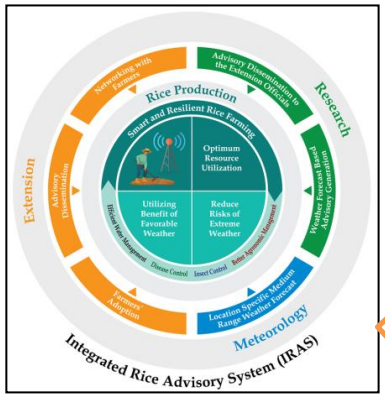
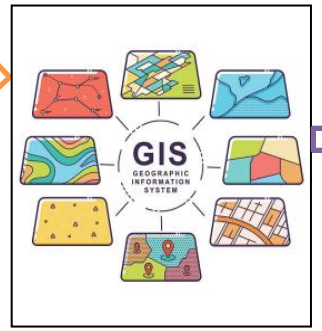
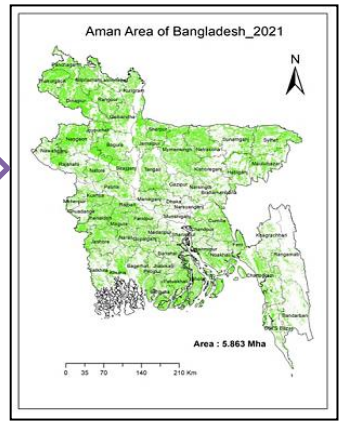


Welcome
to
Agricultural Statistics Division





BRRI
Growing science for food security

Introduction

- Agricultural Statistics division is a part of the Socio-economic and Policy program area. It is one of the major research division of BRRI.
- This division conducted both basic and applied research and enhance research capacity through application of ICT and GIS.

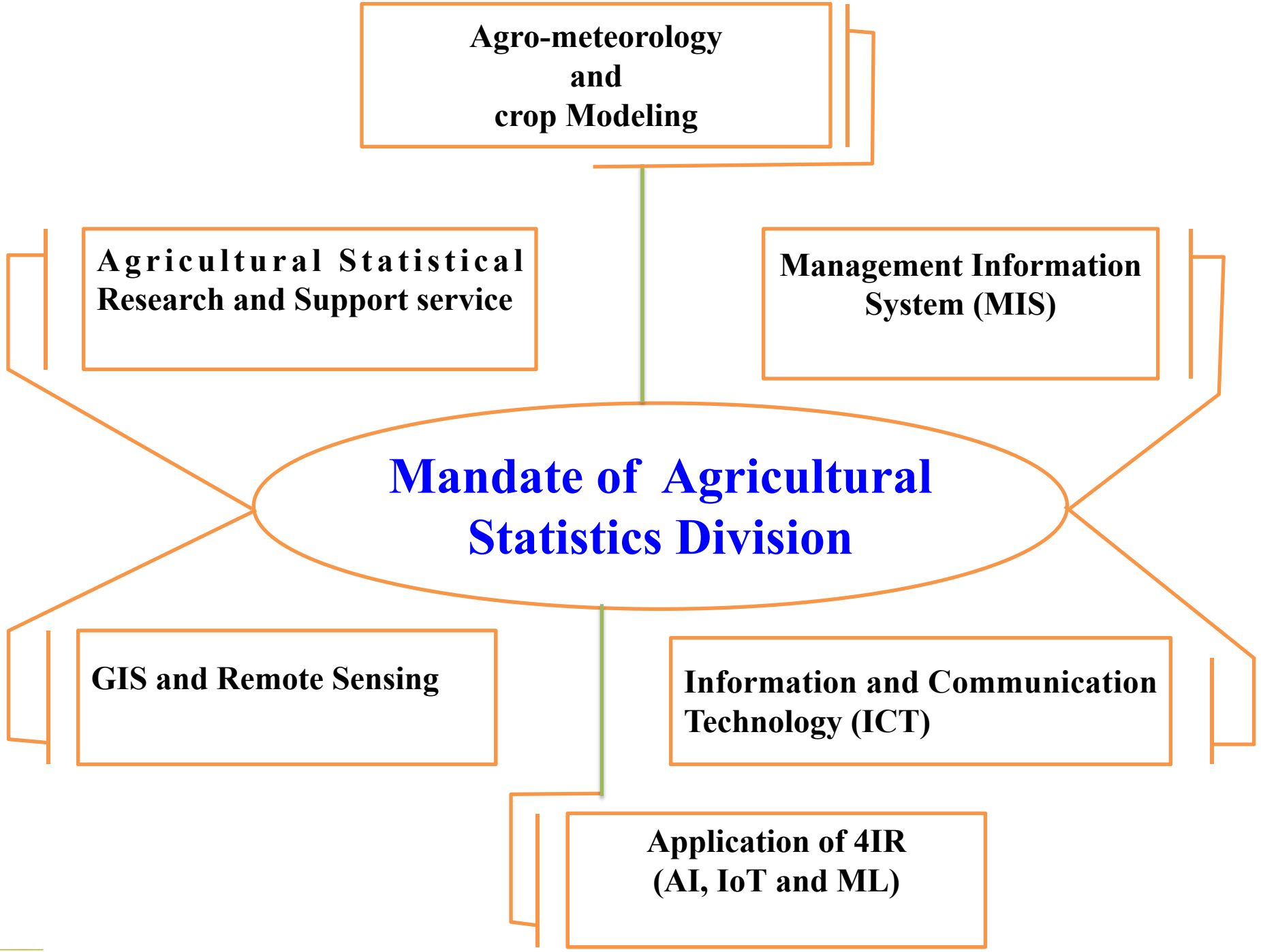
History of Establishment

- After the independence in 1971, this Division was named as “Agricultural Economics and Statistics” in the year of 1973-74.
- In 1980-81, the division was named as Agricultural Statistics Division.

Vision and Mission

Innovation and development of sustainable and standard statistical methods and e-Agriculture service in agricultural research

- **Provide high quality research programs through comprehensive statistical programs in line with the researchers requirements.**
- **Dissemination of statistical method and application of ICT in almost all corners of agricultural research.**


Agro-meteorology
and
crop Modeling
Agricultural Statistical
Research and Support service
Management Information
System (MIS)
Mandate of Agricultural
Statistics Division
GIS and Remote Sensing
Information and Communication
Technology (ICT)
Application of 4IR
(AI, IoT and ML)

Transformation of Agricultural Statistics

Phase 1 (1970-1980):

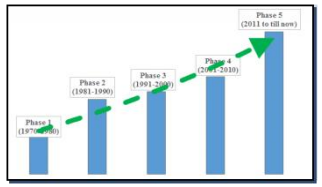
- Conducting Field Research Experiment
- Conducting Sample Survey Research
- Conducting Research using Secondary Data

Phase 2 (1981-1990):

- Crop-cut Method
- Sampling Technique

Phase 3 (1991-2000):

- Computer programming
- Establish MIS



Transformation Phases

Phase 4 (2001-2010):

- GIS Technique in Rice Research
- Multivariate statistical technique
- Development of stability model
- Implementation of ICT

Phase 5 (2011- present):

- Agro-meteorology and crop Modeling
- Remote sensing with GIS
- ICT and Innovation for 4IR
- Analog to Digital system
- Bioinformatics
- Implementation of 4IR through AI (Sensor & IoT)

At a Glance of this Division

Major Achievements (From 1980 to 2024)

Development of stability model for BRRI release rice varieties
[Using single trait (yield)-2001-02]

Stability model: $G_i = \left(F_i^I + P_i^I + S_i^I\right)$

Value of G_i	Nature of stability
≤ 0	Unstable
$0 < G_i \leq 1$	Below average stable
$1 < G_i \leq 2$	Average stable
$2 < G_i \leq 3$	Stable

Table. Stability characterization of a variety

Fig. Stability experiment of released rice varieties (ব্রি উদ্ভাবিত ধানের জাতের ষ্ট্যাবিলিটি পরীক্ষণ)

This stability model is helpful in selecting distinguishing stable varieties from the unstable ones.

Major Achievements (From 1980 to 2024)

Development of micro-plot technique for field experiments of rice

Fig. Field experiments on the micro-plot technique (ছোট-প্লট প্রযুক্তির পরীক্ষণ মাঠ)

- For field experiments on plant characters, the plot size may be as small as $1m^2$.
- However, if yield is of primary importance, the plot size should not be smaller than $4m^2$.

