Oryza Vol. 46. No.1, 2009 (67-70)

The diffusion system of rice variety Rajshree : a case of rapid adoption

G.A.K. Kumar*, S.K. Jha, A.K. Mohanty and B.C.Patra

Central Rice Research Institute, Cuttack –753 006, Orissa, India

ABSTRACT

The present study was conducted in Samastipur district of Bihar where rice variety Rajshree was rapidly adopted which is a superior variety for lowland with water stagnation up to one meter. This variety was adopted by the rice growing community within five years of its release by central variety release committee. The study gives insight in the process of rapid adoption and finds the factor behind it.The superior technological characteristics of the Rajshree variety and education level of farmers that proved crucial in rapid adoption of Rajshree variety over time tested local variety 'Bakol' which could not withstand stress due to drought. The curvilinear regression analysis show that about 73.6 per cent change in adoption quotient can be explained by income, lowland area and perception about technological characteristics of Rajshree variety.

Key words: *Rajshree, lowland, rice, farmer adoption*

While 'diffusion of innovation' has been going on in all places and in all ages, its systematic study started only from the beginning of the 20th century. Gabriel Trade (1903) identified the adoption or rejection of innovations as a crucial research question and he called diffusion of innovation as "the law of imitation". Since then, a large number of adoption researchers have been conducted all over the world to gain better understanding of the process. The present study conducted in Bakhtiyarpur, Bihar aims at highlighting the rapid adoption process of a rice variety, Rajshree.

Rajshree is a local land race, semi tall (125-130 cm), late duration variety of 140-145 days. It is moderately resistant to stem borer and resistant to BLB and blast. Rajshree is also tolerant to lodging, has non-shattering grain, tolerant to delayed planting and performs well in waterlogged condition. The average yield of Rajshree variety is 4.0 – 5.5 t ha^{-1} under normal condition and 3.0-3.5 t ha^{-1} under late planting situation. The farmers of the area under study started using it for lowland area that has less than 100 cm deep standing water. Later, during 1987 drought, it was found that the local variety, 'Bakol' could not withstand the stress, while 'Rajshree' could resist the drought conditions. Hence, the Rajendra Agricultural University, Bihar started recommending Rajshree rice variety for lowland having less than 100 cm deep water which was released by central variety release committee (CVRC) in 1988.

MATERIALS AND METHODS

Two villages namely Bakhtiyarpur, block Kalyanpur and Mahamada, block Pusa in the district of Samastipur, Bihar were selected. Both blocks have lowland area of less than 100 cm stagnant water which is suitable for Rajshree rice variety. The Census method of sampling was used and therefore, all the farmers having lowland were selected from these villages. A total of 108 respondents were selected using purposive sampling method. Data was collected using pre-tested questionnaire. The effect of independent variables on dependent variable adoption quotient of Rajshree variety, curvilinear regression equation was obtained using Micro TSP ver 5.18 released by David M. Lilien which uses iteration technique.

RESULTS AND DISCUSSION

The demographic and general characteristics of the 108 farmers of Bakhtiyarpur have been summarized in Table 1. The typical farmer in Bakhtiyarpur was 44.11 years old at the time of data collection. He had undergone at least 7 years of schooling. Probably, what was most important for the diffusion of innovation through the community is that about 15 per cent of the farmers had college education. The overall literacy rate was found to be as high as 88.71 per cent. An average farmers was a 'medium farmer' possessing about 3.56 hectares of land and had a monthly family

Table 1. Demographic and Economic Characteristics of 108 farmers of Bakhtiyarpur

Characteristics	Class		Statistics
Age	Below 30	27 (25)	Mean Age = 44.11 years
	30 to 45	41 (38)	
	Above 45	40 (37)	
Education	Illiterate	23 (22)	Mean = 7.13 years
	Primary	43 (40)	
	Matriculation	14 (13)	
	Intermediate/Diploma	11 (10)	
	Graduate	8 (7)	
	Post-graduate	9 (8)	
Land owned	Marginal farmers	10 (9)	Mean = 5.69 ha (S.D. 7.08)
	Small farmers	14 (13)	
	Medium farmers	45 (42)	
	Large farmers	31 (29)	
Annual income			Mean = Rs.36,732(SD 36,920) Median = Rs. 28,000

Figures in parenthesis represent percentage

income of Rs.2, 333.

