# Abhisek BISWAS

## WORK EXPERIENCE

### UNIVERSITÀ DEGLI STUDI DI MILANO – MILANO, ITALY

**Department** Dipartimento di Scienze Agrarie e Ambientali - Produzione, Territorio, Agroenergia |

**Address** Via Celoria 2, 20133, Milano, Italy | **Website** https://www.unimi.it

### ASSEGNO DI RICERCA – 01/04/2024 – 31/03/2025

Titolo della ricerca: "Genomica e trascrittomica dell'albicocco per individuare le basi genetiche della resistenza a Sharka e dell'interazione pianta/virus"
Attività svolte e qui brevemente riportate:
1. Genotipizzazione con marcatori molecolari di materiale raccolto in campo
2. Produzione di costrutti per la trasformazione genica di piante
3. Trasformazione di piante coi costrutti ottenuti
4. Analisi di dati genomici e trascrittomici

### CREA - COUNCIL FOR AGRICULTURAL RESEARCH AND ECONOMICS – MONTANASO LOMBARDO, ITALY

**Department** Research Centre for Genomics and Bioinformatics | **Address** Via Paullese 28, 26836, Montanaso Lombardo, Italy |

**Website** https://www.crea.gov.it/en/home

### RESEARCHER, LEVEL - III – 01/01/2022 – 15/10/2022

As part of the "BIOTECH" research project and its sub-project "QUALIMEC – Enhancement of Quality Traits in Eggplant and Artichoke through Genome Editing and Cis-genesis," training was received in gene cloning, construct preparation, and the generation of eggplant mutants through genome editing and cis-genesis approaches. Using the CRISPR-Cas9 system, multiple eggplant mutants were produced with traits such as parthenocarpy and resistance to drought and Fusarium oxysporum f.sp. melongenae. These mutants were characterized at both molecular and phenotypic levels. Additional procedures that were performed included forward and molecular genetics techniques (such as nucleic acid extraction, PCR, HRM analysis, and Sanger sequencing), sequence data analysis, in vitro culture, phenotypic data collection, and crossbreeding of mutant and RIL lines in both field and greenhouse environments. The collected data were subjected to statistical analysis to support the findings.

### UNIVERSITY OF MILAN – MILAN, ITALY

**Department** Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy |

**Website** https://www.unimi.it

### RESEARCH FELLOW – 10/10/2017 – 02/2021

Work title: Genetic analysis of shoot architecture traits in barley
Summary: Barley (Hordeum vulgare), traditionally bred for grain yield, is gaining interest for its straw, a rich source of carbohydrates, for biofuel production. The BarPLUS project (https://barplus.wordpress.com/) aims to enhance barley biomass and yield by identifying genes linked to canopy architecture and photosynthesis.
Our research focused on discovering genes regulating tillering and leaf angle using both induced and natural variation. A forward genetics screen of the HorTILLUS population (Szurman-Zubrzycka et al., 2018) identified four mutants with increased tillering or erect leaves. After crossing with two reference cultivars, pools of F2 wild-type and mutant plants were selected to map and identify the underlying genes by exome sequencing (Mascher et al., 2014). Mapping-by-exome-sequencing (MbS) resulted in identification of a splice junction mutation at HvDep1 gene, a known regulator of plant architecture and grain size. The mutation was validated via cDNA sequencing, co-segregation, and allelism tests. In parallel, TILLING of the HorTILLUS population identified twelve lines carrying mutations in the LBO (Lateral branching oxidoreductase) gene involved in tiller number in Arabidopsis and barley through the strigolactone biosynthesis pathway (Brewer et al., 2016; Wang et al., 2018) and twenty-two lines carrying mutations in the XIAO gene responsible for erect leaf phenotype through the brassinosteroids signaling pathway (Jiang et al., 2012). All TILLING lines were sown in vitro and also in soil but unfortunately very few lines were germinated - lbo.d, lbo.e, lbo.f, lbo.ia and xiao.u. Phenotyping under controlled conditions shows that lbo.f produces significantly more tillers than the wildtype parent Sebastian and xiao.u produces larger penultimate leaf angle than Sebastian. In order to explore also natural genetic variation, we are taking advantage of the 'WHEALBI' (https://www.whealbi.eu/) germplasm collection, which includes 403 exome-sequenced diverse accessions (Bustos-Korts et al., 2019): a greenhouse experiment on a subset of 238 lines allowed us to collect phenotypic data for tiller number, leaf angle - with the PocketPlant3D smartphone app

(Confalonieri et al., 2017) and other eighteen phenotypic traits. A genome-wide association studies (GWAS) analysis was performed on 230 accessions using the BLINK method (Huang et al., 2018) implemented in the R package GAPIT (Tang et al., 2016) to identify genomic regions associated to canopy architecture traits, with priority on leaf angle and tillering.

