



Indian Institute of Horticultural Research, Bangalore- CRIDA, Hyderabad



**Adoption Of Climate Resilient Technologies In A
Drought Prone Village In Tumkur District, Karnataka**

**International Conference on Climate Change and
Implication for Water Resources and Nutrition Security
15-16, Nov, 2013, Bangalore**

**Naik, L.B, Loganandhan, N., Ramesh, P.R.,
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**Krishi Vigyan Kendra
Hirehalli, Tumkur, Karnataka**

Climate change risk: 100m deaths by '30

Developing Countries To Bear The Brunt If The World Fails To Act Fast, Says Study

London: More than 100 million people will die and global economic growth will be cut by 3.2% of gross domestic product (GDP) by 2030 if the world fails to tackle climate change, a report commissioned by 20 governments said on Wednesday. As global average temperatures rise due to greenhouse gas emissions, the effects on the planet, such as melting ice caps, extreme weather, drought and rising sea levels, will threaten populations and livelihoods, said the report conducted by humanitarian organization DARA. It calculated that five million deaths occur each year from air pollution, hunger and disease



as a result of climate change and carbon-intensive economies, and that toll would likely rise to six million a year by 2030 if current patterns of fossil fuel use continue.

More than 90% of those deaths will occur in developing countries, said the report that calculated the human and economic impact of climate change on 184 countries in 2010 and 2030.

It was commissioned by the Climate Vulnerable Forum, a partnership of 20 developing countries threatened by change. "A combined carbon crisis is estimated to claim 100 million lives

now and the end of the next decade," the report said.

It said the effects of climate change had lowered global output by 1.6% of world GDP or by about \$1.2 trillion a year, and losses could double to 3.2% of global GDP by 2030 if global temperatures are allowed to rise, surpassing 10% before 2100.

It estimated the cost of moving the world to a low-carbon economy at about 0.5% of GDP this decade. Responding to the report, Oxfam International said

amount to more than \$500 billion per year by 2030, heavily focussed in the poorest countries where millions depend on these sectors to make a living," said executive director Jeremy Hobbs.

British economist Nicholas Stern said earlier this year investment equivalent to 2% of global GDP was needed to limit, prevent and adapt to climate change. His report on the economics of climate change in 2006 said that without any action to tackle climate change, the over-

TOI 27/10/2012

Global GDP lowered by 1.6% (\$1.2 trillion)

May rise to 3.2% of GDP if corrective measures are not taken now.

Losses to Agril.& Fisheries \$500 b/ year.

Global temperature rise due to green house emissions shall result in:

- **Melting ice, Extreme weather, Drought, Rising sea levels Will threaten population and livelihood- DARA**

Five million deaths every year from :

- **Air pollution, Hunger and Diseases**

90% of the deaths in developing countries

-Study by Climate Vulnerability Forum Commissioned by 20 dev. Countries.

Investment equivalent to 2% GDP to limit, prevent and adopt to climate change.

TECHNOLOGY DEMONSTRATION COMPONENT

NATIONAL INITIATIVE ON CLIMATE RESILIENT AGRICULTURE

SOURCE OF FUNDING	INDIAN COUNCIL OF AGRICULTURAL RESEARCH
CO-ORDINATING INSTITUTION	CENTRAL RESEARCH INSTITUTE FOR DRYLAND AGRICULTURE
IMPLEMENTING CENTRE	KRISHI VIGYAN KENDRA (IIHR) HIREHALLI ,TUMKUR-572 168 KARNATAKA
IMPLEMENTING VILLAGE	D.NAGENAHALLI, KORATAGERE TALUK,TUMKUR
ZONAL PROJECT DIRECTORATE	ZONE VIII, HEBBAL, BANGALORE
PROJECT TEAM OF THE KVK	Dr. L.B.Naik, PI Mr.P.R.Ramesh, Nodal Officer Mr. J.M. Prasanth, Co-PI Mr.T .G. Kishore, S.R.F
DURATION OF PROJECT	2010-12
BUDGET OF THE PROJECT	52.71 Lakhs

Map of D. Nagenahalli

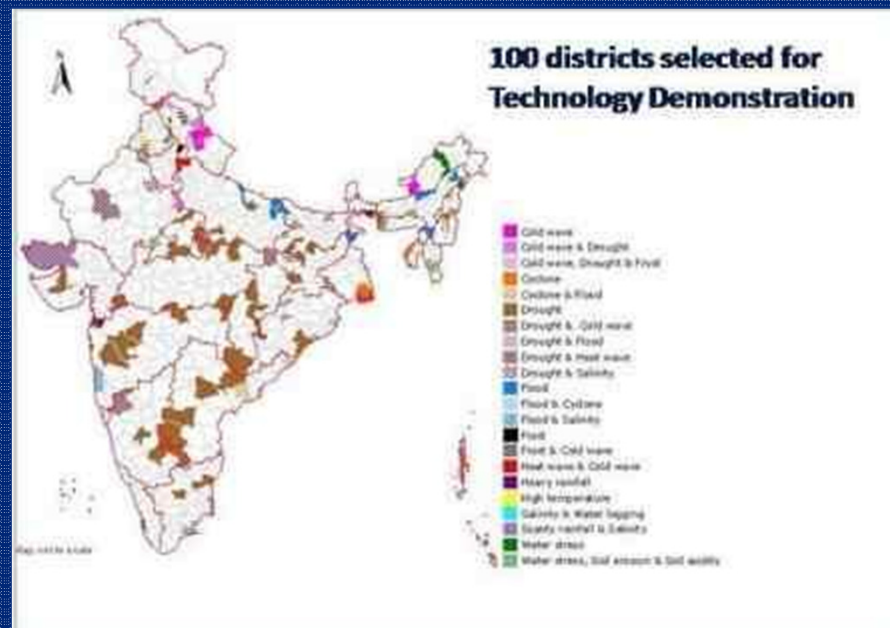


D.Nagenahalli

Objectives

Technology Demonstration

- Integrated Package of Proven Technologies will be Demonstrated in One Village for Adaptation & Mitigation of the Crop & Livestock Production Systems to Climate Variability based on the Available Technologies



Intervention Modules

Module I - Natural Resources

1. *Insitu* Moisture Conservation
2. Water Harvesting & Recycling for Supplemental Irrigation
3. Conservation Tillage
4. Artificial Ground Water Recharge
5. Water Saving Irrigation Methods

Module II - Crop Production

1. Introducing Drought Tolerant/ Temperature Varieties
2. Water Saving Paddy Cultivation Methods
3. Community Nurseries for Delayed Monsoon
4. Custom Hiring Centre for Timely Planting
5. Location Specific Intercropping Systems with High Sustainable Yield Index.

Contd...

