

# Periodic Research

## Documentation of Red Rice Grown in Himachal Pradesh

### Abstract

Present study was conducted to do the documentation of red rice cultivars grown in the selected districts of Himachal Pradesh. Three districts viz; Kullu, Kangra and Shimla were selected for the documentation purpose. Data was collected on the developed performa by personal interview method. Information collected was on the general profile of the farmers, land area under rice cultivation and cultivars of red rice grown. Results revealed that majority of responding framers in these districts were in the age group of 40 -50 years and ahd land holding between 10 to 29 Bigha and 0.25 to 0.75 Bigha land was under red rice cultivation . There were about 12 genotypes of red rice grown in these districts.

**Keyword:** Land holding, red rice, lal dhan, cropping paterren, irrigation

### Introduction

Rice varieties probably emerged 10,000 to 15,000 years ago along with southern and northern slopes of Himalayas. They withstood the periods of drought and pronounced variations in temperature and later spread from Himalayas to north-east and eastern India, northern southeast Asia and south China. States in northwest Himalayas like Himachal Pradesh, Uttarakhand and Jammu and Kashmir have great diversity of traditional rice genotypes (Sharma, 1998). Rice is an important cereal crop of Himachal Pradesh next only to maize during kharif season. The rice production of Himachal Pradesh is 113.54 thousand tonnes and it accounts for 10.8% of area and 10.2% of production on total food grain basis and 22.2% of area and 18.8% of production on wet season crops basis in the state (Anonymous, 2011). The commercially grown rice cultivars in Himachal Pradesh are HPU 845, Norin 18, Himalaya 2216, Himalaya 741, RP 2421, Himalaya 799, China 988 and HPR 1156 whereas, *Ram juvanae*, *Totu*, *Gharsai*, *Chinnu*, *Zhini*, *Pand permal*, *Nagardhan* are locally grown rice genotypes of Himachal Pradesh. The rice cultivars of Himachal Pradesh show varietal differences in respect to quality characteristics (Singh 1996). Rice is cultivated in ten out of the twelve districts of the state except Kinnaur and Lahaul & Spiti with *Kangra* and *Mandi* districts alone accounting 71.2% and 69.7% of rice production. In the traditional growing areas of Asia, rice of various colours viz. red, purple, black, brown, yellow, and green have been known and grown Rice with a red bran layer are called red rice. Though the colour is confined to the bran layer, a tinge of red remains even after a high degree of milling. The colour of the bran ranges from light to dark red. The bran layer contains polyphenol and anthocyanin, and possesses antioxidant properties. The inner portion of red and white rices is alike and white in colour. Red rice also known as "weedy rice" are the species of rice (*oryza*). It is low yielding rice variety with red pericarp which is an unmilled variety with nutty flavour. Red rice has a number of nutritional advantages over common rice. It contains higher content of protein, vitamins and minerals. The zinc and iron content of red rice is 2–3 times higher than that of white rice, although the iron content varies with cultivar and production location. Studies have been conducted on the documentation and nutritional quality evaluation of white rice grown in India and abroad but less work has been done on the documentation of red rice grown in India particularly in Himachal Pradesh. So, the present study was planned to documentation of Red rice grown in Himachal Pradesh.

### Materials and Methods

#### Selection of Area and Subjects

The present study was conducted in the selected villages of *Kangra*, *Kullu* and *Shimla* districts of Himachal Pradesh. The selection of the villages was done on the basis of information collected from Rice research station Malan and Agriculture Department of the respective

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# Periodic Research

districts. The areas *Lambagaon, Thural, Nagrota, Baijnath, Dharamshala, Jagat such, Raisan, Bajaura, Chirgaon, Rohru, Nirmand, Rampur*, were selected from each (*Kangra, Kullu and Shimla*) districts. In order to collect the relevant information the farmers growing red rice were randomly selected from each district.

## Experimental layout and analysis

In order to achieve objectives of the study and arrive at proper conclusions, different mathematical and statistical tools such as per centage was calculated.

