

Yearly Progress Report
2019-2020



Improving Rural Livelihoods through Farmer-centric Integrated Watershed Management



Submitted to
PowerGrid, Odisha



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1. Executive Summary

The Power Grid Corporation of India Limited has supported the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in developing a scalable site of learning to improve livelihoods and build resilience through integrated watershed management in 10 villages of Jaipatna block, Kalahandi district, Odisha. The watershed comprises an area of around 2500 ha and is home to around 8500 people. The watershed program was formally launched on 30 October 2020, which is being implemented by a multi-disciplinary team of scientists/managers supported by field staff and local NGO Jansahajya.

A series of village meetings were held to set up a Watershed Committee, named Saila Srikhetra Watershed Committee. The committee has applied for registration with the local administration. As an entry point activity in the watershed, soil samples were collected and sent for analysis at ICRISAT. The analysis showed widespread soil degradation and low soil organic carbon levels. Around 37% of the farmers' fields were low in soil OC, indicating nitrogen deficiency as well. Deficiencies in Phosphorus (49% of fields), Sulphur (86%), Zinc (53%) and Boron (90%) were revealed. Based on the results, demonstrations were conducted during post-rainy season of 2019-20 in 226 farmers' fields with micro/secondary nutrient fertilizers and improved varieties. Data collected from farmers' green gram fields showed yield gains of around 30% with improved varieties and up to 50% with improved varieties and micronutrient application. To get women involved in livelihood activities, 180 women farmers were provided vegetable seeds to set up kitchen gardens.

To gain a clear idea of the run-off in the watershed, a run-off recorder was set up in Ranibahal village. An automatic weather station that was procured will soon be installed in Mukhiguda village. A topographic survey of the watershed was also initiated. Topographic maps are developed and potential water conservation structures have been mapped in Ranibahal village, and some preliminary sites identified in Mukhiguda and other villages.

A detailed baseline survey was done in the villages covering about 205 sample households. Small and marginal farmers dominated the sample. The findings revealed that the average family size is about 4, average age of the household head is 46 years, and average years of education is around 5. Of the total arable land available, 30% under rabi is fallow. Fifty percent of the land is under assured irrigation where mostly paddy is grown. The number of labour person days during kharif is about 60 and during rabi 43 and from other livelihood sources around 150 days in a year. The oxen are the major cattle and livestock population per household is very low. The seed system for paddy is well established and farmers get their seed from government agencies. Swarna followed by MTU 1010 are the most adopted varieties. Fertilizer dosage of primary nutrients is higher than the recommended dosage and needs immediate awareness efforts. Paddy-chickpea was found to be the most profitable cropping system and needs to be promoted in rabi fallow lands. Food consumption is as per national standards but there is need for millet promotion for better nutrient intake. Average yield levels are lower than the national average and need improvement by following recommended crop management practices.

2. Background

As part of its Corporate Social Responsibility, Power Grid Corporation of India Limited supported the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in developing a scalable

site of learning to improve livelihoods and build resilience through integrated watershed management in Kalahandi district of Odisha.

The watershed is located in Jaipatna block of Kalahandi district and comprises of 10 villages (Table 1).

Table 1. Details of villages under the watershed project in Jaipatna block, Kalahandi district, Odisha (India).

S. No.	Village	Area (Ha)	Population (Nos.)	Household (Nos.)
1	Gandaguda	128	443	112
2	Karanjiguda	188	834	194
3	Patiguda	192	555	151
4	Kuhuriguma	114	567	161
5	Kapurmal	509	1966	490
6	Mundraguda	69	349	96
7	Kotpadi	299	553	136
8	Pipalguda	542	1985	536
9	Mukhiguda	-	-	-
10	Ranibahal	404	1249	353
Total		2445	8501	2229

The specific objectives of the project are to:

1. Establish “Model Sites of Learning” in Kalahandi district of Odisha to harness the potential of rainfed areas by adopting an integrated water resource management approach;
2. Demonstrate and popularize science-led integrated and efficient soil, water and climate smart crop management practices to enhance crop productivity and improve rural livelihood in the targeted villages;
3. Develop the capacity of farmers in the region to improve rural livelihood through farmer-friendly knowledge sharing and dissemination to enhance stakeholders’ awareness about climate smart water efficient and nutritious cereals and vegetables for cultivating and its integration in regular diet.
4. Improve nutrition levels, especially of women and children, through the consumption of more millet and vegetables.

3. Launch and Initial Interactions

The watershed program was formally launched in Mukhiguda village, Jaipatna block, Kalahandi district on 30 October 2019 by Mr DN Sarangi, Senior General Manager, PowerGrid. (Figure 1). Among those who were present were Mr GV Rao, Mr Pradhan, Mr Manas, Mr KC Roy and Mr Ghoi from Power Grid; Drs Sreenath Dixit, Girish Chander and Mahadeva Reddy from ICRISAT, Ms Sita Devi and team from NGO Jansahjaya, and Mr Tikku Potas, Tehsildar, Jaipatna and Ms Rishma, AAO, Jaipatna. Also present were Mr Durjyodhan, President of the watershed committee (WC) and its

representatives along with Ms Basanti, Sarpanch and more than 300 farmers from all the watershed villages.

During the launch, officials interacted with farmers and explained the broad contours of the demand-driven interventions to be implemented. The line department officials also explained about the ongoing government schemes, and assured support to the program.

The event was covered in local print and electronic media.



Figure 1. (Top) Launching the Power-Grid-ICRISAT watershed project in Mukhiguda village, Jaipatna block, Kalahandi district and (bottom) media coverage of the event.

4. Building Local Partnerships and Liaising with Stakeholders

The project is being implemented by a multi-disciplinary team of scientists/managers, with a Research Technician based at the project site to carry out the instructions from scientists. To effectively reach out to the community, ICRISAT entered into an agreement with local NGO Jansahjaya whose two staff are working full time at the project sites.

The project team has kept in the loop the district administration and heads of line Departments of Agriculture, Horticulture, Animal Husbandry and Soil Conservation (Figure 2).



Figure 2. Stakeholders go through an orientation on the project (clockwise): Collector & District Magistrate, Kalahandi; Deputy Director of Agriculture; farmers in the watershed and NGO partner Jansahjaya.

5. Community Mobilization and Strengthening Institutions

5.1. Formation of Watershed Committee

To begin with, ICRISAT and its NGO partner reached out to farmers in all the watershed villages through village-level meetings to brief them about the project. This was followed by the formation of the Saila Srikhetra Watershed Committee (WC), whose members were chosen in subsequent village-level meetings (Tables 2). The WC members chose their office bearers.

Table 2. Details of the office bearers of the Saila Srikhetra Watershed Committee in Jaipatna block, Kalahandi district.

S No	Name	Designation	Gender	Caste	Village	Mobile number
1	Duryodhan Chinda	President	M	OBC	Mukhiguda	9938448054
2	Gouri Sankar Naik	Vice President	M	OBC	Khuriguma	9178216206
3	Nabin Majhi	Secretary	M	ST	Gandguda	7978495091
4	Sukumar Trilochan Sabar	Treasurer	M	ST	Ranibahal	6371367064
5	Jasnane Bisi	Joint Secretary	F	OBC	Patiguda	8018944619
6	Pramila Sahu	Member	F	OBC	Gandguda	9556374574
7	Gomati Majhi	Member	F	ST	Pipalguda	
8	Ahalya Rout	Member	F	OBC	Ranibahl	7749095874
9	Sumitra Patra	Member	F	OBC	Mukhiguda	
10	Purna Chandra Mahali	Member	M	OBC	Patiguda	
11	Ghanashyam Naik	Member	M	OBC	Pipalguda	9178775653

S No	Name	Designation	Gender	Caste	Village	Mobile number
12	Bubaneswar Pujhari	Member	M	OBC	Karanjiguda	6372556237
13	Manoj Dishari	Member	M	ST	Kotpadi	9178203840
14	Madhusudhan Naik	Member	M	OBC	Mundraguda	7326818712
15	Sita Devi	Member	F	OBC	Bhavanipatna	9437839951

5.2. Opening Watershed Committee (WC) bank accounts

Two bank accounts (Works and Development fund) were opened for the Watershed Committee, (Figure 3) whose authorized signatories are its President, Secretary and senior NGO representative (Figure 6). Farmers' contributions will be deposited in the Development Fund Account for future use towards maintenance after the project period.



Figure 3. Snapshots of the two accounts of Saila Srikhetra Watershed Committee, one for the Works Fund and another for the Development Fund.

6. Soil Sampling and Fertilizer Recommendations

Around 50 soil samples were collected from farmers' fields before the 2019 rainy season and analyzed for macro and micro nutrients in the ICRISAT laboratory at Hyderabad (Table 3).

Table 3. Number of soil samples collected from the watershed villages.

S. No.	Village	No of soil samples collected
1	Gandaguda	5
2	Karanjiguda	5
3	Patiguda	3
4	Kuhuriguma	5
5	Kapurmal	5
6	Mundraguda	5
7	Kotpadi	5
8	Pipalguda	-

S. No.	Village	No of soil samples collected
9	Mukhiguda	5
10	Ranibahal	10
Total		48

**See Annexure 1 for farmer wise analysis results.*

The soil analysis showed widespread soil degradation in terms of macro and micro nutrients and low soil organic carbon levels (Figures 4 and 5). Around 37% of farmers' fields were low in soil organic carbon levels, indicating N deficiency as well. Phosphorus, an important primary nutrient was deficient in 49% of the fields. Widespread deficiency was found in secondary nutrient sulphur (86% fields) and micronutrients zinc (53% fields) and boron (90% fields).

The analysis underlined the need for corrective measures in terms of fertilizer management and balanced nutrients in the soil for productivity enhancement and sustainability.

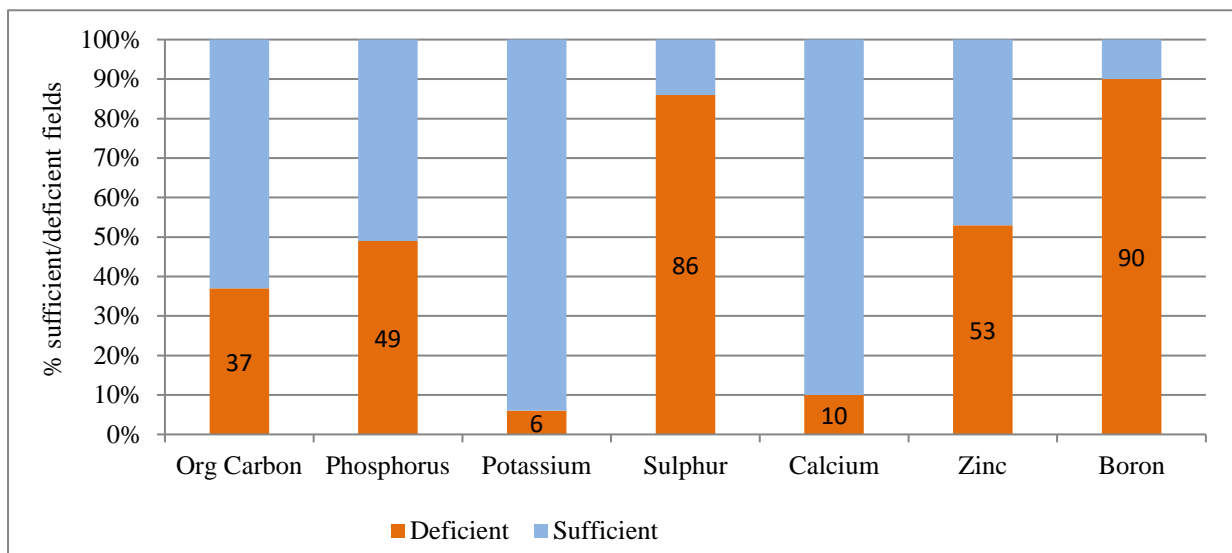


Figure 4. Soil fertility status of farmers' fields in the watershed, Jaipatna block, Kalahandi district.



Figure 5. Soil sampling in farmers' fields in the watershed, Jaipatna block, Kalahandi district.

7. Participatory R&D Trials/Demonstrations

During the 2019-20 post-rainy season, 226 farmers were provided with improved seeds of crop varieties (see Annexure 2; Figures 6-8). Some of the farmers were also provided fertilizers like agribor and zinc sulphate. Data collected from farmers' green gram fields showed yield gains of around 30% with improved variety and up to 50% with a combination of improved variety and micronutrient application.



Figure 6. (L) Chickpea demonstrations in Gandaguda village and (R) Kotpadi village, Jaipatna block, Kalahandi district during rabi 2019-20.



Figure 7. Chickpea demonstrations in (L) Kuhuriguma village and (R) Pipalguda village, Jaipatna block, Kalahandi district during rabi 2019-20.



Figure 8. Green gram demonstrations in (L) Gandaguda village and (R) Kuhuriguma village, Jaipatna block, Kalahandi district during rabi 2019-20.

8. Installing of Run-off Recorder and automatic weather station

For an accurate understanding of run-off in the watershed, a run-off recorder was set up in Ranibahal village (Figure 9).



Figure 9. The run-off recorder installed in Ranibahal village, Jaipatna block, Kalahandi district.

Automatic weather station is procured and will be installed soon.

9. Baseline Survey and Participatory Rural Appraisal

A detailed baseline survey was undertaken to be able to evaluate the benefits accrued after project completion. The methodology followed and results follow.

9.1. Methodology

9.1.1. Study area

The survey was undertaken in the watershed villages in Jaipatna block which has moderately black and loamy soil rich in iron and quartz suitable for agriculture and horticultural crops.

9.1.2. Sample design

Before the baseline, a survey was designed to analyze the feasibility of watershed activities and a focus group discussion (FGD) was conducted at each village, with the number of households given in Table 1. As the population is homogenous, only 10% (Table 4) of the households was considered for the baseline survey.

Table 4. Sample design

Village	No of Households (total)	Sample Household
Ranibahal	350	40
Mukhiguda	200	20
Patiguda	100	10
Kotpadi	100	10
Karanjiguda	100	10
Gandaguda	300	30
Pipalguda	130	10
Kapurmal	400	40
Mundraguda	150	15
Kuhuriguma	250	20

A structured interview schedule was developed based on the objectives of the study and review of literature in consultation with experts. The interview schedule was pre-tested in a sample area and

suitable modifications were made based on the experience gained before administering it. Further, a PRA was conducted in the project villages to gain insights about them.