Module III- Livestock & Fisheries

- 1. Use of Community Lands for Fodder Production During Drought/ Floods**
- 2. Improved Fodder/ Feed Storage Methods**
- 3. Preventive Vaccination**

Module IV – Institutional Interventions

- 1. Custom Hiring Center**
- 2. Seed Bank**
- 3. Fodder Bank**
- 4. Village Climate Risk Management Committee**
- 5. Committee for Managing Custom Hiring Centre**
- 6. Fodder Bank Committee**

Constitution of Steering Committee

- Selection of Village for Implementing the Scheme
- Implementation of Technology Demonstrations
- Discuss about the Constraints faced by the Farmers
- Climate Variability in the District
- Finalizing Climate Resilient Technology Package



Steering Committee-Members

1.	Dr. L. B. Naik, Principal Scientist & PI	Chairman
2.	Dr. M. K. Srinivas Rao, Principal Scientist, IIHR,	Member
3.	The Joint Director of Agriculture, Dept. of Agriculture. Tumkur.	Member
4.	The Deputy Director, Dept. of Horticulture, Tumkur.	Member
5.	The Deputy Director, Dept. of Watershed, Tumkur.	Member
6.	The Deputy Director, Dept. of Water & Soil Conservation, Tumkur.	Member
7.	The Deputy Director, Dept. of Animal Husbandry, Tumkur.	Member
8.	The Deputy Conservator of , Dept. of Forest, Tumkur.	Member
9.	The Programme Co-ordinator, KVK, Konehalli, Tumkur.	Member
10.	The Assistant Director of Fisheries, Dept of Fisheries, Tumkur.	Member
11.	The Director, BAIF, Tiptur,Tumkur.	Member
12.	The Director, AWARE, Tumkur.	Member
13.	Mr. Ramesh, P.R, SMS (Soil Science) & Nodal Officer	Member
14.	Mr. Prasanth .J.M, SMS (Hort) & Co PI	Member

Selection of Village

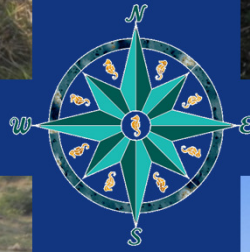
The Committee has suggested to Select D.Nagenahalli Village of Koratagere Taluk based on Vulnerability of its Agriculture to Climatic Variability like

- Drought
- Dry Spells
- Extreme Temperature
- Shortage of Water



View of D.Nagenalli Village

PRA- Village Survey



Agriculture Profile of the D. Nagenahalli Village

Distribution of Households in the Village

Particular	Landless	Marginal	Small	Medium	Large	Total
Number	20	115	98	30	6	269
Average Landholding size (Ha)	--	0.8	1.4	3.2	10.5	1.10
Percentage (%) of Households	7.4	42.8	36.4	11.1	2.2	-

Demographic Details

Particular	Male	Female	Total/ Overall
Total Population	483	449	932
Literacy	53	44	49.1

Rainfall Data

Seasons	Average (mm)	Normal Onset (Specify Week and Month)	Normal Cessation (Specify Week and Month)	
South West Monsoon (June-Sep)	365.6	1 st Week of June	3 rd Week of September	
North East Monsoon(Oct-Dec)	200.0	1 st Week of Oct	Last Week of Dec.	
Winter (Jan- March)	9.4	-	-	
Summer (Apr-May)	121.0	-	-	
Annual	696.1	-	-	
Historical Trends in Rainfall		Decadal Average		
		1980-90	1990-2000	2000- 2010
No. of Rainy Days		55.6	54.7	49.25
No. Dry Spells during Kharif Season	> 10 days	2	5	8
	> 15 days	2	3	8
	> 20 days	0	1	3
No. Intensive Rain-Spells	> 60 mm per day	--	1	2

Agricultural Land Use

Sl. No.	Particulars	Area (Ha)	Per cent
1	Total Cultivated Area	190.0	50.24
2	Cultivable Wasteland	21.3	05.63
3	Pasture Land	87.5	23.14
4	Forest Area	79.4	20.99
	Total Geographical Area	378.2	-

Major Soils

Sl. No.	Particulars	Area (Ha)	Per cent
1	Red Soils	128.2	75
2	Red Loamy Soils	34.2	20
3	Black Soils	8.5	05

Irrigation

Sl. No.	Particulars	Area (Ha)	Per cent
1	Rainfed Area	174.4	91.78
2	Net Irrigated Area	15.6	08.21
3	Gross Irrigated Area	28.5	15.00

Sources of Irrigation

Sl. No.	Particulars	Number	Area (Ha)	% Area
1	Tanks	2	3 ha	19.2
2	Open Wells	32 (22 fail)	8 ha	51.3
3	Bore Wells	29 (19 fail)	4.6 ha	29.5
4	Lift Irrigation	0	--	--
5	Other Sources	0	--	--
6	Sprinkler/ Drip Systems	0	0	--
7	Defunct Rain-Water Harvesting Structures in the Village	20	--	--

Groundwater Availability & Use

Sl. No.	Particulars	
1	Depth of Water Table in Bore Wells (feet)	700-800
2	Decrease of Water Table, if any over the past 10 years (feet)	400
3	Quality of Water	Safe & Potable
4	Area Irrigated by one Bore-Well (Ha)	0.4-0.8
5	Area Irrigated by one Open-Well (Ha)	0.4

Major Field Crops Cultivated

Sl. No.	Crops	Area (Ha)					
		Kharif		Rabi		Summer	Total
		Irrigated	Rainfed	Irrigated	Rainfed		
1	Ragi	--	98.9	--	--	--	98.9
2	Maize	--	8.9	--	--	--	8.9
3	Paddy	13.0	--	--	--	--	13.0
4	Groundnut	--	38.9	--	--	--	38.9
5	Redgram	--	10.1	--	--	--	10.1
6	Horsegram	--	11.9	--	--	--	11.9
7	Dolichos (Inter Crop)	--	10.0	--	--	--	10.0
8	Castor (Inter Crop)		7.6				7.6

Horticulture Crops

Sl. No.	Fruits	Total Area	Irrigated	Rainfed
1	Mango	15.5	--	15.5
2	Banana	1.5	1.5	--
3	Custard Apple	0.4	--	0.4
4	Tamarind	1.7	--	1.7
Vegetables		Total Area	Irrigated	Rainfed
1	Tomato	2.0	2.0	--
2	Chilli	1.5	1.5	--
3	Onion	3.0	3.0	--
4	Brinjal	1.0	1.0	--

Other Crops (Plantation, Fodder Crops, Flower Crops)

Sl. No.	Crops	Area Ha	Irrigated	Rainfed
1	Areca nut	13	13	-
2	Coconut	7	-	7
3	Amla	0.4	-	0.4
4	Sorghum Fodder	5.4	-	5.4
5	Aster	2.1	2.1	-
6	Chrysanthemum	1.7	1.7	-
7	Marigold	0.4	0.4	-

