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SIKKIM

INTRODUCTION

Agriculture is the mainstay of majority rural populace of Sikkim. The economy of the state is linked with agriculture that serves as the source of livelihood and economic security of sizeable native population. The growth, however, has been restricted because of biotic and abiotic factors. It is estimated that over 80% of the rural population depends on agriculture and allied sectors for economic, food and nutritional security. The agricultural systems practiced in Sikkim are integrated in nature that have evolved through years of experimentation by the farmers and withstood the test of time. A marginal improvement in the lifestyle of the farmers has been witnessed with the adoption of modern technologies.

The net cultivated area of Sikkim has remained around 79,000 ha (inclusive of large cardamom plantations) for last decade or so while the net cropped area has decreased due to diversion to non -agricultural uses like development of essential infrastructure. The horizontal expansion of area under cultivation does seem possible. The area under assured irrigation is less than 5 per cent. All the area under rice crop has been considered as irrigated area but many rice fields cannot be irrigated even during kharif season if the rainfall is less than normal. Hence, the entire agriculture in the State is practically rainfed.

There is a deficit of nearly 72,000 MT, 12,500 MT, 3500 MT of food grain, pulses and oilseeds, respectively considering the resident and floating population of the state. The agriculture scenario is dominated by soil acidity,

excess moisture during monsoon period and moisture stress during post monsoon / winter, heavy weed infestation, low temperature stress during winter , occurrence of hailstorm in pre -kharif maize (March -April), and incessant rain from May to September that causes leaching of nutrients and pesticides applied to kharif crops. The prevailing climate favours high incidence of diseases and pests that drastically reduce the crop yields. These factors certainly cause fall in production and productivity of major crops. Nevertheless, the root of the problem is in the persistent domination of traditional cultivars in the various crops cultivated from maize to rice and other crops like finger millet, soybean, buckwheat, toria and others. In the organic farming scenario these traditional cultivars too can play a vital role since they are well adapted to the low input situations and the elite germplasm needs to be identified from within the vast gene pool and used for the production of tailor -made varieties.

The factor productivity in Sikkim is lower than both the regional and national averages for all the major field crops. Increasing per unit productivity will be the key in bridging this gap which can be achieved with area expansion under high yielding varieties along with proper package of practices that will exploit inherent production potential of varieties designed for organic farming from the local gene pool, soil -test values based nutrient management and appropriate plant protection measures.

The per capita land holding has also seen a continuous fall since the 1970s owing to various reasons. The smaller the land holding size higher is the vulnerability for loss of various natural resources, particularly the soil. Besides, emphasizing on the conservation of natural resources it is very important to

protect the fragile ecology, and in addition increase the productivity of different crops for attaining self -sufficiency in cereal, pulses and oilseed production and this will happen only with the concerted efforts on the part of all the stakeholders.

Sikkim has a unique agro -climatic character for which the department makes all attempts to bring about sustainable agricultural methods to be utilized to its fullest advantage .The department hence, has a policy to implement different schemes under the Macro -management of Agriculture like ICDP, INM , NRM and other CSS Programmes like ATMA, NPOF, etc., which has brought about effective advancement in the agricultural sector bringing about an immense impact to the rural farmers of the State.

**STATEMENT SHOWING AREA, PRODUCTION & PRODUCTIVITY
FOR THE YEAR 2008-09 AND TARGET FOR 2009-10**

<u>Area in "000" Ha.</u>		<u>Production in "000" tonnes</u>	
<u>CROPS</u>	<u>Particulars</u>	ACHI EVEMENT	PROJECTED
		2008-09	2009-10
CEREALS		Anticipated	
Rice	Area	13.00	13.00
	Production	23.65	24.25
	Yield in kgs. /Ha.	1819.23	1865.38
Wheat	Area	4.60	5.20
	Production	5.00	5.85
	Yield in kgs. /Ha.	1086.96	1125.00
Maize	Area	39.20	39.50
	Production	64.00	66.25
	Yield in kgs. /Ha.	1632.65	1677.22
Finger Millet	Area	4.20	4.25
	Production	4.50	5.00
	Yield in kgs. /Ha.	1071.43	1176.47
Barley	Area	1.00	1.00
	Production	1.10	1.15
	Yield in kgs. /Ha.	1100.00	1150.00
Buckwheat	Area	1.45	2.15
	Production	1.40	2.00
	Yield in kgs. /Ha.	965.52	930.23
Total Cereals	Area	63.45	65.10
	Production	99.65	104.50
PULSES	Yield in kgs. /Ha.	1570.53	1605.22
Urd	Area	3.20	3.80
	Production	3.15	3.45
	Yield in kgs. /Ha.	984.38	907.89
Other Pul ses	Area	2.75	2.90
	Production	3.10	3.50
	Yield in kgs. /Ha.	1127.27	1206.90

Total Food Grain	Area	69.40	71.80
	Production	105.90	111.45
	Yield in kgs. /Ha.	1525.94	1552.23
OILSEEDS			
<u>CROPS</u>	<u>Particulars</u>	ACHIEVEMENT	PROJECTED
		2008-09	2009-10
		Anticipated	
Rape & Mustard	Area	5.30	5.80
	Production	4.65	5.30
	Yield in kgs. /Ha.	877.36	913.79
Soyabean	Area	3.75	4.00
	Production	3.30	4.10
	Yield in kgs. /Ha.	880.00	1025.00
TOTAL OILSEEDS	Area	9.05	9.80
	Production	7.95	9.40
	Yield in kgs. /Ha.	878.45	959.18

STRATEGY FOR INCREASING CROP PRODUCTION AND PRODUCTIVITY

1. Implementation of water shed development program in the rain fed areas with an objective for developing sustainable agriculture through integrated farming system emphasizing on peoples active participation.
2. VARIETAL REPLACEMENT FOR INCREASING FOOD PRODUCTION
 - All Improved & High Yielding Varieties of crops developed by ICAR for Hill zones of the country will be introduced and tested through adaptive trials.
 - After identification of location specific varieties the seed will be multiplied and distributed to the farmers for the production of field crop.
 - Necessary care will be taken to converge the location specific varieties for their best utilization in future breeding program.
3. SEED PRODUCTION AND CERTIFICATION.
 - Seed production & Certification program are proposed to give prior importance.
 - Foundation Seed Production program will be given emphasis for smooth functioning of Extensive production of certified seed in the state.
 - Production of Hybrid Maize under the supervision of Zuari Seeds.
 - Organic farming will be encouraged for the production of seed with the aim of producing organic brand food and eventually to make Sikkim an Organic State.
4. Use of bio-fertilizers, micro nutrients and organic manure in the perspective of organic farming.
5. Conversion of 200 more villages into bio villages covering 5400 farmers.
6. Increase area under multiple cropping, double cropping , mixed cropping and relay cropping
7. Demonstration on SRI for higher grain yield with less seed requirement, less water and less plant protection measures.
8. 100 % seed treatment for pest and disease protection for higher productivity.

9. Popularize Farmer's Field School (FFS)
10. Introduce E-pest surveillance for reliable pest forecasting and for achieving high level of pest surveillance and issue of farm advisories for effective pest management.
11. Area Expansion in Rabi Crops like wheat, oil seed and beans.
12. Rain Water, runoff and stream water Conservation by constructing Water Harvesting Tank for providing life saving irrigation during Rabi season.
13. Land development and expansion of cultivable land by taking up bench terracing.
14. Organizing Mass Training Programmes & exposure visit of the field functionaries and farmers.
15. Print and electronic media to be used for dissemination of new and innovative system of organic agriculture.
16. Popularization of Farm Implements and Machineries giving more emphasis on power tillers.
17. Improvement of Soil Health by using Liming, Green Manuring & Soil Conditioner.

PHYSICAL AND FINANCIAL ACHIEVMENT UNDER
MACRO MANAGEMENT OF AGRICULTURE 2008-09

(Rs. In lakhs)

A	AGRICULTURE	Unit	TARGET		ACHIEVMENT	
			Physical	Financial	Physical	Expenditure
	Programme & Component					
I	National Watershed Development	Ha.	3324	391.00	3324.00	391.00
	Project for Rainfed Areas (NWDPR)					
II	River Valley Project (RVP)	Ha.	-	220.50	-	220.05
III	Cereal Development Programme			316.56		241.84
1	Certified Seed Distribution @Rs 200/qtl seed.	Qtls.	3375	30.00	3375.00	30.00
2	200/Qtl.	Qtls.	5000	10.00	5000.00	10.00
3	Full Crop Pack Demonstration	Acre	6000	37.66	6000.00	37.66
4	Millet Certified Seed Distribution @400/qtl.	Qtls.	11675	46.70	11675.00	46.70
5	Accelerated Maize Development Programme	Qtls.	22900	183.20	14300.00	114.53
6	Farmer's Training	Nos	18	9.00	6	2.95
IV	PLANT PROTECTION			28.50		24.03
1	Farmer's Field School	Nos.	60	10.20	-	9.08
2	Promotion of Bio pesticides& Pest / Disease	kgs.	2500	10.00	2500.00	10.00
3	Soil Health Card	-	-	0.50	-	0.00
4	Training of Field Functionaries on Plant Protec	-	2	1.80	-	0.00
5	Seed Treatment @25% cost or Rs 50/ha.whichever is le		12000	6.00	9900	4.95
V	Balanced and Integrated use of Fertilizers			394.00		364.22
1	Integrated Nutrient Management Demonstrat	Ha.	3000	90.00	3000	90.00
2	Rural compost/urine pit	Nos.	1550	124.00	2227	119.35
3	Vermi compost unit@ Rs. 1500/unit	Nos.		135.00	4000	128.17
4	Bio fertilizer Demonstration	Ha.	9000	45.00	5340	26.70
VI	Concurrent Evaluation			6.00	-	4.00
VII	Innovative schemes			493.44		315.40
1	Publicity through electronic media		-	6.92	-	6.92
2	Water harvesting @ 25 % subsidy	Nos	1800	207.00	1106	121.67
3	Reclamation of acidic soil	Ha.	5152	161.00	2528	79.03
4	Farmer's Development work		-	16.52	-	9.90
5	Bench Terracing	Ha	533	40.00	524	40.00
6	Strengthening of irrigation facilities -Pipe	Nos	1950	58.00	1930	53.88
7	Survey and Surveillance		-	2.00	-	2.00
8	Power Tiller	Nos.	4	2.00	4.00	2.00
	TOTAL OF MACRO MANAGEMENT =			1850.00		1560.54

