



Promotion of Improved Chickpea Varieties In Rice-Based Cropping Systems of Smallholder Farmers in Odisha

2014-2015 Annual Accomplishment Report
and 2015-16 Physical Targets



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June 12, 2015

Dr Pramod K Meherda
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Dear Dr Meherda,

Subject: **2014-15 Physical and Financial Accomplishment Report and 2015-16 Physical Target re: 'Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems of Smallholder Farmers in Odisha'**

Greetings!

We are happy to submit the **2014-15 Physical and Financial Accomplishment Report and 2015-16 Physical Target re: 'Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems of Smallholder Farmers in Odisha'**. The project covered 401 ha in its initial year as against a target of 350 ha, covering two districts (Keonjhar and Mayurbhanj). While the initial proposed area was 700ha, this was reduced to 50%, with the consent of the Govt of Odisha, due to late approval and delayed implementation of the project.

The project started sowing in December 2014, with ICRISAT delivering 21.17 tons chickpea seed of various seed class. A total of 76.8 ha were sown under ICPT, out of which only 58.6 ha were harvested owing to damage caused by unscheduled rains during the sowing and vegetative stage. Farmers benefited due to their traditional practice of selling their produce as fresh greens. A total of 494,500 bundles of fresh greens were sold locally and in adjacent districts at a price of ₹10/bundle, fetching a staggering ₹4.9 million (M). It is observed that farmers gain more profit from selling their produce as fresh greens than as seeds. Even under the seed production component of this project, the selected farmer seed growers sold majority of their produce as fresh greens. A total of 1,066,250 bundles were sold with street value of ₹10.66 M benefitting 474 smallholder farmers (36 female).

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The institutionalization of the seed system in the state will be challenging and tough because of the limitation and non-competitive pricing of fresh greens. Securing quality seeds during harvest is very difficult because of this practice and the low price of seed purchase established by the Govt. of Odisha. In this regard, DoA has to increase the buying price of various seed class in order to sustain the production of quality seeds in the state. With this scenario, only a total of 10 tons of various seed class were procured by the project for 2015-16 cropping season.

To strengthen the developmental phase of the project, the seed multiplication and backup research at ICRISAT have started with the production of nucleus seeds of a heat tolerant chickpea variety JG 14 (ICCV 92944); developing breeding lines suitable for rainfed rice fallow conditions by combining traits like early maturity, drought and heat tolerance and high yield; evaluation of 18 advanced breeding lines of desi chickpea for their yield performance under rainfed conditions; evaluation of 20 advanced breeding lines of desi plant type during normal season for drought tolerance, and the evaluation of the same set, for heat stress tolerance under late planting conditions was carried out during February to April 2015.

Furthermore, enhancing the farmer's knowledge on new technology was through various awareness meetings, seminar-workshops, trainings on crop seed production, IPM/IDM, and Farmer's Field Day. Through these, the project reached out to 1,382 farmers, local technicians and some NGOs as well. The project also attended the State Level Agricultural Exhibition, showcasing ICRISAT's mission, vision and strategy.

For 2015-16 cropping season, the project will cover a total 2,565 ha in three districts (Keonjhar, Mayurbhanj, and Sundergarh). The area breakup under the four components planned is: 1,350 ha for improved chickpea production technology (ICPT); 300 ha for front line demonstration (FLD); 180 ha for farmers' participatory varietal selection trial (FPVST); and 735 ha for seed production (SP).

We wish to thank you very much for your continuous support to the project.

With warm regards,



Ms Joanna Kane-Potaka
Director
Strategies Marketing and Communication

Copy: Mr Saroj Das, Deputy Director for Pulse, Govt of Odisha
Drs Peter Carberry / Rajeev K Varshney / Myer G Mula / PM Gaur / Ms Supriya Bansal, ICRISAT

Promotion of Improved Chickpea Varieties In Rice-Based Cropping Systems of Smallholder Farmers in Odisha

2014-2015 Annual Accomplishment Report
(July 2014-June 2015)

and

2015-16 Physical Targets
(July 2015-June 2016)

Compiled and Written by

MG Mula, PM Gaur, S Srinivasan, PK Meherda and SK Das

Submitted to

The Director

Department of Agriculture and Food Production
Bhubaneswar, Odisha
(RKVY Sub-scheme)

This work has
been undertaken
as part of the



RESEARCH
PROGRAM ON
Grain Legumes

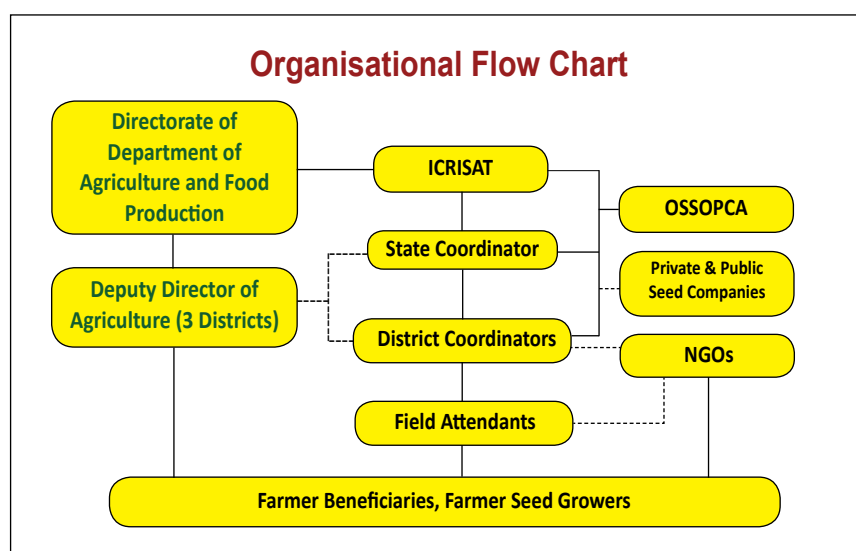


**International Crops Research Institute
for the Semi-Arid Tropics**



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The flow chart shows the organizational setup within the project. It illustrates the project structure in terms of relationships among personnel or departments, as well as distinctively shows the lines of authority and responsibility within the project.

Figure 1. Project's Organizational Flow Chart.

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Section 1:
2014-15 Annual Accomplishment Report
(July 2014-June 2015)

2014-15 Annual Accomplishment Report

Background Information

Odisha is located on the Indian subcontinent's east coast, by the Bay of Bengal (17.49°N to 22.34°N and 81.27°E to 87.29°E). The total cropped area of the state during *Kharif* is about 5.8 million hectares (m ha) of which 2.5 m ha is utilized during *Rabi* season (Odisha Agriculture Statistics 2011-2012). However, out of the total cropped area, roughly 1.3 m ha are under the rice-fallow cropping system in 30 districts. Mainly dependent on agriculture, about 83-86 % of farmers are small and marginal. About 75% of the cultivated areas have red soils and 25% black soils. Nutrient imbalance in soils is a major impediment to crop production with major deficiencies of zinc, calcium and magnesium in light-textured acidic soils; low availability of phosphorus and molybdenum and fixation of applied phosphate; low nitrogen fixation by symbiotic and non-symbiotic bacteria; and aluminum and manganese toxicity in upland situation.