Livestock

Sl. No.	Particular	Number	Yield/ Productivity	Price *
1	Cattle: Crossbred	20	10 lt/day	Rs.14/lt
2	Cattle: Indigenous	310	1.0 lt/day	Rs.15 /lt
3	Buffaloes	110	2 lt/day	Rs.15/lt
4	Goat	430	15 kg	Rs.180 /kg
5	Sheep	401	30 kg	Rs.180 /kg
	Poultry			
1	Commercial	--	--	--
2	Backyard	540	20 Eggs	Rs.5/egg
			1.25 kg	Rs.150/kg
	Inland Fisheries	Area (Ha)	Yield (T/Ha)	
1	Fresh Water	10	0.5 t	Rs.40/kg
2	Brackish Water	--	--	--
3	Others	--	--	--

*Rs./ liter in case of Milk; Rs./ Kg Live body weight in case of Sheep & Goat)

Capacity Building of Staff



Date : 28.01.2011



KVK Staff Visit to BIRD-K, Tiptur

KVK Staff Visit to CRIDA, Hyderabad



1) Dr. K. Usha Rani 2) Ms. Y. Jyothirmayi 3) Ms. M. Pushpalata 4) Dr. VUM. Rao 5) Dr. B. Venkateswari 6) Dr. M.V. Padmanabhan 7) Ms. M. Krishnaveni 8) Ms. K. Aruna
9) Ms. P. Pavani 10) Dr. S.N. Malleswari
1) Mr. B. Ramesh 2) Mr. P. Sreenivasulu 3) Mr. S. Ashok Reddy 4) Mr. C. Jaya Reddy 5) Dr. M. Harishchandra Geete 6) Mr. M. Shivashenkara Murthy 7) Mr. J.M. Prasanth
8) Mr. M.P. Lakhe 9) Mr. P. R. Ramesh
1) Mr. M.D. Giri 2) Mr. Jaibir Singh 3) Dr. K. Ravi Shankar 4) Dr. K. Nagasri 5) Dr. Kausalya Ramachandran

Sensitization Meetings



Date	Place	Farmers
25.01.2011	D.Nagenhalli	68
29.03.2011		70



Farmers Exposure Visit to BIRD-K, Tiptur



Date	Place	Farmers
30.03.2011	BAIF, Tiptur Mylanalli, Arsikere	100



Field Day Visit to IIHR, Bangalore



Field Day on Improved Vegetable Varieties & their Cultivation Practices

Launching Programme of NICRA Project



20.04.2011



Inauguration of Farm Machinery Custom Hiring Centre

Satellite Image of D. Nagenahalli Village



Land Resources Survey in Collaboration with NBSS & LUP, Bangalore



Problems and Potential Areas:

Soil depth, Soil texture, Soil erosion and Soil slope.

Soil Fertility Status:

Organic Carbon, Available NPK, Calcium, Magnesium, Sulphur, Zinc, Manganese, Iron and Copper.

Land Suitability Assessment:

Ragi, Groundnut, Redgram, Castor, Mango.

Land Resource Assessment of Durgada Nagenahalli
(A NICRA adopted village in Karnataka) for
Integrated Development



National Bureau of Soil Survey and Land Use Planning
(ICAR) Regional Centre, Hebbal, Bangalore
and
Krishi Vigyana Kendra, (Under IIHR, Bangalore)
Hirehalli, Tumkur District
April 2012

Major Climatic Concern

SI No.	Major Climatic vulnerability	Consequences	NICRA intervention
1.	Soil degradation	Soil erosion, Graviliness, Loss of soil fertility, Loss of soil productivity Soil salinity	Soil conservation measures, Silt application, Greenmannuring & Composting , Microbial consortium, Salt tolerant crops
2.	Water scarcity	Less percolation, Runoff, Receding ground water Level, Drying water bodies	Percolation ponds, Trench cum bunding, Recharging of bore wells, Check dams, Farm ponds, Desilting & repair of water bodies
3.	Drought, Heat wave, Dry spells, Delayed monsoon	Stunted growth, Flower & fruit drop, Low yield	Drought tolerant varieties, Short duration varieties. Aerobic paddy& Pest & disease, high temp. resistant varieties
4.	Decreasing green cover & deforestation	Low carbon sequestration, Adverse microclimate	Tree based farming System, Agro forestry, Social forestry, Agri-Horti-Silvi-Pastural system

NRM Interventions : Soil

Sl. No.	Vulnerability	NRM interventions
1	Steep slope, Soil erosion	Trench cum bunding Contour bunding
2	Sheet erosion, Water runoff	Leveling and making compartments
3	Soil gravelliness Low water and nutrient holding capacity	Tank silt application
4	Gently slope Water runoff	Ploughing across the slope Live bunds
5	Low organic carbon Low physical, chemical & biological properties	Crop & Stubble mulching, Compost production units, Microbial consortium

NRM Interventions : Water

Sl. No.	Vulnerability	NRM interventions
1	Depleted water bodies	New farm ponds
2	Receding ground water level	Percolation ponds Recharge of bore wells
3	Water runoff	Check dam
4	Seepage loss of water	Concrete water storage structure
5	Siltation of water bodies	Renovation of defunct water harvesting structures
6	Low water use efficiency	Micro irrigations, Natural mulch, Plastic mulch

NRM Interventions : Crop

Sl. No.	Vulnerability	NICRA interventions
1	Delaying monsoon and dry spells	Finger millet (Ragi)- ML-365 Red gram BRG-2
2	Pest and disease incidence Fodder scarcity	Maize -NAH-1137 Groundnut - GPBD- 4
3	Water scarcity	Aerobic Paddy - MAS-26
4	Drought situation	Tomato Arka Meghali Chilli Arka Lohit
5	Low soil fertility	Cropping systems
6	Poor vegetation High temperature	Tree based farming system Integrated farming system

Natural Resource Management

Trench cum bunding

Technology Demonstrated : Trench cum bunding

Adversity : Steep slope, Soil erosion

Combating climatic adversity : Arrest soil erosion
Served as water reservoir
Keeps soil moisture for long time

Technology adoption : 112 farmers in 80 ha with 27 per cent increase in finger millet yield