## Preparation of questionnaire

For the documentation of the red rice growing areas firstly a questionnaire was prepared (Appendix I) and pre-tested in villages (*Jia, Kandwari and Saperu*) of *Kangra* district. Then on the basis of pre-testing an exhaustive questionnaire was prepared to gather the relevant information specially keeping the objectives of the study in view.

## Collection and tabulation of data

The selected population from the target areas was interviewed to get the information as per the questionnaire as .The information collected was,General information ,Land use pattern, and specific information ,related to red rice cultivated area.

Data so obtained were subjected to Analysis of Variance (ANOVA) using statistical package Analysis Of Variance in Completely Randomized Factoria Design (AVCRFD). The obtained data were interpreted following Sendecor and Cochran (1994).

## Results and Discussion

### General Information

During the course of investigation, information regarding the general information was collected. Table 1(a),1(b) and 1(c) indicates the distribution of respondents of *Kangra Kullu and Shimla* districts according to their General profile. Data presented in these tables reveals that in *Kangra* district 50% respondents were male and 50% were female. Whereas in *kullu* and *Shimla* districts majority of were females i.e.53.6 and63% respectively.The majority of respondents in *Kangra* district were below the age of 50 years and were farmers (60%). In all three districts majority of respondents were in the age group of 40-50 years. The majority of respondents had agriculture as their major occupation.

### Land use Pattern

The land use pattern of the respondents in *Kangra, Shimla* and *Kullu* district is illustrated in Table 2. All the respondents in *Kangra* district were having less than 10 bigas cultivable land, and has *khud* as main source of irrigation. The majority of the respondents in *Shimla* and *Kullu* district had land holding 10-20 bigas and *khul* was main irrigation source in these districts.

Rana *et al.* (2009) reported that some of the key sites of area under rice cultivation include lap of Dhauladhar (mid-Himalayan mountain range) famous for fine grains basmati, Changer belt (rainfed drought prone area) for coarse grain drought tolerant), high hill areas such as Chidgaon, Rohru, Jagatsukh,

Nauradhar, Jogindernagar for red grain and cold tolerant types in HP.

### Area and production under red rice

Table 3 indicates area under red rice cultivation of selected districts (*Kangra Shimla* and *Kullu*). The majority of the respondents in *Kangra* districts had 0.25 to 0.50 bigas of land under red rice cultivation whereas in *Shimla* district 66.6 per cent respondents had 0.50 to 0.75 bigas of land under red rice cultivation. The majority of respondents in *Kullu* district ( 53.57%) had 0.50 to 0.75 bigas of land under red rice cultivation.

Rana *et al.* (2009) studied genetic resources of Himachal Pradesh and concluded that there are 14 red pericarp genotypes grown in Himachal Pradesh.

### Cropping Pattern

Table 4 (a) indicates Cropping Pattern of *Kangra* district. Data presented in the Table 7 (a) showed that area under different crops (wheat, maize, white rice, red rice, pulses and other) was less than 5 bigas and the production of all the crops was below 5 quintals .The Majority of respondents retained major the crops for their self consumption and majority of respondents sold less than 1 quintal of the above mentioned crops

According to data presented in Table 4(b) area under different crops(wheat, maize, white rice, red rice, pulses and other) was below 5 bigas and there production was also less than 5 quintals in *Shimla* district. Majority of respondents got more than Rs 10/kg for their production. Majority of respondents retained major portion of crops was less than 1 quintal for their personal consumption. Majority of the respondents sold their surplus produce.

Table 4 (c) indicates the cropping pattern of *Kullu* district. Majority of respondents grow different crops (wheat, maize, white rice, red rice, pulses and other) under 5 bigas area and the production of the crops was under 5 quintals. Majority of respondents in *Kullu* district earn less than Rs.10/Kg for wheat, maize and white rice and for the red rice, pulses and other crops has market value more than Rs 10 /kg. Majority of respondents retained less than 1 quintal for their personal consumption. Majority of respondents sold more than 1 quintal quantity of different crops (wheat, maize, White rice and other crops including fruits and vegetables).