EXPENDITURE INCURRED UNDER MACRO MANAGEMENT
OF AGRICULTURE DURING 2008-09

A	AGRICULTURE	Unit	Provision	Expenditure	Balance
	Programme & Component		Financial	upto	
			(Rs. In lakhs)	9-Mar	
I	National Watershed Development	Ha.	391	391	0
	Project for Rainfed Areas (NWDPRAs)				
II	River Valley Project (RVP)	Ha.	220.5	220.05	0.45
III	Cereal Development Programme		316.56	241.84	74.72
1	Certified Seed Distribution @Rs 200/qtl	Qtls.	30	30	0
	for wheat/rice seed & Rs. 400/qtl for Ragi seed.				0
2	Encouraging Varietal Replacement @ Rs 200/Qtl.	Qtls.	10	10	0
3	Full Crop Pack Demonstration	Acre	37.66	37.66	0
4	Millet Certified Seed Distribution @400/qtl.	Qtls.	46.7	46.7	0
5	Accelerated Maize Development Programme	Qtls.	183.2	114.53	68.67
6	Farmer's Training	Nos	9	2.95	6.05
IV	PLANT PROTECTION		28.5	24.03	4.47
1	Farmer's Field School	Nos.	10.2	9.08	1.12
2	Promotion of Bio pesticides& Pest / Disease	-	10	10	0
3	Soil Health Card	-	0.5	0	0.5
4	Training of Field Functionaries on Plant	-	1.8	0	1.8
5	Seed Treatment @25% cost or Rs 50/ha.whichever is less		6	4.95	1.05
V	Balanced and Integrated use of Fertilizers		394	364.22	29.78
1	Integrated Nutrient Management Demonstration	Ha.	90	90	0
2	Rural compost/urine pit	Nos.	124	119.35	4.65
3	Vermi compost unit@ Rs. 1500/unit	Nos.	135	128.17	6.83
4	Bio fertilizer Demonstration	Ha.	45	26.7	18.3
VI	Concurrent Evaluation		6	4	2
VII	Innovative schemes		493.44	315.4	178.04
1	Publicity through electronic media		6.92	6.92	0
2	Water harvesting @ 25 % subsidy	Nos	207	121.67	85.33
3	Reclamation of acidic soil	Ha.	161	79.03	81.97
4	Farmer's Development work		16.52	9.9	6.62
5	Bench Terracing	Ha	40	40	0
6	Strengthening of irrigation facilities -Pipe	Nos	58	53.88	4.12
7	Survey and Surveillance		2	2	0
8	Power Tiller	Nos.	2	2	0
	TOTAL OF MACRO MANAGEMENT =		1850	1560.54	289.46

Component Wise Balance available as on 01.04.2009 under Macro-
Management in Agriculture (100%CSS)

Sl. No.	Component & Programme	Balance Rs. In lakhs.
I	RVP	0.45
II	CEREAL DEV.PROGRAMME	74.72
1	Accelerated Maize Dev. Programme	68.67
2	Farmers Training @ Rs.5000/- for two days	6.05
III	Plant Protection	4.47
1	Farmer's Field School	1.12
2	Training of field functionaries	1.80
3	Seed treatment @ RS.25/-	1.05
4	Soil Health cards	0.50
IV	Balance and Integrated use of Fertilizer	29.78
1	Rural compost/urine compost	4.65
2	Vermi compost	6.83
3	Bio fertilizer	18.3
V	Concurrent Evaluation	2.00
VI	New Initiatives	178.04
1	Reclamation of Acidic Soil	81.97
2	Water Harvesting @ Rs.25% subsidy	85.33
	Strengthening of Irrigation facilities -Pipes	4.12
4	Farmers Development workshop	6.62
	Total	289.46

2008-09
PHYSICAL AND FINANCIAL ACHIEVEMENT UNDER MACRO-
MANAGEMENT IN AGRICULTURE.

I. NATURAL RESOURCE MANAGEMENT

National Watershed Development Project for Rainfed Areas (NWDPRA)

Under this programme, 32 Nos of watershed as taken up covering an area of 3324 Ha. The detail of Physical and financial target and achievement during 2008-09 is as follows:

PHYSICAL AND FINANCIAL ACHIEVEMENT 2008-2009

Sl. No	District	No. of micro-watershed	Physical (ha.)		Financial (lakhs)	
			Target	Achievement	Target	Achievement
1	East	11	1143.00	1143.00	134.40	134.39
2	West	10	1038.50	1038.50	122.30	122.29
3	South	8	831.00	831.00	97.70	97.70
4	North	3	311.50	311.50	36.60	36.60
	TOTAL	32	3324.00	3324.00	391.00	390.98

The impact of the programme has been successful among the farming communities of the project area, because of its holistic / cluster approach for all round development in a sustainable manner. The programmes under this scheme have a wider acceptance because it incorporates indigenous with

improved technologies, improvement in land & water management, up-gradation of water sources, livestock management, participatory and belonging amongst the farmers, improvement in production & productivity both in agricultural and horticulture crops.

RIVER VALLEY PROJECT:

RVP-RIVER VALLEY PROJECT WAS TAKEN UP IN THE IDENTIFIED WATERSHED AS PER THE GUIDELINES BY THE RVP OF FOREST DEPARTMENT. A SUM OF RS. 220.50 LAKHS HAS BEEN UTILISED UNDER THIS COMPONENT.

INTEGRATED CEREAL DEVELOPMENT PROGRAMME (COARSE CEREALS) 2008-09

Under Macro Management of Agriculture, the following different Programmes were implemented under Integrated Cereal Development Programme.

1. DISTRIBUTION OF CERTIFIED SEEDS:

Certified seeds of Paddy, wheat and millet were distributed to the farmers as per the guidelines of the Government of India @ Rs. 200/qtl. for Wheat/Rice and Rs 400/Qtl. for Ragi seeds.

2. ENCOURAGING VARIETAL REPLACEMENT:

Under this component, an amount of Rs. 10.00 lakhs has been utilized As per the guidelines of the Government of India. The farmers were given a subsidy of Rs. 200/qtl. for rice, millet, Ragi, wheat and maize crop for adopting new varieties in place of old and traditional varieties for better production.

3. FULL PACK DEMONSTRATION:

Under this programme, Organic Demonstrations were conducted in paddy, maize, millet and wheat by using new and improved technology. The rate per ha. as per the guidelines is Rs. 2000/acre.

4. MILLET CERTIFIED SEEDS:

Millet is an important crop of Sikkim and is grown through out the State. Millet is mainly grown for the grain purpose. It is used for malting in the preparation of the local drink and the powder of Millet is used in the preparation of bread.

As millet is one of the popular crops of the farmers, Millet certified seeds were distributed as per the guidelines of the Government of India.

5. ACCELERATED MAIZE DEVELOPMENT PROGRAMME (AMDP)

Under Accelerated Maize Development Programme under Macro-Management of Agriculture, Hybrid maize seeds variety C-1415, C-1837 have shown very good response and has improved the production and productivity potential of maize crop in the state. Hybrid maize was distributed to the farmers for higher yield and greater productivity.

6. Farmer's Training :

Farmer's Training were conducted in all the four districts of the State for hybrid maize cultivation and other cereal crops under organic condition.

SUMMARY:

ICDP PHYSICAL & FINANCIAL ACHIEVEMENT 2008-09

Sl. No	Cereal Development Programme	Unit	Rate/ Unit	Target		Achievement	
				Phy.	Fin.	Phy.	Fin.
					In lakhs.		In lakhs.
1	Certified Seed Distribution						
	Wheat/Rice @Rs 200/qtt and Ragi seed.@ Rs. 400/qtt.	Qtls.	-	3375	30.00	3375	30.00
2	Encouraging Varietal Replacement @ Rs 200/QtI.	Qtls.	200	5000	10.00	5000	10.00
3	Full Crop Pack Demonstration	Acre	2000	6000	37.66	6000	37.66
4	Millet Certified Seed distribution VL Ragi 146/ Indaf-9 or any suitable variety for low fertility condition	Qtls.	400	11675	46.40	11675	46.40
5	Accelerated Maize Development Programme @ Rs. 800/QtI.	Qtls	800	22900	183.20	14300	114.53
6	Training -50 farmers/batch.	Nos.	50000	18	9.00	6	2.95
	Total =				316.56		241.84

**PROGRESS REPORT ON IPM – UNDER MACRO MANAGEMENT
(PLANT PROTECTION) 2008-09.**

Sl. No	Programme / Component	TARGET		ACHIEVEMENT		Remarks
		Physical	Financial	Physical	Financial	
1.	Farmer's Field School	60	10.20	-	9.08	FFS has not been conducted. Spray equipment and spray kits has been procured as per the demand of district officials.
2.	Promotion of Bio-pesticides	--	10.00	--	10.00	Bio pesticides was procured and allotted as per the need in specified areas.
3.	Survey & surveillance of Pest & diseases in various crops	--	2.00	--	2.00	All round year tour conducted as per the seasonal requirement.
4.	Training to field functionaries on Integrated Pest Management concept with special emphasis on Rodent Pest Management.	2 nos	1.80	--	-	Training not conducted
5.	Seed Treatment	--	6.00	--	4.95	Paddy, maize, soyabean, rajma, Millet, Wheat and Mustard
6.	Soil Health Card	-	0.50	--	-	
	Production of Bio – agents	--	--	2.50 million	--	
	TOTAL =		30.50		26.03	

BALANCED AND INTEGRATED USE OF FERTILIZERS

Physical and Financial Achievement -2008-2009

1. INTEGRATED NUTRIENT MANAGEMENT DEMONSTRATION:

Under this, demonstrations were carried out in Kharif and Rabi seasons. Maize was the major crop in kharif season and wheat/mustard in Rabi season. The physical and financial achievement is as under:

Sl. No	COMPONENT	Unit	TARGET		ACHIEVEMENT	
			Physical	Financial	Physical	Financial
1	Integrated Nutrient Management Demonstration	Ha.	3000	90.00	3000	90.00

2. RURAL COMPOST CUM URINE PIT:

Farmers having cattle in the farm were given subsidy to construct compost cum urine pits in their fields. They were provided a subsidy amount equivalent to 25% of the total cost which is in the tune of Rs. 8000/- per pit, either in cash or in kind.

The achievement under the component Rural Compost cum Urine pit is placed as under:

Sl. No	COMPONENT	Unit	TARGET		ACHIEVEMENT	
			Physical	Financial	Physical	Financial
1	Rural compost/urine pit	Nos.	1550	124.00	2227	119.35

3. VERMI COMPOST UNITS :

Vermi-culture and Vermi-composting through Earth Worm Eco- technology is indigenous, cheap and easy technology to convert all bio- degradable waste in best quality organic manure (Vermi casting based human fertilizer) it earth worm eco technology all types of beneficial earthworms and microbes are cultural are cultural and all types of bio-degradable materials are used to produce organic manure. Vermi compost units were constructed in the farmer's field after conduction of training.

The achievement under the component Vermi Composting is placed as under:

Sl. No	COMPONENT	Unit	TARGET		ACHIEVEMENT	
			Physical	Financial	Physical	Financial
1	Vermi compost unit	Nos.	4200	135.00	4000	128.17

4. BIO FERTILIZER DEMONSTRATION :

Bio-fertilizer is a product containing living cells of different types of micro-organisms that have an ability to mobilize nutritionally important elements from non-usable form through biological process. It refers to living organisms that augment plant nutrient supply in one way or other. They are renewable energy source. They are environment friendly and cost affective supplement to the chemical fertilizer, laying a significant role in improving nutrients availability to the crop plant. Some bio fertilizers of prime interest in our state are Azolla, Blue Green Algae, Rhizobium, Azatobactor, Azospirillum, Phosphate solubility bacteria and others. They can supplement 20-25% of the nutrient of the crop at very low cost.

Demonstration was conducted in Wheat, Mustard and Maize crop covering an area of 5340 Ha.

Sl. No	COMPONENT	Unit	TARGET		ACHIEVEMENT	
			Physical	Financial	Physical	Financial
1	Bio fertilizer Demonstration	Ha.	9000	45.00	5340	26.70

SUMMARY :

PHYSICAL AND FINANCIAL ACHIEVEMENT BALANCED AND
INTEGRATED USE OF FERTILIZERS: 2008-09

Sl. No	COMPONENT	Unit	TARGET		ACHIEVEMENT	
			Physical	Financial	Physical	Financial
	Balanced and Integrated use of Fertilizers			394.00		364.22
1	Integrated Nutrient Management Demonstration	Ha.	3000	90.00	3000	90.00
2	Rural compost/urine pit	Nos.	1550	124.00	2227	119.35
3	Vermi compost unit@ Rs. 1500/unit	Nos.		135.00	4000	128.17
4	Bio fertilizer Demonstration	Ha.	9000	45.00	5340	26.70

EXTENSION PROGRESS REPORT 2008-2009.