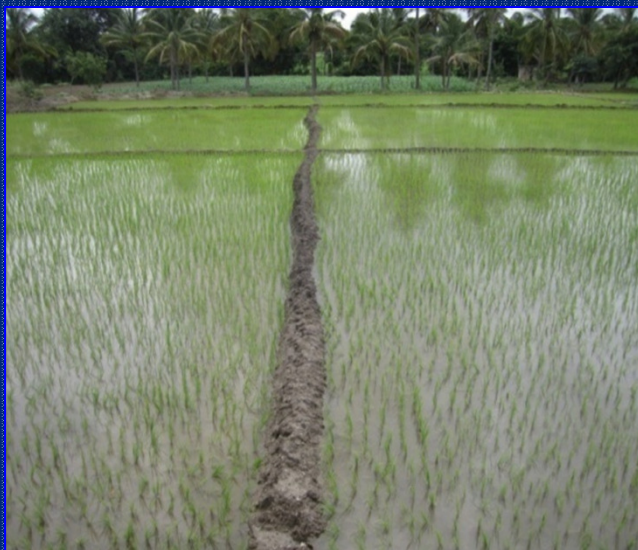
Leveling and Compartment Making

Technology Demonstrated : Land Leveling

Adversity : Sheet erosion

Combating climatic adversity : Reduces soil erosion & run off
Enhancing infiltration of water

Technology adoption : 15 farmers in 5 ha with 17 per cent
increase in Paddy yield



Tank Silt Application

Technology Demonstrated : Tank Silt Application

Adversity : Soil Gravelliness

Combating climatic adversity : Improves water holding capacity & soil productivity

Technology adoption : 25 farmers in 20 ha with 32 per cent increase in Finger Millet yield



Tank Silt application



Tank Silt



No Tank Silt

Ploughing Across the Slope

Technology Demonstrated : Ploughing across the slope

Adversity : Gently slope

Advantages : It checks runoff water
Minimizes soil erosion

Technology adoption : 40 farmers in 15 ha with 13 per cent increase in Groundnut yield



Ploughing across the slope



Groundnut across the slope

Contour Bunding



- Act as a barrier to check runoff
- Increases water storage capacity
- 02 farmers in 1.5 ha



Live Bunds



- Conserves soil and water and acts as borders
- 20 farmers in 5 ha



Crop and Stubble Mulching

Technology Demonstrated : Crop and Stubble Mulching

Adversity : Low organic carbon

Combating climatic adversity : Conserve moisture, improves
Soil fertility
Reduces the splash effects of rain drops

Technology adoption : 25 farmers in 8 ha



Stubble mulching



Horse gram

Rain Water Harvesting Structures

New Farm Ponds



Adversity	Farm ponds	Farmers benefited	Water storage capacity (cu m)	% increase in cropping intensity	
Water scarcity	70	120	62800	100	<ul style="list-style-type: none"> • Supportive irrigation to the crops at critical stage • Recharge of water table




 INDIAN INSTITUTE OF HORTICULTURAL RESEARCH BANGALORE - CRIDA HYDERABAD
 NATIONAL INSTITUTE ON CLIMATE RESILIENT AGRICULTURE - D. HAZENARALLI VILLAGE
INTERVENTION : NEW FARM POND
 FARMER NAME : JAYAMMA LATE YENKATARAMAPPA
 NO. OF DEMONSTRATIONS : 33
 KRISHI VIGYAN KENDRA, HIREHALLI, TUMKUR



Paddy grown with the help of Seepage from Farm Ponds



Percolation Ponds



Adversity	Percolation ponds	Water storage capacity (cu m)	<ul style="list-style-type: none">• Avoid runoff of water• Increase in ground water table
Depletion of ground water	11	1640	



Check Dams



Utilization of Check dam water - Paddy

Adversity	Check Dams	Farmers Benefited	Water storage capacity (cu m)	% Increase in cropping intensity	<ul style="list-style-type: none"> •Avoid runoff of water •Ground water recharge
Runoff water	5	18	5300	100	



Utilization of Check dam water - Chrysanthemum

Water storage structure

Technology Demonstrated : Concrete water storage structure

Adversity : Seepage loss of water

Combating climatic adversity : Minimizes seepage and percolation loss

No of farmers : 04



Conventional



Concrete structure



Recharge of Bore Wells(2 No.)



Functional Bore well

Recharge of D.Nagenahalli lake

Desilting and widening of diversion channels of lake – 1200 mt

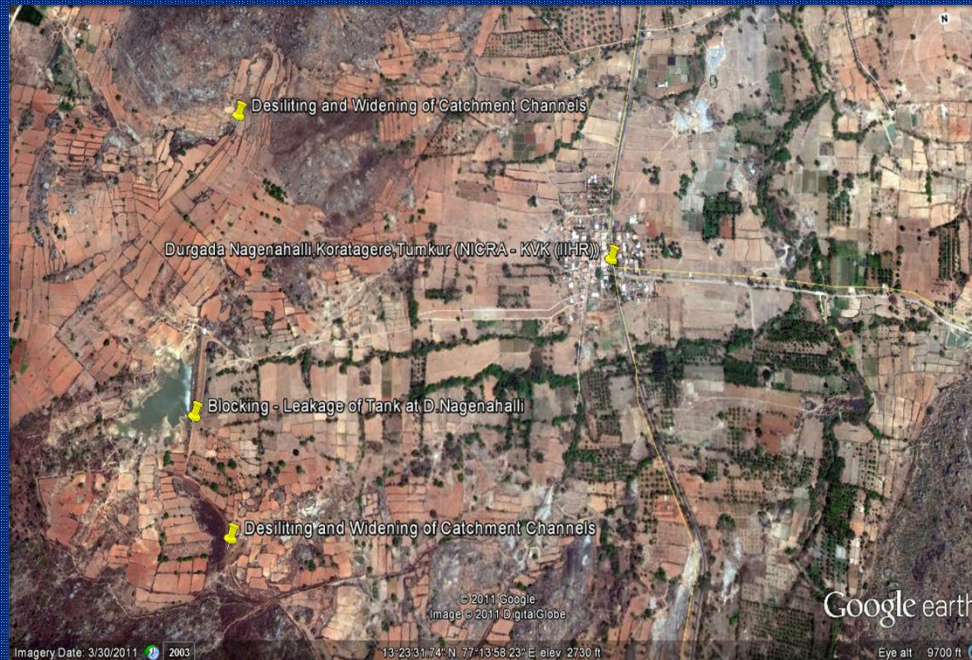


Water storage capacity: 150000 cu m



Reviving Defunct Water Harvesting Structure

Desilting and widening of catchments channels of lake – 1200 mt



Blocking Leakage of Lake

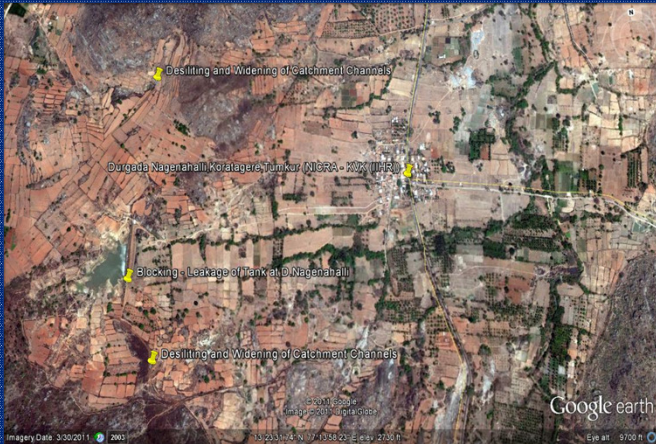


Adversity	Farmers Benefited	Water storage capacity (cu m)	% Increase in cropping intensity	Area Irrigated
Low water storage capacity	45	150000	150	06 ha



