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Problems Faced by Farmers in Adopting BRRI-Released *Boro* Rice Varieties and Suggested Measures for Rapid Varietal Dissemination

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Abstract

BRRI-released *Boro* rice varieties is crucial for enhancing rice productivity in Bangladesh, yet farmers face multiple constraints and difficulties in the adoption process of those varieties. This study evaluated the socio-demography of *Boro* rice farmers, recognized adoption challenges, and sightsaw farmer-prioritized explanations to advance to varietal adoption. Total of 371 farmers were sampled proportionately and randomly from 12 blocks across Cumilla, Mymensingh, Tangail, and Bogura districts. Data were collected from 03 September to 31 December 2021 using a structured interview. Descriptive statistics, Problem Faced Index (PFI), and Standardized Suggestion Index (SSI) were applied to quantify data on constraints and farmer suggestions. Results revealed that most respondents were middle-aged (41.78%), ascetically educated, and skilled in rice farming, but had partial formal training contact. Farmers faced medium to high adoption problems (38.55-37.20%, respectively). The highest-ranked constraints included unavailability of HYV *Boro* seed (PFI 89.67%), lack of credit facilities (PFI 88.95%), and high fertilizer costs (PFI 86.07%). Other challenges involved insufficient technical knowledge, weak extension support, and inadequate market information. Farmers' suggestions prioritized seed and input support

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(SSI 22.46%), credit facilities (SSI 18.56%), and irrigation incentives (SSI 18.21%), followed by advisory services, and rice selling assurance. The research concludes that fcilitating input availability, providing economic support, and availing formal services are vital for stepping into the acceptance of BRRI-released *Boro* varieties. These findings will aid policymakers, extension agencies, and researchers to undertake actionable steps to enable faster uptake of the said rice varieties at the grower level.

Keywords: Adoption, BRRI-released, Boro rice varieties, PFI, SSI

Introduction

The Bangladesh Rice Research Institute (BRRI) serves as the country's premier institution for rice research and technological innovation, with a long-standing contribution to the development of high-yielding rice varieties and improved production practices. To date, BRRI has released a total of 117 modern rice varieties, including eight hybrids designed for cultivation across Bangladesh's three principal rice-growing seasons: *Aus*, *Aman*, and *Boro* (BRKB, 2022). Of these, 58 varieties have been specifically developed for the *Boro* season, reflecting the diverse agro-ecological conditions and production environments prevailing across the country (Islam *et al*., 2022).

Among all three seasons, the foundation of the country's food security has been laid on *aman* production, and among the three seasons, this season covers the highest rice production area (BBS 2024a). This major rice-growing season alone contributed more than 54 percent of total food grain, which is also the highest (3.44 t ha^{-1}) compared to Aus rice (1.66 t ha^{-1}) and Aman rice (1.99 t ha^{-1}) per unit production (BBS 2024b, Parvin and Rahman 2009). *Boro* is the most suitable season for rice production, and its production is higher due to proper operational management and weather conditions (Rahman *et al.,* 2020a).

Despite the considerable yield potential demonstrated under experimental conditions, the on-farm performance of many BRRI-released *Boro* rice varieties remains below expected levels. The yield of the contemporary *Boro* varieties is very responsive to a high level of input use and timely crop management. Farmers may face several challenges when adopting BRRI-released *Boro* rice varieties (Alam *et al*., 2022, Noreen *et al*., 2021). The extent of problems faced by a farmer in adopting BRRI-released *Boro* varieties may be social, technical, economic, marketing, and psychological problems. However, due to various socio-economic constraints faced by farmers and their lack of understanding of recommend *Boro* variety cultivation procedures, yields at the farmer level are lower (Islam *et al.,* 2018).

Although substantial research efforts have concentrated on varietal development and yield enhancement, relatively limited attention has been paid to systematically identifying farmers' field-level constraints in adopting BRRI-released *Boro* rice varieties, as well as documenting their own proposed solutions to these challenges.

