WORKING TOWARDS SELF RELIANCE IN FOOD AND LIVELIHOOD SECURITY AND EXPLORING MARKETS FOR ORGANIC PRODUCE IN JHARKHAND

Project Report

2007-2010

J-235/A, Lane W-15C, Sainik Farms Khanpur,

New Delhi – 110 062 (INDIA)

Ph: -+91 11 29556248 ; Fax: +91 11 29555961

Email – mail@genecampaign.org Web: - http://www.genecampaign.org

Contents

1. Conservation and characterization of agro biodiversity for long term self-reliant food security
2. Develop sustainable/green/organic agriculture and train farmers
3. Helping Self Help Groups(SHG) to establish income sources
4. Training and capacity building

WORKING TOWARDS SELF RELIANCE IN FOOD AND LIVELIHOOD SECURITY AND EXPLORING MARKETS FOR ORGANIC PRODUCE IN JHARKHAND

Ongoing support from the Ford Foundation has helped to establish and expand the work on agrobiodiversity conservation under both in situ and ex situ conditions in Jharkhand. For this work, Gene Campaign and the farming communities it works with on conservation, received the national conservation award called the 'Genome Saviour Award' from the Government of India, in 2009. The agrobiodiversity of rice and some other crops has been collected from 11 states including Jharkhand, Orissa, Bihar, Chhattisgarh, Assam, Manipur, Uttar Pradesh, Madhya Pradesh, West Bengal, Dadar and Nagra Haveli and Gujarat.

Agrobiodiversity is known to be essential for stabilizing food production but scientists working in the Green Agriculture or Industrial Agriculture mode have tended to emphasize yield intensification over every other property of crop varieties. This led to a neglect of agrobiodiversity in government programs, resulting in its rapid destruction despite its importance to food security.

The introduction of high yielding and now hybrid, crop varieties have narrowed the genetic base of agriculture almost dangerously, depleting the rich genetic wealth of the farmers' fields and threatening the future of plant breeding and the creation of new crop varieties. The erosion of genetic diversity and the loss of traditional crop varieties as the source of new genes are recognized as one of the most serious threats to global food security. At the local level, genetic erosion deprives the communities of the crop choices they need to minimize risk in food production and ensure survival. The introduction of high yielding and hybrid, crop varieties with no provisions for conserving the gene pool of traditional varieties, has led to a narrow genetic base, threatening the future of plant breeding and the creation of new crop varieties.

According to climate estimates, agriculture in the productive areas of South Asia will be amongst the most adversely affected. The worst brunt of climate change on food production will be borne by farmers in the dry land regions where as it is agriculture is rain fed, conditions are marginal and only one crop is taken per year. Except where some surface

water is available, there is no winter crop and fields are left fallow. The failure of the monsoon in 2009 and 2010 has meant drought conditions and that even the single rice crop could not be planted in almost 80 percent of the area, dramatically increasing the risk of hunger.

As these challenges increase, the local communities, already poor and marginalized, find it increasingly difficult to address their food, health and nutritional needs. Their wealth of indigenous knowledge is being eroded by neglect even though it constitutes the most sustainable basis for their wellbeing. Apathetic administrations, social exploitation, low levels of literacy and few 'modern' skills combine to pose formidable problems for the people to be able to acquire a reasonable standard of living.

Gene Campaign works in Jharkhand which along with Orissa and Chhattisgarh, constitutes what is called the Center of Origin of rice, in other words, its birthplace, or the region where its maximum genetic diversity is found. Gene Campaign, beginning about five years ago, started the process of collection, characterization and conservation of crop genetic diversity and today has a total of nine community Gene-Seed Banks in the region. Of these one is a master gene bank housing the entire collection of 2317 accessions of crop varieties which include rice, millets, vegetables and oilseed.

These Banks serve as the nucleus of in situ conservation and ex situ conservation. The seed banks serve as the source of seed material that is multiplied to create seed sources, which are given to farmers to plant, so that there is a movement to return genetic diversity to farmers' fields.

The farmer varieties/traditional varieties that are collected are also being characterized using the approved descriptors. This enables a thorough and scientific characterization of traditional crop varieties using internationally recognized descriptors. This characterizes them as genetic resources and identifies their genetic traits, thus making them valuable genetic material for future plant breeding.

Scientists and plant breeders as well as the local communities are exploiting the direct link between food security and the gene/ seed banks. Long term conservation of

genetic material enables future breeding work and the genes contained in this agro biodiversity are not lost as traditional varieties get displaced. These genes, for instance those identified for drought tolerance can be used to breed plant varieties as climate, biotic and abiotic conditions change and vary. Plant breeders can use this kind of gene bank to access genes with specific properties, to breed new varieties tailored for special uses like high protein and for diverse agricultural conditions. That is why it is important not just to collect but also to characterize properties of traditional cultivars.

Farmers benefit from the banks in the short term as it provides a secure seed source that ensures that they have access to locally adapted seed. A few thousand farmers have used seed from the bank.

The aim of the current work is to conserve as much as possible of the genetic diversity of agriculture in the region and to increase field level or in situ conservation. This is to provide the farmer the basis for both short term and long term food security. In situ or field level conservation must go hand in hand with seed banks, so farmers take seed both to conserve the traditional varieties in field 'gene- seed banks and to cultivate traditional crops, specially rice, for use as food at home. Usually hybrid rice is cultivated for the market, not so readily for food. After GC's work on promotion of conservation and setting up of the banks, now increasing numbers of farmers devote at least part of their land to traditional varieties, even if they cultivate hybrids. Because traditional varieties are preferred as food, this rice sells at a better price, so farmers who can grow a surplus, also get a better price for the rice.

The seed bank also provides a seed source for resource poor farmers who cannot afford the cost of agrochemicals and HYV or hybrids. Not all farmers can opt for HYV or hybrid rice cultivation even if they are inclined. Maintaining a secure seed source for such resource poor farmers is important to support their agriculture and local food security.

Project objectives

1. Expand the work on agro biodiversity conservation and characterization in the region. Set up a larger number of Gene/Seed Banks for ex situ and in situ conservation and field level conservation of genetic diversity.

2. Improve the method of desiccation and test it over a five year period to test seed viability at ambient temperatures
3. Increase farmer choice and minimize the risk of crop failure by providing multiple seed choices to farmers through additional Seed Banks
4. Increase the scope and extent of seed multiplication to make available greater volumes of seed of traditional varieties, to keep up with growing farmer demand.
5. Increase the spread of organic/green agriculture practices, develop additional model organic villages and disseminate bioorganic practices in villages of the project area
6. Establish Organic Certification for rice and vegetables and test markets for organic produce
7. Engage in a cost- benefit analysis of cultivating traditional, High Yielding Varieties and hybrid rice to assess actual benefits from each.
8. Characterize promising varieties of traditional rice for registration as Farmers Varieties as provided for in national legislation. Train farmers to characterize their varieties with the help of Gene Campaign and stake claim to their varieties and share benefits accruing from their use by breeders
9. Policy Advocacy work for policy changes aimed at conservation of genetic diversity.

PROJECT ACTIVITIES

1. CONSERVATION AND CHARACTERISATION OF AGROBIODIVERSITY FOR LONG TERM SELF RELIANT FOOD SECURITY

The introduction of HYVs and hybrid crop varieties in dry land agricultural zones such as Jharkhand, is leading to a steady erosion of genetic diversity from the field. These impacts on the farmers' ability to plant locally adapted mixtures of crop varieties to minimize risk of crop losses due to biotic or abiotic stress. Further, this rain fed region with poor lateritic soils is ill suited to the heavy agro-chemical dependent intensive agriculture that is practiced with HYVs and hybrids. On the other hand, since the majority of farmers are resource poor and can scarcely afford the agro-chemical package, the natural choice for this region would be organic or green agriculture, aiming for certification that would help to get a better price

for their low chemical, if not chemical free produce should there be a surplus happening in India as well.

There is an urgent need to conserve the fast diminishing genetic diversity in agriculture in the interest of long term global and local food security. The FAO (Food and Agriculture Organization of the UN) recognizes genetic diversity along with soil health to be the two major factors contributing to food security. The loss of genetic diversity due to the displacement by HYVs has made its conservation a subject of high priority the world over.

India is a major center of origin for rice and one of the centers of maximum diversity for this important food staple. The tribal crescent of Jharkhand, Chhattisgarh and Orissa constitutes the cradle of rice. The government is promoting hybrid and high yielding rice here with little concern for its impact on rice germplasm and no thought for conservation of the rice gene pool.

Keeping in mind the importance and necessity of conservation of traditional varieties Gene Campaign with the support of Ford Foundation and other various supportive organizations has established community level Gene-seed bank in the project area of Jharkhand.

a. Master gene Bank: Community Gene-Seed banks are the source of seed availability to local communities. However it is some time difficult to maintain the genetic purity of the seeds cultivated and harvested by farmers and the importance of scientifically maintained gene bank to maintain the genetic purity of the germplasm collection is the necessity of the time. Therefore, Gene Campaign has established a master Gene Bank which is maintained and curated by the Gene Campaign to ensure genetic purity. Presently this Master Gene Bank contains 1171 traditional paddy accessions out of which 777 are the core collection (having different names). In the near future this bank will contain all the accessions (2317) Gene campaign has.

b. Community Gene Seed banks: At present one master Gene Bank and seven community level gene bank are operational in the project area. The 8th Bank is nearing completion and will be operational by the end of the paddy season. These banks are becoming one of the main seed source for the farming communities of not only of these villages but also to nearby village. The demand for newer seed gene bank of traditional varieties is growing day

by day. Demand for traditional varieties is on higher side as Jharkhand is facing serious drought condition since 2008-09. Farming community of the project area as well as other areas in Jharkhand have good understanding that traditional varieties perform well even in drought conditional as these are adopted to the natural conditionals of the locality.

External and internal view of a level Community Gene Seed bank

Current Germplasm Status of Gene Banks in Project areas

Seed gene Bank Location	**No. Traditional Varieties with Seed quantity**		
	<5 kg	**5-8 kg**	**>10 kg**
A. Master Gene Bank	1171	-	-
B. Community Gene Seed Bank			
1. Bhandra	70	26	9
2. Manatu	108	25	10
3. Kulli	149	20	12
4. Jiddu	90	40	7
5. Jashpur	73	46	10
6. Kachhabri	301	15	8
7. Ichadag	96	20	11
8. Malghosa*			
Total	***2058***	***192***	***67***
Grand Total	**2317**		

** Newly constructed community Gene Seed Bank and will be functional within few weeks*

c. Number of traditional varieties in collection:

The Gene Seed bank maintained by Gene campaign contains a total of 2317 collection of traditional paddy varieties from 11 states. These collection are collected over the years and majority of collection is from Jharkhand (1529) followed by Bihar (370), Chhattisgarh (180) Orissa (130). Detailed state wise collection is presented below.

State	Number of collection
1. Jharkhand	1529
2. Bihar	370
3. Chhattisgarh	180
4. Orissa	130
5. Assam	36
6. Manipur	07
7. Uttar Pradesh	30
8. Madhya Pradesh	10
9. West Bengal	19
10. Dadar & Nagar Haveli	4
11. Gujarat	2
Total	**2317**

d. Number of varieties with important characters: Out of the total collected paddy varieties nearly 65 are aromatic, 76 are drought tolerant, 40 high yielding, 275 low yielding, 190 of medium duration, 175 are of long duration, whereas 330 varieties collected due to having some other characters.

S.No.	Characteristics	No. of Samples
1.	Aromatic Rice	65
2	Drought Tolerant	76
3.	High Yielding	40
4.	Low Yielding	275
5.	Medium Yielding	80
6.	Short Duration	68
7.	Medium Duration	190
8.	Long Duration	175
9.	Flood Tolerant	293
10.	Disease Resistant	345
11.	Disease Susceptible	40
12.	Lodging	215
13	Non-Lodging	125
14	Others	330
	TOTAL	**2317**

e. Amount of seed in collection: During the project period the amount of seed in collection has increased from 888.96 to 9109 kg from 2007-08 to 2009-10 with the community participation. The details of seed amount over the project period are as follows;

Seed gene Bank Location	Amount of seed in collections after return from farmers (kg)		
	2007-08*	**2008-09**	**2009-10**
A. Master Gene Bank	-	-	2348.00
B. Community Gene Seed Bank			
1. Bhandra	92.16	372.00	544.00
2. Manatu	134.65	447.00	941.00
3. Kulli	125.35	806.00	950.00
4. Jiddu	-	747.00	1042.00
5. Jashpur	-	763.00	1144.00
6. Kachhabri	382.45	972.00	1125.00
7. Ichadag	154.35	829.00	1015.00
Total	***888.96***	***4936.00***	***9109.00***

** Initial amount of seed kept in Gene-Seed Bank*

Collection of Traditional Seed Varieties: From the *kharif* season of 2008-09 to 2009-10, seed samples of traditional varieties of paddy have been collected from 6 states of the country. A total of 573 samples of traditional varieties of rice have been collected, characterized and processed for storage in the Gene-Seed Banks. Most of the varieties were collected from Jharkhand followed by Orissa. Over 100 people have been trained in the collection, characterization and documentation of agro-biodiversity during the collection.

