## Sub-Sub-Program: Rice Production Management Project Leader: Md. Sirajul Islam Project.1. Rice Production Management

Expt.1.1. Artificial Plough Pan Development for Facilitating Modern Farm Machineries

## **Rationale**

A plow pan is a subsurface horizon or soil layer having a high bulk density and a lower total porosity than the soil (a compacted layer) directly above or below it as a result of pressure applied by normal tillage operations, such as plows, discs, and other tillage implements. Plow pans are the result of pressure exerted by humans, whereas hard pans occur naturally. In most of the soil plough pan exist at around 20 cm soil depth (Anken et al. 2004, Munkholm et al. 2005, Podder et al. 2012). The presence of plough pan may influence the physical properties of soil such as soil texture, structure, density, pore space, soil consistency soil color, soil temperature and may also affects soil chemical properties such as soil pH, soil organic matter and availability of soil nutrients (Podder et al. 2012, Mojid et al. 2019).

Almost all of the soils of BRRI farm are facing a problem of low soil resistance due to lack or break of natural plough pan. Many areas are earthen up to essentially avoid water stagnation which results no plough pan existence. As a result, modern farm machineries like combined harvester, tractor, even power tillers cannot be operated in this farm. The situation become worsen when tillers/tractor or draft animals stuck in the mud. In addition, combined harvesters are not suitable for this land due to lack of required soil resistance capacity. To solve this problem, BRRI need to develop plough pan (increase soil resistance) artificially.

There are some hypotheses on development of soil resistance/plough pan. Nevens and Reheul (2003), Munkholm et al. (2005) and Singh et al. (2015) suggested that soil compaction by tractor (using 130 kPa pressure) or heavy machine might increase soil resistance by plough pan formation. On the other hand some researchers opined that coarse textured soil show vertical soil resistance which might increases soil capacity to bear heavy farming traffic (Singh et al. 2015, Ellies et al. 2000). Alternate freezing-thawing (Blake 1976) and alternate wet-dry cycles (Radford et al. 2007) have also been reported effective for consistent soil resistance build up. If land remains fallow for a period of time, than plough pan development occurs rapidly (Sattar and Islam, 2022). Considering all the above situation, a research program is taken to develop plough pan artificially in BRRI farm.

## Objectives

- 1. To increase soil resistance capacity
- 2. To develop artificial plough pan in BRRI farm

## **Materials and Methods**

The experiment will be conducted in west byde of BRRI farm in a plot having no plough pan or hard pan. A strip plot design will be followed with 3 replications. BRRI dhan87 and Bangabandhu dhan100 will be used in T. Aman and Boro seasons, respectively. At hard dough stage of rice, irrigation will be stopped and the land will be allowed to dry to facilitate plough pan development. When the moisture content become suitable, then compaction will be done two times in a week interval (treatment plots).

#### **Treatment combinations**

Treatment A (Methods)	Treatment B (Water management)
M1: Control (normal practice).	W1: Continuous flooding
M2: Compaction of soil by tractor <sup>1</sup> after harvesting.	W2: Alternate Wetting and Drying
M3: Placing a 3 inch fine sand layer at 8 inch (20cm)	
below soil surface and compaction.	
M4: Compaction of soil by tractor <sup>1</sup> after T. Aman	
harvesting and fallow in Boro season.	

(<sup>1</sup> The soil will be artificially compacted by a wheel-to-wheel tractor passage. The tractor weight approximately 3000 Kg. Double rear wheels with normal tire type with inflation pressure around 100 kPa. Soil moisture content will be at suitable range between 15-20%. Compaction will be two times at 7-10 days interval).

#### Data to be collected

i. Soil resistance (using penetrometer) and ii. Yield and yield components.

## PI: Md. Mamunur Rahman

CI: Md. Sirajul Islam, Md. Mostofa Mahbub (Agronomy), one scientist from FMPHT.

Year of Initiation: T. Aman 2022

Year of Complition: Boro 2027

Expected output: A method to develop plough pan in soil of BRRI.

