

# Performance of 7 Cultivars of FAG Rice in Srimangal and Sadar Upazilas of Moulvibazar District

2002-3 Boro Season



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## BACKGROUND

Rice is the dominant crop in respect of both the cropped area output within the food grain sub-sector of Bangladesh. It is the nation's most strategic commodity. It contributes nearly 20% of GDP and occupies 75% of cropped land. Rice production provides nearly 50% of employment and 75% of calories consumed in the country. Furthermore, the rural and urban poor spend up to 60% of their income on it. By far the largest component of our agricultural produce is rice, which is the staple food of over 130 million Bangladeshis.

More than five thousand genotypes of rice have so far been collected and preserved, and more remain to be discovered in Bangladesh. It is suspected that a large number of genotypes were lost forever due to the induction of the modern high yielding varieties since the sixties of the past century to meet the food requirement of the ever-expanding population. However, many good varieties of the indigenous rice have survived under the invasion of the HYVs and have remained in cultivation due to their special characteristics. Three such characteristics that made the rice exceptional are fineness (small and elongated grain), aroma and glutinousness.

The present food production in Bangladesh is about 27million m. tons (2001-2002). The country seems to have attained a sustainable level self-sufficiency in food production. In general, farmers sell their paddy below its production cost. In particular, the price of coarse rice falls tremendously during and after harvesting the crop. On the other hand, the price of fine rice is comparatively stable, being higher yielding greater profit than do the coarse rice varieties. Thus, the Indian fine rice (Miniket, Sorna etc) is very popular in Southwest and Northern border districts of the country. Similarly, BRR1 dhan28 has already gained popularity all over the country. Bangladesh is an abundant source of genetic variations of fine, fine & aromatic and glutinous (FAG) rice. The production of these popular FAG rice varieties are location specific; their production being confined to certain traditional production pockets of Bangladesh (e.g. Dinajpur, Rajshahi, Mymensingh, Sylhet etc).

The agro-ecological conditions of the northeast are very diverse, providing suitable environment for growing rice varieties with wide genetic variations. Traditional varieties still continue to be grown in large areas of the region due to the particular conditions that prevail. The loss in gross production due to lower yields of fine varieties of rice is more than offset by their substantially higher prices. Consumers do not hesitate to pay higher prices for the FAG rice.

The demand of fine, fine & aromatic rice is much higher than production in the Sylhet region. Cultivation of FAG rice has tremendous potential in Sylhet region due to high market demand and to the desire among the resource poor farmers (RPFs) in the area to increase their net incomes from the production of these fine, fine & aromatic and glutinous rice cultivars within the traditional rain fed T. Aman cropping pattern. This tendency is bringing about a "sea-change" in the past slow growth in rice production in Sylhet region. There is considerable scope for export of surplus fine, fine & aromatic and glutinous rice to markets outside of Bangladesh, i.e., Middle East, Europe and North America.

According to Bangladesh Rice Exporters Association (BREA) statistics, Bangladesh exported 700 MT of aromatic rice in 2000, 780 MT in 2001 and 1,100 MT in 2002. In 2002 export varieties included Chinigura (702 MT), Kalijira (273 MT), Kataribhog (120 MT) and Basmati (5 MT). Bangladesh's meager export of 1,100 MT of fine variety aromatic rice and in 2002 went to the US, UK, Canada, Australia and Middle Eastern destinations mainly to feed the ethnic consumers. On the other hand, neighbouring Thailand, Pakistan and India continued to command the world aromatic rice market by exporting over ten lakh, five lakh, and four lakh MT respectively in 2002. The issue of Bangladesh's failure in capturing the potential world market of aromatic rice, where 7 million MT is traded annually, government plans to work out a time bound action plans to give a big push to aromatic rice export from Bangladesh.

Some constraints to increase rice export from Bangladesh- local aromatic varieties are short and bold-type grain while global preference is tilted towards long and slender type like Basmati (India and Pakistan) and Jasmine (Thailand), low yield resulting high price, poor milling and grain recovery, and erratic domestic market. However, currently there is a levy of 46 US dollars per MT of rice to European Union. The government needs to gain levy and quota-free access to European markets. Moreover, the important issues are to select desired rice varieties and maintain uniformity and better management at every levels of aromatic rice production.

