# CONTEMPORARY YIELDING KNOWLEDGE OF RICE CULTIVATION AT GRASSROOTS Level- A Study

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## Abstract

A study was conducted in three villages under Comilla Sadar Upazila, in April, 2013 to find out the contemporary yielding knowledge of rice cultivation at grassroots level. Sample survey method (60 respondents were selected along with 3 key informants as sample) was followed to conduct the study considering the parameter like land holding pattern, adoption of variety, seed & seed technology, cultivation methods, age of seedling during transplanting, application of fertilizer, irrigation, weeding, disease & pest management, IPM & also yield & yield gap. The results of the study revealed that the farmers of those three villages of Comilla Sadar upazila cultivated many mordern varitieus but they don’t have any idea about the latest BRRI released high yielding varieties. There are also some other problems like the farmers do not use good quality seed, balanced fertilizer, ideal seed bed & also lack of knowledge about mordern rice production technologies.

**Key words:** Contemporary yielding knowledge, grassroots level

## Introduction

The almost uneven topography and humid tropical climate of country with abundant monsoon rain offers a unique environment for the rice plant in Bangladesh. As such, rice is the staple food of the people of this country and is part of their culture. About 75% of the total cropped area and more than 80% of the total irrigated area is planted to rice. Almost all of the 13 million farm families grow rice (ASB, 2007). Thus, rice plays a vital role in the livelihood of the people.

The rice crop consists of three seasonal harvests: Aus, Aman and Boro. Aus is a short-duration crop which is directly seeded in March-April and harvested in July-August, utilizing the pre-monsoon rain water. Aman, from June-August to November-January, is the monsoon crop. It grows with the floodwaters and is harvested after the floods recede. Boro from November-January to April-June, modern variety rice with irrigation facilities has expanded rapidly at the expense of Aus (Buffes and Gautam, 1996).

Food self-sufficiency mostly depends on rice production since rice alone contributes about 70% of agriculture GDP and 50% of the total agricultural valued added in Bangladesh. Technological change led by varietals improvement in Bangladesh has significantly contributed to the growth of rice production during the last three decades. In fact, due to the introduction of high-yielding seed and fertilizer, irrigation technology and rapid expansion of area under irrigated dry season rice, rice production has been tripled since independence in 1971 without further increase in growing area.

Though the country has achieved near self-sufficiency in rich production, it was at the expense of reduction of the area under non-rice crops, particularly pulses and oilseeds. Therefore, in order to attain self-sufficiency in food, technological advancement in the rice sector will obviously play a major role. Increase in production through horizontal expansion of area under rice cultivation is almost impossible since the area under crop production is always shrinking. Adoption of modern varieties under irrigated ecosystem has already reached a plateau. Further expansion of irrigation will also be difficult. The available statistics suggest that about 82 thousand hectares of land (1% of the total cropped land) are going out of agriculture every year.

Therefore, given the existing land constraints, further growth in rice production will depend on (a) the development of modern varieties for the unfavorable production environments, i.e. flood prone and salinity affected areas which cover nearly 40% of the cultivated land, and (b) the reduction of the gap between potential yield and farmers’ achieved yield, which is commonly called “yield gap.”

Bangladesh Rice Research Institution (BRRI) try to develop new technology including variety for the farmers of Bangladesh. They released 61 mordern rice varieties. Like BRRI, Bangladesh Institute of Nuclear Agriculture (BINA) so released some new variteties. But, unfortunately those new varites are not found in the farmers field. We can not increase our land but can increase the production by minimizing yield gap. So it is very urgent to know the rice yielding situation at local level. In this respect this type of study help the agriculture for future perspective.

The concept of yield gap originated from the constraint studies carried out by the International Rice Research institute (IRRI) during the seventies. Theoretically, yield gap is defined as the quantitative difference between the research/experiment station yield and the farm level yield of any technology/variety.