9.1.3. Data collection

The background information about the study area was obtained through consultation with key informants, others and secondary sources. The process helped build a rapport with respondents and enable them to express themselves and generate information in a relaxed atmosphere. Data from livestock farmers was collected either at their farm or house. Information through observation during interviews, group discussion and secondary sources like departmental documents, records, reports and other sources were collected.

9.1.4. Statistical analysis

The data collected from the sample respondents was coded, tabulated, and analyzed. Statistical tools were used to analyze the data and inferences drawn. Various indicators were developed for the study for future monitoring and evaluation purposes.

9.1.5. Cropping intensity

Cropping intensity refers to raising of several crops from the same field during one agricultural year. It can be expressed as.

$$\text{Cropping intensity} = \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100$$

Thus, higher cropping intensity means that a higher portion of the net area is being cropped more than once during one agricultural year. This also implies higher productivity per unit of arable land during one agricultural year.

9.1.6. Benefit-Cost ratio

The benefit-cost ratio computes returns per rupee invested, which should be greater than one. Net returns $N = G - E$, where G is gross returns and E is expenditure. Net returns were considered for calculation of BCR.

9.2. Results and Discussion

9.2.1. Demographic profile in pilot sites

The average education level among the respondents is between 4-6 years of education (Table 5). The average age of the respondents is 46 and average family size is 4 per household.

Table 5. Demographics of the sample respondents.

Village	Respondent age (years)	Education (no of years)	Family members (no)	Wife's age (years)	Wife's education (no of years)
Gandaguda	45	9	4	41	6
Karanjiguda	45	6	5	37	7
Kuhuriguma	46	6	4	42	6
Kotpadi	50	4	4	42	2
Mukhiguda	42	7	4	33	5
Patiguda	46	5	5	40	7
Ranibahal	46	4	4	43	2
Mundraguda	46	2	4	40	2
Pipalguda	43	5	5	37	6
Grand Total	45	5	4	39	5

9.2.2. Farmer categories

The survey data revealed that small farmers constitute 48% of the respondents (Figure 10). Marginal farmers were dominant in Ranibahal (49%), Gandaguda (23%) and Kuhuriguma (20%). There were a greater number of large farmers in Kuhuriguma, who constituted 5% of the total number of large farmers.

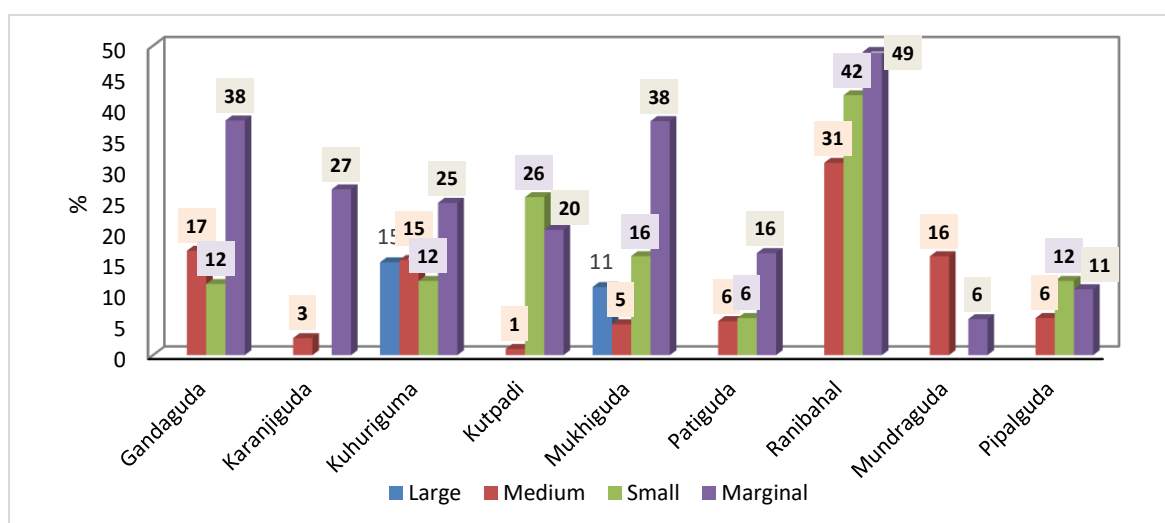


Figure 10. Classification of farmer respondents by land holding size.

9.2.3. Land utilization pattern

Details of the types of land holdings of the respondents are presented in Figure 11. Land holding was classified into operative land, permanent fallows and pastures. Land of all the farmers was arable, except in Gandaguda where 1.5% of the land with farmers was fallow and nearly 1% under pastures and in Ranibahal where 0.7% was fallow and 5.5% under pastures. This shows where opportunities exist for further development in the area.

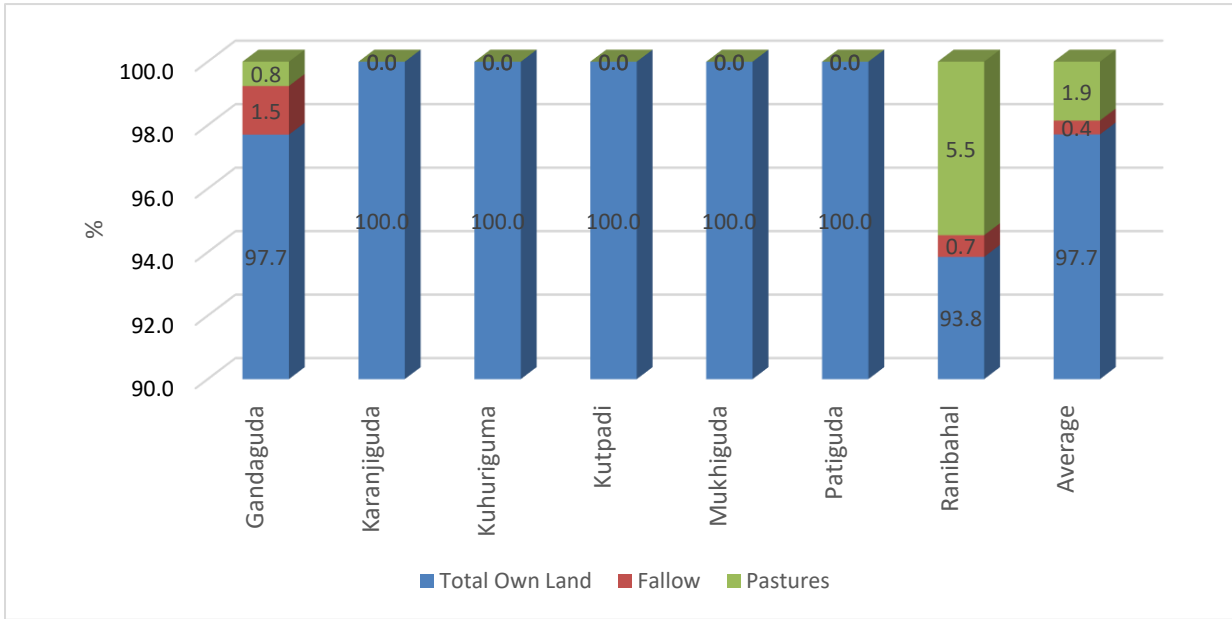


Figure 11. Types of land holdings owned by farmers.

Tenancy was more prevalent in Kuhuriguma (23%) (Figure 12). The rest of the samples exhibited very normal levels (<11%) of tenancy.

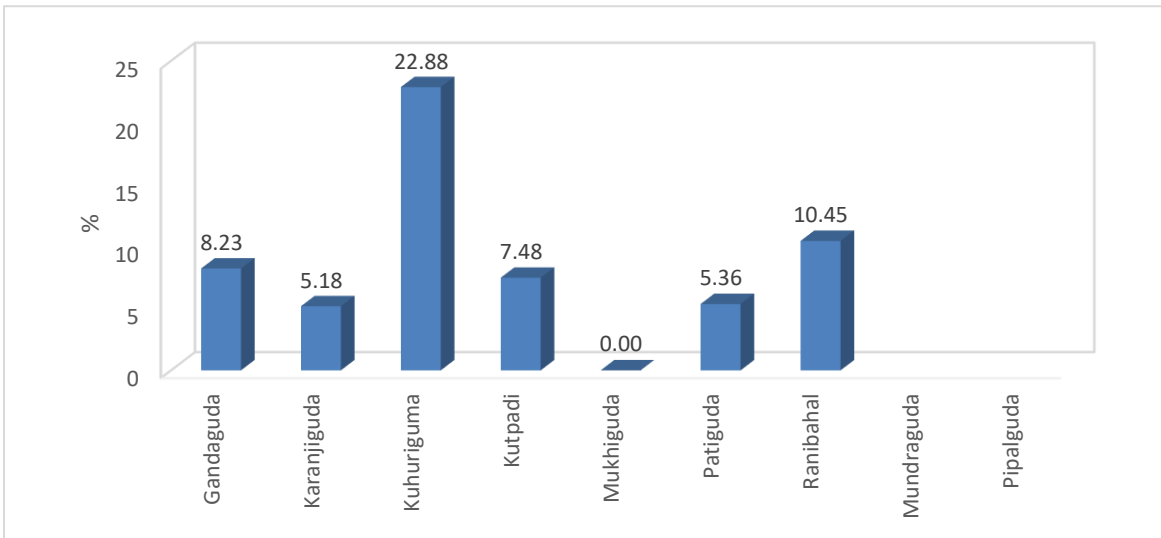


Figure 12. Share of tenancy in total operative land holding.

9.2.4. Cropping seasons and cropping intensity

The share of operational land under two major seasons (kharif and rabi) is depicted in Figure 13. Almost all the arable land under kharif was brought under cultivation.

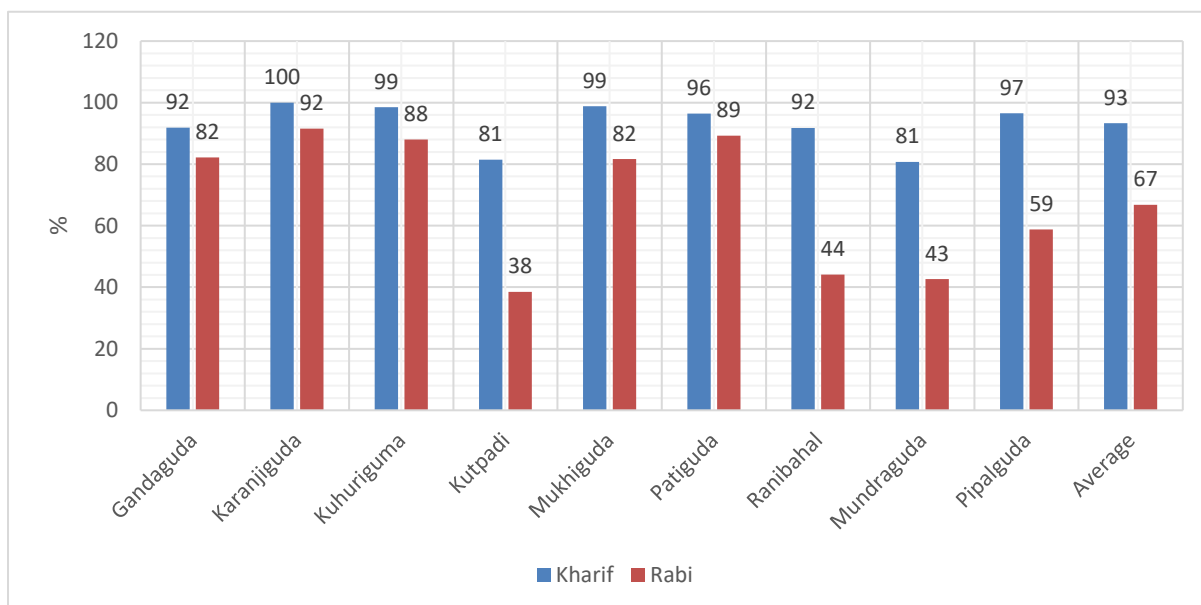


Figure 13. Share of operational land by season.

However, during rabi, the second major season, total cropped area was only 67%, indicating the rainfed condition and scope for intensification. Kotpadi, Mundraguda and Ranibahal need special attention as the cropped area during rabi is less than 50%. The low cropped area in rabi meant low cropping intensity in Kotpadi and Mundraguda (Figure 14), indicating the scope for improvement.

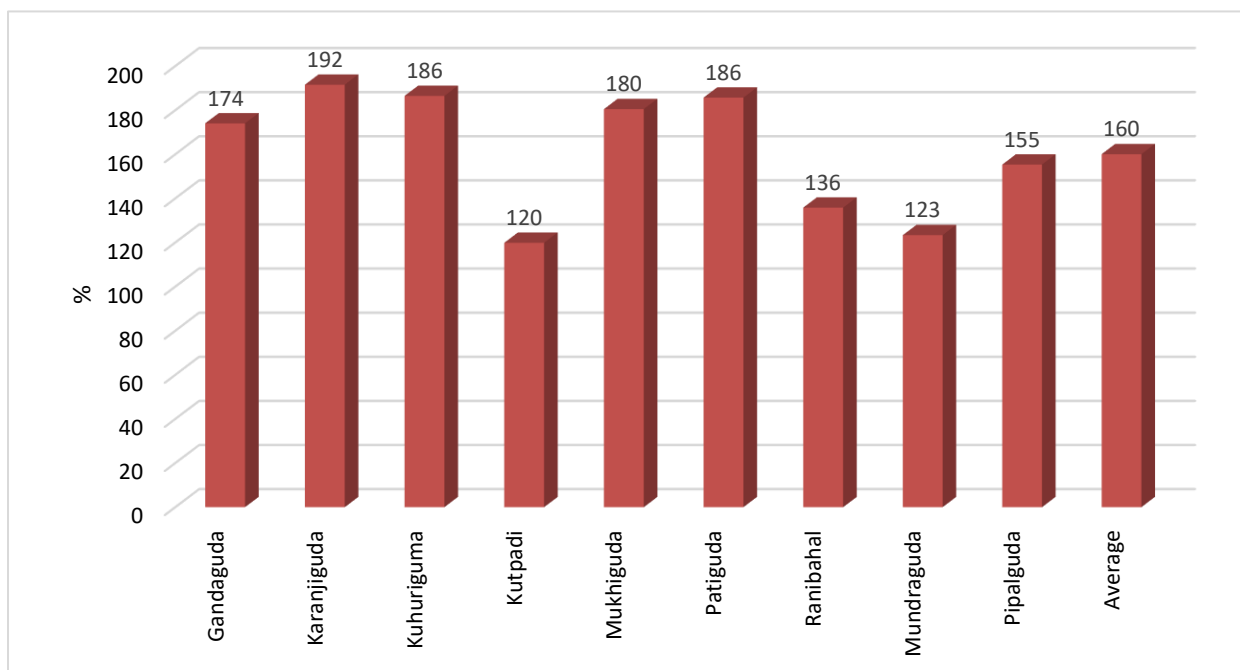


Figure 14. Cropping Intensity in the pilot sites.