Year wise new traditional paddy varieties collection:

S. No.	Area (State) of collection	Number of varieties collected		
		2007-2008	**2008-09**	**2009-10**
1.	Jharkhand	133	23	267
2.	Bihar	53	5	-
3.	Gujarat	-	2	-
4.	Orissa	67	-	-
5.	Chhattisgarh	24	-	-
6.	Dader & Nagar Haveli	-	4	-
Total		**272**	**34**	**267**

Curating the collections: The rice collections were curated by examining the nomenclature, morphology and source of samples. Rice varieties bearing the same or similar names are sometimes collected from different regions. These are usually morphologically distinct. Current genetic wisdom does not treat such varieties as duplicates but as variants that will differ in genetic constitution because of having evolved in distinct habitats. Hence during curating the collection, such variants are identified and retained. When samples are collected those are clearly mixtures of different varieties, the single lines are being separated and maintained individually and the mixture is also maintained. The composition of mixtures that farmers use has risk management significance and constitutes a varietal composite. After careful curating the collections varieties are selected and maintained as core collection. So far a total of 777 varieties are so identified as core collection.

Core Collection: Consists of distinct and individual varieties bearing different names.

Accessions: Total number of samples collected. This contains varieties bearing the same of similar names collected from different locations.

Core collection with specific characteristics:

S. No.	Specific characters	Total
1.	High Yield, (13 – 16 qt./acre)	30
2.	Medium Yield, (10 – 12 qt./acre)	119
3.	Low Yield, (7 – 9 qt./acre)	51
4.	Flood Tolerant	45
5.	Drought tolerant	42
6.	Resistant to diseases & Insect-pests	21
7.	Aromatic	35
8.	Short duration, (Below 110 days)	18
9.	Medium duration, (110 – 119 days)	52
10.	Long duration, (120 days to above)	165
11.	Low land	92
12.	Medium land	85
13.	Up land	22
	Total	**777**

Germplasm Characterization: Rice samples from gene banks are multiplied in the field for seed production and characterized. The important charters of the grown varieties are observed. The characterization requires more careful observations in the field and needs to

be observed for 3-5 years so as to get more stable characteristic of the varieties. The Gene Campaign is making its efforts to characterize all the collection it has in gene banks so as these varieties can be registered with PVFRPA.

Initial characterization of traditional varieties

Name of variety	Days to flowering	Days to maturity	Average Plant Length (cm)	Average No. of tillers	Average Panicle length (cm)	Average No. of seeds / panicle	Average Leaf length (cm)
GC/E/09/001	119	151	102.50	13.50	20.00	33.67	35.00
GC/E/09/002	120	151	122.50	15.00	23.00	245.67	41.00
GC/E/09/003	119	173	191.00	17.00	31.00	123.00	57.00
GC/E/09/004	119	173	152.50	16.00	21.50	203.67	49.00
GC/E/09/005	109	151	122.50	13.50	17.00	126.33	36.50
GC/E/09/006	103	151	112.50	13.50	21.00	118.33	26.50
GC/E/09/007	122	151	142.50	14.00	26.00	174.00	36.50
GC/E/09/008	122	151	117.50	15.50	16.50	123.00	41.00
GC/E/09/009	119	173	137.50	14.50	21.00	123.00	31.00
GC/E/09/010	124	173	142.50	13.50	21.00	156.67	42.50
GC/E/09/011	94	151	85.00	13.50	17.50	52.00	36.50
GC/E/09/012	124	151	112.50	11.00	12.50	55.00	31.50
GC/E/09/013	106	154	117.50	13.50	21.00	208.33	52.50
GC/E/09/014	119	154	117.50	10.00	22.00	93.67	36.50
GC/E/09/015	119	154	122.50	13.00	26.50	209.00	31.00
GC/E/09/016	119	154	122.50	13.00	26.50	120.33	27.50
GC/E/09/017	92	144	120.00	13.00	21.00	271.33	27.50
GC/E/09/018	92	144	124.00	15.00	21.00	128.33	36.00
GC/E/09/019	97	144	123.50	15.00	21.00	100.00	41.50
GC/E/09/020	112	144	133.50	15.00	22.50	118.33	42.50
GC/E/09/021	107	144	126.50	15.00	23.50	209.67	41.50
GC/E/09/022	102	146	143.50	13.00	31.50	207.67	41.50
GC/E/09/023	102	149	107.50	9.00	17.50	67.33	32.50
GC/E/09/024	107	166	127.50	16.50	27.50	57.67	36.50
GC/E/09/025	102	166	132.50	19.00	32.50	263.33	27.50
GC/E/09/026	122	170	127.50	18.00	31.00	129.67	37.50
GC/E/09/027	117	170	132.50	19.00	31.00	176.00	28.00
GC/E/09/028	107	170	122.50	18.00	31.00	308.33	31.50
GC/E/09/029	122	170	133.50	16.50	24.00	133.33	42.50
GC/E/09/030	122	170	142.50	15.00	31.00	99.67	42.50
GC/E/09/031	117	170	122.00	13.00	22.00	203.67	21.00
GC/E/09/032	112	152	97.50	11.00	23.00	182.67	21.00
GC/E/09/033	118	152	121.50	13.00	21.00	178.00	23.00
GC/E/09/034	121	168	92.50	9.00	21.00	130.67	31.00
GC/E/09/035	104	168	106.50	11.00	21.00	128.00	31.00
GC/E/09/036	114	154	112.50	11.00	21.00	110.33	31.00
GC/E/09/037	104	154	106.50	16.50	19.00	187.33	26.50
GC/E/09/038	109	154	141.50	11.00	25.00	208.33	35.00
GC/E/09/039	98	142	112.50	11.00	21.00	217.00	31.00
GC/E/09/040	91	138	117.50	13.00	23.50	118.67	34.00
GC/E/09/041	88	138	106.50	11.00	19.00	130.00	24.00
GC/E/09/042	88	138	92.00	9.00	21.00	140.00	36.00
GC/E/09/043	73	138	82.50	9.00	21.00	91.67	23.50
GC/E/09/044	78	138	105.00	8.50	21.00	95.33	23.00

GC/E/09/045	90	138	132.50	11.00	21.00	130.00	26.50
GC/E/09/046	98	138	107.50	15.00	19.00	58.67	31.50
GC/E/09/047	93	138	142.50	21.00	16.50	153.33	36.50
GC/E/09/048	98	152	142.50	22.00	28.00	142.00	52.00
GC/E/09/049	85	152	137.50	16.50	29.00	163.00	41.50
GC/E/09/050	93	137	123.00	15.00	26.50	192.00	31.50
GC/E/09/051	78	137	112.50	21.00	22.00	86.00	23.00
GC/E/09/052	98	137	124.00	11.00	26.00	208.33	24.50
GC/E/09/053	78	137	112.50	17.50	23.00	141.00	26.50
GC/E/09/054	103	137	127.50	13.50	29.00	164.67	36.50
GC/E/09/055	88	137	92.50	13.00	19.00	121.67	23.00
GC/E/09/056	78	130	107.50	16.50	21.00	114.00	29.00
GC/E/09/057	83	130	112.50	13.00	19.00	132.67	25.00
GC/E/09/058	78	129	92.50	13.00	16.50	100.67	23.00
GC/E/09/059	85	152	102.50	22.50	23.00	144.33	29.00
GC/E/09/060	78	152	135.00	16.00	23.00	400.33	29.00
GC/E/09/061	93	135	117.50	19.00	23.00	204.67	36.50
GC/E/09/062	93	135	122.50	21.00	21.00	153.33	65.00
GC/E/09/063	108	138	112.50	24.00	21.00	69.67	37.50
GC/E/09/064	103	138	122.50	15.00	25.00	116.67	31.50
GC/E/09/065	68	138	117.50	13.00	21.00	112.00	31.50
GC/E/09/066	68	138	107.50	11.00	21.00	104.00	31.50
GC/E/09/067	88	138	122.50	16.50	21.00	78.67	31.50
GC/E/09/068	98	138	66.50	11.00	21.00	86.00	31.50
GC/E/09/069	98	138	122.00	11.00	28.00	192.00	43.00
GC/E/09/070	88	138	122.00	13.00	27.00	188.33	28.00
GC/E/09/071	98	140	127.50	19.50	24.00	130.33	30.00
GC/E/09/072	84	130	127.50	21.00	25.00	120.00	39.00
GC/E/09/073	98	152	122.50	22.50	25.00	156.00	36.50
GC/E/09/074	88	130	102.50	22.50	23.00	163.00	29.50
GC/E/09/075	88	130	127.50	21.00	23.00	168.33	36.50
GC/E/09/076	78	130	85.00	11.00	21.00	161.67	19.00
GC/E/09/077	103	136	127.50	18.00	25.00	108.00	26.50
GC/E/09/078	93	136	147.50	13.00	25.00	128.33	26.50
GC/E/09/079	98	152	112.50	15.00	18.00	125.67	17.00
GC/E/09/080	98	152	97.50	11.00	25.00	92.33	23.00
GC/E/09/081	98	152	112.50	19.00	23.00	98.33	36.50
GC/E/09/082	103	152	117.50	24.00	25.00	122.67	31.00
GC/E/09/083	93	152	112.50	21.00	19.00	182.67	21.00
GC/E/09/084	99	152	112.50	13.00	20.00	213.33	31.00
GC/E/09/085	98	138	106.50	24.00	25.00	216.33	36.50
GC/E/09/086	78	138	107.50	17.00	25.00	212.33	40.00
GC/E/09/087	103	138	112.50	22.00	23.00	207.67	36.50
GC/E/09/088	98	138	137.50	22.00	25.00	234.00	27.00
GC/E/09/089	98	137	106.50	15.00	25.00	148.00	29.00
GC/E/09/090	88	136	82.50	15.00	21.00	98.33	19.00
GC/E/09/091	88	136	112.50	11.00	21.00	121.33	19.00
GC/E/09/092	78	130	117.50	15.50	21.00	156.67	19.00
GC/E/09/093	78	130	122.50	21.00	25.00	177.00	29.50
GC/E/09/094	78	130	112.50	11.00	25.00	151.00	31.50
GC/E/09/095	85	130	112.50	13.50	25.00	147.67	29.00
GC/E/09/096	98	156	102.50	17.50	19.00	195.33	25.00
GC/E/09/097	81	138	107.50	13.00	19.00	154.33	25.00
GC/E/09/098	93	138	112.50	22.50	19.00	178.00	36.00

GC/E/09/099	81	152	82.50	9.00	19.00	95.00	22.50
GC/E/09/100	98	156	117.50	16.50	21.00	252.00	23.00
GC/E/09/101	73	156	112.50	9.00	26.50	148.00	31.00
GC/E/09/102	154	152	117.50	11.00	23.00	220.00	25.00
GC/E/09/103	153	152	102.50	13.00	19.00	135.00	25.50
GC/E/09/104	98	152	97.50	15.00	19.00	161.00	31.00
GC/E/09/105	78	152	112.50	11.00	27.50	135.00	25.00
GC/E/09/106	78	132	112.50	13.00	22.00	161.33	21.00
GC/E/09/107	88	132	112.50	14.00	27.00	198.67	26.50
GC/E/09/108	98	152	107.50	16.50	21.00	252.00	29.50
GC/E/09/109	98	152	112.50	16.50	21.00	176.67	26.50
GC/E/09/110	98	152	107.50	16.50	24.50	150.67	26.50
GC/E/09/111	63	152	106.50	21.00	23.00	91.67	21.00
GC/E/09/112	65	126	96.00	11.67	22.00	131.67	37.33
GC/E/09/113	98	137	112.50	16.00	36.50	152.33	33.00
GC/E/09/114	88	137	122.50	27.00	33.50	171.67	33.33
GC/E/09/115	81	138	101.50	46.00	23.00	97.00	25.67
GC/E/09/116	88	138	89.00	14.67	32.00	201.00	41.33
GC/E/09/117	93	138	108.33	24.00	22.00	199.33	24.67
GC/E/09/118	93	138	102.00	13.67	23.33	172.33	25.00
GC/E/09/119	103	138	114.33	17.67	18.00	207.67	24.33
GC/E/09/120	103	152	96.33	20.67	22.00	158.00	24.33
GC/E/09/121	88	141	92.33	18.00	17.67	87.33	22.67
GC/E/09/122	98	141	85.00	13.50	24.00	78.33	22.00
GC/E/09/123	82	141	98.67	17.50	21.67	82.33	25.33
GC/E/09/124	78	131	96.00	15.00	21.33	75.67	21.33
GC/E/09/125	88	152	95.00	13.50	22.33	124.33	22.67
GC/E/09/126	108	152	86.67	13.50	20.67	148.00	22.00
GC/E/09/127	78	168	30.33	18.00	19.00	162.33	21.67
GC/E/09/128	80	152	81.00	14.00	24.00	140.67	28.67
GC/E/09/129	75	152	91.00	16.00	22.00	169.67	39.00
GC/E/09/130	78	152	94.67	14.00	22.33	132.33	22.00
GC/E/09/131	78	152	86.67	14.50	20.67	215.00	24.33
GC/E/09/132	81	152	105.00	14.00	22.33	226.00	24.33
GC/E/09/133	104	171	82.33	16.00	22.67	184.67	28.33
GC/E/09/134	121	165	47.67	18.00	18.33	111.00	21.67
GC/E/09/135	112	165	95.33	18.33	20.33	163.00	28.00
GC/E/09/136	117	146	107.33	21.33	26.33	106.33	27.67
GC/E/09/137	83	146	96.67	15.33	15.33	66.00	26.33
GC/E/09/138	107	146	98.00	20.00	24.33	150.00	28.33
GC/E/09/139	101	147	105.00	18.00	20.67	289.00	23.33
GC/E/09/140	110	147	103.00	18.33	19.67	171.67	23.67
GC/E/09/141	111	161	105.67	13.00	22.67	160.00	22.67
GC/E/09/142	72	150	93.00	15.33	21.67	145.00	25.00
GC/E/09/143	107	165	91.33	16.67	21.67	180.00	27.00
GC/E/09/144	67	165	91.33	15.00	19.00	165.00	22.67
GC/E/09/145	75	165	74.67	12.67	17.33	70.00	17.33
GC/E/09/146	117	161	84.67	16.33	19.33	99.67	19.33
GC/E/09/147	112	161	52.33	14.67	24.00	94.00	29.67
GC/E/09/148	85	161	79.33	15.33	22.33	149.00	28.00
GC/E/09/149	82	161	69.33	13.00	15.00	139.33	15.33
GC/E/09/150	117	161	67.67	11.67	22.00	197.67	20.00
GC/E/09/151	116	161	84.33	14.00	24.00	106.67	28.67
GC/E/09/152	77	161	85.00	14.00	21.67	122.67	27.33