Farmers' insights are particularly valuable, as their experiential knowledge and context-specific recommendations can inform more practical and effective dissemination strategies. Integrating farmers' perspectives into adoption frameworks is therefore critical for strengthening extension services and accelerating the diffusion of improved *Boro* rice varieties. In this context, a comprehensive understanding of the nature and severity of adoption problems, together with farmer-driven solutions, can support policymakers, extension professionals, and researchers in formulating responsive and demand-oriented dissemination models. Such approaches have the potential to enhance adoption rates, improve productivity, and ensure the long-term sustainability of *Boro* rice production systems. Accordingly, the present study was designed with three specific objectives: (i) to identify and analyze the key problems encountered by farmers in adopting BRRI-released *Boro* rice varieties at the field level; and (ii) to document and prioritize farmers' suggested measures for overcoming these constraints.

Methodology

Study area

The study was conducted in four major *Boro* rice growing regions of Bangladesh, namely Cumilla, Mymensingh, Tangail, and Bogura (Table 1). In the Cumilla region, the research covered Murad Nagar upazila, including the blocks of Dhamgar, Nobipur, and Tonki. The Mymensingh region comprised Nandail upazila, where Sherpur, Kharua, and Chondipasa blocks were selected for data collection. In the Tangail region, Mirzapur upazila was chosen, and the study included Mirzapur, Gorai, and Foteypur blocks. In the Bogura region, Sherpur upazila was selected, covering the blocks of Bishalpur, Garidoho, and Shibpur. These areas were selected due to their high concentration in *Boro* rice cultivation and their relevance to the objectives of the study.

Population and sample

The study population consisted of 10,069 *Boro* rice farmers located in 12 selected blocks across the our districts of Bangladesh (Table 1). The total sample size was determined using the Creative Research Systems sample size calculator (CRS 1984) which suggested a sample of 370 respondents. To ensure proper representation, proportionate random sampling was applied to select farmers from each union based on their population size. For ease of distribution and to avoid fractional values during proportional allocation, the final sample size was slightly adjusted to 371 farmers. The allocated samples from each block ranged from 28 to 35 respondents, reflecting the relative number of *Boro* rice farmers in each area. This sampling approach ensured adequate coverage and representativeness of the study population.

Table 1. The sampling area and sample size undertaken in the study

Region	Upazilas	Unions	Population size	Sample size
Cumilla	Murad Nagar	Dhamgar	841	31
		NobiPur	787	29
		Tonki	814	30
Mymensingh	Nandail	Sherpur	950	35
		Kharua	761	28
		Chondipasa	761	28
Tangail	Mirzapur	Mirzapur	868	32
		Gorai	841	31
		Foteypur	868	32
Bogura	Sherpur	Bishalpur	868	32
		Garidoho	841	31
		Shibpur	868	32
		Total	10069	371

Data collection

The researcher interviewed selected farmers face-to-face with the help of a pre-tested interview schedule from 03 September to 31 December 2021 for the collection of data for the study.

Socio-demographic characteristics of the respondent farmers

The socio-demographic characteristics of the respondent farmers were assessed to understand their background and how these attributes relate to the problems faced in adopting BRRI-released *Boro* rice varieties. Primary data were collected through a structured interview schedule administered to selected *Boro* rice farmers at the field level. The interview schedule was pre-tested and finalized to ensure clarity, relevance, and consistency of the questions.

The socio-demographic characteristics of *Boro* rice farmers were analyzed using primary data collected through a structured interview schedule. Age of the respondents was categorized into young (up to 35 years), middle-aged (35–60 years), and old (above 60 years). Educational qualification was measured by years of schooling and grouped into illiterate, primary, secondary, and above secondary levels.

Rice farming experience was assessed based on the number of years involved in rice cultivation and classified as low (1–5 years), medium (6–10 years), and high (above 10 years). Rice farming profitability was measured using a composite profitability score and categorized into low, medium, and high levels. Training experience was

determined by the extent of participation in agricultural training programs and grouped into no training, little training, and well-trained categories.

Farmers' satisfaction with BRRI-released *Boro* varieties was measured using a satisfaction index and classified into low, medium, and high satisfaction levels. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize and interpret the socio-demographic characteristics of the respondents.