The two components under New Innovative of Macro-Management in Agriculture 100 % CSS are:

- i) Publicity through Electronic media
- ii) Farmers Development Work

1. Publicity through Electric Media

Since last three years, the Department is continuously preparing and telecasting the Agriculture activities through the year and even this year 2008, the Department has produced 48 nos of episodes of Development activities through the local Network once in a week basis. This media is contributing immensely in educating the rural mass regarding Agriculture activities

2. Farmers Development works:

Maximum amount of fund from this component has been utilized in organization of Rabi Kisan Mela 2008 in the State of mass proportion and bringing out required journals on farmers development for the Department.

3. Capacity Building Programme

From this year, all the capacity building programme of Macro-management has been condensed under one umbrella entrusting to Extension & training section for giving out relevant training programme to farmers. The farmers of each district were giving residential training at SAMETI in such subject like

- i) Hybrid Maize Seed Production Technology and
- ii) Hybrid Rice Production through SRI technique.
- iii) IPM related training programme
- iv) Production of jingles for AIR broadcast, short advertisement through local TV network through Electronic media and print media,
- v) Production of Journals, banner & posters for farmers and Panchyat uses.

WATER HARVESTING TANK.

The main objective of the programme is to provide water storage through surface run-off/rain roof water / perennial source for life saving irrigation to a limited area, drinking water for human being and livestock during dry period. The state experiences sufficient annual rainfall but is erratic and unevenly distributed. The distribution of rainfall in summer (March - May) is around 24.23 %, (June - October) is 70.27 percent of the total rainfall and 5.5 % is received during rabi season, resulting moisture stress for crop production. The situation demand harvesting of surplus run-off for supplementary irrigation either to kharif crops during the dry spells or to subsequent rabi crops. The department is constructing RCC water harvesting tank of capacity 10,000 Itrs. at 25 % Government subsidy i.e Rs. 10,000.00/- per beneficiary. The tanks are constructed with the farmers participation / community basis.

PHYSICAL AND FINANCIAL ACHIEVEMENT 2008-2009

Sl. No.	District	Physical (No.)		Financial (lakhs)		No. of beneficiary
		Target	Achievement	Target	Achievement	
1	East	755	435	75.50	43.50	435
2	West	480	300	48.00	30.00	300
3	South	445	296	44.50	29.60	296
4	North	120	75	12.00	7.50	75
	TOTAL	1800	1106	180.00	110.60	1106

PROGRESS REPORT -2008-09 -BENCH TERRACING .

This is one of the mechanical measures widely adopted in higher steep land in the hills. The construction of bench terraces helps to prevent run-off with high velocity, soil loss and retention of moisture, resources manures, fertilizer and facilitates the application of irrigation, if available. The department is implementing the Land Development (Bench Terracing) programme in a compact area in the village. In this programme farmers are provided with Government subsidy of 25% i.e approximately Rs.7,500./- per hectare.

PHYSICAL AND FINANCIAL ACHIEVEMENT 2008-2009

Sl. No.	District	Physical (ha.)		Financial (lakhs)		No. of beneficiary
		Target	Achievement	Target	Achievement	
1	East	170.00	161.82	12.75	12.13	310
2	West	160.00	159.65	12.00	11.98	511
3	South	150.00	149.97	11.25	11.25	298
4	North	53.31	53.02	3.99	3.99	66
	TOTAL	533.31	524.46	39.99	39.35	1185

The impact of this programme was satisfactory as the land for cultivation has increased and culture able fallow land has been converted into an arable land. There is creation of farming system and generation of employment opportunities for rural community.

RECLAMATION OF ACIDIC SOIL

The reclamation of acidic soil plays a vital role in newly terraced land. The high rainfall intensity causes downward leaching resulting soil acidity. The state has acidic to very acidic soil with pH ranging from 4.4 to 5.5 such soils are injurious to plant growth and adversely affect the soil microbial activities resulting poor yield.

The acidic soils has to be reclaimed with liming material dolomite for improving the soil texture, structure, uptake of plant nutrient and moisture retention capacity. All the crops should be applied 1.5 to 2 tonnes per hectare of liming material to neutralize the soil acidity. The total cost per hectare is Rs.3125.00.

PHYSICAL AND FINANCIAL ACHIEVEMENT 2008-2009

Sl. No.	District	Physical (ha.)		Financial (lakhs)	
		Target	Achievement	Target	Achievement
1	East	1600	853	50.00	26.66
2	West	1470	764	45.94	23.88
3	South	1482	746	46.31	23.31
4	North	600	165	18.75	5.16
	TOTAL	5152	2528	161.00	79.00

The impact of this programme was found to be very useful in acidic soil. The application of Dolomite has improved in neutralizing the soil acidity and ultimately the soil becomes more productive with respect to physical, chemical and biological properties resulting optimum crop production.

PHYSICAL AND FINANCIAL TARGET -2009-2010 UNDER MACRO-
MANAGEMENT OF AGRICULTURE.

I. NATURAL RESOURCE MANAGEMENT

National Watershed Development Project for Rainfed Areas (NWDPRA)

The National Watershed Development Project for Rainfed Areas (NWDPRA) is a major CSS programme being implemented by the department. It is an ongoing scheme with the objective for developing sustainable agriculture through integrated farming system emphasizing in people's active participation.

The programme encompasses divergent activities under management and development component. Under management component, training community organization, institutional and capacity building is the major activities. Under development component, watershed work phase, production system and micro-enterprise (for land owning families), livelihood support system (for landless families) and consolidation phase are the major components. Under watershed work phase- land development, plantation of fast growing trees species, dry land horticulture, bamboo plantation and drainage line treatment are the activities. Under farm production system and micro-enterprise- establishment of nurseries, crop production cum demonstration, cash crop plantation, proven technology etc. are the activities. Under livelihood support system- service sector such as carpentry, blacksmith, weaving, broom binding, tailoring etc. works are the activities. Besides, small livestock management such as poultry, piggery, goatery, bee keeping etc. is the activities. Under consolidation phase- up scaling of successful activities, watershed plus activities, documentation of successful experiences, preparation of project completion report, watershed development fund and its management etc. are the activities.

PHYSICAL AND FINANCIAL TARGET 2009-2010

Programme	Rate/per unit	District	Micro - WS (Nos.)	Physical (Ha.)	Financial (Rs.in lakh)	Mandays Employment Generation.	No.of Benf.
National Watershed Dev. Project for Rainfed Areas (NWDPR)	As per common guideline of GOI, 2008	East	11	1702.00	194.09	23500	3600
		West	10	1547.00	177.00	21400	3200
		South	8	1237.00	141.00	17000	2600
		North	3	464.00	53.00	6500	600
		TOTAL	32	4950.00	565.09	68400	10000

Thirty two Micro-Watersheds will be taken up for development works during the year 2009-2010. The revised cost norms per hectare is Rs.12,000/ however the actual treatment cost of watersheds will be based on location specific requirement and actual planning basis.

The preparation of action plan and mode of implementation will be as per the COMMON GUIDELINES FOR WATERSHED DEVELOPMENT PROJECTS, GOVERNMENT OF INDIA, 2008. The Proposed Action Plan, NWDPR for the year 2009-2010 will be submitted to the RFS Division, Ministry of Agriculture, Government of India.

RIVER VALLEY PROJECT:

RVP-River Valley Project will be taken up in the identified watershed as per the guidelines and it will be taken up by the RVP of Forest Department. A sum of Rs. 245.00 lakhs has been earmarked for 2009-2010.

INTEGRATED CEREAL DEVELOPMENT PROGRAMME

2009-2010

Under Macro Management of Agriculture, the following different programmes have been proposed under the component Integrated Cereal Development Programme (ICDP) for the year 2009-2010.

The objective of the scheme is to enhance production and productivity by reducing yield gaps of major crops on a sustainable basis.

7. INTEGRATED CEREAL DEVELOPMENT PROGRAMME-RICE:

a. Demonstration on System of Rice Intensification (SRI):

SRI technique of rice cultivation is being popularized and found to be very effective and farmers are eager to take up this method of rice cultivation due to the requirement of less seeds, less water and less plant protection chemicals and fertilizers. This system helps in the development of large root volume, profuse and strong tillering with big panicles and well fixed spikelets which ultimately give higher grain yield.

It has been proposed to carry out demonstration in the rice growing areas of the four districts. As per the new revised guidelines of MM, the rate per demonstration is Rs 3000/acre.

Under this demonstration, Hybrid rice @ 6kgs /acre plus Bio fertilizers (Nalpak) will be provided to the farmers. The FYM required will be the farmer's contribution.

b. Distribution of High Yielding Varieties of Rice:

Use of High Yielding varieties plays a major role in increasing the food production per unit area thereby helping in achieving the target set for agricultural development.

Seed minikits of HYV of rice suitable for cultivation in the State of Sikkim will be distributed. As per the revised guidelines of the Government of India, one kit of 5kgs at every 50 ha area of rice will be distributed.

Sl. No.	COMPONENT	Unit	Rate/unit in Rs.	Phy.	Fin.
	Integrated Cereal Development Programme (ICDP)				60.00
I.	ICDP -Rice				
	1.Demonstration on System of Rice Intensification	Acre	3000	1000	30.00
	2. Seed Minikits if High Yielding Varieties-Rice	Qtls.	3000	1000	30.00

2. ICDP -COARSE CEREALS :

Seed minikits of High Yielding varieties of coarse cereals i.e. Wheat and Buckwheat will be distributed to the farmers as per the guidelines of the Government of India.

Wheat and Buckwheat are the major crops grown during the Rabi season.

Sl. No.	COMPONENT	Unit	Rate/unit in Rs.	Phy.	Fin.
	Integrated Cereal Development Programme (ICDP)				
II.	ICDP-Coarse Cereals				100.45
	1. Seed minikits of High Yielding Varieties-				
	a. Wheat	Qtls.	4500	2000	90.00
	b. Buckwheat	Qtls.	7000	150	10.45

2.CROP PRODUCTION PROGRAMME FOR OILSEEDS/PULSES/MAIZE:

In order to give a boost to the production of pulses and oilseeds and to meet the food and nutritional security, pulses and oilseeds has been included as one of the crop production under the revised MMA schemes. The objective of the scheme is to increase the production and productivity of oilseeds, pulses and maize in the country.

It has been proposed to distribute Certified seeds of Soyabean, Mustard, Urd, Arhar and Maize at 50% of the cost or Rs 1200/qtl. whichever is less as per the guidelines of the Government of India.

Sl. No.	COMPONENT	Unit	Rate/unit in Rs.	Phy.	Fin.
	Integrated Cereal Development Programme (ICDP)				139.55
III.	Crop Production Programme for: Certified Seed Distribution-Rs 1200/qtl				
	PULSES	Qtls.	1200	1571	18.85
	OILSEEDS				
	Soyabean	Qtls.	1200	812	9.70
	Mustard	Qtls.	1200	1750	21.00
	Total Oilseeds =				30.70
	MAIZE	Qtls.	1200	7500	90.00

SUMMARY OF PROPOSAL FOR 2009-2010 UNDER ICDP :

Sl. No.	COMPONENT	Unit	Rate/unit in Rs.	Phy.	Fin.
	Integrated Cereal Development Programme				300.00
I.	ICDP -Rice				
	1. Demonstration on SRI	Acre	3000	1000	30.00
	2, Seed Minikits if HYV-Rice	Qtls.	3000	1000	30.00
	Total of ICDP-RICE =				60.00
II.	ICDP-Coarse Cereals				
	1. Seed minikits of High Yielding Varieties-				
	a. Wheat	Qtls.	4500	2000	90.00
	b. Buckwheat	Qtls.	7000	150	10.45
	Total of Coarse Cereals =				100.45
III.	Crop Production Programme for:				
	Certified Seed Distribution-Rs 1200/qtl				
	PULSES	Qtls.	1200	1571	18.85
	OILSEEDS				
	Soyabean	Qtls.	1200	812	9.70
	Mustard	Qtls.	1200	1750	21.00
	Total Oilseeds =				30.70
	MAIZE	Qtls.	1200	7500	90.00

INTEGRATED NUTRIENT MANAGEMENT

Proposal for 2009-2010

A policy of state government for elimination of all forms of chemical from Agriculture scenario lead to switch whole agriculture into organic employing options such as enriched rural compost, Vermi-compost, bio-fertilizers organic amendments organic fertilizers and other similar sources of nutrition. Capacity building of the farmers on effective utilization of these options is part of the policy. Capacity building and raising the awareness levels amongst the field functionaries and most importantly the farmer's community will be essential for the successful adoption of the organic farming technologies.