The sub-project on Fine, Fine & Aromatic and Glutinous rice (FAG) variety has been undertaken in the Northeast region of Bangladesh. It aimed to promote opportunities to build upon the lessons and experience learned from local resource poor farmers with technical inputs from BRRI, AAS and facilitated by HEED Bangladesh.

In 2002-3 Boro season, AAS tested the performance of 7 cultivars of FAG rice in Srimangal and Sadar upazila of Moulvibazar district. The methods of field-testing for 7 cultivars of FAG rice during 2002-3 Boro season and their findings are presented in the following sections of this performance report.

## **Purpose**

The purpose of the seasonal report of “2003 Boro” of the sub-project on production and marketing of FAG rice through farmer’s participation in Northeast region in Bangladesh has been to compile the findings and lessons learned from the sub-project activities in Sadar and Srimangal upazilas of Moulvibazar district and to share the conclusions of this findings and lessons among the network partners, relevant scientists, exporters and other relevant stakeholders in the country.

## **Methodology**

### **Location/Research site**

The FAG rice sub-project has been implemented in 5 upazilas of Moulvibazar district since 1 April 2002. Out of 5 upazilas, sub-project has been implementing in Sadar and Srimangal upazilas by AAS and HEED-Bangladesh in Kamalganj, Kulaura and Rajnagar upazilas. The sub-project activities were implemented by AAS at seven villages, of which 4 villages in Srimangal upazila (Uttar Varaura, Majdehee, Motiganj and Shason) and 3 villages in Sadar upazila (Mohammadpur, Gias Nagor and Kodupur) of Moulvibazar district during 2002-3 Boro season. These villages were selected by the assigned agronomist using the AAS developed village selection strategy and process.

### **Group formation and farmers selection**

Resource poor farmer groups for FAG rice were formed at Seven selected project villages in Sadar and Srimangal upazilas of Moulvibazar district during September-October’ 2003. Each resource poor farmer group (RPF) was formed with 10 resource poor farmers (RPFs) with a coordinator at each project village. Farmers for trial and demonstration on FAG rice were selected with cooperation of group coordinators of the RPFs and using pre-determined selection criteria at each project village.

### **Farmers training**

Farmer’s participatory training was conducted at the beginning of the sub-project and after group formation. At the beginning of the training, farmer’s knowledge on FAG rice cultivars and their production practices were collected. Later improved production practices of FAG rice were matched with farmer knowledge in a participatory process. Through this participatory presentation and discussion farmer’s learning on FAG rice technology were clarified among the participating farmers. The training process and its output documented for sharing among the participating farmers and other stakeholders.

### **Varietal trial**

Seven trained resource poor farmers were selected for varietal trial for 2002-3 Boro season. The farmers were selected for varietal trial using AAS developed farmers' selection strategy and criteria at seven villages in Srimangal and Sadar upazilas of Moulvibazar district (Annex-II).

A total of 7 FAG rice cultivars were selected for varietal trial in Northeast Region of Bangladesh. Accordingly seed of 7 cultivars were collected from different sources (Annex-I). Seeds of 7 FAG rice cultivars were distributed (1 kg of each cultivars) among the seven trial farmers. Due to lack of seed each farmer received seed of at least three cultivars and maximum five cultivars of FAG rice. Seeds of 7 cultivars were sown (500 gm each cultivars) with special care during 26 November 2003 to 5 December 2003 in seedbed for raising quality seedlings. Post sowing

seedbed management practices were provided by the farmers under the direct supervision of the assigned agronomist of the sub-project.

The seedling age ranged at 40-45 days old was transplanted during 14 January by the trained 7 farmers in the project areas.

3-5 seedlings per hill for each cultivar were transplanted in the prepared trial plots at 7 villages in the two upazilas of the district. The spacing between rows was 20 cm and 15 cm between the hills.

The trial plots were fertilized with urea, TSP, MP and Gypsum at the rate of 60 kg, 70 kg, 85 kg and 50 kg per hectare. Farmers provided the post transplanting management such as weed control, irrigation and top-dressing with urea as per guidelines.