Recharge of D.Nagenahalli lake

Desilting and widening of diversion channels of lake – 1200 mt



Water storage capacity: 150000 cu m



Stone Pitching, Concrete Works & Heightening of Check Dams



Heightening of check dams

Repair of defunct check dams	Farmers benefitted	Water storage capacity (cum)	% Increase in cropping intensity
6	16	2200	100



Heightening of check dams



Recharge of open wells

Recharge of open wells



Recharge of open wells



check dams

Recharge of open wells

04

% Increase in cropping intensity

100

Desilting and Widening of Farm Ponds and Lake



Farm ponds	No. of Farmers Benefitted	Water storage capacity (cum)	% Increase in cropping intensity	Area irrigated
14	32	68040	150	03 ha



Desilting and Widening of Farm Ponds and Lake



No. of farmers	Area (ha)	Yield (t/ha)	Economics of Demonstration (Rs./ha)			
			Gross Cost	Gross Return	Net Return	BCR
12	0.5	Aster – 4.4	19950	79500	59550	3.98

Farm ponds	No. of Farmers Benefitted	Water storage capacity (cum)	% Increase in cropping intensity	Area irrigated
13	35	68600	150	05 ha



Desilting and Widening of Check Dams



Check dams	Water storage capacity (cum)	% Increase in cropping intensity	Area irrigated
08	6450	100	02 ha



Desilting and Widening of Check Dams



No. of farmers	Storage capacity	Yield (q/ha)	Economics of Demonstration (Rs./ha)			
			Gross Cost	Gross Return	Net Return	BCR
11	11500	Paddy -34.1	29580	45500	15920	1.53

Increases the Storage & Ground water recharge.



Utilization of Check dam water - Paddy



Micro irrigation

Technology Demonstrated : Drip and Sprinkler irrigation system

Adversity : Low water use efficiency

Combating climatic adversity : Ideal moisture regime
Increase the irrigation area
Irrigation efficiency as high as 80- 82 %
Good quality produce

Technology adoption : 11 farmers in 04 ha with 20 per cent increase in tomato Arka Ananya yield



Drip Irrigation



Sprinkler Irrigation

Recharge of D.Nagenahalli lake

Desilting and widening of diversion channels of lake – 1200 mt



Water storage capacity: 150000 cu m



Compost Production units

- Establishment of composting units.
- Soil health improvement, Bio waste recycling, Reduced the fertilizer application and environment safety.

No. of Units	-	12
Size	-	10 ft (L) × 5 ft (w) × 3 ft(H)
Quantity Produced	-	36000 kg



Crop Interventions

Most Signification Intervention

Technology Demonstrated

: ML-365

Adversity

: Erratic rainfall and delayed monsoon

Combating climatic adversity

: Drought tolerant

Medium duration variety

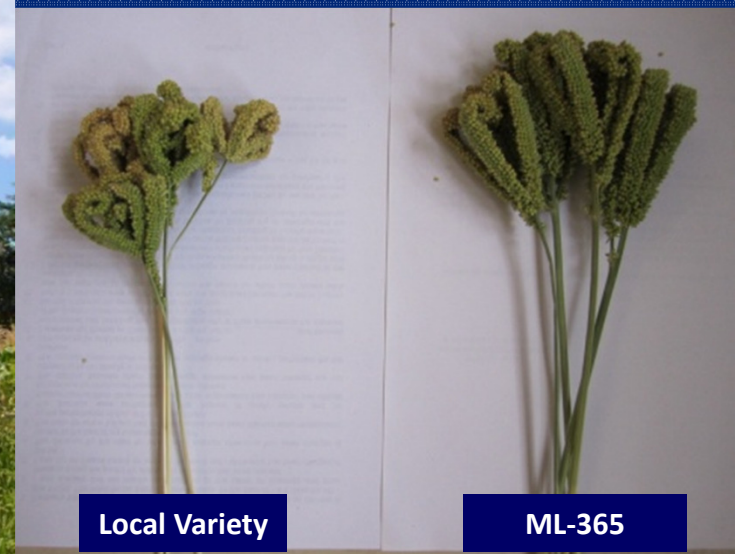
Resistant to lodging & blast

High seed & Fodder yield

Suitable for late sowing

Technology adoption

: 110 farmers in 42 ha with 41 per cent increase in finger millet yield

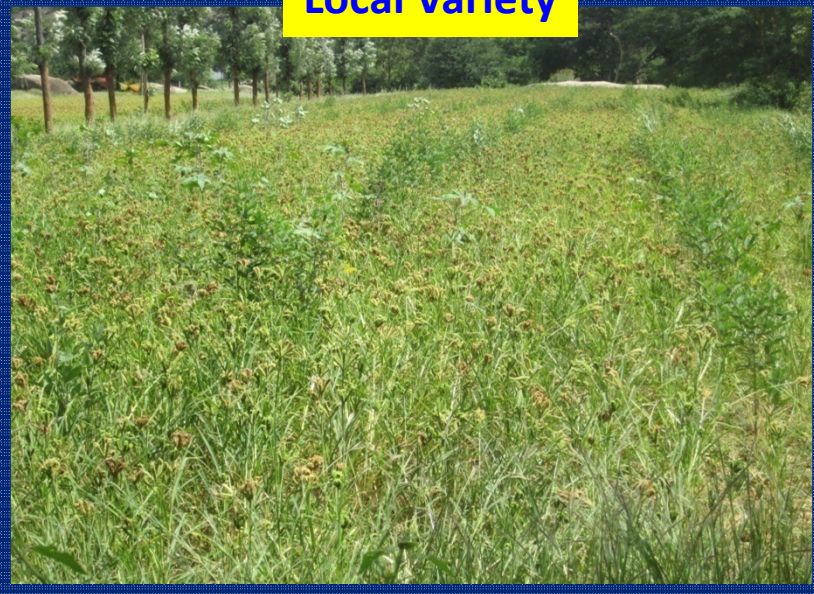
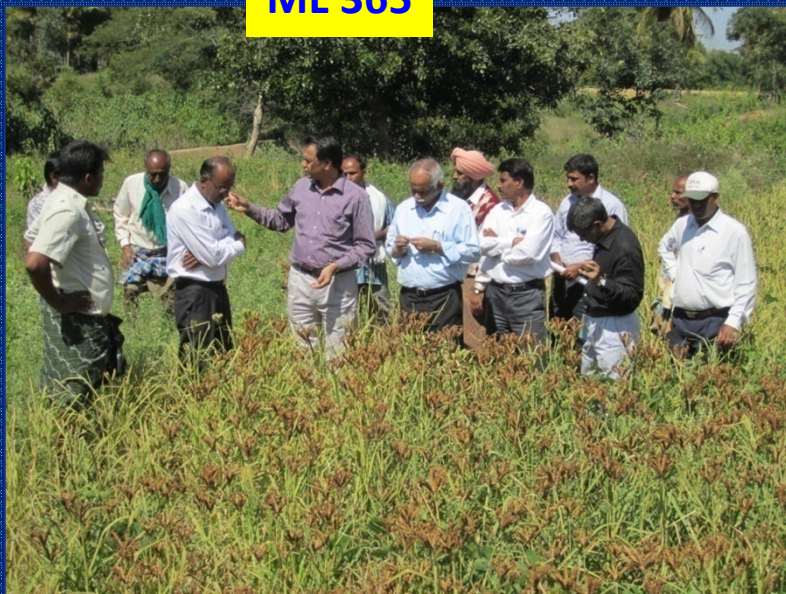