9.2.5. Land under irrigation

Figure 15 shows that arable land was almost equally distributed between rainfed and irrigated conditions. In Kotpadi and Ranibahal, crops are grown under rainfed conditions due to lack of irrigation facilities and the rest of villages have structured irrigation facilities.

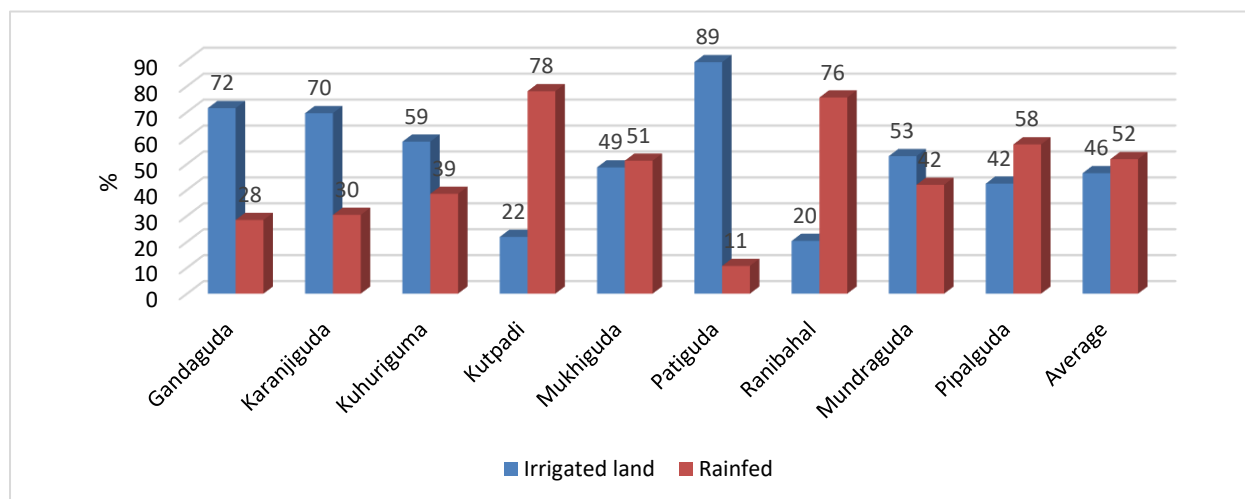


Figure 15. Share of arable land under irrigation.

9.2.6. Major crops and cropping sequence

9.2.6.1. Kharif (rainy) season

Details on the major crops grown in each pilot site and their corresponding productivity levels compared to district, state and national average yields are summarized in Figure 16. Paddy was the major crop in the pilot sites, occupying 95% of the cropped area; pigeonpea (1.8%) and horse gram (1.1%) were the other major crops grown, together constituting 98% of the cropped area during the season. Ladies finger and onion were the major vegetables grown, occupying 0.2% of cropped area (Figure 17). Average productivity was 3.5 t/ha for paddy.

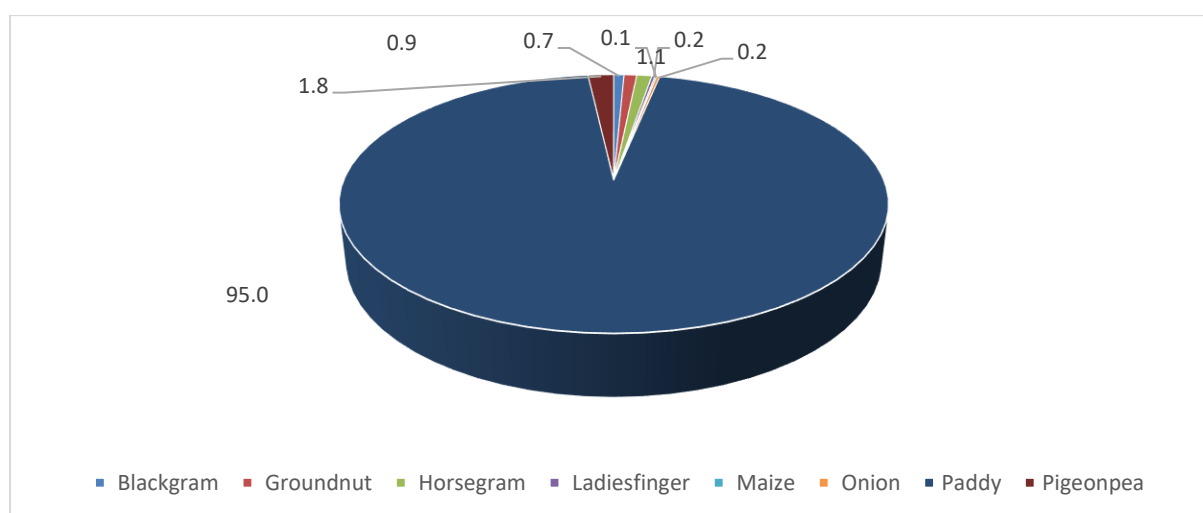


Figure 16. Share (%) of major crops in kharif in the pilot site.

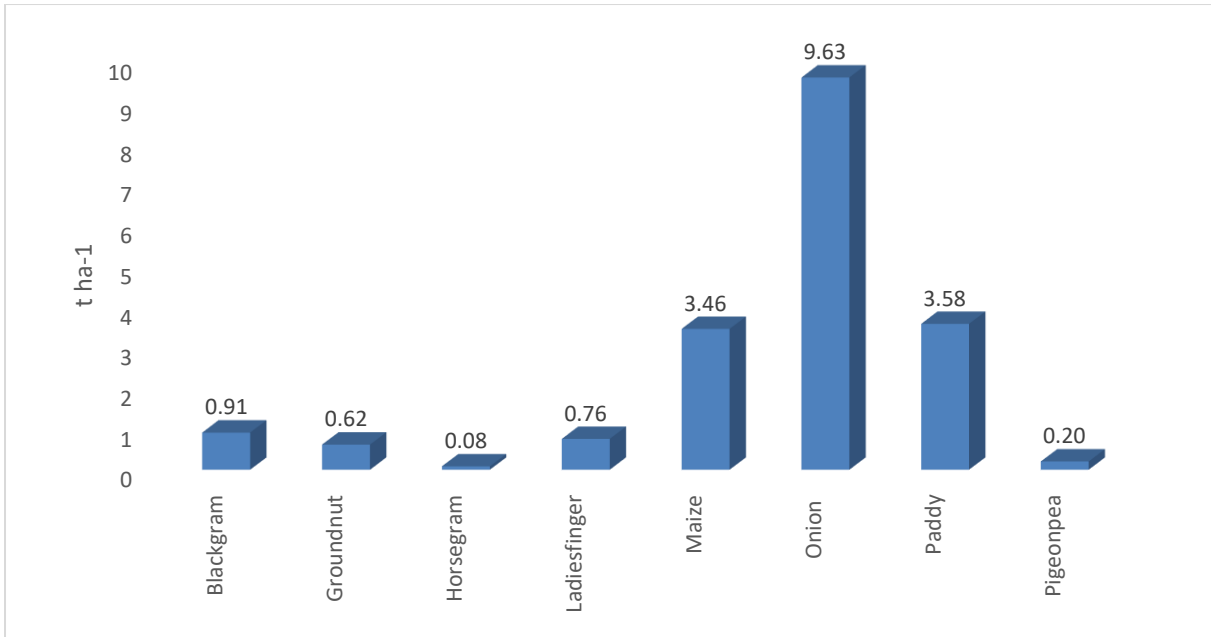


Figure 17. Productivity of major crops in kharif season.

9.2.6.2. Rabi (postrainy) season

Greater diversity was evident in the crops grown in the rabi (postrainy) season compared to the rainy season (Figure 18). Paddy occupied nearly 67% of the cropped area. The other major crops grown were green gram (20%) followed by chickpea (5%). Vegetables together constituted 2% of the cropped area, with peas (0.6%) having the major share followed by onions (0.4%).

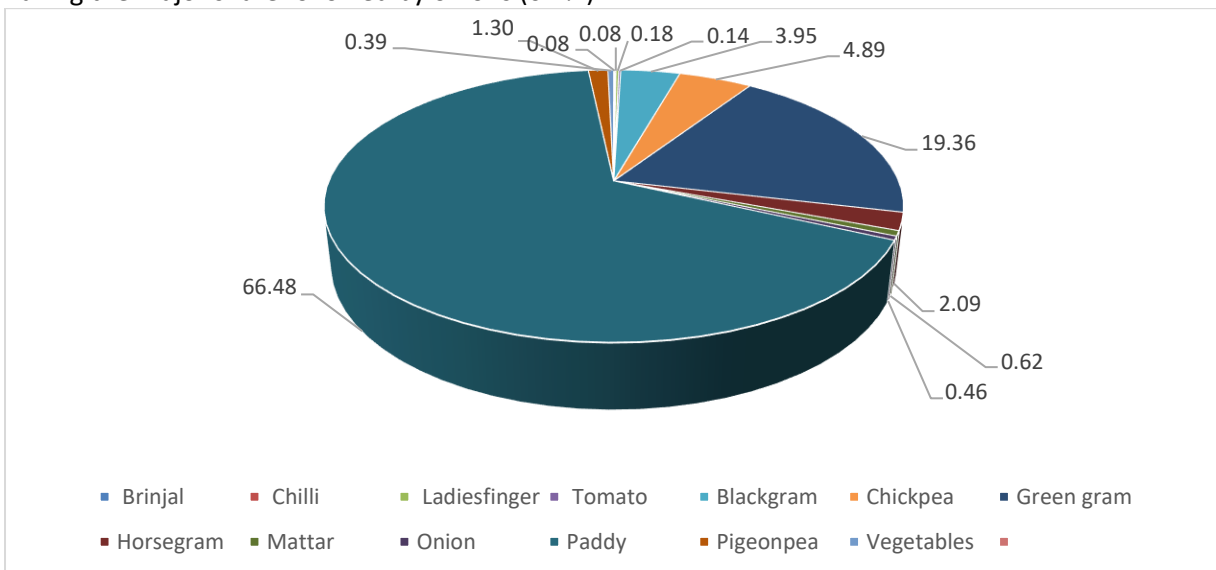


Figure 18. Share of major crops in the rabi season.

Paddy yields were good (4.79 t/ha) compared to the rainy season but only marginally (Figure 19). This could have been due to delayed monsoons and a dry spell during critical stage of growth. While pigeon pea, black gram, and green gram is very low and needs an attention. The vegetables has shown better yield but there is scope for improvement.

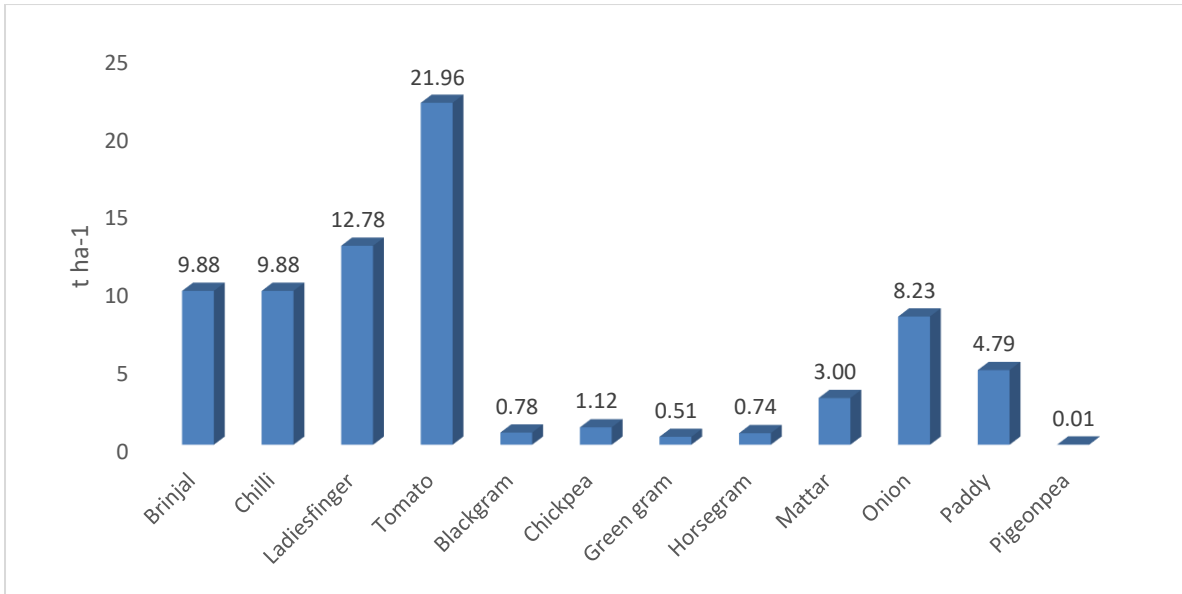


Figure 19. Productivity of major crops.

The share of different cropping patterns practiced in the area are given in Figure 20. Paddy-paddy is the most common, occupying 56% of the share in a year, followed by paddy-green gram (16%), paddy-fallow (7%), paddy-chickpea (5%) and fallow-green gram (3%). The other cropping combinations occupy around 1%. Since fallows in kharif or rabi together have a 13% share, changes in the cropping system in these lands has to be taken up on priority.