GC/E/09/153	87	150	103.33	18.67	19.00	106.00	22.67
GC/E/09/154	82	150	90.33	14.00	24.67	260.67	28.67
GC/E/09/155	82	150	88.67	15.00	24.00	125.00	20.67
GC/E/09/156	82	150	66.67	14.33	18.67	202.67	22.67
GC/E/09/157	82	150	65.33	16.33	20.33	205.00	30.67
GC/E/09/158	82	150	-65.33	14.33	21.00	158.00	24.33
GC/E/09/159	64	150	94.00	11.67	19.00	102.00	27.33
GC/E/09/160	87	150	95.67	13.67	19.00	133.00	30.67
GC/E/09/161	87	150	94.33	16.67	22.00	144.33	30.33
GC/E/09/162	79	147	97.33	15.00	23.67	160.00	30.67
GC/E/09/163	77	147	103.33	14.33	23.67	102.67	28.00
GC/E/09/164	91	161	112.33	15.67	19.00	163.00	18.33
GC/E/09/165	77	145	77.67	12.67	17.33	123.00	18.00
GC/E/09/166	68	144	83.67	16.33	21.67	78.33	25.00
GC/E/09/167	78	144	103.33	16.33	21.67	150.00	23.00
GC/E/09/168	84	144	88.33	12.33	20.33	160.67	27.33
GC/E/09/169	76	158	82.67	12.00	22.67	75.33	17.33
GC/E/09/170	121	158	77.67	13.33	18.00	179.33	20.00
GC/E/09/171	84	158	94.33	14.67	23.33	188.33	12.67
GC/E/09/172	84	173	379.33	14.67	24.00	200.00	19.67
GC/E/09/173	71	173	84.33	14.00	23.00	81.00	23.00
GC/E/09/174	76	173	61.67	15.67	23.33	100.00	25.33
GC/E/09/175	104	158	55.67	13.00	23.33	79.67	23.33
GC/E/09/176	109	173	91.00	13.67	23.33	105.67	22.00
GC/E/09/177	61	173	79.33	17.67	19.67	158.33	27.33
GC/E/09/178	81	175	81.33	13.67	22.67	124.00	28.33
GC/E/09/179	108	175	55.00	16.00	15.67	126.67	28.67
GC/E/09/180	78	170	96.33	14.67	24.33	129.67	23.67
GC/E/09/181	101	163	54.00	14.67	20.67	92.00	28.00
GC/E/09/182	77	144	105.00	11.00	20.00	324.33	28.33
GC/E/09/183	84	144	105.00	21.00	21.67	277.67	24.67
GC/E/09/184	114	147	104.33	21.00	21.33	110.33	23.67
GC/E/09/185	114	147	71.00	12.00	12.33	51.00	22.00
GC/E/09/186	118	136	82.33	18.00	21.67	104.33	25.00
GC/E/09/187	107	136	91.00	23.67	16.00	126.00	17.67
GC/E/09/188	92	136	84.33	17.33	22.00	142.00	26.00
GC/E/09/189	92	136	101.00	18.33	20.00	271.00	26.00
GC/E/09/190	94	138	82.33	26.00	20.67	303.33	21.67
GC/E/09/191	92	138	84.67	18.00	21.33	224.00	27.33
GC/E/09/192	104	136	69.33	11.67	20.67	151.33	20.00
GC/E/09/193	99	136	65.00	11.67	14.67	154.33	14.00
GC/E/09/194	106	136	49.67	19.67	12.33	152.33	19.67
GC/E/09/195	87	171	75.67	12.00	21.67	123.67	19.33
GC/E/09/196	114	136	55.00	12.00	16.67	127.33	18.00
GC/E/09/197	117	155	47.67	12.00	16.00	228.33	17.67
GC/E/09/198	104	147	77.67	17.67	18.33	98.67	20.67
GC/E/09/199	94	135	77.67	24.00	18.00	158.67	24.00
GC/E/09/200	97	143	87.67	19.33	19.00	93.00	16.00
GC/E/09/201	105	164	89.67	14.67	20.67	114.67	25.00
GC/E/09/202	91	162	90.00	16.00	21.67	225.33	23.33
GC/E/09/203	92	135	89.67	16.00	20.00	131.67	25.00
GC/E/09/204	106	135	55.00	9.00	16.00	108.00	21.00
GC/E/09/205	101	147	85.33	13.00	19.00	116.00	21.67
GC/E/09/206	94	136	105.67	14.67	20.00	208.33	27.67

GC/E/09/207	91	146	107.67	11.67	22.67	91.67	27.67
GC/E/09/208	98	147	60.00	8.00	17.67	175.00	17.33
GC/E/09/209	101	144	96.67	9.33	24.33	95.67	27.00
GC/E/09/210	91	144	99.00	17.33	23.33	241.33	22.00
GC/E/09/211	92	144	91.33	18.67	21.00	60.67	24.33
GC/E/09/212	87	136	89.00	17.67	24.00	211.67	20.00
GC/E/09/213	88	136	99.33	13.00	24.67	110.67	29.33
GC/E/09/214	88	139	78.00	8.00	23.33	205.00	25.00
GC/E/09/215	84	176	85.33	8.67	20.67	110.67	18.67
GC/E/09/216	459	176	66.00	10.67	19.00	125.67	22.00
GC/E/09/217	94	135	73.00	10.00	21.33	128.00	26.00
GC/E/09/218	91	138	81.00	11.67	20.33	109.67	25.67
GC/E/09/219	84	-187	78.33	10.67	19.00	118.00	27.00
GC/E/09/220	104	136	71.00	14.00	17.00	134.00	20.00
GC/E/09/221	99	136	84.67	13.33	17.00	220.67	22.00
GC/E/09/222	109	147	75.00	5.00	18.33	95.67	18.33
GC/E/09/223	109	147	69.00	17.00	21.00	109.33	21.33
GC/E/09/224	107	147	66.00	15.00	22.67	66.00	26.33
GC/E/09/225	104	147	64.67	14.67	19.00	143.33	18.67
GC/E/09/226	114	147	91.67	-3.67	-6.67	55.33	30.00
GC/E/09/227	99	171	49.00	11.00	13.00	71.33	18.67
GC/E/09/228	94	147	93.67	11.00	28.33	173.67	25.00
GC/E/09/229	99	147	80.00	20.00	19.67	310.33	19.67
GC/E/09/230	135	147	57.00	9.33	15.67	96.00	18.33
GC/E/09/231	104	147	77.00	11.33	20.00	147.33	21.33
GC/E/09/232	123	176	99.33	11.00	21.33	76.33	24.67
GC/E/09/233	120	164	96.67	15.67	24.33	267.00	27.33
GC/E/09/234	120	175	79.00	12.00	18.00	180.00	24.00
GC/E/09/235	123	175	68.00	12.00	18.00	86.33	22.00
GC/E/09/236	128	171	85.00	14.67	17.67	127.00	19.67
GC/E/09/237	133	174	73.33	8.33	18.33	148.33	20.00
GC/E/09/238	123	168	86.00	12.00	18.67	67.67	14.67
GC/E/09/239	127	168	80.00	8.33	20.33	104.67	15.00
GC/E/09/240	133	168	66.00	8.33	15.00	86.00	14.33
GC/E/09/241	134	174	77.33	13.33	16.00	115.67	15.00
GC/E/09/242	123	168	81.67	9.67	20.67	164.33	21.67
GC/E/09/243	138	168	74.67	11.67	18.00	118.33	21.33
GC/E/09/244	133	-41	73.33	13.33	20.67	97.33	24.67
GC/E/09/245	143	181	42.00	11.00	16.67	140.67	16.67
GC/E/09/246	136	181	76.00	17.33	19.33	136.33	23.00
GC/E/09/247	138	181	90.33	12.67	20.33	186.33	21.00
GC/E/09/248	123	181	61.33	12.33	22.67	182.00	21.00
GC/E/09/249	138	181	71.00	17.00	18.00	43.33	25.33
GC/E/09/250	133	171	90.33	13.33	17.33	149.67	24.00
GC/E/09/251	128	176	73.00	13.00	22.67	126.33	24.33
GC/E/09/252	123	176	79.33	11.33	18.33	222.33	20.67
GC/E/09/253	127	177	63.67	11.33	19.00	121.33	25.67
GC/E/09/254	127	177	56.67	11.67	16.00	64.33	19.67
GC/E/09/255	123	170	93.67	17.67	18.00	291.00	34.00
GC/E/09/256	120	173	97.33	17.00	18.33	299.00	20.33
GC/E/09/257	136	173	80.67	14.00	20.67	127.00	27.00
GC/E/09/258	138	169	92.33	14.67	23.67	349.33	36.00
GC/E/09/259	123	169	59.33	10.00	15.00	151.33	17.67
GC/E/09/260	120	169	62.33	14.00	13.67	89.33	13.33

GC/E/09/261	143	169	61.00	9.33	17.00	95.67	16.67
GC/E/09/262	143	184	65.67	10.33	15.00	88.33	18.33
GC/E/09/263	143	184	36.67	6.67	11.67	120.00	10.33
GC/E/09/264	138	203	64.00	9.00	15.33	187.00	17.33
GC/E/09/265	164	203	48.33	8.67	14.67	202.00	14.67
GC/E/09/266	127	176	46.67	11.00	14.67	190.33	14.67
GC/E/09/267	133	177	50.33	12.00	15.00	54.00	16.00
GC/E/09/268	123	161	83.33	10.00	15.00	56.00	20.00
GC/E/09/269	123	161	52.67	13.00	14.00	84.33	14.67
GC/E/09/270	123	161	94.67	14.33	21.00	61.00	26.33
GC/E/09/271	123	161	89.67	18.00	18.00	65.33	23.33
GC/E/09/272	127	169	76.00	11.33	18.33	179.67	20.67
GC/E/09/273	121	169	88.33	14.00	18.33	245.33	20.67
GC/E/09/274	131	169	76.00	12.00	17.33	226.67	17.67
GC/E/09/275	133	169	63.00	14.33	19.67	89.67	22.00
GC/E/09/276	123	170	67.33	12.00	19.00	95.00	22.00
GC/E/09/277	138	159	89.33	12.00	20.33	203.67	20.00
GC/E/09/278	133	181	75.67	14.00	18.33	216.00	27.33
GC/E/09/279	140	181	88.33	19.67	19.33	153.67	21.67
GC/E/09/280	130	175	82.00	17.67	18.67	181.00	19.00
GC/E/09/281	123	166	76.00	11.00	17.67	159.00	21.67
GC/E/09/282	146	184	64.00	8.33	16.00	68.67	13.33
GC/E/09/283	130	165	70.33	7.00	16.67	102.33	21.33
GC/E/09/284	143	195	63.67	8.00	16.67	85.33	15.67
GC/E/09/285	143	195	53.67	6.67	13.00	86.00	14.33
GC/E/09/286	140	195	74.33	10.00	18.67	99.00	21.00
GC/E/09/287	133	195	48.33	10.00	15.00	147.67	19.67
GC/E/09/288	133	195	64.33	13.00	13.67	93.33	16.67
GC/E/09/289	137	178	65.67	12.33	17.00	130.67	25.67
GC/E/09/290	137	178	63.67	18.00	19.00	150.33	30.33
GC/E/09/291	139	184	87.00	9.67	23.67	128.33	18.67
GC/E/09/292	139	184	52.00	19.67	18.67	87.67	23.67
GC/E/09/293	140	184	85.33	19.67	19.33	180.67	22.33
GC/E/09/294	143	182	83.33	13.67	19.33	172.33	24.33
GC/E/09/295	143	182	45.33	8.00	16.33	81.33	18.00
GC/E/09/296	90	133	99.00	13.67	22.00	135.00	26.00
GC/E/09/297	90	133	72.67	14.00	19.00	261.67	28.33
GC/E/09/298	95	143	52.00	10.00	16.67	97.33	15.33
GC/E/09/299	95	143	93.00	16.00	19.67	151.00	22.00
GC/E/09/300	98	134	86.67	13.67	17.67	270.00	21.00
GC/E/09/301	105	144	73.33	15.67	19.00	248.33	24.67
GC/E/09/302	102	144	82.33	13.67	14.00	117.67	24.00
GC/E/09/303	113	144	67.00	14.67	18.67	143.67	21.33
GC/E/09/304	102	140	83.67	10.00	17.00	105.00	23.33
GC/E/09/305	110	140	66.00	11.00	15.00	139.67	14.00
GC/E/09/306	104	171	85.33	9.67	16.67	178.67	16.67
GC/E/09/307	104	154	85.33	9.67	16.67	146.67	16.67
GC/E/09/308	100	154	61.33	10.00	15.00	148.33	17.00
GC/E/09/309	102	158	78.67	11.67	20.00	158.33	20.67
GC/E/09/310	105	158	71.33	14.33	18.00	122.33	18.00
GC/E/09/311	102	138	74.00	10.00	19.67	157.67	17.33
GC/E/09/312	104	137	66.67	13.00	19.00	129.00	19.00
GC/E/09/313	117	137	89.67	10.00	20.67	132.67	21.67
GC/E/09/314	100	129	73.67	17.00	22.67	224.00	24.33