## **References:**

- Blake GR, Nelson WW and Allmaras RR (1976). Persistence of subsoil compaction in a mollisol. Soil Science Society of America Journal, 55: 224-46.
- Ellies Sch A, Smith RR, Jose Dorner FJ and Proschle TA (2000). Effect of moisture and transit frequency on stress distribution on different soils. Agro Suro, 28: 60-68.
- Nevens, Frank and Reheul Dirk. 2002. The consequences of wheel-induced soil compaction and subsoiling for silage maize on a sandy loam soil in Belgium. Soil and Tillage Research, 70: 175-184.
- Radford BJ, Yule DF, McGarry D and Playford C (2007). Amelioration of soil compaction can take 5 years on a Vertisol under no till in the semi-arid subtropics. Soil and Tillage Research, 97: 249-255.
- Singh Jagdish, Amit Salaria and Amit Kaul (2015). Impact of Soil Compaction on Soil Physical Properties and Root Growth: A Review. International Journal of Food, Agriculture and Veterinary Sciences, Vol. 5 (1): 23-32
- Sattar, S.M.A., and M.S. Islam. 2022. Personal Communication.

- Munkholm, Lars J., Per Schjønning and Rüegg Kaspar. 2004. Mitigation of Subsoil Recompaction by Light Traffic And on-Land Ploughing I. Soil Response. Soil and Tillage Research, 97: 149-158.
- Podder, MM Akter, ASM Saifullah and S Roy. 2012. Impacts of Plough Pan on Physical and Chemical Properties of Soil. J. Environ. Sci. & Natural Resources, 5(1): 289-294.
- Mojid, Mohammad A., Mohammad F. Parvez, Mohammed Mainuddin and Geo Hodgson. 2019. Water Table Trend: A Sustainability Status of Groundwater Development in North-West Bangladesh. Water, 11:1182.

## Expt.1.2. Determination of Fertilizer Management to Control Algae Infestation in Rice Field

#### **Rationale**

Algae infestation is one of the most common problems in BRRI farm. Especially, during the present Boro season, the problem is found in almost all the plots. Some plots were severely affected where transplanted seedling establishment was hampered greatly. If the plots are affected at the early seedling establishment period then the situation become worsen. Algae problem is very common in the lowland rice growing area of Bangladesh, India, Vietnam, Thailand and many other countries of the world (Grant et al. 2006). Algae can smother rice seedlings or cause them to dislodge, resulting in yield loss. Research proved that algae infestation in rice field decreased rice yield significantly and the reduction rate depends on the infestation rate of algae (Freney et al. 1994, Chaiwanakupt et al. 1996). Chaiwanakupt et al. (1996) reported 31 reduction of yield due to algae infestation in rice field.

Some experiments have been done on algae management and control practices. It has been found that nutrient condition of rice field has a great influence on the occurrence of algae in rice field. When urea is added, algae and iron oxidizing bacteria (at the oxic-anoxic interfaces) use NH4 + (ammonium) as a source of nitrogen and grow up (Stitt, 2003). Banu et al., (2004) showed a positive correlation between algal and microbial biomass and total N in soils. Freney et al. (1994) Grant et al. (2006) and Ohadi et al. (2021) showed a clear relationship between increasing urea and growth of algae which have inhibitory effects on early rice growth and ultimately reduce rice yield.

Among different nutrients, available phosphorus in the upper aqua solution has the most influence followed by nitrogen availability (Grant et al. 2006, David and Bruce 2014, Ohadi et al. 2021). David and Bruce (2014) found rice fields that received conventional surface-applied phosphorus fertilizer had 4–8 times more algal biomass and 3–11 times higher concentrations of soluble reactive phosphate (SRP) than soil incorporated one and suggested phosphorus fertilizer management to control algae in rice field. Different fertilizer combination has different effect on nutrient solubility and availability. Use of different sources of phosphorus fertilizer should have different effect on algae infestation (David and Bruce 2014). Therefore, in this experiment we have decided to see the effect of two different phosphorus fertilizers on algae infestation in rice field.