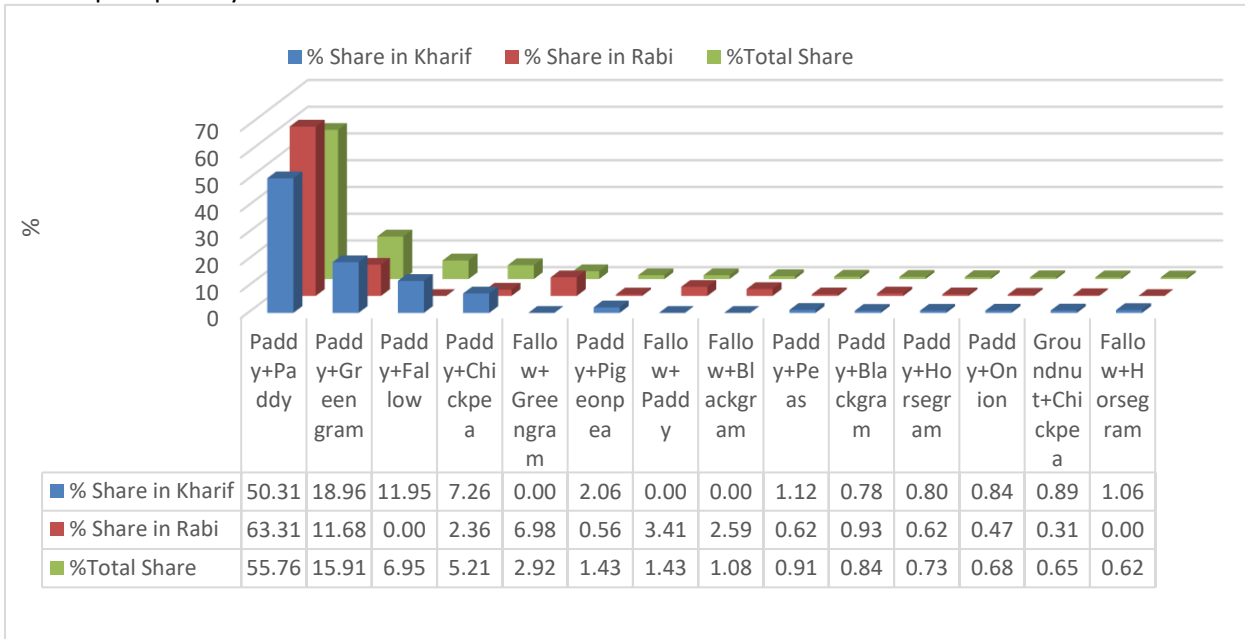


Figure 20. The share of different cropping patterns at the pilot sites.

9.2.7. Seed systems

This study also aims to understand the interlocking of formal and informal seed supply routes by considering the dynamic flow of seeds within networks. An FGD conducted to analyze the seed systems across the villages and found that except for paddy, self-pollinated crops like pulses have informal systems like using own seeds or obtaining seed from fellow farmers. The major varieties of paddy grown across the villages are Swarna (70%), MTU 1010 (23%), MTU 1001 (3%) and others 4% (Figure 21). Cultivars of other crops grown are mostly unknown and locally grown.

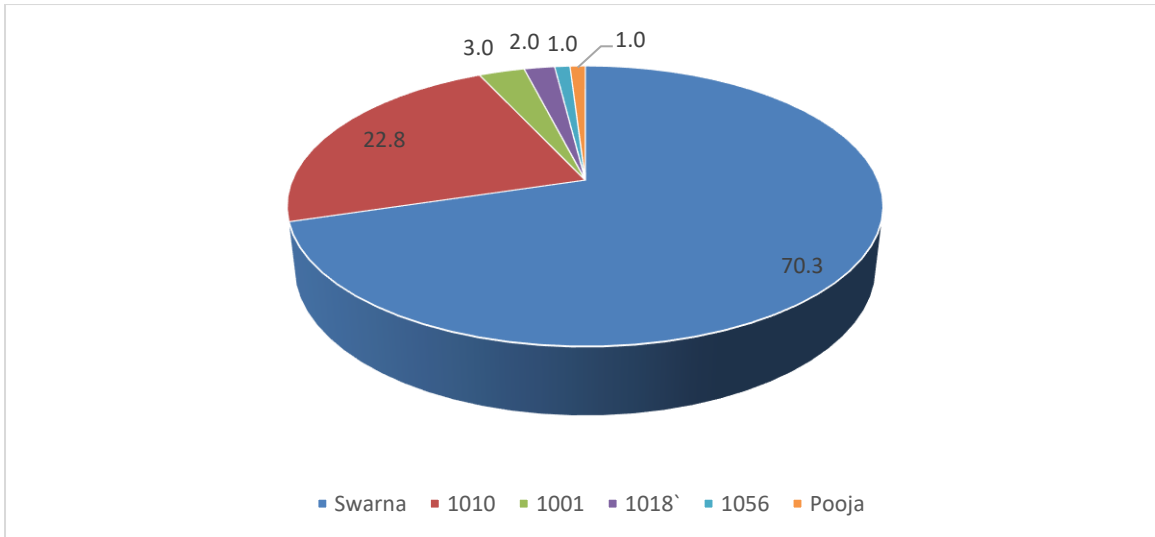


Figure 21. Share of the seeds of different paddy varieties grown.

9.2.8. Fertilizer use

Efficient nutrient management in rice is very important to ensure high yields. The recommended dosage of NPK for paddy is 70:25:35 kg/ha. However, the applied dosage in the villages was 122:89:62. This needs to be corrected with proper soil testing (Figure 22). The practice of applying fertilizers in pulses was not observed.

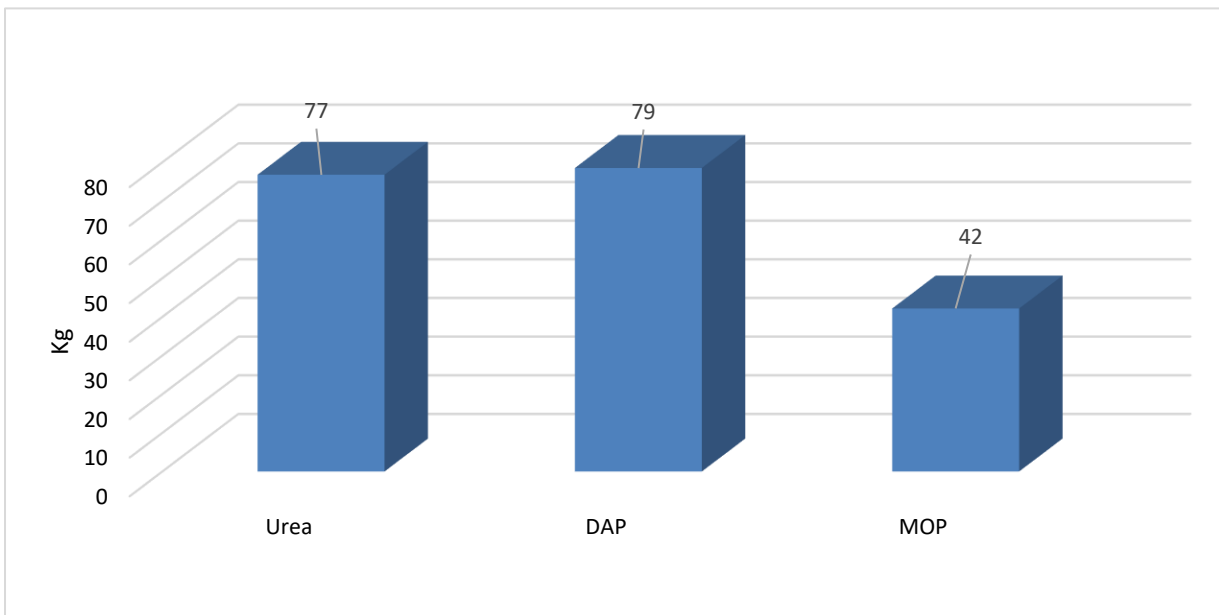


Figure 22. Fertilizer use pattern.

9.2.9. Sources of irrigation

The villages selected for the study have two distinct types of farming (Figure 23). The arable land in Gandaguda, Kuhuriguma, Mukhiguda and Patiguda are almost irrigated (>90%) while the rest of the villages are partly irrigated and rainfed. Rainfed area was the highest in Kotpadi (70%) followed by Ranibahal (>60%), accounting for the low productivity and higher fallow in the post-rainy season. The major source of irrigation (100%) is through canals. No farmer reported using groundwater as a source of irrigation.

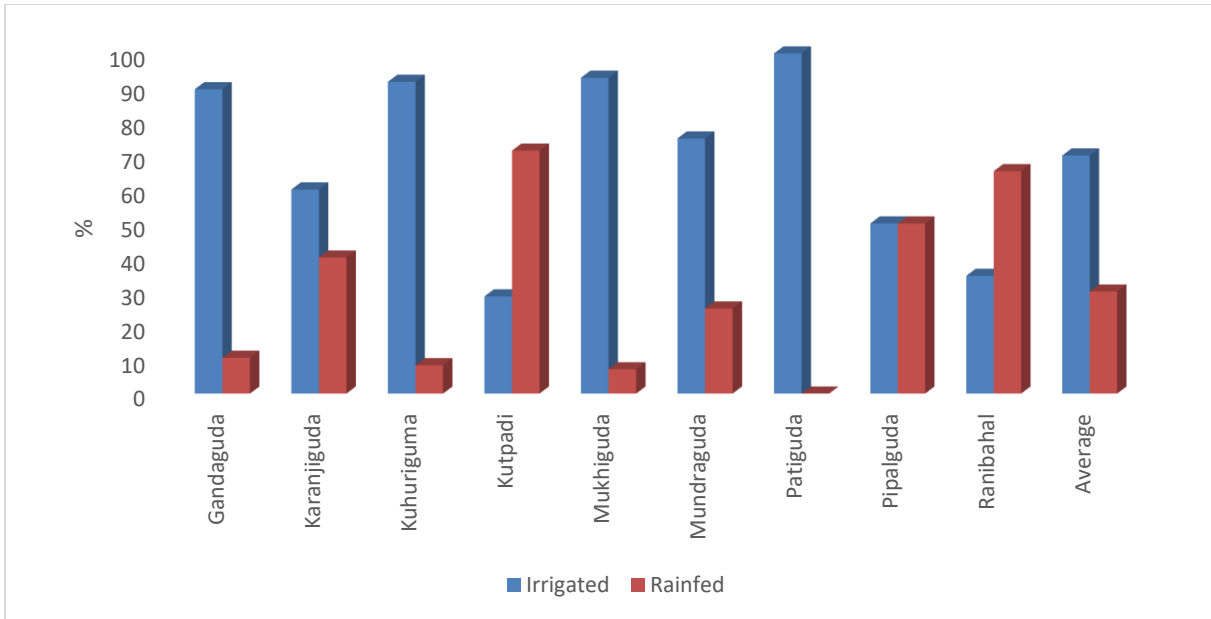


Figure 23. Rainfed and irrigated sites.

9.2.10. Mechanization pattern

Mechanization in agricultural operations can impact crop production. Small farmers who cannot own agricultural machinery and equipment often hire them to perform specific farm tasks. Figure 24 gives some insights into the extent of ownership of farm machinery, their usage and the source of equipment. Tractors, power sprayers, trolleys and threshers are used and hired from various sources.

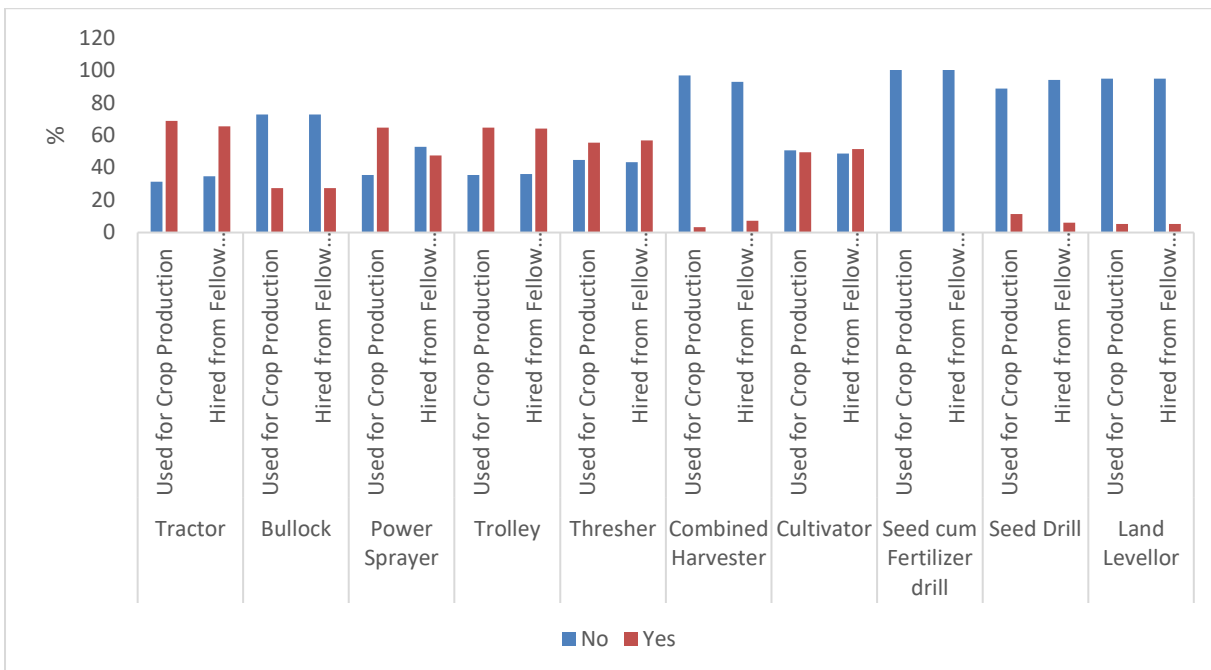


Figure 24. Mechanization pattern and machinery used in the study sites.

9.2.11. Systems profitability

The study compared the cropping systems in all the villages (Table 6) and observed paddy-chickpea to be the best (BCR = 1:8). Even though net returns were more in paddy-peas, due to the high expenditure incurred in cultivation, paddy-chickpea was found to be better, and hence needs to be promoted. Profitability in the system depends on the how well the farmer is able to manage the farm, for which documentation is suggested.

Table 6. Profitability of the different cropping patterns in kharif (K) and (R) rabi seasons.