Measuring problems faced in adopting BRRI-released *Boro* varieties

For measuring problems faced in adopting BRRI-released *Boro* varieties, items containing social, technical, economic, marketing, and psychological problems were selected after thorough consultation with extension experts, researchers, and other available sources. Thirty items of problems were selected and arranged in the scale to have real feelings on problems faced in adopting BRRI-released *Boro* varieties. The nature of the alternative responses of the respondents to each of the items was 'severe problem', 'moderate problem', 'less problem', and 'not a problem at all'. Scores were assigned to those alternative responses as 3, 2, 1, and 0, respectively. Problems faced in adopting the BRRI-released *Boro* varieties: the score of a respondent was determined by adding up all the scores for all the responses of that respondent. Thus, the possible range of scores of problems faced in adopting BRRI-released *Boro* varieties was 0-90, with zero (0) indicating not a problem at all and 90 indicating severe problems faced in adopting BRRI-released *Boro* varieties. To compare the severity of the problems, the PFI was computed by using the following formula for each problem item (Alam *et al.*, 2018):

$PFI = F_h x3 + F_m x2 + F_l x1 + F_n x0$

Where,

PFI = Problem Faced Index

F_h = Frequency of respondents who faced the severe problem

F_m= Frequency of respondents who faced the moderate problem

F_l = Frequency of respondents who faced the low problem

F_n = Frequency of respondents who faced no problem at all

Thus, the PFI of each of the problem items could range from 0 to 1113, where zero (0) indicated not a problem at all and '1113' indicated the most serious problem. The Standardized Problem Faced Index (SPFI) was then computed by using the following formula for each problem:

$$SPFI = \frac{PFI\ of\ the\ Problem}{Highest\ Possible\ PFI\ (i,e,1113)}\ X\ 100$$

Thus, the SPFI of the items could range from 0-100, while zero (0) indicated not a problem at all and 100 indicated severe problems faced in adopting BRRI-released

Boro varieties. Rank order was also made based on the descending order of SPFI of the problem items to compare the problems.

Measuring of Standardized Suggestion Index (SSI)

After identifying farmers' problems, the respondent farmers were asked to mention some suggestions to solve the identified problems. Farmers were also asked to rate the suggestions as 1st, 2nd, 3rd, 4th, 5th, and 6th for minimizing farmers' problems with adopting BRRI-released *Boro* rice varieties, and scores were assigned to the ratings as 6, 5, 4, 3, 2, and 1, respectively. Then the Suggestion Index (SI) was computed by using the following formula for each suggestion item (Ali, 2021):

$SI = S_1x6 + S_2x5 + S_3x4 + S_4x3 + S_5x2 + S_6x1$

Where,

SI = Suggestion Index

S_1= Frequency of respondents rated as 1st suggestion

S_2= Frequency of respondents rated as 2nd suggestion

S_3 = Frequency of respondents rated as the 3rd suggestion

S_4= Frequency of respondents rated as 4th suggestion

S_5= Frequency of respondents rated as 5th suggestion

S_6= Frequency of respondents rated as 6th suggestion

Thus, the SI of each of the suggestion items could range from 371 to 2226, where '371' indicated the lowest SI and '2226' indicated the highest possible SI. SSI was then computed by using the following formula for each suggestion item:

$$SSI = \frac{SI \ \ of \ the \ Suggestion}{Total \ SI \ of \ all \ the \ 6 \ Items} \ X \ 100$$

Rank order was made based on the descending order of the SSI of the suggestion items. Cumulative SSI was also computed for a better understanding of the support and service-related suggestions for minimizing the problems faced by the farmers in adopting BRRI-released *Boro* rice varieties.

Data analysis

The collected data were coded, analyzed, and transferred from the interview schedule to a master sheet, summarized, categorized, and entered into a database using Microsoft Excel 2019. The data were analyzed using SPSS (Version 21.0), and the frequency, percentage, mean, and standard deviation were computed to summarize the socio-demographic profile of the respondents. These variables were subsequently used to interpret the nature and extent of problems faced by farmers in adopting BRRI-released *Boro* varieties and to formulate appropriate suggestions for rapid varietal dissemination.

Results and Discussion

Sociodemography

Age distribution of farmers: The majority of *Boro* rice farmers were middle-aged (35–60 years), representing 41.78% of the respondents (Table 2). Older farmers above 60 years accounted for 38.01%, while young farmers up to 35 years constituted 20.21%. The average age of the respondents was 48.93 years, indicating a predominantly mature farming population. The predominance of middle-aged farmers in *Boro* rice cultivation suggests that this age group constitutes the most economically active and decision-making segment within the farming community. Farmers aged between 35 and 60 years are generally more experienced, physically capable, and actively involved in farm management, which enables them to adopt and manage relatively input-intensive crops such as *Boro* rice more effectively. Similar age distributions among rice farmers have been reported in earlier studies, indicating that middle-aged farmers tend to balance traditional farming knowledge with a willingness to adopt improved technologies when economic benefits are evident (Lei *et al*., 2025, Hoque *et al*., 2022).