The farmers in Bakhtiyarpur cited a wider variety of different sources and channels carrying information about Rajshree. A summary of the percentages of farmers who obtained information at awareness stage and subsequent stages from different channels is presented in Table 2.

During interview each farmer was asked about the extent of his exposure to the mass media in general and to specific channels carrying information regarding Rajshree. None of the farmers reported having been made aware of Rajshree through mass media (Table 2). However, it would be too early to marginalize the role of mass media at awareness stage. In fact, the farmers of Bakhtiyarpur were well exposed to mass media but the coverage of programmes/articles regarding Rajshree by various media was considerably

Table 2 General information sources cited by farmers regarding Rajshree

Source	First Information(Awareness)	Subsequent information(Interest to adoption)
Radio	0	45 (42)
Television	0	2 (2)
Newspaper	0	3 (3)
Workers of University	29 (27)	N.A.
Scientist	10 (9)	N.A.
Demonstration	9 (8)	92 (85)
Fellow Farmers	57 (53)	105 (97)
Miscellaneous	3 (3)	N.A.

N.A. : Not available, Figures in parenthesis indicate percentages.

Table 3. Sources of information about agriculture as cited by farmers of Bakhtiyarpur

Media	Farm Programmes	Other Programmes
Radio	66 (61)	78 (72)
Television	26 (24)	50 (46)
Newspaper	26 (24)	50 (46)

Figures in parenthesis indicate percentage

Table 4. Coverage of information regarding Rajshree by various mass media

Media	1989	1990	1991	1992
Radio (min)	10	45	95	90
Television (min)	30	30	60	120
Newspaper (Area in cm^2)	600	900	1350	2050

low. (Table 3 and 4).

At the later stage of innovation decision process, radio did play a role in providing information to farmers. Radio was most commonly used mass media. Yet another important channel of information flow was experts/extension personnel. A fairly high percentage (36 per cent) of farmers reported technical and extension personnel as source of information at awareness stage (Table 2). However, data regarding the contact with these personnel could not be obtained as farmers failed to recall it. Eight per cent of farmers cited demonstration as first source of information regarding Rajshree and 85 per cent of farmers have reported it as source of information at a later stages of innovation decision process (Table 2). As regards the frequency of exposure to demonstration 53% of the farmers were exposed 2-6 times, 22% farmers were exposed once and 17% farmers were never exposed Eight per cent farmers were exposed 6-12 times.

The most frequently cited sources of information about new practices were fellow farmers (Table 2). About 53 per cent of farmers were made aware of Rajshree by fellow farmers and a phenomenally higher proportion of farmers (97 per cent) reported having discussed about technology with fellow farmers during innovation decision process. Only 3 per cent of farmers received first information from different sources such as agricultural fair, relatives from far-off villages etc. However, no information was available regarding the role of above-mentioned channels during later stages of innovation decision process.

In an *ex-post facto* experimental design, data regarding stages of innovation decision process is difficult to collect. However, farmers of Bakhtiyarpur were able to recollect period of knowledge and implementation. This data has been presented in

Table 6. Distribution of farmers at knowledge and implementation stages

Year	Knowledge	Implementation Stage
1988	1	1
1989	26	26
1990	48	47
1991	20	16
1992	13	06
Did not adopt	-	12