## EDUCATION AND TRAINING

10/10/2015 – 10/07/2017 Milan, Italy

### MASTER OF SCIENCE (M.SC.) IN SCIENCE OF PLANT PRODUCTION AND PROTECTION (DOTTORE MAGISTRALE IN SCIENZE DELLA PRODUZIONE E PROTEZIONE DELLE PIANTE) [CLASS LM-69] University of Milan

Two research activities were carried out:
(a) The identification of tomato (Solanum lycopersicum) and lettuce (Lactuca sativa) cultivars was performed using simple sequence repeat (SSR) molecular markers to evaluate their effectiveness for variety protection. This was conducted as part of a blind trial organized by the National Seed Certification Organization of Italy, operating under the CREA institution.
(b) Homozygous lines of apricot (Prunus armeniaca) were developed for the purpose of investigating Sharka resistance, with the aim of facilitating marker-assisted selection (MAS)

**Address** Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, Via Giovanni Celoria 2, 20133, Milan, Italy

**Website** http://eng.disaa.unimi.it/ | **Field of study** Agriculture/Plant Genetics & Breeding/Molecular Biology |

**Final grade** Qualified with maximum absolute vote 110/110 cum laude |

**Thesis** Assessment of molecular tools for variety protection and marker-assisted breeding in vegetables (tomato and lettuce) and tree (prunus) species

06/2011 – 04/06/2015 Bolpur, India

### BACHELOR OF SCIENCE IN AGRICULTURE (HONOURS) [B.SC. (AGRICULTURE) HONOURS] Visva-Bharati University

Attended a total 58 courses in accordance with the Indian Council of Agricultural Research (ICAR) curriculum

**Address** Palli Siksha Bhavana, Sriniketan, 731204, Bolpur, India | **Website** http://psbvb.in |

**Field of study** Agriculture (Plant Genetics & Breeding, Plant Physiology, Agronomy, Soil Science, Horticulture, Plant Pathology, Entomology, Animal Husbandry, Agricultural Meteorology, Agricultural Extension Edu.)

**Final grade** 7.85 OGPA out of 10 OGPA (78.5%)

01/12/2019 – 31/07/2020 Potsdam, Germany

### INTERNSHIP ABROAD University of Potsdam

Candidate gene (CG) validation using co-segregation analysis, allelism test and re-sequencing the cDNA
Development and application of gene-based molecular markers for co-segregation analysis
RNA analysis techniques, e.g. extraction and quality controls, reverse transcription, cDNA synthesis and sequencing
Phenotyping and data analysis for allelism tests
Image-analysis based phenotyping using ImageJ and Python custom scripts.
Protein interaction assay
Gene cloning using Gateway technology
Yeast two-hybrid (Y2H) screening

**Address** Institute for Biochemistry and Biology, AG Genetics, Building 26, Karl-Liebknecht-Str. 24-25, 14476, Potsdam, Germany

## LANGUAGE SKILLS

Mother tongue(s): **BENGALI**

Other language(s): **ITALIAN** | **HINDI**

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---|---|---|---|---|---|
| | Listening | Reading | Spoken production | Spoken interaction | |
| **ENGLISH** | C2 | C2 | C2 | C2 | C2 |

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## HONOURS AND AWARDS

01/2020
### ERASMUS+ Student Traineeship scholarship – ERASMUS+, European Commission

Completed three-months of traineeship at the University of Potsdam, Germany with ERASMUS+ scholarship.

13/09/2019
### 63rd Italian Society of Agricultural Genetics (SIGA2019) annual congress poster prize – Italian Society of Agricultural Genetics

Poster title: Quest for barley canopy architecture genes in the HorTILLUS population and WHEALBI germplasm collection
Place: Napoli, Italy
Date: 10/13 September, 2019

10/10/2017
### Research fellowship – University of Milan

University research fellowship for three years

**Link** https://sites.unimi.it/dottorato_aab/

10/10/2015
### BRAVE, Erasmus Mundus Scholarship – Erasmus Mundus, European Commission

Fully funded scholarship for a two-year master's degree program at the University of Milan, from 10/10/2015 to 10/07/2017.