#### **Objectives**

- 1. To determine fertilizers' effect on algal growth in rice field
- 2. To identify fertilizer management to control algae in rice field

#### **Materials and Methods**

The experiment will be conducted in a relatively lower land at west byde of BRRI. RCB Design with 3 replications will be followed. Plot size will be 25 m<sup>2</sup>. BRRI dhan92 or any one suitable Boro variety will be used.

## Treatments

- I. Full dose basal fertilizer of DAP, MoP, Gypsum & Zinc (BRRI recommended)
- II. Full dose basal fertilizer of TSP, MoP, Gypsum & Zinc (BRRI recommended)
- III. Half dose basal fertilizer of DAP and Full dose MoP, Gypsum & Zinc
- IV. Half dose basal fertilizer of TSP and Full dose MoP, Gypsum & Zinc
- V. Basal fertilizer of full dose TSP, MoP, Gypsum & Zinc, and 1/3<sup>rd</sup> Urea

For treatment III and IV, rest half dose DAP/TSP will be applied at second urea top-dress.

#### Data to be collected

i. Tillering dynamics, ii. Plant height, iii. Yield and yield components, iv. HI, v. Algae infestation

#### PI: Md. Mamunur Rahman

CI: Md. Sirajul Islam, Md. Mostofa Mahbub (Agronomy)

Year of Initiation: T. Aman 2022

Year of Complition: Boro 2025

**Expected output:** A of fertilizer management method to control algae.

#### **References**

- Banu, NA, B Singh and L Copeland. 2004. Soil Microbial Biomass and Microbial Biodiversity in Some Soils from New South Wales, Australia. Australian Journal of Soil Research, vol. 42: 777-82.
- Chaiwanakupt, P, JR Freney, DG Keerthisinghe, S Phongpan and RL Blakeley. 1996. Use of Urease, Algal Inhibitors, and Nitrification Inhibitors to Reduce Nitrogen Loss and Increase the Grain Yield of Flooded Rice (*Oryza Sativa* L.). Biology and Fertility of Soils volume 22: 89–95.
- David FS and AL Bruce 2014. Reducing rice field algae and cyanobacteria abundance by altering phosphorus fertilizer applications. Paddy Water Environ 12:147–154
- Freney, JR, DG Keerthisinghe, S Phongpan, P Chaiwanakupt and KJ Harrington. 1994. Effect of Urease, Nitrification and Algal Inhibitors on Ammonia Loss and Grain Yield of Flooded Rice in Thailand. Fertilizer research vol 40:225–233.
- Grant AJ, M Pavlova, L Wilkinson-White, A Haythornthwaite, I Grant, D Ko, B Sutton, & R Hinde. 2006. Ecology and biology of nuisance algae in rice fields. School of Biological Sciences, A08, University of Sydney, NSW, Australia.
- Ohadi S, Godar A., Madsen J. and K. Al-Khatib. 2021. Response of Rice Algal Assemblage to Fertilizer and Chemical Application: Implications for Early Algal Bloom Management. Agromomy, 11, 542.

Stitt, M, C Mueller, P Matt, Y Gibon, P Carillo, R Morcuende, WR Scheible and A Krapp. 2002. Steps Towards an Integrated View of Nitrogen Metabolism. Journal of Experimental Botany, vol. 53: 959-970

## Expt.1.3. Suitable Chemical Control of Algae in Rice Field.

## <u>Rationale</u>

Algae infestation is one of the most common problems in BRRI farm. Especially, during the present Boro season, the problem is found in almost all the plots. Some plots were severely affected where transplanted seedling establishment was hampered greatly. If the plots are affected at the early seedling establishment period then the situation become worsen. Algae problem is very common in the lowland rice growing area of Bangladesh, India, Vietnam, Thailand and many other countries of the world (Grant et al. 2006). Algae can smother rice seedlings or cause them to dislodge, resulting in yield loss. Research proved that algae infestation in rice field decreased rice yield significantly and the reduction rate depends on the infestation rate of algae (Chaiwanakupt et al. 1996). Chaiwanakupt et al. (1996) reported 31 reduction of yield due to algae infestation in rice field.

