Development and Validation of Producer and Consumer Preference Models for Rice Varieties in Bangladesh

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ABSTRACT

Rice production depends on both producers' and consumers' preference. The consumption of rice depends on consumers' taste and habits. The objectives of this study were to develop and validate mathematical models for producers', consumers' and producers-cum-consumers' preference to rice varieties and to evaluate the factors affecting both producers' and producer-cum-consumers' decision on varieties for rice cultivation and can provide an indication of the factors affecting consumers' preferences to rice varieties in Dhaka, Gazipur, Dinajpur and Bhola districts of Bangladesh. Chi-square (χ^2) tests were used to explore the significant difference of preferring rice varieties among the groups of people and compared the results with the proposed models for validation. Producers and producers-cum-consumers preferred BR11, BR22 and BRRI dhan32 in T. Aman; BR16, BRRI dhan28 and BRRI dhan29 in Boro and BR9, BR16 and BR20 in Aus seasons respectively. The specific grain quality characteristics such as whiteness, brokens, shape, amylose (%), aroma, cooking quality, hardness and chalkiness influenced the consumers and producers preference. Furthermore, pure consumers also preferred rice varieties on the basis of its tastiness and fineness.

Keywords: Rice varieties, consumer, producer, producer-cum-consumer and preferences

INTRODUCTION

Rice, the staple food in Bangladesh, occupies nearly 90% of the total net cropped area of the country and more than 99% of the people eat rice as their main food @ 416 gm/person/day (HIES, 2010). Bangladesh Rice research Institute (BRRI) varieties occupying 80% of the total rice area account for 90% of the total rice production (Annual Report, BRRI, 2010-11). Crop agriculture in Bangladesh is mainly characterised by a rice monoculture. Almost 80% of the total cropped area is planted with rice, which accounts for more than 90% of total grain production (Alauddin and Tisdell, 1987; BBS, 2009; Asaduzzaman *et al.*, 2010). The percentage share of rice in value term is more than 60% of the total crop agriculture (Asaduzzaman *et al.*, 2010; Yu et al., 2010). The production of rice depends on both producers' and consumers' preference. It varies from variety to variety and the rice consumption depends on consumers' preference. Usually they were very concerned about the quality and price of the commodity when they made a purchase (Diako *et al.*, 2010). In America consumers preferred rice, which is associated with specific cooking types and menu as well as the processing characteristics. Whereas, in the Middle East they mostly favoured a long grain and well-milled rice with strong aroma compared to the Europeans who tend to prefer the long grain with no scent. The Japanese, on the other hand, put high priority on the well-milled, very recently processed, short-grain Japonica rice. The well-milled and long grain Indica rice, however, was preferred by consumers in Thailand (Lancon *et al.*, 2003, Galawat and Yabe, 2010, Suwannaporn and Linnamenn, 2008). In contrast, the imported rice became a consumer choice in Nigeria due to their cleanliness and swelling capacity, taste, availability and grain shape. These characteristics of imported rice also are mostly preferred by restaurants and fast food industries to be used in their businesses. (Akaeze, 2010).

Suwannaporn and Linnemann (2008) and Basorun (2008) reported that consumers in Japan, Korea, North China and Taiwan, prefer to purchase rice at low price. There were increasing demands for local rice in these countries as the price was cheaper than the imported one. High price is a factor that prevents consumers to purchase certain rice brand that they preferred. The dominance of the demographic factors was also highlighted in a number of studies.

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Consumers who lived in urban area and had high standard of living, high income and education, tend to purchase rice of high quality based on their nutritional content (Tomlins *et al.*, 2005). Whereas Kassali *et al.* (2010) found that income, age of the consumers and frequency of purchase were the important factors that influence household food consumption. Consumers tend to make a purchase at the retails closer to their homes because it makes them easier to get the rice and will purchase whichever rice brand that is available in the market. (Azabagaoglu and Gaytancioglu, 2009).The consumers in Brunei tend to purchase an imported rice rather than local one due to its availability in the market and family inherent where consumers have been using imported rice since childhood (Galawat and Yabe, 2010).

