Annual Research Programme

(2015-16)

Plant Pathology Division

PROGRAMME AREA : DISEASES MANAGEMENT

Project 1 **: Use of nuclear techniques in plant disease management**

Objective (s) **:** To observe the effect of radiation on storage fungi and bio-control agents in crop protection.

Personnel assigned **:** Dr. Md. Abul Kashem, SSO
Dr. Mahbuba Kaniz Hasna, SSO (PI)
Mr. Shazahan Ahmed, ASO
Mr. Md. Al-Amin Talukder

Status **:** The gamma radiation (^{60}Cobalt) has suppressive effect on seed and soil borne fungi such as *Macrophomina phesiolina*, *Rhizoctonia solani*, *Fusarium* spp., *Sclerotium rolfsii* and on the root infecting fungi in storage. ^{60}Cobalt gamma radiation has also stimulatory effect on growth parameters of pulse, vegetables and oil seed crops.

Growing season **:** 2015-16

Source of fund **:** GOB

Experimental details **:**

Experiment 1 : **Enhancing the antagonistic potentiality in *Trichoderma* against *Rhizoctonia solani* of rice and *Fusarium oxysporum* of lentil through radiation**

Objective (s) : To enhance bio-control potentiality in antagonistic *Trichoderma.*
Growing season : All the year round, 2015-16
Treatments : 0, 100, 150, 200 and 250Gy
Design with replications : CRD with 4 replications
Location(s) : Plant pathology Laboratory of BINA, Mymensingh
Data to be recorded : Antagonistic potentiality of *Trichoderma* will be measured in dual plate techniques.

Experiment 2 : **Evaluation of *Trichoderma* mutant against sheath blight of rice and root rot of lentil under pot condition**

Objective (s) : To evaluate the potentiality of antagonists against sheath blight and root rot diseases.
Growing season : 2015-16
Treatments : Selected mutants of antagonists
Design with replications : CRD with 5 replications
Location(s) : BINA HQ, Mymensingh
Data to be recorded : Disease incidence and severity will be recorded.

Experiment 3 : **Effect of gamma rays in reducing storage disease of sesame**

Objective (s) : To increase the storage capability of sesame by reducing storage fungi.
Growing season : 2015-16
Treatments : Radiation for 0, 3 and 5 minutes
Design with replications : CRD with 5 replications
Location(s) : BINA HQ, Mymensingh
Data to be recorded : Counting of seed borne fungi at 0, 15, 30, 60, 90 and 100 days after radiation.

Experiment 4	:	**Influence of gamma radiation on post harvest disease incidence of onion**
Objective (s)	:	To reduce decay caused by post harvest fungal pathogens in onion.
Growing season	:	All the year round (2015-16)
Treatments	:	0, 20, 40, 60 and 80 Gy
Design with replications	:	CRD with 5 replications
Location(s)	:	BINA HQ, Mymensingh
Data to be recorded	:	Disease status in inoculated onion (irradiated).

Experiment 5	:	**Evaluation of disease status of irradiated seeds of tomato, okra and onion**
Objective (s)	:	To know the effect of radiation on seed-borne diseases of vegetables and spices.
Growing season	:	All year round (2015-16)
Treatments	:	0, 20, 40 and 60 Gy
Design with replications	:	CRD with 5 replications
Location(s)	:	BINA Head Quarter, Mymensingh
Data to be recorded	:	Disease status of major seed-borne diseases of tomato, okra and onion will be recorded.

Project 2	**:**	**Integrated management of plant diseases**
Objective (s)	**:**	To develop eco-friendly disease management packages for crop plants.
Personnel assigned	**:**	Dr. Md. Abul Kashem, SSO Dr. Mahbuba Kaniz Hasna, SSO (PI) Mr. Shazahan Ahmed, ASO Mr. Md. Al-Amin Talukder
Status	**:**	Crop mutants/varieties released by BINA and other modern varieties are becoming susceptible to their diseases due to climate change and the development of new virulent races of the pathogens. Integrated application of fungicides, bio-control agents, soil amendments, boron, molybdenum, plant extracts and sanitation were used successfully for the control of fusarium wilt of tomato, yellow mosaic of mungbean and late blight of tomato.
Growing season	**:**	2015-16
Source of fund	**:**	GOB
Experimental details	**:**	

Experiment 6	:	**Integrated management of sheath blight of rice**
Objective (s)	:	To develop suitable disease management method for sheath blight.
Growing season	:	Aus, Aman and Boro of 2015-16
Treatments	:	Seed treatment with mehuguny leaf extract, application *Trichoderma harzianum* and Nativo 75WG
Design with replications	:	RCBD with 4 replications
Location(s)	:	BINA farm Mymensingh, Magura
Data to be recorded	:	Disease incidence and severity of sheath blight.