Bharathi et al. (2021), Berdalet et al. (2014), Chaiwanakupt et al. 1996 and some other researcher observed effect of different chemicals on growth of algae and found some chemicals effective for controlling algae. Some experiments were conducted at BRRI using some chemicals, CuSO<sub>4</sub> and Dithane M45. Though CuSO<sub>4</sub> is proved to be effective, but are relatively very slow and are highly reactive to form insoluble compound which decrease its efficiency quickly (Grant et al. 2006). Therefore, we would like to see the effect of some chemicals on algae to control its infestation in rice field.

**Objective:** To identify suitable algae control chemical for rice field.

## Materials and Methods

The experiment will be conducted in a relatively lower land at west byde of BRRI. RCB Design with 3 replications will be followed. BRRI dhan92 will be used in this study. Plot size will be  $25 \text{ m}^2$  with transplanting maintaining 20 cm spacing. An artificial inoculation at 7 DAT will be done if necessary. Treatments will be applied 12-15 days after first urea top dress when the algae mat will nearly cover the land.

## Treatments

- I. Control plot
- II. CuSO4 (2.5 kg ha<sup>-1</sup>) (55g in 10 litre water for 5 decimal land)
- III. Dithane M45 (4.5 kg ha<sup>-1</sup>) (100g in 10 litre water for 5 decimal land)
- IV. Sodium Carbonate Peroxyhydrate (1.5 kg ha<sup>-1</sup>)
- V. Benzalkonium chloride (Zephiran) (1.5 kg ha<sup>-1</sup>)

## Data to be collected

i. Tillering dynamics, ii. Plant height, iii. Yield and yield components, iv. HI v. Algae infestation

## PI: Md. Mamunur Rahman

CI: Md. Sirajul Islam, Md. Mostofa Mahbub (Agronomy)

Year of Initiation: T. Aman 2022

Year of Complition: Boro 2024

Expected output: A method to control algae at BRRI farm.

## **References:**

- Banu, N.A., B. Singh and L. Copeland. 2004. Soil Microbial Biomass and Microbial Biodiversity in Some Soils from New South Wales, Australia. Australian Journal of Soil Research, vol. 42: 777-82.
- Bharathi, M. J., K. Rajappan and M. Raju. 2021. Green Algae Diagnosis and Management in Low Land Paddy Fields of Cauvery Delta Zone, Tamil Nadu, India. International Journal of Current Microbiology and Applied Sciences, Volume 10 (02): 3407-3420
- Berdalet E., M.A. McManusb, O.N.Rossa, H.Burchard, F.P.Chavez, J.S.Jaffe, I.R. Jenkinson, R.Kudela, I.Lips, U.Lips, A.Lucas, D.Rivasi, M.C.Ruiz-de la, Torrej, Ryand, J.M.Sullivank, H.Yamazakim. 2014. Understanding harmful algae in stratified systems: Review of progress and future directions. Deep Sea Research Part II: Topical Studies in Oceanography, 101: 4-20.
- Chaiwanakupt, P., J. R. Freney, D. G. Keerthisinghe, S. Phongpan and R. L. Blakeley. 1996. Use of Urease, Algal Inhibitors, and Nitrification Inhibitors to Reduce Nitrogen Loss and Increase the Grain Yield of Flooded Rice (*Oryza Sativa* L.). Biology and Fertility of Soils volume 22: 89–95.
- David F. S. and A. L. Bruce 2014. Reducing rice field algae and cyanobacteria abundance by altering phosphorus fertilizer applications. Paddy Water Environ 12:147–154
- Grant A.J., M. Pavlova, L. Wilkinson-White, A. Haythornthwaite, I. Grant, D. Ko, B.Sutton, & R. Hinde. 2006. Ecology and biology of nuisance algae in rice fields.School of Biological Sciences, A08, University of Sydney, NSW, Australia.
- Ohadi S, Godar A., Madsen J. and K. Al-Khatib. 2021. Response of Rice Algal Assemblage to Fertilizer and Chemical Application: Implications for Early Algal Bloom Management. Agromomy, 11, 542.
- Stitt, M., C. Mueller, P. Matt, Y. Gibon, P. Carillo, R. Morcuende, W.R. Scheible and A. Krapp. 2002. Steps Towards an Integrated View of Nitrogen Metabolism. Journal of Experimental Botany, vol. 53: 959-970