Odisha's ecology and weather have undergone a noticeable alteration due to climate change, which is responsible for reduction in production of pulses by 56.4%. Considering this adverse effect of climate change, sustainable farming systems, with improved food security need to be established that are appropriate for and tolerant towards, a specific area and its climate. Given these conditions, there is a need to increase production of pulses by utilizing the area under rice-fallow cropping system practiced by smallholder farmers of Odisha.

Chickpea is the second largest produced food legume globally and India is the largest producing country with production of about 8.2 metric tons (MT). It is an important source of protein (23%) and contains 47% carbohydrates, 5% fat, 6% crude fiber, and 6% soluble sugar as well as other minerals such as iron, copper, zinc and magnesium.

Besides the nutritional benefits derived, chickpea plays a significant role in improving soil fertility by fixing atmospheric nitrogen up to 140 kg/ha, which goes on to provide substantial amounts of residual nitrogen for subsequent crops while adding organic matter that maintains and improves soil health and fertility. Chickpea therefore, has several qualities, which can fulfil the nutritional, social, and economic needs of Odisha's smallholder farmers. It is expected that integrating chickpea production with appropriate soil and nutrient conservation techniques will pave the way for agricultural prosperity in the rainfed ecosystems of Odisha.

Pulses in Odisha: Chickpea, pigeonpea, black gram and green gram are among the major pulses covering 1.3 m ha during *Rabi* in 30 districts of Odisha. However, the productivity is stagnant at 508 kg/ha which is well below the national average of 786 kg/ha.

Chickpea is widely grown in Odisha but only 41,910 ha are sown during *Rabi* due to non-availability of quality seeds. The average productivity is recorded at 780 kg/ha. The chickpea seed system in Odisha is not well established and this forces the smallholder farmers to save their own seeds year after year or to get it from other farmers as there is no proper access to good seeds. Approximately 80-90% of all planting material used is largely sourced from farmers' saving seed from own harvest and using them for re-sowing, seed sharing, bartering and selling.

Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems: A large section of farmers in Odisha are isolated from improved chickpea cultivars and better management practices for various reasons, the main one being non-availability of a strong seed supply system, that could make available good quality and high yielding cultivars to smallholder farmers. This requires development and accelerated replication of good seeds production and delivery systems which will give farmers access to adapted, stress-tolerant, highly productive and market-preferred cultivars. Our strategy is geared to meet the seed needs and the utilization of fallow lands with poor resources or highly commercialized farmers. For this, both formal and informal seed sectors will be involved and further strengthened. On the consumer/user side, our vision is, the creation of seed production and delivery systems which can process a range of high quality

chickpea seeds to make them widely available even in remote areas and render them affordable to a wider population. On the supply side, the vision is to promote economically-sustainable enterprises, open to chickpea innovations. Highly effective seed systems can help forge the path to real production stability and raise rural incomes, mainly of the women, and the poor, thus contributing to the development of sustainable livelihoods.

The project '**Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems of Smallholder Farmers in Odisha**' is funded by the Department of Agriculture and Food Production, Government of Odisha, India and through the Rashtriya Krishi Vikas Yojana (RKVY) sub-scheme No. AG(RKVY)60/2014/17759. This was approved on October 20, 2014, for a period of 4 years from 2014 to 2018 with a total budget of ₹785.58 lakh (US\$1.23 million).

Executive Summary

While in the initial year, the project was supposed to cover 350 ha, a total of 401 ha was sown covering two districts (Keonjhar and Mayurbhanj). The reason for reducing the area to 50% from the targeted 700 ha was the late approval and delayed implementation of the project with the consent of the Govt of Odisha. The project started sowing in December with ICRISAT delivering 21.17 tons of various seed class. A total of 76.8 ha were sown under ICPT and out of which only 58.6 ha were harvested due to climatic factors like unscheduled rainfall during sowing and vegetative stage. Farmers benefited due to their tradition of selling their produce as fresh greens. A total 494,500 bundles of fresh greens were sold locally and in adjacent districts with a price of ₹10/bundle fetching a staggering ₹4.94 million (M), benefitting 190 smallholder farmers including 30 women farmers. It was observed that farmers gain more profit from selling their produce as fresh greens than as seeds.

Even under the projects' seed production component, the selected seed grower farmers sell majority of the various seed class produce as fresh greens. The institutionalization of the seed system in the state will be challenging and tough because of the limitation and non-competitive pricing of fresh greens than seeds. Securing quality seeds during harvest is very difficult as farmers opted to sell their produce as fresh green pods, due to higher market value, as compared to the price of seeds pegged by the Govt. of Odisha. A total 1,066,250 bundles were sold with a street value of ₹10.66 M benefitting 474 smallholder farmers (36 female). In this regard, DoA has to increase the buying price of quality seeds in order to sustain the production of quality seeds in the state. Another limitation is that very few farmers saved their own seeds for next cropping season because of the difficulty in preserving the seeds for 8 months long period due to pests, low dormancy during next sowing, and no post-harvest facility. Farmers chose to sell their produce because of their belief that seeds can be purchased easily during the cropping season (even though it is not of high quality). With this scenario, only a total of 10 tons of various seed class were procured by the project for 2015-16 cropping season.

To strengthen the developmental phase of the project, at ICRISAT, the seed multiplication and backup research has started the production of nucleus seeds of a heat tolerant chickpea variety JG 14 (ICCV 92944); developing breeding lines suitable for rainfed rice fallow conditions by combining traits such as, early maturity, drought and heat tolerance, and high yield; evaluation of 18 advanced breeding lines of desi chickpea for their yield performance under rainfed conditions; and evaluation of 20 advanced breeding lines of desi plant type during normal season for drought tolerance, and the same set is being evaluated for heat stress tolerance under late planting conditions during February to April 2015.

Enhancing farmer's knowledge on growing chickpea by introducing new technology was fruitful, by reaching out to 1,382 smallholder farmers, local technicians, including NGOs through various awareness meetings, seminar-workshops, trainings on crop seed production, IPM/IDM, and Farmer's Field Day. The project also had the opportunity to attend the State Level Agricultural Exhibition, showcasing ICRISAT's mission, vision and strategy.

Physical Accomplishment

Seed Distribution

A total of 21.17 tons seeds of various seed class, to cover 401 ha, were delivered to the project sites of Keonjhur and Mayurbhanj district (Table 1). In Keonjhur, 11.17 tons of various types of seeds were distributed to cover 242 ha while in Mayurbhanj, 10 tons were used across 159 ha.

Table 1. Seed distributed by districts.

District	Variety	Seed class	Quantity (kg)	Area (ha)
Keonjhur	JAKI-9218	Breeder	3,180	106
	JG-14	Foundation	600	9.6
	JG-14	Certified	240	7.2
	JG-14	Truthful	1,600	32
	VIHAR	Nucleus	100	1.6
	KAK-2	Nucleus	100	1.6
	JAKI-9218	Nucleus	250	4
	JAKI-9218	Certified	5,100	80
Sub-total			11,170	242
Mayurbhanj	JAKI-9218	Breeder	2,375	38
	JG-14	Certified	575	9.2
	JG-14	Truthful	900	14.4
	VIHAR	Nucleus	150	2.2
	KAK-2	Nucleus	50	0.75
	JAKI-9218	Nucleus	200	3
	JAKI-9218	Certified	5,750	92
Sub-total			10,000	159.55
Total			21,170	401.55

Improved Chickpea Production Technology (ICPT)

The technology of growing chickpea at a commercial scale has been inculcated to farmers before sowing of seeds through hands-on training and awareness meetings. A total of 76.8 ha were sown using ICPT, but only 58.6 ha were harvested, as climatic factors like unscheduled rainfall during sowing and vegetative stage affected yields (Table 2). About 190 smallholder farmers (including 30 women farmers) benefited by selling their produce as fresh greens. A total 494,500 bundles of fresh greens were sold locally and in adjacent districts with a price of ₹10/bundle and farmers generates a gross income of ₹100,000 per ha which is way above the income gained by growing chickpea for seed production. Very few farmers saved their own seeds for the next cropping season because of the difficulty faced in preserving them (due to pest, low dormancy during next sowing, and no post-harvest facility) over a period of 8 months. Farmers chose to sell their produce because of their belief that seeds can be purchase easily during the cropping season (even though it is not of high quality).