Major Achievements (From 1980 to 2024)

Estimating the effect of missing hills on the yield of rice

Fig. Missing hills of experimental field
(নষ্ট গোছাযুক্ত পরীক্ষণ মাঠে)

- No marked error if the number of missing hills remains within up to 20% of the total number of hills in the plot.
- Yield loss was not appreciable even if the missing hill number equalled 40%.

Sampling techniques for data collection regarding yield components of rice

Fig. Sampling techniques for data collection regarding yield components of rice
(ধানের ফলন উপাদান সম্পর্কিত তথ্যের জন্য নমুনা সংগ্রহ পদ্ধতি চিত্র)

The number of filled grains per panicle, number of unfilled grains per panicle, grain weight per panicle and number of panicles per hill should be from at least 10% of the total number of hills of the plot

Major Achievements (From 1980 to 2024)

Estimating area and production of rice in Bangladesh by the crop-cut method

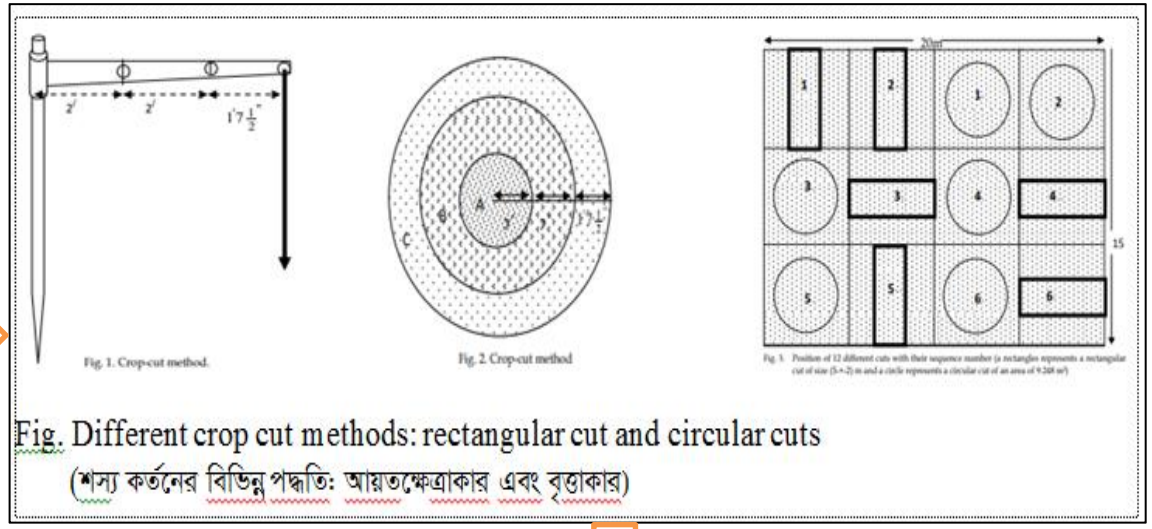


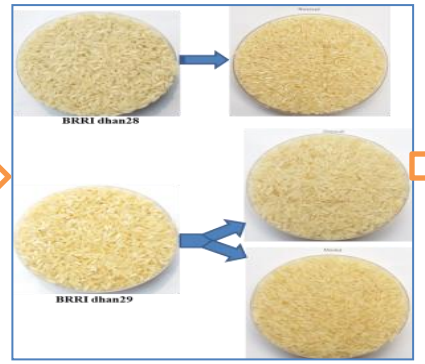
Fig. Different crop cut methods: rectangular cut and circular cuts

(শস্য কর্তনের বিভিন্ন পদ্ধতি: আয়তক্ষেত্রাকার এবং বৃত্তাকার)

- **In estimating yield, at least three crop-cuts are taken from a circular sampling area with a radius of 178.5 in each plot.**
- **In this procedure, the sampled area in a plot (crop-cut area) becomes $10m^2$.**
- **In some cases, two instead of three crop-cuts suffice.**

Major Achievements (From 1980 to 2024)

Development of producer, consumer and producer cum consumer preference model to rice varieties



BRRI variety contributes about 90% of total production, it does not reflect in field label because BRRI varieties are sold in different brand names. As for example, BRRI dhan28 sales as Nizersail and BRRI dhan29 as Jhingasail and Miniket etc

Consumer model

$$CP_i = f(PR_j, CI_k, CRV_m, ARV, V_n)$$

where, CP_i = Preference of ith consumers; $PR_{j(1,2,3...)}$ = Price of rice; here $PR_j = \sum_{i=1}^{p} X_{R_j} R_{C_j} + U$; where,

Producer model

$$PP_i = f(CP_i, PRV, RGEAEZ, TFSR_s, LFP, LD, RSS, T_c)$$

where, PP_i = Preference of ith producers;
CP_i = Preference of ith consumers;

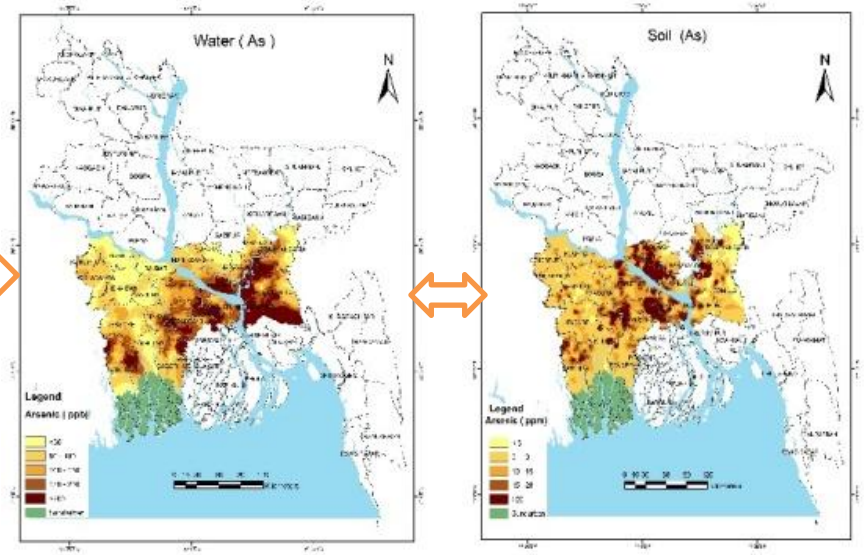
Producer-consumer model

$$PC_i = PP_i + CP_i$$

where, PP_i = Preference of ith producers;
CP_i = Preference of ith consumers

Major Achievements (From 1980 to 2022)

Spatial distribution of Arsenic (As) for water and soil of irrigated rice field in South-West and Central-East of Bangladesh



Distribution of the toxic element, arsenic, in irrigation water and soils of Bangladesh

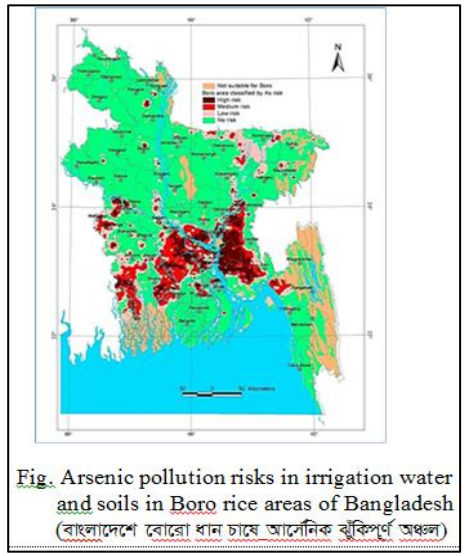
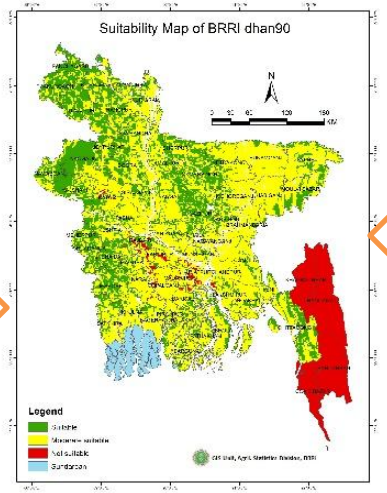
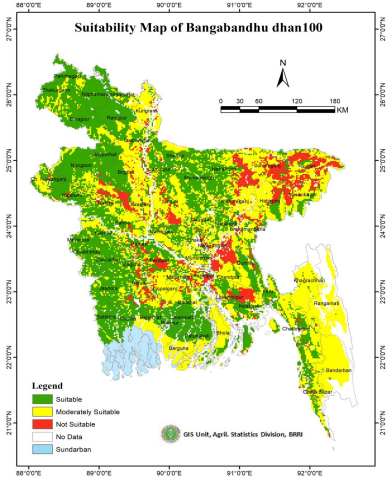