Educational status: Most respondents had formal education. Secondary education (6–10 years of schooling) was the most common level (38.27%), closely followed by primary education (36.66%). Illiterate farmers represented 12.67%, while 12.40% had education above the secondary level. The mean years of schooling was 6.07 years (Table 2). The educational profile of the respondents indicates that the majority of *Boro* rice farmers possess at least a basic level of formal education with secondary schooling being the most prevalent. This level of education is particularly relevant for the adoption of BRRI-released *Boro* rice varieties, and the secondary-educated farmers are generally better equipped to understand extension messages, follow recommended agronomic practices, and interpret written information related to seed quality, fertilizer application, and pest management (Hassan *et al*., 2025). Previous studies have consistently shown that farmers with higher educational attainment tend to demonstrate greater awareness of improved technologies and are more likely to adopt modern rice varieties and associated management practices (Akter *et al*., 2025, Chakrobarty *et al.,* 2021).

Rice farming experience: Rice farming experience was generally high among the respondents. About 64.42% had medium experience (6–10 years), while 21.02% had low experience (1–5 years). Only 14.56% had more than 10 years of experience. The average farming experience was 25.49 years, reflecting long-term involvement in rice cultivation (Table 2). Those results suggest that most farmers have accumulated sufficient practical knowledge of rice cultivation systems, seasonal management, and local agro-ecological conditions. Kumar *et al*. (2020) noted that the extensive farming experience does not always translate into higher adoption of improved varieties. Similar observations have been reported in earlier studies, where highly experienced farmers exhibited cautious adoption behavior due to fear of yield loss and economic uncertainty (Adnan *et al*., 2018).

Rice farming profitability: Most farmers reported medium profitability from *Boro* rice cultivation (66.04%). Low profitability was observed among 19.41% of the respondents, whereas 14.55% experienced high profitability. The mean profitability score was 1.65, indicating moderate economic returns (Table 2). This outcome may be attributed to high production costs, particularly for irrigation, fertilizers, labor, and pest management, which often offset yield gains and reduce net returns (Aravindakshan *et al*., 2021). Farmers experiencing low profitability are more likely to be risk-averse and hesitant to invest in recommended inputs, thereby constraining the adoption of improved *Boro* varieties. Conversely, the relatively small proportion of highly profitable farmers indicates that optimal management and timely input use can enhance returns, but such practices are not yet widely achieved. These findings highlight the need for cost-reducing technologies, stable market prices, and targeted extension support to improve profitability and accelerate the dissemination of BRRI-released *Boro* rice varieties (Emran *et al*., 2022, Momin *et al*., 2025).

Training experience: The absolute majority of farmers (86.25%) had no formal training related to rice cultivation. A small proportion (11.30%) received limited training, and only 2.45% were well trained. The low mean training score (0.52) suggests limited access to capacity-building programs (Table 2). The very low level of formal training among *Boro* rice farmers indicates a major institutional constraint to the effective adoption of BRRI-released *Boro* varieties. Limited exposure to training restricts farmers' understanding of recommended agronomic practices, input management, and varietal-specific requirements, often leading to partial or improper adoption at the field level (Dewi *et al*., 2021). As a result, farmers may fail to realize the yield potential of improved varieties, discouraging continued use. This finding underscores the critical need for regular, need-based training programs, farmer field schools, and hands-on demonstrations to strengthen farmers' technical capacity and facilitate the rapid and sustainable dissemination of BRRI-released *Boro* rice varieties (Islam *et al*., 2024, Karmakar *et al*., 2021).