Yield component data and plant height (cm) were collected from 16 hills at 4 spots (4 hills/spot) for each variety of 7 trial plots separately. Three representatives (average) hills were harvested for 7 cultivars for the yield component from each farmer varietal trial plot separately. Later, panicles were detached from three representative hills for each cultivar separately. After drying the detached panicles both filled and unfilled grains were threshed and counted manually at the zonal office AAS, Srimangal. Thereafter, 1000-grain weight was taken and adjusted at 14% moisture content for 7 FAG rice cultivars from each farmer trial plot.

The crop was harvested by keeping two hills at the boarder at the four sides to avoid the boarder effect for appraising the 7 cultivars. After harvesting the crop, threshing, drying and cleaning were done for each cultivar from each farmer, trial plot separately. The grain-yield, yield contributing characters, growth duration and plant height at 7 FAG rice cultivars for each farmer trial plot are provided in Table 1.

### **Field day**

A total of 303 resource poor farmers (RPFs) participated at 7 field days at varietal trial villages in Srimangal and Sadar upazilas during ripening stage of the 2002-3, Boro season. At each field day, after field visit farmers participated in open discussion about the varietal assessment based on their knowledge and learning during field visit. During the field day, project staff acted as facilitators. Moreover, field days were informal, highly participatory and very cost effective ways to disseminate the accumulated knowledge and lessons. Farmer's assessment on the 7 rice cultivars in summarized and presented in Table-3.

### **Physicochemical analysis of FAG cultivars**

The laboratory analysis was conducted at Grain Quality and Nutrition Division of Bangladesh Rice Research Institute (BRRI). Milled rice outturn was determined by dehulling 200 gm rough rice in a satake rice mill, followed by 45 second polishing in a Satake Grain Testing Mill TM-05. Head rice outturn was expressed of rough and milled rice, respectively. Grain length and breadth were measured by slide calipers. Amylose content was determined by the procedure of Juliano (1971) and gelatinization temperature was determined according to the procedure of Little *et al*, (1958). Protein content was calculated from nitrogen and was determined by Micro Kjeldahl method. Volume of cooked and milled rice was measured by water displacement method. Five gram of milled rice was placed in a graduated cylinder containing 50 ml of water and change in volume was noted. For cooked rice volume 5 gm of milled rice was cooked and the cooked rice was placed in the same cylinder and the change in volume was measured. Cooking time was measured when 90% of cooked rice was totally gelatinized. Data presented in the table 4 are calculations based on the mean of three replications.

## Findings

The performance of 7 rice varieties was evaluated through varietal, cost and return analysis and farmers participatory assessment at field day during 2002-3 Boro season at 7 villages in Sadar and Srimangal upazilas at Moulvibazar district. The findings of FAG rice study during 2002-3 Boro season is given below:

### Varietal Trial Information

Among the 7 FAG rice cultivars the average grain yield from trial plots was highest with 3.90 t/ha Lakhai and followed in order by 3.75 t/ha in Rata Boro, 3.35 t/ha Boro Beruin and Samudra Fena. Among the all-trial plots Rata Boro (Nikash Goup) gives the highest grain yield 4.63 t/ha (Table 1).

The average panicle per hill was highest with Rata Boro (11.34) followed by Samudra Fena (11.31), Parbatjira (11.30) and the remaining 4 cultivars ranged from 9.48 to 10.35 panicles per hill. Among the all-trial plots Parbatjira gives the highest (Nikash Goup) panicle 12.57 (Table-1).

The average number of filled grains per panicle was highest with 141 in Parbatjira followed in order by 105 in Begun Bechi and 70 in Lakhai. The proportion of filled grains was lowest in Boro Beruin (71.19%). However, the proportion of field grains fluctuates between about 71-83 percent in seven cultivars under the varietal trial (Table-1).

The average 1000-grain weight was lowest with Parbatjira followed by Begun Bechi, Rata Boro. However, 1000-grain weight fluctuates between 9-24 gm of the seven tested cultivars (Table-1).