Experiment 7	:	**Integrated management of stemphylium blight of lentil**
Objective (s)	:	To develop suitable disease management method for stemphylium blight.
Growing season	:	Winter, 2015-16

Treatments : Seed treatment with Provax-200, spray of *Trichoderma harzianum* suspension and Nativo 75WG/Secure 600 WG
Design with replications : RCBD with 3 replications
Location(s) : BINA farm, Mymensingh, Ishurdi
Data to be recorded : Disease incidence and severity of stemphylium blight.

Project 3 : Screening and evaluation of breeding materials against major diseases

Objective (s) : To identify induced mutants with quantitative resistance to different major pathogens.

Personnel assigned : Dr. Md. Abul Kashem, SSO (PI)
Dr. Mahbuba Kaniz Hasna, SSO
Mr. K. M. Eadun Nabi, SO
Mr. Shazahan Ahmed, ASO
Mr. Md. Al-Amin Talukder, SA-I

Status : The level of resistance against major diseases of the induced mutants and the varieties developed at BINA has been evaluating repeatedly over several years under field and pot conditions. The different mutants and cultivars of rice, jute, mustard, chickpea, mungbean, tomato, lentil, soybean and groundnut developed at BINA were identified as moderately resistant to tolerant against their major diseases.

Source of fund : GOB

Experimental details :

Experiment 8 : **Evaluation of advanced mutants and lines of rice against bacterial leaf blight, sheath blight and blast**
Objective (s) : To evaluate the level of field resistance/tolerance of advanced mutants and lines of rice against the diseases under inoculated condition.
Growing season : Aman, 2015
Treatments : Ten mutants/lines, RM (2)-50(C)-4-2-8, RM (2)-50 (C)-1-1-2, RC-2-4-1-1-2, GSR-3, B-10, B-11, N_{10}/350/P-5-4, N_4/350/P-4(5), N_4/250/P-1(2), N_4/250/P-2(6)-26 and three check varieties Brridhan-49, Binadhan-7 and TN-1.
Design with replications : RCBD with 3 replications
Location(s) : BINA farm, Mymensingh, Magura and Rangpur
Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 9 : **Screening of advanced mutants and lines of rice against bacterial leaf blight, sheath blight and blast**
Objective (s) : To evaluate the level of field resistance/tolerance of advanced mutants and lines of rice against the diseases under inoculated condition.
Growing season : Boro, 2015-16
Treatments : Three mutants/lines RM (2)-50 (C)-1-1-2, B-10, B-11 and two check varieties Binadhan-10 and TN-1
Design with replications : RCBD with 3 replications
Location(s) : BINA farm, Mymensingh, Shatkhira and Barishal
Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 10 : **Evaluation of advanced mutants and lines of rice against bacterial leaf blight, sheath blight and blast**

Objective (s) : To evaluate the level of field resistance/tolerance of advanced mutants and lines of rice against the diseases under inoculated condition.

Growing season : Aus, 2016

Treatments : Eight mutants/lines N_{10}-40(C)-1-1-5, N_{10}-40(C)-1-1-5-7, N_{10}-40(C)-1-1-5-3, GSR-3, N_{10}/350/P-5-4, N_4/350/P-4(5), N_4/250/P-1(2), N_4/250/P-2(6)-26 and one check variety TN-1.

Design with replications : RCBD with 3 replications

Location(s) : Jamalpur and Ishurdi

Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 11 : **Identification of resistance of some groundnut mutants/varieties against cercospora leaf spot and collar rot diseases**

Objective(s) : To identify the sources of resistance in induced mutants/varieties of groundnut against the diseases.

Growing season : Winter, 2015-16

Treatments : Twenty mutants and two check varieties (Zingabadam and Dacca-1)

Design with replications : RCBD with 3 replications

Location(s) : BINA farm, Mymensingh

Data to be recorded : Disease incidence and severity, yield and yield components of groundnut will be recorded.

Experiment 12 : **Screening of sesame mutants against stem rot, yellow mosaic and foot rot and wilt diseases**

Objective (s) : To identify the sources of resistance in induced mutants of sesame against stem rot, yellow mosaic, foot rot and wilt diseases.

