

# Agronomy Division

# Welcome



# Agronomy Division

- **Mandate:** To develop technology on suitable practices and agronomic management for rice yield maximization
- **Mission:** To achieve food security through sustainable agronomic research and technological innovation
- **Vision:** Development of suitable agronomic practices and technologies for rice production to ensure food security of increasing population by addressing the challenges of climate change and dwindling resources

# Agronomy Division

## Major fields of research

1. *Seeds and Seedlings*
2. *Planting Practices*
3. *Fertilizer Management*
4. *Soil Health Improvement*
5. *Yield Maximization*
6. *Crop Modeling*
7. *Weed Management*
8. *Soil Microbiology & residual effect*

## Research Facilities Developed in Agronomy Division

Portable Photosynthesis meter

Plant growth chamber

Auto nitrogen analyzer

Flame photometer

Spectrophotometer

Real time PCR

Atomic Absorption

Spectrophotometer



Opening ceremony



Monitoring team of MoA



# Agronomic Management

$$Y = G \times E$$



$$Y = G \times E \times M$$



$$Y = G \times E \times M (\times P)$$

$$Y = G + E + M (+ P)$$

*G*: Genotype;

*E*: Environment (Agro-ecosystems);

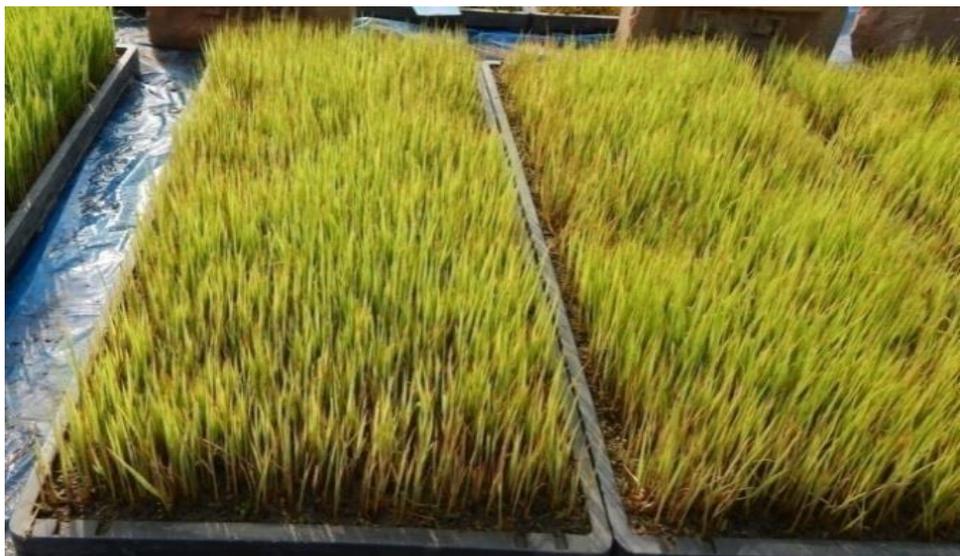
*M* = Agronomic practices;

*P*: People

## *Seedling Raising in Tray for Rice Transplanter in Boro Season*

- Cold spell is a major factor arresting the seedling quality in Boro
- Rice husk mixed with soil may act as an insulator to preserve soil temperature

*75% loamy soil + 25% rice husk is an excellent tray media to produce quality seedling for rice transplanter in Boro season*



**100% Soil**



**75% Soil + 25% Rice Husk**

# Protection of Boro Rice Seedling from Cold Injury using Polythene Shed

Polythene covering for all time with round shape opening is the most suitable technique for protecting Boro rice seedling from cold injury



- A. Conventional Seed bed
- B. All time Polythene covering with round shape opening
- C. Night time Polythene Covering
- D. Day time polythene covering
- E. Polythene covering during cold
- F. All time Polythene covering



