ENHANCING CHICKPEA PRODUCTION IN RAINFED RICE FALLOW LANDS (RRFL) OF CHHATTISGARH AND MADHYA PRADESH STATES OF INDIA FOLLOWING IMPROVED PULSE PRODUCTION AND PROTECTION TECHNOLOGIES (IPPPT)

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Enhancing chickpea production in Rainfed Rice Fallow Lands (RRFL) of Chhattisgarh (CG) and Madhya Pradesh (MP) states of India following Improved Pulse Production and Protection Technologies (IPPPT)

Submitted by:

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, CG; and Jawharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, MP, a collaborative work on "Enhancing chickpea production in rainfed rice fallow lands (RRFL) of Chhattisgarh and Madhya Pradesh states of India following Improved Pulse Production and Protection Technologies (IPPPT)".

Annual Progress Report
2009 –2010

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Contents **Page**

1. Executive Summary: Activities 2009-10

Introduction:

- The overall objective of the project is "Harnessing Improved Pulse Production and Protection Technology (IPPPT) in the Rainfed Rice Fallow Lands (RRFL) of Chattisgarh (CG) and Madhya Pradesh (MP)". In this project, chickpea was identified as a candidate pulse. It was further expanded in the collaboration with JNKVV and IGAU in farmer's field in the RRFL of CG and MP using IPPPT, as per the agreed work plan for 2009-2010.
- The RRFL of CG and MP, suitable for chickpea cultivation after rice, have black soils. These soils are broadly classified as vertic-inceptisols (shallow sandy loam) and deep vertisols (top layer consisting of 33% clay and at least 60 cm depth). Therefore the selection of sites for the project and farmers are restricted to vertisols.
- Rainfed vertic-inceptisols types of shallow soils are not suitable for double cropping with chickpea or any other crop without backup of substantial irrigation.

Soil Analysis:

- Following the standard protocol, 82 representative soil samples were collected from the pilot villages/districts of CG and MP. The soils were found deficient in available sulphur (except those from Satna and Rewa), Boron and Zinc, irrespective of villages and districts. The available iron content was normal to medium.

Base Line Data:

- Developed a detailed proforma in collaboration with the socio-economist to identify the constraints and opportunities of introducing chickpea. Base line data sets were collected on village profile, group profile and individual profile for both IPPPT-practicing and non-IPPPT-practicing farmers of the pilot villages and districts. Preliminary analysis indicated that RRFL offers ample opportunites for the cultivation of chickpea. However, non-availability of seeds of improved varieties and production technologies, crop protection awareness, assured price and market, and uncertainties of weather and diseases are the major constraints for large-scale cultivation and expansion of chickpea.

Selection of Sites and Farmers

- A total of 1196 farmers in 76 villages in four target districts in CG (Raipur, Durg, Kabirdham and Rajnandgaon) and MP (Jabalpur, Rewa, Damoh and Satna) were selected randomly during the 2009-10 season. Attempts were made to establish on-farm project activities in a cluster by forming groups of farmers in each village in a district.

On-Farm Activities:

- To achieve the milestones under each objective, three farmers' participatory activities: -- 1) Farmers Participatory Varietal Selection (PVS), 2) Improved Pulse Production and Protection technology (IPPPT) and 3) Village Level Seed System (VLSS) demonstration were conducted in the targeted villages.
- Site specific components of IPPPT such as seeds of improved chickpea cultivars, seed treatment with fungicides (Thiram, Bavistin) and Rhizobium, fertilizer application, line sowing following locally available seed-cum-fertilizer drill and or local adopted methods for chickpea, were used in establishing the trials.

PVS: The eight (JG 14, JG11, ICCC 37, JGK2, JG322, Vaibhav, JG 74 and Vijay) chickpea varieties evaluated in PVS trials in **six** farmers fields in RRFL without supplementary irrigation in CG and grain yield ~ 1.0 t ha^{-1} was recorded. In MP eight

chickpea varieties (JG 11, JG 16, JG 14, JG 74, JG 130, JAKI 9218, JG63, JGK 2) were tested in 5 PVS trials with supplementary irrigation. Grain yields ranged from 0.83 to 3 t ha^{-1}. The mean yield (1.93 t ha^{-1}) chickpea variety JG 16 was the highest yielder across locations in MP.

IPPPT: A Total of 1142, IPPPT on-farm demonstrations were successfully conducted and harvested (≥ 98%) in CG (421) and MP (721) for seed yield and individual household seed systems. Mean yield of chickpea cultivar Vaibhav was 0.81 t ha^{-1} in CG. Among the four improved varieties evaluated in IPPPT in MP; JG 16 gave grain yield of 2.37 t ha^{-1}. The mean grain yield across chickpea varieties and location was ≥ 1.5 t ha^{-1}.

VLSS: A total of 43 VLSS seed multiplication demonstrations were conducted and harvested [CG (34) and MP (9)] and about 30 t of seeds of farmers preferred varieties [JG 16 (10.0 t), JG 130 (9.0 t) and Vaibhav (15.6 t)] were obtained. In addition to seeds stored from VLSS, 27.30 tons of seeds of Vaibhav are stored by farmers in CG from IPPPT demonstrations. In comparison to CG, MP farmers stored a total of 83.60 tons seeds of four improved varieties [JG16 (40.35 t), JG 74 (13.6t), JG 130 (27.58t) and JAKI 9218 (2.03t)]. Approximately 101.41 tons of improved variety chickpea seeds are produced in the pilot villages.

Economics: The IPPPT package was highly profitable and cost effective. Percent gain by using IPPPT was up to 400% in CG and 104% in MP over local farmer practices. The benefit-cost ratio of chickpea production using IPPPT was approxmately 1: 2.93.

Capacity Building:

- IPPPT orientation training was imparted to 2355 farmers (CG = 1155, MP=1200) in the target villages during the crop season to educate farmers on major production constraints and their management practices.
- A two-day orientation program for eight research associates (four each from CG and MP) posted under NFSM–pulses in RRFL, was organized at ICRISAT and information/training on base line data collection, soil sample collection and effective deployment of IPPPT components was provided.
- A total of 55 farmers from CG and MP and eight research associates from target villages/districts participated in a two-day farmers' exposure visit to ICRISAT. They saw disease and insect–pest management technologies, and their timely application for cost effective control of pests. They also got acquainted with the ongoing research on the IPPPT components, for example, rhizobium inoculations, HPR for pod borers, wilt, dry root rot, HNPV production, and on pure seed production and storage at household level.

Backstop Resarch: Dry root rot (DRR) and collar rot (CR) emerged as the potential threat to wilt resistant high yielding chickpea cultivars promoted through IPPPT in the RRFL. Ongoing R&D suggested that moisture holding capacity of 60% and soil temperature of 35^0 C are the predisposing factors for DRR. A search to identify resistance to these diseases is in progress. There is a need to enhance research on these two diseases.

2. Introduction

Chickpea can be grown profitably on residual moisture in medium–heavy vertisols (top layer~33% clay and at least 60 cm depth) in RRFL with light irrigation either at crop establishment and/or at flowering. Selection of RRFL with minimum irrigation is in line with central and state government supported initiatives to bring RRFL into double cropping by cultivating chickpea as a profitable second crop. There is a scope for expanding chickpea production in over 500,000 ha with limited irrigation in RRFL in the states of CG and MP.

Farmers in the states of CG and MP are interested in cultivation of improved high yielding chickpea varieties with IPPPT. However, minimal irrigation is a prerequisite to recharge RRFL and utilize the residual moisture for chickpea establishment and sustainable production. Therefore the project partners (JNKVV, IGKV and ICRISAT) focused on promoting IPPPT (including high yielding short to medium duration wilt resistant/tolerant chickpea varieties as the major component of IPPPT) in partnership with farmers in the RRFL of CG and MP. The chickpea sowing period and crop establishment in RRFL depends upon the termination of monsoons and harvesting of rainy season crops. Normally rains continue up to the end of September and chickpea can be sown in the following three situations.

- **Un-irrigated early sown: 3rd week of September to 2nd week of October**
- **Un-irrigated / partially irrigated timely sown: 4th week of October- 2nd week of November**
- **Irrigated late sown: Up to 1st week of December**

3. Goal and Objectives

Goal

The goal of this project is "self sufficiency in pulse production through increased productivity by expanding improved pulse production and protection technologies, and establishing a village level seed system in the rainfed rice fallow lands in India".

Objectives

1. To enhance capacity at field level for farmer-participatory research and extension (FPRE) by adoption and expansion of improved chickpea production and protection technologies in rainfed rice fallow lands.
2. To multiply and distribute farmer-preferred chickpea varieties along with IPPPT (including IDM, IPM and INM) for sustainable intensification of RRFL cropping systems.
3. To empower farmers and participating local institutions, on FPRE/IPPPT to establish village-based seed system(s) towards achieving self-sufficiency in seeds of farmer-preferred, improved varieties of chickpea at the village level.
4. To provide research backstopping for further improvement of chickpea varieties for traits and IPPPT components preferred by the farmers and traders in the target area.

4. Work Plan: Activity and Time Line

Annual review (2008-09) and planning (2009-10) meetings were conducted at ICRISAT for two days (8-9 Sep 2009). The work done during 2008-09 was presented by the Project coordinator, Principal investigators and Research Associates of the target districts of Chhattisgarh (CG) and Madhya Pradesh (MP). The technical program for the year 2009-10 was discussed by project partners from ICRISAT, IGKV, Raipur and JNKVV, Jabalpur, together taking into consideration remarks and suggestions from NFSM representatives. The time line followed to accomplish the agreed activities in the 2009-10 work plan (Annexure I) is given in Table 1.

Table1. Time line for the NFSM-IPPPT chickpea, RRFL 2009-10 season

Period	Activity
Planning	
April-Aug	• Data collection, and analysis of on-farm and on-station activities 2008-09 • Report writing : 2008-09 activities
Sept-Oct	• Annual review (2008-09) and work-plan (2009-10)development • Identification of seed-fertilizer drills, and deploying to targeted village • Research associates orientation and training at ICRISAT • Selection of sites and villages • Selection of farmers and introduction of the project and its objectives • Base-line data on constraints and opportunities of chickpea cultivation in RRFL • Soil sampling and analysis for micronutrient deficiency and other nutrients
Execution and Monitoring	
Oct -Nov	• Procurement of seeds of improved varieties of chickpea and distribution • Village level farmers' orientation in PVS, IPPPT, and VLSS demonstrations • Crop establishment with or without irrigation and seed cum fertilizer drill • Implementation of critical inputs (micronutrients/pesticides/pheromone traps)
Nov-Dec	• Crop monitoring, diagnosis of biotic/abiotic constraints and training to farmers • Trial-run of fertilizer- seed drill at JNKVV • On-farm hands on training on IPM/IDM at village level • Installation of pheromone traps
Jan-Feb	• Crop monitoring and hands on training to farmers • Plant protection for pod-borer management using insecticides/HNPV etc • Kisan mela at village and university level • Farmer's visit and training on IPPPT components at ICRISAT
Data Collection, Analysis, Report Writing; Annual Review: 2009-10 and Planning: 2010-11	
Mar-April	• Training of farmers in seed storage at household and village level • Crop harvesting and final data collection • Farmers perception on PVS, IPPPT, and VLSS components and demonstrations • Feedback and lessons learned
May-June	• Data analysis and report writing
July-Aug	• Review and Planning meeting 2010 -11
April-cont.	• Back stop research at ICRISAT on dry root rot and collar rot diseases

5. Activities and Progress Report: 2009-10

5.1. Research Associates Orientation

A two-day orientation program for the Research Associates posted under the NFSM- Pulses project in the states of CG and MP on establishing and enhancing chickpea production in RRFL was conducted on 8 and 9 October 2009 at ICRISAT-Patancheru. The orientation program focused on different components such as farmer's participatory varietal selection (PVS), demonstration of improved pulse (chickpea) production and protection technologies (IPPPT), village level seed system (VLSS) and farmers' empowerment (capacity building). The important components of the project and methodology to achieve the outputs were streamlined. Emphasis was given on the commitment and collection of both qualitative and quantitative data sets from the various activities agreed for the work plan of 2009-10 crop seasons. Further emphasis was laid on the use of information generated in this pilot project in further enhancing the chickpea production in the RRFL environment.

5.2. Selection of Sites and Farmers

The procedure for selecting sites and farmers in the targeted districts for the 2009-10 postrainy season was exactly same as in previous seasons. Meetings were held with farmers and participatory rural appraisals (PRA) were conducted in each selected village. Objectives and activities of the on-farm research for development and rapid dissemination of IPPPT components and their timely application were explained to farmers. Perception of chickpea production, profitability, constraints and their affordable remedies were discussed with farmers. It was emphasized that the farmers are integral partners in this project to find solutions for sustainable chickpea production. Finally, farmers' participation was solicited on a voluntary basis.

A total of 470 farmers from four districts [Raipur, Durg, Rajnandgaon, Kabirdham] in CG and 749 farmers were selected from four districts [Jabalpur, Rewa, Satna, Damoh] in MP for IPPPT, PVS and VLSS on-farm trials during the 2009-10 postrainy season. (Table 2)

Table 2: Number of farmers selected to conduct PVS, IPPPT and VLSS trials in CG and MP, in the 2009-10 season.