### Sowing and Cultural Practices of Red Rice

The information pertaining to sowing and cultural practices of *Kangra* district is presented in Table 5(a),5(b) and 5(c). Data indicates the genotypes grown in *Kangra* district were *Lal dhan, Ram jawain, Achoo baldhar , Achoo dhan* and *Desi dhan*. Majority of the respondents (50%) were growing red rice for more than 40 years. The reason for growing red rice in *Kangra* district was the less water requirement for cultivation as compared to white rice genotypes. Majority of respondents in *Kangra* district were using 10-15 Kg seeds/ biga area. The method of cultivating red rice employed by majority of respondents was throwing of germinated seeds in the fields.

# Periodic Research

The respondents from Shimla district were growing *Chohatto*, *Lalu dhan* and *Juin dhan* from more than 40 year. Majority of the respondents were growing red rice for religious purposes. Majority of the respondents (42.9%) use 10-15 kg seeds/biga of land for red rice cultivation and method of planting red rice was germinated seed throwing.

Different genotypes of red rice grown in Kullu district were *Matali*, *Bhrighu*, *Jatto dhan* and *Jhinjan*. Majority of the respondent (48.1%) were growing red rice from more than 40 yrs and the reason of growing red rice was religious usage. Majority of respondent (81.4%) used 10-15 kg seeds / biga area and method of planting red rice was throwing of germinated seed throwing.

Rana *et al.* (2009) found that rice was sown by transplantation by raising the nursery in June and transplanting the seedlings at 3–5 leaf stage in puddled fields. While in uplands, landraces are sown by broadcasting, after the pre-monsoon showers occur in the month of June. After about one month as the seedlings attain height of 8–10 cm, when heavy rains are received the field is ploughed (puddle); the practice is locally called *Halod*, *Hodd*, *pandair*. It

requires higher seed rate (almost two times) than that of transplanting and well repaired bunds so that it can hold rain water during crop season. To avoid the problem of *reesa* (previous year's seed germinate, escape weeding, mature early and spike remain unfilled/partial sterile) farmers rotate varieties with purple colour strains. Further, as the cultivation areas changes from lower to higher elevations, the crop duration increases from 120 days to 150 days.

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**Table. 1(a)**  
Distribution of respondents according to their General profile (Kangra District, N=10)

Villages	Sex		Age(Years)			Caste				Occupation				
	M	F	< 40	40-50	> 50	G	ST	SC	OBC	A	T	S	L	T
Saperu	-	1 (10)	-	1 (10)	-	-	1 (10)	-	-	1 (10)	-	-	-	-
Deol	-	2 (20)	2 (20)	-	-	1 (10)	1 (10)	-	-	1 (10)	1 (10)	-	-	-
Jungli	1 (10)	-	-	1 (10)	-	1 (10)	-	-	-	1 (10)	-	-	-	-
Bola	1 (10)	1 (10)	1 (10)	1 (10)	-	-	2 (20)	-	-	1 (10)	-	1 (10)	-	-
Kharti	3 (30)	1 (10)	1 (10)	1 (10)	2 (20)	-	4 (40)	-	-	2 (20)	-	1 (10)	1 (10)	-

M-Male, F- Female, G-General, ST- Schedule Tribe, SC- Schedule Caste, OBC- Other Backward Castes , A-

Agriculture, T-Trade, S-Service, L-Labourer, T-Transportation\*Figures in paranthesis indicate percentages.

**Table. 1(b)**  
Distribution of respondents according to their General profile (Kullu district, N= 28)

Villages	Sex		Age(Years)			Caste				Occupation				
	M	F	<40	40-50	>50	G	ST	SC	OBC	A	T	S	L	T
Neri	1 (3.5)	3 (10.7)	1 (3.5)	2 (7.1)	1 (3.5)	3 (10.7)	1 (3.5)	-	-	4 (14.3)	-	-	-	-
Pichli haar	3 (10.7)	1 (3.5)	-	3 (10.7)	1 (3.5)	4 (14.3)	-	-	-	4 (14.3)	-	-	1 (3.5)	-
Daral	-	2 (7.1)	-	2 (7.1)	-	2 (7.1)	-	-	-	2 (7.1)	-	-	-	-
Dheemchin	2 (7.1)	2 (7.1)	-	4 (14.3)	-	2 (7.1)	2 (7.1)	-	-	4 (14.3)	-	-	-	-

