

Proposed Research Program 2024-2025

Sl. No.	Program Area/Project/ Experiment Title & Duration	Major Objective	Expected output	
	Plant Pathology Division			
	Project: Survey and monitoring of rice diseases			
1	Survey and monitoring of rice diseases in selected areas	1. To investigate the present status of different rice diseases in different climatic environments 2. To update disease crop calendar	Present disease status in farmers' field will be known.	700
2	Country wide rice disease(s) sample collection, processing, registration and preservation	1.For the development of Pathogen bank 2.Genetic variability study	Genetic variability of the pathogens will be known	100
	Project: Population structure and biology of major pathogens			
3	Population biology of <i>Rhizoctonia solani</i> for Sheath blight resistance in rice	To study the population structure of <i>R. solani</i> in Bangladesh	Identification of virulence patterns of <i>R. solani</i>	200
4	Assessment of Microbial community in Sheath Blight affected rice field	1.To evaluate microbial community at species level; 2. To identify Bacteria/fungus population which promotes ShB disease; 2.To find out biocontrol agents against ShB	1.Effect of fungicides on soil rhizospheric microbial population will be known. 2.Bacteria/fungus population which promotes ShB disease will be known and 3 Biocontrol agents against sheath blight will be identified.	50
5	Studies on the population biology of rice blast pathogen (<i>Magnaporthe oryzae</i>) in Bangladesh	1. To select new differential blast isolates 2.To identify candidate resistant gene(s) or source(s) 3. To monitor regularly of the	Differential set of blast isolates will be identified	300

		evolution of new races		
6	Characterization of blast isolates collected from different hosts	To investigate the various fungal morphological characteristics.	Effective blast management strategies will be developed.	50
7	Variability of <i>Fusarium</i> sp. associated with bakanae disease	To determine the morphological, pathological, and molecular diversity, of the <i>F. fujikuroi</i> population isolated from symptomatic bakanae-diseased rice plants in Bangladesh	variability of the pathogen and thereby to develop cultivars with inbuilt resistance to bakanae disease.	500
8	Characterization of <i>Bipolaris oryzae</i> causal agent of Brown spot disease	To see the variability among <i>B. oryzae</i> isolates collected from different location	Variability among <i>B. oryzae</i> isolates collected from different location will be known.	25
9	Isolation of rice false smut and Sheath rot pathogen from different locations	To identify the diversity of false smut and sheath rot pathogen	Diversity of false smut and sheath rot pathogen will be identified	100
10	Pathotyping, virulence and molecular detection of <i>X. oryzae</i> pv. <i>oryzicola</i> causing BLS of rice	To identify virulent isolates and to study genetic variability of <i>X. oryzae</i> pv. <i>oryzicola</i> pathogen	A set of virulent isolates will be identified	100
11	Detection of causal agent of bacterial panicle blight of rice	Isolate and identify the bacterial panicle blight (BPB) pathogen	Bacterial panicle blight (BPB) pathogen will be identified	100
	Project: Disease resistance and molecular studies			
12	Sheath blight disease resistance in rice through Crispr-Cas9 genome editing	To develop resistance against rice sheath blight pathogen	Homozygous gene-edited sheath blight resistance rice plant	300
13	Development of pre-breeding materials for rice sheath blight disease	To develop sheath blight resistant pre-breeding materials	Sheath blight resistant pre-breeding materials will be developed	
14	Assessment of susceptibility to sheath blight in BRRI released	Identification of resistance source(s) for rice sheath blight resistance	Resistance source(s) for rice ShB resistance breeding	50