## *Azolla consideration in soil could be a substitute of urea*

- Nitrogen derived from urea and Azolla was similar in respect to grain yield
- The biomass of azolla increased linearly with applied phosphorus fertilizer



**Control**



**Azolla Incorporation**

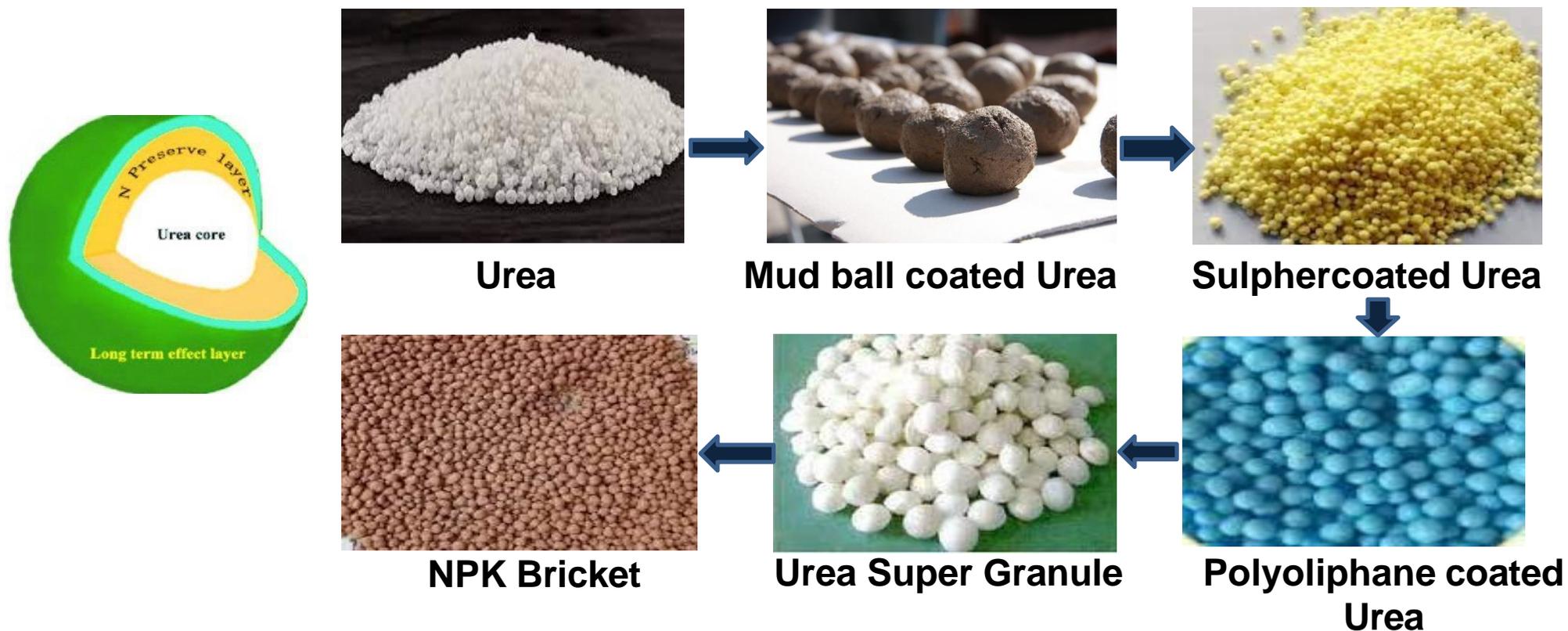


**Azolla**

## Agronomy Division plays a significant role in fertilizer management

S deficiency in Bangladesh was first identified by Agronomy division in 1975-76

Agronomy division is the pioneer of doing research on Mudball coated urea, Sulphur coated urea, USG, NPK bricket to increase the NUE (Input Project, 1979)



# Rice growth stage wise agronomic management



## Germination

- Seed incubation 48-72 hours according to season
- Germination temperature (10°C - 40 °C)