Satisfaction with BRRI-released varieties: More than half of the respondents (57.15%) expressed high satisfaction with BRRI-released *Boro* rice varieties. Medium satisfaction was reported by 33.15% of farmers, while only 9.70% showed low satisfaction. The mean satisfaction score was 30.00, indicating a generally positive perception of BRRI varieties (Table 2). The generally high level of farmer satisfaction with BRRI-released *Boro* rice varieties indicates that these varieties are positively perceived in terms of yield potential and adaptability under farmers' conditions (Akter *et al*., 2025). High satisfaction among a majority of respondents suggests a strong foundation for wider adoption and diffusion. However, the presence of farmers with medium to low satisfaction implies that field-level constraints such as management difficulties, input availability, or economic returns may limit consistent performance. Addressing such practical challenges through targeted extension support and farmer-responsive interventions is essential for transforming positive perceptions into sustained technology adoption and wider dissemination (Debsharma

et al., 2024). Although this study was conducted specifically on BRRI-released Boro rice varieties, its findings were highly relevant and suggest that similar extension and support mechanisms may also facilitate the adoption and dissemination of BRRI-released Boro rice varieties among farmers.

Problems faced in adopting BRRI-released *Boro* varieties: The distribution of the farmers according to their problems faced in BRRI-released *Boro* varieties is shown in Table 2. Data revealed that the majority (38.55%) of the farmers faced medium problems in adopting BRRI-released *Boro* varieties, as compared to 37.20% and 24.25% faced serious and less serious problems in adopting BRRI-released *Boro* rice varieties, respectively. Therefore, most (75.75%) farmers faced medium to serious problems in adopting BRRI-released *Boro* varieties. The findings indicate that a substantial proportion of farmers experienced moderate to severe difficulties in adopting BRRI-released *Boro* rice varieties, highlighting the presence of significant field-level constraints (Baishakhy *et al*., 2023). The dominance of medium to high problem categories suggests that although these varieties are technically sound, farmers often struggle with practical issues related to input availability, management complexity, production costs, and access to timely advisory services. Such challenges can discourage full adoption and limit yield realization, thereby slowing varietal diffusion. These results emphasize the need for farmer-centered support mechanisms, including strengthened extension services, improved input supply systems, and responsive policy interventions, to reduce adoption barriers and promote the rapid technology dissemination (Sarker *et al*., 2021), such as BRRI-released *Boro* rice varieties.

Table 2. Sociodemographic portfolio on adopting BRRI-released *Boro* varieties as revealted in the study

	Categories	Frequency	Percentage	Mean	SD
Age	Young-aged (up to 35)	75	20.21	48.93	11.94
	Middle-aged (35-60)	155	41.78		
	Old aged (Above 60)	141	38.01		
	Total	371	100		
Educational Qualification	Illiterate (0)	47	12.67	6.07	4.27
	Primary (1-5)	136	36.66		
	Secondary (6-10)	142	38.27		
	Above Secondary (above 12)	46	12.40		
	Total	371	100		
Rice Farming	Low (1 to 5 years)	78	21.02	25.49	9.98

	Categories	Frequency	Percentage	Mean	SD
Experience	Medium (6 to 10 years)	239	64.42		
	High (Above 10 years)	54	14.56		
	Total	371	100		
Rice Farming Profitability	Low	72	19.41		
	Medium	245	66.04	1.65	0.25
	High	54	14.55		
	Total	371	100		
Training Experience	No	320	86.25		
	Little training	42	11.30	0.52	2.46
	Well training	09	2.45		
	Total	371	100		
Satisfied with the BRRI release varieties	Low satisfaction	36	9.70		
	Medium satisfaction	123	33.15	30.00	8.48
	High satisfaction	212	57.15		
	Total	371	100		
Problems faced in adopting BRRI-released *Boro* varieties	Low problems faced	90	24.25		
	Medium problem faced	143	38.55		
	High problem faced	138	37.20	49.46	22.84
	Total	371	100		

Note: SD= Standard Deviation

Major input-related problems faced in adopting BRRI-released *Boro* varieties

The top three constraints: The SPFI values of the identified problems varied widely ranging from 17.25% to 89.67% within the possible scale of 0–100. The SPFI scores along with their respective rank orders, are presented in Table 3. Among all constraints, the unavailability of HYV *Boro* seed in the market emerged as the most critical problem, securing the first rank with the highest SPFI value (89.67%). The lack of credit facilities for HYV *Boro* rice cultivation was the second most serious constraint (SPFI = 88.95%), highlighting the importance of financial support. High fertilizer prices also posed a major challenge to farmers and ranked third with an SPFI of 86.07%.