Keonjhur: A total 32 ha was planted under ICPT in Champua block. Smallholder farmers (71 beneficiaries including 5 women farmers) were provided with 1,600 kg seeds of JG-14 (TL) (Table 2). Sowing commenced on 15th December 2014, and the delay was not only due to late execution of the project, but also due to heavy and continuous rainfall during early December,

which affected sowing time and crop growth. However, in spite of these climatic factors, most the ICPT fields were in good condition. As a practice, farmers opted to sell their produce as fresh greens, due to higher market value, than producing the seeds (Table 2). It was found that each bundle, which constituted 10 chickpea plants, fetches ₹10 at the local market. A farmer can produce about 10,000 bundles per ha and earn a gross income of ₹100,000, making a net profit of more than ₹40,000/ha, which is a far more than ₹20,000-30,000 net income derived from seed production. The initial reaction of farmers to the ICPT was very satisfactory due to higher yield and better taste of chickpea compared to their earlier local preference.

Mayurbhanj: Out of 76.8 ha sown, a total 58.6 ha was harvested and a majority sold their produce as fresh greens, than selling their produce as seeds (Table 2). Around 18 ha sown were damaged due to continuous rainfall during sowing and early vegetative phase.

Table 2. Status of improved chickpea production technology (ICPT) in 2 districts.

District and Block	Variety	Area		Farmers			Production			
		Sown (ha)	Actual (ha)	Male	Female	Total	Fresh Green (No. of bundles)	Cost/ bundle (₹)	Total sales (₹)	Kept Seeds (kg)
Keonjhar										
Champua	JG 14	32	32	66	5	71	320,000	10	3,200,000	-
Sub-total		32	32	66	5	71	320,000	10	3,200,000	-
Mayurbhanj										
Karanjai	JG 14	3.6	2	15	-	15	7,000	10	70,000	100
	JAKI 9218	4	3	16	3	19	10,000	10	100,000	200
Joshiapur	JAKI 9218	6	5.6	10	2	12	49,000	10	490,000	-
Saharpada	JG 14	10.8	4	14	10	24	3,500	10	35,000	400
	JAKI 9218	20.4	12	39	10	49	105,000	10	1,050,000	500
Sub-total		44.8	26.6	94	25	119	174,500	10	1,745,000	1,200
Total		76.8	58.6	160	30	190	494,500	10	4,945,000	1,200

Note: 1 bundle constitute 10 plants for Desi and 2-3 plants for Kabuli.

Seed Systems

There is a need to establish, enhance and strengthen Odisha's formal and informal seed sector, to meet the requirement of quality seeds and new high yielding cultivars of chickpea by smallholder farmers. The seed system model was formed in this project to put in place the 'seed village system' concept (Figure 2), as the formal seed sector is unable to make timely supply of the huge volume of quality seeds, required by the farmers. The benefit of partnering with the Seed Certifying Agency, OSSOPCA, has led to the strengthening and institutionalization of the informal seed production system in the two districts.

The project has identified farmer seed growers at village level, to produce different seed classes (Breeder, Foundation, Certified and Certified 2 seeds) of high yielding, disease resistant varieties of chickpea. The varieties used were within the national guidelines of 10 year notification. The participation of OSSOPCA is critical in monitoring and certifying good quality seeds of farmer-preferred varieties. A continuous delivery of pure seeds to farmers will enhance seed production and quality of seeds. ICRISAT will continuously supply Breeder seeds of farmer-preferred varieties to selected progressive farmer seed growers to multiply into Foundation seeds. The

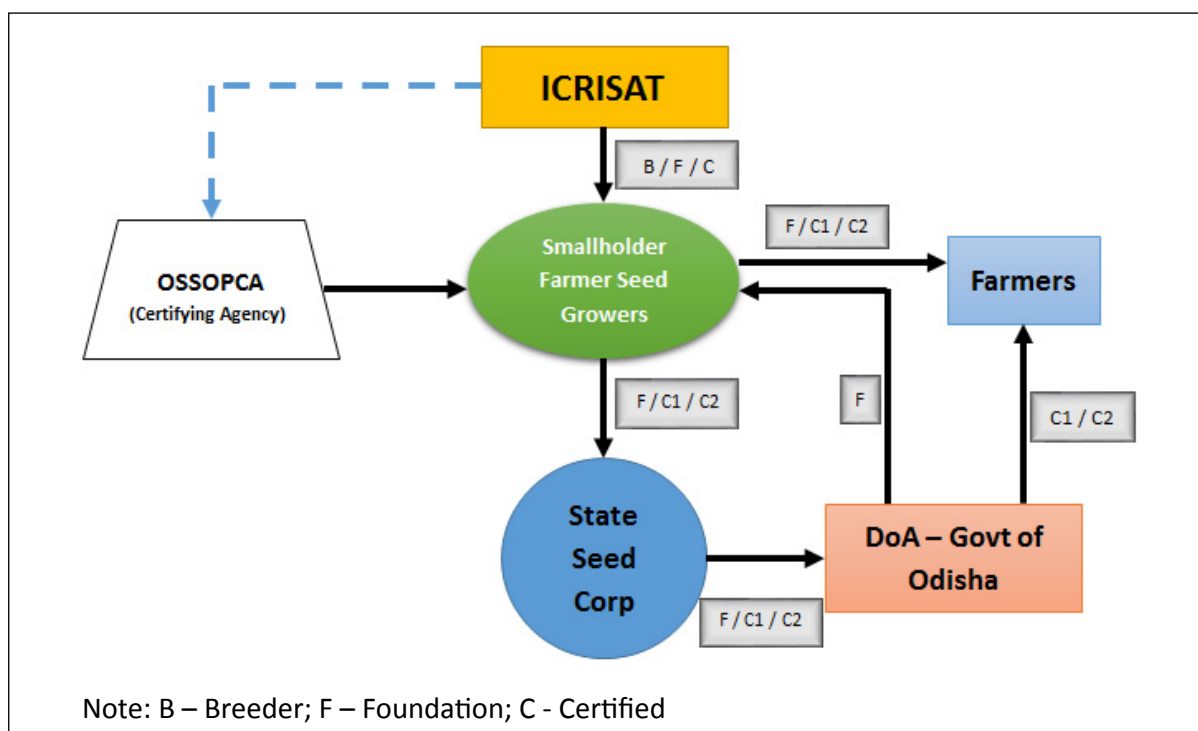


Figure 2. Chickpea seed system model in the Odisha project

Foundation seeds produced will then be distributed to selected farmer seed growers for seed multiplication of Certified and Certified 2 seeds. The entire seed production process will be carried out under the guidance of OSSOPCA during monitoring and certification. However, the limitation of securing the seeds during harvest is very challenging because farmers opt to sell their produce as fresh green pods due to higher market value as compared to the price of seeds pegged by the Govt. of Odisha. A total of 1,066,250 fresh green bundles were sold with street value of ₹10.66 M benefitting 474 smallholder farmers (36 female).