Wong *et al.* (2010) suggested that in future, in order to cope with the demand and changing lifestyle and consumer preference, rice should be made available in different forms: pre-cooked or instant rice, easy-to-cook and ready meal, and various packaging. It was also reported that changes in life style and time constraints on women would also affect the purchasing behaviour on rice brands in the market. Some of them may prefer to eat outside rather than preparing cook at home (Abdullah Farah *et al.*, 2011). Thus, the study was undertaken with the objectives of examining the factors affecting producers' and consumers' preference for the rice varieties, their purchasing behaviour and to explore their consumption patterns.

METHODOLOGY

The study involved four districts - Gazipur and Dhaka as 'rice deficit' area and Dinajpur and Bhola as 'rice surplus' area. From each location fifty farmers were selected and the selected farmers were categorized into three groups such as: i) farmer as a producer; ii) farmer as a producer cum consumer; and iii) pure consumer (purchased rice from market). The pure consumers were selected from the urban areas of the selected districts. A pre-tested questionnaire was used for interviewing the farmers regarding choice of rice varieties for production and consumption. For comparison and validation 25 farmers' data were used from 50 farmers in the proposed models and remaining 25 farmers' data were used to explore the significant difference of preferring rice varieties among the group of people Chi-square (χ^2) tests (Gomez and Gomez, 1983) and survey on food conducted according to Larry McMullen (2004) were used to test the significant difference. The locations were savar upazila of Dhaka, Gazipur sadar of Gazipur, Fulbari upazila of Dinajpur and Bhola sadar of Bhola. In this study both male and female farmer and consumer were selected to get the variation of performance and effective result. Urban consumers pay high price for premium and fine rice compared to rural consumers may be because on average income of urban consumers is higher than the rural ones.

Mathematical model for analysis

The model of consumer demand for good characteristics is adapted from Ladd and Suvannunt (1976). Products and demand for the utility they provide, which in turn is a function of the characteristics of the product (Ladd and Suvannunt, p 505). Then Laurian J. Unnevehr (1986) has given a model of consumer demand for rice grain quality and return to research for quality improvement in southeast Asia. Also Juliano, B O (1982), presented a paper at food conference of Singapore institute of food science and technology about consumer acceptance and processing characteristics of rice varieties. On the basis of above authors model ideas; we proposed three models for consumer preference (Consumer model) and producer preference (Producer model) and producer-cum-consumer preference (Producer-Consumer model) to rice varieties.

Consumer model

$$CP_i = f(PR_j, CI_k, CRV_m, ARV, V_n)$$

where, CP_i = Preference of ith consumers; $PR_{j(1,2,3...)}$ = Price of rice; here $PR_j = \sum_{j=1}^{p} X_{R_j} R_{C_j} + U$; where,

X_{R_j} = Variance in the rice price; and $R_{C_j} = \sum_{j=1}^{p} PC_j + CC_l + OC_k$; $PC_{j(Whiteness, Brokens, Shape, Chalkiness)}$ = Physical characteristics of rice grain; $CC_{l(amylose(\%), Aroma)}$ = Chemical characteristics of rice grain;

$OC_{k(cooking quality, eating quality, Hardness)}$ = Other characteristics; $CI_{k(H,M,L)}$ = kth consumer income;

CRV_m = Category of rice variety; ARV = Availability of rice variety and V_n=Variety name.

U = Constant variance (ie $E(U) = 0$)

Producer model

$$PP_i = f(CP_i, PRV, RGEAEZ, TFSR_s, LFP, LD, RSS, T_c)$$

where, PP_i = Preference of ith producers; CP_i = Preference of ith consumers; PRV = Production of rice variety (High production, Medium or average); $RGEAEZ$ = Rice growing environment of AEZ; TFRS=Total farm size of rice, LFP = Local farmer's practices; LD = Local demand; RSS$_s$=Rice seed source, T$_c$=Traders category

Producer-consumer model

$$PC_l = PP_i + CP_i$$

where, PP_i = Preference of ith producers; CP_i = Preference of ith consumers

Data analysis

The data were taken from the selected producers and consumers of Gazipur, Dhaka, Dinajpur and Bhola. Each sample was chosen randomly from producers and consumers. The retail markets were chosen to reflect the preference displayed by different income classes and price and variety name were recorded for each sample. In this study both qualitative and quantitative data were used. Qualitative data were analysed by descriptive statistics using ranking. The physical and chemical sample characteristics were analysed in the BRRI Grain Quality and Nutrition (GQN) Division's laboratory. The relationship of price and grain quality characteristics to rice is based on retail market demand and consumers' preference (Table 1). Tables 2, 3 and 4 respectively present the estimates of producers' preference, consumers' preference and producer-cum-consumer preference for the four locations. In four locations all parameters (variables), which introduced in the models are significant for producers' preference, consumers' preference and producer-cum-consumer preference.

