







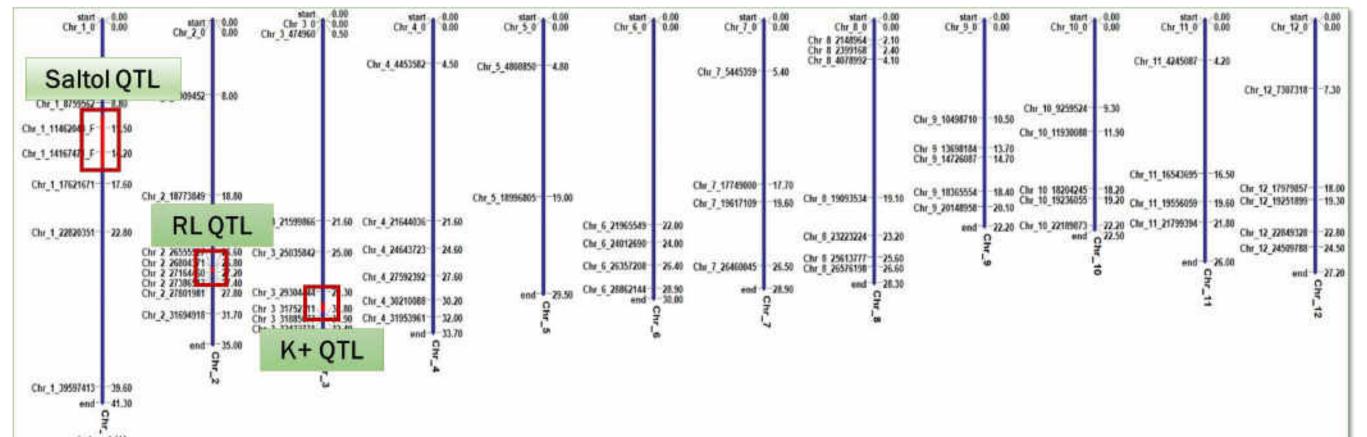
# Department of Biochemistry and Molecular Biology **Plant Biotechnology Laboratory**

Principal Investigator: Prof. Dr. Zeba I. Seraj, Co-Investigators: Prof. Dr. Md. Rakibul Islam, Dr. Rifat Ara

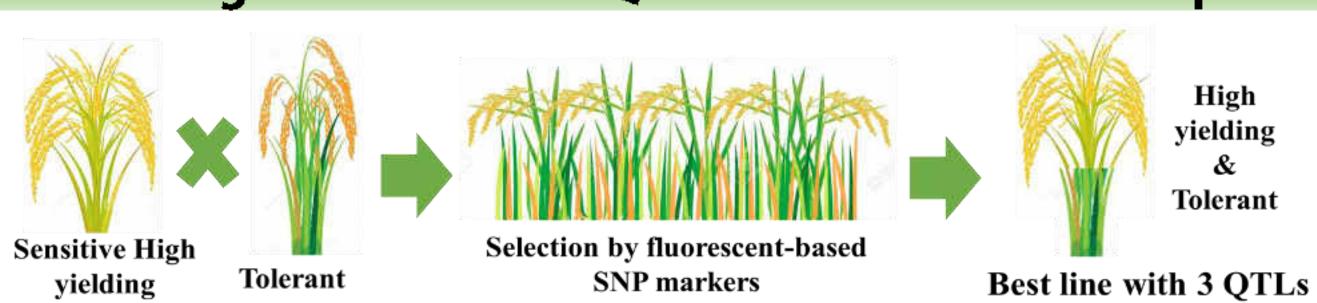
Development of salt-tolerant rice varieties (Target SDG 2, 12, 13) suitable for cultivation in the coastal areas of Bangladesh. Our laboratory contributed to

- DNA marker-based breeding (collaboration : IRRI) and BRRI)
- Identification of the salt tolerance loci
- Characterization of QTLs/genes from salt-tolerant rice landraces
- Pioneered in planta transformation in rice
- CRISPR/Cas-based gene editing in rice