		Farmer No			
State		**PVS**	**IPPPT**	**VLSS**	**Total**
Chhattisgarh	Sown No.*	6	430	34	470
	Harvested No.	6	421	34	461
	Success (%)	100	97.91	100	**98.08**
Madhya Pradesh	Sown No.	8	732	9	749
	Harvested No.	5	721	9	735
	Success (%)	62.5*	98.5	100	**98.13**
Total CG&MP	Sown No.	14	1162	43	1219
	Harvested No.	11	1142	43	1196
	Success (%)	78.57	98.28	100	**98.11**

*No of sown trials = Number of farmers selected.

* Three PVS trials failed in MP (Matha: Satna, Urduwa: Jabalpur, Surkhi-Umaria: Damoh) due to rains after sowing.

5.3. Base Line Data: Opportunities, Constraints and Solutions

Following the procedures discussed with the socio-economist, four sets of Proforma [1. Village profile, 2. Group-Profile, 3. Individual Farmer Profile, and 4. Non-Participating Farmers Profile] were developed to collect the base line data and identify the opportunities, constraints and solutions for introducing and scoping chickpea production and productivity in the target project districts of CG and MP. A consultant is hired to assist in analysis base line data collection. Data analysis and detailed report writing is in progress. However, the preliminary perusal of the data sets so collected identified opportunities, constraints, and possible solutions as follows:

Opportunities

- The Government of India is committed to introduce 'Food Security Act (FSA)' in the near future and the success of FSA will depend on augmentation of agricultural production by raising agricultural productivity and/ or cropping intensities of mono-cropped, rainfed and marginal lands apart from other measures.
- Pulses complement cereals in both production and consumption. They also improve soil fertility; require less water in comparison to cereals and controls diseases and pests in rotation with cereals. Besides, pulses are relatively cheaper sources of protein.
- Despite their importance, the per capita availability of pulses has reduced significantly (from about 60 gm/day in 1950-51 to 32.6 gm/day in 2006).
- RRFL offers an enormous scope for pulse production and chickpea, because of its low water rerquirement, is the most suitable second crop.
- The analysis of data reveals that chickpea production in RRFL of MP and CG has opened several new avenues to the farmers in terms of increased farm income and employment

    - About 82 percent of farmers reported a persistent increase in area of chickpea under rice fallow
    - Because of cultivation of chickpea after rice. farmers could obtain an average additional income of Rs 9300 ha^{-1}
    - Chickpea introduced through IPPPT generated on an average an additional employment of about 48 man days ha^{-1}
    - About 47 percent farmers perceived positive impact of chickpea cultivation on soil fertility in terms of increased yield of paddy.

Constraints

It is clear from the responses of farmers that a number of biotic, abiotic and socio-economic constraints are imposing serious impediments in production and intensification of chickpea in the states of MP and CG. Some of the important constraints are:

Abiotic constraints

- Cultivation of long duration rice varieties: About 87 percent of farmers perceived cultivation of long duration rice as one of the limiting factors in timely sowing and profitable production of chickpea after rice, as this spares a shorter period for chickpea establishment and pod filling.

- Terminal drought: About one-third of the farmers reported terminal drought as a serious problem.
- Hardiness of soils: Hard vertisol interferes with germination of chickpea by forming a hard crust on the surface causing a poor crop stand.
- Low moisture holding capacity of several location specific soils.
- Development of soil cracks facilitates escape of available soil moisture.
- Soil salinity: location specifisc problem that needs immediate solutions.
- Smaller land holdings discourage individual smallholders from cultivating chickpea.

Biotic constraints

- High incidence of pod borer
- Occurrences of diseases such as
    - Dry rot (ranked first among diseases by nearly 59 percent farmers)
    - Collar rot
    - Fusarium wilt
- Stray animals graze in chickpea fields and destroy the standing crops

Socio-economic constraints

- Lack of capital/credit to buy improved seeds, tools and implements
- Non-availability of short duration chickpea varieties at village and individual farmers level to plant immediately after the harvest of long duration rice crop
- Unavailability of desired chickpea seeds in required quantity as and when required
- Lack of information on:

    - Moisture conservation practices
    - Improved varieties
    - Cultivation practices
    - Insect-pest control
    - Disease control
    - Demand and pricing

- Inefficient markets and poor seed delivery systems – The majority of sales and purchases take place in unorganized informal markets, which are unable to safeguard the interests of small and marginal producers who lack sufficient bargaining power due to their generation of low marketable surplus. Private dealers dominate the seed/input market and there is no guarantee of quality and authenticity of the inputs such as of seed, rhizobium and pesticides
- Instability of pulse prices
- High price of improved seeds

Solutions:

- Increase R&D endeavour to develop short duration cultivars with resistance against dry rot, pod borer and terminal drought
- Advocate location specific short duration rice – short duration chickpea
- Strengthen formal seed markets and value chain to safeguard interests of farmers
- Advocate chickpea as a part of the farming system
- Develop cost-effective insect pest/ disease management technologies
- Provide for dissemination of relevant information on different aspects of crop production and protection, and soil and water conservation, markets and prices

- Develop sufficient regulatory and policy mechanisms to regulate role of private sector in seed and input marketing and delivery
- Provide easy institutional credit
- Enhance easy access to seed
- Develop a better seed multiplication and distribution system: Private sector, NGOs, SHGs/ Farmers organizations and government organizations can play a vital role in this area. It is imperative that these are encouraged to come forward in this direction and be supportive with adequate financial, technical and other resources. In this context there is need to strengthen the house holdlevel seed multiplication, processing and storage practices.

5.4. Soil Sampling and Analysis

Following the standard procedures, soon after the harvest of rainfed rice crop, 82 soil samples were collected from the targeted farmers/villages/districts of MP and CG. Out of 82 samples, 39 representative soil samples were collected from 4 districts of CG, [Raipur (10), Rajnandgaon (10), Kabirdham (10) and Durg (9)] and 43 soil samples from 4 districts of MP [Jabalpur (13), Damoh (10), Satna (10) and Rewa (10)]. All 82 soil samples were analyzed at the soil analytical laboratory, at ICRISAT.

Soil chemical analysis results (Chhattisgarh: Table 3a and Madhya Pradesh: Table 3b) were compared by the soil critical limits Jackson (1967) guidelines and as followed by ICRISAT (**Annexure II**). A critical perusal of soil analysis results suggested that the soils of these districts belong to Vertisols, pH is marginally acidic to normal, salinity as measured by electrical conductivity (ds/m) is normal, organic carbon is medium to high except in district Satna and a few locations in MP, where it is lower than the critical limits. Available phosphorus (P) is low-medium at several locations in CG and MP, and much lower than critical limits in Satna (MP). Available potassium (K) and iron (Fe) are high in the majority of locations except in Satna, where K is found deficient. The available sulphur (S), boron (B), and zinc (Zn) are much lower than critical limits of these elements in all locations in CG. Similarly, except Rewa and Satna S, B and Zn are far below the critical limits needed for healthy and productive crop cultivation. The soil analysis results are summarized as follows:

- RRFL soils are deficient in S, B and Zn.
- Soils of majority of farmers are deficient in organic matter
- There is a need for thorough soil testing of more soil samples from RRFL
- There is a need for soil analysis based fertilizer/micronutrient management for enhancing profitability of chickpea production.

Table 3a. Soil chemical analysis of the representative samples collected soon after rice harvest from Chhattisgarh during the 2009-10 season.

Sno	Sample#	District/village	pH	EC	Avail-S	Avail-B	Avail-Zn	Avail-Fe	Exch-K	Ols-P	% org-C
	Raipur (CG)			dS/m	ppm	ppm	ppm	ppm	ppm	ppm	
1	SP 44	Kumhari	6.2	0.12	3.1	0.42	0.44	85.6	206	17.2	1.27
2	SP 45	Khaprideehkhurd	8.0	0.19	6.2	0.36	0.52	18.64	173	8.4	0.77
3	SP 46	Khaprideehkhurd	7.9	0.2	5.6	0.3	0.32	27.36	217	2.5	0.67
4	SP 47	Kumhari	7.2	0.19	6.9	0.46	0.96	41.62	269	16.7	1.08
5	SP 48	Kumhari	6.5	0.19	4.6	0.38	0.52	68.8	156	17.2	1.04
6	SP 49	Khaprideehkhurd	5.9	0.1	4.8	0.24	0.6	102	185	3.4	0.71
7	SP 50	Kumhari	7.8	0.16	3.4	0.3	0.56	22.82	229	3.4	0.87
8	SP 51	Khaprideehkhurd	7.8	0.22	9.7	0.42	0.48	44.94	144	2.7	0.88
9	SP 52	Khaprideehkhurd	6.2	0.11	6.0	0.2	1.04	103.4	152	9.2	0.6
10	SP 53	Kumhari	7.5	0.13	3.4	0.32	0.74	39.42	176	5.7	0.85
	Kabirdham (CG)										
11	SP 54	Silli	6.1	0.1	7.2	0.44	1.39	116.5	362	21.8	1.12
12	SP 55	Dullapur	7.1	0.14	4.1	0.22	0.84	44.76	283	7.0	0.87
13	SP 56	Dullapur	7.3	0.24	4.3	0.36	0.9	54.32	518	16.7	1.04
14	SP 57	Amera	7.0	0.27	4.6	0.32	1.08	53.6	188	27.7	0.96
15	SP 58	Boda	6.3	0.09	6.1	0.2	0.44	31.98	153	1.5	0.68
16	SP 59	Baijaalpur	7.6	0.13	3.1	0.4	0.88	42.28	416	24.6	1.05
17	SP 60	Baijaalpur	6.5	0.21	13.8	0.26	0.82	102	191	15.5	0.77
18	SP 61	Dullapur	7.0	0.12	5.4	0.36	0.76	43.92	338	20.0	0.89
19	SP 69	Silli	6.8	0.13	3.2	0.32	1.11	113.39	236	19.0	1.04
20	SP 74	Tarsingh	6.3	0.16	8.8	0.36	0.64	57.16	438	5.4	0.88
	Durg (CG)										
21	SP 62	Semariya	7.8	0.22	6.3	0.74	0.82	37.52	225	15.8	0.71
22	SP 63	Dhour	7.9	0.13	3.5	0.5	0.38	19.88	191	8.3	0.67
23	SP 64	Mohandi	7.8	0.12	2.7	0.26	0.32	12.22	208	6.6	0.5
24	SP 65	Dhour	8.1	0.2	2.3	0.56	0.54	17.76	196	15.5	0.72
25	SP 66	Mohandi	8.0	0.17	3.0	0.28	0.34	10.96	206	6.3	0.54
26	SP 67	Mohandi	8.1	0.16	3.4	0.36	0.46	18.14	201	2.8	0.75
27	SP 68	Mohandi	7.8	0.2	5.1	0.3	1.28	35.98	154	8.3	1.07
28	SP 72	Mundpar	8.1	0.23	3.8	0.36	0.42	16.12	246	12.1	0.65
29	SP 80	Mundpar	8.1	0.19	2.7	0.42	0.46	16.58	262	11.8	0.53
	Rajnanadgaon (CG)										
30	SP 70	Nathunawagaon	7.8	0.14	4.8	0.56	0.44	46.64	141	9.2	0.7
31	SP 71	Kohka	7.9	0.19	2.1	0.36	0.46	16.64	206	6.3	0.78
32	SP 73	Kohka	7.9	0.13	2.0	0.32	0.24	18.94	173	2.1	0.56
33	SP 75	Kumhalori	6.1	0.07	4.9	0.44	1.42	117.15	105	14.7	0.97
34	SP 76	Kumhalori	6.7	0.14	9.0	0.48	1.97	116.9	149	33.7	1.08
35	SP 77	Kumhalori	7.7	0.12	5.6	0.28	0.6	27.24	146	6.0	0.59
36	SP 78	Bharregaon	7.6	0.25	17.1	0.74	3.06	78.44	193	23.7	0.88
37	SP 79	Bharregaon	7.6	0.17	8.9	0.6	0.52	68.04	223	8.0	0.73
38	SP 81	Bharregaon	7.9	0.27	12.4	0.38	0.48	64.6	126	7.6	0.75
39	SP 82	Dhamansari	8.0	0.22	5.5	0.44	0.44	31.3	161	6.3	0.55

: Low : Medium/Normal : High

Table 3b. Soil chemical analysis of the representative samples collected soon after rice harvest from Madhya Pradesh during the 2009-10 season.