RESULTS AND DISCUSSION

From the validation and analysis (linear regression) of the models and the χ^2-test for the independence of preferring rice varieties among the selected group of respondents were significant in Dhaka area, which indicates that trend of preferring rice varieties differ from group to group (Tables 5 and 6). BR22 was highly preferred variety (33%) in T. Aman season. Producer preference level was 28% and that of the producer-cum-consumers was 36%.

In Boro season, BRRI dhan29 was highly preferred (30%) variety. About 32% of the producer, 20% of the producer-cum-consumers and 34% of the pure consumers preferred this variety. In Aus season, BR20 was highly preferred (43%) variety. About 34% of the producer as well as, 50% of the producer-cum-consumers preferred this variety.

In Gazipur area, the χ^2-values for the independence of preferring rice varieties among the selected group of respondents were significant which indicates that trend of preferring rice varieties differ from group to group (Tables 5 and 7). BR11 was highly preferred (52%) variety in T. Aman season. Producer (50%) as well as producer-cum-consumers (68%) equally preferred this variety. In Boro season, BRRI dhan28 is highly preferred (34%) variety. Twenty-eight percent of the producer, 32% of the producer-cum-consumers and 34% of the pure consumers preferred this variety. In Aus season, the preferred variety was BR16 (66%). About 52% of the producer as well as, 66% of the producer-cum-consumers preferred this variety.

In Dinajpur area, χ^2-values for preferring rice varieties vary significantly from group to group (Tables 5 and 8). In T. Aman season, the selected persons respond nothing about their variety choice. But in Boro season, the χ^2-value indicates that trend of preferring rice varieties was more or less same in the selected group of people. The highest preferred variety in Boro season was BR16, where 30% producer and 24% producer-cum-consumer preferred this variety. Aus variety was not produced in the locality.

In Bhola area, the χ^2-values for the independence of preferring rice varieties among the selected group of respondents were significant, which indicates that trend of preferring rice varieties differ from group to group (Tables 5 and 9). BR32 was highly preferred (28%) variety in T. Aman season, where 26% producer and 30% producer-cum-consumers preferred this variety.

In Boro season, BRRI dhan29 was highly preferred (25%) by the selected respondents. Twenty percent of the producers, 22% of the producer-cum-consumers and 34% of the pure consumers preferred this variety. In Aus season, BR9 was highly preferred (33%) by the selected respondents. About 52% of the producer as well as, 66% of the producer-cum-consumers preferred this variety.

Tables 10, 11, 12 and 13 indicate that most of the selected persons, who are grouped as producer

and producer-cum-consumer preferred rice varieties for their higher yield in Dhaka, Gazipur, Dinajpur and Bhola areas. On the other hand, the pure consumers preferred varieties based on their tastes (Table 14).

Table 1. Correlation of price and grain quality characteristics in four locations.

Characteristic	Location			
	Dhaka	Gazipur	Dinajpur	Bhola
Price (Tk/kg)	43.2	41.5	36.3	34.6
(Average price both coarse and fine rice)	(6.7)[c]	(6.1)	(5.5)	(5.1)
Physical characteristics				
Whiteness	71.2	70.3	52.6	41.4
(% of pure white/polish)	(4.7)	(4.4)	(2.9)	(2.5)
Brokens	15.6	16.2	20.7	30.8
(% of grains)	(14.9)	(15.1)	(11.6)	(9.4)
Shape	3.5	3.3	2.5	2.1
(length and width)	(0.3)	(0.3)	(0.2)	(0.2)
Chemical characteristics				
Amylose (%)	27.9	26.7	25.3	25.8
	(2.6)	(2.5)	(2.2)	(2.8)
Aroma	5.36	5.12	2.45	2.10
(No aroma, less aroma, strong aroma)	(0.98)	(0.92)	(1.56)	(1.48)
Cooking quality	7.1	7.3	10.4	10.6
(Time)	(0.7)	(0.8)	(0.5)	(0.5)
Hardness	1.1	1.3	1.7	1.9
(Sticky or non-sticky)	(0.20)	(0.22)	(0.41)	(0.49)
Eating quality	6.43	6.46	7.32	7.42
(taste)	(1.16)	(1.18)	(1.34)	(1.36)
Varietal characteristics				
Chalkiness	5.5	5.8	6.2	6.6
(proportion of grain)	(3.1)	(3.3)	(4.1)	(4.3)
No. of samples	25	25	25	25
R^2	0.89	0.82	0.73	0.69

[c]Standard deviations are in parenthesis.