Fig. Arsenic pollution risks in irrigation water and soils in Boro rice areas of Bangladesh (বাংলাদেশে বোরো ধান চাষে আর্সেনিক ঝুঁকিপূর্ণ অঞ্চল)

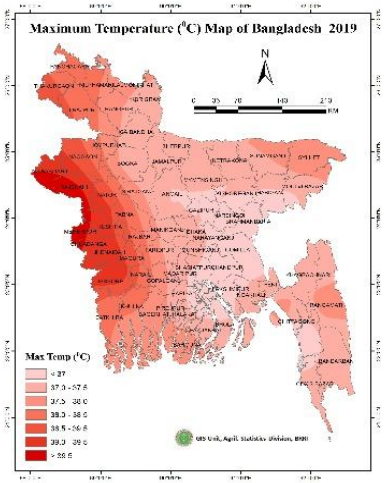
Major Achievements (From 1980 to 2024)

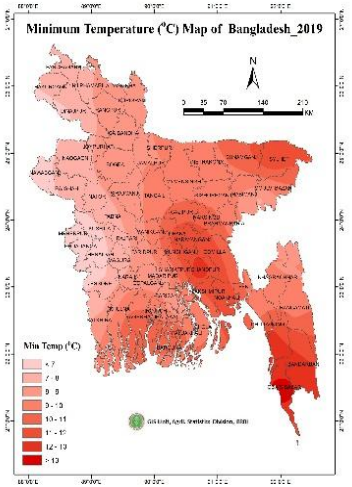
Suitability and Zoning Map of BRRI Varieties

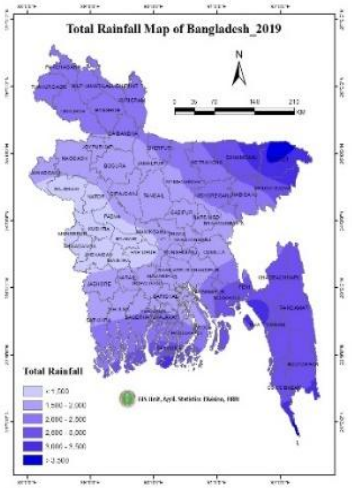




Climatic Map of Bangladesh







BRRI
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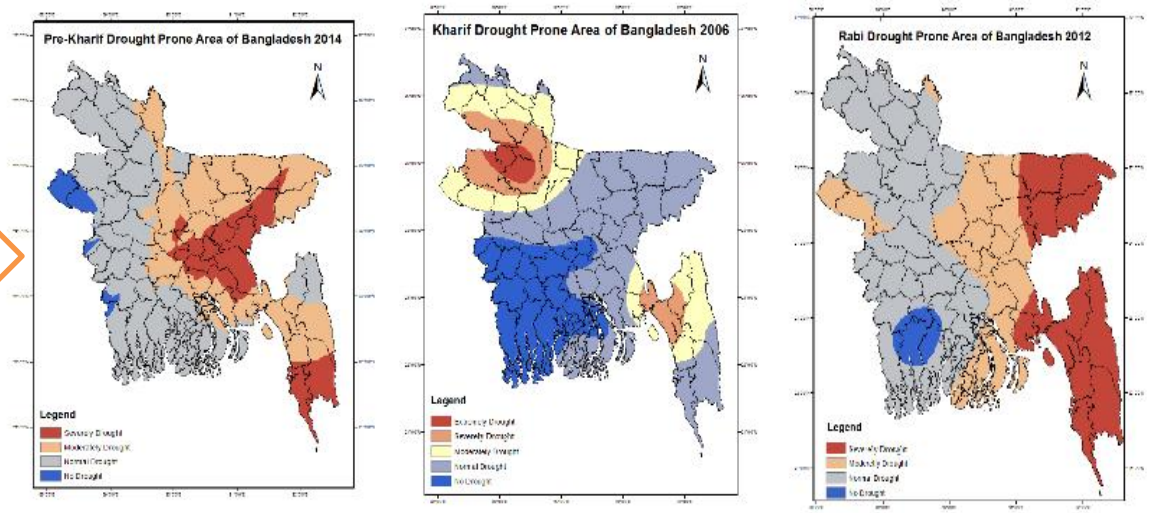
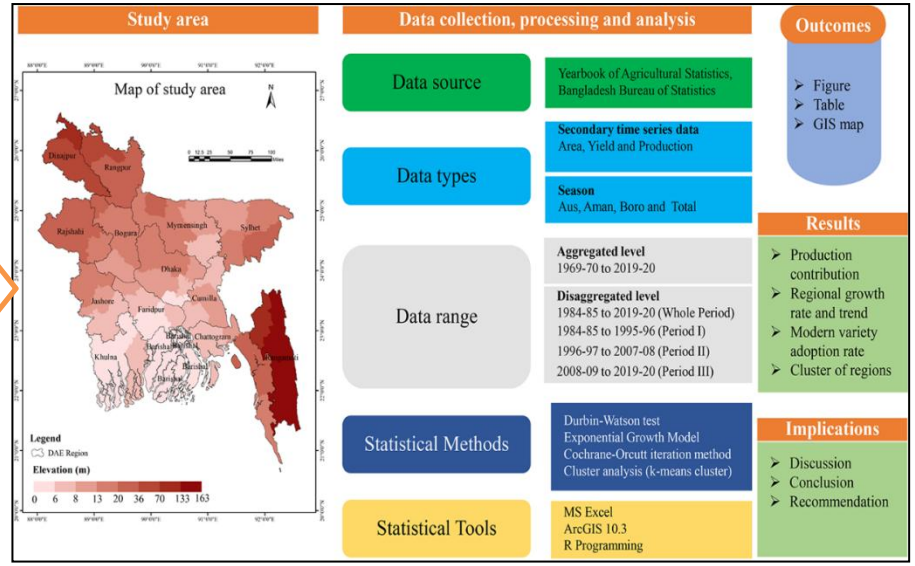
Major Achievements (From 1980 to 2024)

Identification of Meteorological Drought Prone Area in Bangladesh

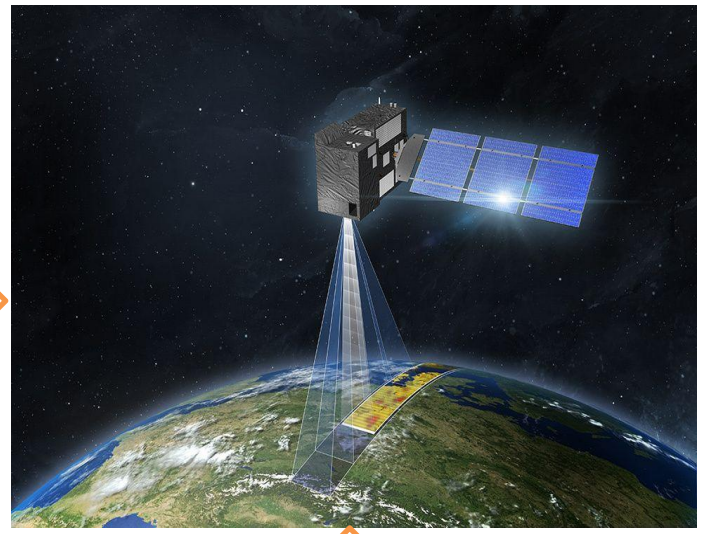


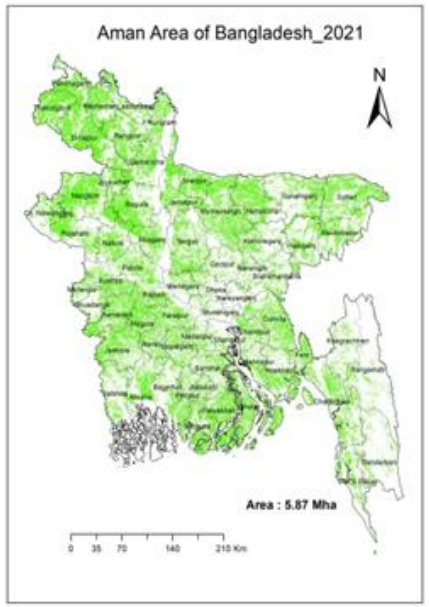
Growth and trend analysis of area, production and yield of rice: A scenario of rice security in Bangladesh