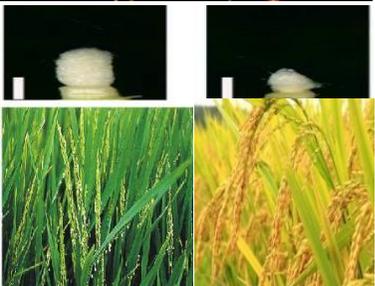
## Seedling

- Prepare ideal seed bed and protect seedling from cold
- Seedling age: Aus:15-20, T. Aman: 20-25 and Boro: 30-45 days



## Tillering (Active to Maximum tillering)

- N top dress at active tillering, maximum tillering & before PI
- Weed Mgt. (30-40 DAT in Aus & Aman & 40-45 DAT in Boro)
- Water management to ensure nutrient uptake

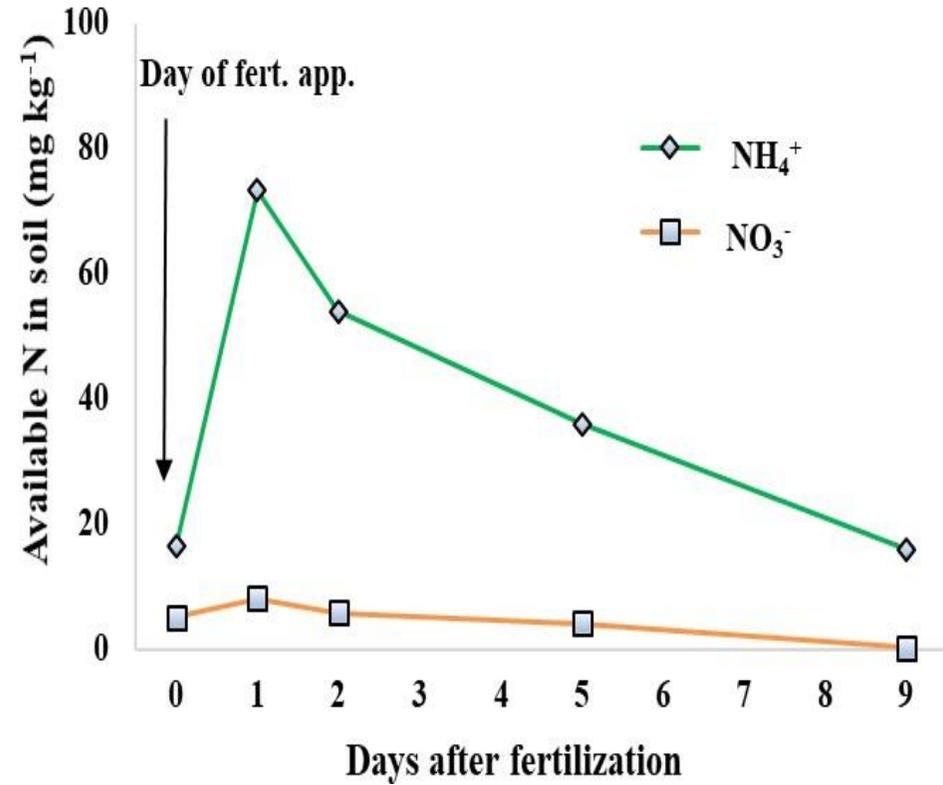
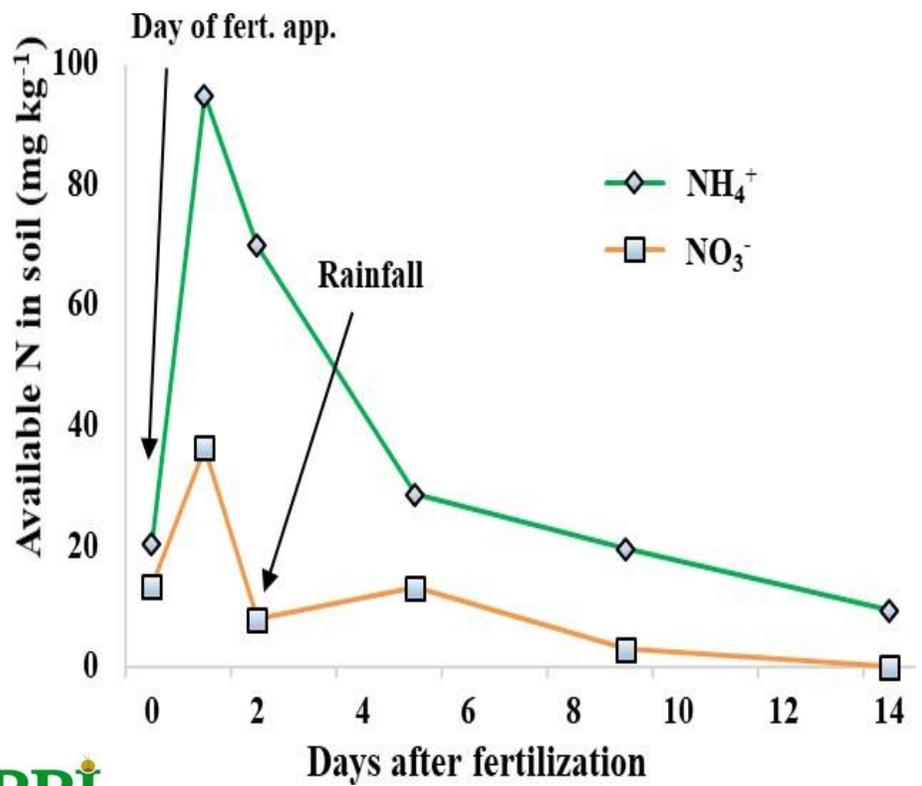