**Link** http://brave.aua.gr/index.php?lang=en

## BIOMETRIC INDICATORS

### Orchid ID: https://orcid.org/0000-0002-9547-3606

H-Index: 7, Total times cited: 135

20/05/2025
### Scopus Author ID: 57205183366

H-Index: 7, Total times cited: 130

20/05/2025
### Web of Science Researcher ID: ABE-1811-2021

## PUBLICATIONS

2019
### Genetics of barley tiller and leaf development

WOS citations: 37, Scopus citations: 41
Impact factor: 9.3

**Authors**: Shaaf, S., Bretani, G., Biswas, A., Fontana, I. M., & Rossini, L. | **Journal Name**: Journal of Integrative Plant Biology | **Volume, Issue and Pages**: 61(3), 226-256

2019
### Resistance monitoring for conventional and new chemistry insecticides on Bemisia tabaci genetic group Asia-I in major vegetable crops from India

WOS citations: 26, Scopus citations: 27
Impact factor: 1.5

**Authors**: Roy, D., Bhattacharjee, T., Biswas, A., Ghosh, A., Sarkar, S., Mondal, D., & Sarkar, P. K. | **Journal Name**: Phytoparasitica | **Volume, Issue and Pages**: 47(1), 55-66

2020

## Antixenosis, tolerance and genetic analysis of some rice landraces for resistance to Nilaparvata lugens (Stål.)

WOS citations: 6, Scopus citations: 6
Impact factor: 1.1

**Authors**: Roy, D., Chakraborty, G., Biswas, A., & Sarkar, P. K. | **Journal Name**: Journal of Asia-Pacific Entomology | **Volume, Issue and Pages**: 24(1), 448-460

2021

## Insecticide resistance status of Hyposidra talaca (Lepidoptera: Geometridae) in major tea growing zone of India

WOS citations: 10, Scopus citations: 10
Impact factor: 1.5

**Authors**: Roy, D., Samanta, A., Biswas, A., Chakraborty, G., & Sarkar, P. K. | **Journal Name**: Phytoparasitica | **Volume, Issue and Pages**: 49(5), 983-1002

2022

## Toxicity and Sublethal Effects of Fluxametamide on the Key Biological Parameters and Life History Traits of Diamondback Moth Plutella xylostella (L.)

WOS citations: 15, Scopus citations: 14
Impact factor: 3.7

**Authors**: Gope, A., Chakraborty, G., Ghosh, S.M., Sau, S., Mondal, K., Biswas, A., Sarkar, S., Sarkar, P.K., Roy, D. | **Journal Name**: Agronomy | **Volume, Issue and Pages**: 12(7):1656

2022

## Field-evolved resistance and mechanisms in Bemisia tabaci Asia I to a novel pyropene insecticide, afidopyropen, in India

WOS citations: 15, Scopus citations: 14
Impact factor: 2.5

**Authors**: Mahalanobish, D., Dutta, S., Roy, D., Biswas, A., Sarkar, S., Mondal, D., Gaber, A., Hossain, A., Sarkar, P.K | **Journal Name**: Crop protection | **Volume, Issue and Pages**: 162, 106078

2022

## Can insecticide mixtures be considered to surmount neonicotinoid resistance in Bemisia tabaci?

WOS citations: 8, Scopus citations: 8
Impact factor: 1.1

**Authors**: Roy, D., Biswas, S., Biswas, A., Chakraborty, G., Sarkar, P.K | **Journal Name**: Journal of Asia-Pacific Entomology | **Volume, Issue and Pages**: 25(2), 101901

2022

## Evaluation and characterization of indigenous rice (Oryza sativa L.) landraces resistant to brown planthopper Nilaparvata lugens (Stål.) biotype 4

WOS citations: 2, Scopus citations: 3
Impact factor: 2.7

**Authors**: Roy, D., Biswas, A., Sarkar, S., Chakraborty, G., Gaber, A., Kobeasy, MI., Hossain, A. | **Journal Name**: PeerJ | **Volume, Issue and Pages**: 10, e14360

2023

## Resistance risk assessment in diamondback moth, Plutella xylostella (L.) to fluxametamide

WOS citations: 11, Scopus citations: 12
Impact factor: 2.5

**Authors**: Roy, D., Sau, S., Adhikary, S., Biswas, A., Biswas, S., Chakraborty, G., Sarkar, P.K | **Journal Name**: Crop protection | **Volume, Issue and Pages**: 163, 10610

2025

**Baseline susceptibility and biochemical mechanism of field-evolved resistance in brown planthopper, Nilaparvata lugens (Stål) to flupyrimin in India**

Impact factor: 2.5

**Authors**: Roy, D., Paul, K., Biswas, A., Ghosh, A., Biswas, M., Banerjee, S., Biswas, S., Chakraborty, G. | **Journal Name**: Crop protection | **Volume, Issue and Pages**: 191, 107161

2025

**Blending moringa root extract with biorational insecticides: A potential approach for the management of Bemisia tabaci through synergistic interactions and induced plant defense**