Growing season : Kharif, 2015

Treatments : Six mutants (SM-8, SM-9, SM-058, SM-067, SM-white and SM-black) and a check variety (Binatil-3)

Design with replications : RCBD with 3 replications

Location (s) : Ishurdi, Gopalganj and Jessore

Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 13 : **Performance of some mutant lines of soybean for resistance against cercospora leaf spot, collar rot and yellow mosaic**

Objective(s) : To evaluate the level of field resistance of some advanced mutants of soybean in inoculated condition.

Growing season : Winter, 2015-16

Treatments : Four mutants (SBM-9, SBM-15, SBM-18, SBM-22) and two check varieties (Binasoybean-1 and Binasoybean-2)

Design with replications : RCBD with 3 replications

Location(s) : Magura and Noakhali

Data to be recorded : Disease incidence and severity and yield of soybean will be recorded.

Experiment 14 : **Screening of mustard-rapeseed mutants against alternaria blight**

Objective (s) : To identify the sources of resistance in induced mutants of mustard.
Growing season : Winter, 2015-16
Treatments : Two mutants (MM 64, RC-9) and two check varieties (Binasarisha-9 and Tori-7)
Design with replications : RCBD with 3 replications
Location (s) : Head Quarter, Mymensingh and Ishurdi
Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 15 : **Evaluation of advanced mutants of chickpea against root rot, wilt and BGM**

Objective (s) : To identify the sources of resistance in induced mutants of chickpea to root rot, wilt and BGM diseases under inoculated condition.
Growing season : Winter, 2015-16
Treatments : Three mutants (CPM-8-400GY, CPM-8-300GY and CPM-(KAB) and two check varieties (Binasola-2 and BARI Sola-1)
Design with replications : RCBD with 3 replications
Location (s) : Ishurdi and Magura
Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 16 : **Evaluation of promising mutants of mungbean against root rot, cercospora leaf spot and yellow mosaic**

Objective (s) : To identify the sources of resistance in induced mutants of mungbean to the diseases under inoculated condition.
Growing season : Summer, 2016
Treatments : Five mutants (MBM-07-Y-1, MBM-527-114, MBM-347-13, MBM-390-94-Y, and MBM-427-87-3) and two check varieties (Binamoog-5 and Binamoog-8)
Design with replications : RCBD with 3 replications
Location (s) : Magura and Barishal
Data to be recorded : Disease incidence and severity will be recorded.

Experiment 17 : **Evaluation of advanced mutants of lentil against root rot and stemphylium blight**

Objective (s) : To identify the sources of resistance in induced mutants of lentil to root rot and stemphylium blight diseases under inoculated condition.
Growing season : Winter, 2015-16
Treatments : Fourteen mutants (LM-75-4, LM-132-7, LM-6-11(2), LM-185-2, LM-156-1, LM-206-5, LM-138-3, LM-118-9, LM-13-1, LM-28-2, LM-6-7(2), LM-B_6-11(2), LM-B_6-7(2) and LM-5(3)-11) and two check varieties (Binamasur-3 and BARI Masur-1)
Design with replications : RCBD with 3 replication
Location (s) : Ishurdi and Magura
Data to be recorded : Disease incidence, severity and yield will be recorded.

Experiment 18 : **Field evaluation of mutants (M_8) of onion against purple leaf blotch and stemphylium blight**

Objective (s) : To identify the sources of resistance in induced mutants of onion to purple leaf blotch and stemphylium blight.
Growing season : Winter 2015-16, Summer 2016

Treatments	:	Three mutants (BP_2/75/2, BP_2/75/5 and BP_2/100/2) and two check varieties (BARI Piaj-2 and BARI Piaj-3)
Design with replications	:	RCBD with 3 replications
Location(s)	:	BINA Head Quarter, Mymensingh, Ishurdi, Rangpur and Chapi Nawbganj
Data to be recorded	:	Disease incidence, severity and yield will be recorded.