Certified Seed Production

In 97.5 ha, the seed production program was successfully implemented, out of a total of 147.5 ha sown, benefitting 267 smallholder farmers (including 31 women farmers). The reduction in area output was due to late project implementation, and damage by continuous rainfall during the early vegetative phase (Table 3). Only 4,643 kgs of certified seeds were procured by the project due to farmer's selling their produce as fresh greens. This occurred in spite of the project staff creating awareness during the selection of farmers about the projects main intension being the development and maintenance of various seed class.

Keonjhar: A total of 41.5 ha of chickpea were successfully grown and harvested from the 77.5 ha of sowing, due to continuous rainfall during and after sowing which resulted in rotting of seeds (Table 3). Smallholder farmers (total of 86 including 6 women farmers) were keener on selling their produce as fresh greens (due to higher market value and quick returns) than producing the seeds. Only a few seeds were retained and sold for the project.

Mayurbhanj: Of the 70 ha sown, 56 ha were harvested; benefitting 181 farmers (including 15 women farmers). The crop loss was due to late sowing and damage from continuous rainfall during the early vegetative stage. Only 2,651 kg of seeds were procured by the project as the bulk of the production was sold as fresh greens by the farmers (Table 3).

Table 3. Certified seed production by district and block.

Location	Variety	Class	Area		Farmers (no)			Production						
			Sown (ha)	Actual (ha)	Male	Female	Total	Fresh		Seeds				
								Bundles (no)	Cost (₹/ bundle)	Total (₹)	Sold (kg)	Cost (₹/kg)	Total (₹)	Kept (kg)
Keonjhar														
KSadar	JAKI 9218	C2	64.0	28	29	-	29	70,000	10	700,000	1,565	45	70,425	200
Jhumpura	JG 14	C1	9.6	9.6	27	4	31	50,000	10	500,000	427	45	19,215	100
	JG 14	C2	3.9	3.9	24	2	26	39,000	10	390,000	-	-	-	-
Sub-total			77.5	41.5	80	6	86	159,000	10	1,590,000	1,992	45	89,640	300
Mayurbhanj														
Karanjia	JAKI 9218	C2	9.2	7	19	6	25	60,000	10	600,000	410	45	18,450	540
	JG 14	C2	9.2	8	41	-	41	70,000	10	700,000	130	45	5,850	150
Joshiapur	JAKI 9218	C2	51.6	41	106	9	115	315,000	10	3,150,000	2,111	45	94,995	300
Sub-total			70.0	56	166	15	181	445,000	10	4,450,000	2,651	45	119,295	990
Total			147.5	97.5	246	31	267	604,000	10	6,040,000	4,643	45	208,935	1290

Foundation Seed Production

A total of 62.8 ha were harvested out of 80.4 ha sown, due to damage from continuous rainfall during the early vegetative stage (Table 4). It was noted that even when we informed farmers to retain their crop production for seeds, they still opted to sell most of their crop as fresh greens, due to high returns. A total of ₹4.57 M was generated out of fresh greens, while the returns from seeds would have been ₹167,265.

Keonjhur: Of the total cultivated area of 42.4 ha, around 36.8 ha were harvested. The reason for the decrease in area was due to continuous rainfall after sowing which led to 5.6 ha crop damage (Table 4). A total of 189 smallholder farmers including 5 women farmers benefitted, and just like in ICPT, farmers opted to sell their produce as fresh greens due to better income. This practice has affected the concept of seed production to sustain quality seeds in the district and the state as a whole. The project staff has continuously created awareness among the beneficiaries regarding the concept of seed production, but they are unable to relate to it, due to higher income they receive from the practice of selling their produce as fresh greens. A total 230,000 bundles were sold in the local market and adjacent districts, fetching about ₹2.3 M (Table 4). A small quantity of seeds was retained by some farmers, for sowing in the next cropping season or to be used as dal.

Mayurbhanj: A total of 26 ha were successfully harvested and the production of green fresh recorded was 227,000 bundles, with the street value of ₹2.27 M (Table 4). Of the seeds harvested, only 209 kg were sold to the project and 450 kg of seeds were retained for sowing in the 2015-16 cropping season.

Breeder Seed Production

The project introduced the concept of multiplying breeder seeds in the farmer's field under the supervision of the ICRISAT breeder. A total 14.35 ha were sown using nucleus seeds of Vihar, KAK 2 and JAKI 9218 in Keonjhur and Mayurbhanj, involving 18 farmers (Table 5). However, only 9.4 ha gave satisfactory results with the seed production of 1,692 kgs. The rest of the area was not productive as, in Mayurbhanj farmers opted to sell some of their produce as fresh greens, (Table 5). The project purchased the foundation seeds to be used as planting materials during 2015-16 cropping season.

Seed Certification

Certification of seeds is an important component of a developmental project to sustain quality seeds. The role of the seed certification agency begins with the seed sowing phase, up to the processing of seeds. The Assistant Seed Certification Officer (ASCO) was actively involved in the seed certification process. Out of the 227.9 ha sown, a total 181.9 ha were registered and inspected (Table 6). However, only 51.5 ha of various seed class were certified because 130.49 ha were rejected due to isolation and distance, dibbling method of sowing, and damage from insect pest and diseases while 45.91 ha were damaged due to rainfall.

Keonjhur: A total 77.9 ha were registered and inspected out of 119.9 ha sown. However, only 15.2 ha were certified and the remaining 62.79 ha were rejected due to isolation problems, dibbling method of planting, mixed cropping, and insect and pest infestation while 41.91 ha were damage from rainfall (Table 6).

Mayurbhanj: Only 36.30 ha were certified of various seed class by OSSOPCA out of the total 108 ha sown. As shown in Table 6, total registered and inspected was 104 ha and OSSOPCA rejection totaled to 67.70 ha due to mixed cropping, isolation problems and insect pest infestation while 4 ha was due to damage caused by rainfall.

Table 4. Foundation seed production by district and block.

Location	Variety	Class	Area		Farmers (no)			Production						
			Sown (ha)	Actual (ha)	Male	Female	Total	Fresh		Seeds				
								Bundles (no)	Cost (₹/ bundle)	Total (₹)	Sold (kg)	Cost (₹/kg)	Total (₹)	Kept (kg)
Keonjhar														
Jhumpura	JAKI 9218	F	28	26	79	4	83	150,000	10	1,500,000	3328	45	149,760	500
Champura	JAKI 9218	F	14.4	10.8	23	1	24	80,000	10	800,000	180	45	8,100	200
Sub-total			42.4	36.8	102	5	107	230,000	10	2,300,000	3508	45	157,860	700
Mayurbhanj														
Karanjai	JAKI 9218	F	23.6	16	57	-	57	140,000	10	1,400,000	17	45	765	250
Joshiapur	JAKI 9218	F	14.4	10	25	-	25	87,000	10	870,000	192	45	8,640	200
Sub-total			38	26	82	-	82	227,000	10	2,270,000	209	45	9,405	450
Total			80.4	62.8	184	5	189	457,000	10	4,570,000	3717	45	167,265	1150

Table 5. Breeder seed production by district and block.

