

# **Monitoring Rice Varieties Grown in the Rice Zone of the Punjab: Results from 1985-87**



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FROM 1985-87

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## Abbreviations

AARI: Ayub Agricultural Research Institute.  
AERU: Agricultural Economics Research Unit.  
CIMMYT: International Maize and Wheat Improvement Center.  
U.A: University of Agriculture.  
RRI: Rice Research Institute.

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Introduction

Breeders, seed institutions and extension agents in the Punjab are continuously working to evolve and disseminate varieties that are both high yielding and resistant to insects, pests and other diseases (Akhtar et al., 1987). Recommended rice cultivars are an important component of improved rice technology. Presently the extent of adoption of rice planted by farmers is not regularly reported and published in the Punjab. Due to the unavailability of such information, researchers and policy makers are not fully aware of farmers perceptions about rice varieties planted.

To fill such gap, a regular monitoring of rice varieties on farmers fields has been started by AERU, Faisalabad. This exercise will help to assess the varietal diffusion and distribution with respect to farm size in the rice-wheat interface. Information on the relative areas planted to different rice cultivars is also important to alert rice breeders and policy makers to potential losses from insects, pests and other diseases of the rice crop. The major purpose in this paper is to determine the adoption of rice varieties grown by farmers over the past three years.

Review of Rice Varietal Development  
in Punjab

The rice varietal improvement programme in the Punjab was initiated in 1926 when a rice research station was established at Kala Shah Kaku (Khichi et al., 1985). They further argued that up to the 1940s, the improvement work was confined to the development of varieties, through pure line selection. As a result 7 varieties were released; Basmati-370; Mushkan-41; Mushkan-7; Jhona-349, Sathra-278, Mahlar-346 and Palman sufaid (Khichi et.al 1985). They have further stated that two fine grain varieties C-622 and Basmati-Pak were also released in the sixties.

The research received impetus with the introduction of IRRI strains (Khichi et.al 1985). They have further argued that three varieties namely IRRI-8, IRRI-6 and Basmati-198 were approved for general cultivation in 1969, 1971 and 1972 respectively. The local research programme was gradually developed and efforts are

now underway to produce high yielding varieties suited to local conditions. Two Basmati varieties, PK-177 and KS-282 were released in 1977 and 1982. Basmati-385, a new rice variety for Punjab was released in 1985 (Chaudhry and Rehman, 1986). This variety was evolved by crossing Basmati-370 x Taichung (native) I (Chaudhry and Rehman 1986). The crossing work started in 1969. Four time back crossing with Basmati-370 has contributed the aroma, grain shape and cooking quality of Basmati-370, while early maturity and stem stiffness has been contributed by Taichung (Native) I. Basmati-385 has medium height, has a maturity period of 100 days and is moderately resistance to rice stem borer (Chaudhry and Rehman, 1986).

### Research Methods

The rice varietal diffusion survey was conducted by a team of agricultural economists, from the Agricultural Economics Research Unit (PARC), Faisalabad in the second week of March 1988. The "Kalar" Tract (Gujranwala, Sialkot and Sheikhpura districts) of the irrigated Punjab was chosen. From these districts, three contiguous Tehsils were randomly selected. These Tehsils were Gujranwala, Daska and Ferozewala. Twenty four villages from these adjacent Tehsils were randomly selected with the probability of selection a sample proportional to the size of the village population. Fifteen farmers were interviewed from each village to give a total sample size of 360 farmers. The data given in Table 1 reveal the breakdown of sample farmers by Tehsils and farm size. It is evident from the Table that 56, 22 and 22 percent of the farmers were small (<5 ha), medium (5-10 ha) and large (>10 ha), respectively.

Table 1. Sample distribution by Tehsils and farm size in the rice zone, 1987.

