



TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO

ID CODE \_6313

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type B fellowship at **Dipartimento di** \_\_\_\_\_

Scientist- in - charge: Prof. PASQUALI MATIAS

[Name and surname] Shikha Dixit

**CURRICULUM VITAE**

**PERSONAL INFORMATION**

Surname	Dixit
Name	Shikha

**PRESENT OCCUPATION**

Appointment	Structure
Young Professional II	Sep-2022-Present  Identification of host factors and signaling regulators in response to necrotroph fungal pathogens and viruses in chickpea, mungbean and rice.

**PAST PROFESSIONAL POSITIONS HELD:**

Positions	Duration	Project Title
1. <b>Research Associate III</b> Department of Genetics, University of Delhi South Campus, New Delhi, India	Jan. 2020- Sep. 2021	DBT-BBSRC project: Genomics-led improvement of biotic and abiotic stress tolerance in mustard rape for economic and environmental sustainability.
2. <b>Project Fellow</b> UAS, Dharwad, India	Jul. 2012-Jul. 2013	Nanobiotechnology Project: Plant based Green synthesis of nanoparticles.



## EDUCATION AND TRAINING

Degree	Course of studies	University	year of achievement of the degree
Degree B.Sc. (Bachelors of Science)	Agriculture	Indira Gandhi Agricultural University Raipur, India	2010
Specialization	Agriculture, Molecular Biology and Biotechnology	Indian Agricultural Research Institute, New Delhi, India	2020
PhD Ph.D. Molecular Biology and Biotechnology	Molecular Biology and Biochemistry	Indian Agricultural Research Institute, New Delhi, India	2020
Master M.Sc. (Plant Biotechnology)	Plant Biotechnology	University of Agricultural Sciences, Bangalore, India	2012
Degree of medical specialization			
Degree of European specialization			
Other			

## REGISTRATION IN PROFESSIONAL ASSOCIATIONS

Date of registration	Association	City
March 2020	Member of the Indian Society of Genetics and Plant breeding,	New Delhi, India
August, 2022	Member of German Society of Plant Science	Salzburg, Austria
April, 2023	Member of American Phytopathology Society	MN, USA

## FOREIGN LANGUAGES

Languages	level of knowledge
English	Advanced

## AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS

Year	Description of award
2020	<b>IARI merit medal:</b> Awarded by Indian Agricultural Research Institute for outstanding academic performance in the doctoral program



2014	<b>Indian Agricultural Research Institute Ph.D. Fellowship 2014:</b> Awarded based on the national level exam. National ranking secured: 4 <sup>th</sup>
2010	<b>Scholarship for master's degree by Department of Biotechnology, Ministry of science and technology, 2010:</b> Awarded based on the national level exam. National ranking secured: 9 <sup>th</sup>
2007	<b>Academic Merit Award, 2007:</b> Secured <b>SECOND</b> position in the College of Agriculture, Indira Gandhi Agricultural University, Raipur, India.
2006	<b>National Talent Scholarship for under graduation, 2006:</b> Awarded by Indian Council of Agricultural Research based on national level competitive exam.

TRAINING OR RESEARCH ACTIVITY

description of activity	<b>Present position</b>
<b>1. <u>As Young Professional II</u></b>	
<b><u>Research work:</u></b>	
<ul style="list-style-type: none"><li>• Rearing and maintenance of whitefly under laboratory conditions for virus acquisition and transmitting.</li><li>• Comparative transcriptomics studies of host and non-host plant in response to YMV infection in mung bean.</li><li>• Fungus pathogenesis study in <i>Megnaporthe oryzae</i> including pathogen virulence analysis and biodiversity analysis</li><li>• Gene expression analysis, cloning and functional characterization of early induced genes in response to <i>F.oxysporum</i></li><li>• Promoter identification and isolation studies in wild rice to identify pathogen induced strong promoter.</li><li>• Protein/metabolite quantification.</li><li>• Mentoring master students and teaching two courses: Basics of molecular Biology (Theory) and Techniques in molecular Biology (Practical)</li><li>• Writing papers, reports and project proposals</li></ul>	
<b>2. <u>As Research Associate</u></b>	<b>Duration: 1 year 9 months</b>
<b><u>DBT-BBSRC project entitled- “Genomics-led improvement of biotic and abiotic stress tolerance in mustard rape for economic and environmental sustainability”</u></b>	
<b><u>Research Title: “Molecular dissection of the resistance in <i>B. carinata</i> population towards <i>Sclerotinia</i> stem rot caused by <i>Sclerotinia sclerotiorum</i>”.</u></b>	
<ul style="list-style-type: none"><li>• Phenotypic screening of RILs for tolerance to the <i>S. sclerotiorum</i> under field conditions.</li></ul>	