	and other HYVs of rice	breeding		
15	Screening of germplasm and advanced breeding lines against sheath blight of rice	To find out resistant genotype(s) against sheath blight disease	Sheath blight resistant materials would be obtained	100
16	Development of blast resistant varieties using differential system and molecular markers	To develop blast resistant materials for Bangladesh	Blast resistant materials would be obtained.	500
17	Screening of advanced breeding lines and germplasm against blast diseases	To identify blast resistant germplasm	Durable blast resistant variety will be developed.	100
18	Detection of novel loci underlying rice blast resistance by integrating a genome wide association study (3K Genome Project)	To detect novel loci underlying rice blast resistance in local germplasm of Bangladesh.	Resistance source(s) for rice blast resistance breeding	200
19	Genome-wide association study to identify blast resistant novel loci from Bangladeshi landraces.	To detect broad spectrum resistant loci underlying for rice blast, disease (<i>Magnaporthe oryzae</i>) in Bangladesh	Resistance source(s) for rice blast resistance breeding	500
20	Marker assisted pyramiding of major blast resistance genes <i>Pi9</i> , <i>Pita2</i> and <i>Pb1</i> .	To widen the resistance spectrum of emerging lines as well as to attain durable resistance	Resistance source(s) for rice blast resistance breeding	300
21	Phenotypic and molecular characterization of rice blast resistance in native Rice Germplasm in Bangladesh	Phenotypic Assessment, Molecular Identification and Population Structure Analysis of native germplasm against rice blast.	New blast resistant sources/QTL will be identified	100
22	Transcriptome analysis of blast disease resistant advanced lines	Validation of reference genes to observe the functional status of advanced lines	Disease resistance mechanism will be understood.	200
23	Gene expression profiling and proteomics during rice blast	To know the gene expression profiling and proteomics during rice blast disease	Blast resistant variety development	300

	(<i>Magnaporthe oryzae</i>) disease development (PhD work)	development		
24	Characterization of upland Aus rice genotypes resistance to blast	1.To understand blast resistance mechanism in Aus germplasm 2.To evaluate the physio-chemicals & nutraceutical properties	New blast resistant sources will be identified.	100
25	Development of durable Blast and BB resistant variety through mutagenesis by CRISPR/Cas9 system	To develop broad spectrum resistant rice variety against Bacterial Blight and Blast disease using CRISPR/Cas9 system	Multiple disease (BB and Blast) resistant variety will be developed within short time.	500
26	Introgression of blast resistance gene(s) into BRRI dhan58 using marker assisted backcross breeding	To introgress blast resistance <i>Pi9</i> and <i>Pbl</i> genes in BRRI dhan58	Blast resistant variety development.	50
27	Screening of rice germplasm against Bakanae disease	To identify the resistance source against bakanae	Potential donors for resistance to bakanae disease will be identified.	100
28	Development of bakanae resistant pre-breeding lines	To develop bakanae resistant pre breeding material/lines.	The superior resistant lines will be selected based on pathogenicity test against virulent races.	300
29	Evaluation and screening of rice germplasm resistant to false smut disease at field condition	To identify potential donors for resistance to rice false smut	Potential donors for resistance to rice false smut disease will be identified.	50
30	RYT of tungro resistance advanced breeding lines	To observe the yield and tungro resistance in different regions/hotspots	Develop tungro resistant variety.	100
31	Observational Yield Trial (OT) for Tungro disease	To select genetically fixed lines with RTV resistance and yield potential	Develop tungro resistant variety.	100
32	Screening of germplasm/ advanced breeding lines against rice tungro.	To identify the resistance native source against tungro disease of rice.	Potential donors for resistance to tungro disease will be identified	50
33	Genome-wide association studies for identifying	1.To identify useful BB resistant QTL(s)/gene(s)	Useful gene resources, resistant genetic loci of land races and distribution and	500

	quantitative resistant loci (QRL) conferring rice BB resistance	2.To elucidate genetic mechanism of bacterial blight disease resistance	nature of pathotypes of <i>Xoo</i> will be revealed.	
34	Screening of rice germplasm and advanced materials against Bacterial blight disease	To identify new resistant sources against bacterial blight disease	Potential donors for resistance to BB disease will be identified	50
35	Development of BB resistant pre-breeding materials for T. Aus	To develop medium duration BB resistance advanced lines for T. Aus	Develop BB resistant variety.	100
36	Development of pre-breeding materials of BB and False smut resistance in the background of BRR1 dhan49	To develop resistance rice lines of bacterial blight and false smut disease.	Develop BB and false smut resistant variety.	100
37	Evaluation for Blast and BB resistant long duration advanced lines during Boro	To evaluate specific and general adaptability of blast and BB resistant LD advance breeding lines	Develop blast and BB resistant variety.	50
38	Evaluation for Blast and BB resistant short duration advanced lines during Boro	To evaluate specific and general adaptability of blast and BB resistant SD advance breeding lines	Develop blast and BB resistant variety.	50
	Project: Epidemiology, yield loss and grain quality studies			
39	Quantifying yield losses caused by rice sheath blight disease.	To estimate the yield loss in rice caused by sheath blight disease under controlled conditions	Yield loss due to rice sheath blight disease at different growth stage will be determined	200
40	Genotype and environmental interaction on neck blast incidence in blast prone area	To understand the pattern of neck blast incidence in relation to variety and environment	Neck blast disease forecasting model will be developed.	30
41	Identification of disease economic threshold level for controlling rice blast	To find out exact critical disease status to take control measures	Optimum time of leaf blast disease management will be identified.	100
42	Development of Early Warning	1.To aware the rice growers at least 14	Blast disease management purpose	300