Tehsils	Farm Size		
	Small (< 5 ha)	Medium (5-10 ha)	Large (> 10 ha)
	(Percent farmers)		
Gujranwala	60	22	18
Daska	65	20	15
Ferozewala	42	26	32
All	56	22	22



## Results and Discussion

### Farm Size and Rice Area

Information on the average farm size and rice area in the rice zone is presented in Table 2. The average farm size and area under rice were 8.3 and 5.4 hectares. On average, sample farmers devoted more than half of the total farm area to rice (Table 2). Furthermore, small farmers devoted 10 percent more area of their total farm area to rice as compared to large farmers in the study area.

Table 2. Average farm size and rice area by farm size in the study area, 1987.

Farm Size Group	Average Farm Size (ha)	Average Rice Area (ha)	Percent Farm Area in Rice
Small (< 5 ha)	2.8	2.0	69.8
Medium (5-10 ha)	7.7	5.5	71.3
Large (> 10 ha)	23.3	14.0	60.0
All Farms	8.3	5.4	64.2

### Number of Rice Varieties Planted on Sample Farms

The information on number of rice varieties planted by sample rice growers in the study area is presented in Table 3. Thirty six percent of rice growers planted only one variety. A significantly higher proportion of large farmers planted more than three varieties as compared to small farmers.

Table 3. Number of rice varieties planted on sample rice growers by farm size in study area, 1987.

Farm Size Groups	Number of Varieties Planted			
	One	Two	Three	More than three
(Percent farmers)				
Small (<5 ha)	46	40	11	3
Medium (5-10 ha)	21	41	27	11
Large (>10 ha)	28	37	21	14
All Farms	36	40	17	7

## Rice Varieties Planted by Sample Rice Growers

The data regarding rice varieties planted by sample farmers are presented in Table 4. At least 13 varieties of rice were grown by farmers in the study area. The major rice varieties grown during 1987 were Basmati-385 (51%), Basmati-370 (22%), IRRI-6 (9%), Kashmira (5%) and IRRI-9 (5%). A comparison with the previous years, indicates that the area under Basmati-385 has increased (7% to 51%) significantly in the study area. As a result of this increase the area of Basmati-370 halved in 1987. The percentage of the area under IRRI-6, Kashmira, IRRI-9 has decreased similarly in 1987. Farmers have substituted strongly Basmati-385 for Basmati-370, IRRI-6, Kashmira and IRRI-9 in the study area.

Table 4. Area under different rice varieties planted by sample rice growers in the study area during 1985-87

Varietal Groups	Y e a r s		
	1985	1986	1987
(Percent area)			
<b>Recommended Varieties</b>			
Basmati-385	0.2	7.3	50.7
Basmati-370	52.7	42.7	22.3
Basmati-Pak	1.8	2.2	1.8
KS-282	1.2	3.6	1.9
IRRI-6	20.1	18.8	8.8
Basmati-198(Russain)	3.1	5.3	2.2
<b>Not Recommended Varieties</b>			
Kashmira	4.3	6.1	5.4
IRRI-9	13.6	11.4	4.8
IRRI-8	0.4	0.2	-
Malta	1.2	1.6	0.9
Bara	0.4	0.2	0.2
C-621	0.1	0.1	0.2
Pulman	0.9	0.5	0.8

Varieties were further classified into recommended and not recommended cultivars. Just under 88 percent of the rice area was devoted to recommended varieties and 12 percent to those not recommended (Table 5). Furthermore the area under recommended varieties has increased from 79 percent in 1985 to 88 percent in

1987. On the contrary, area under varieties not recommended has decreased from 20 percent in 1986 to 12 percent in 1987 (Table 4). More disaggregated data are given in appendices i, ii & iii.

Table 5. Summary of rice varieties planted in rice zone of the Punjab, 1985-87.

Area (Tehsils)	Category					
	Recommended			Not Recommended		
	1985	1986	1987	1985	1986	1987
	(Percent area)					
Gujranwala	66.2	68.1	72.2	3.80	31.9	27.8
Daska	96.9	96.8	96.5	3.1	3.2	3.5
Ferozewala	88.5	78.6	92.4	11.5	21.4	7.6
All (Tehsils)	79.1	79.9	87.7	20.9	20.1	12.3

#### Rice Varietal Diffusion by Farm size

The data regarding rice area planted under two varietal groups by farm size are presented in Table 6. The data reveal that large farmers have adopted new rice varieties more rapidly than small farmers. The rice area planted by farm size to different varieties is given in Appendix iii. The area under recommended rice varieties was proportionately higher with large farmers. Even though small farmers grew a higher percentage of varieties not recommended than large farmers, they had more than 80 percent under recommended varieties.