ML 365

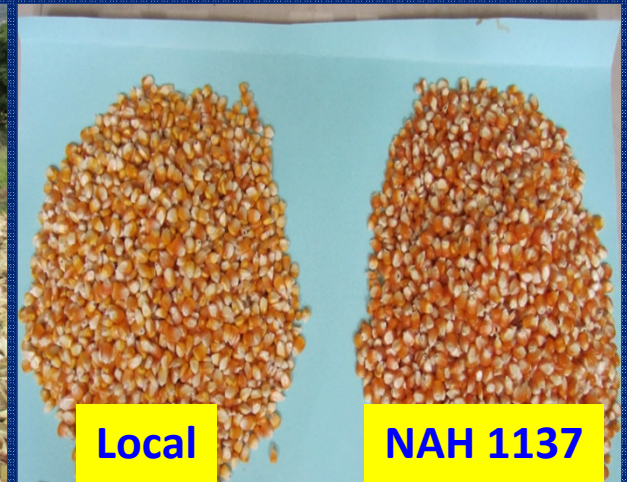


Local Variety



Maize

- Technology demonstrated** : NAH 1137
- Adversity** : Pest and disease incidence and fodder scarcity
- Combating climatic adversity** : Drought tolerant
High seed and fodder yield
Resistance to Leaf Blight,
Downy mildew and Rust
- Technology adoption** : 10 farmers in 03 ha with 21 per cent increase in maize yield

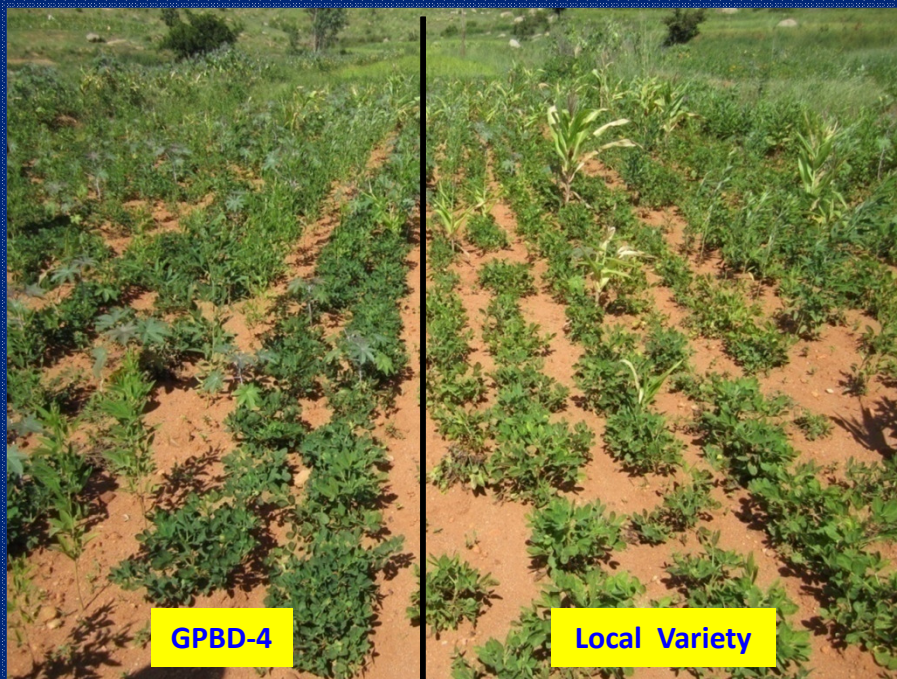


Ground nut

Technology demonstrated : GPBD-4
Adversity : Pest and disease incidence

Combating climatic adversity : Foliar disease tolerant
Uniform Kernels & high yield

Technology adoption : 25 farmers in 08 ha with 19 per cent increase in Groundnut yield



Redgram

- Technology demonstrated** : BRG-2
- Adversity** : Erratic rainfall and delayed monsoon
- Combating climatic adversity** : Performing well in the Rainfed Condition
Resistance to Pod Borer
Suitable for late sowing
- Technology adoption** : 30 farmers in 06 ha with 25 per cent increase in Redgram yield



Dignitaries inspecting the plot



Red gram -BRG-2

Aerobic Paddy

Technology demonstrated

: MAS -26

Adversity

: Water scarcity

Combating climatic adversity

: Drought tolerant variety

60 Per cent Water saving

Seed rate 3 Kg/acre

Direct sowing

50 tillers per seed

Technology adoption

: 05 farmers in 1.5 ha



MAS -26

Vegetables - Tomato

Technology Demonstrated	Combating climatic adversity
Arka Meghali Plastic Mulching Arka Microbial Consortia - 5 kg/ha Spraying Vegetable Special @5g/lt	It is Drought Tolerant It Conserve Moisture & Control Weeds. Improves the Soil Microbial Population Improves the Yield Reduces the 35 % of fertilizer application



Technology adoption

20 farmers in 03 ha with 16 per cent increase in tomato yield

Plastic Mulching Intervention



Chilli

Technology Demonstrated	Combating climatic adversity
Arka Lohit	It is Drought Tolerant, Multiple Disease & Pest Tolerant.
Spraying Vegetable Special @5g/ltr	Improves the Yield.
Arka Microbial Consortia - 5 kg/ha	Reduces the 25 % fertilizer application