## Reproductive and Ripening Phase

- Keep 5-6 cm water in the field to reduce sterility
- Drain out-water after hard dough stage
- Harvest at 80-100% grain maturity

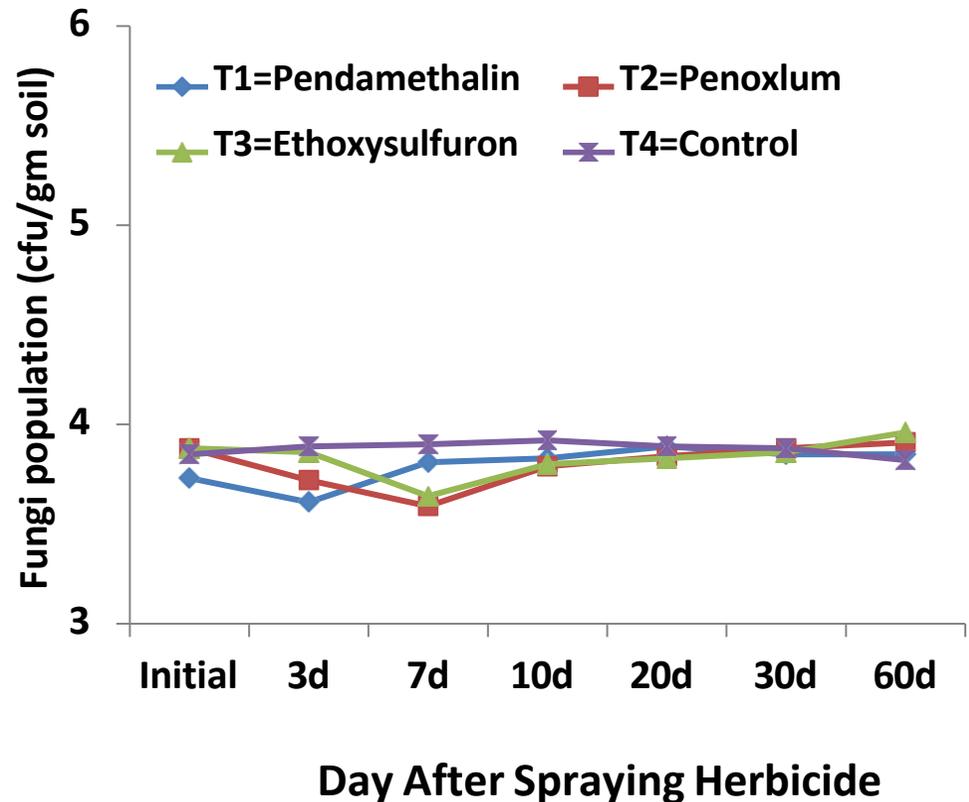
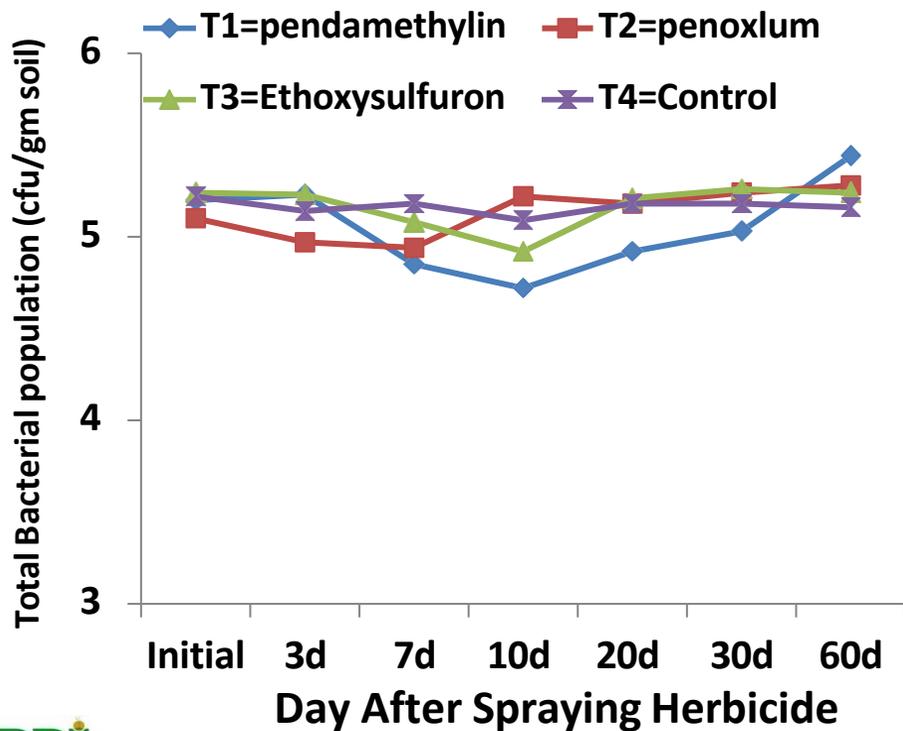
# Nitrogen Pools in Wetland Rice Soil after Urea Application

The highest mineral-N in soil was measured at day-1 and then declined gradually to the base level at day-9 after urea application



# Effect of herbicides on soil microorganisms in transplanted rice

- Fungi and bacterial population could be regained their numbers 7 and 10 days after the application of herbicides, respectively
- Regain capacity of fungi and bacterial population varied on different herbicide groups



## *Integrated rice-duck culture for weed control in transplanted rice fields*

- Two weeks after rice transplanting, 25-30 d old ducks are release to the rice field
- No need any herbicide to control weed
- Required less amount of chemical fertilizers



## Potato-Mungbean-T. Aus-T. Aman: A sustainable high-intensity cropping pattern for medium high land to medium lowland

- The **rice equivalent yield (REY) is higher (33 t ha<sup>-1</sup>)** in the proposed pattern compare to existing farmers' improved pattern (Potato-Maize-T. Aman: 27 t ha<sup>-1</sup>) and farmers' traditional practice (Boro- Fallow-T. Aman: 11 t ha<sup>-1</sup>)
- **Beneficial for soil health due to the inclusion of a legume crop mungbean**