Table 6. Area under two varietal groups by farm size 1987

Varietal Group	Farm Size		
	Small (< 5 ha)	Medium (5-10 ha)	Large (> 10 ha)
	(Percent area)		
Recommended	83.3	85.4	90.3
Not Recommended	16.7	14.6	9.7

## Changes in Area Under Different Rice Varieties Over Time

The information on the area under different rice varieties during 1985 to 1987 is given in Table 7. The share of Basmati varieties in the rice zone has increased from 66 percent in 1985 to 86 percent in 1987. Correspondingly, the share of IRRI varieties has decreased from 34 percent in 1985 to 14 percent in 1987. These results indicate that farmers have substituted strongly Basmati-385 for IRRI.

Table 7. Changes in the area under different rice varieties in the rice zone of the Punjab over time.

Varietal Groups	Y e a r s		
	1985	1986	1987
	(Percent area)		
Basmati Varieties	66	70	86
IRRI Varieties	34	30	14

### Summary and Suggestions

The main conclusion of this exercise is that farmers are rapidly adopting Basmati-385. In contrast to wheat varieties, farmers were very much aware of the name of the rice variety they had planted. This may be due to the fact that rice is the major cash crop of the area and price is determined by variety.

The results for 1985 to 1987 indicate that farmers have substituted strongly B-385 for their previously most popular basmati variety B-370. This is due to the fact that B-385 has higher yield potential and matures 12-15 days earlier than B-370. Farmers growing wheat after rice as the major rotation in the rice zone have quickly adopted this new variety of Basmati, in order to avoid delays in wheat planting.

The results of this study underline the need for continuous monitoring of adoption of rice varieties. We have conducted a more detailed study on adoption of B-385 and its comparison with other rice varieties, which will be released later this year. However, the results of this study imply that production of Basmati rice will increase strongly. In contrast, production of IRRI rice could decline because of area substitution.

Appendix i: Rice varieties planted by Tehsil, during 1985.

Varietal Group	Tehsils		
	Gujranwala	Daska	Ferozewala
(Percent Area)			
<b>Recommended varieties</b>			
B-385	0.1	0.9	-
B-370	40.7	91.8	40.8
IRRI-6	18.9	1.6	30.1
Basmati-Pak	4.3	1.6	0.4
KS-282	1.0	0.1	1.9
Basmati-198(Russian)	1.2	0.9	15.3
<b>Banned varieties</b>			
Kashmira	10.1	0.1	2.6
IRRI-9	18.2	0.9	17.1
IRRI-8	0.7	-	0.4
Malta	2.6	0.2	0.9
Bara	0.9	-	0.3
C-621	-	0.2	-
Pulman	1.3	1.7	0.2

Appendix ii: Rice varieties planted by Tehsil during 1986.

Varietal Group	Tehsils		
	Gujranwala	Daska	Ferozewala
( Percent Area )			
<b>Recommended varieties</b>			
B-385	5.8	16.3	4.0
B-370	35.2	73.1	32.6
IRRI-6	11.5	2.5	30.6
Basmati-Pak	6.2	0.9	0.5
KS-282	8.0	0.8	2.5
Basmati-198(Russian)	1.4	3.3	8.4
<b>Banned varieties</b>			
Kashmira	15.0	0.7	3.6
IRRI-9	13.0	0.7	15.5
IRRI-8	-	-	0.4
Malta	2.4	0.4	1.7
Bara	0.7	-	0.1
C-621	-	0.4	-
Pulman	0.8	0.9	0.1

Appendix iii: Rice varieties planted by Tehsils during 1987.