# Expt.1.4. Influence of different dates of transplanting on growth, yield performance and quality of fine rice varieties

## **Rationale**

Rice is grown in variable environmental conditions. The adaptability of a variety to a particular location depends mainly on their varieties having desirable characteristics to adjust the agro-climatic conditions of those locations. Consideration of planting of rice is the most important to obtain higher yield. The early or late planting of rice the T. *aman* season influences the growth and yield due to changes in the climatic conditon (Joseph and Havangi, 1987). Transplanting time in T. *aman* season is very important as this control the vegetative phage of a variety. In other words, early transplanting beyond optimum date enhanced excessive vegetative growth and late planting shortening the vegetative phage (Zaman, 1981). Transplanting time influences the vegetative phage of a variety. Rice seedling when

planted late, it will get short period for its vegetative growth and thus its yield decreased (Miah *et al.*, 1990; Islam *et al.*, 1999). Due to late planting the yield reduction was higher in weekly photoperiod sensitive varieties compared to strongly photoperiod sensitive rice (BRRI, 1994). Drastically yield reduction was observed when transplanting was done after mid-September (BRRI, 2003). The grain yield of photoperiod sensitive varieties decreases as the transplanting delay beyond September in at Gazipur area. The rate of grain yield reduction was higher in the Northern regions compared to Southern part of Bangladesh (BRRI, 1990). With the view in mind, the study was undertaken to evaluation the suitable optimum date of transplanting and screen out the suitable fine rice variety.

## Objectives

To confirm best planting time of fine rice varieties for higher yield and quality.

## Materials and methods

The experiment will be conducted at BRRI Gazipur farm during T. Aman season 2022. The experiment involves two factors.

#### Treatments

Factor A: Transplanting date	Factor B: Variety
$T_1 = 1$ July	$V_1 = BRRI dhan34$
$T_2 = 15 July$	V <sub>2</sub> = BRRI dhan90
$T_3 = 30$ July	V <sub>3</sub> = Binadhan-13
$T_4 = 15$ August	
$T_5 = 30$ August	
$T_6 = 15$ September	

#### Data to be collected

i. Plant height (cm) at 15 days interval, ii. No. of tillers hill<sup>-1</sup> at 15 days interval, iii. LAI and TDM at 15 days interval, iv. 50% flowering date, v. Number of effective tillers hill<sup>-1</sup>, vi. Number of filled grain panicle<sup>-1</sup>, vii. Number of unfilled spikelet's panicle<sup>-1</sup>, viii. Panicle length (cm), ix. Wt. of 1000 grain (g), x. Grain yield (t ha<sup>-1</sup>), xi. Straw yield (t ha<sup>-1</sup>), xii. Harvest index, xiii. Quality parameters (Physioco-chemical and cooking properties)

PI: Mohammad Rezaul Manir

**CI:** Md. Sirajul Islam, Md. Mamunur Rashid, Setara Begum and Habibul Bari Shozib (GQND) **Year of initiation:** T. Aman 2022-2024

Year of completion: 3 year

Location: BRRI farm, Gazipur	Design: Strip plot
Season: T. Aman 2022	<b>Replication</b> : 3

**Expected output:** Appropriate transplanting date and variety might be identified for growth, yield performance and quality.