GC/E/09/315	118	129	57.00	21.33	19.67	203.33	29.00
GC/E/09/316	102	160	65.33	13.00	577.67	166.00	23.67
GC/E/09/317	98	160	69.33	15.00	18.33	186.00	25.67
GC/E/09/318	104	160	72.67	10.00	17.33	86.00	18.00
GC/E/09/319	126	167	42.67	15.33	14.33	115.33	13.67
GC/E/09/320	126	167	64.00	16.67	15.67	153.33	14.33
GC/E/09/321	95	143	87.33	14.00	20.67	138.33	22.67
GC/E/09/322	95	134	92.67	13.00	19.67	281.67	23.67
GC/E/09/323	95	174	43.67	15.33	15.67	97.33	15.67
GC/E/09/324	141	174	94.33	17.33	17.00	135.33	25.67
GC/E/09/325	96	128	65.33	12.67	15.67	68.67	16.33
GC/E/09/326	96	135	72.33	6.33	21.33	69.67	21.00
GC/E/09/327	108	154	78.33	12.00	18.33	133.33	14.67
GC/E/09/328	93	154	69.33	12.00	17.67	61.33	16.33
GC/E/09/329	91	140	68.67	16.33	16.33	79.00	14.33
GC/E/09/330	91	140	69.67	13.00	14.33	80.00	14.67
GC/E/09/331	108	140	69.00	16.33	15.33	127.00	18.00
GC/E/09/332	93	140	83.00	16.67	17.00	110.67	21.00
GC/E/09/333	108	161	68.33	14.67	19.67	64.67	25.00
GC/E/09/334	100	161	76.33	15.00	17.33	125.00	22.33
GC/E/09/335	106	142	74.67	14.33	17.67	177.00	20.67
GC/E/09/336	90	142	89.67	19.67	19.33	126.67	15.67
GC/E/09/337	90	140	59.33	7.67	17.00	130.33	16.67
GC/E/09/338	105	140	79.67	14.67	19.00	32.33	24.00
GC/E/09/339	105	146	70.33	13.67	15.33	81.00	19.00
GC/E/09/340	116	146	48.00	13.00	16.67	89.67	19.00
GC/E/09/341	98	146	80.33	22.67	18.00	218.33	39.33
GC/E/09/342	101	-219	68.67	17.33	18.67	78.67	23.67
GC/E/09/343	91	152	86.00	11.67	19.33	90.00	26.33
GC/E/09/344	91	152	90.00	13.00	20.00	134.67	25.00
GC/E/09/345	107	152	44.33	9.33	12.00	143.33	11.33
GC/E/09/346	113	152	48.00	10.00	12.00	203.00	10.67
GC/E/09/347	117	152	68.00	11.33	17.33	155.67	16.00
GC/E/09/348	106	152	65.33	10.67	17.33	121.00	17.33
GC/E/09/349	90	142	46.00	10.00	13.00	74.00	11.67
GC/E/09/350	112	142	48.00	9.33	11.33	134.33	11.33
GC/E/09/351	106	148	65.33	11.67	16.33	170.00	17.67
GC/E/09/352	90	148	94.33	13.67	20.00	257.00	23.67
GC/E/09/353	90	140	67.00	14.33	18.33	95.67	18.33
GC/E/09/354	86	140	89.00	14.33	18.67	120.67	19.33
GC/E/09/355	86	151	74.67	13.33	18.67	122.33	21.00
GC/E/09/356	90	140	89.00	13.67	19.67	114.33	20.00
GC/E/09/357	90	140	53.33	13.67	15.00	161.00	19.00
GC/E/09/358	90	140	80.33	10.00	15.33	159.67	23.67
GC/E/09/359	93	140	91.00	12.33	21.00	185.67	20.67
GC/E/09/360	90	140	70.67	12.00	17.67	132.67	18.67
GC/E/09/361	129	172	44.33	10.33	14.33	178.00	12.33
GC/E/09/362	113	172	86.67	15.67	20.33	135.00	28.33
GC/E/09/363	89	172	85.33	14.67	16.33	142.67	21.67
GC/E/09/364	106	172	72.00	13.00	19.33	39.00	28.00
GC/E/09/365	106	172	88.33	15.33	19.33	163.00	23.67
GC/E/09/366	124	172	45.00	19.67	14.00	130.33	14.00
GC/E/09/367	93	147	76.33	14.33	14.67	77.67	17.67
GC/E/09/368	103	151	46.00	11.67	17.33	176.00	13.67

GC/E/09/369	106	151	64.00	14.67	17.00	112.33	16.33
GC/E/09/370	91	151	85.33	12.00	15.67	148.67	14.67
GC/E/09/371	108	151	43.67	10.00	15.33	89.33	14.00
GC/E/09/372	90	147	83.33	13.00	17.00	122.67	15.33
GC/E/09/373	90	147	54.33	9.00	14.67	78.00	15.00
GC/E/09/374	109	154	80.33	15.67	19.67	95.33	18.67
GC/E/09/375	103	162	80.67	14.00	19.00	191.67	18.67
GC/E/09/376	91	147	65.00	13.00	17.67	65.33	25.33
GC/E/09/377	91	141	73.33	16.00	15.67	117.00	20.67
GC/E/09/378	129	177	51.67	10.67	12.00	127.67	20.33
GC/E/09/379	103	156	66.33	9.00	13.00	106.00	20.33
GC/E/09/380	113	156	36.33	18.67	11.67	89.00	17.00
GC/E/09/381	106	156	63.00	10.67	15.33	162.00	16.00
GC/E/09/382	106	142	54.33	10.00	15.33	91.33	14.67
GC/E/09/383	90	142	84.67	11.67	20.67	86.67	22.67
GC/E/09/384	100	142	76.00	10.33	17.33	122.00	21.33
GC/E/09/385	130	167	70.33	15.00	16.67	159.67	20.33
GC/E/09/386	137	177	64.67	14.67	16.67	112.67	18.67
GC/E/09/387	106	154	46.67	14.33	16.00	129.67	14.67
GC/E/09/388	96	154	82.67	10.00	17.67	227.33	20.33
GC/E/09/389	129	170	71.67	12.67	16.67	116.00	17.67
GC/E/09/390	134	170	79.33	10.00	19.33	175.00	18.33
GC/E/09/391	124	168	66.67	10.00	16.67	138.00	14.00
GC/E/09/392	141	168	47.33	10.00	15.67	166.00	19.33
GC/E/09/393	141	168	72.67	10.00	15.67	172.33	18.33
GC/E/09/394	103	168	64.00	11.00	16.67	52.00	15.00
GC/E/09/395	134	163	63.67	10.00	18.00	129.00	23.33
GC/E/09/396	90	146	70.00	10.00	15.00	74.33	15.67
GC/E/09/397	132	176	60.00	10.00	15.33	102.00	16.00
GC/E/09/398	103	176	66.67	8.33	16.33	100.67	19.00
GC/E/09/399	108	176	65.67	10.00	19.00	58.33	22.33
GC/E/09/400	129	167	77.67	14.33	14.67	46.33	13.00
GC/E/09/401	90	142	65.33	8.00	15.33	90.00	16.33
GC/E/09/402	121	166	55.00	12.00	14.67	32.33	23.00
GC/E/09/403	86	140	76.00	8.67	13.67	53.67	21.00
GC/E/09/404	107	148	68.67	9.67	17.33	30.33	17.67
GC/E/09/405	83	139	72.67	11.67	21.00	133.67	20.00
GC/E/09/406	113	152	77.33	8.00	20.33	136.00	21.33
GC/E/09/407	93	152	77.33	12.00	17.67	45.33	19.67
GC/E/09/408	103	152	55.00	19.00	14.67	86.33	14.67
GC/E/09/409	106	152	63.00	8.00	18.67	81.33	20.33
GC/E/09/410	110	140	50.67	12.33	14.33	90.00	15.67
GC/E/09/411	108	152	69.33	9.33	17.33	95.67	16.33
GC/E/09/412	98	152	71.67	11.00	20.67	148.67	21.00
GC/E/09/413	98	152	81.00	12.00	20.67	164.33	18.67
GC/E/09/414	89	140	74.33	11.00	13.33	93.33	17.67
GC/E/09/415	106	140	68.67	13.00	17.00	156.33	19.33
GC/E/09/416	106	140	60.67	10.00	17.00	41.67	17.00
GC/E/09/417	107	146	58.33	7.33	16.33	75.67	14.33
GC/E/09/418	75	135	57.67	9.33	16.67	77.67	17.00
GC/E/09/419	75	156	65.67	10.00	18.33	104.33	19.00
GC/E/09/420	105	156	80.00	9.67	21.00	53.33	19.67
GC/E/09/421	95	156	76.33	11.33	19.67	128.00	19.33
GC/E/09/422	98	142	87.33	12.33	20.33	99.67	23.00

GC/E/09/423	103	142	45.67	9.33	16.67	112.33	19.67
GC/E/09/424	108	119	69.00	10.00	17.33	175.67	19.33
GC/E/09/425	117	155	65.00	10.67	18.00	88.33	21.33
GC/E/09/426	111	161	73.33	13.67	17.33	102.00	20.00
GC/E/09/427	98	161	74.33	11.00	19.00	115.00	20.00
GC/E/09/428	88	138	73.67	11.33	21.67	88.33	22.33
GC/E/09/429	93	138	56.00	12.00	16.67	109.33	21.67
GC/E/09/430	92	138	72.00	17.67	17.33	89.00	19.67
GC/E/09/431	98	156	75.33	13.33	18.33	152.00	25.33
GC/E/09/432	129	167	52.67	11.33	17.67	61.67	14.00
GC/E/09/433	91	167	82.00	10.00	20.33	183.67	22.00
GC/E/09/434	85	138	78.33	14.67	19.67	124.67	17.00
GC/E/09/435	91	138	90.33	12.67	19.00	201.33	24.00
GC/E/09/436	78	138	65.67	10.00	15.00	224.33	16.33
GC/E/09/437	82	138	70.67	10.00	17.00	75.33	17.00
GC/E/09/438	129	165	70.33	8.00	19.00	151.33	15.67
GC/E/09/439	108	165	72.67	8.33	19.67	124.00	19.00
GC/E/09/440	98	165	77.00	11.00	20.00	248.33	17.67
GC/E/09/441	101	165	74.00	11.00	20.00	92.00	22.00
GC/E/09/442	92	141	87.67	10.00	21.00	109.00	18.00
GC/E/09/443	125	161	61.00	11.00	13.67	73.67	15.67
GC/E/09/444	92	163	88.33	10.33	18.00	137.33	19.00
GC/E/09/445	86	169	42.00	10.00	14.67	79.33	14.00
GC/E/09/446	85	164	77.33	12.00	19.67	98.33	16.67
GC/E/09/447	78	157	80.00	18.67	20.67	153.00	22.67
GC/E/09/448	76	157	73.00	10.00	22.00	109.00	23.67
GC/E/09/449	76	157	58.00	10.00	13.67	91.00	19.33
GC/E/09/450	86	169	83.67	19.00	23.33	156.33	32.67
GC/E/09/451	78	169	76.67	21.00	19.33	78.00	20.00
GC/E/09/452	78	169	82.67	19.00	19.67	85.00	22.33
GC/E/09/453	88	169	70.67	14.00	18.67	64.33	19.00
GC/E/09/454	78	151	60.00	10.00	13.00	75.00	16.67
GC/E/09/455	78	151	53.33	9.33	18.67	83.33	19.00
GC/E/09/456	90	151	63.33	11.33	16.67	142.00	21.00
GC/E/09/457	86	155	63.00	12.00	13.67	133.33	19.00
GC/E/09/458	64	155	74.67	12.33	20.00	138.67	21.00
GC/E/09/459	74	155	80.00	11.00	18.33	185.00	23.00
GC/E/09/460	85	155	75.33	12.00	19.33	102.00	19.33
GC/E/09/461	66	151	82.33	20.33	19.00	167.00	19.67
GC/E/09/462	66	151	62.67	14.67	19.00	261.00	20.33
GC/E/09/463	74	151	52.33	12.67	15.00	146.00	18.00
GC/E/09/464	74	151	75.00	15.67	22.67	115.33	20.33
GC/E/09/465	86	151	81.67	19.33	19.00	65.33	21.67
GC/E/09/466	86	151	88.00	10.00	21.67	162.00	24.00
GC/E/09/467	78	151	75.33	11.00	15.67	136.00	21.00
GC/E/09/468	88	151	86.00	12.33	20.67	149.00	18.67
GC/E/09/469	90	151	91.33	10.00	19.67	140.00	16.00
GC/E/09/470	77	151	77.67	12.00	19.33	73.67	22.00
GC/E/09/471	77	151	66.33	12.00	14.33	153.33	17.33
GC/E/09/472	77	151	77.33	10.00	18.33	269.00	17.67
GC/E/09/473	71	151	78.33	11.00	19.67	89.00	19.33
GC/E/09/474	74	151	69.00	9.00	15.33	140.67	21.33
GC/E/09/475	74	151	75.67	15.67	19.67	116.00	17.00
GC/E/09/476	90	151	69.33	10.00	13.67	98.67	13.67