Sno	Sample#	District/village	pH	EC	Avail-S	Avail-B	Avail-Zn	Avail-Fe	Exch-K	Ols-P	% org-C
	Damoh (MP)			dS/m	ppm	ppm	ppm	ppm	ppm	ppm	
40	SP 1	Aanu	7.4	0.35	13.8	0.58	1.62	30.18	269	16.3	1.17
41	SP 2	Hindoria	6.9	0.11	5.0	0.32	0.58	39.9	181	6.6	0.93
42	SP 3	Aanu	7.7	0.15	2.8	0.36	0.26	14.88	80	2.5	0.68
43	SP 4	Bamhori	6.8	0.18	5.0	0.36	0.46	35.24	143	4.2	0.55
44	SP 5	Nonepani	6.4	0.3	12.8	0.34	1.2	54.6	320	9.6	0.69
45	SP 6	Bandakpur	8.1	0.19	4.3	0.46	1.04	24.38	87	17.6	0.54
46	SP 7	Gunji	7.8	0.14	3.1	0.3	0.22	11.34	173	3.8	0.47
47	SP 8	Surkhi	7.7	0.18	6.5	0.36	0.48	22.76	117	5.1	0.87
48	SP 9	Aanu	7.4	0.32	7.4	0.66	0.72	12.66	292	15.2	1.11
49	SP 10	Bhadaouli	7.4	0.13	5.2	0.28	0.28	12.3	113	14.3	0.56
	Jabalpur (MP)										
50	SP 11	Urdwa	8.2	0.21	3.8	0.36	0.57	5.25	148	13.8	0.59
51	SP 12	Salliya	7.7	0.18	8.2	0.48	0.86	12.04	221	9.7	0.79
52	SP 13	Cheedi Baroda	7.5	0.21	4.7	0.74	0.31	10.95	123	1.7	0.44
53	SP 14	Paroda	8.1	0.22	9.4	0.62	0.86	11.44	98	11.9	0.9
54	SP 15	Imlai	6.4	0.07	2.1	0.24	0.66	40.88	70	5.1	0.75
55	SP 16	Pondi	6.0	0.16	8.7	0.3	0.7	67.6	263	4.1	1.02
56	SP 17	Gidhora	6.2	0.2	8.4	0.3	1.65	77.58	139	15.5	0.87
57	SP 18	Gwari	8.0	0.37	37.8	0.78	0.74	8.56	388	12.6	0.72
58	SP 19	Kewlari	7.2	0.18	6.0	0.6	1.62	70.28	461	50.3	1.61
59	SP 20	Chhedi	8.3	0.2	5.0	0.7	0.4	11.6	136	1.9	0.43
60	SP 21	Pondi	6.5	0.12	5.2	0.36	1.32	82.5	237	20.4	0.36
61	SP 22	Ghorakoni	6.8	0.16	3.5	0.24	0.5	22.64	191	8.9	0.76
62	SP 23	Ghorakoni	6.5	0.11	4.7	0.2	0.86	60.16	269	7.9	0.95
	Rewa (MP)										
63	SP 24	Sannwbhodi	8.1	0.73	128.3	0.8	0.28	12.96	173	4.5	0.54
64	SP 25	Bahoribhand	7.9	0.78	201.1	1.7	0.9	11.76	376	34.1	1.7
65	SP 26	Veerkham	8.1	0.34	33.9	0.72	0.8	9.74	216	9.6	0.87
66	SP 27	Puraini	7.8	0.48	81.7	1.00	1.54	5.72	928	32.7	1.84
67	SP 28	Bidwa	8.1	0.36	49.2	0.86	0.8	9.48	208	14.7	0.76
68	SP 29	Purani	7.8	0.65	172.5	0.96	0.34	4.04	200	8.1	0.75
69	SP 30	Khokham	8.1	0.43	46.9	0.74	0.28	6.2	158	3.6	0.62
70	SP 31	Tikiya	8.1	0.39	78.0	0.56	0.16	9.74	97	3.4	0.55
71	SP 32	Tikiya	7.8	1.25	488.0	0.82	0.56	9.38	423	10.4	1.01
72	SP 33	Tikiya	8.0	0.3	25.9	0.64	0.9	12.66	266	20.8	1.06
	Satna (MP)										
73	SP 34	Matha	8.2	0.25	15.7	0.26	0.16	6.76	117	1.1	0.24
74	SP 35	Gora	8.2	0.23	13.0	0.2	0.16	6.84	107	0.9	0.25
75	SP 36	Katha	8.2	0.22	11.0	0.2	0.16	6.13	102	0.8	0.24
76	SP 37	Ganesha	8.1	0.2	10.4	0.2	0.14	8.46	108	1.1	0.23
77	SP 38	Bathiya	8.2	0.22	11.9	0.2	0.2	7.6	107	1.1	0.25
78	SP 39	Saajanpur	8.3	0.24	14.8	0.2	0.22	6.66	104	1.1	0.25
79	SP 40	Satri	8.3	0.25	17.6	0.18	0.22	7.12	131	1.0	0.28
80	SP 41	Bachera	8.2	0.23	11.4	0.2	0.16	6.88	118	0.9	0.27
81	SP 42	Parsiya	8.3	0.23	12.4	0.2	0.18	6.98	116	0.9	0.29
82	SP 43	Magraj	8.2	0.22	12.7	0.28	0.16	6.76	116	0.8	0.26

: Low : Medium/Normal : High

5.5. On-Farm Interventions: Establishment of PVS, IPPPT, VLSS Trials

5.5.1. Seed Distribution

A total of 14.11 tons of seed was distributed for PVS, IPPPT and VLSS trials in the four pilot districts of CG. Of the total seed distributed, 38 kg seed of eight improved varieties (JG 14, JG 11, ICCC 37, JGK 2, JG 322, Vaibhav, JG 74, and Vijay) was used for PVS, 12.90 tons seeds of chickpea variety Vaibhav for IPPPT demonstrations and 1.17 tons seeds of Vaibhav were used in VLSS trials.

Similarly, in MP a total of 22.91 tons of seeds were distributed for PVS, IPPPT, VLSS trials in the four target districts. Of this, 32 kg seeds of eight improved varieties (JG 11, JG 14, JG 16, JG 63, JG 74, JG 130, JGK 2, and JAKI 9218) were used for PVS, 20.39 tons seeds of four varieties (JG 74, JG16, JG 130, JAKI 9218) for IPPPT demonstrations and 2.49 tons were used for VLSS.

5.5.2. Mechanization: Introduction of Zero till seed drill

To facilitate an assured chickpea crop establishment utilizing the residual soil moisture left by the preceding rice crop, **zero till seed-cum-fertilizer drills** (modified and manufactured by IGKV, Raipur, CG) were introduced, two in each target district of CG. Farmers' perception on the introduction and performance of seed drill was obtained. There is a mixed reaction about the performance of these drills in the targeted districts/villages. Farmers with small holdings preferred direct seeding by a locally improvised method such as *Nagar Nari,* while medium to big farmers preferred tractor attached seed-cum-fertilizer drills. The zero till seed–cum-fertilizer drills (designed and manufactured by National Agro Industries, Ludhiana) were purchased and test-run in MP and at ICRISAT. These machines arrived late in the season, hence could not be used for larger sowings. Preliminary results indicated that the National seed-fertilizer-drill can work with modifications. A chickpea crop was established in MP using a locally manufactured seed/fertilizer drill (*Kuriee*).

5.5.3. Establishment: PVS, IPPPT and VLSS

Out of 1219 on-farm trials, a total of 1196 [PVS (11), IPPPT (1142), and VLSS (43)] were successfully established and harvested in the targeted villages/districts of CG and MP. All PVS, IPPPT, and VLSS, trials were sown between 10 November and 25 December, 2009 in 34 villages in 4 districts of CG, and between 9 October and 14 December, 2009 in 76 villages of 4 districts of MP (Table 4**).**

Site specific components of improved chickpea production technology, such as seeds of improved chickpea cultivars, seed treatment with fungicides, fertilizer, line sowing using (Indira seed-cum-fertilizer drill in CG and Khuriee in MP) and/or a locally improvised device such as *Nagar Nari* were used to establish the chickpea crop in the on-farm PVS, IPPPT, and VLLS demonstrations. The details of the each of these interventions, including number of villages and farmers in each district and state, are given in Table 4. Data so obtained from each of the successful farmers' participatory PVS, IPPPT and VLLS is presented in the following section.

Table 4. Summary of successfully conducted and harvested participatory varietal selection (PVS), improved pulse production and protection technologies (IPPPT) and village level seed system (VLSS) trials in Chhattisgarh and Madhya Pradesh during 2009-10 season.

State	District	PVS No.		IPPPT No.		VLSS No.		Total No.	
		Villages	Farmers	Villages	Farmers	Villages	Farmers	Villages	Farmers
Chhattisgarh	Raipur	1	1	5	80	1	13	**7**	**94**
	Durg	1	1	5	115	1	10	**7**	**126**
	Rajnandgaon	2	2	6	112	1	6	**9**	**120**
	Kabirdham	1	2	9	114	1	5	**11**	**121**
	Total No. 4	**5**	**6**	**25**	**421**	**4**	**34**	**34**	**461**
Madhya Pradesh	Jabalpur	1	1	12	206	2	2	**15**	**209**
	Rewa	2	2	5	200	1	3	**8**	**205**
	Satna	1	1	5	180	1	2	**7**	**183**
	Damoh	1	1	10	135	1	2	**12**	**138**
	Total No. 4	**5**	**5**	**32**	**721**	**5**	**9**	**42**	**735**
CG&MP total	**8**	**10**	**11**	**57**	**1142**	**9**	**43**	**76**	**1196**

[1]Chhattisgarh

[1]Districts: Raipur, Durg, Rajnandgaon, Kabirdham,

[1] PVS: Varieties sown: Vaibhav, Vijay, JGK-2, JG-322, JG-14, JG-11, and ICCC-37 in plot sizes of 6x10m^2 and 10x8m^2 depending upon the availability of land.

[1]IPPPT: Vaibhav sown in 174.0 ha area in 25 villages and 430 farmers @ 0.20 to 0.40 ha per farmer

[1] VLSS: Breeder seed (Vaibhav) sown in each district

[2] Madhya Pradesh

[2]Districts: Jabalpur, Rewa, Satna, Damoh

[2] PVS: Varieties sown: JG-11, JG-14, JG-16, JG-63, JG-74, JG-130, JGK-2, and JAKI-9218 in plot sizes of 6 x10m^2 to 10 x 8m^2 depending upon the availability of land.

[2] IPPPT: Varieties sown: JG-16, JG-130 in 263.77 ha area in 30 villages and 732 farmers @ 0.2 to 0.4 ha per farmer

[2]VLSS: Foundation/certified seed (JG-16, JG-130) sown in each district

5.5.3.1. Farmers Participatory Variety Selection (PVS) Demonstrations:

A total of 6 PVS trials in CG and 5 in MP were harvested (Table 4). A list of the farmers who participated in the PVS trials are given in **Annexure III**.

Among the eight chickpea varieties evaluated in PVS (Table 5) in CG, chickpea variety JG 11 produced maximum grain yield (1.13 t ha^{-1}) and was closely followed by Vaibhav (1.11 t ha^{-1}), JG 14 and JG 74 (1.09 t ha^{-1}). Farmers preferred JG 14 followed by Vaibhav in Raipur. Farmers preferred JG 11 over other varieties in Durg, Rajnandgaon and Kabirdham. The criteria for selecting this particular variety was its appealing plant type and bigger seed size compared to other test varieties.

In MP, chickpea variety JG 16 topped the list (1.94 t ha^{-1}) closely followed by JG 130 (1.92 t ha^{-1}) respectively (Table 5). Farmers preferred JG 130 in Rewa & Satna districts because

of their higher yield and desirable grain size whereas JG 16, which produced a higher number of branches per plant and had more pods per plant compared to other varieties, was liked in Jabalpur and Damoh. All test varieties had high resistance to wilt but had marked incidence of dry root rot and collar rot, the new potentially emerging diseases of chickpea.

Table 5. Performance of chickpea varieties (yield t ha^{-1}) in the PVS trials conducted in farmers' fields in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

Variety	District / Yield (t ha^{-1})				Mean
Chhattisgarh	**Raipur**	**Durg**	**Rajnandgoan**	**Kabirdham**	
JG 14	1.20	1.06	1.08	1.00	1.09
JG 11	1.07	1.19	1.22	1.04	1.13
ICCC 37	1.10	1.09	0.88	0.93	1.00
JGK 2	1.14	0.90	0.90	0.72	0.92
JG 322	1.07	1.10	0.87	0.91	0.99
Vaibhav	1.32	1.10	1.04	0.96	1.11
JG 74	1.14	1.23	1.06	0.94	1.09
Vijay	1.03	0.96	0.88	0.97	0.96
Madhya Pradesh	**Jabalpur**	**Rewa**	**Satna**	**Damoh**	**Mean**
JG 11	2.83	1.50	1.13	1.43	1.72
JG 16	3.13	1.54	1.28	1.81	1.94
JG 14	2.63	1.71	1.22	1.11	1.68
JG 74	2.80	1.49	1.04	1.72	1.76
JG 130	3.13	1.63	1.15	1.78	1.92
JAKI 9218	2.66	1.33	0.93	1.32	1.56
JG 63	3.00	1.48	1.04	1.64	1.79
JGK 2	1.60	1.52	1.06	0.83	1.25

5.5.3.2. Farmers Participatory Improved Pulse Production and Protection Technology (IPPPT) Demonstrations

Overall, more than 98% of the IPPPT demonstations were successful (Table 6). Of 430 IPPPT demonstrations in CG, 9 trials failed due to heavy rains and therefore data was collected from the remaining 421 trials. Similarly in MP, of 732 IPPPT demonstrations, 11 trials failed in Damoh because of heavy rains after sowing leading to poor plant stand. Hence data was collected only from 721 trials.

A total of 1142 (421 CG and 721 MP) IPPPT demonstrations (including seed priming, treatment with fungicides, insecticides, Rhizobium, PSB, Fertilizer and Pheromone traps) were successfully established in 0.40 ha areas in each of the participating farmers fields. The IPPPT demonstration trials were sown in CG without irrigation between 10 November and 25 December, 2009 at all locations using improved variety Vaibhav. In MP, IPPPT demonstrations were sown from 9 October to 14 December, 2009 in the four target districts using four improved varieties of chickpea (JG 16, JG74, JG 130 & JAKI 9218). All the test varieties were sown @ 30 kg 0.40 ha^{-1}. The list of the farmers who participated in IPPPT demonstrations is given in **Annexure VI**.