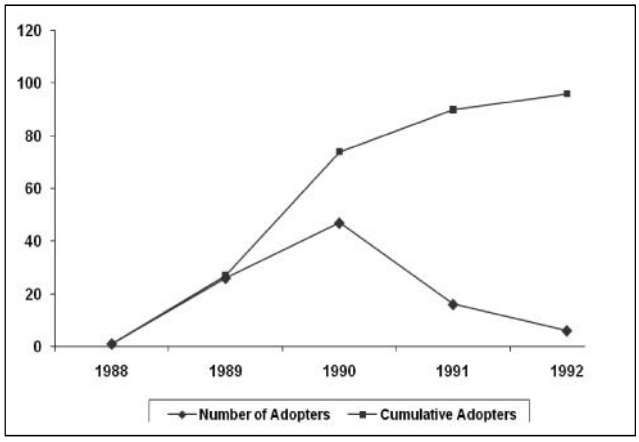

Fig 1. Cumulative adoption curve of rice cv. Rajshree

Table 6 and Fig.1.Rajshree gained rapid adoption among members of the community replacing popular local rice variety 'Bakol' due to its better characteristics. A close examination of technological characteristics of the two varieties revealed that, besides grain yield Rajashree has relative advantage in terms of better cooking quality and physical appearance. Furthermore, profitability also increased by cultivating Rajshree through increased yield up to 8 quintals ha^{-1}. Rajshree could also be cultivated with ease as the package of practices being followed for the local cultivar 'Bakol' could be used for cultivating Rajshree. The above description depicts a clear-cut superiority of Rajshree over local variety, Bakol, on the basis of its technological characteristics.

The results, presented in Table 7, were obtained after five iterations. The results of the study clearly exhibit that at awareness stage, it is the individual and group methods that proved to be effective in the absence of proper coverage by mass media. Mass media in combination with individual and group methods was effective from interest to adoption stages. However, it was the superior technological characteristics of the Rajshree variety and education level of farmers that proved crucial in rapid adoption of Rajshree variety over time tested local variety 'Bakol' which could not withstand stress due to drought. The curvilinear regression analysis show that about 73.6 per cent change in adoption quotient can be explained by income, lowland area and perception about technological characteristics of Rajshree variety. Hence it could be concluded that, in general, income of the farmer and his perception about technological characteristics will

Table 7. Curvilinear regression coefficient of economic and psychological variables regressed upon adoption quotient of Rajshree

Coefficient	Value		
C (1)	1.0045		
C (2)	-0.00007		
C (3)	86529.226		
C (4)	140.1201		
C (5)	0.0099		
C (6)	10.9199		
C (7)	2.6329		
C (8)	0.2750		
R^2	0.7942	Mean of Dependent Variable	19.9603
Adjusted R^2	0.7367	SD of Dependent Variable	17.2621
SE of regression	8.8581	Sum of residue squared	1961.68
		F-statistics	13.788**

Curvilinear Regression Equation

$AQ = C(1)+C(2)*INCM+C(3)/INCM+C(4)*C(5)^{(1/LWLAND)}*LWLND^{C(6)}+1/(C(7)-C(8)*PERCEP)$

Where AQ = Adoption Quotient, INCM = Income, LWLND = Lowland area, and PERCEP = Perception about technological characteristics

help in rapid adoption of technologies.

REFERENCES

Kumar GAK 1993. Simulating Adoption of Rajshree rice variety, Unpublished Ph.D.Thesis, Indian Agricultural Research Institute, New Delhi

Lankford Bruce and Franks Tom 2000. The sustainable coexistence of wetlands and rice irrigation: a case study from Tanzania, The Journal of Environment and Development, 9 (2): 119-137

Sharma SD and Prasad Rao U 2004. Genetic improvement of Rice varieties of India (in 2 parts), Pub: Today & Tomorrow's Printers and Publishers, New Delhi.

Tarde Gabriel 1903. The Laws of Imitation, translated by E.C.Parsons, Pub: Henry Holt & Co, New York

Yoichi Inoue 1998. A case study on the rice business system of JA AICHI-CHUOH under staple food law. *Journal of* Rural Community Studies, 86: pp 91-99