#### Expt.1.5. Effect of storage time in different storage technologies on quality of rice

## **Rationale**

Most of the rice grains produced in the country is stored in traditional storage structures at farmer's level; these account for 70-80% of the total produce. The most widely used rice storage structures in rural areas of Bangladesh are different types of traditional bins which used bulk storage of food grains. These include various types of earthen wares, plastic bags, jute bags, and bins made of plant materials, especially bamboo. The traditional methods of paddy seeds storage has no or limited control of humidity, temperature, insects, rodents etc. Therefore, traditional methods of paddy seed storage cause deterioration of seed health and thereby seed quality. Storage time commences harvest and continues as a time, temperature and moisture dependent index (Perdon et al., 1997; Okabe, 1979). During storage time of rice, a number of physiochemical properties changes that causes impact on rice cooking and eating quality. However, the main components of the rice like starch, protein and lipids remains unchanged during storage time and only structural changes take place along with change in flovors and texture. The freshly harvested rice cooks sticky, more solids are leached out during cooking, and it swells less as compared to aged rice. Significant changes occur in the cooking characteristics in the months following harvested because of number of physicochemical changes in the grain. Storage is an inevitable step that results in decreased cohesiveness, large volume and fine texture of the cooked rice. The cost of aged rice is normally 25-30% higher than fresh rice (Rajendran et al., 2002). Moreover, there is some report showed that aging generally results in a higher head rice yield on milling, higher volume expansion and water absorption upon cooking, and harder, less sticky cooked rice. Considering above these points, an experiment was taken to find out storage time and storage technologies effect on grain quality at rice variety.

## Objectives

- i. To observe the grain quality of fine rice variety at different storage time and storage technologies.
- ii. To identify the suitable storage technologies for preservation of rice seed.

## Materials and methods

The experiment was conducted in Farm Mangement Division and Grain Quality and Nutrition Division in BRRI head quater, Gazipur during 2022-23 season. Two rice varieties BRRI dhan70 in T. Aman season and BRRI dhan84 in Boro season were selected in this experiment at 12% moisture content (wet basis). The experiment involves two factors.

#### Treatments

Factor A: Storage time	Factor B: Storage container
$T_1$ = Milling after immediate of harvesting	$C_1 = Plastic container$
$T_2$ = Milling after 3 months	$C_2$ = Jute sacks
$T_3$ = Milling after 6 months	$C_3$ = Plastic bag
$T_4$ = Milling after 9 months	$C_4 = Motka$
$T_5 =$ Milling after 12 months	C <sub>5</sub> = Grain Pro bag

#### Data to be collected:

i. Moisture content (%), ii. Temperature (%), iii. Relative humidity (%), iv. Germination Test (%), v. High density grain (%), vi. Seedling vigour index (%), vii. Root length, viii. shoot length, ix. Shoot dry weight, x. Root dry weight, xi. Insect infestation (%), xii. Grain quality parameters (Protein, Amylose, Cooking time, Vitamins (available in Rice).

## PI: Mohammad Rezaul Manir

**CI:** Md. Sirajul Islam, Md. Mamunur Rashid, Setara Begum and Nilufa Ferdous (GQND) **Year of initiation:** T. Aman, 2022

Year of completion: Boro, 2024

**Expected output:** Appropriate storage time and storage technologies might be identified for rice variety.

## Expt.1.6. Effect of Nitrogen Levels on Protein Quality of Rice at Different Regions

## **Rationale**

Rice grown in variable environmental conditions. The adaptability of a variety to a particular location depends mainly on their varieties having desirable characteristics to adjust the agroclimatic conditions of that location. Rice quality is an important consideration in the production of the crop, and much research has shown that rice quality is controlled by genetic factors as well as is affected by light, temperature and by of management water and nitrogen (Mo, 1993; Bao and Xia, 2000; Zhou et al., 1997). Nitrogen plays a key role supporting plant activity and increasing the rice yield (BRRI, 1997). Nitrogen is the key element in the production of rice and gives the largest response. It is also the fact that improper use of nitrogenous fertilizer, instead of giving yield advantage, may reduce the same. Again different varieties may have varying responses to nitrogen fertilizer depending on their agronomic traits. Many workers have reported a significant response of rice to nitrogen in different soils in Bangladesh (Bhuiyan et al, 1989 and Islam et al, 1990). The cooking and nutritional qualities are two of the most important aspects of rice quality. Some studies (Gomez, 1981; Kim, 1993) have investigated the relationship between nitrogen and the cooking and nutritional qualities and reported that the crude protein content was increased with increased nitrogen application but that the amylose content and gel consistency were reduced. With the view in mind, the study was undertaken to examine the effect of nitrogen levels on growth, yield and protein quality of rice at different regions.