Table 6. Success (%) of IPPPT demonstrations conducted in farmer's field in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

State/District	IPPPT demonstration (No.)		
	Sown	Harvested	Success (%)
Chhattisgarh			
Raipur	81	80	98.76
Durg	115	115	100
Rajnandgaon	117	112	95.73
Kabirdham	117	114	97.44
Total	**430**	**421**	**97.91**
Madhya Pradesh			
Jabalpur	206	206	100
Rewa	200	200	100
Satna	180	180	100
Damoh	146	135	92.47
Total	**732**	**721**	**98.50**
Grand Total	**1162**	**1142**	**98.28**

Table 7. Performance (Yield t ha^{-1}) of IPPPT demonstrations conducted in farmers' field in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

State/District	Variety	Farmer (No)	Area Sown (ha)	Total Yield (t)	Average Yield (t ha^{-1})
Chhattisgarh					
Raipur	Vaibhav	80	32.00	21.74	0.68
Durg	Vaibhav	115	46.00	35.79	0.78
Rajnandgaon	Vaibhav	112	44.80	43.93	0.98
Kabirdham	Vaibhav	114	45.60	35.05	0.77
Total /Mean	**1**	**421**	**168.40**	**136.51**	**0.81**
Madhya Pradesh					
Jabalpur	JG16 JG74	89 117	32.80 40.00	77.72 68.01	2.37 1.70
Rewa	JG130	200	80.00	110.15	1.38
Satna	JG16 JG130	125 55	47.00 22.00	65.01 27.9	1.38 1.27
Damoh	JG16 JAKI 9218	116 19	38.00 7.60	58.99 10.16	1.55 1.35
Total/Mean	**5**	**721**	**267.40**	**417.94**	**1.56**

In CG, the mean yield of Vaibhav was 0.81 t ha $^{-1}$ across locations and villages. The highest mean yield of 0.98 t ha $^{-}$1 was recorded in district Rajnandgaon. In comparision to CG the mean grain yield in MP was 1.56 t ha^{-1}. Chickpea cultivar JG 16 produced >2.0 t ha^{-1} of grain yields in district Jabalpur (Table 7).

Gain (%) in comparison to IPPPT Vs local practices

To compare the advantage of IPPPT over non-IPPPT, yield data of farmer's grown chickpea varieties using their practices were collected from 50 farmers in each district. In CG, the gain in chickpea yields ranged from 300 to ≥400% except in Raipur district, where many non-participatory farmers used the IPPPT to grow chickpea. In Kabirdham, Rajnandgaon and Durg districts the higher per cent gain in IPPPT over Raipur was due to the first time introduction of IPPPT in the tribal backward areas. In these tribal villages, farmers grow traditional cultivars of chickpea using local practices. Gain in chickpea production using IPPPT over local farmer variety and practices were between 25.4 – 103.95 % across the locations and for farmers in targeted districts of MP (Table 8).

Table 8. Gain (%) of IPPPT demonstrations over local farmer's practices in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

State/District/ Variety	Yield(t ha^{-1})		
	IPPPT	**Non-IPPPT**	**Gain (%)**
Chhattisgarh			
Raipur Vaibhav	0.68	0.64	6.25
Durg Vaibhav	0.77	0.19	305.26
Rajnandgaon Vaibhav	0.98	0.18	444.44
Kabirdham Vaibhav	0.76	0.14	442.86
Madhya Pradesh			
Jabalpur JG74 JG16	 1.70 2.37	 1.19 1.31	 42.86 80.92
Rewa JG130	 1.38	 0.82	 68.29
Satna JG130 JG16	 1.27 1.38	 0.96 1.1	 32.29 25.4
Damoh JAKI 9218 JG16	 1.34 1.55	 0.8 0.76	 67.5 103.95

5.5.3.3. Village Level Seed System (VLSS) Demonstrations:

Out of 43 VLLS production trials, 34 and 9 farmers conducted VLLS trials in each of the four districts in CG and MP respectively. Depending upon the assured irrigation, 1-3 farmers per village were selected to conduct these trials during the 2009-10 crop seasons. Farmers preferred chickpea cultivar Vaibhav in CG and JG 16 and JG 130 in MP. These were included in the VLLS trials (Table 9). The trials covered a 35.40 ha area (15.60 = CG, 19.80=MP). The list of farmers who conducted VLSS trials is given in **Annexure V.**

5.5.3.3.1. Seed Production and Storage from VLLS Demonstrations:

In CG, total seed produced of the chickpea variety Vaibhav was 15.47 t, and in MP, total seed produced from JG 16 and JG 130 varieties was 17.83 t (Table 9). Total seed produced and stored from VLSS is 33.30 t, which will be sufficient to cover an additional area of 444.00 ha @ 75 kg ha^{-1}during the 2010-11 crop seasons.

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Table 9. Seed production (t) in VLSS trials conducted in farmer's field in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop seasons.

State/District	Villages (No)	Farmers (No)	Variety	Area (ha)	Seed Sown (Kg)	Seed Production (t)
Chhattisgarh						
Raipur	1	13	Vaibhav	5.2	390	4.61
Durg	1	10	Vaibhav	4.0	300	4.13
Rajnandgaon	1	6	Vaibhav	3.2	240	3.16
Kabirdham	1	5	Vaibhav	3.2	240	3.57
Total	**4**	**34**	**1**	**15.6**	**1170**	**15.47**
Madhya Pradesh						
Jabalpur	2	2	JG16	5.0	300	5.40
Rewa	1	3	JG130	4.8	360	4.31
Satna	1	2	JG130	5.0	360	3.78
Damoh	1	2	JG16	5.0	300	4.34
Total	**5**	**9**	**2**	**19.8**	**1320**	**17.83**
CG&MP Total	**9**	**43**	**3**	**35.4**	**2490**	**33.30**

5.5.3.3.2. Village Level Seed Systems (VLSS): Seed Production and Storage from IPPPT

In addition to the seed produced in VLSS, approximately 20% of the total chickpea production in IPPPT demonstrations was kept as seed by the participating farmers at individual household levels. In CG, 27.30 t seeds of the Vaibhav variety have been stored by the farmers for the next crop season. Similarly, in MP total grain yield from 721 IPPPT demonstrations during 2009-10 seasons was 417.94 t. Chickpea grain stored as seed (20%) at individual household level by participating farmers is 83.59 t [ie, 40.34 t (JG 16), 27.61 t (JG 130) 13.60 t (JG 74) and 2.03 t (JAKI 9218)]. This seed will be sufficient for 1114.53 ha sowing in the next season in targeted districts of MP (Table 10).

Table 10. Chickpea grain production (t) and storage (20%) at individual household level) from the IPPPT trials conducted in farmers fields in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

State/District	Village (No)	Farmers (No)	Variety	Area (ha)	Production* (t)	Seed (t) (20%)
Chhattisgarh						
Raipur	5	00	Vaibhav	27.13	21.74	4.35
Durg	5	115	Vaibhav	46.56	35.79	7.16
Rajnandgaon	6	112	Vaibhav	45.34	43.93	8.79
Kabirdham	9	114	Vaibhav	44.13	35.05	7.01
Total	**25**	**421**	**1**	**163.16**	**136.51**	**27.30**
Madhya Pradesh						
Jabalpur	12	89 117	JG16 JG74	32.80 40.00	77.72 68.01	15.54 13.60
Rewa	5	200	JG130	80.00	110.15	22.03
Satna	5	125 55	JG16 JG130	47.00 22.00	65.01 27.9	13.01 5.58
Damoh	10	116 19	JG16 JAKI 9218	38.00 7.60	58.99 10.16	11.80 2.03
Total	**32**	**721**	**4**	**267.40**	**417.94**	**83.59**

5.5.3.3.3. Seed Storage from VLSS and IPPPT Demonstrations

Total seed stored from VLSS (100%) and IPPPT (20%) at village and district levels is 42.75 t in CG and 101.41 t in MP. This seed will be sufficient to cover additional area of 570 ha in CG and 1352.13 ha in MP respectively during the 2010-11 crop season (Table 11)

Table 11. Seed Storage (t) from VLSS and IPPPT trials conducted in farmer's field in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season.

State/District	Village (No)	Farmers (No)	Variety	Seed stored (t)		
				VLSS	IPPPT	VLSS+IPPPT
Chhattisgarh						
Raipur	5	81	Vaibhav		4.35	4.35
	1		Vaibhav	4.61		4.61
Durg	5	116	Vaibhav		7.16	7.16
	1		Vaibhav	4.13		4.13
Rajnandgaon	5	113	Vaibhav		8.79	8.79
	1		Vaibhav	3.16		3.16
Kabirdham	9	115	Vaibhav		7.01	7.01
	1		Vaibhav	3.57		3.57
Total	**28**	**425**		**15.47**	**27.31**	**42.78**
Madhya Pradesh						
Jabalpur	12	89	JG16	-	15.54	15.54
		117	JG74	-	13.60	13.60
	2	2	JG16	5.40	-	5.40
Rewa	5	200	JG130	-	22.03	22.03
	1	3	JG130	4.31	-	4.31
Satna	5	125	JG16	-	13.00	13.00
		55	JG130	-	5.58	5.58
	1	2	JG130	3.78	-	3.78
Damoh	10	116	JG16	-	11.80	11.80
		19	JAKI 9218	-	2.03	2.03
	1	2	JG16	4.34	-	4.34
Total	**37**	**730**		**17.83**	**83.58**	**101.41**
Grand Total	**65**	**1155**		**33.30**	**110.89**	**144.19**

5.3.3.3.4. Breeder Seed Production at ICRISAT Patancheru and at JNKVV, Jabalpur:

A total of 15.7 t breeder seed was produced for six varieties, which included JG 14 (1.65 t), JG 11 (3.40 t), JAKI 9218 (7.00 t), ICCC 37 (1.90 t), JG 130 (0.50 t) and KAK 2 (1.25 t) at ICRISAT, Patancheru. Part of this seed will be available for conducting the 2010-2011 on-farm trials. Additionally 220 t of breeder seeds of faremrs preffered improved chickpea varieties were produced at JNKVV, Jabalpur, MP.

5.5.3.3.5. Seed Multiplication and Distribution - Expansion: How to go?

The 16 improved varieties of chickpea that are being piloted through RRFL have passed the foundation seed stage. Two varieties, JG 14 and Vaibhav, in CG and JG 130, JG 14 and JG 16 in MP, are perhaps the most impressive in farmer participatory varietal selection trials. Seeds of these varieties need to be increased for further expansion of chickpea cultivation in the RRFL in CG and MP, and in similar environments in India. Two main models exist for multiplication of seed and for making it available to farmers – the **formal** and **informal** (community-based) seed sectors – the latter being larger but less controlled.

The JNKVV and IGAKV seed multiplication centers, DoA farms, National Seed Company (NSC), private seed companies and some NGOs comprise the formal seed sector and all will contribute to seed provision. However, JNKVV, IGKV and ICRISAT will play a key role in early stages of multiplication and will be the principal providers for seed multiplication. The seed provision model consists of breeders' seed (provided by JNKVV, IGKV and ICRISAT), foundation seed (provided by JNKVV, IGKV and ICRISAT along with qualified private organizations) certified seed (provided by JNKVV, IGKV and ICRISAT, seed companies, farmer groups) and truthfully labeled seed provided by seed companies, CBOs and individual farmers. The informal sector comprises CBOs, farmer groups and individual farmers who provide at the farmer-to-farmer level.

The formal sector needs to maintain its advantage in terms of quality and purity control over the informal sector and also its institutional accreditation. However improvements must be made in terms of the supply of seed at the right time. Without a commercial incentive it is difficult to see how this can be achieved. Questions of price fixing also need to be addressed. Profits drive the informal seed sector, which is thus able to provide timely delivery of good quantities of seeds because it is demand driven. However, infrastructural changes are needed to enable the development of mechanisms that address quality issues and price. Clear roles should be assigned for each stage of seed provision (Table 12).

Table 12. Seed multiplication and distribution: How to go?

Role and Responsibilities of Institutions		
JNKVV, IGKV, ICRISAT, DoA, SSC/NSC	**NGOs**	**CBO**
• quality control • market links • source seed • dissemination • variety release • price setting • maintenance • coordination • training	• scaling up • formation and mobilization of CBOs • varietal development • training • market links • technology input and supply	• seed production and distribution • farmer to farmer training • participatory varietal development • sales & distribution of technologies

5.6. Economics of IPPPT:

The recommended IPPPT package to grow chickpea in RRFL of CG and MP was highly profitable and cost-effective. On the basis of information gathered from 430 farmers in CG, gain in average net return was 486% (Table 13). The reason behind the high per cent gain in net return due to improved practice over the local practice in CG was the selection of RRFLs in the tribal backward areas, where farmers are cultivating traditional chickpea and use minimum inputs in terms of fertilizers/ insecticides/ fungicides/ improved varieties. Though the cost of the IPPPT package for chickpea production was 23% higher than the local farmer practices in MP, net returns using IPPPT was 74.8 % in MP more than local farmer practices. The benefit-cost ratio of chickpea production using IPPPT was estimated to be 2.89 in MP.