Cropping System	Yield_(K)	Yield_(R)	Price (K)	Price (R)	GI_(K)	GI_(R)	COC_(K)	COC_(R)	NI_(K)	NI_(R)	T_NI	BCR
Paddy + paddy	15	19.4	1668	1632	30020	37541	11015	11434	19004	26107	45111	2
Paddy + green gram	23	4	1526	4033	35102	16133	7340	2894	27762	13239	41001	5
Paddy + fallow	17		1508		25628	0	5084		20543		20543	5
Paddy + chickpea	24	7	1683	4000	40400	29211	4314	4211	36086	25000	61086	8
Paddy + pigeonpea	23	2	1300	6500	29900	13000	6080	4444	23820	8556	32375	4
Paddy + peas	21	20	1350	5000	28350	100000	7000	25000	21350	75000	96350	4
Horsegram +fallow	4		2525	0	10100	0	2526		7574	0	7574	4
Pigeonpea + fallow	2		5000	0	10000	0	3756		6244	0	6244	3
Groundnut +chickpea	5	7	4500	4000	22500	28000	15000	10000	7500	18000	25500	2

K= kharif; R=rabi; GI=gross income; COC=cost of cultivation; NI=net income; BCR=benefit cost ratio

9.2.12. Livestock ownership

The average livestock ownership per sample household is summarized in Figure 25. On an average, every 10 sample households had only two draft animals. The buffalo population is low compared to that of cows. Karanjiguda, Kuhuriguma and Kotpadi have the highest cattle population. Among small ruminants, there were more goats per household in Mukhiguda, Patiguda and Ranibahal. Average milk yield/day was not reported by majority of farmers.

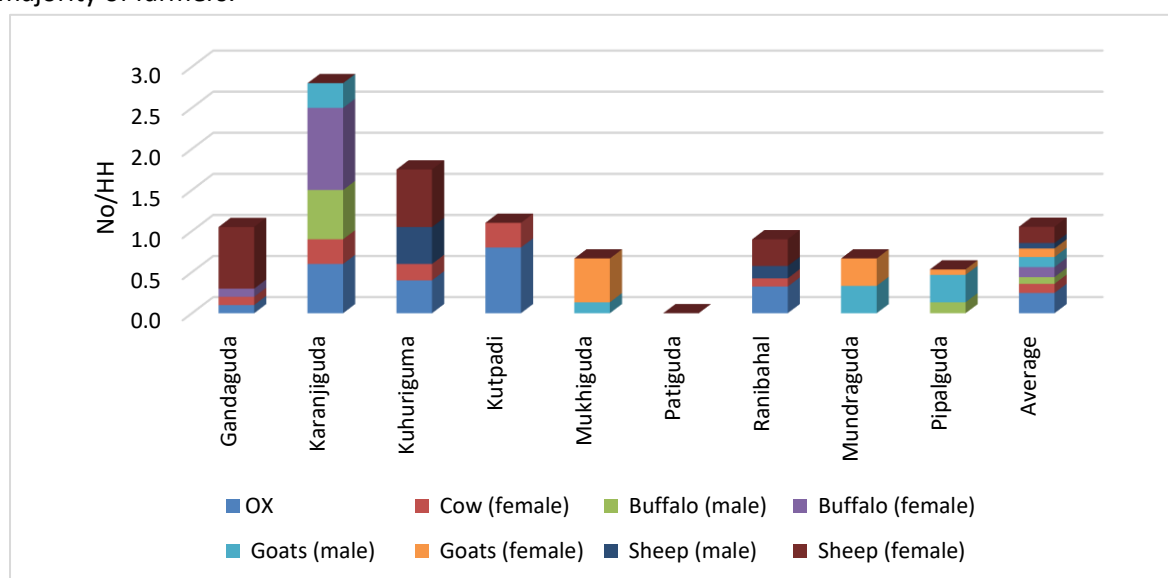


Figure 25. Livestock ownership pattern.

9.2.13. Livelihood options - Labour employment

The study reflects the important role played by agriculture and non-farm activities in the region. Majority of person-days (120) in the sample came from farm work. The majority were during the kharif season (77 days) and rabi season (60 days). Households from Mukhiguda have good opportunities to undertake non-agricultural activities (120 days). The details are provided in Figure 26.

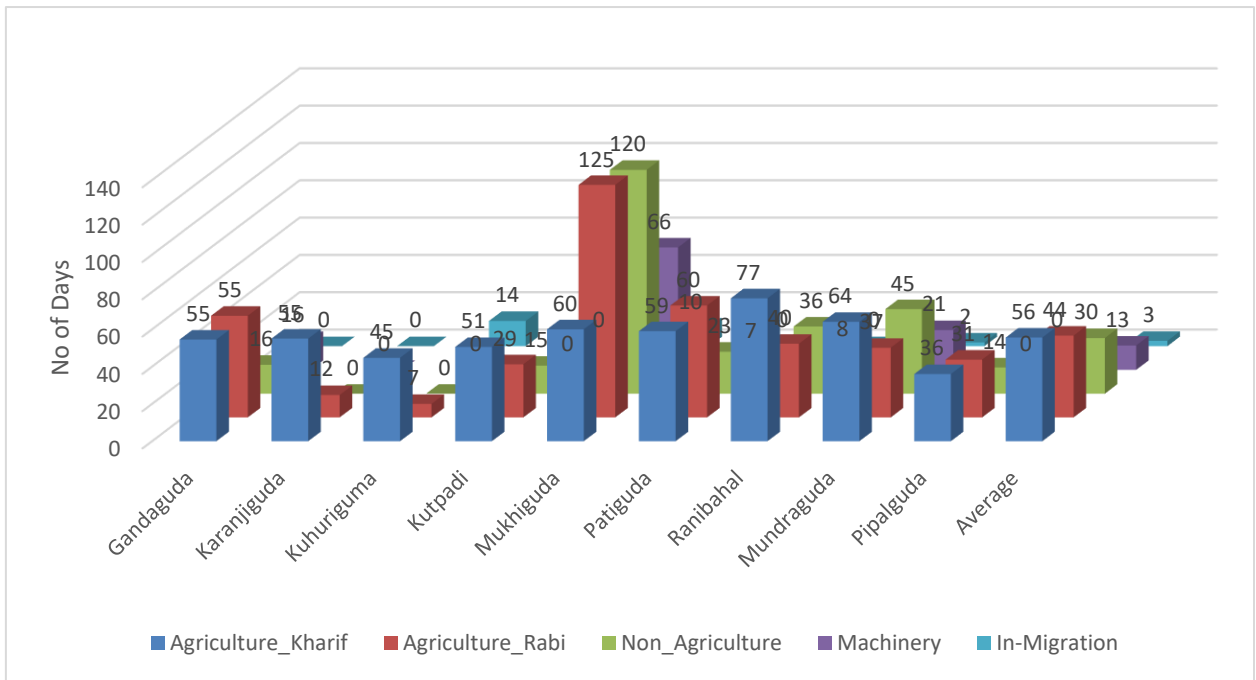


Figure 26. Labour employment across the villages.

9.2.14. Food consumption pattern

Food security continues to be one of the critical objectives of watershed development. Figures 27a-e describe the consumption pattern of cereals, pulses, oils, vegetables and livestock products across the villages. The monthly consumption of paddy is 36 kg/month, while that of pulses like pigeonpea, black gram and green gram is around 2-3 kg/month. Palm oil consumption is around 3 litres/month. Meat and milk consumption were substantial across the villages.

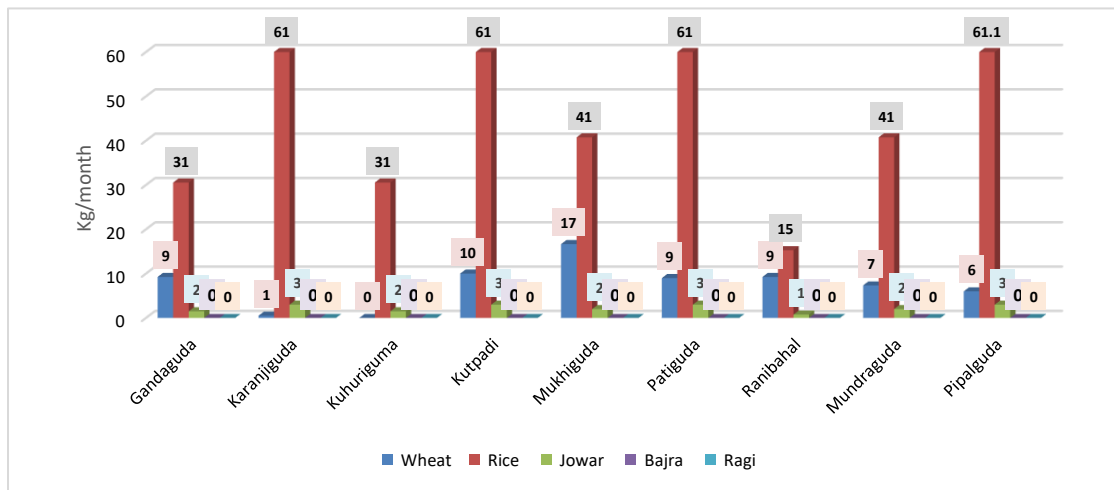


Figure 27a. Consumption pattern of cereals.

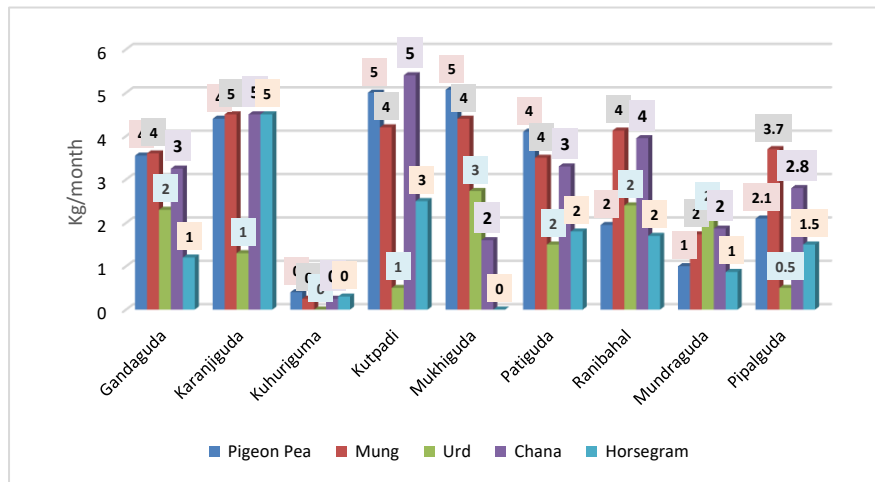


Figure 27b. Consumption pattern of pulses.

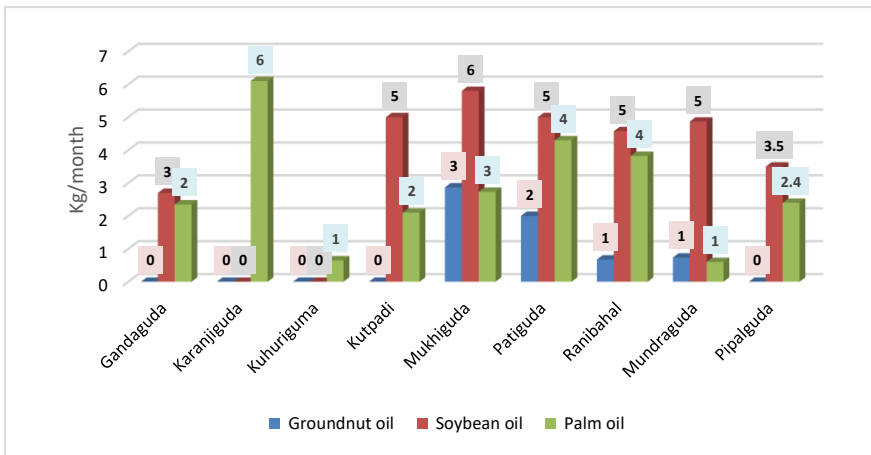


Figure 27c. Consumption pattern of oils.

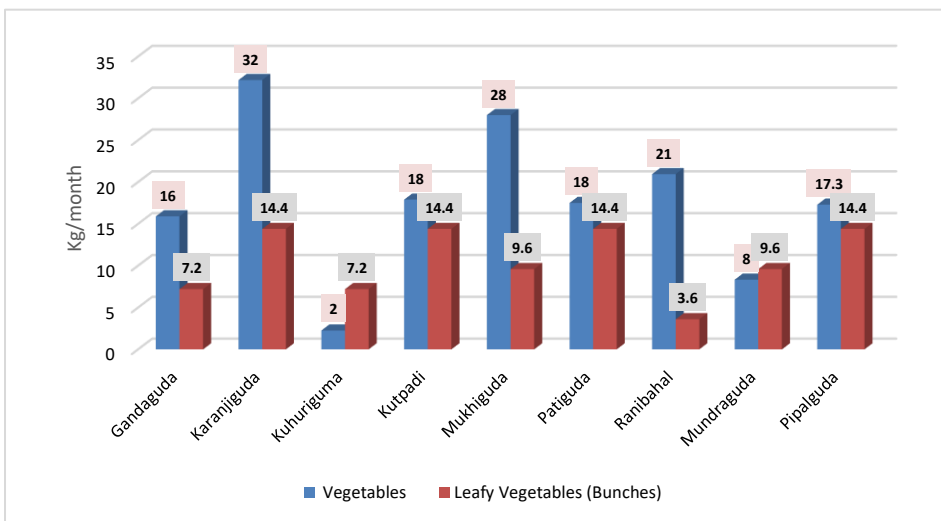


Figure 27d. Consumption pattern of vegetables.