**Objective:** To find out the best nitrogen level for protein quality of rice at different regions.

## Materials and methods:

The experiment will be conducted in all regional stations with BRRI head quarter and Grain Quality and Nutrition Division, Gazipur during 2022-23. BRRI dhan87 in T. Aman season and BRRI dhan92 in Boro season will be used in this experiment. RCB design with three replications will be used for this experiment.

#### **Treatments:**

N levels (Kg/ha in T. Aman season )	N levels (Kg/ha in Boro season)
$T_1 = No N$	$T_1 = No N$
$T_2 = 25$	$T_2 = 100$
$T_3 = 50$	$T_3 = 125$
$T_4 = 75$	$T_4 = 150$
$T_5 = 100$	$T_5 = 175$
$T_6 = 125$	

#### Data to be collected:

i. Yield components and Yield, ii. Nitrogen status in leave, stem and panicles, iii. Diseases infestation (%), iv. Temperature (%), v. Rainfall (%), vi. Quality parameters (Protein, Amylose, Vitamins (available in rice)

PI: Mohammad Rezaul Manir

**CI:** Md. Sirajul Islam, Md. Mamunur Rashid, Setara Begum and Habibul Bari Shozib (GQND)

Year of initiation: T. Aman 2022

## Year of completion: 2024

**Expected output:** Appropriate nitrogen dose might be identified for growth, yield performance and protein quality of rice at different regions.

## Sub-Sub-Program: Labor Management System Project 2: Survey and development of data base for labor management. Project Leader: Md. Sirajul Islam

Expt. 2.1. Labour efficiency and work quality at different time frame for rice production. (New)

## <u>Rationale</u>

Now a day, farm mechanization is boasting up in agricultural sectors in Bangladesh. Fully mechanized agriculture is very much difficult in Bangladesh due to some practical social reasons. Presently around forty percent labour force of Bangladesh are employed in agriculture. Rice is the main part of agriculture in Bangladesh and most of the labours are associated to rice production. In some cases, labours work all day long. There are need of research about their work quality and efficiency at different time frame. Therefore, labourers' efficiency and work quality at different time frame during different management practices of rice production are important. In BRRI, different types of agricultural labours are available, for example, regular and irregular labour, daily hire labour and contract labour. Our objectives of the study are:

- 1. To see the labour efficiency of different labours.
- 2. To find out quality of work of different labours.
- 3. To find out suitable time frame of a day for quality and efficient work.

#### **Materials and Methods**

The experiment will be conducted in head quarter (BRRI farm, Gazipur), Sonagazi Regional Station and Sirajganj Regional Station. The experiment will be conducted in two factorial

RCBD design with three replications. The first factor will be four group of labours. These are:

- 1. Regular labour
- 2. Irregular labour,
- 3. Daily hire labour
- 4. Contractual labour

The second factor will be time of work. The time of work will be:

- 1. 6.30-8.00 am
- 2. 8.30-11.00 am
- 3. 11.30 am -1.00 pm
- 4. 2.00-3.30 pm
- 5. 4.00-5.30 pm

Work efficiency and quality of work will be measured at different intercultural activities like:

- i. Transplanting
- ii. Weeding
- iii. Harvesting
- iv. Some data collection (Plant height, PPMS etc.)