Table 13. Net return (%) and benefit-cost ratio gains from the IPPPT trials conducted in farmers fields in the targeted districts of Chhattisgarh and Madhya Pradesh in the 2009-10 crop season

Particulars	IPPPT	Local farmers Practice	% increase/ gain of IPPPT over local farmers practice
Chhattisgarh			
Input cost Rs/ha^{-1}	8126	5138	58.15
Yield kg/ha^{-1}	817.5	302.5	170.25
Gross return Rs/ha^{-1}	18803	6957.5	170.26
Net return Rs/ha^{-1}	10673	1820	486
BC ratio	1 : 1.31	1 : 0.35	
Madhya Pradesh			
Input cost Rs/ha^{-1}	9300	7550	23.17
Yield kg/ha^{-1}	1563	991	57.72
Gross return Rs/ha^{-1}	35949	22793	57.72
Net return Rs/ha^{-1}	26649	15243	74.83
BC ratio	1 : 2.89	1 : 2.02	

5.7. Farmers Perceptions and Expectations

More than 1100 farmers were directly exposed to the use of IPPPT to obtain higher grain yield in chickpea in RRFL. Interaction with ≥2000 participatory and non-participatory farmers during periodical monitorings, village level group meetings and during their visit to ICRISAT indicated that almost all the participating and neighboring farmers were impressed and convinced about the advantage of the IPPPT, and expressed their willingness to adopt these technologies in the coming crop season. Several non-participatory farmers also booked and or bartered chickpea seeds with wheat for the next season to adopt IPPPT. The farmers are confident that they can grow chickpea and obtain higher yields by adopting the IPPPT package in their rice fallows with at least one irrigation. They are convinced that chickpea has provided them pertinacious grains, increased income and increased production of rice by improving soil fertility.

5.8. Capacity Building

The IPPPT orientation [including integrated nutrient management (INM), integrated pest management (IPM), integrated disease management (IDM), storage pest and production technology] programs were conducted in 48 in villages of CG and 36 villages of MP during the 2009-10 crop season to train farmers on major production constraints and their management. A total of 1155 farmers in CG state and 1300 farmers from MP, attended training in target villages (Table 14). Further, hands–on training was also given to farmers during trial monitoring and visits to the research institutions.

Table 14. Capacity building: activities and training conducted during the 2009-10 crop season.

Title of the training	**Village (No)**	**Farmers (No)**	**Duration (days)**
Chhattisgarh			**No of Trainings**
IPPPT – Orientation	10	327	10
INM	6	95	6
IDM: Wilt/CR/DRR, disease	2	66	2
IPM: Pod borer	6	167	6
IPM: Storage pest	7	191	7
Seed production technology	3	52	3
Sowing methods and implements for increasing the nutrient and water use efficiency	14	257	14
TOTAL	**48**	**1155**	**48**
Madhya Pradesh			
IPPPT – Orientation	5	225	1
INM	6	200	1
IDM: Wilt/CR/DRR, diseases	6	200	1
IPM: Pod borer	6	200	1
IPM: Storage pest	6	200	1
Seed production technology	5	175	1
Sowing methods and implements for increasing the nutrient and water use efficiency	2	100	1
TOTAL	**36**	**1300**	**7**
Grand Total	**84**	**2455**	**55**

5.8.2. Farmers Visit and Training of Trainers (TOT) at ICRISAT

Fifty-five farmers and site coordinators involved in the project on 'enhancing chickpea production in rainfed rice fallow lands (RRFL) of Chhattisgarh and Madhya Pradesh states of India following improved pulse production and protection technologies' funded by National Food Security Mission-Pulses, Government of India, visited ICRISAT-Patancheru on 7 and 8 January 2010. The project coordinator reiterated that learning is a mutual process and that one must be open to new technologies and contribute to new developments. He elaborated on the objective of the two-day training program for trainers. Farmers from each of the participating villages of eight districts –Jabalpur, Damoh, Rewa and Satna of Madhya Pradesh and Raipur, Durg, Kabirdham and Rajnandgaon of Chhattisgarh – were given hands-on training in the improved chickpea production technologies. The farmers designated as trainers will in turn impart training to other farmers in their respective villages during the year.

The trainees were also exposed to different components of the projects: Disease management, Insect Pest management, IPM and others hands-on training provided through subject matter specialists. Wrapping up, farmers shared their experiences, spelt out their doubts and sought the best solutions to different problems concerning chickpea production.

5.9. Lessons Learned from IPPPT Farmer Promotion and Adoption of Chickpea and IPPPT in RRFL

Economics

- Chickpea competes well with alternatives, is highly profitable and can improve livelihoods for poor farmers and their families.
- If rewards are sufficient, farmers will adopt and reinvest.
- Markets are not limiting for chickpea in India. Connectivity between the extension system (eg, DoA and NGOs) SAUs and ICRISAT, is essential.
- Good storage is crucial but currently a low priority for farmers – needs pest management.

Pest and disease management

- Pesticide quality is important and adulteration is frequently reported. Needs monitoring.
- Insecticide resistance reported in the West (associated with Cotton India?). Needs addressing with alternatives.
- NPV works but no infrastructure available for backstopping, quality control, production, legislation and policy.
- Diagnostic skills need to be taught to farmers, with technical backstopping.
    - Key life stages of pod borer essential for successful control
    - Resistance for wilt and susceptibility to stem rot and dry root rot: Is it climate change?
    - Early warning: for wilt, dry root rot and stem rot diagnosis
    - Technologies too complicated for some farmers.
    - Adequate technical backstopping research on new emerging diseases is essential and often lacking.

Micronutient and Rhizobium:

- Vigrous soil sampling and timely chemical analysis is the prerequisit for site specific application of minor and major nutrients.

- Rhizobia and plant growth promoters available in the maket are adulterated and need quality control and timely availability to the farmers

Mechanization and Crop Establishment:

- This is the most important issue and needs focused private-public partnership approach. It is a issue that needs focused R&D

Seed production

- Chickpea is a self-fertilizing crop. Once farmers have a variety they can maintain their own seed, negating the role of seed SMEs.
- There is always a need for technology inputs. We encourage low cost inputs – less financially rewarding for SME, therefore low interest.
- Self-help groups to take on role of seed production. This works and helps to ensure wider knowledge dissemination.

Dissemination

- Popular media such as newspapers and television give agriculture a low priority, so novel and alternative, local or traditional mechanisms need to be exploited to ensure widespread dissemination of information and knowledge.

5.10. Backstop Research:

Emerging Diseases: Improved high yielding wilt [(*Fusarium Oxysporium f. sp. ciceris*) resistantant chickpea varieties selected for introduction and expansion in the RRFL of CG and MP are found susceptible to potentially emerging diseases such as dry root rot (*Rhizoctonia bataticola*) and collar rot (*Sclerotium rolfessii*). The occurrence of these two potentially emerging diseases is weather dependent. In this context we initiated basic research to understand the biology of these pathogens and epidemiology of dry root rot and collar rot diseases. The main areas of backup research are:

- Weather and sequential occurrence of wilt, dry root rot and collar rot
- Analysis of historical weather and disease (wilt and dry root rot) occurrence
- Determine the effect of weather variables (temperature, moisture stress) on wilt, dry root rot and collar rot.

The results obtained are as follows:

- Dry root rot is a potentially emerging disease of chickpea and is predisposed by high temperature and soil moisture stress (Fig 1 and Fig 2)
- Sucession of collar rot, wilt and dry root rot is changing (Fig3 and Fig 4)
- Development of screening techniques to identify the host plant resistance is the priority reseach area (Fig 5 and Fig 6)
- There is a need to enhance research and funding/man power to resolve the dry root rot, wilt, and collar rot etc. relationships.

Dry root rot

Fig. 1 Dry root rot chickpea

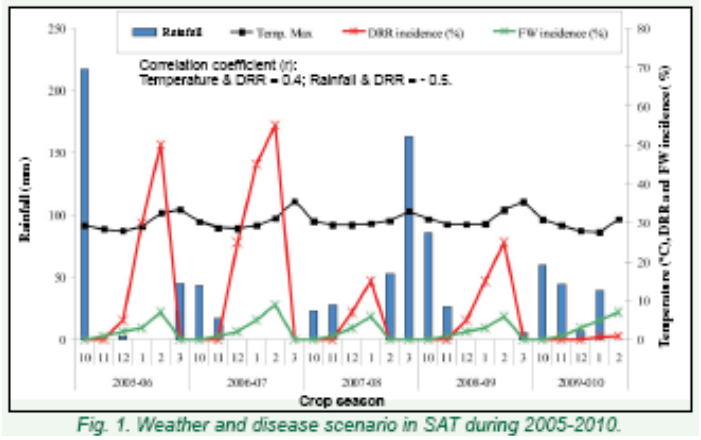
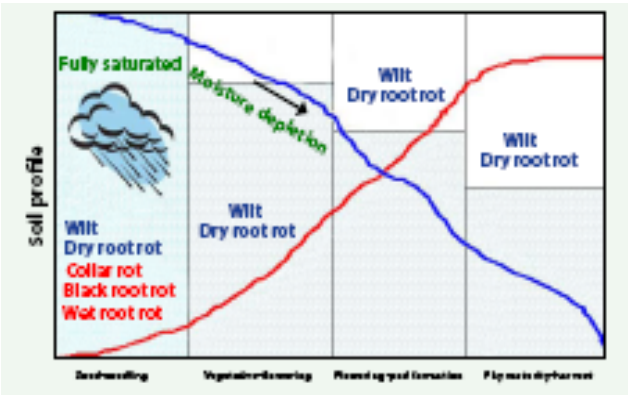


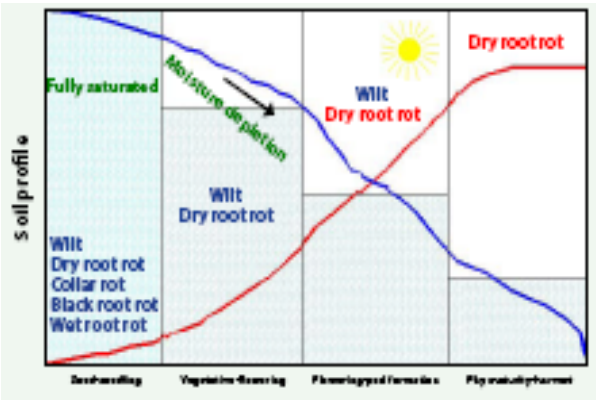
Fig. 1. Weather and disease scenario in SAT during 2005-2010.

Fig. 2 Weather variables and dry root rot of chickpea



Low moisture and high temperature- Collar rot

Fig. 3 Succession of collar rot in chickpea



High temperature and low moisture – Dry root rot

Fig. 4 Succession of dry root rot in chickpea

Collar rot of chickpea

Fig. 5 Collar rot of chickpea

Fig. 6 Deveopment of screening technique for collar rot of chickpea

5.11. Visuals of On Farm Interventions: Chhattisgarh

Training **Monitoring**

5.12. Visuals of On-farm Interventions: Madhaya Pradesh






5.13. Publications in Press and Media

6. Acknowledgements:

On behalf of the the project partners, I gratetfully acknowledge the National Food Security Mission (NFSM), Department of Agriculture & Cooperation (DoA&C), Ministry of Agriculture, Govt. of India for funding this pilot project. I am grateful to Dr William Dar DG, ICRISAT, Dr Gautam Kalloo Vice-Chancellor JNKVV, and Dr MP Pandey and the respective managements for their contant encouragement and help rendered during the execution of this project.

I wish to extend my special thanks to Dr SK Rao, Principal Investigator Madhya Pradesh and his team, and Dr RN Sharma and his team who worked hard to meticulously impement the challenging agreed work plan of introducing chickpea in the rrainfed rice fallow lands in the target districts villages and to farmers of Chhattisgarh and Madhya Pradesh. Finally on behalf of the team I acknowledge enthusiastic participation of the farmers in successfully implementing the various activities of the project.

7. Annexures: I-V

Annexure I

Work Plan 2009-10

Objective 1: To enhance capacity at field level for farmer-participatory research and extension (FPRE) in adoption and expansion of improved chickpea production and protection technologies (IPPPT) in rain fed rice fallow lands.

***Activity 1.1*: Collect base line data of the targeted villages of the selected districts of Chhattisgarh and Madhya Pradesh**

Milestone 1.1.1: Identify constraints and opportunities for enhancing chickpea cultivation in the rainfed rice fallow lands of Chhattisgarh and Madhya Pradesh.

Work plan 1.1.1.1: Develop base line data methodology and impart training to investigators in collaboration with socio-economists.

Workplan 1.1.1.2: Collect base line data on village profile, group profile and individual farmer profile (participating and non-participating farmers)

***Progress:** Developed methodology and imparted training. Data compilation is in progress.

***Activity 1.2: Collect and analyze soil samples from the targeted villages of the selected districts of Chhattisgarh and Madhya Pradesh**

Milestone 1.2.1: Analyze and identify micro- and macronutrient deficiencies.

Workplan 1.2.1.1: Collect five samples from each targeted village representing soils of all participatory farmers, and get them analyzed at ICRISAT

***Progress: Completed**

Activity 1.3: Identify improved chickpea cultivars for IPPPT participatory varietal selection

Milestone 1.3.1: 2-3 improved chickpea cultivars identified for each target district for IPPPT through participatory varietal selection.

Workplan 1.3.1.1: Evaluate location specific 6-8 improved chickpea cultivars for IPPPT through participatory varietal selection

***Progress: Completed**

Activity 1.4: Enhance farmer-participatory research and extension (FPRE) capacity by providing training and orientation in IPPPT components

Milestone 1.4.1: At least 500 farmers provided hands-on training in IPPPT components.