Table 2. Regression estimate of producers preference in four locations.

Location	No. of sample	Intercept	PR_j	CI_k	CRV_m	ARV	V_n	R^2	Adjusted R^2
Dhaka	25	10.36	0.58**	0.21*	0.052*	0.043*	0.047*	0.85	0.81
Gazipur	25	10.22	0.59**	0.20*	0.056*	0.042*	0.045*	0.87	0.78.
Dinajpur	25	11.30	0.56**	0.24*	0.052*	0.044*	0.042*	0.79	0.77
Bhola	25	11.15	0.55**	0.22*	0.051*	0.040*	0.043*	0.75	0.76

Note: ** and * denotes significant at the 1% and the 5% level respectively.

Table 3. Regression estimate of consumers preference in four locations.

Location	No. of sample	Intercept	CP_i	PRV	RGEAEZ	TFSR	SRS	LEP	LD	T_C	R^2	Adjusted R^2
Dhaka	25	30.28	0.61**	0.39*	0.047*	0.019*	0.013*	0.033*	0.035*	0.033*	0.87	0.82
Gazipur	25	30.47	0.63**	0.36*	0.046*	0.014*	0.011*	0.030*	0.037*	0.031*	0.85	0.81
Dinajpur	25	28.36	0.59**	0.34*	0.044*	0.012*	0.012*	0.029*	0.032*	0.034*	0.83	0.79
Bhola	25	27.93	0.55**	0.33*	0.040*	0.011*	0.014*	0.028*	0.030*	0.031*	0.81	0.77

Note: ** and * denotes significant at 1% and 5% level respectively.

Table 4. Regression estimate of Producer-cum-consumers' preference in four locations.

Location	No. of sample	Intercept	PP_i	CP_i	R^2	Adjusted R^2
Dhaka	25	58.68	0.55**	0.44**	0.89	0.78
Gazipur	25	57.76	0.53**	0.43**	0.87	0.73
Dinajpur	25	55.39	0.51**	0.40**	0.86	0.71
Bhola	25	54. 67	0.50**	0.41**	0.84	0.69

Note: ** denotes significant at the 1% level.

Table 5. Combined analysis of proposed regression models.

Consumer model: $CP_i = 10.76 + 0.59\ PR_j^{**} + 0.24\ CI_k^* + 0.55\ CRV_m^* + 0.043\ ARV^* + 0.48\ V_n^*$; $R^2 = 0.82$

Producer model: $PP_i = 30.11 + 0.66\ CP_i^{**} + 0.035\ PRV^* + 0.046\ RGEAEZ^* + 0.018TFSR^* + 0.015\ SRS^* + 0.029\ LEP^* + 0.033\ LD^* + 0.031\ T_C^*$

$R^2 = 0.84$

Producer-cum-consumer model: $PC_l = 56.84 + 0.51\ PP_i^{**} + 0.40\ CP_i^{**}$; $R^2 = 0.88$

Note: ** and * denotes significant at the 1% and the 5% level respectively.

Table 6. Contingency table for the independence between group of variety and group of farmers on varietal preference in Dhaka area.