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According to the experts- “We have calculated that if the yield gap could be reduced by 50 percent, the country can produce an additional 29 million tones of rice a year.” (MH Kabir, 2011). To know the farmers perception and present knowledge and constraints regarding modern rice production practices, it needs to interview the different categories of farmers of different resource constraints areas. These areas may be saline, tidal submergence, drought or environmentally suitable for rice production. In this context we selected farmers of environmentally suitable areas under Comilla district near Bangladesh Academy for Rural Development (BARD) to find out the present rice cultivation practices of farmers. The other areas may include other studies. Hence, the study was conducted in three nearby village of BARD with the following objectives-

- To find out the existing condition of rice cultivation practices of three villages in Comilla Sadar Upazila.
- To observe and record current rice production management practices at farmers’ level and
- To identify farmer’s problems regarding rice management practices.

**Scope of the study**
Scope of the study will cover the following usage

1. Socio-economic characteristics of the study area e.g. occupation, income and expenditure, education and land ownership etc. of the respondents.
2. Knowledge of the respondents regarding proper management practices,
3. Availability of agricultural inputs e.g. seed, fertilizer and irrigation etc. timely.
4. Relation with DAE (Department of Agricultural Extension).

**Methodology**
The study was conducted in villages of Raichow, Olipur and Komolapur under Comilla Sadar Upazilla. These villages were also adjacent to the BARD. A total of 60 respondents were selected as sample. Random selection method was followed to select the respondents & also 3 key informants were also selected to communicate with the respondent. Both primary & secondary data were collected. Data was collected by personal interviews through pretested questionnire. Secondary data were collected from different books, journals, website etc. Data were coded for tabulation purpose. Data were then compiled in tabulation sheet. Finally date were transferred to worksheet of MS Excel for statistical analysis.

**Limitation of the study**
The Study has following limitations

- Time constraint that means very short time of the study.

Contemporary knowledge of rice cultivation at grassroots level

- The number of sample size is poor.
- Methodology of this study was also poor. We focused only the survey methods but gather are many empirical research method beside the survey method.

**Findings of the study**

**Land holding Pattern**
A total of 60 people were interviewed (20 from each village) Raichow, Olipur and Komolapur. There are 55.59 acres of cultivable land where per household land is estimated to be 1.85 each household contain on an average six members.

![Fig 1. Land Ownership Patterns](image)

The Percentages of households of small (0.01-1.49 acre) and Medium (1.50-4.99 acre) farmers were 60% and 33% respectively. 7% large (5.00 & above) farmers were found among the respondents (Fig. 1).

The above facts clearly indicated the inequality of land distribution.

Almost all areas were found under the crop coverage round the year. The cropping intensity of the studied villages was estimated at 300%, which implies that the farmers of Raichow, Olipur and Komolapur villages produce 3 crops on their land in a year.

**Adoption of Varieties**
The farmers of Raichow, Olipur and Komolapur villages cultivated 7 varieties of rice, out of which 4 (BR22, BRRI dhan28, BRRI dhan39, BRRI dhan48) were from BRRI. Other cultivated varieties were Hybrid Hira, Swarna, and Namsara etc.

**Seed and Seed Technology**
Quality seed is one of the key elements for enhancing good yield. It was found in the study that most of the farmers produced their own paddy seeds from new seeds purchased or in many cases collected from their neighbors or from local markets (Table-1).

**Table 1. Farmers number according to the seed source**

<table>
<thead>
<tr>
<th>Season</th>
<th>Number of farmers according to the seed source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own</td>
</tr>
<tr>
<td>Aus</td>
<td>15</td>
</tr>
<tr>
<td>Aman</td>
<td>13</td>
</tr>
<tr>
<td>Boro</td>
<td>14</td>
</tr>
</tbody>
</table>

Most of the farmers were not aware of the necessity of good seed. Concerning other area of seed technology,
farmers’ knowledge was found not up to date. None of the respondents was found practicing seed treatment and not even germination test prior to sowing.