Impact factor: 6.8

**Authors**: Roy, D., Biswas, S., Sarkar, S., Biswas, S., Mondal, K., Das, P., Adhikary, S., Bárek, V., Brestic, M., Hossain, A. | **Volume, Issue and Pages**: 16, 100852

## PARTICIPATIONS AS PRESENTER AT CONGRESSES AND CONFERENCES OF INTERNATIONAL INTEREST

10/07/2019 – 11/07/2019

### BarPLUS workshop (final meeting), Katowice, Poland

Oral Communication
Title: Hunting for Barley Canopy Architecture Genes in the HorTILLUS Population

**Link** https://barplus.wordpress.com

24/10/2019 – 25/10/2019

### BarleyGenomeNet (BGN) Kick-start meeting, Accademia dei Georgofili, Logge Uffizi Corti, 50122 Florence, Italy

Oral Communication
Title: Exploring Induced and Natural Genetic Variation for Barley Canopy Architecture Traits

**Link** http://pgrc.ipk-gatersleben.de/barleynet/

25/06/2018 – 27/06/2018

### Second International Barley Mutant Workshop 2018 (iBMW2018), Dundee, United Kingdom

Poster Communication
Title: Genetic Analysis of Canopy Architecture Traits Linked to Barley Biomass and Yield

**Link** https://ics.hutton.ac.uk/ibmw2018/

25/09/2018 – 28/09/2018

### 62nd Italian Society of Agricultural Genetics (SIGA2018) annual congress, Verona, Italy

Poster Communication
Title: Exploring Natural and Induced Variations for the Genetic Improvement of Barley Biomass and Yield

**Link** http://www.geneticagraria.it/congress_abstract.asp?a_pag=4&id=62

10/09/2019 – 13/09/2019

### 63rd Italian Society of Agricultural Genetics (SIGA2019) annual congress, Naples, Italy

Poster Communication
Title: Quest for Barley Canopy Architecture Genes in the HorTILLUS Population and WHEALBI Germplasm Collection

**Link** http://www.geneticagraria.it/congress_abstract.asp?a_pag=4&id=63

## SUMMER COURSES

12/06/2018 – 15/06/2018

### Summer School - Climate Change and Crop Productivity: The Role of Plant Physiology, Breeding and Biotechnology

VII Annual Meeting of the Plant Genetic and Biotechnology Network
Summer school in collaboration with the Italian Society for Plant Biology (SIBV)
Isola Polvese del lago Trasimeno, Perugia, Italy

**Link** http://www.sibv.eu/congressi-ed-eventi/summer-school-2018

03/07/2019 – 05/07/2019
### Summer School - in Plant Phenotyping

Organized by the Working Groups of "Cell and Molecular Biology" and "Biotechnology and Differentiation" of the Italian Botanical Society, at ALSIA - Lucana Agency for Development and Innovation in Agriculture, Metaponto (MT), Italy

14/06/2018
### Research Integrity - Natural and Physical Sciences

Epigeum online course offered by Oxford University press 2018

## INTERNATIONAL AND NATIONAL LEVEL CONFERENCES AND CONGRESSES

06/12/2013 – 09/12/2013
### 5th Indian Youth Science Congress

Visva-Bharati University, Sriniketan, West Bengal, India

**Link** https://www.mssrf.org

08/03/2018 – 09/03/2018
### BarPLUS III Mid-Term Meeting

Organised by BarPLUS consortium in association with the University of Lleida
University of Lleida – Av. Rovira Roure 191, Lleida, Spain

**Link** https://barplus.wordpress.com

30/05/2018 – 31/05/2018
### WHEALBI workshop 6: Wheat and Barley Pre-breeding

Organised by KWS and the WHEALBI consortium
Sophi Tailor Building, Park Farm, Villa Road, Cambridge, United Kingdom

**Link** https://www.whealbi.eu/trainings-crop-management-innovative-cropping-systems-practical-assisted-pre-breeding-may-2018-cambridge/

25/06/2018 – 27/06/2018
### Second International Barley Mutant Workshop 2018 (iBMW2018).

Dalhousie Building, University of Dundee, DD1 5EN Dundee, United Kingdom

**Link** https://ics.hutton.ac.uk/ibmw2018/

10/07/2018 – 11/07/2018
### Rice Days at the University of Milan (UNIMI)

University of Milan, Via Mangiagalli 25, Milan, Italy

25/09/2018 – 28/09/2018
### 62nd Italian Society of Agricultural Genetics (SIGA2018) Annual Congress

Topic: Plant development and crop productivity for sustainable agriculture.
Verona, Italy

**Link** http://www.geneticagraria.it/congress_abstract.asp?a_pag=4&id=62

10/07/2019 – 11/07/2019
### BarPLUS Workshop - Final Meeting

Topic: Plant architecture traits and efficient energy assimilation for improved biomass and grain production in cereals.