Since Sikkim has been declared as organic state and the subsidy on chemical fertilizers is tapered and is zero since 2006-07. In order to replace the need of nutrients to crop the department is propagating and advocating farmers to adopt new and modern technology of organic farming system to sustain the crop production. For increasing income from farm sector the farmers need to be provided with vital inputs including technical know how and institutional financing in right quantity and at appropriate time .To increase the crop production and productivity, the soil health and soil nutrient available to crop play a major role. The integrated nutrient management is the only alternative in organic farming system to improve the production in sustainable manner.

Through proper demonstration of nutrient management using various organic sources in the farmer's field and maintenances of soil health can bring awareness of the technology amongst the farming community. With the maintenance of soil health card of individual farmer one can know the fertility

status of their farm and help to use organic manures and other sources of nutrients in judicious manner. The effort to replace the chemical sources of nutrients by organic sources through the process of recycling farm and forest waste, promoting use of bio-fertilizer, organic fertilizers has been successful. The department is also promoting the modern and scientific method of compost making and other technology of soil health improvement.

1. BIO FERTILIZER DEMONSTRATION:

Bio-fertilizer is a product containing living cells of different types of micro-organisms that have an ability to mobilize nutritionally important elements from non-usable form through biological process. It refers to living organisms that augment plant nutrient supply in one way or other. They are renewable energy source. They are environment friendly and cost effective supplement to the chemical fertilizer, laying a significant role in improving nutrients availability to the crop plant. Some bio fertilizers of prime interest in our state are Azolla, Blue Green Algae, Rhizobium, Azatobactor, Azospirillum, Phosphate solubility bacteria and others. They can supplement 20-25% of the nutrient of the crop at very low cost.

It is proposed to conduct demonstration in 4000 ha of in different crops during current year. The cost of conducting such demonstration will be Rs. 1000/ha.

Sl.No	Programme & Component	Unit	Rate/Ha (Rs)	Target Physical	Financial outlay (Rs in lakhs)
1	Bio-fertilizer	Ha	1000	4000	40.00

2. PROMOTION AND DISTRIBUTION OF MICRO-NUTRIENTS

Sikkim soils are poor in Nitrogen followed by Phosphorous, Potassium, Zinc, Calcium, Magnesium, Boron and Molybdenum. Soil PH is very low and hence nutrients are not available to the plants even if present in the soil. Since the State is declared as an Organic State the use of chemical fertilizer is being discouraged. To meet the nutrient requirement, various organic manures *viz.*, compost, vermi-compost, bio-fertilizers, green-manuring crops and soil amendments for reclamation of acidic soil through application of are being practiced.

Required in very less quantities, micronutrients such as Mn, Mo, Cu, Zn, Bo and Mo are critical from the point of view of overall growth and development of the crop plants having a direct relation to production and productivity. Bulky organic manures hardly contain sufficient amounts of these micronutrients as a result of which deficiency symptoms are apparent in the field manifested also in increased susceptibility to pests and diseases.

Further, high acidity due to high rainfall along with leaching of nutrients in addition to fixation of nutrients make micro-nutrients a limiting factor in crop growth and performance.

In order to correct deficiency of micronutrients in the soils of Sikkim, it is proposed to conduct demonstration in farmers' fields covering an area of 4000 ha on Kharif and Rabi crops during 2009. Mode of application of the micronutrients will be through soil application as well as foliar spray.

Sl.No	Programme & Component	Unit	Rate/Ha (Rs)	Target Physical	Financial outlay (Rs in lakhs)
1	Micro nutrients	Ha	500	4000	20.00

VERMI COMPOSTING :

a) Vermi-culture and Vermi-composting through Earth Worm Eco-technology is indigenous, cheap and easy technology to convert all bio-degradable waste in best quality organic manure (Vermicomposting based human fertilizer) it earth worm eco technology all types of beneficial earthworms and microbes are cultured and all types of bio-degradable materials are used to produce organic manure.

The key role of earth worms in improving soil fertility is well known from time immemorial. Earth worms feed on any organic waste consume 2-5 times their body weight and after using 5-10 percent of the feed & lose for their growth excrete the rest as mucus coated undersized wetter as worm cast. Worm cast consists of organic matter that has undergone physical and chemical breakdown, through the activity of muscular gizzard that grinds the material to a practical size 1-2 mm. The nutrients present in the worm cast are readily soluble in water for uptake of plants. Vermicompost is a rich source of macro and micro nutrient, vitamins, enzymes anti-biotic growth hormones and annualized micro flora.

The major benefits of Vermicompost are economical, sustainable and easily acceptable. It is eco-friendly and improves soil health by supplying micro nutrient. It works as an agent of physical decomposition.

A total of Rs 90.00 lakhs has been proposed under this programme to take up 300 units.

VERMI TECHNOLOGY

The development of standards of vermi composting technology was established in 2006. Two species of earthworm have been found to be most effective i.e. *Eisenia foetida* & *Eudrilus euginae*. Both these species are found to be very effective in conversion of organic biodegradable waste into vermi compost.

This technology enhances the production of the cocoon in the specialized hatchery which can be easily transferred to the farmer's field in various temperature ranges of the region. The earthworm so produced gets easily acclimatized to any environment given. The technology of production of cocoons and live earthworms can be transferred to the farmers based on their requirement.

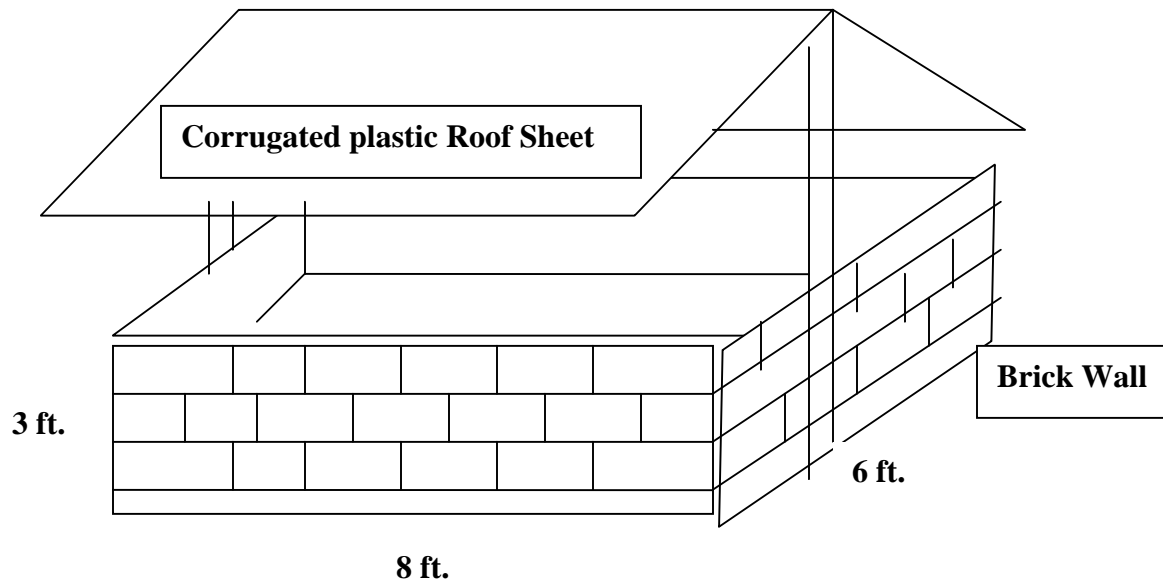
VERMI COMPOST PIT

The dimension of 8ft (length) X 6ft (width) X1.5 ft (Height) has been found to be suitable to fulfill the requirement of production of vermi compost in a year if it is utilized in full of its capacity. Each unit will contain a fabricated vermin shed consisting a complete fitting fixing and covered with plastic corrugated sheet of 22 gauge along with foundation work for fitting and fixing. The structure will have MS pipes fitting of 32 mm and 25 mm pipes with 2 mm thickness. Brick partition along the periphery would keep the structure intact and strong.

COST OF VERMI COMPOST PIT :

Sl. No.	ITEMS	Cost /Unit in Rs.
1.	Vermi-culture Shed construction consisting of corrugated roof sheet with fittings if MS pipe and brick partition wall	18,000
2.	Mother culture and cocoons 16 kg and Training and delivery charges etc.	12,000
	TOTAL =	30,000

VERMICULTURE SHED



b. Revival of old one ton Vermi compost unit – During last 2 -3 years we have assisted for construction of low cost one ton vermin compost units to the farmers. But around 20 -25 % of such units are not functioning due to poor management and death of earth worms. These units have to revive by supply of fresh mother culture and cocoons of different species of earthworm and the farmers have to be reoriented.

It is proposed to revive 2400 such units by providing them training and supply mother culture. The cost for revival of one units will be Rs.1250/- and for 2400 units the cost will be Rs.30.00 lakhs.

4. DEMONSTRATION ON INTEGRATED NUTRIENT MANAGEMENT:

Integrated nutrient management includes the utilization of plant nutrients from diverse sources which are available, in order to improve the agronomic efficiency of such nutrients and at the same time reducing the losses of nutrients. Being Organic State, the use of chemical fertilizers is completely avoided in the scheme and only the organic sources of the nutrients are to be applied in the demonstration.

The bio-fertilizer and other micro organism play important role in plant by various processes. In the demonstration all the diverse sources of nutrients like organic manure, micro organism, organic fertilizer would be included along with the incorporation of legume crop in the cropping system. The merit of demonstration lies in seeing is believing and doing is learning. The field demonstration trial on the farmers' field is the most effective way of demonstrating the correct use and the effect of organic inputs. As organic farming is a new area, there is need for adequate demonstration trials with organic inputs for bringing awareness for sustainable crop production.

The demonstration would be carried out in Kharif and Rabi seasons. Maize will be the major crop in kharif season and wheat/mustard in Rabi season. It is proposed to conduct demonstration detailed as below:

Sl. No	Component	Unit	Rate(Rs)	Physical Target	Financial (Rs in lakhs)
1	Demonstration of Integrated Nutrient Management	Ha	3000	1600	50.00

PROPOSAL 2009-2010 SUMMARY UNDER I NM -MMA

A	AGRI CULTURE	Unit	TARGET 2009-2010	
			Physical Targets	Financial Outlays
	Programme & Component		(Ha/Nos)	(Rs. In lakhs)
	Integrated Nutrient Management			242.00
1	Bio fertilizer Demonstration	Nos.	4000	40.00
2	Distribution of Micro nutrients	Ha.	165	20.00
3	Vermi compost	Nos.	-	132.00
4	I NM Demonstration	Ha.	1600	50.00

RECLAMATION AND DEVELOPMENT OF ACIDIC SOIL

The reclamation of acidic soil plays a vital role in newly terraced land. The high rainfall intensity causes downward leaching resulting soil acidity. The state has acidic to very acidic soil with pH ranging from 4.4 to 5.5 such soils are injurious to plant growth and adversely affect the soil microbial activities resulting poor yield. The acidic soils has to be reclaimed with liming material like dolomite for improving the soil texture, structure, uptake of plant nutrient and moisture retention capacity. As per the revised guideline of Macro Management of Agriculture Scheme, the physical and financial target has been proposed as under :-

PHYSICAL AND FINANCIAL TARGET 2009-2010

Sl. No.	Programme	Unit cost Rs. per Ha.	District	Physical (Ha.)	Financial (Rs.in lakhs)	Cost Sharing (Rs. In lakhs)	
						GOI	Benf.
1	Reclamation of Acidic Soil on Demonstration basis	7,000	EAST	875.00	61.25	21.43	39.81
			WEST	750.00	52.50	18.37	34.12
			SOUTH	650.00	45.50	15.92	29.57
			NORTH	253.00	17.71	6.19	11.51
			TOTAL	2528	177.00	62.00	115.01

PLANT PROTECTION

IPM (Integrated Pest Management)

Sikkim has been declared as an organic state and the use of chemical pesticides in the State has been banned. Farmers are being encouraged to adopt traditional means of pest and disease control which are cost effective and environmental friendly.