	System of rice blast disease	days earlier of blast disease infection. 2.To generate data on the thermal and humidity effect on rice disease development.		
43	Measurement of yield loss due to Sheath rot disease of rice	1. To estimate the yield loss of sheath rot 2. To develop yield loss model.	Yield loss model for Sheath rot will be developed	100
44	Estimation of tungro virus incidence & its impact on rice cultivation in Cumilla	1. Instant estimation of yield loss due to major rice disease. 2. To assess the tungro affected area and yield loss due to tungro disease. 3. To evaluate varietal response to tungro disease	Tungro disease management	50
45	Crop Loss Assessment of rice due to major diseases	To calculate the actual crop loss due to major diseases in Barishal region.	Crop loss assessment due to disease will be clarified.	500
46	Seed health status of rice in Bangladesh	1. To know the health conditions of rice seeds available from public and private sectors, and farmers' seed as well; 2.To develop rice seed health standard in Bangladesh	Rice seed health standard in Bangladesh will be developed	50
47	Climate change effect on rice disease development	To generate data on the climate change effect on rice disease development (Climate change project, IWMD).	Rice disease management.	100
48	Development of a yield loss app	Instant estimation of yield loss due to diseases	Yield loss will be estimated.	200
	Project: Management of rice diseases			
49	Determination of residual effect of sheath blight controlling fungicides in rice grain, stem and soil.	To detect the residue of different fungicides in grain, straw and soil samples	Residual existence in rice grain and straw would be determined	100
50	Evaluation of new chemicals	To find out the effective chemicals	Chemicals suitable for ShB disease	100

	against sheath blight diseases of rice	suitable for ShB disease management.	management will be identified.	
51	Efficacy of <i>Bacillus cereus</i> as bacterial biopesticide to manage sheath blight disease	To manage sheath blight disease	Biopesticide for sheath blight disease management will be developed	100
52	Evaluation of new chemical against blast disease of rice.	To find out the effective chemicals suitable for Blast disease management.	Chemicals suitable for blast disease management will be identified	100
53	Estimation of yield loss due to bakanae and blast disease at field level	To estimate yield loss due to rice blast and bakanae disease at field level.	Yield loss will be estimated.	100
54	Integrated Management of Bakanae Disease of Rice	Efficacy of Trichocompost and Bacterial biopesticide to control bakanae disease	Bakanae disease will be managed	100
55	Brown spot disease management under non-stress, saline and char land environment.	To control Brown spot disease	Brown spot disease will be managed	300
56	In vitro and in vivo evaluation of nano mediated fungicides against sheath blight disease	1. To find out appropriate ratio of nano materials and fungicide for controlling sheath blight disease 2. To detect residual effect of NPs in rice	Sheath blight disease will be managed	25
57	Synthesis of AgNPs and ZnONPs using bacterial isolates for controlling ShB and blast	1.To investigate the potency of biosynthesized NPs against blast & sheath blight 2.To detect residual effect of NPs in rice	Sheath blight and blast disease will be managed	100
58	Evaluation of plant extract mediated silver nano particle against bakanae disease.	1. To determine the effect of nano particle on bakanae disease management. 2.To determine the residual effect of NPs.	Plant extract mediated silver nano particle will be validated to manage bakanae disease without having residual effect.	150
59	Extraction of silica NPs from rice husk ash and its application in rice cultivation	To develop silica nano-particles from rice husk ash and its application in rice cultivation.	Effective and eco-friendly disease management practices will be developed.	200