Varietal Group	Tehsils		
	Gujranwala	Daska	Ferozewala
(Percent area)			
<b>Recommended varieties</b>			
B-385	39.4	55.2	55.1
B-370	18.1	38.1	17.1
IRRI-6	6.4	0.6	14.2
Basmati-Pak	4.9	0.2	0.7
KS.282	2.3	0.8	2.2
Basmati-198(Russian)	1.1	1.7	3.1
<b>Banned varieties</b>			
Kashmira	16.1	1.7	1.0
IRRI-9	7.6	0.1	5.5
Malta	2.5	*	0.3
Bara	0.3	-	0.2
C-621	0.1	0.7	0.1
Pulman	1.2	0.9	0.5

\* Negligible.



Appendix iv: Area under different rice varieties by farm size during 1985.

Varietal Group	Farm Size Groups		
	Small (<5 ha)	Medium (5-10 ha)	Large (> 10 ha)
(Percent area)			
<b>Recommended varieties</b>			
B-385	1.2	-	-
B-370	65.7	63.0	44.2
IRRI-6	9.0	15.0	26.0
Basmati-Pak	3.4	2.2	1.1
KS-282	0.7	0.4	1.7
Basmati-198(Russian)	0.9	3.3	3.7
<b>Banned varieties</b>			
Kashmira	4.6	1.7	5.1
IRRI-9	12.8	10.0	15.4
IRRI-8	-	0.7	0.4
Malta	0.6	1.6	1.3
Bara	0.1	0.1	0.6
C-621	-	0.3	-
Pulman	0.9	1.7	0.5

Appendix v: Area under different rice varieties by farm size during 1986.

Varietal Group	Farm Size Groups		
	Small (<5ha)	Medium (5-10ha)	Large (>10ha)
(Percent area)			
<b>Recommended varieties</b>			
B-385	5.4	8.5	7.6
B-370	56.1	54.5	33.1
IRRI-6	8.5	11.8	25.3
Basmati-Pak	4.5	3.0	1.0
KS-282	0.8	2.0	5.2
Basmati-198(Russian)	2.4	5.1	6.4
<b>Banned varieties</b>			
Kashmira	7.1	5.0	6.4
IRRI-9	12.8	7.2	12.6
IRRI-8	-	0.7	-
Malta	1.3	0.5	2.1
Bara	0.1	0.1	0.3
C-621	0.2	0.2	-
Pulman	0.8	1.4	-

Appendix vi: Area under different rice varieties by farm size during 1987.

Varietal Group	Farm Size Groups		
	Small (<5 ha)	Medium (5-10 ha)	Large (> 10 ha)
(Percent area)			
<b>Recommended varieties</b>			
B-385	34.5	45.4	58.8
B-370	39.5	30.2	13.0
IRRI-6	3.0	5.1	12.4
Basmati-Pak	4.1	1.7	1.0
KS-282	0.1	1.2	2.8
Basmati-198(Russian)	2.1	1.8	2.4
<b>Banned varieties</b>			
Kashmira	7.6	5.6	4.5
IRRI-9	6.9	6.6	3.4
Malta	0.4	0.6	1.2
C-621	0.7	0.4	-
Pulman	1.1	1.4	0.5

## References

- Akhtar, M.R., Z. Ahmad., K.A. Tetlay. 1987. "Monitoring Wheat Varietal Diffusion in the Irrigated Punjab: Results from 1986-87". Agricultural Economics Research Unit (PARC), Staff Paper No. 87-3, Faisalabad.
- Chaudhry, A. Majid, and Habib-ur-Rehman. 1987. "Basmati-387: A New Rice Variety for Punjab". Progressive Farming Vol.6.No.1, Jan/Feb 1986 PARC. P.O.Box. 1031, Islamabad.
- Khichi, A.B., F. A. Faiz., and A. M. Chaudhry. 1985. "Present Status of Rice Improvement in the Punjab". Published in the Proceeding of the Fifth National Seminar on Rice Research and Production held at Kala Shah Kaku Pakistan April 25-27, Pp:1-6.