Knowledge and information constraints: Lack of technical information on HYV *Boro* rice ranked fourth (84.73%), while inadequate knowledge on HYV *Boro* cultivation ranked fifth (82.21%). Farmers also faced problems related to a lack of

weather information and early forecasting, which ranked sixth with a PFI of 79.87% (Table 3).

Seed, labor, and management issues: The high price of HYV seed ranked seventh (79.16%). Difficulties in sorting and grading and labor crisis during transplanting and post-transplanting periods ranked eighth (76.64%) and ninth (76.28%), respectively. Inadequate extension services to support HYV *Boro* adoption ranked tenth (Table 3).

Fertilizer and input supply problems: Scarcity of fertilizer supply at the right time ranked eleventh (72.69%), while unavailability of other agricultural inputs ranked twelfth (69.63%). These issues indicate inefficiencies in input distribution systems (Table 3).

Pest, disease, and environmental challenges: Increased insect and disease attack due to natural hazards ranked thirteenth with a PFI of 66.04%. Lack of IPM knowledge was also reported but ranked relatively lower (50.31%) (Table 3).

Market and marketing-related problems: Lack of market information and poor knowledge of market demand ranked fourteenth (63.16%) and fifteenth (61.55%), respectively. Poor linkage with marketing channels and lack of fair market price were ranked sixteenth and eighteenth, reflecting marketing inefficiencies (Table 3).

Infrastructure and mechanization constraints: Lack of agricultural machinery ranked nineteenth (43.94%), while inadequate irrigation facilities and high irrigation costs ranked twentieth and twenty-first. These constraints limited production efficiency (Table 3).

Post-harvest and institutional problems: Lack of storage facilities ranked twenty-second (34.14%). Problems related to middlemen involvement, weak research–extension linkage, and lack of training ranked lower, indicating comparatively lesser severity (Table 3).

Least reported problems: Poor transportation for marketing, low milling recovery, post-harvest processing problems, and high fertilizer requirement ranked at the bottom, suggesting these were less critical compared to other constraints faced by HYV *Boro* rice farmers (Table 3).

The results reveal that farmers face a complex and interrelated set of constraints in adopting BRRI-released *Boro* rice varieties, with input-related problems emerging as the most severe. Similar findings have been reported in earlier studies, emphasizing that seed availability remains a primary bottleneck in modern rice technology adoption in Bangladesh (Rahanan *et al*., 2020b). Financial constraints were also prominent, as reflected by the high ranking of inadequate credit facilities and high fertilizer prices. *Boro* rice cultivation is capital-intensive, requiring substantial investment in irrigation, fertilizers, and labor. High input prices further reduce profitability, reinforcing farmers' reluctance to fully adopt BRRI-released varieties (Rahman *et al*., 2018). Marketing-related issues, including lack of market information, weak market linkages, and unstable prices, also affected adoption

decisions by reducing farmers' confidence in economic returns (Dessie *et al*., 2018). Post-harvest and institutional problems were relatively less severe but still reflect systemic gaps in storage, training, and research–extension coordination (Jamal *et al*., 2023).

Table 3. Response of the interwied farmers presented as Problem Faced Index (PFI) with wank Order

Items of the problem	Number of respondent farmers				PFI Score	PFI (%)	Rank order
	Severe problem	Moderate problem	Less problem	Not a problem at all			
Unavailability of HYV *Boro* seed in the market	311	24	17	19	998	89.67	1
Lack of credit facility for HYV *Boro* rice cultivation	305	21	23	22	990	88.95	2
High price of fertilizer	291	25	35	20	958	86.07	3
Lack of technical information on HYV *Boro* rice	286	23	39	23	943	84.73	4
Inadequate knowledge of HYV *Boro* rice cultivation	276	21	45	29	915	82.21	5
Lack of weather information and early weather forecasting	266	28	35	42	889	79.87	6
High price of HYV seed in the market	258	32	43	38	881	79.16	7
Difficult to sort and grade	246	40	35	50	853	76.64	8
Labor Crisis during transplanting and post-transplanting	250	35	29	57	849	76.28	9
Inadequate extension service to support HYV *Boro* Adoption	235	45	28	63	823	73.94	10
Scarcity of fertilizer supply on time	230	37	45	59	809	72.69	11
Unavailability of other inputs	215	40	50	66	775	69.63	12
Increase in Insect and Disease attacks due to natural hazards	196	56	35	84	735	66.04	13
Lack of market information on HYV *Boro* rice	180	59	45	87	703	63.16	14
Lack of knowledge on market demand	170	60	55	86	685	61.55	15
Poor linkage with the marketing channel	140	61	60	110	602	54.09	16
Lack of IPM knowledge	134	40	78	119	560	50.31	17
Lack of a fair market price	118	45	67	141	511	45.91	18
Lack of agricultural machineries	110	40	79	142	489	43.94	19
Inadequate irrigation facilities	101	46	79	145	474	42.59	20
High irrigation cost	75	55	78	163	413	37.11	21