PROGRAMME AREA : DEVELOPMENT OF DISEASE RESISTANT VARIETIES

Project 4	**:**	**Induction of disease resistance in rice and groundnut through gamma-radiation**
Objective (s)	**:**	To induce disease resistance in high yielding but susceptible cultivars of rice and groundnut through nuclear techniques.
Personnel assigned	**:**	Dr. Hosne-Ara Begum, CSO (PI) Dr. Md. Abul Kalam Azad, PSO Dr. Md. Abul Kashem, SSO Dr. Mahbuba Kaniz Hasna, SSO Mr. K. M. Eadun Nabi, SO Mr. Shazahan Ahmed, ASO
Status	**:**	To induce bacterial leaf blight resistance, Iratom-24 seeds were treated with different doses of gamma radiation (200, 250 and 300Gy) and the M_3 seeds will be collected during the Aus and Aman seasons of 2015. To induce cercospora leaf spot resistance, seeds of groundnut will be treated with different doses of gamma radiation (150, 200 and 250Gy) and the irradiated seeds will be evaluated.
Growing season	**:**	Robi season of 2015-16, Aus and Aman 2016.
Source of fund	**:**	GOB
Experimental details	**:**	

Experiment 19	:	**Evaluation of disease reaction of M_2 generation of rice against BLB**
Objective (s)	:	To develop resistant varieties of rice against BLB.
Growing season	:	Aus and Aman, 2015-16
Treatments	:	0, 200, 250, 300 Gy
Design with replications	:	RCBD with 3 replications
Location(s)	:	BINA HQ, Mymensingh
Data to be recorded	:	Disease incidence, severity yield and yield contributing characters.
Experiment 20	:	**Evaluation of disease reaction of irradiated seeds of groundnut against cercospora leaf spot**
Objective (s)	:	To develop resistant varieties of groundnut against cercospora leaf spot.
Growing season	:	2015-16
Treatments	:	0,150, 200, 250 Gy
Design with replications	:	RCBD with 3 replications
Location(s)	:	BINA HQ, Mymensingh
Data to be recorded	:	Disease incidence, severity yield and yield contributing characters.

PROGRAMME AREA: BIOTECHNOLOGY

Project 5	**:**	**Molecular analysis of variation in virulence and genetic diversity of *Rhizoctonia solani* associated with sheath blight of rice in Bangladesh**
Objective (s)	**:**	To identify the variability of *Rhizoctonia solani* races of sheath blight of rice.
Personnel assigned	**:**	Dr. Md. Abul Kashem, SSO (PI) Mr. Md. Rohizuddin Mia, ASO Mr. Md. Al-Amin Talukder, SA-I
Status	**:**	Three isolates of *Rhizoctonia solani* of sheath blight were collected from three locations (Magura, Ishurdi and Rangpur) of Bangladesh. Purified isolates were processed using lysis buffer, EDTA, SDS, Potassium acetate, vortexes, isopropyl alcohol etc. to extract DNA of fungal isolates. DNA from filamentous fungi (*R.s.*) will be run in Agarose gel for staining and amplified by PCR.
Source of fund	**:**	GOB
Experimental details	**:**	

Experiment 21	:	**Characterization of some isolates of *Rhizoctonia solani* through molecular markers**
Objective (s)	:	To determine the genetic variability of *Rhizoctonia solani* through molecular analysis.
Growing season	:	All year round (2015-16)
Treatments	:	Three isolates of *Rhizoctonia solani*
Location	:	Plant Pathology Laboratory, Biotechnology Laboratory of BINA and BAU
Data to be recorded	:	The isolates to be characterized after PCR and gel documentation.
Experiment 22	:	**Evaluation of virulence of some isolates of *Rhizoctonia solani* under pot condition**
Objective (s)	:	To determine the sheath blight incidence and severity caused by *Rhizoctonia solani* of rice.
Growing season	:	Aman and Boro season 2015-16
Treatments	:	Three isolates of *Rhizoctonia solani*
Location	:	BINA farm, Mymensingh
Data to be recorded	:	Disease incidence and severity of sheath blight.

Head of Plant Pathology Division **CSO (RC)** **Director (Research**

ANNUAL RESEARCH BUDGET FOR PLANT PATHOLOGY DIVISION (2015-16)

('000 TAKA)

Items Program/Project	Source of fund	Labour	Chemicals/ Glassware's	Travel	Inputs	Project Total
PROGRAMME 1						
Project 1	GOB	Central	100	30	50	180
Project 2	GOB	Central	50	50	50	150
Project 3	GOB	Central	30	100	50	180
Sub-total	**--**	**--**	**180**	**180**	**150**	**510**
PROGRAMME 2						
Project 4	GOB	Central	50	30	20	100
Sub-total	**--**	**--**	**50**	**30**	**20**	**100**
PROGRAMME 3						
Project 5	GOB	Central	200	50	50	300
Sub-total	**--**	**--**	**200**	**50**	**50**	**300**
GRAND TOTAL	**--**	**--**	**430**	**260**	**220**	**910**

Head of Plant Pathology Division **CSO (RC)** **Director (Research**