# Periodic Research

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<b>Dongri</b>	2 (7.1)	1 (3.5)	2 (7.1)	-	1 (3.5)	2 (7.1)	1 (3.5)	-	-	3 (10.7)	-	-	-	-
<b>Shalang</b>	1 (3.5)	2 (7.1)	1 (3.5)	1 (3.5)	1 (3.5)	3 (10.7)	-	-	-	2 (7.1)	1 (3.5)	-	-	-
<b>Ropagad</b>	4 (14.3)	2 (7.1)	-	4 (14.3)	1 (3.5)	2 (7.1)	2 (7.1)	-	2 (7.1)	4 (14.3)	2 (7.1)	-	-	-
<b>Gahidhar</b>	-	2 (7.1)	2 (7.1)	-	-	2 (7.1)	-	-	-	2 (7.1)	-	-	-	-

M-Male, F- Female, G-General, ST- Schedule Tribe, SC- Schedule Caste, OBC- Other Backward Castes , A- Agriculture, T-Trade, S-Service, L-Labourer, T-Transportation\*Figures in paranthesis indicate percentages.

**Table. 1(c)**

**Distribution of respondents according to their General profile(Shimla district, N= 27)**

Village	Sex		Age(Years)			Caste				Occupation				
	M	F	<40	40-50	> 50	G	ST	SC	OBC	A	T	S	L	T
	1 (3.7)	1 (3.7)	1 (3.7)	-	1 (3.7)	2 (7.4)	-	-	-	2 (7.4)	1 (3.7)	-	-	1 (3.7)
<b>Giltadi</b>	-	1 (3.7)	1 (3.7)	-	-	1 (3.7)	-	-	-	1 (3.7)	-	-	-	1 (3.7)
<b>Lower koti</b>	-	1 (3.7)	-	1 (3.7)	-	-	-	-	1 (3.7)	1 (3.7)	-	-	-	-
<b>Chamrada</b>	-	1 (3.7)	-	-	1 (3.7)	-	-	-	1 (3.7)	1 (3.7)	-	-	-	1 (3.7)
<b>Kuppad</b>	1 (3.7)	-	1 (3.7)	-	-	-	-	-	1 (3.7)	1 (3.7)	-	1 (3.7)	-	-
<b>Gaista</b>	-	1 (3.7)	-	1 (3.7)	-	1 (3.7)	-	-	-	1 (3.7)	-	-	-	1 (3.7)
<b>Ramnagri</b>	-	3 (11.1)	1 (3.7)	1 (3.7)	1 (3.7)	2 (7.4)	1 (3.7)	-	-	3 (11.1)	-	-	-	1 (3.7)
<b>Hatkopi</b>	2 (7.4)	2 (7.4)	1 (3.7)	2 (7.4)	1 (3.7)	4 (14.3)	-	-	-	4 (14.3)	-	-	-	-

\*Figures in paranthesis indicate percentages. M-Male, F- Female, G-General, ST- Schedule Tribe, SC- Schedule Caste, OBC- Other Backward Castes , A- Agriculture, T-Trade, S-Service, L-Labourer, T-Transportation

# Periodic Research

**Table.2**  
Distribution of respondents according to Land Use Pattern

District	Cultivable Land		Area (Bigas)				Irrigation Facility			
	Yes	No	<10	10 -20	20-30	>30	Nala	Khul	Khad	Other
<b>Kangra N=10</b>	10 (100)	-	10 (100)	-	-	-	2 (20)	3 (30)	4 (40)	1 (10)
<b>Shimla N=27</b>	27 (100)	-	4 (14.81)	20 (74.07)	3 (11.1)	-	6 (22.2)	5 (18.5)	11 (40.7)	6 (22.2)
<b>Kullu N=28</b>	28 (100)	-	2 (7.4)	13 (46.4)	7 (25)	5 (17.9)	10 (35.7)	7 (25)	4 (14.3)	7 (25)

Figures in Parenthesis indicate percentages.