Integrated Pest Management (IPM) is an eco friendly approach which aims at keeping pests below Economic Threshold Level (ETL) by employing all available pest control methods and techniques such as cultural, mechanical and biological control, with greater emphasis on the use of bio pesticides and pesticides of plant origin like neem formulations.

a) FARMER'S FIELD SCHOOL.

Under MMA Scheme, IPM was promoted through Farmer's Field School (FFS) which is a form of adult education, based on the concept that farmers learn optimally from field observations and experimentation. FFSs were organized to help farmers tailor IPM practices to suit their needs.

FFS is a season long programme to impart training to the farmers for one day in a week through out the season in various aspects of production technologies. In this 30 farmers group are being trained at their own field for particular crop in the whole cropping season from land preparation to post harvesting. Under the revised MMA scheme , it would endeavored to make FFSs more popular and farmer friendly.

b) PROMOTION OF BIO PESTICIDES

Being on Organic State it is essential to popularize bio pesticides, pheromone traps, BCA's etc among the farming communities.

c) SEED TREATMENT

Seed treatment is an important activity which needs focused attention. Seed treatment is the use of biological agents on seeds to control primary soil and seed borne infestation of insects and diseases, which are serious threats to crop production. It also helps in uniform emergence of seedlings. . It protects seedlings from sucking pests as well as leaf curl virus. Adopting this simple technique, adequate plant protection can be assured to obtain higher productivity by 5 to 10% without much expense. It is proposed to carry on seed treatment for cereal, pulses and oilseeds. The Certified seeds produced locally under Seed village programme and the farmers seed will be treated under this programme.

SUMMARY OF PROPOSAL 2009-2010

Sl. No.	Component	Physical	Financial (Rs. In lakhs)
1	Farmer's Field School	60	10.20
2	Promotional of Bio Pesticides	2500 kgs.	10.00
3	Seed Treatment	10600 Ha.	5.30
	Total =		25.50

FARM MECHANISATION - 2009-10

Farm mechanization is for improving efficiency of doing work at low cost, faster speed with high precision and more comfort. It also helps carrying out farm operations timely and reducing the cost of cultivation through efficient use of inputs. Mechanization also helps in conservation of produce and by products from qualitative and quantitative damage; it also enables value addition, preservation and processing of agriculture produce. On the whole it improves the quality of rural life.

Agriculture of hill region demands a set of machineries which is small in size, light in weight & has capability to do maximum possible operation. The machine should be such that it could be taken uphill or down the slope by two - three persons by lifting it and carrying it physically. It must be able to operate in the narrow terraces, where the bigger ones are unable to reach and perform the operation. The required machine should have more field capacity than the manual & reduce the drudgery of operation. With this aim and objective the proposal has been made accordingly.

SETTING UP OF CUSTOM HIRING CENTER

Since the majority of farmers in Sikkim are marginal farmers, owning Power Tillers and other processing equipment individually does not work out to be economically viable and the machineries also remain underutilized. Hence, it is proposed to procure certain machineries which are useful to the farmers but which the farmers cannot afford to buy. These machineries are proposed to be kept in one center location in districts, which will serve as custom hiring center and the farmers can either rent the machineries like Power Tillers, thresher etc

or utilize the services of the machineries like dryers, grinders etc in the center itself.

The equipments / MCS Proposed are:-

1. Power Tiller (8 BHP) with attachment & accessories.
2. Manually operated Maize Sheller.
3. Hard tools minikit.

PHYSICAL AND FINANCIAL TARGETS DURING 2009 -10.

Sl. No.	Items	Units	Physical	Financial (in lakhs)
1.	Power Tiller (8 BHP) with attachments	Nos	10	12.00
2.	Manually operated Maize Sheller	Nos	175	7.00
3.	Hard tools minikit	Nos	200	1.00
Grand Total				20.00

The total projected expenditure for this programme is 20.00 lakhs.

PATTERN OF ASSISTANCE

Subsidy at the rate of 25% is provided by GOI , and remaining 75% shall be the farmer's contribution.

CONCURRENT EVALUATION

As per the guidelines of the Government of India, concurrent evaluation will be carried out. A sum of Rs. 14.00 lakhs have been earmarked during this financial year.

INNOVATIVE SCHEMES

1. RUN OFF AND STREAM WATER CONSERVATION-GENAP WATER TANK

The steep hill slopes of Sikkim, especially West and South of Sikkim has high rainfall concentration in particular season with low rainfall during winter season poses a multi pronged problems for the farmers of the hilly region. The steep slopes and rainfall concentration in three to four months leads to scarcity of water during off-seasons, resulting in mono-cropping or low yield due to water stress situation in crops grown on sloppy land. The use of Tank-irrigation systems help in conservation and efficient utilization of available water during lean season. The know how regarding their use and benefits needs to be propagated.

Sikkim is richly endowed with water resources and hence has great potential for irrigation development. The rainfall far exceeds the loss of water due to evaporation during most of the months. The climate being mostly subtropical to temperate in nature, the evapo-transpiration losses are also expected to be low, thus indicating low irrigation needs. Therefore, even if a small part of the total rainfall is harnessed appropriately considerable area could be brought under irrigated agriculture. As the scope for bringing additional area under the cultivation is limited the practical solution lies in increasing the

cropping intensity through appropriate development of irrigation water resources.

In any planned economy irrigation plays an important role to make agriculture sustainable.

Appropriate level of planning process is devolved for optimizing agriculture production through irrigation in Sikkim. Till 1999-2000, the potential created is 28,864 Ha and potential utilized is 20,376 Ha. Every year schemes are undertaken to enhance the potential to provide maximum boost to Agriculture sector.

During the recent times it has been observed that there has been long periods of drought and with possibility of climate change there is no rainfall when it normally should rains thus the crops may not do well such a situation. To overcome this problem in future the department has proposed to tap the scanty water from the nearby streams by means of open channel or conduits and collect it in a special water tanks called GENAP water tanks to be important from Israel. GENAP tanks are simple to assemble and easy to transport. Their long lasting properties make them a worthwhile investment. Galvanized steel sheets are slit from the mother rolls, corrugated and punched. The corrugated sheets are then formed into the desired diameter tanks. These tanks are treated with high grade Zincrolyte de-ionizing coating which guarantees very high level of corrosion resistance. This tanks are coated on both sides with plastisol coating is 200pm gauges. The water collected in tanks would be judiciously utilized by means of pipes to the crop.

The tank is lined with high quality polyolefine plastic film which is light, resistant to high temperature, harmful UV rays and chemicals.

The cost of installation of one Genap Water Tank is calculated as below:

Sl. No.	Particulars-	Tentative Cost in Rs. In Lakh	Remarks
1	Genap Tank-NETAFIM-50,000 ltrs. capacity	3.65	Subsidy amount required under MMA
2.	Installation charges, distribution accessories, Sprinkler system and installation of sprinkler etc.	3.65	Farmer's contribution
	TOTAL =	7.30	

GENAP Water Tank of 50,000 Ltrs has been designed for distribution to 5 Nos. farmers, each of approx. 10000ltrs. Hence, there is a collective group of farmers being benefited simultaneously.

Specifications of GENAP Water Tank .:

- Corrugated Steel Plate; standard zinc plated high strength steel of International standards.
- Tank Liners made of High quality PVC Film with extra UV stabilized Chemical resistant.
- Tank Liners made of Aquatex EX - high quality Polyolefine plastic Film.
- Expected life of GENAP under normal conditions is 5-25 yrs.
- Fitted with nut bolts and can be dismantled & refixed in another location as per requirement.
- This Scheme is a combination of a water storage & supply with Sprinkler Irrigation Systems in Open field crops viz. Wheat & Mustard.
- At least 5 farmers can be benefited with this distribution System covering 1.0 Ha area In the dry season this system can be used effectively to use the water collected during the monsoon in the GENAP. The effects of drought can

be minimized during the dry months as there will be enough water for irrigation purposes.

- For Mustard Crop an alternative Sprinkler System can be installed - MEGANET SPRINKLER SYSTEM - which has low discharge & is suitable for the crop. Larger Sprinkler discharge could destroy a part of the area where the flow of water is large.



GENAP WATER TANK



SPRINKLER SYSTEM

GIS FOR LAND USE PATTERN & CROPPED AREA OF SIKKIM

The data available and the system of data collection in the State is about 20 years old and needs urgent up gradation.

Under the programme Of GIS, a software will be developed development which will provide crucial link of GIS Data with other Data. The accuracy of data under this at the end of project will be 85-90 %.

With the help of this GIS, information about the major agricultural crops of Sikkim Block wise and GPU wise will be generated which will help in the future for Agricultural development.

This project will be taken up in all the four districts of the State.

A total of Rs. 34.00 lakhs has been proposed for this programme.

E-PEST SURVEILLANCE

E-pest surveillance device- It is a portable hand-held device helps in capturing data on pests and beneficial insects for farmers

In a first ever step in addressing the farming community, which drives the economic growth of India, the government launched E-pest surveillance device – a portable, hand-held device, a type of protected Personal Digital Assistant (PDA), for capturing data on pests and beneficial insects and sending it to institutes where it is made part of databases. The device can withstand rough field conditions (dust and water, high temperature, poor visibility, etc) and has high battery life for long field use.

This enables application of ICT for farmers' benefit. Pests cause heavy damage to various crops and are known to affect some crops such as cotton, rice, fruits and vegetables, if not properly controlled.

At present, there is no effective surveillance and database on pest build up. Such survey and database is a prerequisite for reliable pest forecasting.

The surveillance apparatus in the field is poor, and part of this poor surveillance is lack of an easy system for capturing field observations in a standard format and immediately transmitting the data upwards.

E-pest device is aimed at filling the gap. The introduction of this device will help in achieving high level of pest surveillance and issue of farm advisories for effective pest management

In the long run, the database would be used for understanding long-term implications of climate change and such other phenomenon on crop-pest relationships.

The field observation official fills up forms provided by very simple and user-friendly software in the device. The software makes a summary of the observations, and the official sends the summary to the National Center for IPM through Internet. The data will form part of the database maintained by the center. The database is geo-referenced using a GPS (geo-positioning system) so as to pin-point pest data to different geographical areas. The device has been field-tested and the results show that it is user-friendly. National Plant Protection Training Institute, Hyderabad will provide training on use of this device and the tentative cost of each device comes to Rs 25,000.

EXTENSION & TRAINING PROPOSAL 2009-2010

1. Exposure visit of Field functionaries & Officials

The technology of modern Agriculture has been changing day by day. To update the technology visit of Research Station, Agriculture Institute, Reputed Agriculture farm, Seed Production centers in & outside the state is very important. Hence it proposed to conduct exposure visit of field functionaries & officials prior to kharif & Rabi season. The proposed destination of visit are VPKAS-Almora, GBPUAT- Pantnagar, IARI - New Delhi, CSAUAT- Kanpur, HARC- Deheradun, USSOPA, Deheradun etc.