60	Biosynthesis of Nanoprticles using microbes for controlling major diseases of rice	1.To synthesize NPs using bacteria. 2. To determine the effect of nano-particles on fungal growth and evaluate their efficacy on rice disease management. 3.To see their stability and longevity in stored condition	Developed Nanoprticles using microbes will be used for controlling major diseases of rice	50
61	Sustainable management of rice bacterial blight through nano-particles	1.To prepare effective NPs using plant sources and inorganic salts. 2.To evaluate NPs (biosynthesized and synthetic) for BB management. 3. To reduce the quantity of recommended chemicals through NPs mediatrd fungicides.	Developed Nanoprticles using microbes will be used for controlling BB	50
62	Determination of longevity of native antagonistic bacteria in carrier materials	1.To find out a suitable carrier 2.To determine the shelf life of bacterial inoculum in career	Longevity of native antagonistic bacteria in carrier materials will be determined.	50
63	Bioaccumulation and detoxification of As (III) and disease management by <i>Achromobacter xylosoxidans</i> in As-contaminated soil (in vitro)	1.To decrease as uptake by spraying <i>Achromobacter xylosoxidans</i> bacteria inoc. 2.To find out the major disease escaping capacity by applying <i>Achromobacter xylosoxidans</i> in rice field.	Effectiveness of <i>Achromobacter xylosoxidans</i> will be determined for disease menegemnet and arsenic detoxification	100
64	Evaluation of biopesticides for rice insect pest management	1.To control leaf folder and stem borer using the developed biopesticide(s). 2.Commercial formulation of the effective biopesticide(s).	Developed biopesticide will be used for insect pest management	150
65	Effect of Trichocompost on nutrient and disease management in rice	1 To find out the efficacy of Trichocompost for K management in rice 2.To observe the effectiveness of Trichocompost for disease management	Effectiveness of Trichocompost for disease management will be identified	200

66	Development of Rice disease diagnosis and management platform using artificial intelligence	To develop a farmers' friendly disease diagnosis and management advisory software.	Disease diagnosis and management software (apps).	200
77	Precise detection of rice disease through proximal sensing	To detect problems early and to manage diseases precisely.	Early detection of rice diseases.	200
	Mapping and monitoring rice diseases using high-resolution satellite images (PhD work)	1.To build up an unattended mapping system of rice disease 2.To detect high precision rice disease at an early stage 3.To preserve data and make it available for further use.	Detect and map major rice diseases as a preliminary support system for disease management.	200
68	Enabling Farmers in combating pest and diseases in rice crops through Artificial Inetegence	1.To apply Artificial Inelegancy in rice pests diagnoses and management. 2. To determine photosynthetic efficiency after pathogen infection in rice leaves using RGB value (New).	Rice pests diagnoses and management will be done.	100
69	Validation of <i>Ankuri</i> [®] seed disinfectant and germinator and its smart restructuring	1.To evaluate field efficacy of <i>Ankuri</i> and farmers' use efficiency 2.Development of a smart <i>Ankuri</i> for further improvement	Seed germination failure during boro season will be solved.	50
70	Suppression of fungal and bacterial development by hydrogen peroxide	To observe the effect of H ₂ O ₂ on fungal and bacterial development at different concentrations	Effectiveness of H ₂ O ₂ against fungus and bacteria management will be understtod	100
71	Seed borne disease management using microwave treatment	Effectivity to control seed borne fungal pathogens without reducing seed vigor. For more stringent pesticide regulation and improving seed safety.	Seed borne pathogens will be destroyed and seed borne diseases will be managed without pesticide hazardous.	50
72	Effect of ShB controlling fungicides Fungicide on Microbial Community in rice rhizosphere	1.To investigate microbial communities for the use of ShB controlling fungicides 2.To detect the residue of fungicides in soil and plant	Status of microbial communities will be understood after the use of ShB controlling fungicides	100

73	Residual effect of Amistar Top 325 SC (Azoxystrobin 20% + Difenoconazole 12.5%) in soil	To know the residual effect of Amistar Top 325 SC in soil	Residual effect of Amistar Top 325 SC in soil will be known	25
	Project: Technology Transfer			
74	Up scaling of rice disease(s) management technology followed by field demonstration training.	1.To disseminate effective disease management practices among the farmers. 2.To develop farmers' knowledge on disease identification and management	Disease management practices will be popularized.	1000
75	Training on integrated disease management in changing climate	To build up farmer's awareness on integrated rice disease management	Farmer's awareness will be increased on integrated rice disease management	1000
76	Healthy seedling production in seedling tray for enhancing mechanical transplantation	To enhance mechanical transplantation by producing healthy seedling in seedling tray.	Mechanical transplantation will be enhanced by producing healthy seedling in seedling tray.	50