Technology adoption

06 farmers in 1.0 ha with 15 per cent increase in chilli yield



Arka Lohit

Cropping System Interventions

Adversity	Crop	Area (ha)	No. of Farmers
Low soil fertility	Ragi + Red gram (4:1)	06	18



Mono cropping



Intercropping

Maize + Redgram

Adversity	Crop	Area (ha)	No. of Farmers
Low soil fertility	Maize + Red gram (4:1)	3.5	09



Maize + Red gram

Ground Nut+ Redgram

Adversity	Crop	Area (ha)	No. of Farmers
Low soil fertility	Groundnut + Red gram	08	60



GPBD-4 + BRG - 2

Tree based Farming System

Technology demonstrated : Tree based Farming System

Adversity : poor vegetative cover,
high temperature

Combating climatic adversity : Increases the vegetative cover,
improves the micro climate,
increase the organic carbon sequestration

Technology adoption : 94 farmers in 28 ha

Interventions Undertaken			No. of Farmers	Area (Ha)
Block Plantation	i	Mango	06	02
	ii	Amla	04	02
	iii	Tamarind	07	02
	iv	Lemon	03	1.2
Forest Tree Block Planting	i	Melia dubia	12	04
	ii	Acacia auriculiformis	05	02
Forest Tree Planting	i	Planting on Trench cum Bunding	100	50
	ii	Fodder Seeds	20	04
Green Manuring Crops	i	Glyricidia,5000 Nos.(Cuttings)	8	2
	ii	Subabul (100 Kgs)	25	6

Planting Material	Qty.(Nos.)
Amla Grafted	1000
Mango	1300
Tamarind	2462
Cashew	232
Pongamia	500
Acacia auriculiformis	5000
Casurina	1000
Jamoon	300
Bahumia parpuria	500
Melia dubia	8800
Jack fruit	150
Silver oak	2000
Maduca longifolia	1000
Muttuga	20
Teak	1000
Total	25262



Tree based Farming System

- Technology demonstrated** : Tree based Farming System
- Adversity** : poor vegetative cover,
high temperature
- Combating climatic adversity** : Increases the vegetative cover,
improves the micro climate,
increase the organic carbon
sequestration

Tree spp	No.s	No of farmers	Area (ha)
Melia dubia	3000	30	07
Acacia Aurculiformis	1500	18	03
Tamarind	2000	15	04
Amla	2070	20	04
Mango	750	12	02
Silver Oak	300	13	0.5
Teak	200	10	0.5



Melia dubia

Mixed Tree Species



Teak



Melia dubia



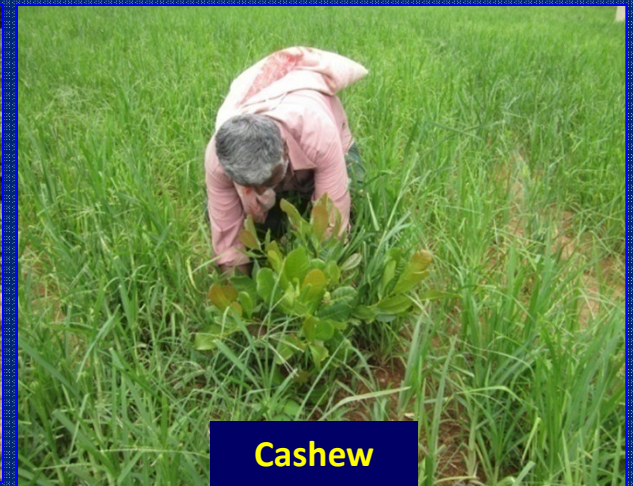
Silver oak



Jamoon



Bahumia parpuria



Cashew

Trees Planted on Trench cum Bunding



Dry Land Horticulture Fruit Crops

Mango Block Plantation



Tamarind Block Plantation



Cashew Block Plantation



Amla Block Plantation



Lemon Block Plantation



Acacia auriculiformis Block Plantation



Melia dubia Block Plantation



Melia dubia Block Plantation



Integrated Farming System

Before NICRA



Mango



Agri-Horti-Silvi



Livestock

After NICRA

Number of Interventions : 02



Farm Pond



Bee Keeping



Fish farming

Fodder interventions

Technology demonstrated

: Fodder crops

Problems

: Fodder Scarcity

Advantages

: Fast growing and multi cut

Technology adoption

: 20 farmers in 4 ha



Napier grass- Co-3



Fodder Maize- PC 23



Guinea grass -Hemil

Value Addition in Amla



Farmer Mahesh N.M has earned **Rs. 2.8 Lakh** from the production of Durga Amla Juice

Capacity Building of the Farmers

SL.No.	Thematic area	Title of training	No. of Courses	No. of beneficiaries		Date
				Male	Female	
1	Impact of Climate change	Sensitization Meeting	2	98	40	29.03.2011
2	Land Resource Development	Exposure visit to BIRD-K, Tiptur		69	31	31.03.2011
3	Vegetable Crop Production	Exposure visit to IIHR, Bangalore	1	28	-	16.09.2011
4	Drought tolerant Ragi	Ragi(ML 365) Field day	1	122	28	04.10.2011
5	Integrated Nutrient Management	Use Bio- fertilizer & its Importance	1	27	6	03.12.2012
6	Soil Carbon Sequestration	Improved Compost Preparation & its uses	2	38	15	16.12.2011
7	Soil Health	Method of Soil Sampling & its Importance		29	7	05.01.2012
8	Integrated Pest Management	Seed Treatment	1	25	3	19.01.2012
9	Integrated Nutrient Management	Microbial Consortia Application to Tomato Crop	1	29	5	09.02.2012

Training Programmes



Use of Bio-fertilizer & its Importance



Improved Compost Preparation & its Uses

Method of Soil Sampling & its Importance





Compost Pit Making



Seed Treatment with Bio-pesticides



Microbial Consortia (Combination of bio fertilizers, bio pesticides and growth hormones in single carrier) Application to Tomato Crop