2. Use of Print & Electronic Media.

a. Print media:

Printing, publication & distribution of leaflets, pamphlets, poster & banner etc. is important and it plays major role in extension delivery system of Agriculture. Hence it is proposed to print the leaflets & pamphlets on S.R.I., Organic Certification, Package of Practice on organic cultivation of various crops grown in Sikkim, Manual on crop statistics including procedure of crop yield estimation of various crops, etc.

b. Electronic Media

Electronic Media plays an important role in Agriculture Extension system. Hence it is proposed to produce new items of 30 minutes duration on major agriculture events of the state and telecast in local cable network on weekly basis. Apart from this it is proposed to produce documentary film based on Organic Agriculture and other innovative subject of Agriculture.

3. Farmers Development Workshop

Pre seasonal Interface of Field Functionaries, Experts & subject Matter Specialist with Farmers is very important. Hence it is proposed to hold the workshop before the onset of Kharif & Rabi season.

PROPOSAL ON EXTENSION & TRAINING 2009-2010.

(Amount Rs. in lakhs)

SI No	Particulars	Cost Norms	Unit	Amount in Rs. In lakhs.
1	<u>Exposure visit of Field functionaries & Officials</u>	Rs.200/- per day	100 & 100 nos for 10 days- Kharif & Rabi respectively.	4.00
2.	<u>Use of Print & Electronic Media.</u> <i>a. Print media:</i> Printing, publication & distribution of leaflets, pamphlets, poster & banner etc. b. Electronic Media Local TV network, documentary etc.			1.00 6.00
3.	Farmers Development Workshop	Rs.10 lakhs per 4 dist./season.	2 nos	20.00
	TOTAL			31.00

BENCH TERRACING UNDER LAND DEVELOPMENT PROGRAMME IN AGRICULTURAL LAND.

This is one of the mechanical measures widely adopted in higher steep land in the hills. The construction of bench terraces helps to prevent run-off with high velocity, soil loss and retention of moisture, resources manures, fertilizer and facilitates the application of irrigation, if available. The bench terraces proposed in the project areas are upto 50 % slope. This programme will help to bring an additional area under cultivation which under proper agronomic practices is expected to contribute crop production and productivity of area.

The department is implementing the Land Development (Bench Terracing) programme in a compact area in the village. In this programme farmers are provided with Government subsidy of 25% i.e approximately Rs.30,000.00/- per hectare.

PHYSICAL AND FINANCIAL TARGET 2009-2010

Sl. No	Programme	(Unit)	Rate /Unit (Rs.)	District	Physical (Ha.)	Financial (Rs.in lakhs)	No. of Benf.
1	Land Development: Bench terracing in Agriculture land. 25% contribution from beneficiaries	Ha.	30,000	EAST WEST SOUTH NORTH	55.00 50.00 46.00 16.00	16.40 15.00 13.80 4.80	140 130 120 45
				TOTAL	167.00	50.00	435.00

RAIN WATER CONSERVATION THROUGH SURFACE RUN-OFF

The main objective of the programme is to provide water storage through surface run-off for life saving irrigation to a limited area during dry period. The state experiences sufficient annual rainfall but is erratic and unevenly distributed. The distribution of rainfall in summer (March - May) is around 24.23 %, (June - October) is 70.27 percent of the total rainfall and 5.5 % is received during rabi season, resulting moisture stress for crop production.

The situation demand harvesting of surplus run-off for supplementary irrigation either to kharif crops during the dry spells or to subsequent rabi crops. The department proposes for constructing RCC water harvesting tank of capacity 10,000 ltrs. at 50 % Government subsidy i.e Rs. 25,000.00/-. The tanks are constructed with the farmer's participation.

PHYSICAL AND FINANCIAL TARGET 2009-2010

Programme	Unit	Rate/ Unit (Rs.)	District	Physical (No.)	Financial (Rs. in lakhs)	No. of Benef.
Water conservation through surface run-off. 50 % contribution form beneficiaries.	No.	25,000	EAST	125	31.25	125
			WEST	120	30.00	120
			SOUTH	125	31.25	125
			NORTH	30	7.50	30
			Total	400	100.00	400

EFFECTIVE MICROORGANISM (EM)

PROJECT FOR CONVERSION OF VILLAGE INTO ORGANIC BIO VILLAGE

Effective Micro-organism (EM) is the liquid concentrate containing a concussion of beneficial microbes, which acts as soil conditioner for the soil. It acts as an antioxidant and develops a conducive environment for the crop to grow. EM mainly consists of Lactic acid bacteria, Photosynthetic bacteria, yeast. EM includes both aerobic and anaerobic species of micro-organisms, which co-exist in an environment of pH below 3.5. These micro-organisms are neither imported, exotic, genetically engineered or modified. Various products prepared from EM are as follows:

EM compost: A very useful and economical compost which is prepare in farm by using farm waste like crop residues, cow dung, cow urine, animal bedding, weeds, etc. within 35- 45 days by the use of EM technology.

EM bokashi: This is Japanese fermented compost made within 7-10 days; this is a good source of nutrients for crops. It gives sustained nutrition supply from organic material and produces growth regulator- like substances from fermentation of organic matter.

EM FPE: It is a chemical free bio-pesticide and an organic insect repellent.

EM 5: It is a chemical free disease controlling measure or a bio-pesticide, use to prevent leaf diseases.

RATIONAL :

Over the years, the low equilibrium balancing needs and supplies that mountain communities attained has been hampered and the sustainable system which existed has broken down. This can be attributed to a host of reasons, primarily being pressure of population of people and livestock and improved communications, which brought about awareness of better standard of living and

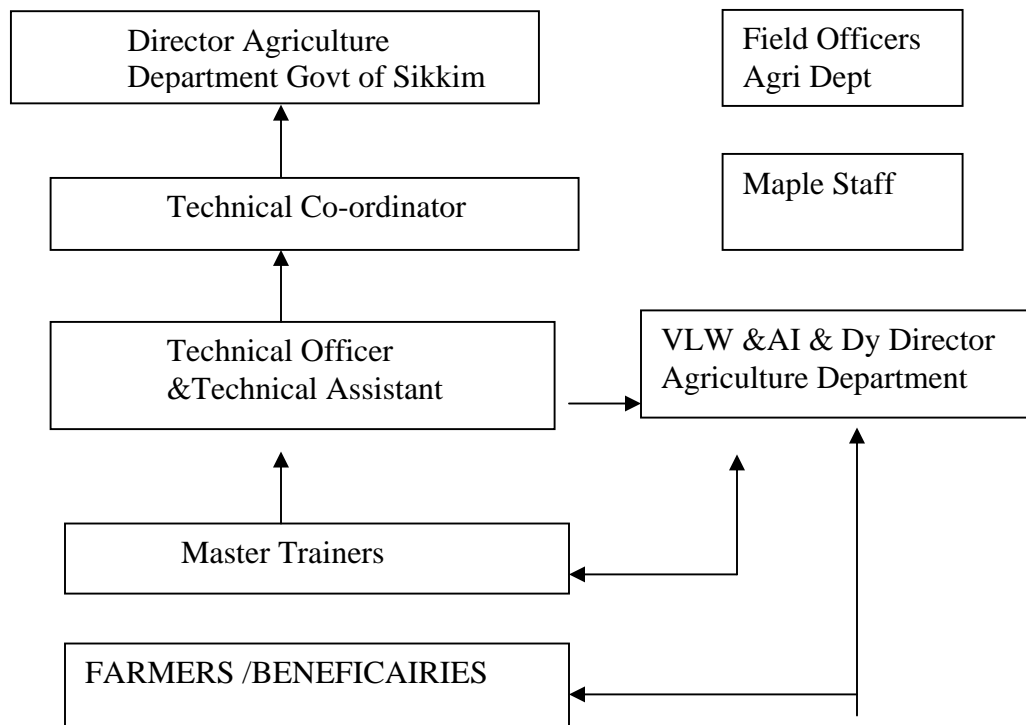
thus aspirations have risen. This has resulted in accentuation of poverty and mass migration outside the state in the hope of better prospects. This increased demand on natural resources without conservation has led to their slow but steady deterioration. Though there is awareness and desires of finding viable solutions closer to home in the mountains itself, myriad of development programs has not adequately addressed the peculiarities of the conditions prevailing in the mountains.

OBJECTIVE:

Traditional farming has always been followed for centuries in the plain regions. The effects of the 'Green revolution' never did reach these remote areas for a host of reasons. Even today, majority of the villages can be termed as "Traditional Villages". By making organic farming the main focal point, the project will take into account this fact and all other issues, which need to be addressed to bring about all around development. Specific objectives will be to:

1. Promote a core sensitive approach to the design and implementation of development initiatives.
2. Enhance the capabilities of the local people by adopting Maple EM.1™ Technology and simple Organic package of practice and slowly sensitizing them to the benefits of Organic farming.
3. Exploitation and conservation of natural resources simultaneously.
4. Creation of valuable human resource for carrying out effective extension activities.
5. Create a farmer driven movement. Organic system can only be implemented if it is of the farmers, by the farmers and for the farmers.
6. Ensure that the income of the farmers increase in rupees terms at the end of project.

7. Creation of a efficient manpower to look after the day to day running of the project.
 8. Ensure that the farming community takes ownership of the project at the end of project
- Develop and implement a mechanism to ensure regular monitoring of activities, outputs and outcomes



1. Project Area and Target Group : The project shall initially cover 200 villages to start with and make them model villages for others to follow. 27 farmers from each village shall be chosen and initial hand holding shall be done in an attempt to implement better technologies and interventions in their current package of practice. Care shall be taken to ensure that there is no large cultural change that takes place for quicker acceptance.
2. Project Strategy and approach: The project aims at carrying widespread demonstrations for organic farming with the use of EM technology. It targets a small community of farmers to get better yield to address both food security and better capital generation in the hands of an average farmer by accessing local markets. Through the demonstrative effect, it is hoped that adoption of the various interventions are adapted by the rest of the farming community.
3. Project components : The project comprises of the following 5 components to be implemented :-
 - Formation of an 'Organic ' work force
 - Demonstration of the farmers for the benefits of adopting organic farming technique
 - Expanding and strengthening the capacity and capabilities of the rural poor and their organization by exposing them to EM technology for production of higher yields for self consumption and creating a surplus for the market
 - Best use of natural resources and technology, natural resource conservation and environmental protection
 - Ensuring that the activities become sustainable in the long run

4. Project Cost: The direct financial implications will be Rs.80,00,000 over a period of ONE years.
5. Benefit and Impact : To start with, the project shall benefit 7000 farmers directly in 200 villages in the form of increased economic security brought about by sustainable livelihoods created by the project . NGOs, PRUs and Nodal Officers of the Agriculture Department will develop a greater capacity to take charge of their own destinies and a greater confidence in dealing with external development entities.