The average growth duration was lowest (142 days) in Lakhai and highest with Parbatjira (151 days). The average growth duration of Rata Boro and Begun Bechi were 144 and 148 days respectively (Table-1).

The average plant height was highest with Rata Boro (142.51 cm) followed by Begun Bechi (140.21 cm). The average plant height of the remaining five cultivars ranged from 122.84 cm to 126 cm (Table-1).

### Cost and return of FAG rice

Cost and return of the main product and by-product of 7 cultivars of FAG rice is provided in Table-2.

The net-return on cash-cost-basis of tested cultivars of FAG rice was found economically encouraging. On the other hand, the net-return on full-cost-basis of the tested cultivars of FAG rice was found economically discouraging.

Similar trend of findings was observed for benefit-cost ratio and net return in terms of gross value of the product (%) with the cash-cost-basis and full-cost-basis of 7 tested cultivars of FAG rice.

Thus, most of the tested cultivars of FAG rice were found economically viable with farmers on cash cost basis with better farm-gate price from FAG rice.

However, the per hectare net return on cash cost was highest with Parbatjira (Tk. 30,176), followed in order by Begun Bechi (Tk. 28,499), Samudra Fena (Tk. 27,986), Rata Boro (Tk. 27,790), Boro Beruin (Tk. 26,693), Lakhai (Tk. 22,455) and Posu Shail (Tk. 18,294) during 2002-3 Boro season. The benefit-cost ratio on cash-cost-basis was highest with Parbatjira

(5.71), followed in order by Begun Bechi (5.40), Rata Boro (5.36) among seven FAG rice cultivars tested during 2002-3 Boro season.

### **Varietal assessment during field days**

At the end of each field day at trial sites participating farmers ranked the FAG rice cultivars and provided their specific comments about seven cultivars.

Among the seven fine and Aromatic rice cultivars, farmers ranked Parbatjira as the best followed in order by Begun Bechi, Rata Boro, Samudra Fena, Lakhai, Pasu Shail and Boro Beruin (Table-3).

### **Physicochemical properties of FAG cultivars**

The physicochemical properties such as milling outturn (%), Head rice (%), Chalkiness, appearance, length, breadth, L/B ratio, size and shape, amylose (%), protein (%), cooking times, ER, IR etc. of 7 FAG cultivars are provided in Table-4.

Amylose content is lowest with 11.3% in Boro Beruin increased followed in order by Parbatjira (24.3%), Rata Boro (24.9%), Lakhai/ Begun Bechi (25.9%), Posu shail (26.7%) and Samudra Fena (26.9%). Among the 7 cultivars, Boro Biruin was found as sticky rice and close to glutinous rice (Table 4).

Similarly, protein content is highest with 8.9% in Begun Bechi followed in order by Boro Biruin, Samudra Fena, Rata Boro, Parbatjira/ Lakhai and Posu Shail (Table 4).

## **Conclusion**

Actually there was no enough FAG rice cultivar at Boro season as like as T. Aman season in our country. Among the tested 7 FAG rice cultivars the performance of Parbatjira was found to be the best followed in order by Begun Bechi, Rata Boro during 2002-3 Boro season in the project area. Thus the sub-project (AAS component) identified Parbatjira as having a tremendous potential for producing such rice during Boro season in Sylhet region. Parbatjira is a fine-grain rice and its grain size is the lowest among the tested FAG rice cultivars. Although Parbatjira and Begun Bechi were rejected by the farmers during 2002 T. Aman season but during Boro 2002-3 season they are highly accepted by the farmers. The yield capability of Parbatjira was medium but its overall acceptability was found to be very high among farmers in Sadar and Srimangal upazilas of Moulvibazar district. This high level of acceptability was consistently assessed and documented during farmer's participatory field days/ visits at trial sites during 2002-3 Boro season. Moreover, profitability of Parbatjira is also very high when compared with the other six FAG cultivars tested. The implication of this is that resource poor farmers fare better with FAG rice than with non-FAG rice alternatives. They and their families are benefiting in important economic ways from the introduction of high value FAG rice cultivation in the project areas.

Average panicle production per hill with tested FAG rice cultivars was medium with satisfactory grains per panicle and the proportion of filled grains production. 1000-grain weight is the lowest with Parbatjira followed in order by Begun Bechi and Rata Boro.