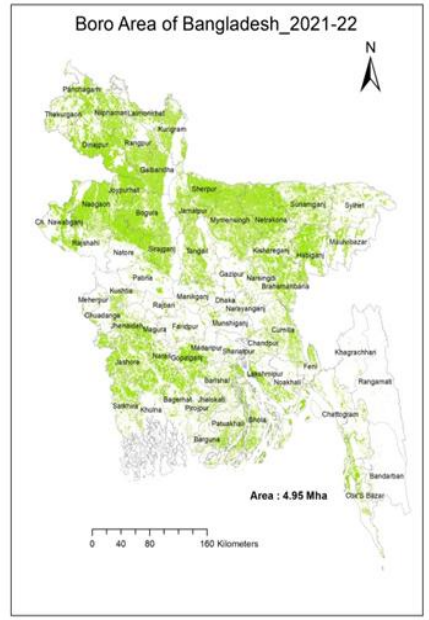


Major Achievements (From 1980 to 2024)

Season wise Rice Area Map using Satellite Image





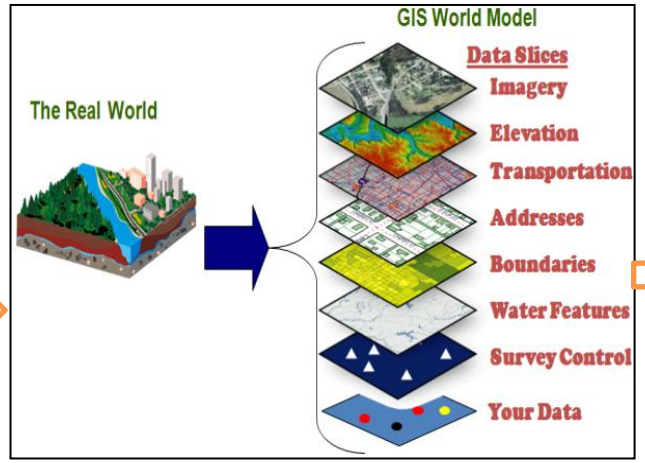


Calculated rice area in BD:

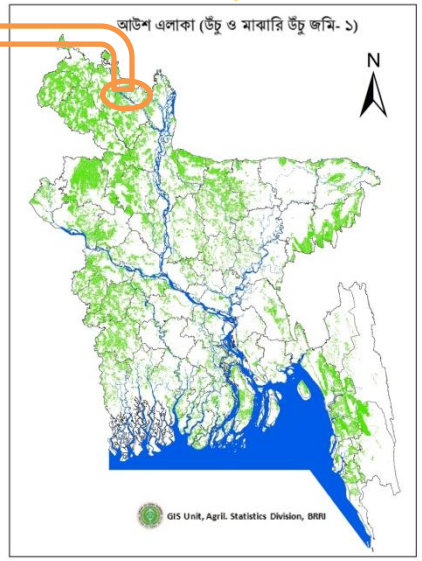
- **Boro_2020-21 about 4.95 Mha**
- **Aman_2021=5.87 Mha**

Major Achievements (From 1980 to 2024)

A book of Prospect of Aus rice Area in Bangladesh



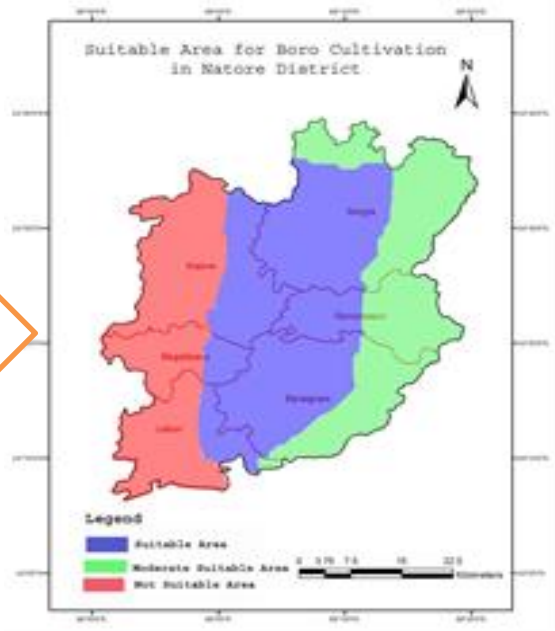
- **Total Potential Cultivable Aus area=2.49 Mha**
- **Current Aus area about 1.34 Mha**
- **Possible to expand Aus area about 1.15 Mha**
- **Production can be increased 1.5 Mton**



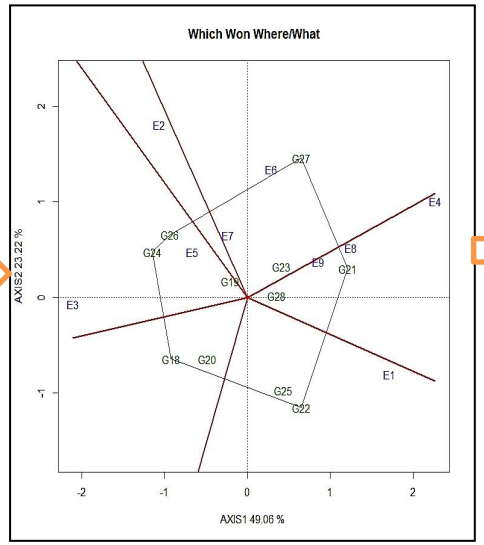
DISTRICTS	UPAZILAS	UNIONS	MOUZA	LAND TYPE	AREA_ha
Lalmonirhat	Kaliganj	Chandrapur	Satirpar	HL	127.89
				MHL1	10.43
	Hatibandha	Bhalaguri	Bhalaguri	HL	145.05
				MHL1	15.69
			Dakshin Jaorani	HL	325.68

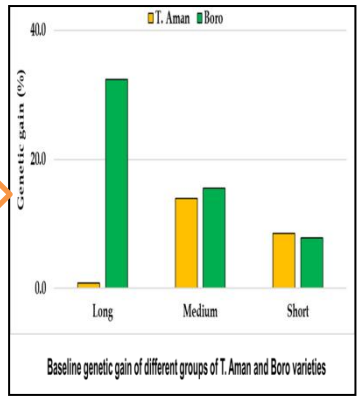
Major Achievements (From 1980 to 2024)

Identifying suitable area of irrigated rice (Boro) cultivation based on ground water level in Natore District



Study on G X E interaction of BRRI varieties





BRRI
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Data provide system at BRRI

Data/information provide system

Analog

Period (1970-2000)

Static website

Period (2001-2010)

Dynamic Website

Period (2010-2021)

BRRI Website (www.brri.gov.bd)

Rice and related information system at BRRI

Rice and related information provide system(BRKB)

Analog

Period (1970-2000)

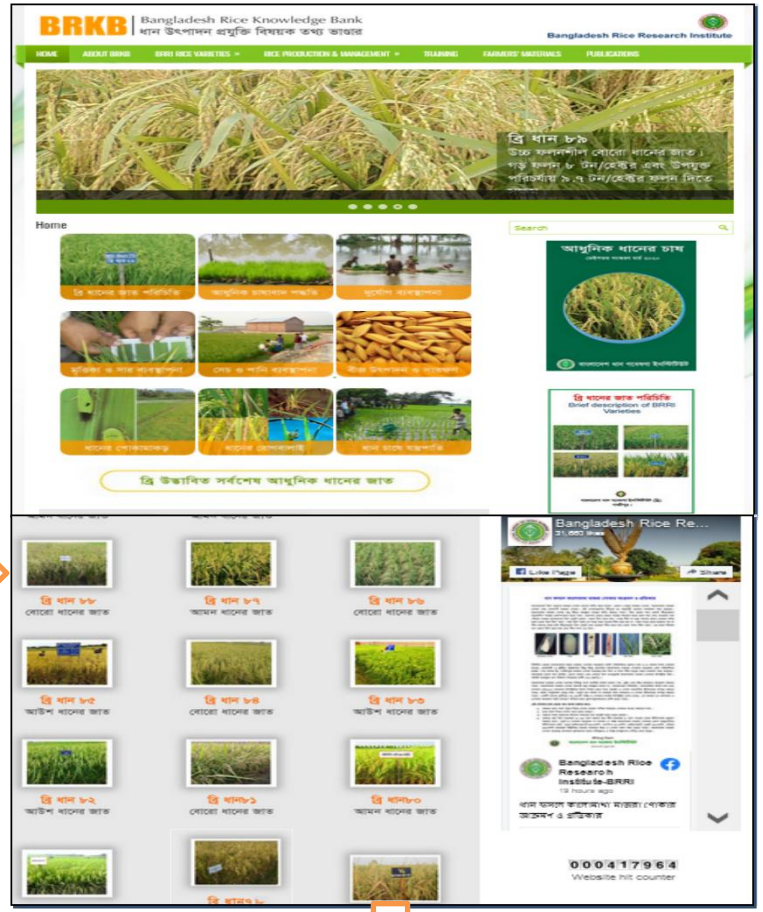
Static website

Period (2001-2010)