PARAMETERS

S.No	Particular	Calculation	Total
1	Project duration	1 Year	1 Years
2	Project area & Total no of Farmers	200 Villages*25 Farmers / Village	200Villages &5000 Farmers
3	Nos of cropping cycle	2 crop cycle per year	2
4	Average land holding per farmer	1.5 acre per farmer	10500 Acre
5	Selected land per farmer	1 acre per farmer	5400 acre
7	Nos of MTs	10 MTs monitoring farmers each	10 MTs
8	Nos of Technical Assistant	3TAs Monitor 25 MTs &7000 Farmers	4 TAs
9	Nos of TC	1 TC monitor 1 TOs 3 TAs and 25 MTs	1 TC
10	Maple EM1 requirement farmers distribution	3 ltr/cropping cycle *2 crop cycle in 1 year	
11	Nos of Training & Demo and review meeting in Farmers Field	180 starting training and demo & 180 review training.	360 Nos
12	Neem Cake, Bone Meal, requirement for Demo	200 Demo*3 kgs each	600 Kgs each
13	Molasses requirement for Demo	200 Demo*3Ltrs	600 Ltrs
14	Jerrycan requirement for Demo(20 &10 Ltrs capacity)	2 &1 each*200 Demo	400 &200 Nos
15	Vinegar &Alcohol	200 Demo*1 Ltrs each	200 Ltrs each
16	Stationary, Application Manual	200 Demo*35 Farmers	7000 Nos each
17	Compost made (In Tonnes)	8 Tonnes Per Farmer	43,200 Tonnes
18	Bokashi made(In Qtl)	3 Qtl Per Farmer	16,200 Qtls
19	FPE /EM5 made (in Ltrs)	60 Ltrs Per Farmer	324,000 Ltrs

1. INPUT COST:

Inputs	Quantity	Rate in Rs	Total Amount for one year in Rs.
Maple EM 1Stock solution	6 Ltr*5000 Farmers=30,000 Ltrs	218	65,40,000
Molasses/Jaggary	600 ltr/kg	25	15000
Jerry cans	400 &200 Nos	80 &60	44000
Vinegar &Alcohol	200 Ltrs each	45 &130	35000
Total			66,34,000

2. MANPOWER:

(A) HONORARIUM AND TRAVELLING COST

Description	No	Amount Per Month in Rs.	Total Amount for one year in Rs.
Technical Coordinator	1	14,000	1,68,000
Technical Officer & Technical Assistants	-	-	-
Master Trainers	10	4000	4,80,000
Total			6,48,000

3. TRAINING

Description	No	Amount per Training in Rs.	Total Amount for one year in Rs.
Exposure Visit of Govt official	6	10,000	60,000
Training to Govt field Officers and MTs	3	30,000	90,000
Field level Training Camp for the farmers by Mt's on organic farming with EM & periodical Review.	100	5000	5,00,000
Monthly Review & meeting of MTs for Reporting	12	5000	60,000
Total			7,10,000

4. TOTAL PROJECT COST FOR ONE YEAR

S. No	ACCOUNT HEAD	TOTAL AMOUNT(IN RS)
1	Input Cost	66,34,000
2	Honorarium & travelling Cost	6,48,000
3	Training Cost	7,10,000
	Grand Total	79,92,000

Rounded upto 80,00,000

ORGANIC RESEARCH

Sikkim has been declared as Organic state and farmers have already started practicing organic farming cultivation in 10,000 Ha of land has also been started. At present we are recommending organic inputs based on the research conducted in different parts of the country which is not giving desired result in our agro - climatic conditions.

This has necessitated to start organic research in our state itself by using the consultancy services of International Competence Centre for Organic Agriculture (ICCOA) Bangalore, who have vast experience in this regard.

The programme will continue for 3 years and package of practices for organic cultivation will be developed for 5 major crops that have potentiality for organic market. These crops are Cardamom, Ginger, Turmeric, Chillies, Corn and Mustard. The total project cost is Rs.92.44 lakhs for 3 years period. In the first year a provision of Rs.20.00 lakhs have been earmarked for this project.

The details of the project is given below:-

1. INTRODUCTION

The role played by agriculture in a global social system and the negative environmental aspects of conventional agriculture have oriented the whole system towards new forms of agriculture. During the past few years observed a constant positive trend of organic agriculture. In the last decade organic agriculture has been able to extend its own dimension to become a significant landmark for agriculture. This rise in support for organic farming represents a marked change in the trajectory of modern agricultural development as increasing attention is being devoted to the sustainability and multi-functionality of agricultural systems

Organic agriculture is one among the broad spectrum of production methods that are supportive of the environment. Organic farming is one of the fastest growing

markets. Because of this, organic production offers small- and mid-size farms an option that can improve economic viability and environmental sustainability. It is also the only sector with increasing numbers of farmers. This is clear from many indicators ranging from the number of farms involved and the growing demand for organic produce, to the expanding interest among community, government, market support, researchers, politicians and civil servants. The demand for organic food is steadily increasing both in the developed and developing countries with an annual average growth rate of 20–25%.

Driving forces include the increasing awareness in connections between food and health, between our lifestyle and the degradation of the environment, and of the sad state of the farm economy. Despite this awareness, many barriers remain, and much needs to be done if a smooth transition to a truly sustainable food system is to be achieved in an efficient and just manner.

Therefore, organic agriculture needs to be understood not simply in terms of another production technology, but as a fundamental shift in the relationships between producers and markets; producers and technology; and producers and the environment.

2. NEED FOR RESEARCH:

Since organic farming systems are based on the functional dynamic interaction between soil, plants, animals, humans, ecosystems and environment (IFOAM, 1996), an important premise for research in organic farming is to develop approaches that are as holistic as possible.

There is a general lack of credible research and development effort, especially for developing package of agronomic practices suitable for organic cultivation. Besides, the technically sound and successful commercial scale business models are not readily available. Moreover, though organic farming has been in vogue in different parts of the world for over two decades now, there have been no systematic studies to compare organic systems of farming with conventional cultivation in terms of productivity, product quality and cost of cultivation.

Hitherto there is limited, almost non-existent research of the organic crop production aspects which is significant required for faster and efficient growth of Organic farming. Lack of technical know-how is an impediment to growth of organic and sustainable farming practices in India.

Hence this pilot project is prepared in focus of research and technology, in developing organic 'Package of Practices' for the selected horticultural crops (4 crops) and to compare organic systems with conventional farming (in terms of productivity, quality of produce, and cost of cultivation) through 'System comparison studies' and the replication trials at farmer's field by participatory research approach. This pilot project will not only be a useful tool for policy support, but also for decision support for farmers willing to convert to organic farming. Therefore, research has the potential to be the crucial factor driving organic farming quickly and substantially forward.

3. PROJECT RATIONALE

Current organic farming offers useful starting-points for development of farming systems with advantage of soil fertility, cost and income. However, some shortcomings prevent acceptance by and support of wider groups of producers and consumers. Several recent review papers have dealt with the needs and priorities of research activities in organic farming (Niggli and Willer 2000, Padel 1999, Willer and Zerger 1999, Wynen 1998, Hoesek 1997, Niggli and Lockeretz 1996). Because agricultural research has neglected organic farming for decades, presentations of research needs turn out to be long lists of top priority.

Renewal of Indian traditional agriculture with emphasis on scientific practices is essential for integrated and efficient management of natural resources however lack of sound scientific foundation is coming in the way of propagation of these farming methods. There is a great need for scientific validation of these practicing methods, besides, evolving new methods suitable to different agro-climatic zones and socio-economic condition of the farmers.

At this juncture, it is essential to provide interventions, support and solutions to problems that may arise from time to time for effective implementation. The lack of confidence during this transition period and dearth of practical information seemed to be major obstacles to the advancement of organic agriculture. Another aspect of primary concern to farmers is economic viability during transition.

Knowledge on the economic aspects of organic farming is very important for the support of policy decisions and certainly for farmers, when they consider a conversion to organic farming. This research project tries to provide an image of the economic conversion potential of conventional farms by means of a farm level model.

Therefore, a prototype consisting of three distinct farming methods were designed along with a control to be tested with replication in three farms/plots.

4. Why SIKKIM?

Agro climatically the North Eastern region is known for its rich diversities, representing temperate, subtropical and tropical areas. Sikkim is a small hilly state, has a total area of 7,096 sq. km The state's economy is basically agrarian. More than 64 per cent of the population depends on agriculture for their livelihood. Agricultural land in Sikkim is estimated to be around 1,09,000 hectares, i.e; 15.36 percent of the total geographical area. Farmers commonly follow mixed farming, which is ideally suited and fits well in the developmental process of making Sikkim an organic state.

The State Government has drawn up plans to promote organic farming in Sikkim and see the further value addition in its agricultural and horticultural produces. Maize, rice, wheat, potato, large cardamom, ginger and orange are the principal crops. Sikkim has the largest area and highest production of large brown cardamom in India. Ginger, potato, orange and off-season vegetables are other cash crops.

Sikkim is India's largest producer of large cardamom and the oleoresin in ginger grown here is between 6-8 per cent, while the capsaicin content in chillis is over 1 per cent which is double that found in chillies grown elsewhere.

Hence this project is prepared keeping in mind the importance for growth and future strategies for development of horticulture to ensure sustainable horticultural production by way of research and scientific validation results of Organic farming in Sikkim.

5. ABOUT ICCOA

International Competence Centre for Organic Agriculture is registered under Karnataka State Societies Act in 2004. ICCOA responds to the needs of different stakeholders of Indian organic agribusiness and functions as a networking and interface organization. ICCOA provides:

- Consultancy services
- Collects, analyses, documents and disseminates information and knowledge
- Builds capacity of individuals and institutions; conducts trainings and workshops
- Advocates for and popularizes organic agriculture
- Network and mobilize stakeholders on specific issues

ICCOA is today among the prominent organization in organic sector working across the entire value chain. It is also a stakeholders' organization with 161 members from all over India. Since its inception, it has undertaken various programmes in the field of research and technology, market development, cluster development, certification, capacity building, policy and advocacy etc. It has the requisite in house expertise of trained technical manpower as well as a pool of resources with varied experience in diverse fields of organic agriculture.

Experience in relation to the proposed project:

S.N	Research & Technology	Description
1.	System Comparison' and 'Participatory Research	India's first scientific study/research on 'System Comparison' between organic farming system and conventional farming systems was conducted on cotton and its intercrop/rotation in Madhya Pradesh during 2003-2005. The research work was designed and coordinated by FiBL, Switzerland in cooperation with ICCOA and Maikaal BioRe Organic cotton project. Research study were published in English and Hindi versions in 2005.
2.	India's first market research on organic products	"The Market for Organic Foods in India". This study is a benchmark for market potential and is referred to in many international publications/articles. ("The Market for Organic Foods in India", VSK Kishore Rao, Raj Supe, Manoj K Menon, Tej Pratap)
3.	Package of Practices	Research on Organic Cotton & Evolving Package of Practices for organic cotton in 2005-2006 along with Research Institute for Organic Agriculture- FiBL, Switzerland.

ICCOA wishes to join hands with Government of Sikkim to implement the project *"TECHNOLOGY INTERVENTION IN ORGANIC FARMING THROUGH 'SYSTEM COMPARISON' AND DEVELOPMENT OF 'ORGANIC PACKAGE OF PRACTICES'*. ICCOA is submitting this project to the Govt. of Sikkim for support,

implementation and execution of the research and development activities in organic farming in Sikkim. The Government support to Research and development activity in organic farming plays a key role in bringing the sector at a higher level.

6. GOALS & OBJECTIVES:

GOALS:

Scientific validations of organic farming through research and evolve technology interventions to improve production and economics.

OBJECTIVES

1. To analysis best practices, productivity and cost benefit ratio by conducting 'System Comparison' studies.
2. To bring out 'Organic package of practices' for the selected five crops in Sikkim.
3. To conduct input availability mapping to determine organic input availability in the selected region in Sikkim.

7. RESEARCH METHODOLOGY

Methodologically, this project will conduct System comparison studies to compare organic production system with conventional farming system to evaluate important parameters e.g. Soil fertility, Crop productivity, Cost Benefit ratio and evolving best practises or organic package of practises.

As stated in the objectives, the project seeks to focus on the following activities:

A. 'System comparison study':

The project will bring an innovative comparative analytical study between Organic and Conventional farming systems for five different crops. This will help in scientific validation of organic farming system in India. The system comparison studies will be carried out for the period of three years.