Location	Variety	Class	Area		Farmer (no)			Production						
			Sown (ha)	Actual (ha)	Male	Female	Total	Fresh		Seeds				
								Bundles (no)	Cost (₹/ bundle)	Total (₹)	Sold (kg)	Cost (₹/kg)	Total (₹)	Kept (kg)
Keonjhar														
KSadar	Vihar	B	1.6	0.8	1	-	1	-	-	100	80	8,000	-	
	KAK 2	B	1.6	0.4	1	-	1	-	-	87	80	6,960	-	
	JAKI 9218	B	4.0	3.2	1	-	1	-	-	550	50	27,500	-	
Sub-total			7.2	4.4	3	-	3	-	-	737	80/50	42,460	-	
Mayurbhanj														
Karanjai	KAK 2	B	0.8	0.8	1	-	1	1,550	10	15,500	25	2,000	25	
	JAKI 9218	B	1.6	1.6	5	-	5	2,500	10	25,000	159	7,950	41	
	Vihar	B	0.2	-	1	-	1	-	-	-	-	-	-	
Joshiapur	Vihar	B	1.4	1.1	2	-	2	1,000	10	10,000	360	28,800	50	
	JAKI 9218	B	0.8	0.5	2	-	2	200	10	2,000	211	10,550	-	
Saharpada	KAK 2	B	0.75	0.5	2	-	2	-	-	-	90	7,200	-	
	Vihar	B	0.6	0.5	1	-	1	-	-	-	110	8,800	-	
	JAKI 9218	B	1.0	-	1	-	1	-	-	-	-	-	-	
Sub-total			7.15	5.0	15	-	15	5,250	10	52,500	955	80/50	65,300	116
Total			14.35	9.4	18	-	18	5,250	10	52,500	1692	80/50	107,760	116

Table 6. Various seed class certified by OSSOPCA by district.

Location	Variety	Class	Sown (ha)	Seed production (ha)				
				Registered	Inspected	Certified	Rejected	Damage
Keonjhur	JAKI 9218	F	42.40	36.80	36.80	8.10	28.70	5.60
	JAKI 9218	C2	64.00	27.69	27.69	3.60	24.09	36.31
	JG 14	C1	9.60	9.60	9.60	2.80	6.80	-
	JG 14	C2	3.90	3.90	3.90	0.70	3.20	-
Sub-total			119.90	77.99	77.99	15.20	62.79	41.91
Mayurbhanj	JAKI 9218	F	38.00	36.40	36.40	13.80	22.60	1.60
	JAKI 9218	C2	60.80	58.80	58.80	19.20	39.60	2.00
	JG 14	C2	9.20	8.80	8.80	3.30	5.50	0.40
Sub-total			108.00	104.00	104.00	36.30	67.70	4.00
Total			227.90	181.99	181.99	51.5	130.49	45.91

Seed Multiplication and Backup Research at ICRISAT

Quality seed multiplication and distribution

Nucleus seed production of a heat tolerant chickpea variety JG 14 (ICCV 92944) was undertaken at the research fields of ICRISAT, Patancheru, Hyderabad, during *Rabi* 2014-15. Two hectare block was prepared and seeds planted at 20 x 60 cm spacing on a ridge and furrow system. Planting was done after cessation of monsoon rainfall on 19th October 2014. Crop was kept weed-free throughout the growth period and protected from insect pest and diseases. Under supervision of scientists, seed production block was observed periodically at a 30 day, 50 day, 70 day and 90 day interval after sowing and off-types were removed based on flower color, growth habit, flowering time and days to maturity. The harvested bulk seeds were cleaned carefully, by removing all inert materials, foreign seeds, damaged seeds and shriveled seeds using mechanical grading machines. A total of 2.1 ton of nucleus seed was produced.

Seed production of JG 14 variety was also undertaken at the farmers' fields near Patancheru, Hyderabad during 2014-15 *Rabi* season where the crop was grown under complete rainfed conditions. Four farmers were given informal training on seed production technologies. Scientists visited the farmers' fields during the flowering and harvesting stage for monitoring the seed production activities. After harvesting, 2 ton of labelled seeds were procured from the farmers. Crop failures were observed by few farmers, who harvested chickpea late (February 2015) due to heavy rainfall at maturity stage.

Backup Research

Backup research at ICRISAT aimed at developing breeding lines suitable for rainfed rice fallow conditions by combining traits like, early maturity, drought and heat tolerance, and high yield has been initiated. In this direction several crosses, made between popular chickpea varieties and breeding lines, with tall and erect plant types were carried out. Segregating populations of these crosses were advanced from F₃ to F₄ (Table 7) and F₄ to F₅ (Table 8) under rainfed conditions. Single plant selections were made from these populations at various growth stages based on early flowering, erect growth habit, and early maturity, for developing progenies. Post-harvest processing of selected plants is in progress and the number of selections made in each cross will be shared in the next report.

Table 7. List of F₃ populations advanced during *rabi* 2014-15.

S No	Female parent	Male parent	S No	Female parent	Male parent
1	JG 11	ICCV 96836	17	ICCV 95333	ICC 7308
2	N BeG 3	ICCV 96836	18	Vihar	ICC 7308
3	JAKI 9218	ICCV 96836	19	JGK 1	ICC 7308
4	ICCV 10	ICCV 96836	20	JGK 2	ICC 7308
5	JG 11	ICCV 05113	21	ICCV 95334	ICC 7308
6	JG 14	ICCV 05113	22	ICCV 95333	ICCV 01301
7	JG 16	ICCV 05113	23	KAK 2	ICCV 01301
8	N BeG 3	ICCV 05113	24	JGK 1	ICCV 01301
9	JAKI 9218	ICCV 05113	25	JGK 2	ICCV 01301
10	ICCV 10	ICCV 05113	26	ICC 17109	ICCV 01301
11	JG 11	ICCV 05103	27	ICCV 95334	ICCV 01301
12	JG 14	ICCV 05103	28	JG 14	ICC 7323
13	JG 16	ICCV 05103	29	JG 16	ICC 7323
14	N BeG 3	ICCV 05103	30	JGK 1	ICC 7323
15	JAKI 9218	ICCV 05103	31	KRIPA	ICC 7323
16	ICCV 10	ICCV 05103	32	KAK2	ICC 7323

Table 8. List of F₄ populations advanced during *rabi* 2014-15.