Dynamic Website

Period (2010-2021)

BRKB Website ((http://knowledgebank-brri.org)



Total User/ beneficiaries 418685

Rice and related information provide system (BRKB)

Analog

Period (1970-2000)

Static website

Period (2001-2010)

Dynamic Website

Period (2010-2021)

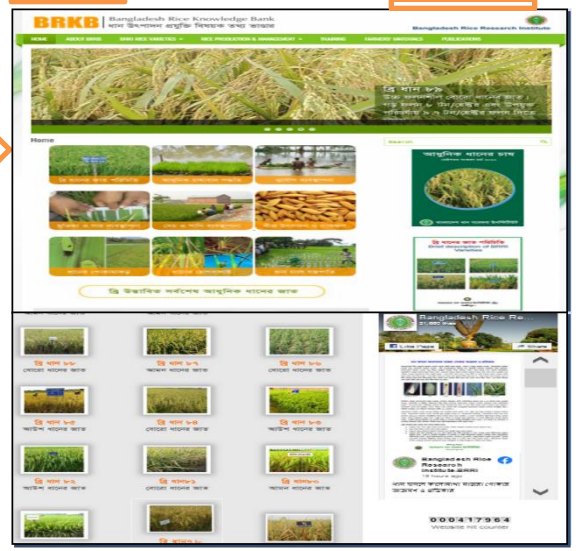
Total User/ beneficiaries 17358

RKB APP

Total User/ beneficiaries 2500

Modern Rice Nursing APP

Period (2011-16)



http://knowledgebank-brri.org)

BRRI
Growing science for food security

Rice and related information provide system (BRKB)

Analog

Period (1970-2000)

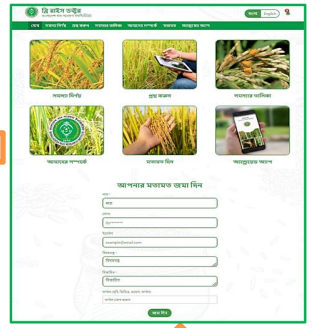
Static website

Period (2001-2010)

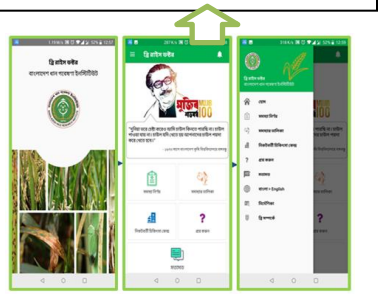
Dynamic Website

Period (2010-2021)

Total User/ beneficiaries 1750



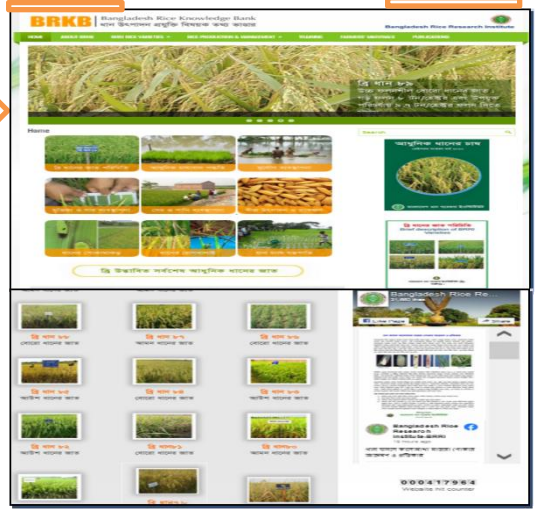
Total User/ Beneficiaries 1950



Rice Doctor Web App

Rice Doctors Mobile App

Period (2011-21)



http://knowledgebank-brri.org)

BRRI
Growing science for food security

Rice and related information provide system (BRKB)

Analog

Period (1970-2000)

Static website

Period (2001-2010)

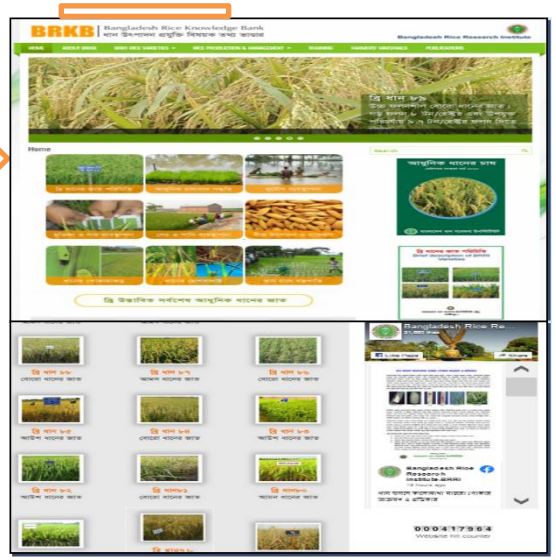
Dynamic Website

Period (2010-2021)

Total User/ Beneficiaries 1750

Rice Solution Mobile App

Period (2021-22)



http://knowledgebank-brri.org)

BRRI
Growing science for food security

Rice and related information provide system (BRKB)

Analog

Period (1970-2000)

Static website

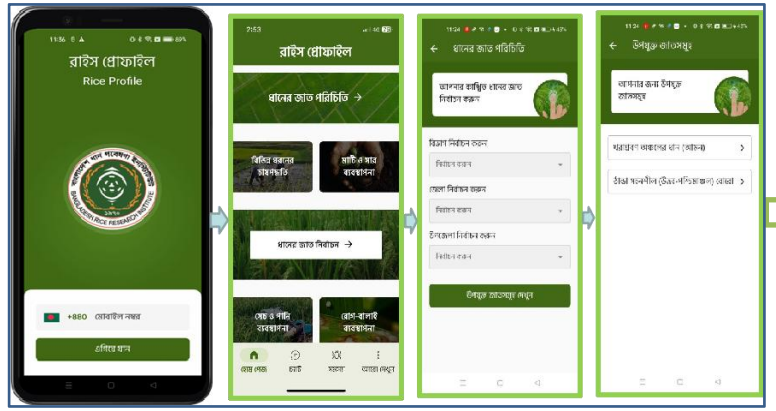
Period (2001-2010)

Dynamic Website

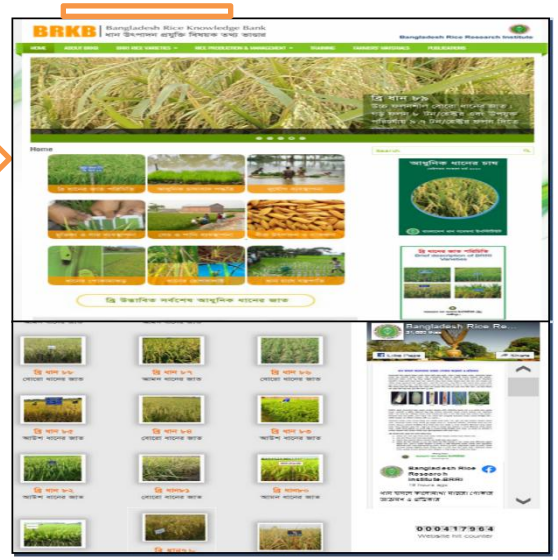
Period (2010-2021)

Rice Profile Mobile App

Period (2023-24)



Total User/ Beneficiaries 1050



http://knowledgebank-brri.org)