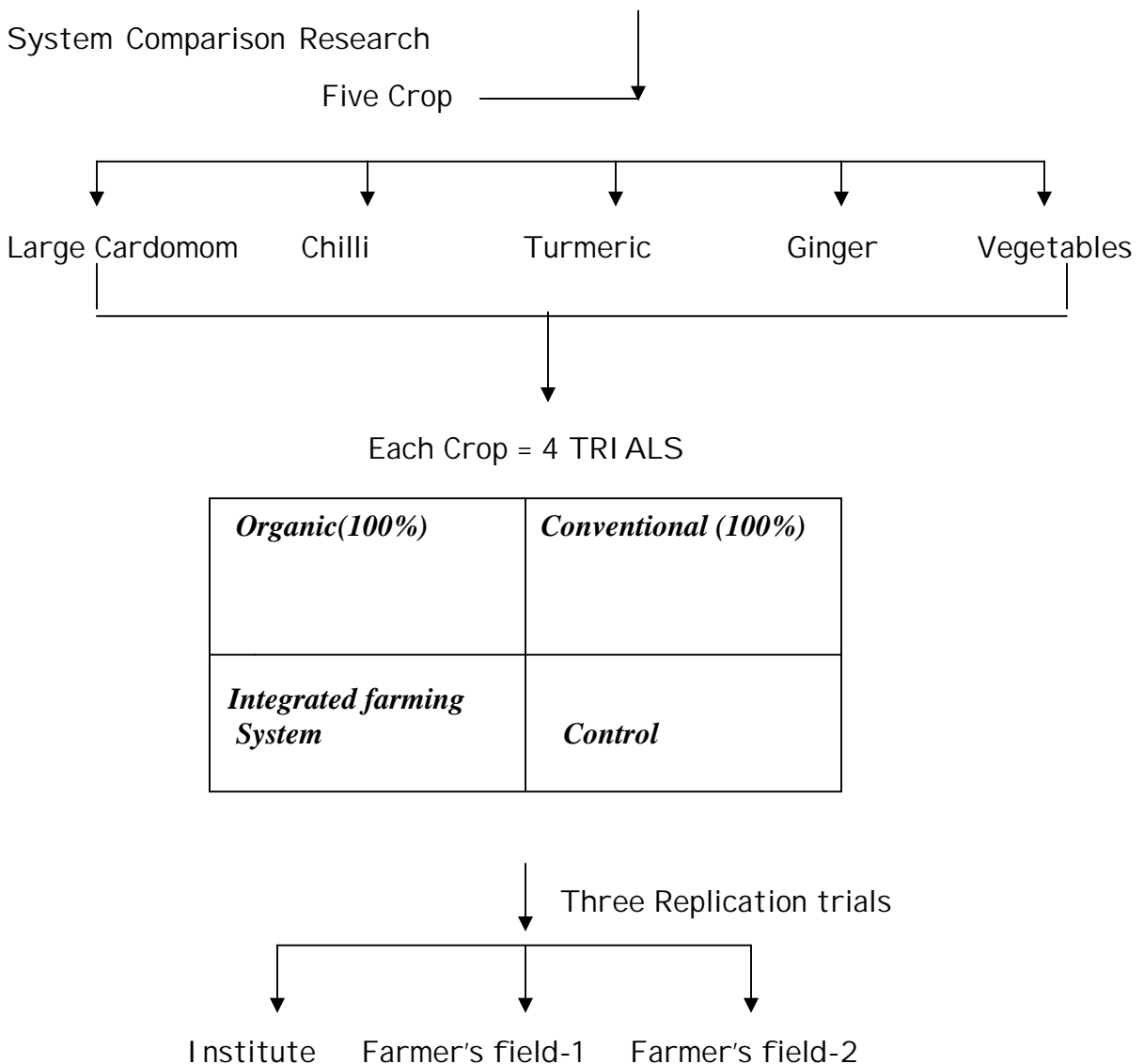
Major Activities:

- (i) For the purpose of research establishment of farms of five acre for five different selected crops viz., Large Cardomom, Chilli, Turmeric and Ginger crops in Sikkim, of which an acre/crop is

been considered. Research will evolve four different trials in three replications for each of the five selected crops.

- (ii) Each trial is of one acre for each crop. Therefore three replications of each trial in three acre in each crop. The trial of an acre is divided into four blocks to carry out simultaneously three different methods of farming viz., organic, conventional, integrated farming system and control.

Illustratively shown below: -



(iii) Research and development – the project would support the research and development for undertaking soil management practices, the development of compost/manures, pests and disease management. The research combines the important dimension of direct, overall comparison of organic and conventional systems along with the other Integrated farming system and control with specific investigations into individual aspects of organic production. The use of a multi-disciplinary approach and a combination of research techniques and analysis, allow for the better understanding of the effects of conversion to organic production.

(iv) Organic Research Farm has to be certified organic. That means the block of organic in each of the farm must comply with the rules of the National Organic Program. That includes using organic seed, using only allowed materials on the fields, and keeping excellent records of practices.

Parameters for comparing and analysis between the systems:

- The cost involved in the production of the same crop in different systems.
- Inputs availability, generation and quantity used for soil nutrient management
- Cost of protection measures taken up in the control of pest and disease management of crop
- Cost of certification in organic trials
- Yield parameters: the quantity and quality of the harvested crop
- Nutritional status: The nutrition availability in both the systems
- Soil science: soil structure, texture and microbial status is compared between the systems.
- Cost benefit analysis: Net returns over variable costs for the three years will be calculated for all the selected five crops.
- Determining net cash returns and economic constraints during conversion to organic practices.

B. Organic Package of Practices: The technical difficulties in transitioning to organic farming will be resolved by evolving and documenting the best practices

(Organic Package of Practices) of selected five horticultural crops suitable to the zones. Thereby the farmers will possess the technical means for Organic crop management. Initial studies examine the transition from conventional to organic production – a crucial period for building the high soil fertility and beneficial organism levels - on organic farms.

Major activities:

Over this period, farm will be used to evaluate technologies and management strategies including cropping systems, best composting methods, manure handling methods, effective pest and disease management etc.

An organic production technology will be developed in a farming system, which facilitates to combine different enterprises which can complement and supplement each other to achieve reproduction, production, protection and conservation functions in a sustainable way. The indigenous traditional knowledge will be amalgamated with innovative organic production practices to enhance the productivity.

C. Mapping of Input availability and on farm generation:

The inputs availability is most important factor to be analyzed in and around the selected region in Sikkim. Further the availability of inputs is taken into consideration, research on *in situ* decomposition, co-composting and enrichment is essential.

Organic Compost: Composting is a process of bringing together plant/ and/ or animal wastes to speed up its decomposition to get nutrient rich organic manure called compost. Adding compost to the soil, improves water holding capacity, micro nutrients in the soil, drainage and aeration of soil, and better aeration to root system: favours activities of soil micro flora & fauna, microbial diversity in the rhizosphere, improves soil structure, availability of natural antibiotics, and beneficial biotic substances.

Different methods of composting will be carried out to find out the best suitable method for Sikkim. The ingredients for compost making are agriculture waste,

farmyard waste, compost-able waste from urban and rural dwellings with cattle dung and soil.

The details of different composting techniques are given below: -

- NADEP method of composting
- Indore Method of composting
- Heap method of composting
- Vermi-culture/ Vermi-composting/ Vermi-wash

8. BUDGET: R and D (3 yrs trials for 5 crops x 3 replication) for Sikkim each 1-acre

S N	Particulars	Rate	No/qty	1st year	2nd year	3rd year	Total
1	Cost of Manpower/contractual services						
	Research Associate	22000/month	1	264000	277200	291060	832260
	Senior Research Fellow	14500/month	1	174000	182700	191835	548535
	Skilled Labour	3000/month					
	Salary of office Asstt.to be placed at Gangtok site office	5000 per month					
2	Cost of Travel and fooding						
A	International consultants-1 person 2 times a year for 12 days in a year for 1st year, once a year for 2nd and 3rd year						
	(i) Travel to and Fro	35000		70000	35000	35000	140000
	(ii) Boarding and Lodging	3000/day	12 days in 1st year and 6 days each in 2 nd and 3rd year	36000	18000	18000	72000
B	ICCOA experts-2 persons 3 times a year for 15 days in a year						
	(i) Travel to and Fro	16000/trip/person	2 x 3	96000	96000	96000	288000
	(ii) Boarding and Lodging	2500/day/person	2 x15	75000	75000	75000	225000
C	National Consultant 1 persons for 2 times a year for 12 days in a year)			100000	100000	100000	300000
	(i) Travel to and Fro	16000/trip/person	2	32000	32000	32000	96000

	(ii) Boarding and Lodging	2500/day/person	12	30000	30000	30000	90000
D	RA(Local conv and communication @2500/- per month)	2500/month	1	30000	30000	30000	90000
	SRF(Local conv and Communication @1500/- per month)	1500/month	2	36000	36000	36000	108000
3	Consultancy services						
	ICCOA	3000/manday	90	1213000	1181900	1204895	3599795
	International consultants	30000 per day	12 mandays per year for 1st year and 6 mandays for 2nd and 3rd year	360000	180000	180000	720000
	National Consultant	5000 per day	12 mandays per year	60000	60000	60000	180000
4	Analysis						
	Soil Analysis-Soil Carbon/Nutrients	500 per sample	5 crops in 3 replication	30000	30000	30000	90000
	Soil Biological parameters	2000 per sample	30	60000	60000	60000	180000
	Soil Analysis-Chemicals	15000	30	45000	45000	45000	135000
	Products: Nutrient analysis	17000	30	510000	510000	510000	1530000
	Products: Residue analysis	17000	30	510000	510000	510000	1530000
5	Cost of cultivation						
	Ginger	30000 per acre	For 3 replication				
	Turmeric	30000					

	Orange	30000					
	large Cardamom	40000					
	Vegetables(Chilli,cabbage,Cauliflower)	25000					
6	Organic input infrastructure						
	Vermi compost unit	30000					
	NADEP compost and Indore method	10000					
	Labour shed	10000					
	Store house	10000					
	Cow shed	7000					
	Concrete tank	7000					
7	Office setup Research Coordinator						
	Cost of Computer and Printer	45000		45000			45000
	cost of 2 table and 4 chairs	10000		10000			10000
	office rent						
	Office Expenses	1500 per month		18000	18000	18000	54000
8	Animal Husbandary						
	Cost of cow 1 no	20000	3	60000			60000
	Cost of watchmen cum farm hand	3500 per month					
	Cost of feed and Misc exp.	2500 per month	3	90000	90000	90000	270000
	Sub total			301100		270789	
				0	2684900	5	8403795
9	Administration Expenses	10 % of the project cost		301100	268490	270789	840379
10	TOTAL			331210		297868	
				0	2953390	4	9244174

9. OUTCOMES & IMPACTS

The outcome of the project

- Bringing out organic package of cultivation practices for the selected four crops.
- Dedicated research and knowledge transfer becomes available for expanding organic industry.
- The outcome of the project ultimately helps the planners, administrators and extension personnel for fostering the organic farming and thus agricultural sustainability.
- Further, the programme also accrue benefits like sustainable production systems for livelihood of major farming community consisting of small and medium farmers.
- The product of this project will be a research facility that will enable to carry out similar Research activities in several research institutes, Universities faculty and graduate students.
- The unit shall provide opportunities for further collaborative research in organic methods of production.
- Many of the production practices developed at this research facility will lead to reductions in agricultural chemical use over the long-term
- Improved economic viability of organic farms.

Besides, the following benefits will also come out of the programme:

. The following list of research outcomes:

- Nutritional management of the selected crops through organic sources.
- Crops and cropping systems encompassing organic thing.
- Pest and disease management through botanical, bio-agents and bio-pesticides.
- Alternate land use systems for degraded lands.