S No	Female parent	Male parent
1	JG 11	ICCV 11601
2	JAKI 9218	ICCV 11601
3	JG 130	ICCV 11601
4	JG 16	ICCV 11601
5	ICCV 97105	ICCV 11601
6	ICCV 10	ICCV 11601
7	JG 14	ICCV 11601
8	JG 14	ICCV 96836
9	JG 16	ICCV 96836
10	ICCV 96836 x GG 2	ICC 4958 TM x JG 11
11	ICCV 96836 x JG 11	ICC 4958 TM x JAKI 9218
12	ICCV 96836 x JAKI 9218	ICC 4958 TM x JG 130
13	ICCV 96836 x JG 130	ICC 4958 TM x ICCV 97105
14	ICCV 96836 x ICCV 97105	ICC 4958 TM x GG 2

Evaluation of early maturing chickpea breeding lines under rainfed conditions

Eighteen advanced breeding lines of desi chickpea were evaluated for their yield performance under rainfed conditions during *Rabi* 2014-15. The experiment was conducted in randomized block design with three replications. JAKI 9218 and JG 11 were used as checks. Sowing was done on 19th October 2014 after the cessation of monsoon rainfall in vertisol. No supplementary irrigation was provided during the crop season, but the crop received 3.4 cm rainfall at 35 days after sowing. Each genotype was grown on a 4 m long broad bed (1.5 m wide) in 4 rows; each row was separated by 30 cm and the space was 10 cm between plants. The crop was regularly monitored for insect and disease incidence and necessary plant protection measures were taken to raise a healthy crop. Agronomic observations on phenology and yield related traits were recorded during the crop growth period. Flowering of genotypes varied from 39-45 days, whereas maturity was in the range of 96-101 days. Yield of genotypes were compared with the best check (JAKI 9218) and several lines, producing on par yield with JAKI 9218 were identified (Table 9). Seed size of these selected lines was in the range of 22-31g. The top lines selected in this trial will be evaluated further under rice-fallow conditions at farmers' fields for their establishment and yield related traits.

Table 9. List advanced breeding lines evaluated during *Rabi* 2014-15 under rainfed conditions.

Entry No	Entry Name	Days to flower	Days to maturity	Plant Height	Yield (kg/ha)	100 Seed weight	Harvest Index
1	ICCV 14101	42.0	98.0	32.1	1077	19.8	0.54
2	ICCV 14102	39.0	96.3	31.3	1122	24.2	0.58
3	ICCV 14103	42.3	97.3	36.7	1148	21.8	0.51
4	ICCV 14104	42.3	96.0	29.4	1324	26.5	0.62
5	ICCV 14105	40.0	96.3	33.2	1122	21.5	0.56
6	ICCV 14106	38.7	96.0	42.1	1204	21.9	0.54
7	ICCV 14107	42.0	96.3	32.2	1150	23.4	0.55
8	ICCV 14108	39.7	95.7	32.7	1251	23.1	0.57
9	ICCV 14109	45.3	101.0	37.9	1239	31.4	0.52
10	ICCV 14110	44.0	99.0	37.6	1135	29.8	0.57
11	ICCV 14111	42.0	96.7	36.0	1016	29.4	0.51
12	ICCV 14112	44.0	96.3	34.0	1215	24.6	0.65
13	ICCV 14113	43.7	96.7	36.8	1101	27.3	0.55
14	ICCV 14114	42.3	96.7	33.9	1067	26.9	0.52
15	ICCV 14115	39.0	96.7	33.2	1140	27.8	0.60
16	ICCV 14116	43.0	96.3	39.9	1013	25.9	0.51
17	ICCV 14117	43.3	97.3	35.2	1130	26.5	0.53
18	ICCV 14118	41.7	96.3	39.2	1118	27.1	0.52
19	JG 11	41.0	95.7	32.7	1190	23.2	0.55
20	JAKI 9218	45.0	96.3	33.9	1288	21.9	0.59
	GM	42.0	96.9	35.0	1153	25.2	0.55
	SED	2.11	1.02	1.83	92.5	0.98	0.03
	LSD 5%	4.39	2.12	3.82	193	2.04	0.07
	LSD 1%	5.99	2.89	5.20	263	2.78	0.10
	EMS	6.65	1.55	5.02	11180	1.40	0.00
	CV %	6.1	1.3	6.4	9.2	4.7	6.97

Evaluation of early maturing chickpea breeding lines under heat stress conditions

ICRISAT developed a rapid generation advancement method for chickpea, in which two generations were taken in field, the first crop sown in September-October 2014 and the second crop in January-February 2015 immediately after the harvest of the first crop. As the second crop faces relatively high temperatures at the reproductive stage, it was proposed that Jan/Feb sowing can be used for screening of chickpea genotypes for high temperature tolerance. This delayed-sowing method for screening reproductive stage heat tolerance in chickpea was further refined. Studies on long-term weather data from all locations was looked at and suitable sowing dates for each location was decided to coincide with high temperatures ($\geq 35^{\circ}\text{C}$) at the reproductive stage. This delayed-sowing method is being used for screening several breeding lines, segregating material for heat tolerance in a cost effective manner.

A total of 20 advanced breeding lines (Table 9) of desi plant type were evaluated during normal season for drought tolerance, and the same set is being evaluated for heat stress tolerance under late planting conditions during February-April 2015. Crop is at pod filling stage and observation on visual scoring and yield related traits are being recorded.

Seed Procurement for the 2015-2016 Cropping Season

Establishing the seed system in the project site should make the purchase of good quality seeds efficient and effective, apart from the benefit in income that the farmer seed growers will get. However, the recent situation of smallholder farmers selling their produce as fresh greens has made the concept of seed system challenging. Each sample of the processed seeds was drawn by OSSOPCA to be submitted to Bargarh Seed Testing Laboratory (STL) for germination test, moisture percentage, purity percentage and percentage of insect damage. The total seeds of various seed class, of varieties procured by the project for the 2015-2016 cropping season, were about 10 tons (Table 10).

Table 10. Seed procurement for 2015-16 cropping season.

Location	Variety	Class	Quantity (kg)	Remarks
Keonjhur				
KSadar	JAKI 9218	Foundation	550	Purchase for the project
	Vihar	Foundation	100	
	KAK 2	Foundation	75	
	JAKI 9218	Certified 2	1,566	
Jumpura	JAKI 9218	Foundation	3,328	
	JG 14	Certified	427	
Champua	JAKI 9218	Foundation	180	
Sub-total			6,226	
Mayurbhanj				
Karanjai	JAKI 9218	Foundation	159	Purchase by the project
	JAKI 9218	Certified	17	
	KAK 2	Foundation	25	
	JAKI 9218	Certified 2	410	
	JG 14	Certified 2	130	
Joshiapur	JAKI 9218	Foundation	211	
	Vihar	Foundation	360	
	JAKI 9218	Certified	192	
	JAKI 9218	Certified 2	2,111	
Sharpada	Vihar	Foundation	110	
	KAK 2	Foundation	90	
Sub-total			3,815	
Total			10,041	

Capacity Building

A total of 1,382 stakeholders (farmers, DA officers and technicians, NGOs, and ICRISAT staff members) including 382 women attended various awareness meetings; seminar-workshops; training on crop seed production; IPM/IDM; and Farmer's Field Day (Table 11). A two-day scientific visit by ICRISAT project staff and DoA staff was initiated in December 2014 at ICRISAT, to enhance their learning capacity on chickpea production and management practices. Awareness meetings were conducted to monitor and continuously interact with chickpea growers on the status of the crop. Aside from this capacity building, ICRISAT participated in the State Level Agricultural Exhibition, showcasing ICRISAT's mission, vision and strategy.

Table 11. Capacity building conducted and attended by various stakeholders.