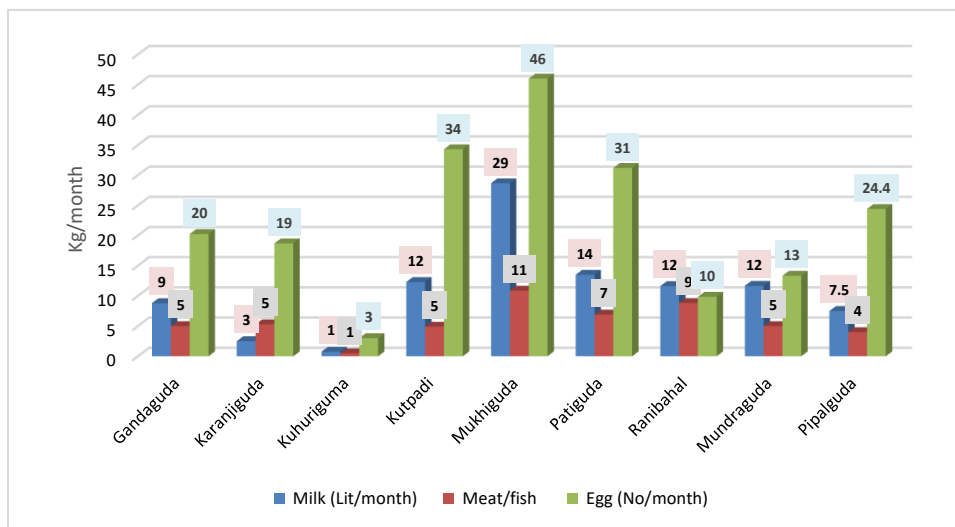


Figure 27e. Consumption pattern of livestock products.

9.2.15. Quality of market produce

The price of produce is largely determined by its quality. The results show (Table 7) the defects in the marketable produce in the villages, such as the moisture content, grain damage due to pests, unfilled pods, shrivelled grains, etc. The average damage is around 7% for unfilled pods, shrivelled grains and damaged grains, 9% for moisture content and 8% for mud content, which need attention.

Table 7. Extent of defects in marketable produce.

Village	Unfilled pods (%)	Shrivelled grains (%)	Damaged grain due to pests and disease (%) (smut)	Moisture content (%)	Mud (%)
Gandaguda	5	5	6	9	
Karanjiguda	5	13	10	10	2
Kuhuriguma	4	4	6	8	
Kotpadi	7	4	5	6	
Mukhiguda	5	8	7	6	6
Patiguda	7	5	6	7	
Ranibahal	9	8	8	11	11
Mundraguda	5	5	5	5	5
Pipalguda	5	5	11	5	
Average	7	7	7	9	8

9.2.16. Training needs

Training is an integral part of any development activity. The training needs of small farmers in order of importance were post-harvest technologies, land levelling and FYM methods, chemical and weed application/methods i.e., IPM, seed priming, climate-linked farming and kitchen gardens (Figure 28). Future capacity building exercises should focus more on these aspects.

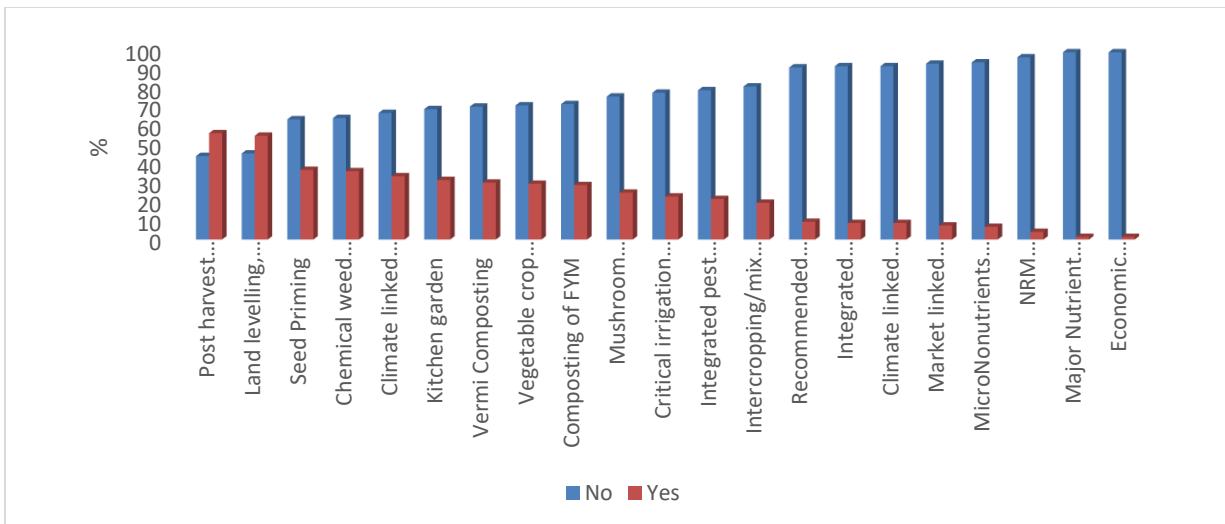


Figure 28. Training needs of farmers.

10. Topographic Survey and Mapping of in-situ, ex-situ water conservation sites

Finding ways to increase water availability and access to farmers, both blue water (in water harvesting structures) and green water (stored in the soil matrix) is key to intensifying agricultural production in the region. In this context, the major focus was on rainwater conservation to enhance water availability and rainwater use efficiency. A team of agricultural engineers along with the ICRISAT team and NGO partner is surveying the rainfed areas of the watershed where there is no irrigation network. Topographic maps have been developed and potential water conservation structures have been mapped in Ranibahal village. A couple of preliminary sites have been identified in Mukhiguda and other villages. Priority interventions in Ranibahal village will include a graded bund (GB 2 in Figure 29a), three secondary bunds (SB 1 & 2 in Figure 29b; SB 4 in Figure 29c), nine farm ponds and other structures (Figure 29 d). Similarly, important farm pond sites have been identified in other villages as well.



Figure 29a. Proposed water conservation structures in Ranibahal village, graded bund GB2).



Figure 29b. Proposed water conservation structures in Ranibahal village, secondary bunds SB 1 & 2.



Figure 29c. Proposed water conservation structures in Ranibahal village, secondary bund SB 4.



Figure 29d. Other proposed water conservation structures in Ranibahal village.

11. Other Income Generating Activities

To involve women in income generating activities, 180 women farmers were provided vegetable seeds during post-rainy season 2019-20 to set up kitchen gardens (Figure 30).



Figure 30. Kitchen gardens set up during post-rainy season 2019-20 by women farmers in (L) Ranibahal and (R) Mukhiguda villages.

12. Capacity Building

Capacity building is at the core of watershed interventions, done through formal/informal trainings and field days. Regular formal/informal meetings/trainings by one ICRIAT field staff and 2 NGO staff with technical support from a team of scientists at ICRIAT headquarters were part of the watershed program to enable proper implementation of technologies (Figure 31).



Figure 31. Village level meetings in the watershed.

13. Annexures

Annexure 1. Result of the soil analysis of samples collected from farmers' fields in the watershed, Jaipatna block, Kalahandi district, Odisha.

S No	Village	Farmer's name	Available nutrients (mg/kg)												
			pH	EC (dS/m)	OC (%)	P	K	Ca	Mg	S	Zn	B	Fe	Cu	Mn
1	Ranibahal	Trinath Naik	6.16	0.03	0.76	0.47	97	1600	383	2.74	0.30	0.30	22.66	1.26	16.08
2	Ranibahal	Arkhit Majhi	6.26	0.03	0.75	3.42	145	923	277	4.32	0.92	0.21	31.84	0.76	35.08
3	Ranibahal	Saiba Majhi	6.33	0.03	0.41	0.28	92	1677	400	3.37	0.12	0.22	15.12	1.02	14.76
4	Ranibahal	Pabitra Majhi	6.31	0.02	0.27	0.12	55	621	340	2.33	0.08	0.18	17.42	0.62	13.08
5	Ranibahal	Nehar Behara	6.06	0.05	0.95	10.62	454	2183	750	6.34	0.68	0.37	132.42	3.48	46.14
6	Ranibahal	Khaqeswar Patra	6.23	0.07	0.78	38.77	222	1091	148	6.23	2.10	0.34	121.68	2.20	50.26
7	Ranibahal	Ratan Harijin	6.18	0.02	0.48	5.98	54	1500	338	4.17	0.60	0.34	52.40	1.72	49.16
8	Ranibahal	Harikanta Naik	6.55	0.08	0.52	1.26	90	3326	332	3.83	0.16	0.26	13.30	1.36	9.42
9	Ranibahal	Narasing Naik	6.43	0.03	0.42	0.96	82	1443	444	3.88	0.28	0.21	26.50	1.50	28.82
10	Ranibahal	Mana Naik	6.25	0.02	0.48	1.24	46	1033	290	2.81	0.64	0.15	49.08	1.62	48.22
11	Mukhiquda	Santosh Kumar Sahu	6.39	0.07	0.99	11.20	252	1966	360	6.94	1.08	0.35	45.72	1.68	32.34
12	Mukhiquda	Banmail Maihi	6.31	0.05	0.59	6.09	109	1985	320	3.81	2.74	0.25	16.04	1.28	17.90
13	Mukhiquda	Gobinda Patel	6.18	0.03	1.10	6.79	77	1336	359	4.25	1.56	0.26	108.86	2.64	44.96
14	Mukhiquda	Sarat Chandra Panigrahi	7.14	0.10	0.29	1.85	97	3795	684	3.65	0.20	0.19	6.70	0.90	3.92
15	Mukhiquda	Prasanna Mishra	7.04	0.11	0.58	16.24	176	1862	634	6.81	0.80	0.49	8.84	2.22	11.20
16	Karanjiguda	Chamara Khamari	6.09	0.05	0.55	8.01	109	897	150	6.03	0.68	0.20	109.18	1.64	40.30
17	Karanjiguda	Sashi Pujhari	6.46	0.04	0.63	1.42	129	2916	620	3.81	0.28	0.31	25.96	1.80	15.28
18	Karanjiguda	Judhesti Dhangada Maihi	6.05	0.02	0.77	1.76	126	1689	502	4.75	0.56	0.30	40.82	2.62	34.22
19	Karanjiguda	Syama Jain	6.15	0.02	0.43	2.30	83	427	104	3.73	0.66	0.15	53.28	1.68	41.72
20	Karanjiguda	Nabin Dhanguda Maihi	6.31	0.03	0.65	0.70	143	2031	460	5.45	0.24	0.17	31.92	2.10	23.52
21	Kapurmal	Nilakantha Pijhari	6.66	0.14	1.26	66.81	325	3194	274	7.15	2.04	0.43	66.10	2.34	9.72
22	Kapurmal	Ganja Pujhari	7.08	0.06	0.41	2.94	60	2869	409	3.80	0.04	0.26	6.96	0.98	4.06
23	Kapurmal	Sanjaya Pujhari	6.68	0.03	0.34	0.04	62	1965	402	1.96	0.04	0.17	13.18	0.90	9.34
24	Kapurmal	Rati Banua	7.83	0.09	0.23	0.04	79	2737	711	3.14	0.04	0.22	6.02	0.88	3.56
25	Kapurmal	Madan Chandra Bag	7.75	0.08	0.35	0.04	326	2888	462	3.84	0.08	0.33	8.34	0.96	4.92
26	Gandaguda	Banchha Nidhi Mishra	6.96	0.10	0.96	5.23	253	2576	497	5.21	0.52	0.32	43.34	3.02	25.70
27	Gandaguda	Tankadhar Majhi	7.81	0.10	0.43	1.62	137	3392	612	4.26	0.20	0.32	9.58	1.54	4.74
28	Gandaguda	Tankadhar Majhi	7.11	0.06	0.67	1.44	70	2250	380	4.81	0.20	0.24	31.18	2.04	16.28
29	Gandaguda	Jhalia Majhi	6.65	0.04	0.56	8.40	230	2013	324	3.09	0.32	0.22	24.68	1.10	18.16
30	Gandaguda	Banchha Nidhi Mishra	7.41	0.14	0.48	10.30	420	3115	686	24.35	0.68	0.40	21.42	2.24	9.48

S No	Village	Farmer's name	Available nutrients (mg/kg)												
31	Kotpadi	Duriyodhan Disari	6.73	0.02	0.32	2.54	57	918	217	2.15	0.50	0.17	28.52	0.92	24.14
32	Kotpadi	Kartik Disari	7.44	0.16	1.03	48.77	225	2552	409	5.33	2.14	0.28	38.90	3.14	16.62
33	Kotpadi	Monoj Disari	6.75	0.05	0.64	9.76	168	1127	200	10.41	0.66	0.54	43.98	1.00	18.64
34	Kotpadi	Monoj Disari	7.33	0.13	0.97	46.34	208	1703	314	11.67	7.24	0.57	30.64	3.06	12.62
35	Kotpadi	Sailendra Singh Deo	6.13	0.06	0.92	6.12	68	1889	535	5.14	2.44	0.31	64.90	2.44	42.12
36	Kuhuriguma	Kesab Chandra Naik	6.53	0.04	0.64	1.01	80	1576	682	4.38	0.16	0.24	28.96	1.42	15.74
37	Kuhuriguma	Manjit Rout	6.46	0.03	0.74	2.59	51	1047	318	2.83	0.54	0.16	60.90	2.10	26.34
38	Kuhuriguma	Hari Naik	7.33	0.08	0.41	1.17	58	2532	520	3.97	0.18	0.19	13.16	1.24	6.14
39	Kuhuriguma	Saidhar Dandasena	7.63	0.09	0.43	1.05	75	3697	597	7.04	0.06	0.27	7.86	1.48	5.50
40	Kuhuriguma	Sanyasi Naik	7.05	0.08	0.20	1.42	41	2222	482	6.30	0.06	0.10	9.82	0.44	3.66
41	Mundraguda	Thakur Naik	7.67	0.14	0.29	50.85	1273	1915	536	4.51	0.42	0.43	9.48	1.28	10.86
42	Mundraguda	Pitabash Naik	7.73	0.10	0.58	15.17	609	2129	502	7.18	0.98	0.34	9.18	1.32	10.80
43	Mundraguda	Madhusudhan Naik	7.36	0.18	0.55	6.97	1167	2976	969	10.16	0.36	0.35	10.96	1.14	11.18
44	Mundraguda	Harisankar Naik	6.83	0.20	2.22	44.59	822	3110	944	43.16	5.42	0.79	321.80	2.50	49.22
45	Mundraguda	Nabin Naik	6.41	0.22	2.58	75.97	814	1818	427	18.48	2.92	0.95	109.38	3.60	34.74
46	Patiguda	Parsu Rout	6.57	0.03	0.52	7.09	58	1556	476	4.81	0.74	0.19	36.44	1.46	27.64
47	Patiguda	Durion Bag	6.18	0.06	0.89	9.83	162	1237	208	6.52	1.14	0.32	101.38	1.96	31.36
48	Patiguda	Jagarnath Rout	6.78	0.06	0.84	12.78	483	1611	597	6.05	0.88	0.38	32.38	1.22	21.62

* pH=Soil reaction; EC=electrical conductivity; OC=organic carbon; P=phosphorus; K=potassium; Ca=calcium; Mg=magnesium; S=Sulphur; Zn=zinc; B=boron; Fe=iron; Cu=copper; Mn=manganese

Annexure 2. Details of farmers who were provided seeds of improved crop varieties for demonstrations in the watershed, Jaipatna block, Kalahandi district, 2019-20.