Season	T. Aman						Total
Group/Variety	BR11	BR22	BRRI dhan32	BRRI dhan40	Chinigura	Non-respondent	
Producer	3(12)	7(28)	5(20)	2(8)	4(16)	4(16)	25 (100)
Producer-cum-consumer	2(8)	9(36)	6(24)	3(12)	2(8)	3(12)	25 (100)
Pure consumer	4(16)	8(32)	6(24)	4(16)	1(4)	2(8)	25 (100)
Total	9(12)	24(32)	17(23)	9(12)	7(9)	9(12)	75 (100)
Chi-square value	13.243*						
Season	Boro						Total
Group/Variety	BR16	BRRI dhan28	BRRI dhan29	BRRI dhan47	Savayra Sail	Non-respondent	
Producer	3(12)	5(20)	8(32)	2(8)	4(16)	3 (12)	25(100)
Producer-cum-consumer	4(16)	4(16)	6(24)	2(8)	5(20)	4(16)	25 (100)
Pure consumer	3(12)	3 (12)	9(36)	3(12)	5(20)	2(8)	25 (100)
Total	10(13)	12(16)	23(31)	7(9)	14(19)	9(12)	75 (100)
Chi-square value	21.364**						
Season	Aus						Total
Group/Variety	BR1	BR20	BRRI dhan26	BRRI dhan27	Pueikka	Non-respondent	
Producer	4(16)	8(32)	3(12)	1(4)	4(16)	5(20)	25 (100)
Producer-cum-consumer	2(8)	11(44)	4(16)	2(8)	3(12)	3(12)	25 (100)
Pure consumer	3 (12)	12 (48)	2(8)	1(2)	4(16)	3(12)	25 (100)
Total	9(12)	31(41)	9(12)	4(5)	11(15)	11(15)	75(100)
Chi-square value	5.431 (NS)						

Note: Figures in the parentheses represent percentage, **=significant at the 1% level, *=significant at the 5% level, NS =Not significant.

Table 7. Contingency table for the independence between group of variety and group of farmers on varietal preference in Gazipur area.

Season	T. Aman					Total
Group/Variety	BR3	BR11	BR22	BR25	Non-respondent	
Producer	1(4)	12(48)	2(8)	1(4)	9(36)	25 (100)
Producer-cum-consumer	2(8)	16(64)	1(4)	1(4)	5(20)	25 (100)
Pure consumer	4(16)	8(32)	8(32)	4(16)	1(2)	25 (100)
Total	7(9)	36(48)	11(15)	6(8)	15(20)	75 (100)
Chi-square value	16.291*					
Significance level	0.050					
Season	Boro					Total
Group/Variety	BR14	BRRI dhan28	BRRI dhan29	BRRI Dhan36	Non-respondent	
Producer	1(4)	7(28)	8(32)	2(8)	7(28)	25 (100)
Producer-cum-consumer	1(4)	8(32)	9(36)	2(8)	5(20)	25 (100)
Pure consumer	3(12)	10(40)	7(28)	3(12)	2(8)	75 (100)
Total	5(7)	25(33)	24(32)	7(9)	14(19)	75 (100)
Chi-square value	25.488**					
Significance level	0.002					
Season	Aus					

Group/Variety	BR3	BR16	Kalijira	Non-respondent	Total
Producer	5(20)	13(52)	1(4)	6(24)	25 (100)
Producer-cum-consumer	2(8)	16(64)	3(12)	4(16)	25 (100)
Pure consumer	5 (20)	20 (80)	0	0	25 (100)
Total	12(16)	49(65)	4(5)	10(13)	75(100)
Chi-square value	6.875 (NS)				
Significance level	0.537				

Note: Figures in the parentheses represent percentage, **=significant at the 1% level, *=significant at the 5% level, NS =Not significant.

Table 8. Contingency table for the independence between group of variety and group of farmers on varietal preference in Dinajpur area.

Season	T. Aman						Total
Group/Variety	BR11	BR22	Gutisharna	Ranjit	Jatapari	Non-respondent	
Producer	2(8)	3(12)	2(8)	2(8)	4(16)	12(48)	25 (100)
Producer-cum-consumer	4(16)	1(4)	2(8)	1(4)	1(2)	16(64)	25 (100)
Pure consumer	6(24)	4(16)	1(4)	1(4)	3(12)	10 (40)	25 (100)
Total	12(16)	8(11)	5(7)	4(5)	8(11)	38(50)	75 (100)
Chi-square value	44.392**						
Significance level	0.000						

Season	Boro										Total
Group/Variety	BR1	BR16	BRRI dhan28	BRRI dhan29	Gutisharna	Jata Pari	Hybrid	China	Parija	Non-respondent	
Producer	1(4)	4(16)	4(16)	1(4)	4(16)	2(8)	3(12)	1(4)	1(4)	4(16)	25 (100)
Producer-cum-consumer	1(4)	6(24)	5(20)	1(4)	2(8)	3(12)	3(12)	1(4)	0	3(12)	25 (100)
Pure consumer	1(4)	2(8)	4(16)	3(12)	1(4)	7(28)	3(12)	0(0)	3(12)	1(4)	25 (100)
Total	3(4)	12(16)	13(17)	5(7)	7(9)	12(16)	9(12)	2(3)	4(5)	8(11)	75 (100)
Chi-square value	12.276 (NS)										
Significance level	0.764										

Note: Figures in the parentheses represent percentage, **=significant at the 1% level, *=significant at the 5% level, NS=Not significant.