Workplan 1.4.1.1: Conduct specialized courses and hands-on training on IPPPT components (IPM, IDM and INM) to participating farmers, representatives from NGOs and Research Associates of participating institutions

Progress: Completed

Workplan 1.4.2.1: Prepare farmer-friendly training and extension manuals in Hindi on improved chickpea production technology

***Progress: Completed**

Objective 2. To multiply and distribute farmer-preferred chickpea varieties along with IPPPT (including IDM, IPM and INM) for sustainable intensification of rainfed rice fallow cropping systems

Activity 2.1: Identify farmers for IPPPT demonstrations in RRFL of target states

Milestone 2.1.1: At least 1000 farmers identified in target states for IPPPT demonstrations

Workplan 2.1.1.1: Identify farmers from each target district for IPPPT demonstrations in RRFL

***Progress: Completed**

Activity 2.2: Multiply and distribute location specific farmer-preferred chickpea varieties for IPPPT demonstrations in RRFL

Milestone 2.2.1: Seeds of at least 1-2 improved chickpea varieties distributed to farmers

Workplan 2.2.1.1: Distribute seeds of location specific improved chickpea varieties to farmers for IPPPT demonstrations in RRFL

Milestone 2.2.2: At least 20% of the grain produced from IPPPT demonstrations stored as seed at individual household level for next crop season

Workplan 2.2.2.1: Assure storage of at least 30-40% of seed produced from each IPPPT demonstration at individual household level for next crop season

***Progress: Completed**

Activity 2.3: Introduce location specific mechanization for establishing IPPPT demonstrations

Milestone 2.3.1: At least one Zero till seed-cum-fertilizer drill introduced in each target district

Workplan 2.3.1.1: Evaluate and identify location specific Zero till seed-cum-fertilizer drill for crop establishment

***Progress: Partially completed**

Objective 3. Empowerment among farmers and participating local institutions, on FPRE/IPPPT to establish village-based seed system(s) to achieve self-sufficiency in seeds of farmer-preferred improved varieties of chickpea at the village level

Activity 3.1: Identify/develop a functional model of seed system(s) and validate in selected villages in each state

Milestone 3.1.1: Farmers' groups identified to initiate village level seed system in site locations

Workplan 3.1.1.1: Initiate seed multiplication in identified farmer's groups in project village/district

Progress: Completed

Objective 4. Research backstopping for further improvement of chickpea varieties for traits and IPPPT components preferred by the farmers and traders in the target area

Activity 4.1: Identify biotic and abiotic constraints to chickpea production in RRFL

Milestone 4.1.1: Biology and epidemiology of the new pathogens associated with chickpea in RRFL determined

Workplan 4.1.1.1: Monitoring and identification of new emerging diseases in chickpea in RRFL

Workplan 4.1.1.2: Initiate studies on biology and epidemiology of the identified pathogens in RRFL and devise their management strategies

Progress: In progress

Annexure II

Soil Critical Limits

Sno	Pariculars of analysis	Guidelines followed by ICRISAT
1.	PH (1:2 Soil : Water)	<6.5 Acidic 6.5 - 8.5 Normal >8.7 Alkaline
2.	Salinity (Electrical Conductivity (dS/m)	<0.8 Normal 0.8 - 1.6 Critical for salt sensitive crops 1.6 - 2.5 Critical for salt tolerent crops >2.5 injurious to all norms
3.	Organic Carbon %	0.5% Low 0.5 - 0.75 Medium >0.75 High
4.	Available P (Olsen's Method) ppm	<0.5% ppm Low 0.5 - 0.75 ppm Medium >10 ppm High
5.	Available K (1 N Neutral Am. Acetate)	<50ppm Low 50 -125 ppm Medium 125 ppm High
6.	Available Mg (1 N Neutral Am. Acetate)	<40ppm Low 40 - 80 ppm Medium >80 ppm High
7.	Available Ca (1 N Neutral Am. Acetate)	<1000 ppm Low 1000 -1600 ppm Medium >1600 - 2400 ppm High
8.	For Indian soils DTPA Extractable Particulars Zinc (Zn) Copper (Cu) Iron (Fe) Manganese (Mn) Hot water extractable Boron $Cacl_2$ extractable S	 Critical limit ppm 0.75 0.5 2 1 0.58 8-10

Same limits for P suggested by Olsen et al. in US Department of Agriculture 939, 1954- cited by Rajendraprasad, 1968.

Reference: Jackson ML. 1967. Soil Chemical Analysis.

Annexure III

List of PVS demonstrations in individual farmer's field during 2009-10

State: Chhattisgarh

District: Raipur, **Village: Khapridih Khurd**
1. Gajanand Verma

District: Durg, **Village: Mohandi**
1. Jotendra

District: Rajnandgaon, **Village: Nathunawagaon and Kumhalori**
1. Ajeetram
2. Sukhram

District: Kabirdham, **Village: Amera**
1. Kanhiya Verma
2. Ramesh Maravi

State: Madhya Pradesh

District: Jabalpur, **Village: Saliya and Urdwa**
1. Surendra Patel
2. Umasanker Tiwari

District: Rewa, **Village: Bahuribandh and Puraini**
1. Vidhaya Prasad Tiwari
2. Ram Kishore Tiwari

District: Damoh, **Village: Hindoria and Surkhi Umariya**
1. Laxaman Singh
2. Raguveer Singh

District: Satna, **Village: Bathiya and Matah**
1. Ayodhya Singh
2. Anil Dwedi

Annexure IV

List of IPPPT demonstrations in individual farmers' fields during 2009-10
State: Chhattisgarh

SNo	Farmer name/ Village	SNo	Farmer name/ Village	Sno	Farmer name/ Village	SNo	Farmer name/ Village
District: Raipur		43	Rupendra Verma	**District: Durg**		43	Varun Kumar
	Khapridih Khurd	44	Kalicharan Verma		**Mohandi**	44	RupRam
1	Bisauha Ram Verma	45	Rajendra Verma	1	NetRam	45	YogiRam
2	Aatmaram Verma	46	Sarju Sahu	2	Chhattarsinh	46	SumitraDevi
3	Pilaram Verma	47	Bhagvat Sahu	3	Lakshminbai	47	Mohit Kumar
4	Chhabiram Verma	48	Veerendra	4	Indirabai	48	Sarda Sahu
5	Chhattar Singh Ratre	49	Anup Singh Verma	5	Ramesh	49	Rajendra
6	Radhe Lal Ratre	50	Aatma Ram verma	6	Ram	50	M.Parvati
7	Samaru Ram Nishad	51	Alok Verma	7	Ankalha	51	Ramanand
8	Resham Lal Satnami	52	Kunti Verma	8	Geetabai	52	Omprakash
9	Ramsingh Verma	53	Manharan Dhruw	9	Dindayal	53	Ashvani
10	Ashok Kumar Verma	54	Ripudaman Verma	10	Rajendra	54	Artilal
11	Kantibai Manikpuri	55	Bhupendra Verma	11	Kuleshwar	55	Dhanulal
12	Anupram Verma	56	Takeshwar Verma	12	BisauhaRam	56	Ramesh
13	Sitaram Sen	57	Amarika Verma	13	Bala Ram	57	Vishnath
14	Ghanshyam Sen	58	Mahesh Verma	14	Atma Ram	58	Pemanlal
15	Thanu Yadav	59	Narayan Patel	15	Kedu Ram	59	Bhondu
16	Uttara Patel		**Khairi**	16	Daoraprasad	60	Manuva
17	Chhabu Verma	60	Kamal narayan	17	Jhulavan	64	Dasru
18	Bisen Kr Verma	61	Dukhu Ram Dhruw	18	Santu	62	Meshnarayan
19	Asam Das Gurugosai	62	Dhanush Dhruw	19	Sundarlal	63	Ghansyam
20	Muktidas Gurugosai	63	Panch Ram Nishad	22	JhabbuRam	64	Sudariya
21	Latel Chelak	64	Mohar Yadav	21	Rajkumar	65	Aman sahu
22	Sudhuram Chelak	65	Chaiti Bai Yadav	22	Ramuprasad	66	Smt Pushpa
23	Hemlal Ratre	66	Ramchandra Dhruw	23	Ramnath	67	Baeshakhu
24	Rajaram Verma	67	Surendra Yadav	24	Krishnkumar	68	Mahettar
25	Naresh Vishwakarma	68	Ramjivan Verma	25	SadhuRam	69	Hemant Kumar
26	Sadhram Khunte	69	Mohar Singh	26	Dhannu	70	Dvarkaprasad
27	Lalaram Khunte	70	Tarun Verma	27	Smt Paragbai	71	Smt Renuka
28	Melaram satnami	71	Dhruw Singh Yadav	28	Lochan	72	Bhuneshwari
29	Rupu Verma	72	Ratan Nishad	29	Dinesh	73	Harishchand
30	Bhagbali Verma	73	KaliRam Dhruw	30	GvaluRam	74	Dharmendra
31	Kamdev Sen	74	Anjori Dhruw	31	Rohit	75	Gudda
32	Sudhuram Verma	75	Kanhaiya Nishad	32	Patharsh	76	Ashok kumar
	Kumhari	76	Mahar Singh Yadav	33	Smt Damayanti		**Semariya**
33	Sunil Verma	77	Dev Ram Yadav	34	Rekh Ram	77	Ravindra
34	Khubchand Sahu	78	Mukhit Dhruw	35	Dvarika	78	Harmesh
35	Kamal Verma		**Bharuwadih**	36	Ramesh	79	Sarvjeet
36	Man Singh Verma	79	Punit Ram Sahu	37	Girver	80	Pooja
37	Keju Ram Verma	80	PunaRam Verma	38	TikaRam	81	Silu Dau
38	Gaindlal Verma		**Musawadih**	39	Gopichand	82	Takapothi
39	Yugal Verma	81	Dani Ram Tikariha	40	Dhan Singh	83	IA Aak
40	Girdhar Verma				**Dhour**	84	Bhashvendar
41	Menesh Verma			41	Kamta	85	Kedar kumar
42	Ramkhilavan Verma			42	Pitamber	86	B Ramhakand

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village
87	Jyoti	14	Salik	59	Kisun		**Bharregaon**
88	AP Doshi	15	Kuman	60	Chitesh	104	Devendra
89	Ganga Ram	16	Jageshwar	61	Shobhit	105	Bhart
90	Bal Ram	17	Rohit	62	Uday Singh	106	Omkar
91	Harihar Ram	18	Unmed	63	Leeladhar	107	Dinesh
92	M Bhaskar	19	Mahaveer	64	Keshavchand	108	Ruplal
93	Sarvalata	20	Sukhi Ram	65	Khuman Singh	109	Hemant
94	TirathRam	21	Atma Ram	66	Khumman Singh	110	Rohani
95	Gorakhnath	22	GangaRam	67	Ramprsad	111	Loknath
96	Ramavtar	23	Jhanak	68	Chait Ram	112	Ashok
97	Bhola Ram	24	Bhupendra Singh	69	Ishwar	113	Rajesh
98	Vishnu Ram	25	Allal	70	Jhar Singh	114	Madan
99	Lalit	26	Rukmani		**Kumhalori**	115	Bashakhin
100	Indrasen	27	Hari Ram	71	Rooplal	116	Gajendra
	Mudhpar	28	Tej Ram	72	Madanlal	117	Jageshwaj
101	Subhash	29	Santosh	73	Shivkumar	**Dist: Kabirdham**	
102	Dhananjay	30	Jeevan	74	Arjun Singh		**Dullapur**
103	Sanjay		**Pendarvani**	75	Jainu Ram	1	Sada Ram
104	Dayalu	31	Vish Ram Singh	76	Rajeshwar	2	Jait lal Sahu
105	Komal	32	Krishna Dash	77	Chandraprakash	3	Sukhau Sahu
106	Sarita Devi	33	Sohan	78	Nandu	4	Ramesh Sahu
107	Khilavdayal	34	Chait Ram	79	Sant Ram	5	Panchu Sahu
108	Bhandas	35	Kishare	80	ThanuRam	6	Ganpat Singh
109	Jagatnath	36	Bhagoli	81	ChabbluRam	7	Patwari hirwani
110	Harihar Ram	37	Shatrughan	82	Gaindlal	8	Jagdish Sahu
	Murra	38	Suryadarshan	83	NaruRam	9	Jagat Ram
111	SukhiRam	39	Chavilal	84	RamSingh	10	Anju Ram
112	Kusumbai	40	Bhuneshwar	85	BaalaRam	11	Anand Ram
113	Johanlal	41	Mohar Das		**Dhamansara**	12	Kunj Ram
114	ChaitiRam	42	Pilu Ram	86	Punu Ram	13	Parsadi Ram
115	GangaRam	43	Chain Prasad	87	Chankant		**Amera**
		44	Teekam	88	Khemu Ram	14	Man Singh
Dist: Rajnandgaon		45	Sukhi Ram	89	Champa	15	Baratu
	Nathunawagaon	46	Videshi Ram	90	Ramdas	16	Sidh Ram
1	Bajrang Sahu	47	Dipchand	91	Seva Ram	17	Kunwar Singh
2	Rekhan	48	Bhagwat	92	Sant Ram	18	Amar Singh
3	Manharan	49	TukaRam	93	Ramchandra	19	Narayan Singh
4	Ashok	50	BhukhuRam	94	Ramkumar	20	Asaru Singh
5	Ghanshyam	51	VishRam	95	Jagdish	21	Pyar Singh
6	MannuRam	52	Hemant	96	GangaRam	22	Mangal Singh
7	Gokul	53	Dukhawa	97	Mukesh	23	Bachhu Singh
8	Chandraprakash	54	Sajanlal	98	Bhoj	24	Dukhu Singh
9	HemSingh		**Kohka**	99	Narayan	25	Banshi Dhurvey
10	Heeralal	55	Nutan Singh	100	Dusyant	26	Maik Lal
11	Praduman	56	Uttam Singh	101	Madhu	27	Sant Kumar
12	Moti Ram	57	Purshottam	102	Jeevrakhan	28	Ramesh Maravi
13	KripaRam	58	PritRam	103	Kamlesh	29	Samau Ram