BRRI
Growing science for food security

Nothi/File System of BRRI

- Nothi System at BRRI
- Tendering System

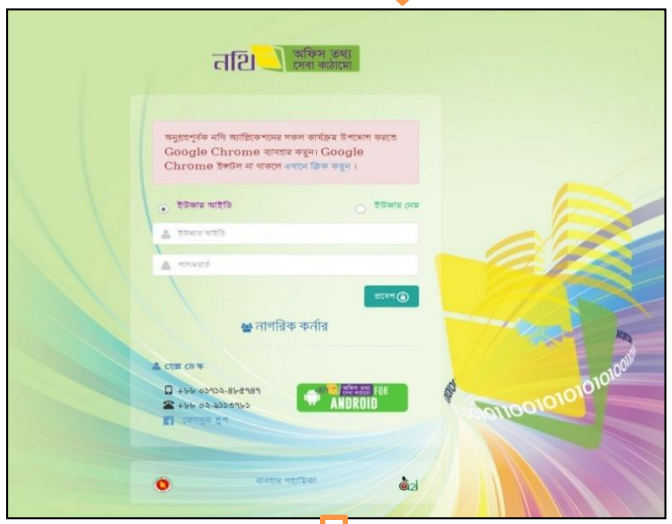
Analog

Period (1970-2010)

e-Nothi

Period (2011-21) Digital

e-GP



- 100% activities in e-Nothi
- Hard file activities almost zero

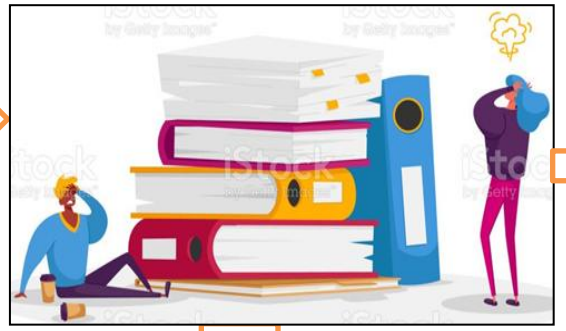
- 100% activities in e-GP
- Hard file activities almost zero

BRRI
Growing science for food security

MIS at BRRI

Labour Management System (LMS)

Analog



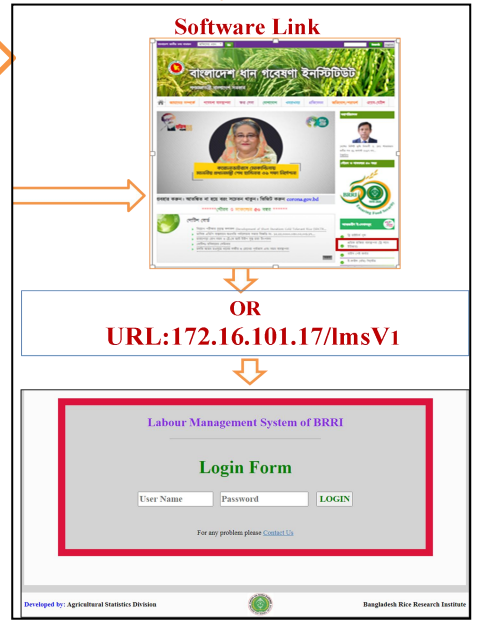
Period (1970-2010)

Digitalize

Digitalize (2017-18)

Period (2011-21)

Online base (2019 to ..)



BRRI
Growing science for food security

MIS at BRRI

Salary Management System (SMS)

Analog

Period (1970-2000)

Payroll

Period (1991-2010)

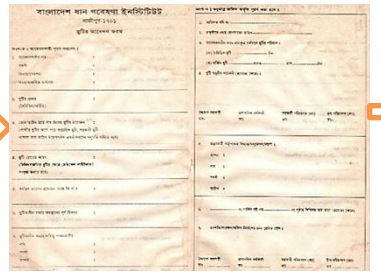
Online base

Period (2019 to …..)

MIS at BRRI

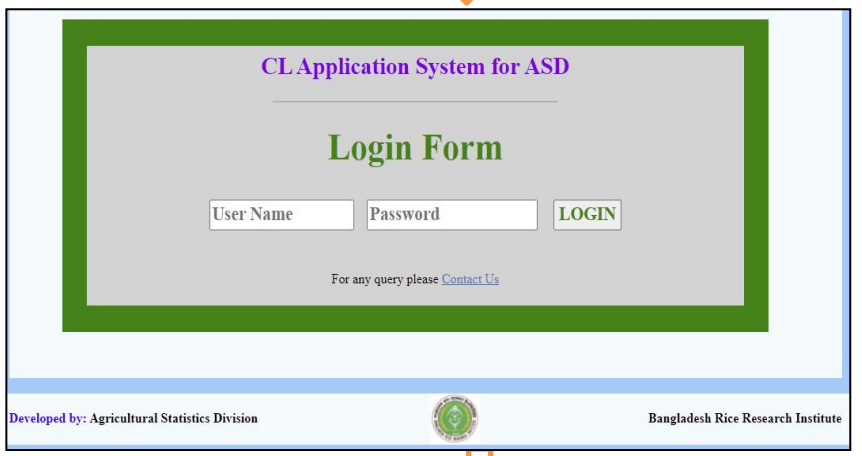
CL Application System (CLS)

Analog



Period (1970-2010)

Digitalize



Digitalized CL Application System of Agricultural Statistics Division (2020-21)

Statistical Research at BRRI

New approach of stability model for BRRI release rice varieties

[Using multi-traits-2020-2021]

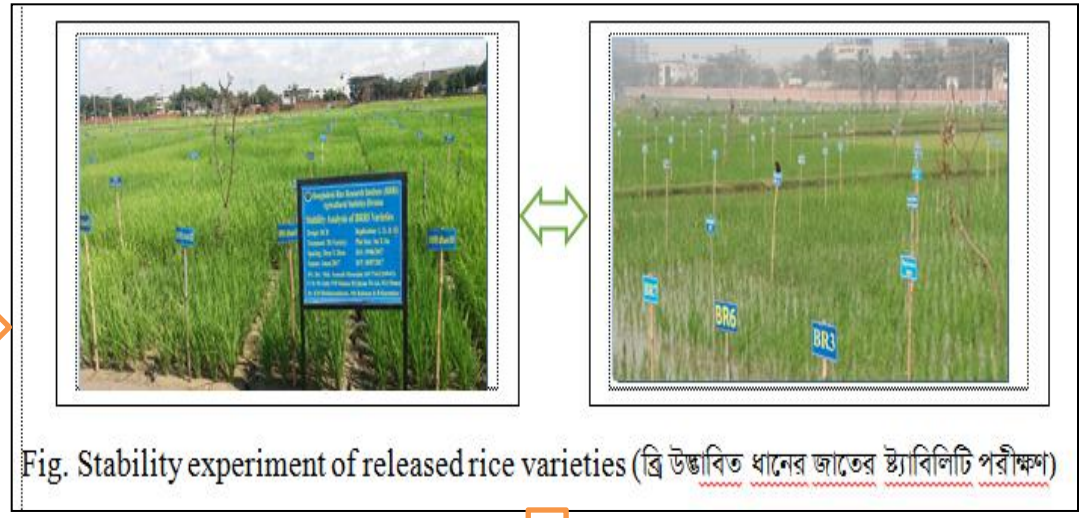


Fig. Stability experiment of released rice varieties (ব্রি উদ্ভাবিত ধানের জাতের ষ্ট্যাবিলিটি পরীক্ষণ)

- Evaluate the stability of rice genotypes and Multi-trait stability index (MTSI) by applying popularly recommended multi-trait (GY and GP, PN TN, GD and PH) stability analysis under diverse environmental conditions in Bangladesh.

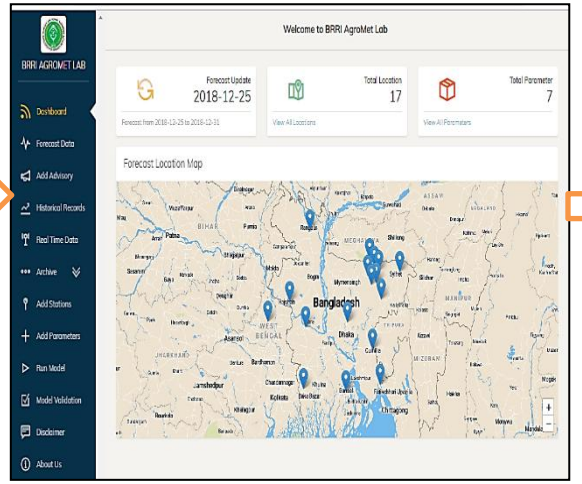
Statistical research at BRRI

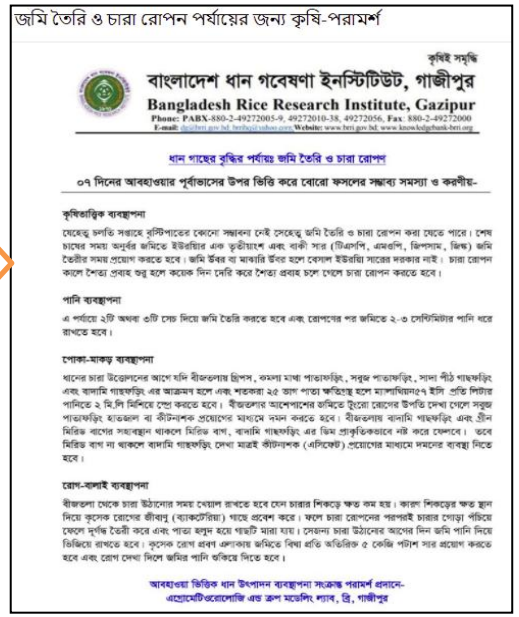
Weather Forecast → SPARRSO & BMD → **Period (1970-2000)**