**Table.3**  
Distribution of responses according to area under red rice cultivation

District	Area (bigas)			
	0-0.25	0.25-0.50	0.50-0.75	> 0.75
<b>Kangra N=10</b>	1 (10)	5 (50)	3 (30)	1 (10)
<b>Shimla N=27</b>	-	7 (25.92)	18 (66.66)	2 (7.40)
<b>Kullu N=28</b>	-	13 (46.42)	15 (53.57)	10 (35.71)

\*Figures in Parenthesis indicate percentages.

**Table. 4(a)**  
Distribution of responses according to Cropping pattern ( Kangra district, N=10)

Crops	Area (in Bigas)		Production (in Quintals)		Value (Rs/kg)		Retained for self (in Quintals)		Marketed (in Quintals)	
	≤5	>5	≤5	>5	≤ 10	>10	≤1	>1	≤1	>1
	Wheat	10 (100)	-	10 (100)	-	-	10 (100)	4 (40)	5 (50)	-
Maize	10 (100)	-	10 (100)	-	7 (70)	3 (30)	9 (90)	-	2 (20)	-
White rice	10 (100)	-	10 (100)	-	-	10 (100)	6 (60)	4 (40)	1 (10)	-
Red Rice	10 (100)	-	10 (100)	-	-	10 (100)	10 (100)	-	4 (40)	-
Pulses	10 (100)	-	10 (100)	-	-	10 (100)	2 (20)	-	2 (20)	-
Other	10 (100)	-	10 (100)	-	3 (30)	5 (50)	8 (80)	-	8 (80)	-

\*Figures in Parenthesis indicate percentages

# Periodic Research

**Table. 4(b)**  
Distribution of responses according to Cropping pattern( Shimla district, N=27)

Crops	Area (in Bigas)		Production (in Quintals)		Value (Rs/kg)		Retained for self (in Quintals)		Marketed (in Quintals)	
	≤5	>5	≤5	>5	≤ 10	>10	≤1	>1	≤1	>1
Wheat	15 (55.6)	12 (44.4)	23 (85.2)	4 (14.8)	23 (85.2)	4 (14.8)	25 (92.6)	2 (7.4)	2 (7.4)	14 (51.9)
Maize	27 (100)	-	27 (100)	-	23 (85.2)	4 (14.8)	7 (25.9)	12 (44.4)	13 (48.1)	3 (11.1)
White rice	9 (33.3)	18 (66.7)	13 (48.1)	14 (51.9)	-	27 (100)	2 (7.4)	25 (92.6)	4 (14.8)	15 (55.6)
Red Rice	27 (100)	-	27 (100)	-	-	27 (100)	27 (100)	-	9 (33.3)	-
Pulses	26 (96.3)	-	26 (96.3)	-	-	26 (96.3)	26 (96.3)	-	26 (96.3)	-
Other	27 (100)	-	26 (96.3)	1 (3.7)	26 (96.3)	1 (3.7)	27 (100)	-	9 (33.3)	18 (66.7)

\* Figures in Parenthesis indicate percentages.

**Table. 4(c)**  
Distribution of responses according to Cropping pattern ( Kullu district, N=28)

Crops	Area (in Bigas)		Production (in Quintals)		Value (Rs/kg)		Retained for self (in Quintals)		Marketed (in Quintals)	
	≤5	>5	≤5	>5	≤ 10	>10	≤1	>1	≤1	>1
Wheat	23 (82.1)	5 (17.9)	25 (89.3)	3 (10.7)	28 (100)	-	26 (92.8)	1 (3.6)	3 (10.7)	11 (39.3)
Maize	28 (100)	-	28 (100)	-	28 (100)	-	9 (32.1)	18 (64.3)	5 (17.9)	4 (14.3)
White rice	13 (46.4)	15 (53.6)	12 (42.9)	16 (57.1)	-	28 (100)	-	28 (100)	1 (3.6)	17 (60.7)
Red Rice	28 (100)	-	28 (100)	-	-	28 (100)	28 (100)	-	11 (39.3)	-
Pulses	22 (78.6)	-	22 (78.6)	-	-	22 (78.6)	22 (78.6)	-	22 (78.6)	-
Other	13 (46.4)	15 (53.6)	17 (60.7)	11 (39.3)	28 (100)	-	28 (100)	-	5 (17.9)	23 (82.1)

\*Figures in Parenthesis indicate percentages.