S No	Farmer's name	Village	Crop	Variety
1	Gajindra Majhi	Ranibahal	Chickpea	JG 14
2	Sitaram Sabar	Ranibahal	Chickpea	JG 14
3	Trinath Naik	Ranibahal	Chickpea	JG 14
4	Narendra Naik	Ranibahal	Chickpea	JG 14
5	Pabitra Majhi	Ranibahal	Chickpea	JG 14
6	Gokul Sahu	Ranibahal	Chickpea	JG 14
7	Somnath Sahu	Ranibahal	Chickpea	JG 14
8	Durbind Rout	Ranibahal	Chickpea	JG 14
9	Bhawani Rout	Ranibahal	Chickpea	JG 14
10	Arkhit Rout	Ranibahal	Chickpea	JG 14
11	Garib Rout	Ranibahal	Chickpea	JG 14
12	Ramesh Chandara Rout	Ranibahal	Chickpea	JG 14
13	Sada Rout	Ranibahal	Chickpea	JG 14
14	Hara Majhi	Ranibahal	Chickpea	JG 14
15	Sankar Rout	Ranibahal	Chickpea	JG 14
16	Narasing Sabar	Ranibahal	Chickpea	JG 14
17	Devraj Majhi	Ranibahal	Chickpea	JG 14
18	Sebati Sahu	Ranibahal	Chickpea	JG 14
19	Dutika Majhi	Ranibahal	Chickpea	JG 14
20	Bhola Rout	Ranibahal	Chickpea	JG 14
21	Rabidra Majhi	Ranibahal	Chickpea	JG 14
22	Ghenu Sabar	Ranibahal	Chickpea	JG 14
23	Jugal Majhi	Kuhuriguma	Chickpea	JG 14
24	Digbash Majhi	Kuhuriguma	Chickpea	JG 14
25	Bharat Bhusan Naik	Kuhuriguma	Chickpea	JG 14
26	Hari Naik	Kuhuriguma	Chickpea	JG 14
27	Rupchan Naik	Kuhuriguma	Chickpea	JG 14
28	Sanyasi Majhi	Kuhuriguma	Chickpea	JG 14
29	Sunadhar Pradhani	Kuhuriguma	Chickpea	JG 14
30	Ranjit Rout	Kuhuriguma	Chickpea	JG 14
31	Bamnu Harijan	Kuhuriguma	Chickpea	JG 14
32	Saidhar Dandasena	Kuhuriguma	Chickpea	JG 14
33	Laxman Majhi	Kuhuriguma	Chickpea	JG 14
34	Rupchan Bhatra	Kuhuriguma	Chickpea	JG 14
35	Manjit Rout	Kuhuriguma	Chickpea	JG 14
36	Rabindra Patra	Kuhuriguma	Chickpea	JG 14
37	Suresh Majhi	Gandaguda	Chickpea	JG 14
38	Sukru Majhi	Gandaguda	Chickpea	JG 14
39	Tankadhar Sahu	Gandaguda	Chickpea	JG 14

S No	Farmer's name	Village	Crop	Variety
40	Maniram Majhi	Gandaguda	Chickpea	JG 14
41	Ratan Majhi	Gandaguda	Chickpea	JG 14
42	Madhab Pujhari	Patiguda	Chickpea	JG 14
43	Purnna Chandra Pattnaik	Patiguda	Chickpea	JG 14
44	Lingraj Naik	Patiguda	Chickpea	JG 14
45	Jagarnath Rout	Patiguda	Chickpea	JG 14
46	Devraj Pujhari	Patiguda	Chickpea	JG 14
47	Sashi Rout	Patiguda	Chickpea	JG 14
48	Goutam Rout	Patiguda	Chickpea	JG 14
49	Swama Jhodia	Patiguda	Chickpea	JG 14
50	Udhab Pujhari	Patiguda	Chickpea	JG 14
51	Dashrah Naik	Patiguda	Chickpea	JG 14
52	Dhabaleswar Pujhari	Patiguda	Chickpea	JG 14
53	Maheswar Disari	Kotpadi	Chickpea	JG 14
54	Monoj Kumar Disari	Kotpadi	Chickpea	JG 14
55	Rajendra Dishari	Kotpadi	Chickpea	JG 14
56	Hiran Dishari	Kotpadi	Chickpea	JG 14
57	Mahendra Rout	Kotpadi	Chickpea	JG 14
58	Purnna Chandra Dishari	Kotpadi	Chickpea	JG 14
59	Baibasuta Doishari	Kotpadi	Chickpea	JG 14
60	Tike Dishari	Kotpadi	Chickpea	JG 14
61	Bholanath Dishari	Kotpadi	Chickpea	JG 14
62	Banmali Naik	Kotpadi	Chickpea	JG 14
63	Ganesh Rout	Kotpadi	Chickpea	JG 14
64	Sashi Pujhari	Karanjiguda	Chickpea	JG 14
65	Nabin Dhangada Majhi	Karanjiguda	Chickpea	JG 14
66	Motiram Panigiri	Karanjiguda	Chickpea	JG 14
67	Bhubneswar Pujhari	Karanjiguda	Chickpea	JG 14
68	Trinath Pujhari	Karanjiguda	Chickpea	JG 14
69	Satyanand Das	Karanjiguda	Chickpea	JG 14
70	Abhi Patra	Karanjiguda	Chickpea	JG 14
71	Purnna Chandra Patra	Karanjiguda	Chickpea	JG 14
72	Dhanurjya Panigiri	Karanjiguda	Chickpea	JG 14
73	Lokhnath Pujhari	Karanjiguda	Chickpea	JG 14
74	Olek Pangri	Karanjiguda	Chickpea	JG 14
75	Madhusudhan Naik	Mundraguda	Chickpea	JG 14
76	Thakur Naik	Mundraguda	Chickpea	JG 14
77	Balram Naik	Mundraguda	Chickpea	JG 14
78	Bhagban Sagaria	Mundraguda	Chickpea	JG 14
79	Naben Naik	Mundraguda	Chickpea	JG 14
80	Jagdish Naik	Mundraguda	Chickpea	JG 14

S No	Farmer's name	Village	Crop	Variety
81	Parsu Naik	Mundraguda	Chickpea	JG 14
82	Tuaram Naik	Mundraguda	Chickpea	JG 14
83	Tunu Naik	Mundraguda	Chickpea	JG 14
84	Malaya Naik	Mundraguda	Chickpea	JG 14
85	Harisankar Naik	Mundraguda	Chickpea	JG 14
86	Sundarlal Tandi	Mundraguda	Chickpea	JG 14
87	Laxmi Bewa	Mundraguda	Chickpea	JG 14
88	Arjun Naik	Mundraguda	Chickpea	JG 14
89	Kumar Nak	Mundraguda	Chickpea	JG 14
90	Jyotiraj Naik	Mundraguda	Chickpea	JG 14
91	Gobardhnan Naik	Mundraguda	Chickpea	JG 14
92	Paduna Naik	Mundraguda	Chickpea	JG 14
93	Taila Naik	Mundraguda	Chickpea	JG 14
94	Kesab Naik	Mundraguda	Chickpea	JG 14
95	Chaturbhuj Naik	Mundraguda	Chickpea	JG 14
96	Amar Naik	Mundraguda	Chickpea	JG 14
97	Chaitu Naik	Mundraguda	Chickpea	JG 14
98	Dhanu Majhi	Mukhiguda	Chickpea	JG 14
99	Gouri Majhi	Mukhiguda	Chickpea	JG 14
100	Jagarnath Patel	Mukhiguda	Chickpea	JG 14
101	Trinath Bhoi	Mukhiguda	Chickpea	JG 14
102	Abdul Sameer	Mukhiguda	Chickpea	JG 14
103	Abdul Rahis	Mukhiguda	Chickpea	JG 14
104	Abdul Azad	Mukhiguda	Chickpea	JG 14
105	Nidhan Harijan	Mukhiguda	Chickpea	JG 14
106	Madhusudhan Naik	Mukhiguda	Chickpea	JG 14
107	Hartikanta Naik	Pipalguda	Chickpea	JG 14
108	Maheswar Harijan	Pipalguda	Chickpea	JG 14
109	Ratan Harijan	Pipalguda	Chickpea	JG 14
110	Binod Harijan	Pipalguda	Chickpea	JG 14
111	Debsingh Naik	Pipalguda	Chickpea	JG 14
112	Gajrath Majhi	Pipalguda	Chickpea	JG 14
113	Gula Harijan	Pipalguda	Chickpea	JG 14
114	Bhagat Naik	Pipalguda	Chickpea	JG 14
115	Ramsingh Naik	Pipalguda	Chickpea	JG 14
116	Pabitra Sil	Pipalguda	Chickpea	JG 14
117	Mahendra Rana	Pipalguda	Chickpea	JG 14
118	Surekha Naik	Kuhuriguma	Green gram	SML668
119	Kesar Majhi	Kuhuriguma	Green gram	SML668
120	Chandra Kala Naik	Kuhuriguma	Green gram	SML668
121	Mani Harijan	Kuhuriguma	Green gram	SML668

S No	Farmer's name	Village	Crop	Variety
122	Bana Chhatria	Kuhuriguma	Green gram	SML668
123	Rupchan Bhatra	Kuhuriguma	Green gram	SML668
124	Chandra Mani Bhatra	Kuhuriguma	Green gram	SML668
125	Phulchan Naik	Kuhuriguma	Green gram	SML668
126	Sanyasi Majhi	Kuhuriguma	Green gram	SML668
127	Laxman Majhi	Kuhuriguma	Green gram	SML668
128	Pulasti Majhi	Kuhuriguma	Green gram	SML668
129	Saidhar Dandasena	Kuhuriguma	Green gram	SML668
130	Kesab Chandra Naik	Kuhuriguma	Green gram	SML668
131	Bhujbal Naik	Kuhuriguma	Green gram	SML668
132	Ranjit Rout	Kuhuriguma	Green gram	SML668
133	Sunadhar Pradhani	Kuhuriguma	Green gram	SML668
134	Akshya Naik	Kuhuriguma	Green gram	SML668
135	Ghenu Naik	Kuhuriguma	Green gram	SML668
136	Sriram Naik	Kuhuriguma	Green gram	SML668
137	Phulkumar Harijan	Kuhuriguma	Green gram	SML668
138	Manjit Rout	Kuhuriguma	Green gram	SML668
139	Rupchan Naik	Kuhuriguma	Green gram	SML668
140	Jujhasti Harijan	Kuhuriguma	Green gram	SML668
141	Giridhari Naik	Kuhuriguma	Green gram	SML668
142	Bibhuti Behera	Ranibahal	Green gram	SML668
143	Dashmath Rout	Ranibahal	Green gram	SML668
144	Trinath Naik	Ranibahal	Green gram	SML668
145	Benudhar Rout	Ranibahal	Green gram	SML668
146	Udhab Majhi	Ranibahal	Green gram	SML668
147	Mdhu Sabar	Ranibahal	Green gram	SML668
148	Narendra Naik	Ranibahal	Green gram	SML668
149	Jagdish Rout	Ranibahal	Green gram	SML668
150	Fakir Rout	Ranibahal	Green gram	SML668
151	Durbind Rout	Ranibahal	Green gram	SML668
152	Gokul Sahu	Ranibahal	Green gram	SML668
153	Somnath Sahu	Ranibahal	Green gram	SML668
154	Nidhi Sabar	Ranibahal	Green gram	SML668
155	Bhawani Rout	Ranibahal	Green gram	SML668
156	Bholanath Rout	Ranibahal	Green gram	SML668
157	Dhansai Majhi	Ranibahal	Green gram	SML668
158	Sontosh Majhi	Mukhiguda	Green gram	SML668
159	Sarat Panigrahi	Mukhiguda	Green gram	SML668
160	Kamala Hansa	Mukhiguda	Green gram	SML668
161	Satrughan Rout	Mukhiguda	Green gram	SML668
162	Chatur Suna	Mukhiguda	Green gram	SML668

S No	Farmer's name	Village	Crop	Variety
163	Sonu Bhoi	Mukhiguda	Green gram	SML668
164	Umesh Das	Mukhiguda	Green gram	SML668
165	Lingaraj Majhi	Mukhiguda	Green gram	SML668
166	Mana Barik	Mukhiguda	Green gram	SML668
167	Udhab Majhi	Mukhiguda	Green gram	SML668
168	Chandrashekhar Majhi	Gandaguda	Green gram	SML668
169	Rajkishor Majhi	Gandaguda	Green gram	SML668
170	Rajeswar Majhi	Gandaguda	Green gram	SML668
171	Sukru Majhi	Gandaguda	Green gram	SML668
172	Ramchandra Majhi	Gandaguda	Green gram	SML668
173	Nabeen Majhi	Gandaguda	Green gram	SML668
174	Satya Prakash Sahu	Gandaguda	Green gram	SML668
175	Jhalia Majhi	Gandaguda	Green gram	SML668
176	Dhania Majhi	Ranibahal	Black gram	PU 31
177	Ruku Majhi	Ranibahal	Black gram	PU 31
178	Mohan Majhi	Ranibahal	Black gram	PU 31
179	Dhansai Majhi	Ranibahal	Black gram	PU 31
180	Arakhit Majhi	Ranibahal	Black gram	PU 31
181	Arakhit Rout	Ranibahal	Black gram	PU 31
182	Gajindra Majhi	Ranibahal	Black gram	PU 31
183	Narendra Naik	Ranibahal	Black gram	PU 31
184	Bhawani Rout	Ranibahal	Black gram	PU 31
185	Durbind Rout	Ranibahal	Black gram	PU 31
186	Gokul Sahu	Ranibahal	Black gram	PU 31
187	Somnath Sahu	Ranibahal	Black gram	PU 31
188	Pitambar Rout	Ranibahal	Black gram	PU 31
189	Loknath Sahu	Ranibahal	Black gram	PU 31
190	Ahalya Rout	Ranibahal	Black gram	PU 31
191	Trinath Naik	Ranibahal	Black gram	PU 31
192	Giridhari Naik	Kuhuriguma	Black gram	PU 31
193	Surekha Naik	Kuhuriguma	Black gram	PU 31
194	Kesar Majhi	Kuhuriguma	Black gram	PU 31
195	Chandra Kala Naik	Kuhuriguma	Black gram	PU 31
196	Mani Harijan	Kuhuriguma	Black gram	PU 31
197	Bana Chhatria	Kuhuriguma	Black gram	PU 31
198	Rupchan Bhatra	Kuhuriguma	Black gram	PU 31
199	Chandra Mani Bhatra	Kuhuriguma	Black gram	PU 31
200	Phulchan Naik	Kuhuriguma	Black gram	PU 31
201	Sanyasi Majhi	Kuhuriguma	Black gram	PU 31
202	Laxman Majhi	Kuhuriguma	Black gram	PU 31
203	Pulasti Majhi	Kuhuriguma	Black gram	PU 31