University of Silesia, Katowice, Poland

**Link** https://barplus.wordpress.com/

24/10/2019 – 25/10/2019
### BarleyGenomeNet (BGN) Kick-Start Meeting

Accademia dei Georgofili, Logge Uffizi Corti, 50122 Florence, Italy

**Link** http://pgrc.ipk-gatersleben.de/barleynet/

10/09/2019 – 13/09/2019
### 63rd Italian Society of Agricultural Genetics (SIGA2019) Annual Congress

Topic: Science and innovation for sustainable agriculture intensification: the contribution of plant genetics and breeding.
Naples, Italy

**Link** http://www.geneticagraria.it/congress_abstract.asp?a_pag=4&id=63

06/09/2022 – 09/09/2022
### 65th Italian Society of Agricultural Genetics (SIGA2022) Annual Congress

Topic: ON MENDEL'S FOOTSTEPS – FROM GENES TO FORK
Piacenza, Italy

## SEMINARS

11/09/2016
### Bioavailability of photochemicals: intestinal biotransformations and their consequences on the study of polyphenols.

SANA Academy, Bologna, Italy

19/03/2018
### Biotechnologies in the breeding program: the asparagus genome and sex chromosome, a case study

University of Milan, Italy

05/06/2018
### Genome editing to modify agricultural traits in rice and grape

University of Milan, Italy

07/09/2018
### Genomics and Transcriptomics approaches for cereals and medicinal plants improvement

University of Milan, Italy

14/09/2018
### Genetic studies on Japanese plum for phenolic compound content

University of Milan, Italy

19/09/2018
### Innovative strategies for agricultural and environmental management

Fognano di Brisighella, University of Milan, Italy

04/04/2019
### Employing barley mutants to dissect a chlorophyll bio-synthetic enzyme

Research Center for Genomics and Bioinformatics (CREA), Fiorenzuola d'Arda, Italy

25/09/2019
### New biological archives for exploiting e DNA based biodiversity survey across space and time

Institute of Emiliani, Fognano di Brisighella, University of Milan, Italy

## PROJECTS

2017 – 2020

### BarPLUS

The BarPLUS project (https://barplus.wordpress.com/) aims to enhance barley biomass and yield by identifying genes linked to canopy architecture and photosynthesis.

**Link** https://barplus.wordpress.com

2022 – 2022

### BIOTECH Project sub-projects "QUALIMEC - Improvement of qualitative properties in eggplant through genome editing and CIS genesis"

Statistical analyzes and bioinformatics analyzes on genomes; identification, cloning and functional analysis of genes underlying QTL of total and partial resistance to Fusarium oxysporum f.sp. melongenae. Development and validation of molecular markers associated with resistance and phenotypic characterization of traits.

01/04/2024 – 31/03/2025

### PRIN 2022 - " Apricot genomics and transcriptomics to unravel the genetic bases of resistance to Sharka and the plant/virus interaction"

The project proposal focuses on resistance to Sharka disease in apricot, caused by Plum pox virus (PPV). Among the various objectives of the project, our specific goal was to validate candidate gene(s) through genetic transformation, gene editing, and virus-induced gene silencing. The primary task involved the design and generation of constructs for plant genetic transformation.

## ORGANISATIONAL SKILLS

### Laboratory/Biotechnology skills

DNA extraction
RNA extraction
cDNA preparation
PCR
RT-PCR
Sanger sequencer (capillary electrophoresis)
Gene cloning (Gateway and other techniques)
Yeast two-hybrid (Y2H) screening
Agarose & polyacrylamide gel run
Preparation of different growth mediums
Plant dissection for microscopy and other fundamental laboratory techniques

### Field skills

Experienced in phenotyping large plant populations.
Proficient in performing crosses in cereal and vegetable crops.
Skilled in growing plants under both greenhouse and field conditions.
Completed a 6-month fieldwork program in rural India, working directly with village farmers as part of the Rural Awareness Work Experience (RAWE) initiative during the final year of undergraduate studies (certificate attached).

### Bioinformatics skills

Strong working knowledge of sequence alignment tools and online genomic databases.
Proficient in R programming for population genetics (including GWAS), multivariate techniques, and basic statistical analyses.
Trained in Python programming and experienced with statistical software such as SPSS and SAS.
Skilled in image-based phenotyping using ImageJ and custom Python scripts.