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village		
30	Hriday Das	73	Veer Singh	117	Vanshi gaud		
31	Tihari	74	Mangela Singh				
32	Tirath Ram	75	Rati Ram				
33	Son Singh	76	Dhup Singh				
34	Than Singh		**TarSingh**				
35	Hari Ram	77	Shatrughan				
36	Asha Ram	78	Vishwanath				
37	Jedu Ram	79	Bhagat				
38	Shatru Ram	80	Shushil chandrawansi				
39	Manik Ram	81	Premlala				
40	Hotal Singh	82	Jaleshwar				
41	Bahori Ram	83	DhaRam Singh				
42	Dhur Singh Gaud	84	Sona Ram				
43	Kanhiya Ram	85	AshaRam				
44	Rajkumar	86	Basha Ram				
	Magarwada	87	Shankar				
45	Ratan Singh		**Singhari**				
46	Veer Singh	88	Khagesh Verma				
47	Gyan Singh	89	Sundar Singh				
48	Ram chandra	90	Jaan Singh				
49	Dhannu	91	Pantora				
50	Dhan Singh	92	Sahesh Ram				
51	Hansha Ram	93	Lakhan lal				
52	Bish Ram	94	shyam Singh				
53	Nohar Singh	95	Vijay Patil				
	Boriya	96	Mahesh				
54	Ram ji Jaiswal		**Baijalpur**				
55	Dham Singh	97	Dhimara Ram				
56	Sant Ram	98	Kumar durvey				
	Sili	99	Ghadu Ram				
57	Tulasi Ram	100	Gali Ram				
58	Sukhraju	101	Ghamau Markam				
59	Nandu Ram	102	Panch Ram				
60	Bisaru	103	Bhagat Ram				
61	Pantora	104	Kripa Ram				
62	Tilak Ram	105	Jahara				
63	Gore lal	106	Kunwar Singh				
64	Prahlad	107	Kanhya Ram				
65	Bhola Ram	108	Ram Singh				
66	Kartik	109	Ram Chandra				
67	Phul Singh	110	Vijay				
68	Son Singh	111	Sushil				
69	Bharat Singh	112	Kanwal Singh				
70	Jaganu sahu	113	Charan Singh				
71	Rup Ram	114	Dheeraj				
	Boda	115	Seetur				
72	Dukhi Ram Dhurvey	116	Krishana Kumar				

State: Madhya Pradesh

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village
District: Jabalpur		45	Sunil Patel	91	Baniprashad Patel	137	Dilip Jaiswal
	Saliya	46	Shiv Prasad Patel	92	Sonelal Patel	138	Brajlal Barman
1	Premlal Patel	47	Satendra Patel	93	Ravi Patel	139	Pawan Barman
2	Ram ji Patel	48	Saraswati Beva Patel	94	M Narayan Patel	140	Dinesh Jaiswal
3	Surendra Patel	49	Santosh Patel	95	Sarita Patel	141	Pushpraj Singh
4	Shree Jairam Patel	50	Halke Ram Patel		**Gidorha**	142	Munna Singh
5	Bijendra Patel	51	Pahlad Patel	96	Kannuram Kachi	143	Guddu Singh
6	Anjani Bai Patel	52	Suraj Patel	97	Gopal Yadav	144	Yogenra Singh
7	Manish Patel	53	Pradeep Patel	98	Shivcharan Yadav	145	Sunil Bega
8	Gulvanshi bai Patel	54	Ganshayam Patel	99	Keshav Kachi	146	Surendra Singh
9	Manoj Patel	55	Shanti bai Patel	100	Surendra K. Kachi	147	Johar Gowd
10	Surekha Patel	56	Ramvilash Patel	101	Sunil Yadav	148	Ratibai Gowd
11	Mona Patel	57	Krishan Patel	102	Vindravan Kachi	149	Davi deen Jharia
12	Dinesh Mishra	58	Mamta Bai Patel	103	Avadh K. Kachi	150	Ratiram Jharia
13	Rakesh Mishra	59	Balveer Patel	104	Manjulal Kachi	151	Bihaj bai
14	Saket Mishra	60	Barat kumar Patel	105	Chatur Kachi	152	Geeta bai
15	Yogesh Mishra	61	Govind Patel	106	Rambagash Kachi	153	Pahlad Jharia
16	Daivesh Mishra	62	Bejendra Patel	107	Kishan Yadav	154	Jankee Jharia
17	Rajkumari Mishra	63	Raja Patel	108	Munna Yadav	155	Ramlal Barman
18	Suresh Patel	64	Shanti bai Patel	109	Laxaman P. Kachi	156	Nonelal Jharia
19	Narmada P. Patel	65	Raju Patel	110	Chaturairam Kachi	157	Shayamlal Barman
20	Channilal Patel	66	Gangaram Patel	111	Ravindra Kumar	158	Basanta Gowd
21	Jaganath Patel	67	Sakhi bai Patel	112	Shiv charan Kachi	159	Meerabai Pradhan
22	Ram Prasad Patel	68	Narayan Prasad Patel	113	Shivdas Kachi	160	Biayalal Jharia
23	Hasanlal Patel	69	Munna lal Thakur	114	Amritlal Kachi	161	Maneesha Pradhan
24	Kusum bai Patel	70	Vishanu kumar	115	Chandesh Kachi	162	Rajeev Sharma
25	Sheela bai Patel	71	Saroj Bai Thakur	116	Shambhulal Kachi	163	Gulab sahu
26	Sadaram Patel	72	Naveen Patel	117	Dasharath Prasad	164	Munna Sahu
27	Harilal Yadav	73	Om Prakash Patel	118	Ashok Kachi		**Podi / Sunderpur**
28	Salochan bai Patel	74	Kalpana Bai	119	Biharilal Kachi	165	Laxaman Singh
29	Sushil sahu		**Bilkharwa**	120	Munnalal Kachi	166	Gulab Singh
30	Subhash chand Patel	75	Madav Tiwari	121	B Prasad Kachi	167	Ram Prasad Singh
31	Lakhu Patel	76	Ramlal Tiwari	122	Kamlabai Kachi	168	Sukrat Singh
32	Gama Patel	77	Ishawari Prasad	123	Laxamibai Kachi	169	Sumitira Bai
	Ghorakoni	78	Bakunth N Awashthi	124	Badriprasad Kachi	170	Gyan singh
33	Nirmal Paliwal	79	Umesh N Awashthi	125	Vishnu P. Yadav	171	Rama Singh
34	Kamal Paliwal	80	Badilal Yadav	126	Manoj K. Yadav	172	Mangal Singh
35	Santram Paliwal	81	Charanlal lukai	127	Munnalal Kachi	173	Govind Singh
36	Uttam Chand P		**Kevlari**	128	Kashavi P Kachi	174	Ramkumar Yadav
37	Shiv kumar Patel	82	Gandalal ji Patel	129	Sukhchan Kachi	175	Pram Singh
38	Naresh Patel	83	Jodhelalji Patel	130	Hivram Kachi	176	Heera bai
39	Gopal Patel	84	Bhagwandas Patel	131	Ramji Pra.d Singh	177	Shakun bai
40	Brajesh Patel	85	Lalchand Patel	132	Devendra Kachi	178	Kala Bai
41	Sabal Singh	86	Narayan Patel	133	Ragunath Kachi	179	Paravat Singh
42	Shive K. Sharma	87	Prabhu Narayan Patel	134	Lakhanlal	180	Mannulal Singh
	Paroda	88	Santlal Kori	135	Kishanlal Kachi		**Urdawa**
43	B Prasad Patel	89	Chirangilal Patel		**Imlai**	181	Ramlochan Patel
44	Ramkumar Patel	90	Rajkumar Patel	136	RamPrasad Kachi	182	Salegram Patel

Sno	Farmer name/ Village	Sno	Farmer name/ Village	Sno	Farmer name/ Village	Sno	Farmer name/ Village
183	Vishnu Prasad Patel	22	Rakesh Dixit	69	Hiramani Pandey	116	Bhairav P. Dwivedi
184	Chandramani Patel	23	Nand Kishore Dixit	70	Har Prashad Diw.	117	Arjun Dwivedi
185	Mannu Dahiya	24	Manoj Shrivastava	71	Ramdhani Tiwari	118	Ram Sundar Tiw.
186	Virendra Patel	25	Ramlal Tiwari	72	Raj K. Sharma	119	Bindeshwar Pandey
187	Hallu Barman	26	Ashok Tiwari	73	Rambabu Yadav	120	Tulshi Das Pandey
188	Sandeep Patel	27	Jagat Dev Tiwari	74	Shankar D. Tiwari	121	Nivash Pandey
	Chedi and Baroda	28	Dinesh diwevedi	75	Lallu Yadav	122	Rang Nath Pandey
189	Arvindra Giri	29	Surendra Tiwari	76	Daddi Ram Tiwari	123	Premlal Tiwari
190	Chottelal Patel	30	Kamta Pra.d Prajapati	77	Hargovind Tiwari	124	Basant Tiwari
191	Keshari Patel	31	Dinesh Tripathi	78	Sitaram Diwevedi	125	Sindhu Shukla
192	Vipin Patel	32	Mahendra Shukla	79	Rajmani Diwevedi	126	Pappu Tiwari
193	Yogenra Patel	33	Ramayan Pr.d Dixit	80	Ramgopal Tiwari	127	Ganga Tiwari
194	Lakhan Patel	34	Sobhnath Diwevedi	81	Lallan Diwevedi	128	Bala P.Mishra
195	Anil Patel	35	Narendra Sharma	82	Loknath Pandey	129	Jagdish P. Mishra
196	Sunil Kumar	36	Rajendra Prashad T	83	Akhilesh Kumar D	130	Vidyacharan C.
197	Kisan Patel	37	Ajay Tiwari	84	Raghvendra Singh	131	Santosh Kushwaha
198	Madhav Patel	38	Rammilan Tiwari	85	Vansh Gopal D	132	Jagdish Chaturvedi
199	Balram Patel	39	Shayam Sunder D	86	Pradeep Kumar	133	Pramod Tiwari
200	Ramesh Patel	40	Ramlal Diwevedi	87	Krishna Pal	134	Mahendra Tiwari
201	Rashami Patel	41	Ramlakhan mishra	88	Bhola P Sharma	135	Upendra Mishra
202	Savitri Patel	42	Shyam Diwevedi	89	Sajivan Prashad	136	D. Kushwaha
203	Rajendra Patel	43	Pradeep Mishra	90	Chakradhar Tiwari	137	Amritlal Tiwari
204	Sunil Patel	44	Krishna Tiwari	91	Naval Kishore T	138	Vinod Tiwari
205	Mohan Tiwari	45	Bhola Tiwari	92	Tulshi Das Tiwari	139	Nand K. Tiwari
206	Ramkrishan Soni	46	Lalloo Mishra	93	Jamuna Prashad T	140	Kamta Kushwaha
District: Rewa		47	Balmik Mishra	94	RamSujan	141	Premlal Tiwari
	Bahuri Bandh	48	Ramlakhan Diwevedi	95	Madhav Prashad T	142	Rajdhar Kushwaha
1	Rajbahadur Tiwari	49	Gayaprasad Sharma	96	S Niwash Sharma	143	B. Kushwaha
2	Balmik Tiwari	50	Sobhraj Tiwari	97	Manbharan Pandey	144	Shy. Sundar Mishra
3	Madan G. Tiwari		**Puraini**	98	Ramesh kumar T	145	Avadhesh Tiwari
4	Rambhola Tiwari	51	Ramkishore Tiwari	99	Nageshwar Pandey	146	Dinesh Pandey
5	Babulal Tiwari	52	Baulal Tiwari	100	Baijnath Pandey	147	Anil Tiwari
6	Ramruchi Sharma	53	chandrika Tiwari		**Saanw**	148	Brijendra Tiwari
7	Vidya P.T iwari	54	Gopal Tiwari	101	Ram Sujan Tiwari	149	Ram S. Mishra
8	Shankar Tiwari	55	Ramcharit Tiwari	102	Nathhulal Tiwari	150	D. Krishna Tiwari
9	Vinayak Tiwari	56	Ghanshyam Tiwari	103	Ram Swaroop T		**Tikiya**
10	Ramlakhan Tiwari	57	Suresh Tiwari	104	Rakesh Tiwari	151	Sidhyanarayan
11	K Lal Shrivastava	58	Dinesh Tiwari	105	Madhaw Pd. Tiwari	152	Pawan tiwari
12	Pushpraj Mishra	59	Brij kishore Tiwari	106	Indra Jeet Tiwari	153	Rambali Verma
13	Shivendra Sharma	60	Arun Tiwari	107	Bandhulal Tiwari	154	Cha.bhusan Verma
14	Ramayan Mishra	61	Shyam kishore	108	Shri Balmik Tiwari	155	Naresh Sharma
15	Kamta Prashad	62	Shailendra Tiwari	109	Laxhmi Pd. Sharma	156	Suresh Verma
16	Ramniwash Tiwari	63	Mithilesh Tiwari	110	Ram Bilash Tiwari	157	Satyaman Verma
17	Baidhnath Sharma	64	Jeevan Lal Diwevedi	111	Chhote Tiwari	158	Mahesh Verma
18	Virendra Sharma	65	Dwarika P. Tiwari	112	Bhaiyalal Pandey	159	Sanjeev Pandey
19	Manash Sharma	66	Kamleshwar Pandey	113	Ram Kripal Pandey	160	Jairam Verma
20	Ramraj Dwivedi	67	Dinesh Kumar D	114	Indra Jeet Mishra	161	Shivdhari Verma
21	Raj Dixit	68	Ramesh Kumar T	115	Baijnath Mishra	162	Moradhvaaj verma