## Recommendation

The sub-project will take initiative to disseminate Parbatjira, Begun Bechi and Rata Boro FAG cultivars in Moulvibazar district (Sadar and Srimangal upazilas) through cost effective approach using AAS developed RPFs of FARMSEED network.

The variety selection process will continue through farmers field trial and demonstration followed by varietal assessment using farmers participatory field days and rice quality test.

The sub-project needs to develop a clean seed supply system of traditional FAG rice cultivars in the project areas. This will be done with the help of BRRI. The FARMSEED strategy and network should also be used for this purpose.

FAG rice is high value as compared with coarse rice and should be introduced among properly trained and motivated resource poor farmers (RPFs) both within and outside the project areas.

FAG rice production system should be developed for acceptable cultivars using AAS established RPFs, its FARMSEED and FAG rice sub-projects in the project areas. A farmer driven FAG rice seed procurement linkage should be developed with private sector outlets and HEED Bangladesh.

Modern, privately owned milling systems suitable for FAG rice processing should be introduced in the project areas. Both IRRI and BRRI can play a key role in developing improved milling systems for FAG rice processing and packaging in the project areas.

The sub-project should take initiative for linkage development among FAG rice producers, millers (using improved FAG rice processing systems) and wholesale/ retail market outlets (both domestic and international).

**Table 1: Comparison of different Characteristics of 7 FAG rice cultivars tested in 2002-3 Boro Season.**

Sl No	Farmers Name	Panicle per hill (Nr)	Filled grain per panicle (Nr)	% Filled grain	1000-grain weight (gm) at 14% moisture	Growth duration (days)	Plant height (cm)	Yield (t/ha)
<b>A: Rata Boro</b>								
1	Nikash Goup	12.51	70	77.63	13.58	145	141.63	4.63
2	Hirendra Dev	9.58	61	71.39	14.12	142	142.37	3.46
3	Faruck Miah	10.59	61	73.01	13.85	142	138.51	3.21
4	Ajit Saker	11.14	65	71.55	13.85	147	143.20	3.54
5	Akhlac Miah	12.14	85	80.75	12.79	142	149.31	4.10
6	Rakesh Devnath	12.10	73	74.89	13.66	145	140.10	3.61
<b>Average</b>		<b>11.34</b>	<b>69</b>	<b>75.37</b>	<b>13.53</b>	<b>144</b>	<b>142.51</b>	<b>3.75</b>
<b>B: Parbatjira</b>								
1	Nikash Goup	12.57	136	79.21	8.64	152	125.65	2.96
2	Faruck Miah	10.26	145	82.18	9.05	150	122.31	3.20
3	Akhlac Miah	11.09	143	83.21	8.47	150	123.28	3.30
<b>Average</b>		<b>11.30</b>	<b>141</b>	<b>81.53</b>	<b>8.72</b>	<b>151</b>	<b>123.74</b>	<b>3.15</b>
<b>C: Lakhai</b>								
1	Nikash Goup	9.39	72	78.75	20.94	143	124.03	4.66
2	Ajit Saker	9.57	68	79.56	21.35	141	125.00	3.15
<b>Average</b>		<b>9.48</b>	<b>70</b>	<b>79.16</b>	<b>21.15</b>	<b>142</b>	<b>124.51</b>	<b>3.90</b>
<b>D: Boro Beruin</b>								
1	Rakesh Devnath	9.97	68.19	71.19	24.45	143	126.00	3.35
<b>E: Begun Bechi</b>								
1	Nikash Goup	10.76	122	83.46	11.35	150	140.95	3.64
2	Hirendra Dev	8.17	118	82.64	10.03	148	138.09	3.12
3	Faruck Miah	9.96	103	80.89	10.32	150	138.56	3.03
4	Ajit Saker	10.59	112	84.21	11.46	145	139.47	3.42
5	Subahan Miah	8.21	85	84.97	11.35	143	141.57	2.99
6	Akhlac Miah	10.51	96	82.71	10.79	148	141.57	3.16
7	Rakesh Devnath	10.24	101	84.81	10.10	150	141.32	3.13
<b>Average</b>		<b>9.77</b>	<b>105</b>	<b>83.38</b>	<b>10.77</b>	<b>148</b>	<b>140.21</b>	<b>3.21</b>
<b>F: Posu Shail</b>								
1	Nikash Goup	12.38	63	79.21	20.73	141	124.78	3.69
2	Hirendra Dev	10.13	59	80.32	19.31	145	122.81	3.01
3	Faruck Miah	10.09	56	77.95	21.09	144	120.79	3.47
4	Ajit Saker	8.89	53	78.57	24.54	141	122.38	2.92
5	Subahan Miah	8.97	58	78.55	23.73	144	126.00	2.82
6	Akhlac Miah	11.54	64	80.76	20.61	146	120.65	3.04
7	Rakesh Devnath	10.45	64	79.23	21.10	142	122.47	3.61
<b>Average</b>		<b>10.35</b>	<b>60</b>	<b>79.24</b>	<b>21.59</b>	<b>143</b>	<b>122.84</b>	<b>3.22</b>
<b>G: Samudra Fena</b>								
1	Subahan Miah	11.31	71	80.15	16.38	143	126.00	3.35