**Cultivation Practices**

In the Raichow, Olipur and Komolapur villages the adoption of mechanized ploughing through tractor seemed to be highly satisfactory (100%). No respondent was found to use draft plough in his rice field.

**Age of seedling at transplanting**

In this study it was found that the farmers of those villages used over aged seedlings at all seasons. Such as in Aus (25-35 days), Aman (35-45 days), Boro (45-60 days). Farmers used 2-3 seedlings/hill in Boro season, but they used 6-7 (sometime 10) seedlings/hill in Aman season.

**Application of Chemical Fertilizer and Organic Manure**

There are various factors that affect crop production. Among these, fertilizer is the single most important one that plays a crucial role to increase yield provided the other factors are not too limiting. For successful crop production systems fertilizers are responsible for about 50 percent of the total production (BARC, 2006). Balance use of fertilizer nutrients in crops and cropping pattern will act as insurance against possible nutrient deficiencies that may be created by repeated use of single fertilizer nutrients. Besides, balance fertilizers can play a vital role in sustaining higher yield of crops and cropping patterns as well as in maintaining fertility status of soils on a long-term basis.

<table>
<thead>
<tr>
<th>Name of fertilizer</th>
<th>Fertilizer requirement (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aus</td>
</tr>
<tr>
<td>Urea</td>
<td>125</td>
</tr>
<tr>
<td>TSP</td>
<td>50</td>
</tr>
<tr>
<td>MP</td>
<td>60</td>
</tr>
<tr>
<td>Gypsum</td>
<td>60</td>
</tr>
<tr>
<td>Zinc Sulphate</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: According to Adhunik Dhaner Chash, 16th Edition, BRRI.

In the studied villages, the average urea used by the farmers in Aus, Aman and Boro seasons were 150 kg/ha, 170 kg/ha and 300-310 kg/ha respectively (Table 3). This amount can be increased considering the recommended does given by the fertilizer Recommendation Guide (FRG)-2006 (BARC, 2006). The rate of application of TSP was 50 kg/ha, 60 kg/ha and 90-110 kg/ha for Aus, Aman and Boro respectively those were also lower than the recommended dose. The villagers applied MP fertilizer more or less similar in three seasons and the amount also appropriate. They used to apply 60 kg/ha MP fertilizer which was less than the recommended does (Table 2). The most important finding was, the surveyed villagers do not apply Gypsum and Zinc fertilizer in their field. The farmers of Raichow, Olipur and Komolapur villages did not face any problem to get fertilizer.

**Irrigation Practices**

Irrigation by underground water is mostly done by Deep Tube Well (DTW) and Shallow Tube well (STW) in Raichow, Olipur and Kmolapur Villages. Due to environmental change monsoon rains become irregular and as such the need of supplemental irrigation in Aus, Aman and Kharif crops are extending. The farmers of those villages did not face any problem for irrigation water.

**Weeding Practices**

Farmers used hand weeder machine for weeding particularly rice few years back in those villages. Up to 45% yield loss may occur due to weed. Now a days farmers have become casual users of weeder. They consider a hand weeded as a time consuming and expensive tool not efficient enough to properly clean the weeds. They prefer weeding along with urea top dressing. Few farmers used chemicals or herbicides to control weed.

**Disease and Pest Management**

There are several rice diseases in Bangladesh, such as Tungro, Bacterial Leaf Blight (BLB), Bacterial Leaf Steak (BLS), Sheath blight, Sheath rot, Stem rot, Brown spot etc. The farmers of 3 villages cannot clearly distinguish different rice diseases. They might experience Sheath blight, Stem rot, Sheath rot and Leaf blight in their rice fields. To overcome these problems some of them use different types of fungicides at recommended doses given by dealers, neighbors, etc.

The farmers of these villages moderately suffered from insect infestation. The insect which attack in rice fields are Rice stem borer, Rice bug etc. To solve the problem farmers used different types of insecticides like Curater, Dimecron, Sumitheon, Malathion by the advise of dealer, experienced farmers and SAAO.