Sno	Farmer name/ Village	Sno	Farmer name/ Village	Sno	Farmer name/ Village	Sno	Farmer name/ Village
163	Balram Verma	8	Praduman Singh	55	Ayodhya Singh	103	Chotelal
164	Jeetendra Verma	9	Pushpendra Singh	56	Brijrndra Singh	104	Phoolmati Singh
165	Krishnakumar	10	Kishorilal	57	Gajendra Singh	105	Indrapal Singh
166	Ramjagat Pandey	11	Sitasaral Singh	58	Parmeshwar Singh	106	Dhirendra Singh
167	Mudrika Verma	12	Ramkhilawan Singh	59	Ramesh Singh	107	Babulal Singh
168	Shivdhari Verma	13	Seetasaran Singh	60	Ganga Singh	108	Arun Singh
169	Ramsumiran Verma	14	Ramkhelawan Sahu	61	Baliraj Singh	109	Satyapal Singh
170	Ramruchi Verma	15	Heera Singh	62	Kamleshwar Sing	110	Man Singh
171	Shambhu Dahiya	16	Umanand Singh	63	Jagdeesh Singh		**Sajjanpur**
172	Dwarika dwivedi	17	Umesh Singh	64	Rambha Devi	111	Munnalal
173	Rajkishore Sharma	18	Santosh Singh	65	Chandrabhan Sing	112	Satyanarayan
174	Loknath Pandey	19	Narottam Singh	66	Jai Singh	113	Devraj Gupta
175	Kamleshwar Pandey	20	Bal Govind Singh	67	Ramsiya Singh	114	Sanjay Tiwari
176	Samaylal Tiwari	21	Ram Avtar Singh	68	Phulen Singh	115	Valmiki Gupta
177	Vishnudatt Tiwari	22	Umesh Singh	69	S Rajendra Singh	116	Mahendra Singh
178	Hargovind Verma	23	Baijnath Singh	70	Kuber Singh	117	Chandrabhan Singh
179	Sugam Prajapati	24	Sheshmani Singh	71	Bhuwneshwar Sin	118	Suman Singh
180	Rambali Verma	25	Rakesh Sen	72	Ramshana Singh	119	Brijraj Singh
181	Dilip kumar	26	Ravi Sunder Prajapati	73	Umakant Singh	120	Narendra Singh
182	Premshankar Tiwari	27	Ram Sunder Prajapati	74	S Dharindra Singh	121	Umesh Singh
183	Shivdhari Verma	28	Purlai Prajapati	75	Premkali Singh	122	Suryapratap Singh
184	Damodar P. Tiwari	29	Ramlal Singh	76	Mahendra Singh	123	Mahip Singh
185	Rambahar Verma	30	Ramgyan Singh	77	Virendra Singh	124	Ajay Singh
186	Sanjeev Kushwaha	31	Sudsen Singh	78	Rambhan Singh	125	Dinesh Singh
187	Balram Verma	32	Virendra Singh	79	Indrajeet Singh	126	Kamlesh Singh
188	Krishnaraj Verma	33	Rajkumari Singh	80	Shivendra Singh	127	Rekha Patel
189	Makhardwaj Verma	34	Kalawati Singh	81	Gajendra Singh	128	Lala Gadiya
190	Ramnihare Verma	35	Chandra Bhan Singh	82	Shri Neelu Singh	129	Rajesh Gadiya
	Veerkham	36	Suman Singh	83	Ravi Pratap Singh	130	Tarendra Singh
191	Umendra Tripathi	37	Sukhlal	84	Ramlakhan Singh	131	Kamlesh Singh
192	Pool Tripathi	38	Kadam	85	Sukhendra Singh	132	Rajwendra Singh
193	Shiv Naresh Gautam	39	Anil Singh	86	Sunder Singh	133	Dinesh Singh
194	Harivansh Tiwari	40	Mahendra Singh	87	Bitto Singh	134	Badri Singh
195	Mahesh Tiwari	41	Shyam Singh	88	Rohit Prasad	135	Samudra Singh
196	Kukesh Tiwari	42	Mohanlal Dwedi	89	Babloo Singh	136	Mahendra Singh
197	Deepak Tiwari	43	Pragyesh Singh	90	Maharniya Sin.	137	Ram Gyan Singh
198	Vinay Dwivedi	44	Pramod Shukla	91	Dheerj Singh	138	Vaijnath Singh
199	Raghuvansh Tiwari	45	Ramnarayan Tiwari	92	Pramod Singh	139	Ramhet Singh
200	Bala P. Tiwari	46	Santosh Singh	93	Godraj Singh	140	Sundar Singh
District: Satna		47	Awdesh Tiwari	94	Rajendra Singh		**Satri**
	Bathiya	48	Rajkumar Tiwari	95	Karamwati	141	Rajendra Singh
1	Shalikram Singh	49	Naseer Mohammad	96	Shivnath Singh	142	Lal Mani Singh
2	Rajendra Singh	50	Sudarshan Singh	97	Badri Singh	143	Indrapal Singh
3	Anil Dwedi	51	Shri Param Surat	98	Shyamkali Sin.	144	Surendra Singh
4	Laxmi P. Dwedi	52	Shri Laxmi Singh	99	Sawitri Singh	145	Dherrendra Singh
5	Santosh Tiwari		**Mataha**	100	Suryabhan Singh	146	Ramdeen Singh
6	Ram Samehi	53	Shri Mathura Singh	101	Ramdevda Singh	147	Shanti Singh
7	Mohit Singh	54	Shri Badri Singh	102	Ganesh Pal	148	Pushpendra Singh

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village
149	Ramsiya Singh		**Kherua**	55	Laxman singh	101	Dhooman K. Singh
150	Uma Singh	13	Anrat /Prahlad Singh	56	Kausalya Rani Singh	102	Santosh Rani/K Sngh
151	Gaya Singh	14	Heera / Prah. Singh	57	Vishnu Kodariya	103	Mulam/Dili Singh
152	Ramdas Singh	15	Phool / Madh. Singh	58	Dinesh Kodariya	104	Ganesh/Chatur Sing
153	Sugreev Singh	16	Dariyaw / P. Singh	59	Manak /Dh. Patel	105	Laxman/pooran singh
154	Badri Singh		**Halgaj**	60	Preetam / Gop.Singh	106	Khilan/Darai Singh
155	Chandrika Singh	17	Dhan singh	61	Bharat / Ram. Patel	107	Hukam/m. Singh
156	Chotelal Singh	18	Nanhe Bhai	62	Vinod Kodariya	108	Khunsai/Gadiwasi
157	Ramdayal Singh	19	Gopal/ Lakhu sahu	63	Khoob singh	109	Ratan/Durag Sing
158	Mohanlal		**Mudari**	64	Veeram patel	110	Prakash/U shingh
159	Shyam Dwedi	20	Madan / Jhu. Dubey	65	Deevan Patel	111	Komal/K.ram Singh
160	Arun Malviya	21	Kalyan / Nirpat singh	66	Narayan Singh	112	Munna/Dundi Adiwasi
	Ganesha	22	Hakam / Kaly. Singh	67	Jahar Singh	113	Trilok/Kalu Singh
161	Krishnalal		**Bamhori**	68	Mahendra Pandey	114	Lakhan/Lalu Shing
162	Puneet Singh	23	Sukhdev Singh		**Bandakpur**	115	Babu/Murat Singh
163	Ramcharan	24	Birsan Singh	69	Balmukund/R Dayal	116	Hari / Kanai Singh
164	Kundan Singh	25	Meerabai Singh	70	Komal / Ram. Patel	117	Heera/khuman Singh
165	Chandraman Singh	26	Deshraj Singh	71	Yogesh / Ram.Gupta	118	Daal/Madhav Shingh
166	Vishram Singh	27	Kausal Kisore	72	Jeevan Gupta/ Gupta	119	Suraj/Komal Singh
167	Ramnath Singh	28	Bhag Chandra	73	Neetesh Gupta	120	Daulat/Kasiram Shing
168	Suraj Prasad		**Hindoria**	74	Lal ji / R. Pujari	121	Dadubhai/R. Adiwasi
169	Santosh S. Patel	29	Laxman/Arjun Singh	75	Munna Swami /Sitar	122	Tulasiram/Lallu Singh
170	Sukhlal	30	Prahlad/Arjun Singh	76	Neeraj /RC Jain	123	Bagwandas/Dhansingh
171	Jeevendra Singh	31	Aman/Bhan Singh	77	Babulal / S Jain	124	Natthu/Jalam Singh
172	Indrajeet Singh	32	Shashikant/Gok.Tiwari	78	Rajkumar / Bab.Jain	125	Khilan/Nanhe Singh
173	Jahendra Singh	33	Shiv Narayan/M.Soni	79	Nirbhay Kumar/ Jain	126	Amar/Bhagun Singh
174	Mahendra Singh	34	Virendra/Naray. Singh	80	Suneel/ Babulal Jain	127	Mamata/L. Kacchhi
175	Rajesh Singh	35	Rizwaan/Md. Hanif	81	Gulab/Panch. Singh	128	Kusumbai/R Kacchhi
176	Rambali Singh	36	Taiyab/Abdul Hafeej	82	Dhanaiya/ P. Singh	129	Balaram /G Adiwasi
177	Sadashiv Singh	37	Asharam/Jagan. Yadav	83	Anand / E. Lal Jain	130	Rajesh/Hukam Shingh
178	Anil Singh	38	Lakhan/Bare Singh	84	Amit kumar/E. Jain	131	Halle/Nanhe Singh
179	Jay Naresh Singh	39	Kamla Bai/ L.Singh	85	Sumati Rani/E. Jain	132	Mulchandra/Adiwasi
180	Bhupendra Singh	40	Susila/Lakhan Singh	86	J. Kumar/Singh	133	Ramprasad/N Adiwasi
District: Damoh		41	Mahendra/Lakh. Singh	87	B. Patel/R Kumar	134	Khemchandra
	Surkhi	42	Tarvar/Nanhe Singh	88	Laxmiprasad/SP Soni	135	Govind/Rusai Adiwasi
1	Jitendra Singh	43	Anil/U. Chandra Jain	89	Khilan / CS Thakur	136	Ladli Bahun
2	Ramsingh	44	Munni bai/s.chaursiya	90	Badal / CharanSingh	137	Pancham/Pratap singh
3	Raghuvir Singh	45	Jan Md./Jalil Khan	91	Dry Singh/ C Singh	138	Bharat/H. Adiwasi
4	Ganpat Singh	46	Rahul/Vijay Singh	92	Ramnath / D Yadav	139	Kanchhedi/H. Adiwasi
5	Jeevan	47	Badi Bahun /A Singh	93	Doman/ Rth Yadav	140	Umasankar/R.Adiwasi
6	Kalu Patel	48	Gopal/halku Ramsingh	94	Ramesh / Ch. Jain	141	Param/P Adiwasi
7	Brajendra	49	Munna modi/m.haniff	95	Dharmendra/C.Yadav	142	Hemraj/Hukam Singh
8	Kashiram	50	Erfan/Md. Hanif	96	Santosh Rani/Yadav	143	Ganesh/Chatur Sing
9	Rajkumar	51	Bablu / Md. Hanif		**Nonepani**	144	Lal/Durag Singh
	Loharra		**Aanu**	97	Dhaniram/M Singh	145	Gabbi/Khulle Harijan
10	Kishori	52	Birju/ Nirpat Patel	98	Ram/Gopal Singh	146	Prabhu/R Sing Adiwasi
11	Santosh	53	Nahe Bhai/S. Chaube	99	Indrajeet/Gokalsingh		
12	Bhav Singh	54	Prahlad Singh/Kalian	100	Mohan/Kanai Singh		

Annexure V

List of VLSS demonstrations in individual farmer's fields during 2009-10

State: Chhattisgarh

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village
District: Raipur		**District: Durg**		**District: Rajnandgaon**		**District: Kabirdham**	
	Kumhalori		**Mohandi**		**Bharregaon**	1	T. Chandrawanshi
1	Girish Verma	1	Ramkumar	1	Dasrath Nandan	2	S. Chandrawanshi
2	Dogesh Verma	2	Kheduram	2	Khileshwar	3	Mogara Bai
3	Kamlesh Verma	3	Kriparam	3	Ramesh	4	Jeetu Ram Sahu
4	Kalika Verma	4	Sobhitram	4	Janki	5	Ram Sahu
5	Usha Verma	5	Jagannath	5	Bahadur		
6	Narayani Verma	6	Ashkaran	6	Neharu		
7	Dilip Verma	7	Satyanarayan				
8	Dauva Verma	8	Bhopesh				
9	Nand Ku. Verma	9	Dindayal				
10	Chandra Bhu. Verma	10	Jotendra				
11	Mani Sahu						
12	Aajuram Sahu						
13	Kunjlal Verma						

State: Madhya Pradesh

SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village	SNo	Farmer name/ Village
District: Jabalpur		**District: Rewa**		**District: Satna**			**District: Damoh**
SNo	**Umariya choubey and Saliya**	**SNo**	**Bahuri Bandh**	**SNo**	**Hindoria**	**SNo**	**Bathiya**
1	Vivak Patel	1	Baidhyanath Sharma	1	Asharam /Jaganath	1	Santosh K. Tiwari
2	Bijenra Patel	2	Krishnakant Sharma	2	Md. Rijwan/ Harif	2	Pradumnath Dwedi
		3	Ramdhar Tiwari				

8. Financial Report: Submitted later