Particular	District (no.)	Blocks (no.)	Participant (no.)	Women (no.)	Remarks
Project Orientation Planning Workshop cum Seed Production Training	2	2	240	40	ICRISAT staff, Farmers and DA officers and technicians
IPM and IDM Training	2	4	220	49	DCs, SC, NGO, Field attendants
Scientific visit @ ICRISAT	5	-	23	5	ICRISAT staff, DoA staff and technicians
Farmer's Field Day	2	4	301	106	Farmers, Field Technicians, NGO
Farmers awareness meetings	2	5	584	180	Farmer beneficiaries
Project Planning Workshop Meeting	-	-	14	2	ICRISAT staff, DoA officials and staff
State Trade Fair	4	6	8	-	ICRISAT staff
Total			1,382	382	

Challenges for the Improvement of the Project

The 2014-15 cropping season was the initial and yet challenging year for the project. Site and farmer identification started in November 2014, though the sowing was to have started in early October, but due to the delay in project approval, there was a delay in implementation. However, ICRISAT has made tremendous stride to make the project successful. The hiring of a district coordinator and field attendants has helped a lot in the ground work and monitoring of project activities. Another difficult aspect, yet one that provides good income to farmers, is the selling of chickpea as fresh greens from our seed production areas due to higher market value and income, as against producing and selling seeds. Table 12 presents the constraints and possible solutions for improving project implementation.

Table 12. Constraints in project implementation.

Constraints	Solution
Limitation in procuring seeds from our seed production areas due to farmers selling chickpea as fresh green with better market value. The income from this practice is more than ₹40,000/ ha, far more beneficial than producing and selling quality seeds.	To sustain quality seeds of chickpea in the state, Govt. of Odisha has to increase the price of various certified seeds produced by farmers to have a fair market value just as the fresh greens. As per market price dictated by the Govt of Odisha, only ₹45 per kg is allotted for certified seeds. With this low price, farmers would only have an income of ₹20,000 – 30,000 per ha.
Limitation of farmer seed growers to sell their various certified seeds at higher price.	DoA to increase the buying price of quality seeds in order to sustain the production of quality seeds in the state.
Pests during flowering and pod development stage.	Provision of pesticide in the seed production and ICPT. DoA to provide subsidy scheme for fertilizer and pesticide to fully support the program. In seed production, the project will provide 50% of fertilizer and 50% of pesticides.
Non-compliance of the technology by other farmers.	Farmer selection must be given strict importance.
Seed procurement	Department of Agriculture should take the lead in ensuring the purchase of good quality seeds.

Financial Report

While the granted budget for operating the project in 2014 was ₹143.96 lakhs, only about 50% of the amount was allocated, due to reduction in planted area because of late sowing and the implication of various certified chickpea seeds available. A total of ₹96.085 lakhs were allocated and fully utilized as shown in the attached utilization certificate and statement of accounts (Annex 1).



**International Crops Research Institute
for the Semi-Arid Tropics**

April 2, 2015

Dr. Pramod Kumar Meherda
Director of Agriculture and Food Production
Government of Odisha
Bhubaneswar – 751 001

Dear Dr. Meherda,

Sub: Utilization Certificates for the project "Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems in Smallholder Farmers in Odisha"

Please find the attached the Utilisation Certificate (OGFR-19) for October 01, 2014 to 28 February, 2015 For the above project.

Kindly arrange to remit Rs.29, 53,500/- towards balance funds for the financial year 2014-2015, as per the bank details below:

Name of the Account	:	ICRISAT
Account Number	:	908102000000037
Type of Account	:	Current
Name of the bank	:	IDBI Bank, ICRISAT, Patancheru Hyderabad – 502 324, Telangana
IFSC Code	:	IBKL0000908
Branch Code	:	908
MICR Code	:	500259006

With best regards,

Yours sincerely,

Rajesh Agrawal
Assistant Director General
Finance

Encl: As above

Copy: Drs. Myer G Mula / Sameer Kumar / S K Gupta / Ms. Joanna Kane-Potaka (ICRISAT)

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ICRISAT's scientific information: <http://EXPLOREit.icrisat.org>
Inclusive Market-Oriented Development (IMOD) – our approach to bringing prosperity in the drylands
ICRISAT is a member of the CGIAR Consortium

UTILISATION CERTIFICATE

(OGFR-19)

RASTRIYA KRUSHI VIKASH YOJANA (RKVY)

Sl. No.	Letter No. And Date	Amount Sanctioned (Rs.)
1	AG (RKVY)60/ 2014 # 17759; RTGS 08/12/2014	66,55,000/-
	Total	66,55,000

1. Certified that ICRISAT received Rs. 66,55,000/- of grants-in-aid sanctioned during October 01, 2014 to February 28, 2015 in favor of Director General, ICRISAT, Patancheru, AP by the Director of Agriculture & Food Production, Government of Odisha, Bhubaneswar under RKVY vide letter No.

AG (RKVY)60/ 2014 # 17759, and an amount of Rs. Nil as at October 01, 2014. A sum of Rs.47,05,781/- (Forty Seven Lakhs Five Thousand Seven Hundred and Eighty One only) has been utilized during October 01, 2014 to February 28, 2015 for the purpose of the project titled "Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems in Smallholder Farmers in Odisha" for which it was sanctioned and the balance available is Rs.19,49,219/- (Nineteen Lakhs Forty Nine Thousand Two Hundred and Nineteen Only) as at February 28, 2015.

2. We have met the project targets on time and the remaining operations are in progress (see attached Progress Report).

3. Certified that I have satisfied that the condition on which the grant in aid was sanctioned has been duly fulfilled and that I have exercised the following checks to see that the money was actually spent for the purpose for which it was sanctioned.

Kinds of checks exercised:

1. The Financial management of the project has been done thru Financial Services, ICRISAT.
2. Procurements have been made thru centralized Purchase and Supplies Division, ICRISAT.
3. Expenditures have been verified and approved by the Project Manager.
4. ICRISAT maintains its accounting records as per CGIAR-Guidelines.

Signature: 

Rajesh Agrawal

Designation: Assistant Director General
Finance

Date: 01st April, 2015

ICRISAT
Statement of Account
For the period October 01 to February 28, 2015 and cumulative to February 28, 2015

Project title : Promotion of Improved Chickpea Varieties in Rice-Based Cropping Systems in Smallholder Farmers in Odisha
 Donor : Government of Odisha Agriculture Department
 Classification : CGIAR Research Program - Bilateral
 Currency : USD
 Project Duration : October 01, 2014 to September 30, 2015

Item	Budget		Expenditure		Balance as at	
	INR	USD	INR	USD	INR	USD
A. Recurring						
1. Production Program						
a. Seed Cost	1,500,000	24,233	545,200	8,890	954,800	15,373
b. Breeder/Foundator/Certified seed production	300,000	4,803	277,689	4,443	22,311	359
c. Seed certification	35,000	954	-	-	35,000	564
d. FPVST operations	1,100,000	17,632	1,000,234	16,026	99,766	1,605
e. ICRISAT (seed production/research)	600,000	9,619	290,841	4,641	309,159	4,978
2. Capacity building & publications	700,000	11,383	688,351	11,196	11,649	188
3. Mobility support	3,100,000	49,877	997,088	16,020	2,102,912	33,858
4. Hiring of manpower	300,000	4,630	-	-	300,000	4,830
5. Contingencies	7,635,000	122,941	3,789,404	61,185	3,835,596	61,755
Sub-Total-Recurring						
	1,100,000	17,712	478,579	7,707	621,421	10,005
B. Non-recurring						
1. Equipment & accessories	1,100,000	17,712	478,579	7,707	621,421	10,005
Sub-Total-Non-Recurring						
	8,735,000	140,653	4,277,982	68,893	4,457,018	71,760
Total (A+B)						
	9,735,000	154,719	4,705,781	75,783	4,902,719	78,936
C. Institutional Overhead 10%						
	973,500	14,006	427,799	6,690	445,701	7,179
Grand Total						
	10,708,500	168,725	5,133,580	82,473	5,348,420	86,115