**Extend of the Use of IPM**

Most of the farmers of Raichow village were aware about IPM. But the farmers of Olipur and Komolapur do not know anything about IPM. Perching is practiced in the fields by all farmers of the study area.
Harvesting and Threshing
Cent percent farmers practiced the manual method of rice crop harvesting just using a sickle. However, almost all of the farmers were habituated to use machine for threshing paddy. Among the threshers, paddle threshers were most common. The large farmers used personal or rented power threshers during the harvesting season of rice when the laborer is very scarce.

Yield and Yield Gap
Yield was more or less similar in case of the three studied villages but differ among the varieties. The variety wise average yield and difference between research station yield and farmers yield was given (Table 4).

Table 4. Average yield of different rice varieties and yield gap

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Avg. yield of farmers Practice (t/ha)</th>
<th>Avg. yield of research station (t/ha)</th>
<th>Yield gap (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR22</td>
<td>3.45</td>
<td>5.00</td>
<td>1.55</td>
</tr>
<tr>
<td>BRRI dhan28</td>
<td>5.45</td>
<td>6.00</td>
<td>0.55</td>
</tr>
<tr>
<td>BRRI dhan39</td>
<td>3.85</td>
<td>4.50</td>
<td>0.65</td>
</tr>
<tr>
<td>BRRI dha 48</td>
<td>5.94</td>
<td>6.50</td>
<td>0.56</td>
</tr>
<tr>
<td>Minikate</td>
<td>5.45</td>
<td>6.50</td>
<td>1.05</td>
</tr>
<tr>
<td>Namsara</td>
<td>5.25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Average Yield Gap</td>
<td></td>
<td>1.012</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 showed that BRRI dhan28, Minikate and Namsara produced higher yield i.e., 5.45 t/ha, 5.45 t/ha and 5.25 t/ha respectively. BR22 is popular as late Aman variety. Few farmers cultivated BRRI dhan39 and BRRI dhan48. Minikate is a popular Indian Boro rice variety for its grain quality and high productivity. From the Table 4 it was also observed that, the research station yield is always greater than the farmers practice. This is the yield gap. Yield gap varies from 0.55 t/ha to 1.56 t/ha in the three surveyed villages. The average yield gap found in those three villages was 1.012 t/ha.

Conclusions and Recommendations
The results of the current study revealed that farmers of the Raichow, Olipur and Komolapur villages accepted many of the modern technologies of rice production but still there are areas to be improved. The farmers of three villages cultivated seven varieties of rice, out of which four were form BRRI. Recently released BRRI varieties and Hybrid rice was not introduced in Raichow, Olipur and Komolapur villages. Most of the farmers produced their own paddy seeds form new seeds purchased or in many cases collected form their neighbors or from local markets or dealers. Most of the cases, the farmers use poor quality seed which is a cause of low yield production. Another reason behind yield gap of these three villages is application of imbalanced fertilizer. The farmers of the surveyed three villages do not know anything about soil test. On the other hand, they do not use the recommended fertilizer doses. This situation is more or less common in other country.

The farmers of the surveyed villages have good knowledge regarding management practices such as transplanting, weeding and threshing, but due inadequate communications from the Department of Agricultural Extension (DAE), they do not have any ideas of modern management practices. Communication between farmers and DAE personnel should be enhanced for proper dissemination of modern rice production techniques.

The findings could be indicative to the policy planners and extension workers for further improvement of the yield of rice to meet up the increased demand of food. Based on the study the following recommendations should be given for improving their rice cultivation practices.

- Quality seed should be used
- Age of seedling should be maintained properly
- Ideal seed bed should be prepared
- Balanced dose of fertilizer should be used
- Proper insect & diseases management practice
- Proper training should be given to the farmers
- Relationship with the DAE should be strengthened.

References
Kabir M H. 2011. Study findings presented in a workshop held in May 2011 on “Minimizing Rice Yield Gap” at BRRI, Gazipur.