Items of the problem	Number of respondent farmers				PFI Score	PFI (%)	Rank order
	Severe problem	Moderate problem	Less problem	Not a problem at all			
Lack of storage facilities	68	45	86	172	380	34.14	22
Unavailability of printed materials on HYV *Boro* rice cultivation	56	40	90	185	338	30.37	23
Undesirable involvement of middlemen	61	42	95	173	332	29.83	24
Weak Research Extension Linkage	55	36	110	170	317	28.48	25
Lack of training in the adoption of HYV rice cultivation	37	41	108	185	301	27.04	26
Poor and inadequate transportation for marketing	22	24	90	235	204	18.33	27
Low milling recovery	26	25	102	218	230	20.66	28
Post-harvest Processing Problem	20	19	103	229	201	18.06	29
Requires a high amount of fertilizer	20	16	100	235	192	17.25	30

Farmers' suggestions for improving adoption of BRRI-released *Boro* varieties

Farmers were asked to prioritize measures that could help overcome the adoption barriers of BRRI-released *Boro* rice varieties. The responses were analyzed using the SSI to rank the suggestions based on their relative importance (Table 4).

The results indicate that seed and input support was the most critical measure, receiving the highest SSI value of 22.46%, and was ranked first by the respondents. Credit support was the second most important suggestion (SSI 18.56%), followed closely by irrigation incentives (SSI 18.21%). Advisory services were ranked fourth (SSI 17.30%), highlighting the need for technical guidance. Farmers also emphasized assured on rice selling mechanisms (SSI 13.13%) and strengthening research–extension linkages (SSI 10.33%) to facilitate adoption (Table 4). The cumulative analysis of farmers' suggestions (SSI = 100%) demonstrates that provision of essential inputs, financial support, irrigation facilitation, and advisory services are the top priorities for promoting the adoption of improved *Boro* rice varieties. These findings provide clear direction for policymakers and extension agencies to target interventions effectively at the field level. These findings indicate that integrated interventions combining input availability, financial facilitation, irrigation support, and farmer-centered extension services are essential for accelerating the diffusion of BRRI-released *Boro* rice varieties (Anwar *et al*., 2021, Akter *et al*., 2025). Policymakers and extension agencies should prioritize these areas to enhance adoption efficiency and field-level productivity.

Table 4. Standardized Suggestion Index (SSI), rank order, and cumulative SSI measured from the suggestion by the interviewed farmers

Farmers' Suggestions	Number of farmers based on the priority of suggestions							SI	SSI (%)	Rank order
	1st	2nd	3rd	4th	5th	6th	Total			
Seed and Input support	145	108	50	29	14	25	371	1750	22.46	1
Credit Support	64	53	115	83	32	24		1446	18.56	2
Irrigation incentive	45	82	96	80	47	21		1419	18.21	3
Advisory Services	69	84	49	50	49	70		1348	17.30	4
Rice selling assurance	23	23	48	74	153	50		1023	13.13	5
Research-extension linkage	25	21	13	55	76	181		805	10.33	6
Total			371				-	7791	100	-

Conclusion

The study revealed that most farmers were middle-aged, moderately educated, and experienced in rice farming, yet faced medium to serious problems in adopting BRRI-released *Boro* varieties. The main constraints were the unavailability of HYV seed, lack of credit, and high fertilizer prices, along with limited technical knowledge and weak extension support. Farmers prioritized seed and input support, credit, and irrigation incentives to overcome adoption barriers. Strengthening these supports and ensuring reliable advisory services and market access are essential for faster dissemination and higher adoption of BRRI *Boro* varieties.

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