**Table 2: Cost and return of 7 FAG rice cultivars for 2002-3 Boro season.**

Item	Variety						
	Posu Shail	Lakhai	Rata Boro	Boro Beruin	Samudra Fena	Begun Bechi	Parbatjira
Paddy yield (kg/ha)	3220	3900	3750	3200	3350	3220	3150
Price of paddy (Tk./kg)	7.25	7.00	8.75	10.00	10.00	10.50	11.25
Straw yield (kg/ha)	2576	3120	3000	2560	2680	2576	2520
Price of straw (Tk./kg)	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Gross return (Tk./ha)	25,504	28,704	34,162	33,1523	34,706	34,969	36,571
<b>Total Cost (Tk/ha)</b>							
(i) Full cost basis <sup>a</sup>	21,841	23,291	23,341	22,981	23,632	22,750	22,920
(ii) Cash cost basis <sup>b</sup>	6210	6249	6372	6459	6720	6470	6395
<b>Net return (Tk/ha)</b>							
(i) Full cost basis	2663	5413	10,821	10,171	11,074	12,219	13,651
(ii) Cash cost basis	18,294	22,455	27,790	26,693	27,986	28,499	30,176
<b>Benefit cost Ratio</b>							
(i) Full cost basis	1.12	1.23	1.46	1.44	1.46	1.53	1.59
(ii) Cash cost basis	3.94	4.59	5.36	5.13	5.16	5.40	5.71
Net return in terms of gross value of the product (%)							
(i) Full cost basis	10.87	18.86	31.68	30.68	31.90	34.94	37.33
(ii) Cash cost basis	74.66	78.23	81.35	80.52	80.63	81.49	82.51

<sup>a</sup> Full cost includes human labour, bullock power, seeds, fertilizer, insecticides, interest on working capital and land rent.

<sup>b</sup> Cash-cost includes seeds, fertilizer, insecticides, irrigation and interest of the out flow cash.

\* Grain and straw is considered at 1:0.8 for this cost analysis.

**Table 3: Assessment of 7 FAG rice cultivars during farmer's field days.**

SI No.	Variety	Ranking	Farmers comments
1	Parbatjira	1	Plant is slightly green, hard and lodging does not occur. Number of tiller is high and long duration variety. Rice is small and fine and tasty to eat. Market price is high. It is suitable for Moulvibazar district.
2	Begun Bechi	2	Plant is deep green, hard, long and lodging does not occur. Long duration variety, rice is small and round shaped. Its market price is high.
3	Rata Boro	3	Plant is green, long and leaf is wide. It gives more tillers. It is not stout and lodging occurs easily. It has drought tolerant capacity. It has slightly good smell and has a long own. Rice is small and fine. Farmer's comments that it is good for diarrhoeal patient.
4	Samudra Fena	4	Stem is hard and number of tiller is more. It looks like Begun Bechi but size is big. There are black spots in front as well as at the end of the rice. It has good smell and price of rice is high.
5	Lakhai	5	Short duration variety. Rice (unhusked) colour is red. Rice size is medium, coarse and has slight smell. Yield is good.
6	Posu Shail	6	Plant height is low; leaf is deep green and short duration crop. Plant is stout and lodging does not occur. Rice size is medium and coarse. Rice is aromatic and tasty to eat.
7	Boro Beruin	7	Plant height is medium. Leaf colour is blackish-green. Rice is long and medium coarse. Rice (husked) colour is reddish-white. It has slight glutinous character. It is very tasty to eat and price of rice is high.