GC/E/09/477	77	155	65.67	11.00	15.67	140.00	19.67
GC/E/09/478	77	155	67.67	11.00	17.67	156.00	18.67
GC/E/09/479	70	155	82.33	12.00	19.67	130.00	22.33
GC/E/09/480	70	155	75.67	14.33	18.33	101.00	18.00
GC/E/09/481	50	157	61.33	10.00	16.67	96.00	19.00
GC/E/09/482	50	157	61.67	10.00	15.33	115.33	19.00
GC/E/09/483	60	157	87.00	12.33	17.33	112.67	18.00
GC/E/09/484	60	157	79.33	13.33	17.33	112.67	20.33
GC/E/09/485	60	157	62.67	12.00	14.00	71.00	19.00
GC/E/09/486	54	157	66.33	13.33	18.67	70.33	21.33
GC/E/09/487	84	164	70.33	10.00	17.67	77.00	14.33
GC/E/09/488	84	164	51.00	12.67	13.67	79.33	14.67
GC/E/09/489	85	138	86.33	12.67	19.33	78.00	23.67
GC/E/09/490	85	164	82.33	13.33	20.33	74.67	23.67
GC/E/09/491	82	164	67.00	12.67	16.33	110.33	13.67
GC/E/09/492	78	164	72.00	12.00	19.33	133.33	20.67
GC/E/09/493	78	164	49.67	9.67	17.00	64.00	15.67
GC/E/09/494	94	164	68.67	10.00	19.33	137.67	18.00
GC/E/09/495	94	164	84.00	9.67	18.33	50.33	15.33
GC/E/09/496	87	164	46.33	9.00	17.00	64.33	14.67
GC/E/09/497	87	164	77.00	10.00	19.33	95.67	18.67
GC/E/09/498	78	164	72.33	12.00	19.67	106.33	20.00
GC/E/09/499	94	164	78.00	11.00	20.00	123.00	17.00
GC/E/09/500	70	164	71.00	10.00	18.00	147.67	23.00
GC/E/09/501	70	164	72.33	15.33	19.00	132.33	17.67
GC/E/09/502	116	164	76.33	10.00	19.67	45.67	19.33
GC/E/09/503	75	162	46.67	8.67	15.33	45.67	15.33
GC/E/09/504	75	162	44.33	8.67	19.00	77.00	17.67
GC/E/09/505	75	162	75.00	7.33	22.00	91.33	20.33
GC/E/09/506	62	162	57.67	10.67	18.67	112.00	17.67
GC/E/09/507	62	162	71.00	12.33	17.33	152.67	14.67
GC/E/09/508	72	162	79.33	11.67	21.33	93.67	18.67
GC/E/09/509	72	162	81.00	13.00	20.33	118.00	18.67
GC/E/09/510	72	162	86.67	10.00	20.00	203.67	27.00
GC/E/09/511	83	162	78.67	10.00	19.00	90.33	20.67
GC/E/09/512	75	162	69.33	10.33	18.00	101.00	18.00
GC/E/09/513	96	162	69.00	10.00	18.33	88.00	16.33
GC/E/09/514	96	161	69.67	9.67	18.00	185.67	16.33
GC/E/09/515	75	161	62.33	8.00	19.00	142.67	16.00
GC/E/09/516	75	161	65.67	8.00	17.67	134.00	16.33
GC/E/09/517	83	161	74.33	10.00	17.00	113.00	17.00
GC/E/09/518	83	161	84.33	13.33	20.33	101.67	24.00
GC/E/09/519	81	161	69.00	12.33	17.00	125.00	19.67
GC/E/09/520	75	162	70.00	9.33	15.33	111.67	21.33
GC/E/09/521	75	162	70.67	12.33	17.33	178.00	19.67
GC/E/09/522	75	162	65.67	10.00	17.33	146.00	16.33
GC/E/09/523	83	162	64.00	10.00	16.33	106.33	16.33
GC/E/09/524	83	162	46.67	9.00	12.00	76.33	18.00
GC/E/09/525	83	162	58.67	10.00	14.67	159.00	16.33
GC/E/09/526	92	162	51.67	10.00	14.67	130.00	17.33
GC/E/09/527	86	162	50.67	11.00	15.00	139.33	19.00

Characterization of paddy germplasm

Germplasm evaluation for important genes:

a. New genes for resistance to Bacterial Leaf Blight (BLB) found in Gene Campaign's Gene Banks

Rice samples from the Gene Bank are being tested by the Division of Genetics, Indian Agricultural Research Institute, (IARI) Delhi, for resistance to Bacterial Leaf Blight, a rice disease, causing significant yield loss. Starting with 17 traditional varieties that farmers characterized as disease resistant, IARI had taken 10 varieties into the third year of BLB testing. In the *kharif* season 2005-06 these ten varieties were sent to various rice stations for field trials. Out of the 10 varieties five varieties have been identified as resistant to bacterial leaf blight; these are *Lambasari, Bhathani, Kalajeera, Jhuler* and *Hindmauri*.

Process of BLB evaluation: 325 traditional rice varieties from the Gene-Seed Bank collections of Gene Campaign were given to the Genetics Division/ IARI, New Delhi, for screening and testing. The varieties were screened for resistance to the Bacterial Leaf Blight (BLB) disease. The varieties were tested at the nursery and the two-tillage stage. After screening, the varieties were grouped into 3 groups: highly susceptible; moderately resistant and resistant. The resistant varieties were further tested. Eight traditional varieties that were found consistently resistant to BLB were also screened at the Central Rice Research Institute (CRRI), Cuttack during the 2005 kharif season. Two breeder's varieties, Pusa Basmati as a highly susceptible variety and IRBB 55 as a resistant variety were used as check varieties during the screening and testing.

The exciting discovery is that neither of these varieties carries the genes XA 13 and XA 21 which are known to confer resistance to BLB. It is obvious that the farming communities have conserved new genes, so far unknown, that confer BLB resistance in rice. The varieties are being further tested by the IARI group, to characterize the new genes.

This discovery has very great significance for the future of rice breeding. For this conservation effort, the farming communities from Jharkhand are conferred with recognition in the form of the Genome Savior Award by Protection of Plant Varieties and farmers' Rights Authority of India on 12th February 2009.

Traditional Rice Varieties Resistant To BLB

S. No.	Varieties	Score in nursery	Score in field (Transplanted)	Average score
1	Hardimuri	2.3	1.25	1.8
2	Kala Jeera	2.5	1.45	1.98
3	Bhatind	2.1	1.50	1.80
4	Sitwa Dhan	2.2	1.35	1.80
5	Sarna Gora	2.5	1.6	2.05
6	Chaina Gora	2.4	1.7	2.05
7	Lamba Asari	1.6	1.7	1.65
8	Jhulur	1.6	1.7	1.65
9	IRBB 55	1.8	1.5	1.65
10	Pusa Basmati-1 (control)	16.5	12.5	14.5

b. Varieties found with Drought Tolerant properties:

The Department of Plant Breeding, Birsa Agricultural University, Ranchi is testing the traditional upland rice varieties characterized as drought tolerant by farmers for tolerance to water stress. Materials have been shared with research stations for germplasm evaluation following the conditions of the Convention on Biological Diversity. An MoU has been signed by Gene Campaign on behalf of the local communities, after taking the consent of the representatives of communities. According to the MoU, no patents can be taken on any material developed from the research and evaluation and the germplasm will continue to be the property of the local communities.

During dry season 2007 & 2008, 125 farmers' varieties were screened by Birsa Agricultural University in upland condition for drought tolerance. Some promising genotypes were identified, which can be used for breeding purposes and will serve as good parents for the development of drought tolerant lines. The screening and testing of these varieties was

undertaken by comparing drought resistance with respect to the controls like drought susceptible varieties (IR 20, IR 36; moderately drought tolerant varieties (BVD-109, WITA-1) and highly drought tolerant variety (Salampikit). After two years of the evaluation traditional varieties like ***Darikasar, Biri, Hemo, Bachakalamdani Bara, Safed Dhan, Khair Bhojan, Karhani-2, Dudhkalma*** and ***Jagarnath*** were found to be tolerant to drought. This has significance for rice cultivation in an era of global warming and climate change.

Traditional Rice Varieties Tested for Drought Resistance

Sl. No.	Name of the Entries	Drought Tolerance Score
1.	Ajan	5
2.	Ambabudha	7
3.	Ambagod	3
4.	**Bachakalamdani Bara**	**1**
5.	Baleshar	3
6.	Barkhasal	3
7.	Basmanjari	3
8.	Basmati Kala	5
9.	Basmati Lal	3
10.	Basmati Ujala	5
11.	Bastabhog	3
12.	Bastar	3
13.	Bhanjani	3
14.	Bharim bhojnaya	3
15.	Bharim bhojnaya	3
16.	Bhasar	3
17.	Bhelwa	2
18.	Bherakapara	5
19.	Bhojani	7
20.	Bhojani Lal	3
21.	Bhujana	5
22.	Bhurkur	3
23.	Biri	1
24.	Champa Dhusari	3
25.	Charinakhi	5
26.	Dali Safed	5
27.	**Darikasar**	**1**

Sl. No.	Name of the Entries	Drought Tolerance Score
28.	Darmi	5
29.	Dasi	3
30.	Devatabhog	5
31.	Dhani Motka	2
32.	Dhania Phool	7
33.	Dhudhasair	3
34.	Dhusari	7
35.	Dhusari Bara	7
36.	Dhusari safed	3
37.	Dhusari-4	5
38.	DudhaRusia	3
39.	Dudhasal	7
40.	**Dudhkalma**	**1**
41.	Dulgi	7
42.	Gagi Prasad	5
43.	Gang kesar	3

Sl. No.	Name of the Entries	Drought Tolerance Score
44.	Gangasafri	2
45.	Gopalbhog Mota	7
46.	Haldi	2
47.	Hanskala	3
48.	Hanskalma chhota	2
49.	Hariken	3
50.	Hathi Panja	7
51.	**Hemo**	**1**
52.	**Jagarnath**	**1**
53.	Jammu Basmati	7
54.	Jhalki	7
55.	Jhilli Dhusri	3
56.	Jogva Safed	3
57.	Kadva	3
58.	Kair Dhan	3
59.	Kaira Kanghi	3

Sl. No.	Name of the Entries	Drought Tolerance Score
60.	Kalajira	7
61.	Kalam Kathi	7
62.	Kalamdani Lamba	7
63.	Kanhar	3
64.	Kankawa	2
65.	Kankesal	3
66.	Karamisal	3
67.	**Karhani-2**	**1**
68.	Karijhari	5
69.	Karma	3
70.	Karwa Pankhi	3
71.	Katarni	2
72.	Ketika	3
73.	**Khair Bhojan**	**1**
74.	KhairaKunchi (G.Mahto.)	3
75.	Khirdat	5

Sl. No.	Name of the Entries	Drought Tolerance Score
76.	Kishan	2
77.	Kohara Phool	3
78.	Kohara Phul-2	3
79.	Lahi	7
80.	Lakhansal	3
81.	Lal bhog	3
82.	Lal jari	3
83.	Lal Ptla	5
84.	Lalgandhari	3
85.	Lalmund (Bara)	3
86.	Lalsar	3
87.	Larjo	2
88.	Madhumal	3
89.	MahikUjla Basmati	5
90.	Mahin Dhan	7
91.	Mainathori-2	3

Sl. No.	Name of the Entries	Drought Tolerance Score
92.	MakarKalma	5
93.	Mani Phool	5
94.	Manihari Phool	3
95.	Manjari	2
96.	Mansuri (B.Mahto)	2
97.	Mansuri Majhala	2
98.	Mansuri Nata	3
99.	Mathani	3
100.	Nanka Dhusari	3
101.	Nanka Pd Bhog	2
102.	Panipath	2
103.	Panjali	2
104.	Pansaila Chhota	2
105.	Patal Safed	2
106.	Patarlal Dhan	3
107.	Prakash	2

Sl. No.	Name of the Entries	Drought Tolerance Score
108.	Pusa Sugandha	2
109.	Rajshree (Bihar)	3
110.	Ratgora	3
111.	Sabal Purya	3
112.	Sadma Safed	2
113.	Sadma-2	3
114.	Safari	3
115.	**Safed Dhan**	**1**
116.	Sahe	3
117.	Saman Chota	2
118.	Sarai kela	3
119.	Sikkihatta	3
120.	Sikkisuga	5
121.	Sirhathi Safed	2
122.	Sonachamitti	2
123.	Swarna	3

Sl. No.	Name of the Entries	Drought Tolerance Score
124.	Tikariyan	3

Sl. No.	Name of the Entries	Drought Tolerance Score
125.	Vandana	7

Significance of these varieties is more as Jharkhand is facing drought condition since last two years. Also traditional verities are again been preferred by the farmers for cultivation as they are facing drought condition in Jharkhand as well as late onset of monsoon. Farmers opted for hybrid rice has lost their seeds as there is no rainfall during nursery raising period (June) and seedling not able to survive.