- Conducting pathogen screening under controlled environment chamber.
- Culture and molecular analysis of collection of *S. sclerotiorum* pathotypes.
- Virulence, variability studies and phylogenetic analysis of pathotypes of *S. sclerotiorum*.
- Effector gene cloning from different isolates and sequence data analysis.
- Statistical data analysis for disease severity assessment and disease index in the RILs
- Identification of major QTLs and candidate genes responsible for tolerance towards *S. sclerotiorum* in the population using SNP data.
- Transcriptomics and gene expression analysis.
- Manuscript writing, report writing and presentation.

**3. As Ph.D. Scholar**

**Duration: 5 years 4 months**

**Thesis title: Exploring the cross-talk among SA, JA and ABA at a molecular level in response to *Alternaria brassicae* in *Brassica* and its wild relatives**

- Isolation and molecular characterization of isolates of *Alternaria brassicae*.
- Virulence analysis, disease assessment and disease progression analysis.
- Gene expression analysis of the SA, JA and ABA biosynthesis genes and downstream defense responsive genes.
- Transgenic experiments in *Arabidopsis* for gene validation
- Standardization and efficient extraction of phytohormones using solvent based extraction and solid phase extraction (SPE) for volatile compounds.
- HPLC and GC-MS quantification, data analysis and interpretations.
- Biochemical assays to detect H<sub>2</sub>O<sub>2</sub> accumulation, fungal biomass and cell death.
- Histological and microscopic study of pathogen-infected plant tissues
- In silico analysis and characterization of genes
- Seminars, Thesis writing and manuscript writing.

**4. As. Project Fellow (Nano-biotechnology):**

**Duration: 1 year**

- Standardization of protocol for green synthesis of silver and gold nanoparticles.
- Characterization of the synthesized nanoparticles using SEM and TEM analysis.
- Evaluation of methods utilized to design miRNA conjugated nanoparticles for targeted delivery to plant cells.
- Studying the physiological effect of conjugated nanoparticle delivery to the *Arabidopsis* plant generated through tissue culture.

**V ACQUIRED SKILLS**

**1. Research and Technical Skills:**

- Phenotyping for disease assessment under field conditions and screen house
- Experience in handling large datasets (phenotypic and genotypic data)
- Transcriptomics data analysis and interpretation
- Data analysis and QTL mapping tools: STAR, CropStat, PBtools, Fieldlabs, QTL cartographer



- Other Bioinformatics tools: Bioedit, gNorm, GeneFinder, Bestkeeper, ClustalW, and Mega7
- Experience in working with databases: NCBI, MirBase, Gramene, BRAD, TAIR, FungiDB and mycosm
- Molecular biology techniques: DNA, RNA and Protein extraction, PCR, Real time PCR, cloning and transformation in *Arabidopsis*, mustard, rice.
- Agroinfiltration experiment in mungbean
- Pathological studies: Fungal culture, morphology studies and fungal diversity analysis and Fungus transformation using Protoplast mediated method and Agrobacterium based transformation
- Biochemical techniques: Phytohormone and secondary metabolite extraction using solvent based and solid phase procedure, toxin isolation and identification using chromatography, GC-MS and HPLC for qualitative and quantitative analysis.
- Microscopic techniques: histological sample preparation (leaf section and stem section), confocal, SEM and TEM.
- Root phenotyping and imaging techniques: DIRT and SmartRoot.
- Rearing of whitefly under lab condition, Agro-inoculation and plant-to-plant virus transmission in mung bean
- Construct designing for gene editing in soybean