Period (2016-2017)

5 days interval Weather Forecast & Rice Advisory Services → **Online based (2020-2021)**

Every 7 days continuously Weather Forecast & Rice Advisory Services




জমি তৈরি ও চারা রোপন পর্যায়ের জন্য কৃষি-পরামর্শ

কৃষিই সমৃদ্ধি

বাংলাদেশ ধান গবেষণা ইনস্টিটিউট, গাজীপুর

Bangladesh Rice Research Institute, Gazipur

ধান গাছের বৃদ্ধির পর্যায়ঃ জমি তৈরি ও চারা রোপণ

০৭ দিনের আবহাওয়ার পূর্বাভাসের উপর ভিত্তি করে বোরো ফসলের সম্ভাব্য সমস্যা ও করণীয়-

কৃষিতাত্ত্বিক ব্যবস্থাপনা

যেহেতু চলতি সপ্তাহে বৃষ্টিপাতের কোনো সম্ভাবনা নেই সেহেতু জমি তৈরি ও চারা রোপন করা যেতে পারে। শেষ চাষের সময় অনূর্ধ্ব জমিতে ইউরিয়ার এক তৃতীয়াংশ এবং বাকী সার (টিএসপি, এমওপি, জিপসাম, জিঙ্ক) জমি তৈরীর সময় প্রয়োগ করতে হবে। জমি উঁচুর বা আবাদি উঁচুর হলে বেসাল ইউরিয়া সারের দরকার নাই। চারা রোপন কালে শৈত্য প্রবাহ শুরু হলে কয়েক দিন দেরি করে শৈত্য প্রবাহ চলে গেলে চারা রোপন করতে হবে।

পানি ব্যবস্থাপনা

এ পর্যায়ে ২টি অথবা ৩টি সেচ দিয়ে জমি তৈরি করতে হবে এবং রোপণের পর জমিতে ২-৩ সেন্টিমিটার পানি ধরে রাখতে হবে।

পোকা-মাকড় ব্যবস্থাপনা

ধানের চারা উত্তোলনের আগে যদি বীজতলায় গ্রিপস, কমলা মাথা পাতাফড়িং, সবুজ পাতাফড়িং, সাদা পীঠ গাছফড়িং এবং বাদামি গাছফড়িং এর আক্রমণ হলে এক শতকরা ২৫ ভাগ পাতা ক্ষতিগ্রস্থ হলে ম্যালাথিয়ন৫৭ ইসি প্রতি লিটার পানিতে ২ মি.লি মিশিয়ে স্প্রে করতে হবে। বীজতলার আশেপাশের জমিতে ইঁদুরের রোগের উপস্থিতি দেখা গেলে সবুজ পাতাফড়িং হাতজাল বা কীটনাশক প্রয়োগের মাধ্যমে দমন করতে হবে। বীজতলায় বাদামি গাছফড়িং এবং ঘ্রীন মিরিড বাগের সহাবস্থান থাকলে মিরিড বাগ, বাদামি গাছফড়িং এর ডিম প্রাকৃতিকভাবে নষ্ট করে ফেলবে। তবে মিরিড বাগ না থাকলে বাদামি গাছফড়িং দেখা মাত্রই কীটনাশক (এসিফেট) প্রয়োগের মাধ্যমে দমনের ব্যবস্থা নিতে হবে।

রোগ-বালাই ব্যবস্থাপনা

বীজতলা থেকে চারা উঠানোর সময় খেয়াল রাখতে হবে যেন চারার শিকড়ে ক্ষত কম হয়। কারণ শিকড়ের ক্ষত স্থান দিয়ে কুসেক রোগের জীবাণু (ব্যাকটেরিয়া) গাছে প্রবেশ করে। ফলে চারা রোপনের পরপরই চারার গোড়া পঁচিয়ে ফেলে দুর্গন্ধ তৈরী করে এবং পাতা হলুদ হয়ে গাছটি মারা যায়। সেজন্য চারা উঠানোর আগের দিন জমি পানি দিয়ে ভিজিয়ে রাখতে হবে। কুসেক রোগ প্রবণ এলাকায় জমিতে বিঘা প্রতি অতিরিক্ত ৫ কেজি পটাশ সার প্রয়োগ করতে হবে এবং রোগ দেখা দিলে জমির পানি শুকিয়ে দিতে হবে।

আবহাওয়া ভিত্তিক ধান উৎপাদন ব্যবস্থাপনা সংক্রান্ত পরামর্শ প্রদানে-

এগ্রোমেটিওরোলোজি এন্ড ক্রপ মডেলিং শ্যাব, ব্রি, গাজীপুর

BRRI
Growing science for food security

Statistical data analysis System

Statistical Data Analysis System (LMS)

Analog

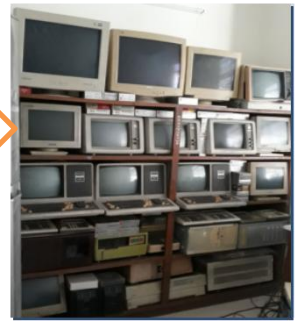
Form Fill-up and data provide (Hard Copy), Data analysis manually (calculator)

Period (1970-1990)

Digitalize

Online form collection and data provide by mail (Soft copy/pen drive), Data analysis by MSTAT, IRRIStat, GenStat, SPSS etc. (Computer)

Period (2001-2010)



Period (2010 to …)

Digitalize

Online form collection and data provide by mail (Soft copy/pen drive), Data analysis using R (Hi-speed Computer/Lap top))

BRRI
Growing science for food security

Information Sharing System at BRRI

Information Sharing System

Analog

Period (1970-1990)
[Letter, post, mail, hard file etc.]

e-mail

Period (1991-2010)
[yahoo, g-mail]

Organization e-mail

Period (2011 to till now)
[Web Mail, Group Mail]

Web Mail & Group Mail of BRRI

Total User: 343 (Scientists and Officers)

BRRI
Growing science for food security

Information Sharing System at BRRI

BRRI Facebook Group and Facebook Page

Facebook Group (BRRI Networks) of BRRI

Total Member: 4500 (BRRI Scientists/Officers and others people)

BRRI Facebook Page

- **31,856 people like this page**
- **32,635 people follow this page**

BRRI
Growing science for food security

Statistical Training

Training on Data collection and Statistical analysis

Total Participants:
160 (Scientists)

Total Participants:
40 (SA & FM)

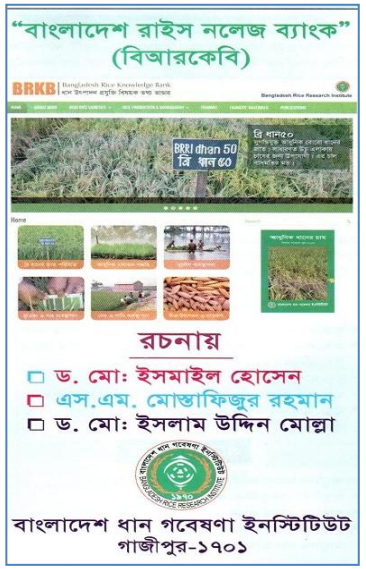
Training/workshop on Innovation & ICT

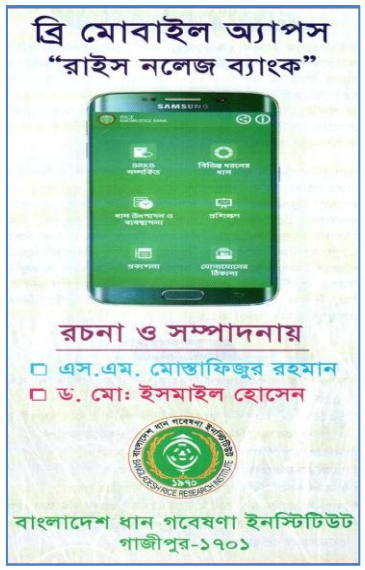
Total Participants:
- **For Innovation: 145**
- **For SPS: 55**