Funds Status:

Balance as at October 01, 2014
 Add: Amount received during the period
Total funds available
 Less: Expenditure during the period
 Balance available as at February 28, 2015

	INR	USD
	-	-
	6,655,000	107,166
	6,655,000	107,166
	4,705,781	75,783
	1,949,219	31,383



Rajesh Agrawal
Assistant Director General
Finance

Notes:

- Total budget and line item classification are as specified by the donor at project inception
- Currency conversions (INR/USD) are at average exchange rates as applicable

Section 2:
2015-16 Physical Targets

2015-16 Physical Targets

The 'Orientation, Planning Workshop' for 2015-16 was conducted on May 1-2, 2015 at Bhubaneswar, Odisha, for the State and District Coordinators of Keonjhar, Mayurbhanj, and Sundergarh. During 2015-16, a total of 2,565 ha will be covered under the project, of which 1,350 ha is for improved chickpea production technology (ICPT), 300 ha for front line demonstration (FLD), 180 ha for farmers' participatory varietal selection trial (FPVST) and 735 ha for seed production. The project will continuously strengthen stakeholders through capacity building activities. To sustain good quality seeds in the institutionalized seed system of the project, ICRISAT will continuously supply Nucleus and Breeder seeds of the farmer preferred varieties. To operationalize these activities, the required budget will be ₹205.085 lakhs. This budget represents the allocated budget of ₹157.87 lakhs for the second year of operation, plus the remaining balance of ₹47.215 lakhs pending from the year 1 operation, as only ₹96.745 lakhs was released out of the budget fund of ₹143.96 lakhs due to non-implementation of FPVST and FLD component together with only 50% of the ICPT and seed production activities being implemented.

- a. Improved Chickpea Production Technology (ICPT):** The required certified seeds for the implementation of ICPT is 54 tons to cover 1,350 ha (Table 13 and 14). The source of seeds will be drawn from the produce of the farmer seed growers, during the 2014-15 cropping season.
- b. Front Line Demonstration (FLD):** This concept will showcase new updates on chickpea technology for increase productivity. A total of 300 ha will be covered requiring 12 tons of various seed class (Table 13 and 14).
- c. Farmer Participatory Varietal Selection Trial (FPVST):** FPVST will continue to demonstrate the different high yielding cultivars in comparison with farmer's existing varieties. A total of 445 sites (180 ha) at 1 acre (0.4045 ha) per site, covering three districts will be utilized (Tables 13 and 14). The required seeds of different varieties will be 7.2 tons.
- d. Seed Production:** The project will continuously supply pure quality seeds to farmer seed growers in Odisha by enhancing and/or strengthening the seed delivery system of chickpea. Nucleus, Breeder, Foundation, and Certified seeds will be procured and will be reproduced by progressive farmer seed growers. A total 135 ha will be sown to produce the Breeder and Foundation seeds of farmer preferred varieties, while 600 ha will be used to produce the Certified seeds (Table 13 and 14). The source of Foundation seeds will be procured from the produce of farmer seed growers in the previous cropping season. The required seeds for the production of various seed class will be 29.4 tons.

Table 13. Seed requirement and area to be covered by each component.

Component	Activities	Area (ha)	Qty (kg)	Remarks
ICPT	Commercial	1,350	54,000	Project
FLD	Seed production	300	12,000	Project
FPVST	Varietal trial	180	7,200	ICRISAT
Seed Production	N to B	15	600	ICRISAT
	B to F	75	3,000	Project
	F to C	300	12,000	Project
	C1 to c2	345	13,800	Project
Total		2,565	102,600	

Table 14. District wise chickpea seed requirement by activities for 2015-2016.

District	Component	Area (Ha)	Qty (kg)	Remarks
Keonjhar	SP (N to B)	5	200	ICRISAT to supply
	SP (B to F)	25	1,000	
	SP (F to C)	100	4,000	
	SP (C1 to C2)	110	4,400	
	ICPT	425	17,000	
	FLD-SP	100	4,000	
	FPVST	60	2,400	
Sub-total		825	33,000	
Mayurbhanj	SP (N to B)	5	200	ICRISAT to supply
	SP (B to F)	25	1,000	
	SP (F to C)	100	4,000	
	SP (C1 to C2)	120	4,800	
	ICPT	500	20,000	
	FLD-SP	100	4,000	
	FPVST	60	2,400	
Sub-total		910	36,400	
Sundergarh	SP (N to B)	5	200	ICRISAT to supply
	SP (B to F)	25	1,000	
	SP (F to C)	100	4,000	
	SP (C1 to C2)	115	4,600	
	ICPT	425	17,000	
	FLD-SP	100	4,000	
	FPVST	60	2,400	
Sub-total		830	33,200	
Total		2,565	102,600	

e. Schedule of Activities Prior to Sowing: Table 15 presents the milestone of specific activities prior to sowing of chickpea including the trainings to be conducted.

Table 15. 2015-schedule of activities.

Activity	Schedule	Remarks
Procurement and Processing of Foundation, and Certified seeds	April-August,	Seeds procured from farmer seed growers and from various national seed institute
Processing of Breeder seeds	August	ICRISAT headquarters
Processing of FLD and FPVST seeds	August	ICRISAT headquarters
Distribution of seeds (ICPT, Seed production and FPVT)	September	ICRISAT (DCs, SC, Field Assistants, and DoA)
Capacity Building	October – December	
a. Conduct of project orientation and planning workshop for the 3 districts	September – October	DDA, DOs, Field Assistants, Agricultural Technicians, NGOs, Seed company, DCs, and SC, OSSOPCA
b. Conduct of Farmer's Orientation meeting for the 3 districts	September – October	Distribution of seeds and fertilizers
c. Conduct of farmer seed growers orientation cum training	November	4 districts
e. Conduct of IPM/IDM training	November-December	Farmer seed growers
f. Sowing	October	ICPT, FLD, PFDVST, Seed production

Section 3:
Photo Documentation

Improved Chickpea Production Technology (ICPT)

a. Seed Distribution



b. Seed Sowing



c. Early Vegetative Stage



d. Late Vegetative Stage



e. Flowering and Pod Development Stage



f. Maturity Stage



g. Harvesting and Threshing



h. Procurement



i. Breeder, Foundation, and Certified Seed Production



j. Seed Production Certification by OSSOPCA



Seed Production @ ICRISAT



Research Backup @ ICRISAT



Capacity Building

a. Specialized Training for DoA Staff and ICRISAT Personnel



b. Smallholder Farmers Seed Growers Training



c. IPM and IDM Farmers Training



d. Farmers Field Day



e. Project Orientation and Planning Workshop



f. Farmers Awareness



g. Attendance to the State Agricultural Trade Fair



Project Monitoring

a. By National Food Security Mission (NFSM-Delhi)



b. By Rashtriya Krishi Vikas Yojana (RKVY – Govt. of Odisha)



c. By ICRISAT Scientist









International Crops Research Institute for the Semi-Arid Tropics

The **International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)** is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, of whom 644 million are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD).

ICRISAT is headquartered in Patancheru, Telangana, India, with two regional hubs and six country offices in sub-Saharan Africa. It is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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