S No	Farmer's name	Village	Crop	Variety
204	Saidhar Dandasena	Kuhuriguma	Black gram	PU 31
205	Kesab Chandra Naik	Kuhuriguma	Black gram	PU 31
206	Bhujbal Naik	Kuhuriguma	Black gram	PU 31
207	Ranjit Rout	Kuhuriguma	Black gram	PU 31
208	Sunadhar Pradhani	Kuhuriguma	Black gram	PU 31
209	Akshya Naik	Kuhuriguma	Black gram	PU 31
210	Ghenu Naik	Kuhuriguma	Black gram	PU 31
211	Sriram Naik	Kuhuriguma	Black gram	PU 31
212	Phulkumar Harijan	Kuhuriguma	Black gram	PU 31
213	Sambhuswar Harijan	Kuhuriguma	Black gram	PU 31
214	Manjit Rout	Kuhuriguma	Black gram	PU 31
215	Rupchan Naik	Kuhuriguma	Black gram	PU 31
216	Jujhesti Harijan	Kuhuriguma	Black gram	PU 31
217	Sontosh Sahu	Mukhiguda	Black gram	PU 31
218	Tike Patel	Mukhiguda	Black gram	PU 31
219	Mana Barik	Mukhiguda	Black gram	PU 31
220	Bheshkana Majhi	Mukhiguda	Black gram	PU 31
221	Parsuram Asahu	Mukhiguda	Black gram	PU 31
222	Jalandhar Majhi	Mukhiguda	Black gram	PU 31
223	Dalimbar Majhi	Mukhiguda	Black gram	PU 31
224	Tusara Mishra	Mukhiguda	Black gram	PU 31
225	Sarat Panigrahi	Mukhiguda	Black gram	PU 31
226	Chatur Suna	Mukhiguda	Black gram	PU 31

Annexure 3. Details of farmers who were provided vegetable seeds to set up kitchen gardens during 2019-20.

S No	Farmer's name	Village	Caste	Mobile Number
1	Janki Patel	Mukhiguda	OBC	9348519015
2	Josoda Patel	Mukhiguda	OBC	9348860080
3	Kanak Patel	Mukhiguda	OBC	
4	Malaya Patel	Mukhiguda	OBC	
5	Anupama Bhitiria	Mukhiguda	OBC	
6	Kuntala Barik	Mukhiguda	OBC	9178853261
7	Dalimba Patel	Mukhiguda	OBC	9938732809
8	Kasturi Parida	Mukhiguda	GEN	8658526541
9	Dhanmati Majhi	Mukhiguda	ST	
10	Santilata Majhi	Mukhiguda	ST	6370400328
11	Padma Patel	Mukhiguda	OBC	9861433082
12	Hiramani Sahu	Mukhiguda	OBC	8599808431
13	Sumitra Patra	Mukhiguda	OBC	
14	Josobanti Naik	Mukhiguda	OBC	
15	Tapasi Mishra	Mukhiguda	GEN	9437939371
16	Gugun Mahalik	Mukhiguda	OBC	8658920215
17	Dei Mahalik	Mukhiguda	OBC	
18	Pramila Chinda	Mukhiguda	OBC	9938448054
19	Maina Dangada Majhi	Mukhiguda	OBC	9178911261
20	Dalimba Gahir	Mukhiguda	OBC	
21	Sibarari Harijan	Pipalguda	SC	9567502983
22	Gitanjli Harijan	Pipalguda	SC	6371543801
23	Nila Harijan	Pipalguda	SC	9178055234
24	Josoda Chhatria	Pipalguda	OBC	8118024995
25	Subhadra Harijan	Pipalguda	SC	7994897182
26	Sundrika Harijan	Pipalguda	SC	8457035289
27	Gunu Gurga	Pipalguda	SC	7684033226
28	Santi Patra	Pipalguda	OBC	8763892217
29	Hema Harijan	Pipalguda	SC	9668671231
30	Dhana Harijan	Pipalguda	SC	9937779045
31	Gouri Naik	Pipalguda	OBC	6371964061
32	Damena Naik	Pipalguda	OBC	9078188139
33	Janki Naik	Pipalguda	OBC	9178775653
34	Shobha Rana	Pipalguda	ST	
35	Bhagbat Naik	Pipalguda	OBC	9178910479
36	Dhabalu Naik	Pipalguda	OBC	
37	Hema Naik	Pipalguda	OBC	7608054229
38	Monalisha Naik	Pipalguda	OBC	9348690749
39	Nilendri Naik	Pipalguda	OBC	9938323266

S No	Farmer's name	Village	Caste	Mobile Number
40	Sujala Sil	Pipalguda	ST	8018956338
41	Parbati Majhi	Gandaguda	ST	
42	Sapura Majhi	Gandaguda	ST	
43	Jayanti Majhi	Gandaguda	ST	7894244312
44	Sebati Majhi	Gandaguda	ST	8658926127
45	Jayanti Sahu	Gandaguda	ST	8249590593
46	Dasmi Majhi	Gandaguda	ST	9777942280
47	Gouri Majhi	Gandaguda	ST	7894096653
48	Pramila Majhi	Gandaguda	ST	7749875300
49	Padma Majhi	Gandaguda	ST	9938549753
50	Sushila Majhi	Gandaguda	ST	9556920184
51	Dutika Majhi	Gandaguda	ST	8658107304
52	Bhabani Majhi	Gandaguda	ST	8018812295
53	Astimi Mahi	Gandaguda	ST	9556027337
54	Hira Majhi	Gandaguda	ST	7735579587
55	Urmila Majhi	Gandaguda	ST	
56	Mathura Majhi	Gandaguda	ST	
57	Bilash Majhi	Gandaguda	ST	
58	Santula Majhi	Gandaguda	ST	7608097708
59	Manjula Majhi	Gandaguda	ST	9381119059
60	Trilochan Majhi	Gandaguda	ST	
61	Subhakar Patel	Kotpadi	ST	
62	Rama Patel	Kotpadi	ST	
63	Dharam Dishari	Kotpadi	ST	9937500863
64	Yubraj Singh	Kotpadi	OBC	
65	Baiba Dishari	Kotpadi	ST	
66	Pitambar Patel	Kotpadi	ST	
67	Madhab Patel	Kotpadi	ST	
68	Hiran Dishari	Kotpadi	ST	8117940097
69	Chyoban Patel	Kotpadi	ST	
70	Pinku Patel	Kotpadi	ST	
71	Biswanath Naik	Kotpadi	OBC	
72	Gopinath Naik	Kotpadi	OBC	
73	Mooj Kumar Dishari	Kotpadi	ST	9178203840
74	Baibasut Dishari	Kotpadi	ST	7077378871
75	Mahendra Rout	Kotpadi	OBC	8118017563
76	Makunda Majhi	Kotpadi	ST	
77	Chandra Dishari	Kotpadi	ST	
78	Kartik Dishari	Kotpadi	ST	7606862881
79	Abhimanyu Majhi	Kotpadi	ST	
80	Laxmikant Panigiri	Kotpadi	OBC	

S No	Farmer's name	Village	Caste	Mobile Number
81	Dropati Pujhri	Karanjiguda	OBC	9777351889
82	Lalita Pujhai	Karanjiguda	OBC	
83	Jaimani Naik	Karanjiguda	OBC	
84	Olek Panigiri	Karanjiguda	ST	
85	Matiram Panigiri	Karanjiguda	ST	
86	Nabina Naik	Karanjiguda	OBC	7326079448
87	Gomati Naik	Karanjiguda	OBC	
88	Purnima Pujhari	Karanjiguda	OBC	
89	Pitabash Pujhari	Karanjiguda	OBC	
90	Sashi Pujhari	Karanjiguda	OBC	
91	Srimati Pujari	Karanjiguda	OBC	6372588091
92	Sabitri Pujhari	Karanjiguda	OBC	6372556237
93	Pabitra Naik	Karanjiguda	OBC	
94	Bhagat Ram Sahu	Karanjiguda	OBC	
95	Abhi Patra	Karanjiguda	OBC	
96	Chandarma Patra	Karanjiguda	OBC	
97	Himadri Panigiri	Karanjiguda	OBC	6372556237
98	Purnima Naik	Karanjiguda	OBC	
99	Dhane Patra	Karanjiguda	OBC	
100	Syama Majhi	Karanjiguda	ST	
101	Kousalya Naik	Patiguda	OBC	
102	Kousalya Mund	Patiguda	OBC	
103	Sapura Majhi	Patiguda	OBC	
104	Bimala Singh	Patiguda	GEN	
105	Prabhathi Biswal	Patiguda	OBC	
106	Kasturi Dalei	Patiguda	OBC	
107	Manjuri Rout	Patiguda	OBC	8895916157
108	Dukhi Bishi	Patiguda	OBC	
109	Padma Bshes Ray	Patiguda	OBC	
110	Jayanti Bishi	Patiguda	OBC	8658370741
111	Hatur Majhi	Patiguda	OBC	
112	Hira Singh	Patiguda	OBC	
113	Nirmala Beheruk	Patiguda	OBC	
114	Bhim Pujhari	Patiguda	OBC	
115	Kumari Rout	Patiguda	OBC	
116	Uma Rout	Patiguda	OBC	
117	Makran Pujhari	Patiguda	OBC	
118	Dahamani Rout	Patiguda	OBC	
119	Mathura Bishi	Patiguda	OBC	
120	Kousalya Bishi	Patiguda	OBC	
121	Ahalya Rout	Ranibahl	OBC	

S No	Farmer's name	Village	Caste	Mobile Number
122	Kamalini Rout	Ranibahl	OBC	
123	Sebati Sahu	Ranibahl	OBC	9178960790
124	Bela Sahu	Ranibahal	OBC	
125	Teba Rout	Ranibahal	OBC	
126	Rajani Majhi	Ranibahal	ST	
127	Dalimb Pujhari	Ranibahal	ST	
128	Premalata Sabar	Ranibahal	ST	6371367064
129	Promodini Sabar	Ranibahal	ST	8658909409
130	Sontosi Naik	Ranibahal	ST	
131	Saraswati Naik	Ranibahal	ST	9556432570
132	Kunti Rout	Ranibahal	OBC	
133	Sukanti Rout	Ranibahal	OBC	
134	Harabati Rout	Ranibahal	OBC	
135	Bela Rout	Ranibahal	OBC	
136	Jayanti Majhi	Ranibahal	ST	
137	Sebati Sahu	Ranibahal	OBC	
138	Nilendra Majhi	Ranibahal	ST	7894719444
139	Kousalya Majhi	Ranibahal	ST	9556440814
140	Dhanmati Majhi	Ranibahal	ST	7077645922
141	Dutika Majhi	Kuhuriguma	ST	
142	Sushama Majhi	Kuhuriguma	ST	
143	Baidi Naik	Kuhuriguma	ST	
144	Surekha Naik	Kuhuriguma	ST	9178216206
145	Subhadra Naik	Kuhuriguma	ST	
146	Mukta Jhodia	Kuhuriguma	ST	
147	Phultola Harijan	Kuhuriguma	SC	
148	Champa Majhi	Kuhuriguma	ST	
149	Jamuna Naik	Kuhuriguma	ST	
150	Yamuna Naik	Kuhuriguma	ST	7681866795
151	Paduka Naik	Kuhuriguma	ST	
152	Sankara Naik	Kuhuriguma	ST	
153	Ulasha Naik	Kuhuriguma	ST	
154	Sumitra Naik	Kuhuriguma	ST	
155	Tikemani Rout	Kuhuriguma	OBC	
156	Mathura Rout	Kuhuriguma	OBC	
157	Debaki Dandsena	Kuhuriguma	OBC	
158	Parbati Harijan	Kuhuriguma	SC	
159	Jyotiprabha Naik	Kuhuriguma	OBC	
160	Batita Bhatra	Kuhuriguma	ST	
161	Maina Naik	Mundraguda	OBC	7326818712
162	Laxmi Naik	Mundraguda	OBC	9178144387

S No	Farmer's name	Village	Caste	Mobile Number
163	Laxmi Naik	Mundraguda	OBC	7684842048
164	Kasturi Naik	Mundraguda	OBC	
165	Dasami Naik	Mundraguda	OBC	
166	Parthabi Naik	Mundraguda	OBC	
167	Gajmati Naik	Mundraguda	OBC	
168	Jamuna Durga	Mundraguda	SC	
169	Gayatri Naik	Mundraguda	OBC	
170	Ratna Naik	Mundraguda	OBC	
171	Ketki Naik	Mundraguda	OBC	8018827601
172	Nisha Mani Harijan	Mundraguda	SC	
173	Sumitra Naik	Mundraguda	OBC	
174	Hema Harijan	Mundraguda	SC	
175	Hemanti Naik	Mundraguda	OBC	
176	Putni Naik	Mundraguda	OBC	
177	Pmnchami Naik	Mundraguda	OBC	
178	Kumudini Naik	Mundraguda	OBC	
179	Laxmi Naik	Mundraguda	OBC	
180	Gomati Naik	Mundraguda	OBC	

We believe all **people** have a **right** to **nutritious food** and a **better livelihood**.

ICRISAT works in agricultural research for development across the drylands of Africa and Asia, making farming profitable for smallholder farmers while reducing malnutrition and environmental degradation.

We work across the entire value chain from developing new varieties to agri-business and linking farmers to markets.

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