# Ideal genotype having 3 Salt tolerant-QTLs in the genomic background of BD63, BD67 and BD74



### Crossing to introduce 3 QTLs in BRRI dhan: Principle



## Fluorescent DNA marker-assisted backcrossing with commercial BRRI Dhan



BC2F2 Line 15-P-99 & **Background BD63** 

Sudip Biswas 2-1, Md. Naprul Islam 2-0-7, Sarah Sarker 2-5, Narendra Tuteja 9, Zeba I. Seraj 2-2, 20



BC2F2 Line 191-P-1701 & **Background BD67** 



BC2F2 Line 428-P-3280 & Background BD74

U. S. M. Amint, Sudip Blowast, Sabrina M. Bilas, Samsad Razzaque, Taslima Hague,

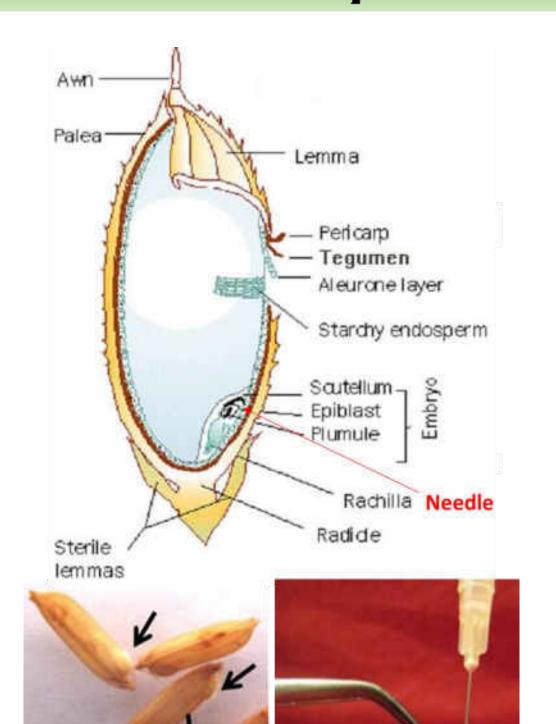
#### **Publications of lab**

#### PLOS ONE frontiers SCIENTIFIC **REPORTS** Reproductive stage physiological Novel QTLs for salinity tolerance revealed by genome-wide association studies of biomass, chlorophyll and tissue ion and transcriptional responses HKT1;5 Transporter Gene Expression to salinity stress in reciprocal and Association of Amino Acid content in 176 rice landraces from Bangladesh Procedure: 324-August 2005 populations derived from tolerant Substitutions With Salt Tolerance Md Nafis Ul Alam, G. M. Nurnabi Azad Jewel, Tomalika Azim, Zeba I. Seraj 🖾 (Horkuch) and susceptible (IR29) Across Rice Genotypes Published: November 5, 2021 + https://doi.org/10.1371/journal.pone.0259456 Mohammad Umar Sharif Shohan", Suprik Sinha<sup>‡</sup>, Fahmida Habib Nabila Sudip Biswas<sup>1</sup>, Scott Schwartz<sup>2</sup>, Abdelbagi M. Ismail<sup>1</sup>, Harkamal Walia<sup>1</sup>, Thomas E. Juenger David School Chairms Suppressed, flow bushes rights out-2004 Kluwer Academic Publishers. Printed in the Netherlands. frontiers Plant Physiology and Biochemistry Volume 144, November 2019, Pages 334-344 Genetic variation in microsatellite DNA, physiology and morphology Enhanced Salt Tolerance Conferred coastal saline rice (Oryza sativa L.) landraces of Bangladesh by the Complete 2.3 kb cDNA of the Rice Vacuolar Na<sup>+</sup>/H<sup>+</sup> Antiporter Overexpression of heterotrimeric G protein Gene Compared to 1.9 kb Coding Laisa A. Lisa<sup>1</sup>, Zeba I. Seraj<sup>1,3</sup>, C. M. Fazle Elahi<sup>1</sup>, Keshob C. Das<sup>1</sup>, Kuntal Bis Region with 5 UTR in Transgenic beta subunit gene (OsRGB1) confers both heat Lines of Rice M. Rafiqul Islam<sup>1</sup>, M. Abdus Salam<sup>2</sup> & A. R. Gomosta<sup>2</sup> and salinity stress tolerance in rice