## PI: Md. Mamunur Rahman

**CI:** Md. Sirajul Islam, SMM Shahriar Tonmoy, Md. Adil Badshah, Md. Asib Biswas and B Karmarar.

Year of Initiation: Aus 2023

Year of Complition: Boro 2024

**Expected output:** Labour efficiency and work quality of different labourers.

## Expt. 2.2. Documentation of Laborers' Wage for Efficient Management and Planning for Rice Cultivation (Continued)

**Objective:** To find out the laborers' wage for rice cultivation throughout Bangladesh with food and without food.

Materials and methods: A pre-set proforma will be used for collecting data.

PI: Md. Sirajul Islam

**CI:** Mohammad Rezaul Manir, Setara Begum, S M M Shahriar Tonmoy, Md. Asib Biswas **Location:** Different locations of Bangladesh.

Season: Aus, Aman and Boro

Date of initiation and duration: April ' 2003; Continued.

**Expected output:** The average wage rate throughout the year may be higher than previous years.

Sub-Sub-Program: Rice Seed Production Project Leader: Md. Sirajul Islam Project 3. Rice Seed Production

Expt.3.1. Performance of BRRI Varieties in Seed Production Plots at BRRI Farm.

**Rationale:** Among all food items the significance of rice is the supreme one in Bangladesh. The International Rice Research Institute (IRRI) reported that in 2025 the demand of rice globally will be some 880 million tons, which is 70% higher than present level of production. But rice production is not increasing accordingly. The average yield of rice in Bangladesh is 2.91 t/ha (Bangladesh Economic Survey, 2011). On the other hand, natural digester like heavy rainfall, flood, cold, and drought damage a lot of rice in every year. Under such condition there is no way out other than the development and adoption in yield increasing technologies. Among different management practices, date of sowing, date of transplanting, fertilizer dose & application, insecticides & herbicides application, weeding, and other intercultural operations are important. All these management practices have important role on growth and yield of rice. Which variety will give better yield is important for expansion in the farmer's level. For the above reason this type of research was under taken by Farm management division.

Objectives: To observe potential yield of BRRI varieties.

**Materials and methods:** The data will be collected from the seed production plots of FMD. Therefore, varieties considered for seed production will be treatment varieties.

Location: BRRI farm, Gazipur

Data to be collected: i. Date of sowing, ii. Date of transplanting, iii. Yield and yield components

Date of initiation: Boro 2020- 21

PI: Md. Sirajul IslamCI: Md. Mamunur Rahman, Mohammad Rezaul Manir, Setara BegumStatus: ContinuedExpected output: Actual yield of a variety in farm.

Sub-Sub-Program: Management Activities and Support Services Project Leader: Md. Sirajul Islam Project. 4. Management and utilization of resources.

#### Expt. 4.1. Management and Utilization of Land and Labor Resources.

#### Objectives

To efficient utilization of farm land and labor resources for smoothly running of research activities and seed production at BRRI farm.

#### **Materials and Methods**

Efficient utilization of BRRI land and labor resources, and their management for smoothly running of research and development activities of BRRI.

Location: BRRI farm, Gazipur

Season: Aus, Aman and Boro

Date of initiation and Duration: 1985 and this will be done in each year (Continued).

PI: Md. Sirajul Islam

**CI:** Md. Mamunur Rahman, Mohammad Rezaul Manir, Md. Mamunur Rashid, Setara Begum

Status: Continued

**Expected output:** Better outcome from farm land and labor and smooth operations of farm implements.

## Project. 4.2. Management and Support Services of BRRI.

## Objectives

Efficient utilization of resources for smoothly running of research activities and other activities of BRRI.

## **Materials and Methods**

Management and support service activities of BRRI like Garden management, beautification of BRRI, Graveyard management, playground management, mosquito control activities, tree plantation etc. will be done by this division.

PI: Md. Sirajul Islam
CI: Md. Mamunur Rahman, Mohammad Rezaul Manir, Setara Begum
Date of initiation and Duration: 1985 and this will be done in every year (Continued).
Location: BRRI farm, Gazipur
Status: Continued
Expected output: Smooth management and attractive office premises.