## **2. Planning, management and mentoring skills:**

- Planning experiments for identification of novel R gene in rice-*M. oryzae* system
- Leading a small team of 5 people in plant-pathogen interaction lab, NIBSM Raipur working on identification of host factor for virus multiplication in mungbean
- Mentoring 2 master's students in the lab
- Preparing concept notes for designing future research proposals

## **3. Computer skills and language skills**

- Microsoft excel, power point and word
- Image editing tool: GIMP
- Expert in English reading, writing, speaking and listening skills
- IELTS score- 08/10

## PATENTS

### Patent

Technology development: Development of microcage based virus acquisition method for controlled study of virus infested mungbean



Associated publication: 2. **Dixit, S.**, Pandian, R.,<sup>1</sup>, Revanasiddappa, Sahu, B., Sridhar J., Marathe, A., Sivalingam, P.N. Protocol for spot inoculation of begomovirus by single whitefly (*Bemisia tabaci*) transmission in mungbean using microcage. In: Muthappa, S. (eds) 2023, Methods in Molecular Biology. Humana Press, USA. Under production.

**Data uploaded to public domain:**

- Sequence of complete cDNA of the 19 *WRKY33* gene from diverse *Brassica* species and were submitted to the database National Center for Biotechnology Information (NCBI) and the data is publicly available for use.
- GenBank ID of the gene sequences are as follows: **MF741706, MF741707, MG014003, MG014004, MF741708, MG014009, MG014010, MG014011, MG014012, MF741709, MF741710, MG014002, MF741711, MG001173, MG001174, MG001175, MG001176, MG001177, MG001178, MG001179, MG004213, MG004214, MG004215, MG004216, MG004217, MG004218, MG013996, MG013997, MG013998, MG013999, MG014000, MG014001, MG014005, MG014006, MG014007, MG014008**

**2. Biological material submission**

- A diverse laboratory collection of *A. brassicae* pathotypes were generated and are available as stocks in the plant-pathogen interaction laboratory, NIPB, New Delhi.
- Two pathotypes, ABSI and ABSII have been characterized for low and high virulence respectively.

CONGRESSES AND SEMINARS

Date	Title	Place
August,2023	<b>Poster Presentation:</b> <u>Dixit S.</u> , Pushkar S., Singh S.B., and Grover A. (2023). A comparative study of SA-JA-ABA cross-talk in response to <i>Alternaria Brassicae</i> in susceptible and resistant Brassica species.	12 <sup>th</sup> International Congress on Plant Pathology. Europa organization, Lyon France.
6-8 March 2016.	<b>Radioisotope use and safety training,</b> Nuclear Research Laboratory,	IARI, Pusa, New Delhi,
24-26 February 2012	<b>Training on Detection of GM Crops &amp; SSR Markers</b>	Department of Plant Biotechnology, University of Agricultural Sciences, Bangalore
March 2014	<b>Poster Presentation:</b> <u>Dixit S.</u> , Jangid V.K., and Shashidhar H.E. (2014).	National conference on Molecular and Physiological Interventions for Improving



	Screening of Elite aerobic rice for favourable root traits for higher productivity under drought stress regime. <b><u>The poster was awarded as the best poster.</u></b>	Crop Productivity. Indian Society of Plant Physiology and Division of Plant Physiology, collage of Agriculture, Bapatla (A.P)
March,2012	<b>Oral presentation:</b> <u>Dixit S.</u> , Jangid V.K., Shashidhar H.E. and Vijayakumar Swamy H.V. (2012).Molecular and phenotypic characterization of elite aerobic rice ( <i>Oryza sativa</i> L.) accessions for drought tolerance and productivity.	Proceedings of International conference on the exploration of biotechnology by students and researchers. Department of Biotechnology, SIET, Tumkur Karnataka, India.