Table 9. Contingency table for the independence between group of variety and group of farmers on varietal preference in Bhola area.

Season	T. Aman						Total
Group/Variety	BR11	BRRI dhan32	BRRI dhan40	Mota	Kajal Sail	Non-respondent	
Producer	6 (24)	6(24)	4(16)	3(12)	5(20)	1(4)	25 (100)
Producer-cum-consumer	5(20)	7(28)	2(4)	5(20)	5(20)	1(4)	25 (100)
Pure consumer	7(28)	7(28)	1(4)	6(24)	2(8)	2(8)	25 (100)
Total	18(24)	20(27)	7(9)	14(19)	12(16)	4(5)	75(100)
Chi-square value	13.457*						
Significance level	0.050						
Season	Boro						Total
Group /Variety	BRRI dhan28	BRRI dhan29	BRRI dhan47	Vojan IRRI	Hybrid-2	Non-respondent	
Producer	3(12)	5(20)	4(16)	6(24)	5(20)	2(8)	25 (100)
Producer-cum-consumer	4(16)	6(24)	4(16)	4(16)	4(16)	3(12)	25 (100)
Pure consumer	5 (20)	8(32)	2(8)	5(20)	3(12)	2(8)	25 (100)
Total	12(16)	19(26)	10(13)	15(20)	12(16)	7(9)	150 (100)
Chi-square value	21.217**						
Significance level	0.002						
Season	Aus						Total
Group/Variety	BR8	BR9	BR24	Kali hytta	Non-respondent		
Producer	4(16)	8(32)	4(16)	5(20)	4(16)		25 (100)
Producer-cum-consumer	4(14)	7(28)	4(16)	5(20)	5(20)		50 (100)
Pure consumer	5 (20)	9 (36)	1(4)	6(24)	4(16)		50 (100)
Total	13(17)	24(32)	9(12)	16(22)	13(17)		75 (100)
Chi-square value	3.198*						
Significance level	0.030						

Note: Figures in the parentheses represent percentage, **=significant at the 1% level, *=significant at the 5% level, NS =Not significant.

Table 10. Liking reasons for BRRI varieties in Dhaka.

Season	T. Aman				Boro				Aus			
Comment/Variety	BR11	BR22	BR32	BR40	BR16	BRRI dhan28	BRRI dhan29	BRRI dhan47	BR1	BR20	BRRI dhan26	BRRI dhan27
Higher yield	5 (56)	9 (41)	11 (44)	4 (44)	10 (72)	10 (56)	11 (44)	4 (57)	7 (62)	10 (40)	4 (28)	2 (40)
Tasty	4 (44)	13 (59)	12 (48)	5 (56)	2 (14)	4 (22)	10 (40)	-	5 (38)	10 (40)	5 (36)	2 (40)
Tasty +less production cost	-	-	2 (8)	-	-	-	-	3 (43)		5 (20)	-	1 (20)
Testy + longer durability of boiled rice +less nursing	-	-	-	-	2 (14)	2 (11)	2 (8)		-	-	-	-
Fine rice +tasty	-	-	-	-	-	-	-	-	-	-	5 (36)	-
Better yield +less fertilizer use	-	-	-	-	-	2 (11)	2 (8)	-	-	-		-
Total	9 (100)	22 (100)	25 (100)	9 (100)	14 (100)	18 (100)	25 (100)	7 (100)	12 (100)	25 (100)	14 (100)	5 (100)

Note: Figures in the parentheses represent percentage.

Table 11. Liking reasons for BRRI varieties in Gazipur.