**Table 4: Physicochemical Properties of Boro Cultivars.**

Variety/Line	Milling outturn (%)	Head rice yield (%)	Chalkiness	Appearance	Length (L) mm	Breadth (B) mm	L/B ratio	Size & shape	Amylose (%)	Protein (%)	Cooking time (min)	ER	IIR
1 Posu Shail	71	88	Opaque	Good	4.4	2.7	1.6	SR	26.7	7.8	21	1.5	3.8
2 Samudra Fena	66	80	Opaque	Fair	4.2	2.3	1.8	SR	26.9	8.5	17	1.3	3.6
3 Begun Bechi	68	96	Wb <sub>1</sub>	Poor	3.1	2.1	1.5	SR	25.9	9.4	17	1.7	4.0
4 Boro Biruin	66	82	Opaque (red per carp)	Poor	6.3	2.0	3.2	LS	11.3	8.9	17	1.2	3.4
5 Parbatjira	70	94	Tr	Good	3.5	1.5	2.3	SB	24.3	8.0	16	1.5	3.4
6 Rata Boro	69	87	Op/Tr	Poor	4.1	1.9	2.2	SB	24.9	8.3	19	1.6	3.4
7 Lakhai	69	80	WC <sub>9</sub>	Good	4.9	2.7	1.8	SR	25.9	8.0	18	1.6	3.4

Wb – White belly

Wc – White centre

Tr – Translucent

Op – Opaque

ER – Elongation ratio

IR - Imbibition ratio

**Annex I: FAG rice varieties and their seed sources.**

SI No.	Variety	Quality of rice	Source
1	Parbatjira	Fine, Small	Srimangal, Moulvibazar
2	Begun Bechi	Fine, Small	Madhabpur, Habigonj
3	Samudra Fena	Corse, aromatic	Srimangal, Moulvibazar
4	Rata Boro	Small, aromatic	Pakundia, Kishoreganj
5	Posu Shail	Corse, aromatic	Srimangal, Moulvibazar
6	Lakhai	Corse, Slightly aromatic	Srimangal, Moulvibazar
7	Boro Beruin	Long, Glutinous	Moulvibazar Sadar

**Annex-II: List of trial farmers in Sadar and Srimangal upazila of Moulvibazar district during 2002-3 Boro season.**

SI No	Farmer's Name	Father's Name	Varieties Name	Village	Union	Upazila
1	Nikash Goup	Gopash Goup	Parbatjira, Begun Bechi, Pasu Shail, Lakhai, Rata Boro	Uttar Varaura	Srimangal	Srimangal
2	Hirendra Dev	Late Gouranga Dev	Begun Bechi, Posu Shail, Rata Boro	Shason	Bhunobir	Srimangal
3	Faruck Miah	Late Abdullah	Parbatjira, Posu Shail, Rata Boro	Motigonj	Satgaon	Srimangal
4	Ajit Sarker	Late Amulla Sarker	Begun Bechi, Posu Shail, Lakhai, Rata Boro	Mazdihee	Kalapur	Srimangal
5	Subahan Miah	Late Sowab Miah	Begun Bechi, Posu Shail, Samudra Fena	Mohammadpur	Giasnagar	Moulvibazar Sadar
6	Akhlac Miah	Md. Zahid Ali	Parbatjira, Begun Bechi, Posu shail, Rata Boro.	Giusnagar	Giasnagar	Moulvibazar Sadar
7	Rakesh Devnath	Late Kashinath Devnath	Begun Bechi, Posu Shail, Boro Beruin, Rata Boro.	Kadupur	Giasnagar	Moulvibazar Sadar