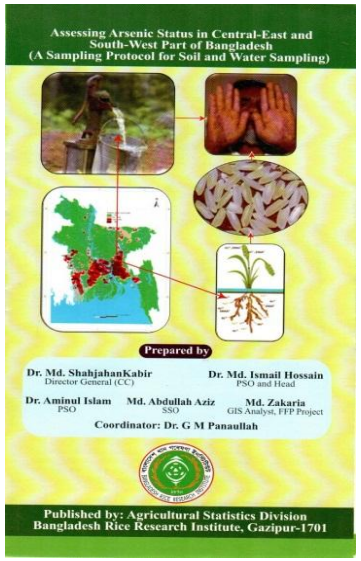
Total Participants:
- **For e-Learning: 30**
- **For Mentoring: 15**
- **For Digital Signature: 160**

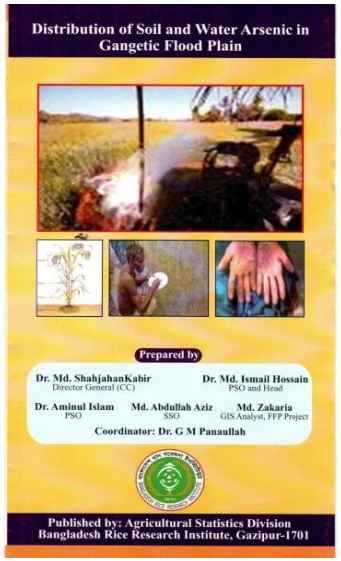
Awarded National ICT Award-2016 at Digital World 2016 for ICT Excellence through Innovative Service Delivery.

Published Leaflets

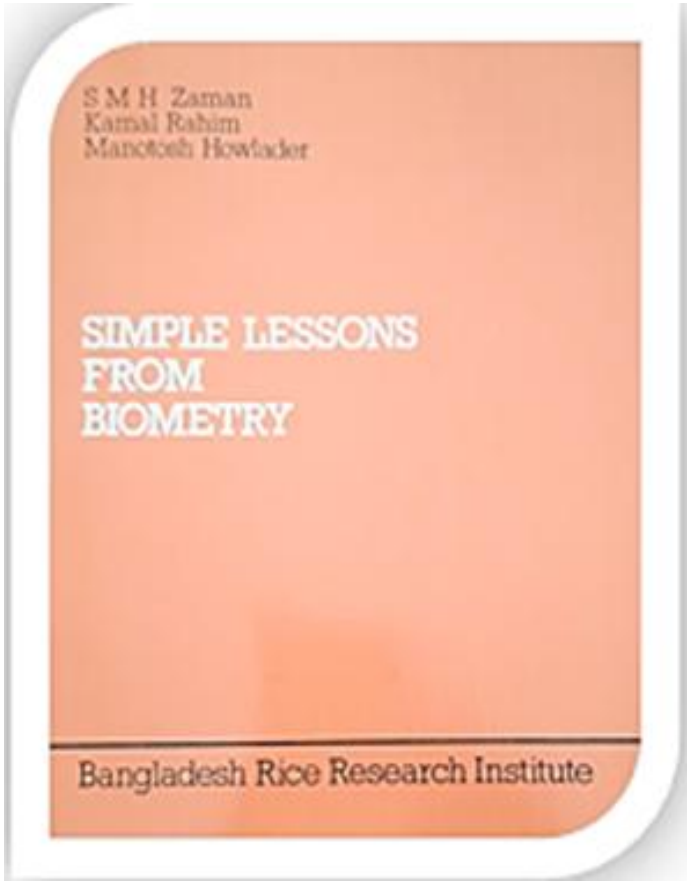


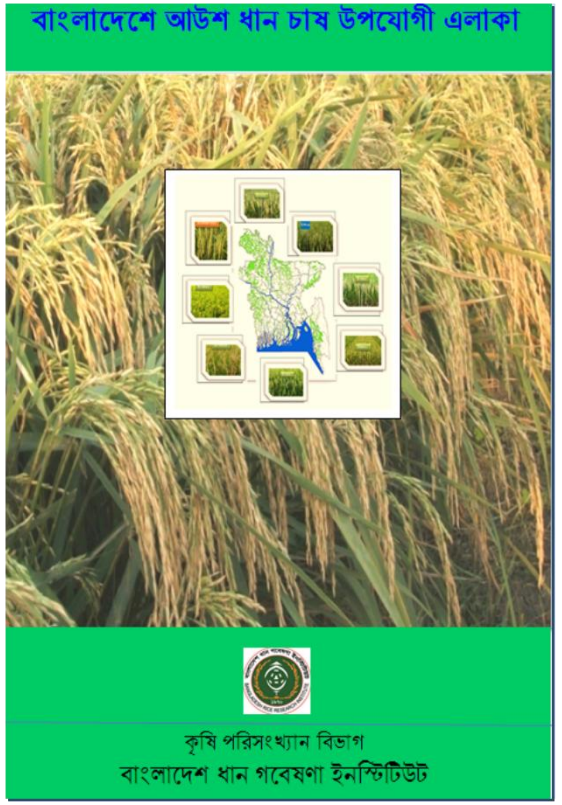


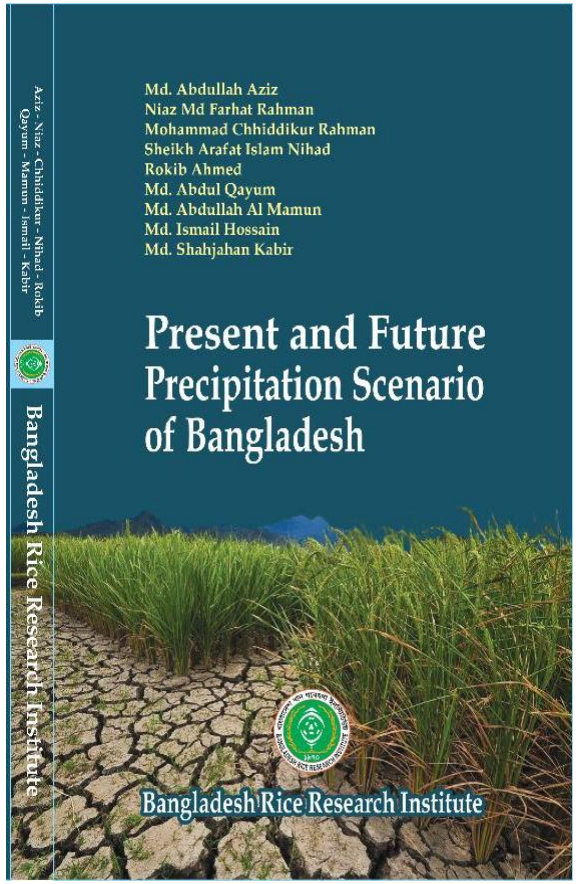




Published Book/ Booklet







Way Forward of Agricultural Statistics Division

In Research

- Estimating genetic, agronomic and environmental gains by developing statistical models to accurately analyze data from breeding, agronomic and adaptive.
- Development moisture adjustment factor for rice yield estimation.
- Development of yield loss prediction model.
- Identification of CV (%) thresholds for getting experimental precision.
- Development of rice database and web platform for analysis using statistical programming.
- Bringing 5% of the country's farmer under weather forecast based rice production management.
- Implementation of precision agriculture theory in production using IoT, ML approach and AI.
- Big data management, data mining and crop modeling.
- Analysis and prediction of rice crops at different stages, genome sequencing and genome editing analysis using Bio-informatics.
- Innovate smart technology in research to build smart Bangladesh.

Way Forward of Agricultural Statistics Division

Using GIS and RS

- Crop monitoring using both satellite and Unmanned Aerial Vehicle (UAV) data.
- Crop damage loss assessment by natural disaster using satellite image.
- Rice yield forecasting using Satellite Images, Artificial Intelligence (AI), Machine Learning Method (MLM).

Using MIS

- BRRI's internal services digitization.
- Digitization of data collection system of rice research.
- Rice research and rice related information-based "Data Bank" for BRRI.
- An Online based automated and dynamic (Real-time) software development for all information related to rice production in Bangladesh.

Way Forward of Agricultural Statistics Division

Using ICT and 4IR

- To establish dashboard-base crop monitoring system analyzing several steps of rice through real-time data feeding system.
- To monitor rice crop health and estimate yield through AI and drone technology.
- Provide diversified information through this dashboard with identifying affected insect and disease including real time location specific detail map.
- To establish Smart AI Research & Development lab and transform existing data center into Big Data center through modernization.
- To collect smart device-base rice related real data and provide internet-enabled device to scientists.
- To establish 'Smart Agriculture' through Big Data, cloud computing and dashboard management in rice research.
- Adopt precision agriculture and 4IR related technology for making digital ecosystem and digital technology extension.

Team of Agricultural Statistics Division