Use and standardization of Desiccation technology for long term storage and conservation: A new technology called desiccation is being tested to prolong the storage period at ambient temperature. This will greatly facilitate long term storage. Unfortunately IARI and NBPGR which were both supposed to be testing ultra-desiccation have not yet begun their programs. GC has therefore begun trials on its own, in the field. This is a pilot project to test whether the new technology of desiccation works in the field.

A total of 60 varieties of traditional seeds were desiccated using the new drying techniques. Special instruments like the, electric seed dryer and digital moisture meters are used to reduce and control seed moisture. An assortment of varieties selected from different land types, yield performance and special properties were selected for desiccation.

Viable and healthy seeds were selected. An initial moisture level of 14% was reduced to lower than 7%. Five hundred grams of the desiccated seed varieties are packed in thick plastic bags (300 gage) that are water proof. The time needed for desiccation to reduce seed moisture below 7% is found to be around 3 to 4 hours if the seeds the dried in the sunlight, however more time is required for desiccating seed not dried under sunlight. Each variety is a packed in replicates of five to enable checking of germination viability every year for five years.

Only after the technology has been validated over five years or more with small samples, can the important samples in the collection be subjected to desiccation and the technology established for wide use. The current year (2010-11) is the fourth year of testing showing the germination from 40% to 71%. However, a careful scientific reevaluation of the effect of desiccation on the germination is required as some of the seed packets kept after

desiccation get infected by the insect which may also effected the germination of the desiccated seeds.

Rice varieties undergoing ultra-desiccation and year wise germination percent:

S. No.	Variety with characteristics	Germination (%)			
		2007-08	2008-09	2009-10	2009-10
1.	Agni Sal (Low land, High yield)	98-100	90-95	90	70
2.	Bhojni (Low land, High yield)	98-100	90-95	78	55
3.	Churi (Low land)	98-100	90-95	82	52
4.	Dahiya (Low land)	98-100	90-95	76	60
5.	Dhusri (Low land)	98-100	90-95	90	65
6.	Hardimuri (Low land)	98-100	90-95	86	57
7.	Hardiphool (Low land, Aromatic)	98-100	90-95	84	56
8.	Jangli Jatta (Low land)	98-100	90-95	62	42
9.	Khejurmuri (Low land)	98-100	90-95	74	66
10.	Madna (Low land)	98-100	90-95	60	53
11.	Moti Safed (Low land)	98-100	90-95	65	49
12.	Nanhinya (Low land, Aromatic)	98-100	90-95	80	70
13.	Palaparwat (Low land)	98-100	90-95	69	54
14.	Panditwa (Low land)	98-100	90-95	75	59
15.	Raisee (Low land)	98-100	90-95	70	58
16.	Rani Muni (Low land)	98-100	90-95	80	65
17.	Suti Nanhinya (Low land)	98-100	90-95	83	69
18.	Prasad Bhog (Low land, Aromatic)	98-100	90-95	90	71
19.	Korhan (Low land)	98-100	90-95	84	58

20.	Mayya Dulari (Low land)	98-100	90-95	80	62
21.	Lujhhri (Low land)	98-100	90-95	90	71
22.	Khejur Kalam (Low land)	98-100	90-95	87	59
23.	Kalajeera (Low land, Aromatic)	98-100	90-95	72	48
24.	Mungaphool (Low land, Aromatic)	98-100	90-95	67	39
25.	Jhingaphool (Low land, Aromatic)	98-100	90-95	83	50
26.	Bhensa Sal (Low land)	98-100	90-95	76	43
27.	Samdhi (Low land)	98-100	90-95	71	46
28.	Gopalbhog (Low land, Aromatic)	98-100	90-95	74	51
29.	Mainathori (Low land)	98-100	90-95	73	55
30.	Sonachur (Low land, Aromatic)	98-100	90-95	78	60
31.	Dubraj (Low land, Aromatic)	98-100	90-95	81	59
32.	Katharphooli (Low land)	98-100	90-95	67	48
33.	Ara Baba (Medium land)	98-100	90-95	77	45
34.	Ara Gora (Medium land)	98-100	90-95	59	47
35.	Bhutri (Medium land)	98-100	90-95	64	50
36.	Dubraj (Medium land)	98-100	90-95	78	53
37.	Karhani (Medium land)	98-100	90-95	83	69
38.	Karmu Sal (Medium land, High yield)	98-100	90-95	76	55
39.	Lokan Sal (Medium land)	98-100	90-95	90	58
40.	Pahari (Medium land)	98-100	90-95	74	55
41.	Pahari (Medium land)	98-100	90-95	72	52

42.	Sonpiya (Medium land)	98-100	90-95	87	60
43.	Sal Jhhati (Medium land)	98-100	90-95	90	63
44.	Mansoori (Medium land, Aromatic)	98-100	90-95	88	62
45.	Jolpo (Medium land)	98-100	90-95	86	60
46.	Kalamdani Mota (Medium land)	98-100	90-95	76	57
47.	Sathi Safed (Medium land)	98-100	90-95	85	60
48.	Jarhan Charka (Medium land)	98-100	90-95	78	55
49.	Dhobo (Medium land)	98-100	90-95	73	57
50.	Dani Gora (Up land)	98-100	90-95	70	52
51.	Jerenga Gora (Up land)	98-100	90-95	81	54
52.	Bahal Gora (Up land)	98-100	90-95	83	58
53.	Karanga Gora (Up land)	98-100	90-95	85	61
54.	Malat (Up land)	98-100	90-95	78	40
55.	Sirhatti (Up land)	98-100	90-95	75	57
56.	Natha (Up land)	98-100	90-95	90	60
57.	Nana Baba (Up land)	98-100	90-95	84	51
58.	Jangli jatta (Up land)	98-100	90-95	83	47
59.	Jhnga Sal (Up land)	98-100	90-95	90	57
60.	Kanchan (Up land)	98-100	90-95	86	51

Seed Multiplication to ensure seed availability among farming community

a) Seed Multiplication of Paddy on Leased Land

To encourage cultivation of traditional varieties and to meet the increasing demand of the farmers as also to enlarge the scope of in situ conservation, Gene Campaign has taken on lease 5.5 acres of land from the farmers in Palma, Kulli and Kachabari. Another 8acres at Tirla village in Ormanjhi for multiplication of traditional varieties to fulfill the ever increasing demands of the traditional paddy varieties. The varieties multiplied on the leased land during the project period are as follows;

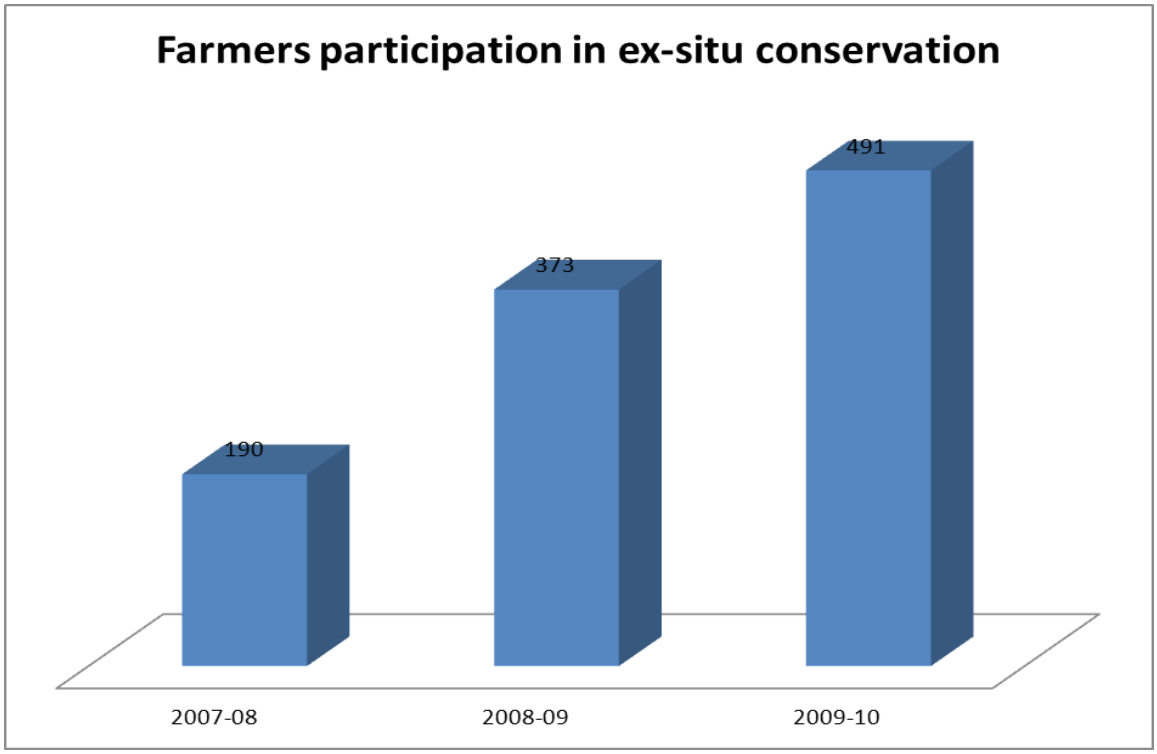
S. No.	Multiplication of traditional varieties		
	2007-08	**2008-09**	**2009-10**
1.	Kala Jeera	Kala Jeera	Kalmdani
2.	Dhaniya Phool	Dhaniya Phool	Dhusari
3.	Prasad Bhog 1	Prasad Bhog	Agni Sal
4.	Prasad Bhog 2	Sona Chur	Neta
5.	Sona Chur	Kurso Bhog	Kala Jeera
6.	Kurso Bhog	Indrani	Dhaniya Phool
7.	Indrani	Kapoor Bhog	Prasad Bhog
8.	Kapoor Bhog	Bachcha Kalmdani	Sona Chur
9.	Sonachoor Lal	Paniyas	Kurso Bhog
10.	Nanhiya Lal	Agni Sal	Indrani
11.	Ratno Churi	Paniyas	Kapoor Bhog
12.	Jau Phool	Kalmdani	Bachcha Kalmdani
13.	Lal Sugandha	Dhusari	Paniyas
14.	Sona Chur	Agni Sal	Agni Sal
15.	Paniyas	Neta	Paniyas
16.	Bachcha Kalmdani	Bhojani	
17.	Paniyas	Agni Sal	
18.	Agni Sal	Bacha Kalmdani	
19.	Paniyas	Dudhi Rice	
20.	Kalmdani	Agni Sal	
21.	Dhusari		

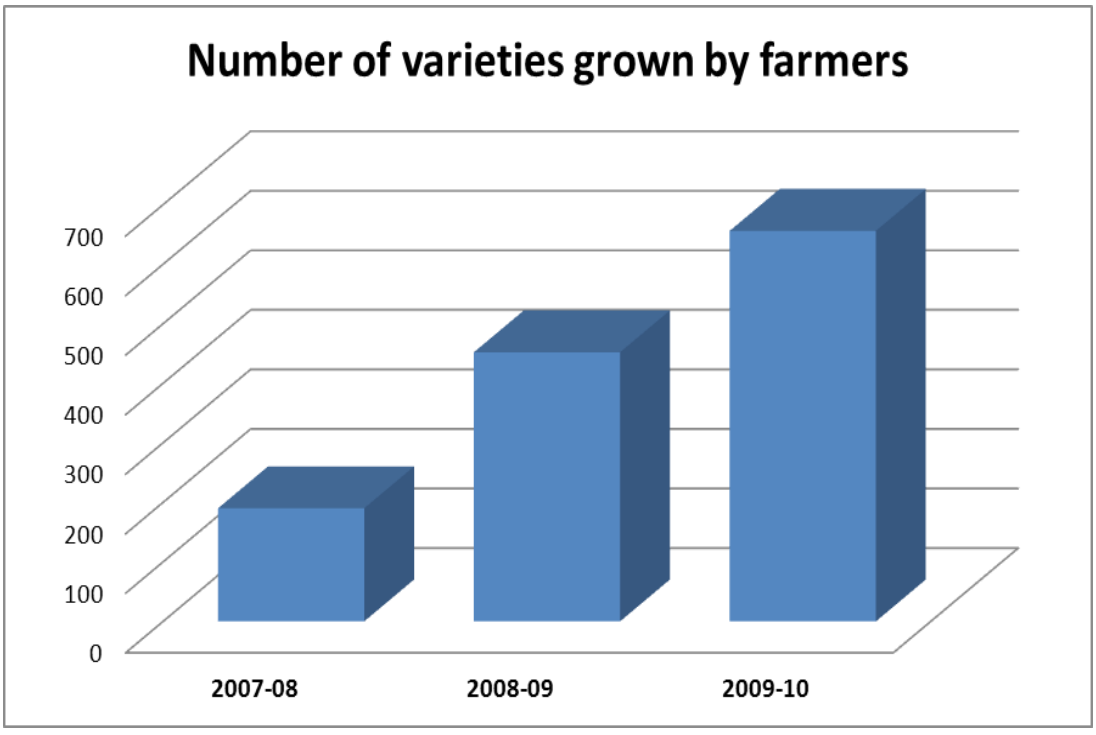
22.	Agni Sal		
23.	Neta		
24.	Bhojani		
25.	Dudhi Rice		
26.	Bachcha Kalamdani		
27.	Agni Sal		
28.	Bacha Kalmdani		
29.	Dudhi Rice		
30.	Agni Sal		
31.	Jau Phool		
32.	Birsamati		
33.	Safed Mahin		

In situ conservation:

a. Traditional varieties cultivated from community Gene-Seed Banks: With the establishment of community gene seed bank, the participation of the community in ex-situ conservation is increase year by years. The number of farmers involved in the ex-situ conservation is 1054 and germplasm being utilized by the community as seed ranges from 190 in 2007-08 to 656 in 2009-10.