<sup>1</sup>Department of Biochemistry and Molecular Biology, University of Dhaka, Dhaka 1000, Bangladesh. <sup>2</sup>Bang

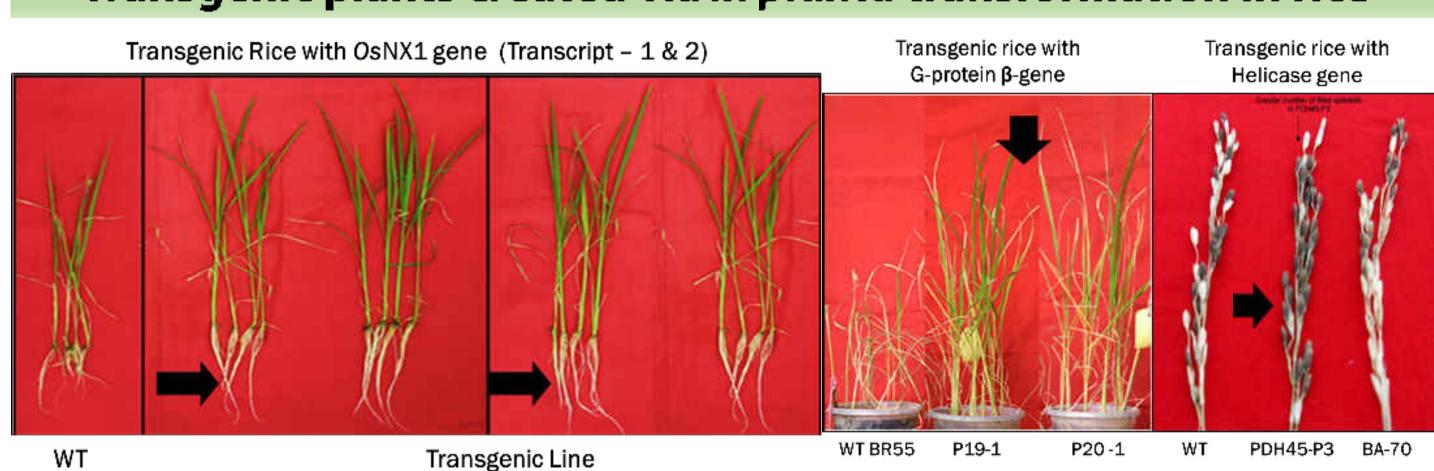
Rice Research Institute, Gazipur, Bangladesh. 3 Corresponding author\*