Season	T. Aman				Boro				Aus		
Comment/Variety	BR3	BR11	BR22	BR25	BR14	BRRI dhan28	BRRI dhan29	BRRI dhan36	BR3	BR16	Kalijira
Higher yield	2 (65)	12 (48)	3 (75)	2 (50)	2 (40)	23 (92)	12 (50)	3 (50)	8 (62)	16 (64)	-
Tasty	-	3 (12)	1 (25)	-	3 (60)	2 (8)	5 (20)	3 (50)	5 (38)	5 (20)	3 (50)
Tasty + less production cost	-	-	-	-	-	-	3 (13)	-		4 (16)	-
Testy + longer durability of boiled rice +less nursing	1 (35)	5 (20)	-	2 (50)	-	-	-	-	-	-	-
Fine rice	-	-	-	-	-	-	2 (8)	-	-	-	-
Fine rice +tasty	-	-	-	-	-	-	2 (8)	-	-	-	3 (50)
Better yield +less fertilizer use	-	5 (20)	-	-	-	-	-	-	-	-	
Total	3 (100)	25 (100)	4 (100)	4 (100)	5 (100)	25 (100)	24 (100)	6 (100)	13 (100)	25 (100)	6 (100)

Note: Figures in the parentheses represent percentage.

Table 12. Liking reasons for BRRI varieties in Dinajpur.

Season	T. Aman				Boro		
Comment/Variety	BR11	BR22	BR1	BR16	BRRI dhan28	BRRI dhan29	Hybrid (Lal)
Higher yield	2 (50)	2 (33)	-	13 (52)	8 (54)	2 (67)	11 (69)
Tasty	1 (25)	2 (33)	2 (67)	-	3 (20)	-	5 (31)
Tasty + less production cost	-	-	1 (33)	-	-	-	-
Tasty + longer durability of boiled rice + less nursing	-	-	-	-	2 (13)	-	-
Good quality rice	-	1 (17)	-	-	-	-	-
Early rice variety	1 (25)	-	-	-	-	-	-
Good for pop and puff (khai and muri)	-	-	-	8 (32)	-	-	-
High grain weight	-	-	-	2 (8)	-	-	-
Fine rice	-	-	-	-	-	1 (33)	-
Fine rice +tasty	-	-	-	-	2 (13)	-	-
Fine rice + non-sticky	-	1 (17)	-	2 (8)	-	-	-
Total	4 (100)	6 (100)	3 (100)	25 (100)	15 (100)	3 (100)	16 (100)

Note: Figures in the parentheses represent percentage.

Table 13. Liking reasons for BRRI varieties in Bhola.

Season	T. Aman				Boro				Aus			
Comment/Variety	BR11	BR32	BR40	Kajal Sail	BRRI dhan28	BRRI dhan29	BRRI dhan47	Hybrid-2	BR8	BR9	BR24	Kali Hytta
Higher yield	14 (64)	11 (44)	12 (80)	14 (61)	8 (67)	13 (61)	10 (62)	16 (89)	8 (62)	10 (40)	11 (65)	10 (50)
Tasty	8 (36)	12 (48)	2 (13)	9 (39)	3 (25)	8 (39)	6 (38)	-	8 (38)	10 (40)	6 (35)	10 (50)
Tasty + less production cost	-	-	1 (7)	-	-	-	-	-	-	5 (20)	-	-
Testy + longer durability of boiled rice +less nursing	-	-	-	-	1 (8)	-	-	2 (11)	-	-	-	-
Fine rice	-	2 (8)	-	-	-	-	-	-	-	-	-	-
Total	22 (100)	25 (100)	15 (100)	23 (100)	12 (100)	21 (100)	16 (100)	18 (100)	16 (100)	25 (100)	17 (100)	20 (100)

Note: Figures in the parentheses represent percentage.

Table 14. Reasons for liking varieties by the pure consumers in different locations.

Reason	Gazipur	Dhaka	Dinajpur	Bhola
Tasty	28 (56)	26 (52)	29 (58)	24 (48)
Fine rice	10 (20)	12 (24)	11 (22)	9 (18)
Fine rice + tasty	9 (18)	7 (14)	1 (2)	10 (20)
Fine rice + non-sticky	3 (6)	5 (10)	9 (18)	7 (14)
Total	50 (100)	50 (100)	50 (100)	50 (100)

Note: Figures in the parentheses represent percentage.CONCLUSIONS

Model analysis indicates that BR11, BR22 and BRRI dhan32 were more preferable in T. Aman season; BR16, BRRI dhan28 and BRRI dhan29 in Boro season and BR9, BR16 and BR20 in Aus season among the producers and producer-cum-consumers. Although, BRRI variety contributes about 90% of total production, it does not reflect in field label because BRRI varieties are sold in different brand names. As for example, BRRI dhan28 sales as Nizersail and BRRI dhan29 as Jhingasail and Miniket etc.

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