**, Rai M, NT Meetei\* (2024). An optimized simple, rapid and reliable method for large-scale estimation of vicine from faba bean (*Vicia faba* L.). *Food Anal. Methods*. 17:436–449.
  21. Rai M, Chucha D, Deepika D, Lap B, Magudeeswari P, Padmavathi G, Singh N, **Tyagi W\*** (2023). Pyramiding of qDTY1.1 and qDTY3.1 into rice mega-variety Samba Mahsuri-Sub1: physiological performance under water deficit conditions. *Physiology and Molecular Biology of Plants*. 12:1931-43.
  22. Nongbri EL, Das S, Bhutia KL, Momin AG, Rai M and **Tyagi W\*** (2023) Differential expression of iron deficiency responsive rice genes under low phosphorus and iron toxicity conditions and association of *OsIRO3* with yield under acidic soils. *Rice Science*. 30(1):58-69.
  23. Bhutia KL, Nongbri EL, Sharma TO, Rai M, **Tyagi W\*** (2021) A 1.84-Mb region on rice chromosome 2 carrying *SPL4*, *SPL5* and *MLO8* genes is associated with higher yield under phosphorus-deficient acidic soil. *Journal of Applied Genetics*. 62:207-222.
  24. **Tyagi W**, Yumnam JS, Sen D, Rai M\* (2020) Root transcriptome reveals efficient cell signaling and energy conservation key to aluminum toxicity tolerance in acidic soil adapted rice genotype. *Scientific Reports*. 10(1):1-14.

25. Bhutia KL, Nongbri EL, Gympad E, Rai M, **Tyagi W\*** (2020) In silico characterization, and expression analysis of rice golden 2-like (OsGLK) members in response to low phosphorous. *Molecular Biology Reports*. 47(4):2529.

## 12. Courses Taught:

Name of the course	Code	Year	No. of times taught
<b>M.Sc (MBB)</b>			
Principles of Biotechnology	MBB 501	2014-15, 2016-17	2
Fundamentals of Molecular Biology	MBB 502	2010-11, 2012-13, 2013-14, 2014-15, 2016-17, 2018-19, 2019-20, 2020-21, 2021-22, 2025-26	10
Molecular Cell Biology	MBB 503	2009-10	1
Omics and Systems Biology	MBB 505	2021-22	1
Techniques in Molecular Biology I	MBB 505/MBB 504	2009-10, 2010-11, 2011-12, 2012-13, 2013-14, 2014-15, 2017-18, 2018-19, 2019-20, 2020-21, 2021-22	11
Molecular Breeding	MBB 507	2012-13, 2013-14	2
Genomics and Proteomics	MBB 508	2013-14, 2016-17, 2018-19, 2019-20, 2020-21, 2021-22	6
Techniques in Molecular Biology II	MBB 509	2012-13, 2013-14, 2019-20	3
Basic Biochemistry	MBB 552	2014-15, 2016-17	2
<b>Ph.D (MBB/GPB)</b>			
Advances in Plant Molecular Biology	MBB 601	2012-13, 2013-14, 2016-17, 2018-19, 2019-20, 2020-21, 2021-22	7
Advances in Genetic Engineering	MBB 602	2018-19, 2019-20, 2020-21	3
Plant Omics and Molecular Breeding	MBB 603	2021-22	1
Advances in Crop Biotechnology	MBB 604	2012-13, 2013-14, 2016-17	3
Genomics in Crop Improvement	GPB 603	2013-14, 2014-15	2
Genomics in Plant Breeding	GPB 605	2025-26	1
<b>Supporting Courses/PGS</b>			
Basic Concepts in Laboratory Techniques	PGS 504	2012-13, 2013-14	2
Disaster Management	PGS 506	2012-13	1
Advanced Bacteriology	PL PATH 603	2013-14, 2014-15, 2016-17, 2017-18	4
Plant developmental biology-physiology and molecular basis	PP 502	2009-10, 2010-11, 2012-13	3

B. Sc Course			
Fundamentals of Plant Biochem and Biotech	Biotech-113	2016-17	1

**13. Student Guidance:**

- a. M.Sc. Guided: **22 (twenty-two)**
- b. Ph.D. Guided: **6 (six)**
- c. As member in student's advisory committee (#42) PhD (12); MSc (30)
- d. Hosted 7 BSc/Btech students as interns (2 currently undergoing training)

**14. Workshops / Training / Conferences Organized:**

- Course director of DBT, Gol sponsored 10 days training on Genomics tools for crop improvement (2019)
- Course director of 5 day farmers' training programme (UBA-PDUUKSY) sponsored by HRD, Gol (2017)
- Organiser of Awareness Workshop on National Fund for Basic, Strategic and Frontier Application Research in Agriculture (NFBSFARA) of ICAR (2013; June 11- 13; funded by ICAR)
- Organized (BioNcube, ICRISAT) **five** training programs (5 days'/training program; 2022) in the area of 'new breeding tools' for the scientists, post-docs, students, industry personal from various state and national organizations, including ICAR and other NARS partners.
- Organised **three** webinars (Nov04, Nov11 and Dec13, 2022) as part of knowledge series in intellectual property rights in biotechnology (sponsored by BioNcube, CMBTE), WIPO-TISC and IPFC at AIP - ICRISAT

**15. Google Scholar / ORCID / ResearchGate / Scopus ID:**

Published >70 research articles (i10 index-37 & 1832 citations). 12 technologies.

**<https://scholar.google.com/citations?user=mlw20t8AAAAJ&hl=en>**

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