**Table. 5(a)**  
Distribution of responses according to sowing and cultural practices in Kangra District

Variety	Time Period of Growing (years)				Reasons of Growing				Quantity of Seeds(Kg)			Methods			
	<10	20-30	30-40	>40	Pooja	Less water reqd.	Color	Other	<10	10-15	>15	Seed throwing		Transplanting	
												G	NG	G	NG
Lal dhan	1 (10)	-	-	2 (20)	3 (30)	-	2 (20)	3 (30)	-	2 (20)	2 (20)	4 (40)	-	1 (10)	-
Ram jawain	-	-	1 (10)	1 (10)	-	1 (10)	1 (10)	2 (20)	-	2 (20)	-	1 (10)	-	1 (10)	-
Achoo baldhar	-	1 (10)	-	1 (10)	-	-	1 (10)	2 (20)	-	1 (10)	1 (10)	2 (20)	-	-	-
Achoo Dhan	-	1 (10)	-	-	-	1 (10)	-	-	-	1 (10)	-	-	-	1 (10)	-

# Periodic Research

Desi dhan	-	1 (10)	-	1 (10)	-	1 (10)	1 (10)	-	-	1 (10)	-	-	1 (10)	1 (10)	-
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\*Figures in Parenthesis indicate percentages

**Table. 5(b)**

**Distribution of responses according to sowing and cultural practices in Kullu District**

Geno type	Time Period of Growing (years)				Reasons of Growing				Quantity of Seeds(Kg)			Methods			
	<10	20-30	30-40	>40	Poo ja	Les s water reqd.	Col or	Oth er	< 10	10-15	>15	Seed throwing		Transpla nting	
												G	NG	G	NG
Matal i	-	1 (3.6)	2 (7.1)	3 (10.7)	4 (14.3)	1 (3.6)	1 (3.6)	3 (10.7)	-	6 (21.4)	-	3 (10.7)	-	3 (10.7)	-
Bhri g hu	-	2 (7.1)	3 (10.7)	4 (14.3)	8 (28.6)	2 (7.1)	2 (7.1)	1 (3.6)	-	5 (17.9)	3 (10.7)	4 (14.3)	1 (3.6)	3 (10.7)	-
Jat to Dhan	-	2 (7.1)	1 (3.6)	3 (10.7)	7 (25)	-	-	-	-	7 (25)	-	7 (25)	-	-	-
Jhin j an	-	2 (7.1)	2 (7.1)	3 (10.7)	7 (25)	1 (3.6)	-	3 (10.7)	1 (3.6)	4 (14.3)	2 (7.1)	2 (7.1)	1 (3.6)	4 (14.3)	-

\* Figures in Parenthesis indicate percentages.

**Table.5(c)**

**Distribution of responses according to sowing and cultural practices in Shimla District**

Genotype	Time Period of Growing (years)				Reasons of Growing				Quantity of Seeds(Kg)			Methods			
	<10	20-30	30-40	>40	Pooja	Less water reqd.	Color	Other	< 10	10-15	>15	Seed throwing		Transplanting	
												G	NG	G	NG
Chohatto	-	-	-	17 (62.9)	17 (62.9)	12 (44.4)	-	3 (11.1)	2 (7.4)	6 (22.2)	9 (33.3)	12 (44.4)	3 (11)	4 (14.8)	-
Lalu Dhan	-	-	-	3 (11.1)	3 (11.1)	3 (11.1)	1 (3.7)	-	-	3 (11.1)	-	2 (7.4)	-	-	1 (3.7)
Jiun Dhan	-	-	-	7 (25.9)	7 (25.9)	5 (18.5)	1 (3.7)	1 (3.7)	2 (7.4)	3 (11.1)	2 (7.4)	5 (18.5)	-	2 (7.4)	-

\* Figures in Parenthesis indicate percentages