## PUBLICATIONS

Books
Kaur, G., Rajarammohan, S., Kumar, S., Verma, R., Kaur, G., Kaur, J., Gajbhiye, S., <b>Dixit, S.</b> , and Kaur, J. Genomic Designing for Biotic Stress Resistance in Rape and Mustard. 2022. In: Kole, C. (eds) Genomic Designing for Biotic Stress Resistant Oilseed Crops. Springer, Cham. <a href="https://doi.org/10.1007/978-3-030-91035-8_5">https://doi.org/10.1007/978-3-030-91035-8_5</a>
<b>Dixit, S.</b> , Pandian, R., <sup>1</sup> , Revanasiddappa, Sahu, B., Sridhar J., Marathe, A., Sivalingam, P.N. Protocol for spot inoculation of begomovirus by single whitefly ( <i>Bemisia tabaci</i> ) transmission in mungbean using microcage. In: Muthappa, S. (eds) 2023, Methods in Molecular Biology. Humana Press, USA. Under production.

Articles in reviews
<b>1. Research Articles:</b> 1. Shikha Dixit, Palaiyur Nanjappan Sivalingam, R. K. Murali Baskaran, Muthappa Senthil-Kumar and Probir Kumar Ghosh. (2023). Plant responses to concurrent abiotic and biotic stress: unravelling physiological and morphological mechanisms. Plant Physiology Reports. <a href="https://doi.org/10.1007/s40502-023-00766-0">https://doi.org/10.1007/s40502-023-00766-0</a>  2. <b>Dixit, S.</b> , and Pandian, R. (2023). An analysis of ABA and JA interaction controlling JA mediated resistance against Alternaria blight in Indian mustard. Journal of Plant Pathology. <b>Under Review.</b>  3. <b>Dixit, S.</b> , Grover, A., Pushkar, S., Singh, S.B. (2023). ABA dominated signaling in susceptible <i>Brassica juncea</i> in response to <i>Alternaria brassicae</i> leads to suppressed JA mediated defense. <b>Under review</b>





4. Dsilva L.S., **Dixit S.**, Marathe A., Kumar V., Kaushal P., Ghosh P.K., Sivalingam P.N.

Identification and validation of Chickpea (*Cicer arietinum L.*) isoflavone synthase 1 promoter conferring pathogen-induced expression in response to *Fusarium oxysporum*. **Under Review**

5. **Dixit, S.**, Jangid, V.K., Grover A. (2020). Evaluation of physiological and molecular effect of variable virulence of *Alternaria brassicae* isolates in *Brassica juncea*, *Sinapis alba* and *Camelina sativa*. *Plant Physiology and Biochemistry*. **155**: 626-636. [doi.org/10.1016/j.plaphy.2020.08.025](https://doi.org/10.1016/j.plaphy.2020.08.025) **(IF- 5.4, citations: 11)**

6. Jangid, V.K., **Dixit, S.**, Tiwari, L.D., Singh, I., Rao, A.K., Grover. A. (2020) "Molecular modeling and in silico characterization of WRKY33 transcription factor from *Sinapis alba* (L): Unravelling its evolutionary functional conservancy. *Indian Journal of Agricultural Sciences* **90** (1):102-106. **(IF-1, Citations-2)**

7. **Dixit, S.**, Jangid, V.K., Grover, A. (2020). Evaluation of stable reference genes in white mustard (*Sinapis alba*) for qRT-PCR analysis under various stress conditions. *Indian Journal of Agricultural Sciences* **90** (1): 189-194. **(IF-1, Citation- 1)**

8. **Dixit, S.**, Jangid, V.K., Grover, A. (2019). Evaluation of suitable reference genes in *Brassica juncea* and its wild relative *Camelina sativa* for qRT-PCR analysis under various stress conditions. *PLoS ONE* **14(9)**: e0222530. [https://doi.org/ 10.1371/journal.pone.0222530](https://doi.org/10.1371/journal.pone.0222530). **(IF-3.5, Citations-8)**

9. **Dixit, S.**, Jangid, V.K., Shashidhar, H.E., Swamy, V.K. (2019) Phenotypic and genotypic characterization of rice genotypes for drought tolerance and yield under drought condition. *Research Journal of Biotechnology* **14 (9)**: 53-63. **(IF-1, Citation-2)**

10. **Dixit S.**, Grover A., Pushkar. S., and Singh. S.B. ABA-induced SA accumulation causes higher susceptibility in *B. juncea* as compared to tolerant genotypes against *A. brassicae*. (2022) **Under review**. Preprint available. <https://www.biorxiv.org/content/10.1101/2022.04.28.489833v1>.

#### OTHER INFORMATION


Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

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paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

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