# In planta transformation in rice

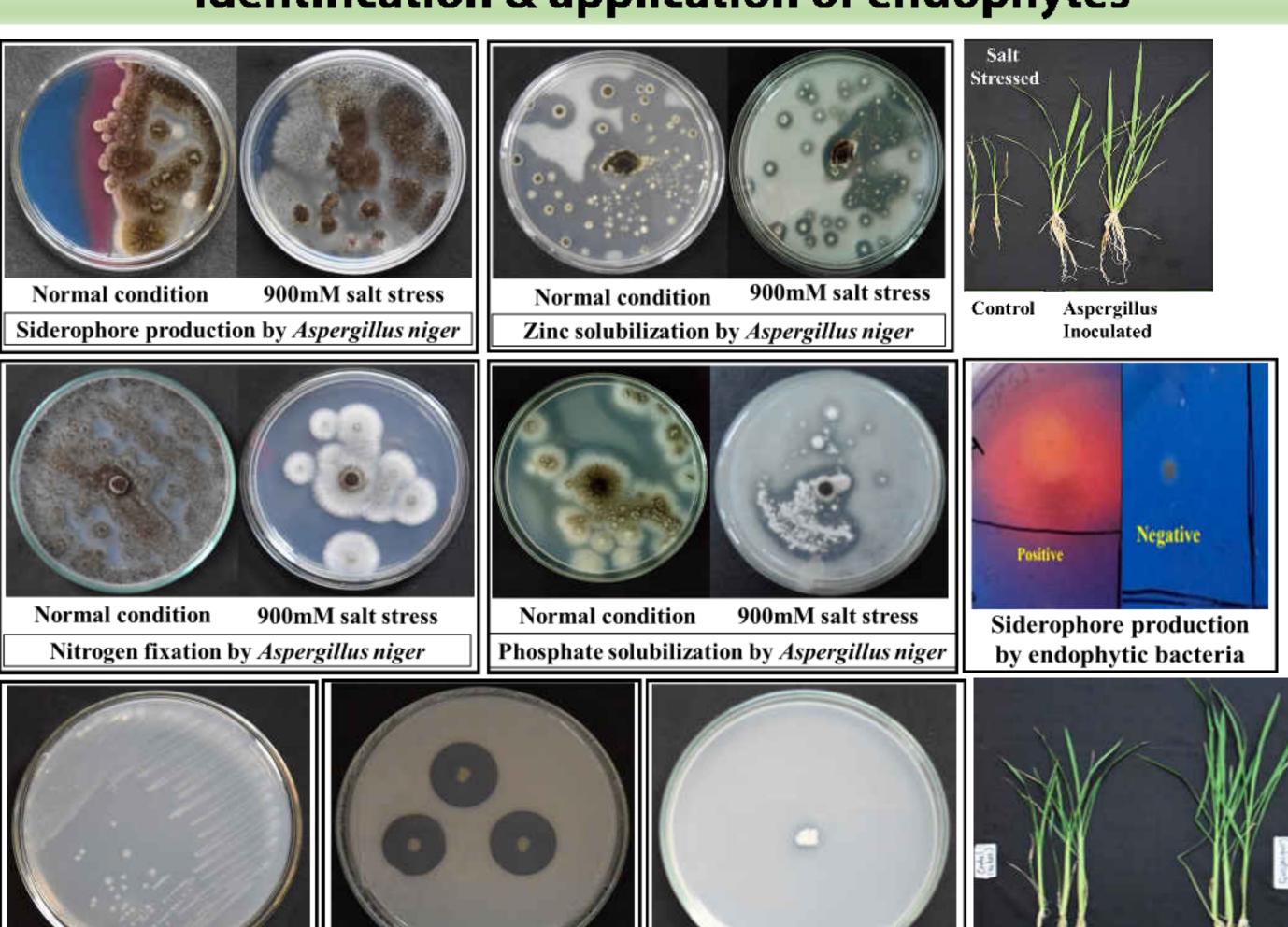


Transgenic Salt, drought, and heat-tolerant rice lines					
developed at Plant Biotechnology lab, BMB, DU.					
Name	Genetic Background	Generation	No. of seeds	Properties	Publication
Rice vNa/H antiporter; 2.3 cDNA	BRRI Dhan 28	T <sub>5</sub>	300	Salt tolerant ~10dS/m	Amin et al. 2016 <sup>1</sup> Biswas et al. 2015 <sup>2</sup>
Pea DNA Helicase (PDH) cDNA	BRRI Dhan 47	T <sub>5</sub>	300	Salt tolerant ~10dS/m	Biswas et al. 2018 <sup>4</sup>
At-HRD cDNA	BRRI Dhan 27	T <sub>5</sub>	300	Drought and Salt	Sumaiya Jannat, 2016. MS thesis, BMBDU <sup>5</sup>
Rice SNAC1 cDNA	BRRI Dhan 55	T <sub>5</sub>	300	Drought and salt tolerant	Parvin et al. 2015 <sup>6</sup>
Rice G-protein βsubunit cDNA	BRRI Dhan 55	T <sub>5</sub>	300	Drought and heat tolerant	Biswas et al. 2019 <sup>8</sup>
amiRNA to DST transcription factor	BRRI Dhan 28	T <sub>5</sub>	300	Salt tolerant	Faisal et al. 2017 <sup>9</sup>

# Transgenic plants created via in planta transformation in rice



# Identification & application of endophytes





Phosphate solubilization

by endophytic bacteria

Tomalika Azim Umme Sabrina Haque

Control

Bacteria

Inoculated

Zinc solubilization by

endophytic bacteria



Nitrogen fixation by

endophytic bacteria