S. No.	Seed Bank	No. of farmers			No. of varieties		
		2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
1.	Manatu	25	69	90	25	87	120
2.	Jidu	-	44	77	-	42	95
3.	Ichadag	-	45	60	-	45	83
4.	Jaspur	-	91	85	-	91	132
5.	Kachabari	30	27	70	30	57	70
6.	Kulli	60	45	50	60	60	75
7.	Bhandra	75	52	59	75	70	81
Total		**190**	**373**	**491**	**190**	**452**	**656**


Farmers participation in ex-situ conservation
190
373
491
2007-08
2008-09
2009-10

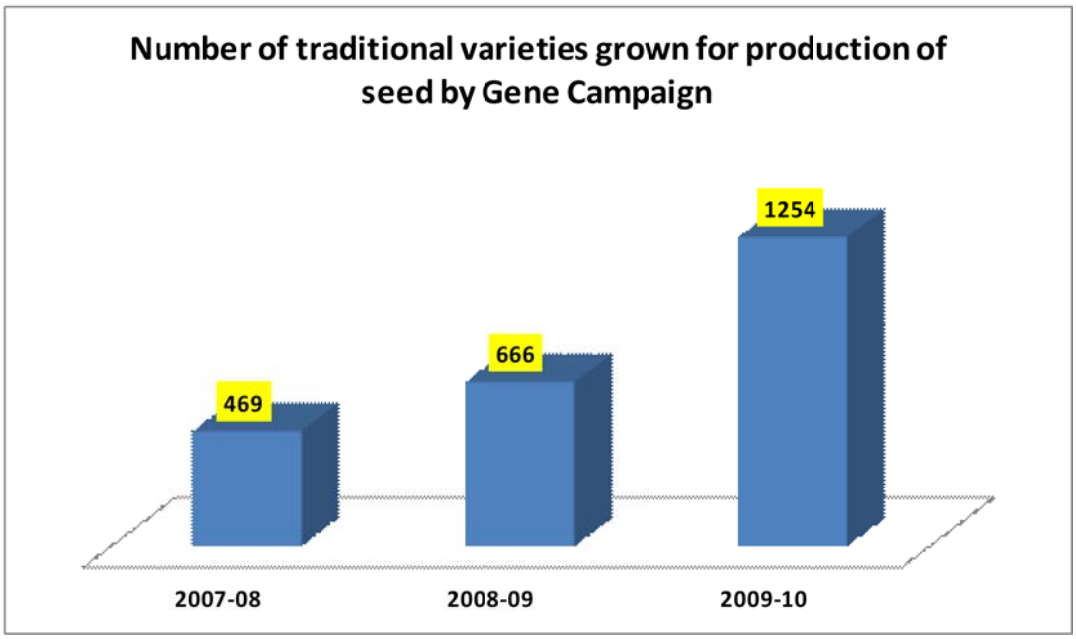

Number of varieties grown by farmers
700
600
500
400
300
200
100
0
2007-08
2008-09
2009-10

b. Community based system for administering the Gene-Seed banks: Meetings were called to set up Gene-Seed Bank Management Committees in each block. The Committees have begun working under the guidance of Gene Campaign. The committee is responsible for processing and storage of collected samples in the Bank. They are also responsible for distribution of seed samples among farmers for seed renewal and multiplication for distributing seeds for cultivation in farmers' fields and for return 3 times the seed volume taken, to the Bank.

The *Beej Bank Sanchalan Samitis* have been set up from amongst village volunteers, with a coordinator each, to administer the Gene-Seed Banks. These samities oversee the seed multiplication, renewal and return to the Bank, farmer distribution and on field conservation.

c. Helping others to set up community Gene-Seed Bank: Mahasakti Mahila Samiti, an organization based in Palkot village of district Gumla is keen to promote traditional rice in their area and maintain a seed bank. GC shared 70 traditional rice varieties from its Bank and provided training and technical support to Mahasakti mahila samiti to set up a small Gene Bank of its own. Similarly another organization, Jan Chetna Munch based at Chandankayari block of Bokao district is also interested to set up seed bank with the help of Gene Campaign. The Jan Chetna Munch has been provided with the 50 traditional varieties for establishing community level seed gene bank. Also seed of 50 traditional varieties was supplied to Mr. Shushil Tirky for establishment of gene seed bank in village Chainpur of Simdega district.

d. Renewal of traditional seed varieties by Gene Campaign: To keep the collective germplasm viable and suitable for community utilization gene Campaign itself involved in multiplication and renewal of germplasm, the year wise detail of the germplasm multiplied by gene Campaign is as follows;



A view of Germplasm nursery at BAU field

Transplanting of germplasm at BAU Field using SRI technique of cultivation

Traditional paddy variety at BAU field

e. Seed return to Seed Gene Banks by Farmers: The traditional seed varieties distributed to the farmers during project period. These farmers returned more seed than they have taken from gene seed banks and helps in increasing the seed volume which in turn will be utilized by more number of farmers.

S. No.	Gene bank*	Seed Amount Distributed (Kg)			Seed Amount returned (Kg)		
		2007-08	2008-09	2009-10	2007-08	2008-09	2009-10**
1.	Bhandra	80.00	118.96	250.00	120.00	190.94	
2.	Kulli	192.00	100.00	225.00	200.00	120.00	
3.	Jaspur	83.00	83.00	165.00	130.00	171.00	
4.	Manatu	50.00	199.50	250.00	150.00	338.00	
5.	Jidu	70.00	63.50	92.00	100.00	136.50	
6.	Ichadag	84.00	50.00	70.00	105.00	120.00	
7.	Kachhabari	70.00	100.00	110.00	135.00	200.00	

** Seed distributed in some area prior to gene bank construction*

*** Seed sown by the farmers will be returned after harvest.*

f. Popularization of drought resistant varieties among the farming community: In general, the Jharkhand is undulated and upland is suitable for cultivation of drought resistant paddy varieties. Frequent droughts in the state and crop failures make poor people prone to unpredictable food security. The best strategy to achieve larger impacts for improving the livelihoods of thousands of farmers in Jharkhand must involve the availability of good quality seed. It is well know that Jharkhand is facing drought in consecutive two years leading to the poor availability of seeds. Farmers are being forced day by days to leave the upland field vacant. To make additions to the food security of the poor farmers Gene Campaign has setup a network of 10 NGO for distribution of upland, drought tolerant, short duration paddy varieties in 16 block of Jharkhand.

Successful in situ conservation:

Over 1054 farmers are cultivating 1298 traditional rice varieties taken from the Gene-Seed Bank. These farmers will also take the responsibility for seed multiplication in renewal plots and return seed to the bank. This kind of field level conservation is greatly desired by conservation policy makers but is difficult to achieve. Gene Campaign has begun to achieve a breakthrough after three years of intensive fieldwork

A total of 1920 rice varieties have been multiplied by gene campaign at the agricultural field at BAU and on leased land which have been returned to farmers' fields to increase the spread of field level in situ conservation.

The difficulties we face in this area are from the government, which pays no attention to conservation of rice agrobiodiversity even as it promotes hybrid and high yielding rice. This

lapse is particularly grave since Jharkhand is one of the regions of maximum rice diversity and is considered a Centre of Origin for rice. In this backdrop there is an even greater need to continue and intensify the work on Gene and Seed Banks in areas like Jharkhand, Chhattisgarh and Orissa.

2- SUSTAINABLE GREEN/ORGANIC AGRICULTURE

a) **Villages for Organic farming:** Twenty 21 villages namely: Dunde, Echadag, Pundag, Gunja, Hindebili, Kukuei, Mandaro, Bartua, Ganeshpur, Gurgaein, Jaidiha, Saher, Kamata, Kuchu, Kunhi, Piska, Nayatoli, Manatu, Trila, Baxsidi, Jidu, are practicing organic cultivation. The relevant information about the various components of organic farming such as, organic nutrient management, crop rotation, control of insects and pests, water management and personal interaction was provided to the farmers of these villages. 100 farmers were selected having desire and aptitude for adopting organic farming.

b) **Conversion from Inorganic to Organic Farming:** 100 farmers from 16 villages opted for vermicomposting units to opt for organic mode of cultivation.

S. No.	Village name	No. of farmers opted for vermicompost
1.	Jidu	10
2.	Ichadag	15
3.	Bartuwa	10
4.	Ganeshpur	5
5.	Manatu	3
6.	Saher	4
7.	Bijang	3
8.	Lupunga	4

S. No.	Village name	No. of farmers opted for vermicompost
9.	Id	7
10.	Nagarabeda	5
11.	Baxidih	6
12.	Kanshitola	1
13.	Mahuatoli	9
14.	Tigga	12
15.	Dohutoli	3
16.	Lodhama	3

C. Package of practices utilized for sustainable green agriculture: Package of Practices Developed for Plant based Pesticides for sustainable agriculture. The package is widely promoted among the famers for promotion of sustainable green agriculture along with various other techniques.

Pesticide Type/Crop	Crop	Dose
Karanj oil	Rice	200 ml/ 15 Ltr. Water
Tobacco extract	Rice	1250 ml/15 ltr. Water
Tobacco extract + Cow Urine	Rice	1000 ml/700 ml Cow Urine/15 ltr.water
Karanj oil	Cabbage	200 ml/15 ltr.water
Tobacco extract	Cabbage	1250 ml/15 ltr. water

Tobacco extract + Cow Urine	Cabbage	1250 ml/900 ml/15 ltr, water
Tobacco extract	Cauliflower	200 ml/15 ltr water
Tobacco extract + Cow	Cauliflower	1000 ml/700 ml cow Urine/15 ltr. water
Karanj oil	Brinjal	225 ml/15 ltr. water
Tobacco extract	Brinjal	1500 ml/15 ltr. water
Tobacco extract + Cow Urine	Brinjal	1250 ml/900 ml/15 ltr. water
Karanj oil	Sweet Potato	200 ml/15 ltr. water
Tobacco extract	Sweet Potato	1250 ml/ 15 ltr. water
Tobacco extract + Cow Urine	Sweet Potato	1250 ml/ 900 ml/15 ltr. water

Bio-fertilizers promoted for green agriculture: The following methods were used to produce organic fertilizers and nutrients. These are tested in farmers' fields and being utilized by the farmers. The biofertilizer utilized in the organic agriculture are

a. Vermicompost, b. Blue Green Algae, c. Rhizobium, d. Green manure, e. Compost

Vermicompost is being used in paddy, ginger and vegetables. BGA was effective in paddy. Vermicomposting green manure and composting are some farmers self vermicompost to generate incomes. 602 farmers have adopted vermicomposting and 500 units have been set up. 75 farmers are trying out Blue Green Algae cultures. Farmers report enhancement in their crop yield and quality with the use of bioorganic nutrients.

Plant based pesticides: Plant based pesticides have been tested on vegetables and paddy. These pesticides are made from extracts of:

(a) Azadirachta indica (b) *Pongamia pinnata* (c) *Nicotiana tabacum* (d) *Vitex negundo* (e) *Calotropis procera* (f) *Allium sativum*

Emulsions were made using water extracts alone and water extracts mixed with cow urine. These pesticides work better as prevention. The pesticides are effective against a number of sucking and boring pests but to be effective; applications must start before the pest season begins or as soon as the first pests are seen.

Nearly 600 farmers are currently adopted plant-based pesticides. A cost –benefit exercise done with a wide variety of farmers revealed that they were able to make considerable savings after moving away from chemical pesticides and fertilizers. With the ever increasing

prices of chemical pesticide and fertilizers the total cost of paddy cultivation is increasing day by day. At presently paddy cultivation with the use of agrochemicals works out to Rs. 4500/acre, but this cost of cultivation by organic method the works out to Rs. 2100/acre, a saving of Rs. 2400 per acre.

Difficulties faced:

Certified organic farming of rice is a difficult prospect in most areas of Jharkhand where farmers have very small land holdings. A much better and more feasible approach is to promote sustainable or green agriculture which replaces agrochemicals with vermin and other composts as well as plant based pesticides. This reduces input costs and produces more healthy food with better shelf life. However, the younger generation , so disenchanted with farming, is reluctant to invest time and labor in sustainable agriculture practices since these do require a greater attention to the field than the use of toxic chemicals that destroy pests, beneficial insects and pollute the land and water but require less investment of time and labor spraying the poison. These apathetic reactions are to do with the fact that agriculture is simply not remunerative enough to justify the input of time and hard work. This must change for the youth to acquire a stake in sustainable and healthy agriculture practices.

d. Popularization of SRI Technique for Cultivation of Traditional Varieties: One of the most common reasons known for decline in traditional varieties cultivation is cited as they are low in yielding. It is well documented that SRI has resulted in 2-3 fold increase in traditional varieties. Gene campaign now motivating farmers for use of SRI technique for cultivation of traditional varieties. Demonstrative plot for technique popularization were tried in 103 village of 4 blocks namely Ormanjhi, Karra, Bero and Angara. A total of with about 630 farmers were provided training in this this technique of paddy cultivation.

However, there is lack of scientific information on the performance of traditional paddy varieties and their yield potential in this technique. The Gene campaign has initiated a program to scientifically evaluate the traditional varieties under SRI and recommend the best performing varieties to the farmers for cultivation by using the Sri technique.