Nov 21-Feb 21

Feb 25-May 5

May 10-Aug 5

Aug 12-Nov 3



**Fig. 1. Adaptation of four-crop pattern (Potato- Mungbean-T. Aus-T. Aman)**

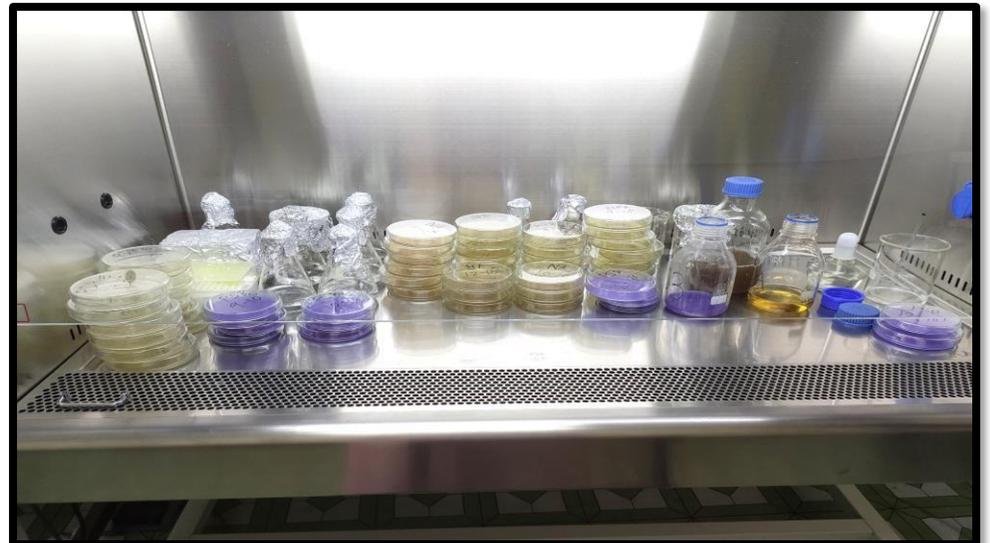


## Training on AAS

## Training on Chemical Analysis









Opening ceremony of rain-out shelter

## Salinity management using Nano-ZnO



# Field day : BIRRI dhan87





## Aus variety dissemination at Gazipur Sadar





## Seed distribution at Taherpur (Sonir Haor)





## Farmers' Training at Tahirpur (Sonir Haor)





**FGD on DTP, Dinajpur**

**FGD on DTP, Rangpur**





Meeting with Rice Miller at Nilphamari

## Rice Branding





## Pesticide dealer meeting at Lalmonirhat



# On-going Research

- Application of Nano-Zinc Oxide to Improve Salt Tolerance of Rice
- Alleviation of salt stress in rice by exogenous phytoprotectants: regulation of  $\text{Na}^+/\text{K}^+$  homeostasis and oxidative metabolism
- Physiological, biochemical and molecular mechanisms of drought tolerance in rice
- Residue analysis of pesticide in soil, water and rice under irrigated ecosystem
- Response of yield and agronomic output of Bangabandhu dhan100 under varying sowing window in cold prone Rangpur region
- Biodegradation of pesticides in soil using selected microbial strains
- Characterization and identification of salt-tolerant PGPR isolated from coastal saline areas in Bangladesh

# Future Research Thrust of Agronomy Division

- *Nano Technology*
- *Precision agriculture*
- *Product Protocol Development for Yield Maximization*
- *Determination of potential allelo-chemicals in rice ecosystem*
- *Mechanism of pesticide degradation by soil microbes*
- *Abiotic stress management using stress tolerant PGPR*
- *Molecular mechanism of abiotic stress tolerance in rice*
- *Herbicide residue analysis in grain and straw*



# GOOD CROP WITH IMPROVED AGRONOMIC MANAGEMENT