S. No.	Block Name	Number of villages	No. of farmers
1.	Ormanjhi	30	145
2.	Bero	24	200
3.	Karra	17	135
4.	Angara	32	150
Total		**103**	**630**

SRI Nursery Raising

SRI Field after 30 days

Comparative demonstration on traditional cultivation and SRI technique at farmer field using traditional paddy variety

e. Underutilized bio-resources as food and nutrition: A total of 86 edible plants have been identified by village communities in the region that arable to create seed sources for such leafy greens. The problem is that since many have very small seeds the scatter easily, making collection of seeds as planting material is proving to be difficult.

Thirty-one tubers have been collected which the community uses as famine foods. Many of these have medicinal properties. With more and more people opting for cereals even in time of food shortage, many of the tuber sources are getting lost. GC is distributing these tubers in villages for multiplication and to revive their use.

3. HELPING SELF HELP GROUPS (SHG) TO ESTABLISH INCOME SOURCES.

a) **SHG:** At present 48 SHG with 398 members are operational. Some members of the SHGs and farmers have started to sell the vermicompost to the nearby villagers. Some SHGs continue to make money by selling cups and plates made of leaves supported by plastic. Other SHGs have received training in the processing of local bioresources and can sell deseeded, deshelled tamarind bricks locally. Marketing

linkages are still a bottleneck in the off take of products produced locally on a small scale.

A view of SHG weekly meeting in the project area

Recently in the time period between October 2009 to June 2010 23 SHGs group were formed out of which 6 have opened their account in the nearest branch of the local banks. The details of the SHG along with location in the project area are as follows;

Sl No.	Name of Group	Village	Block	District	No. of Members
1.	Mahila Purus Vikas Samitti	Chachgara	Bero	Ranchi	13
2.	Manjari Mahila Sameeti	Palma	Bero	Ranchi	21
3.	Mahila vikas Sameeti	Kulli	Bero	Ranchi	18
4.	Mahila vikas Sameeti.	Sursa	Mander.	Ranchi	12
5.	Millat Mahila Sameeti	Kamta	Ormanjhi	Ranchi	15
6.	Mahilavikas Sameeti	Kamta	Ormanjhi	Ranchi	12
7	Mahilavikas Sameeti	Ormanjhi	Ormanjhi	Ranchi	15
8.	Mahilavikas Sameeti	Barwe	Ormanjhi	Ranchi	23
9.	Mahilavikas Sameeti	Kulhi	Ormanjhi	Ranchi	23
10.	Aadiwasi Mahila swaim sahayta samuh.	Manatu.	Ormanjhi	Ranchi	11
11.	Mahila vikas sameeti	Ganeshpur	Ormanjhi	Ranchi	14
12.	Kamal nayan Mahila Sameeti	Bartuwa	Ormanjhi	Ranchi	35
13.	Mahila vikas sameeti	Ganeshpur	Ormanjhi	Ranchi	14
14.	Mahila vikas sameeti	Badhartoli	Ormanjhi	Ranchi	14
15.	Hariyali Mahila Sameeti	Ichadag	Ormanjhi	Ranchi	13
16.	Kriti Mahila Sameeti	Ichadag	Ormanjhi	Ranchi	16

17.	Puja Mahila Sameeti.	Ichadag	Ormanjhi	Ranchi	17
18.	Mamta Mahila Sameeti	Manatu	Ormanjhi	Ranchi	13
19.	Mahila vikas Sameeti.	Jamuntoli	Ratu	Ranchi	15
20.	Mahila Utthan Sameeti	Gadri	Ratu	Ranchi	12
21.	Yuwa Kisan Vikas Sameeti	Bhonda	Ratu	Ranchi	09
22.	Chameli Mahila Swain Sahayta Samuh	Nayatoli	Ormanjhi	Ranchi	09
23.	Champa Mahila Swain Sahayta Samuh	Ichadag	Ormanjhi	Ranchi	13
24.	Indra Mahila Swain Sahayta Samuh	Karamtoli	Ormanjhi	Ranchi	14
25	Jyoti Mahila Samiti	Kachchabari	Karra	Ranchi	11
26.	Khushbu Swain Sahayta Samuh	Kachchabari	Karra	Ranchi	16
27.	kamal Swain Sahayta Samuh	Pundag	Ormanjhi	Ranchi	16
28.	Chameli Swain Sahayta Samuh	Bhartua (Pahan toil)	Ormanjhi	Ranchi	15
29.	Shivalaya Mahila Samuh	Gagari	Ormanjhi	Ranchi	15
30.	Gulab Swain Sahayta Samuh	Pundag	Ormanjhi	Ranchi	20
31.	Khushi Mahila Samiti	Jidu	Ormanjhi	Ranchi	15
32.	Kiran Mahila Mandal	Darkel Mahua toli	Karra	Khunti	20
32.	Akash Ewain Sahayta Samuh	Dighia	Bero	Ranchi	10
33.	Chameli Ewain Sahayta Samuh	Nayatoli	Ormanjhi	Ranchi	9
34.	Swain Sahayta Samuh Chameli	Icchadag Nayatoli	Ormanjhi	Ranchi	21
35.	Jagriti Sangh	Bagitola	Ormanjhi	Ranchi	22
36.	Astha Srijan Samiti	Tirla	Ormanjhi	Ranchi	10
37.	Gulab Swain Sahayta Samuh	Ganeshpur	Ormanjhi	Ranchi	13
38.	Mahila Vikash Samiti	Ganeshpur	Ormanjhi	Ranchi	14
39.	Mahila Vikash Samiti (Badhar toil)	Ganeshpur	Ormanjhi	Ranchi	14
40.	Sanghi Swain Sahayta Samuh	Dighia	Bero	Ranchi	12
41.	Chameli	Gadgaon	Bero	Ranchi	10
42.	Pragya Swain Sahayta Samuh	Tuko	Bero	Ranchi	13
43.	Om Swain Sahayta Samuh	Dighia	Bero	Ranchi	10
44.	Bela Swain Sahayta Samuh	Gadgaon	Bero	Ranchi	
45.	Puja Swain Sahayta Samuh	Dighia	Bero	Ranchi	10
46.	Ujala Swain Sahayta Samuh	Tuko	Bero	Ranchi	11
47.	Khushi Mahila Samiti	Jidu	Ormanjhi	Ranchi	15
48.	Lakshmi Swain Sahayta Samuh	Putka tola (Manatu)	Ormanjhi	Ranchi	12

Training of SHG groups in generaion activities and their impact in the project areas:

a. A 5 days training to 5 SHG Members of Sanghi Swain Sahayta Samuh was provided at BAU for pig rearing. The trained SHG members will establish the pig breading units for their income generation. At presently 2 members has established the breading unit with 5 piglets each.

b. Another training program on piggery was organized at BAU Piggery farm. In this program total of 21 members from different SHG participated out of which 6 participants were from Bero block, 7 participants were from Karra block, and 8 participants were from

Angara block. One SHG in each of the blocks has agreed to establish the piggry breeding unit while trained members are suceesfully rearing the pigs for the household income generation.

c. Five programs on Mushroom cultivation were organized in 3 village of Karra Block and 2 villages of Bero block in which nearly 50 women of different SHG groups participated. Many trained SHG members has started mushroom cultivation and are involved in income generation thus helping in the improvement of the families' financial status.

d. 10 Members of SHG in Ichadag village were trained in bamboo craft making and successful involved in the income generation from bamboo craft.

b. Kissan Clubs:

This effort which were started to organize the farmer to form group as farmer clubs so as they have better access to the government programmes is resulted into 18 active kissan clubs. At presently 12 farmers club are formed and are now functional. They will be provided with the training so as they can establish income sources.

Sl No.	Name of Group	Village	Block	District.
1	Birsa Adivasi Kisan Samiti	Haratu	Angara	Ranchi
2	Kissan Club Sahida	Sahida	Angara	Ranchi
3	Kissan Club Jaspur	Jaspur	Angara	Ranchi
4	Kissan Club Hethnagru	Hethnagru	Angara	Ranchi
5	Kissan Club Baxidi	Baxidi	Angara	Ranchi
6	Kissan Club Kasitola	Kasitola	Angara	Ranchi
7	Krishi Mazdoor Club	Nagerabeda	Angara	Ranchi
8	Kissan Club	Tuko	Bero	Ranchi
9	Birsa Kissan Club	Pundag	Ormanjhi	Ranchi
10	Sarna Kissan Club	Manatu	Ormanjhi	Ranchi
11	Jago Kissan Club	Dernkel	Karra	Khunti
12	Sangam Kissan Club	Dahutoli	Karra	Khunti

Training of Kissan clubs in income generation activities:

- The Kissan clubs are the communities organization recently organized in the project villages. The involve the kissan clubs in income generation activities 3 training programs of 7 day each on mini dairy establishment and management were organized. In these

training 30 members of kissan clubs from Angara block, 20 from Ormanjhi block, 15 from Karra block and 20 from Bero block belonging to different farmer clubs were participated. Some trained members have taken loan for dairy establishment while others are in line for taking dairy as their main income generation activity.

- Members of Kissan club at village Baxidi are involved in nursery raising of multipurpose plants like papaya, Moringa for sale in local areas for their income generation.

- Members of Kissan club at village Drankel in Karra block are involved in plant nursery of papaya, drumstick, lemon, sweet potato for improving the income generation capacity of the kisssan club.

- A block level training on animal husbandry is being provided in Karra bock for goatry, piggery and dairy farming promotion in the area. In this training program nearly 35 members of kissan club and community were participated. These members are waiting their turn for support from governments and clearance of bank loans for undertaking goatary, piggery and dairy farming.

4. TRAINING AND CAPACITY BUILDING

For strengthening the village community at all the levels, various training and capacity building programs were organized. The term 'community capacity building' means different things to different people. We understand it as meaning developing the capacity and skills of the members of a community in such a way that they are better able to identify, and help meet, their needs and to participate more fully in society. Community capacity building as we understand it is therefore concerned with

- Providing opportunities for people to learn through experience - opportunities that would not otherwise be available to them; and

- Involving people in collective effort so that they gain confidence in their own abilities and their ability to influence decisions that affect them.

We mean making a positive difference to the capacity and skills of the members of the community in question because they participate with other members of that community in

activities directed towards meeting their needs in some way. Sometimes this process is described as empowerment. In more specific terms, this is likely to involve:

- Equipping people with skills and competencies which they would not otherwise have.
- Realizing existing skills and developing potential;
- Promoting people's increased self-confidence;
- Promoting people's ability to take responsibility for identifying and meeting their own, and other people's, needs; and
- In consequence encouraging people to become involved in their community and wider society in a fuller way.

Some of the important activities undertaken during the project period in the areas are as follows;

a. Ten training programs were conducted at Tape, Piska, Nagarabeda, Id, Tigga, Haratu, Malghosha, Piperabunda, Dighiya and Mahutungri to expand the outreach beyond the project area as also to build the sustainability beyond the life of the project. In these training nearly 150 male and 100 female members of nearly 20 SHG groups have participated. The training programs mainly covered the following subjects:

- Setting up gene and seed banks with proper storage conditions like water proofing, light proofing and pest control.
- Administering the material in the gene/seed bank through village samities
- Multiplication of seed samples to create seed source for farmers, developing a protocol for seed dissemination to farmers and return to seed from farmers to seed bank.
- Biopesticides use in the cultivation of vegetables, tubers and other crops.

b. One day training program on vermicomposting was organized at village Dhigiya Block Bero. In this training program 15 farmers were present. The farmers were trained in the organic mode of paddy cultivation and preparation and setting up of vermicompost units.

c. Another program on organic crop cultivation was organized at village Riakera Block Bherno was also organized in which 16 male and 13 female have participated.

d. Over 75 training were organised in the project areas on SRI cultivation of paddy to encourage the communities to adopt for organic mode of paddy cultivation with increased productivity.

FUTURE DIRECTION:

1. Although the Seed Banks have provided seed to the village community, the crisis of seed availability is assuming very critical proportions. Hence GC would like to take up community led seed production on a larger scale, using our collections as well as locally adapted disease resistant paddy varieties to provide farmers with viable seeds in lager volumes over time. This community led seed production should form a major thrust of our future work on supporting household level food security.

2. Also rice is the staple food of the populace residing in this area, enhancement of its productivity would go a long way in addressing the food security concerns of the people. Yet, yields of the crop are abysmally low in this region, with average productivity being in the range of 2-3 tons per hectare. Rice cultivation requires large amounts of water and in the wake of growing scarcity of water a gradual shift towards cultivation of less water-demanding crops is being witnessed. Compounding this problem is the erratic monsoon, because of which most farmers in this region are unable to transplant timely in the main field. So there is an imperative need to make paddy cultivation more efficient in terms of returns on farmer investments as well as in use of scarce resources such as water. Production in the uplands is completely dependent on the vagaries of the monsoon and because of the primitive agricultural practices the average yield of paddy is 2 to 3 tonnes per hectare. This leads to a situation whereby they produce food grains which provides food

security for 4 to 8 months. Our primary aim is to bridge this gap of 4 to 8 months to ensure year the round food sufficiency. This gap can be bridged through enhanced productivity by adopting System of rice intensification (SRI). The SRI technique is more suitable in the area where water management is feasible with some irrigation facilities. However, In Jharkhand where traditional paddy varieties are being cultivated in upland, midland and low land type, this SRI Methodology requires slight modification for its utilization in paddy cultivation in different land type to enhance productivity. GC would like to involve itself in its future work to evaluate traditional varieties under SRI methodology and develop new methodologies for each land type so as the paddy productivity get boosted for enhanced food security.