INDIAN INSTITUTE OF HORTICULTURAL RESEARCH, BANGALORE - CRIDA, HYDERABAD



NATIONAL INITIATIVE ON CLIMATE RESILIENT AGRICULTURE

Soil Health Card

Card No: 09

I. General Information

1. Name of the farmer : Suresh S/o Hanumantharayappa
2. Survey number : 50
3. Village : D.Nagenahalli

II. Soil Chemical Analysis Report

Soil health information	Units	Observed	Critical limit	Remarks
1. Soil pH	(1:2)	4.63	6.50 to 7.50	Low
2. Electrical Conductivity	(dSm-1)	0.096	<1.00	Safe
3. Organic Carbon	(%)	0.21	0.75 to 1.00	Low
Major Nutrients				
4. Available Nitrogen	(mg kg-1)	34.02	125 to 180	Low
5. Available Phosphorous	(mg kg-1)	21.20	5 to 10	High
6. Available Potassium	(mg kg-1)	45	62 to 125	Low
Secondary Nutrients				
7. Available Calcium	(mg kg-1)	75	800 to 1500	Low
8. Available Magnesium	(mg kg-1)	99	150 to 250	Low
9. Available Sulphur	(mg kg-1)	18.7	10 to 15	High
Trace Nutrients				
10. Available Iron	(mg kg-1)	19.7	5 to 10	High
11. Available Manganese	(mg kg-1)	10.3	3 to 8	High
12. Available Zinc	(mg kg-1)	0.45	0.75 to 1.00	Low
13. Available copper	(mg kg-1)	0.28	0.50 to 1.00	Low



Summary of results of soil testing across the village

160 Samples

Sl.No	Particulars	Units	Range	Mean	Remarks
1	pH	(1:2)	4.17-8.32	5.66	Low
2	Electrical conductivity	dsm-1	0.036-0.277	0.12	Safe
3	Organic carbon	%	0.15-1.2	0.46	Low
4	Nitrogen	mg kg-1	24.3-194.4	74.72	Low
5	Phosphorus	mg kg-1	0.6-41.5	8.74	Normal
6	Potassium	mg kg-1	18-255	56.62	Low
7	Calcium	mg kg-1	75-2150	778.61	Low
8	Magnesium	mg kg-1	72-580	203.4	Normal
9	Sulphur	mg kg-1	1.4-61.1	11.49	Normal
10	Iron	mg kg-1	5.2-208.9	22.60	High
11	Manganese	mg kg-1	3.4-47.7	14.67	High
12	Zinc	mg kg-1	0.25-1.84	0.49	Low
13	Copper	mg kg-1	0.06-2.47	0.60	Normal

Soil Health Management

Problems : Indiscriminate use of fertilizers

Combating climatic adversity :

- Balanced nutrients application on the basis of soil test
- Reduced the application of fertilizer, increase in fertilizer use efficiency

No. of soil samples analyzed - 160

Soil health card prepared - 160



Soil Sample Collection

NATIONAL INITIATIVE ON CLIMATE RESILIENT AGRICULTURE				
SOIL HEALTH CARD No. 93				
I. General Information				
1. Name of the Farmer	Mudalappa Siv Thimmappa			
2. Survey Number	491			
3. Village	St. Nagendhalli, Karavargu Taluk			
4. District	Tumkur, Karnataka State			
II. Soil Chemical Analysis Report				
Soil health information	Units	Observed	Critical Limit	Remarks
Soil pH	(1-2)	5.27	6.50-7.50	Low
Electrical Conductivity	(dSm-1)	0.084	<1.00	Safe
Organic Carbon	(%)	0.36	0.75-1.00	Low
Major nutrients				
Available Nitrogen	(mg kg-1)	58.32	125-180	Low
Available Phosphorus	(mg kg-1)	5.90	5-10	Safe
Available Potassium	(mg kg-1)	95	60-125	Low
Secondary nutrients				
Available Calcium	(mg kg-1)	496	800-1500	Low
Available Magnesium	(mg kg-1)	124	100-250	Low
Available Sulphur	(mg kg-1)	6.3	10-15	Low
Trace nutrients				
Available Iron	(mg kg-1)	25.9	5-10	High
Available Manganese	(mg kg-1)	11.2	3-8	High
Available Zinc	(mg kg-1)	0.57	0.75-1.00	Low
Available copper	(mg kg-1)	0.31	0.50-1.00	Low

Soil Health Card



Dr. S. Ayyappan, DG, ICAR distributing soil health card

Custom Hiring Centre

Sl. No.	Name of Farm Implements
1	Weed Cutter with Accessories
2	Trencher
3	Land Leveler
4	Furrow Opener
5	Heavy Duty Disc Plough
6	Disc Harrow(Ten plates)
7	Chaff Cutter 3 HP
8	Portable 4 stroke Power Sprayer
9	Water Tanker 4000 litre
10	Power Operated Weeder 1 HP
11	Water Pumping Diesel Engine 4 hp
12	Tamarind Deseeder
13	Chisel Plough
14	Amla Deseeder
15	Chain Saw 2.5 HP Petrol
16	Small Weather Station
17	Weighing Machine



Implements Purchased under Custom Hiring Centre



Power Sprayer



Chain Saw



Diesel Engine



Water Tanker



Land Leveller



Disc Harrow



Furrow Opener



Chisel Plough



Trencher



Power Weeder



Disc Plough



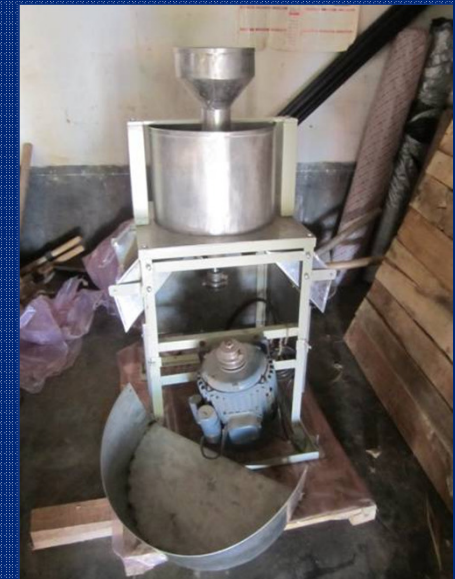
Weighing Scale



Chaff Cutter



Tamarind Deseeder



Amla Deseeder



Weed Cutter



PH meter



Conductivity Meter

Custom hiring centers for timely planting

Implements	No. of farmers	Area (ha)	Mechanization Capacity output /hr	Conventional method Capacity output /hr	% labour saving
Disc plough	8	2	2ha	0.3 ha	85
Brush cutter	25	10	0.75 ha	0.1 ha	86
Water Tanker	75	30	4ha	0.8 ha	80
Disc Harrow	8	3	2.5 ha	0.4 ha	84
Furrow opener	16	6	2.5 ha	0.4 ha	84
Amla deseeder	3	-	180 kg	10 kg	94
Land leveler	16	10	0.75 ha	0.1 ha	86
Trencher	11	7	50 mt	5 mt	90
Power sprayer	40	16	2.5ha	0.2 ha	92
Power weeder	17	24	0.75 ha	0.1 ha	86
Water pumping Diesel engine	75	30	6000 lit	580 lit with pot	90
Weighing Balance	50	-	-	-	-

Small Weather Station



Rain Gauge



Open Pan Evaporimeter



Max. & Min. Thermometer



Anemometer

Village Climate Risk Management Committee (VCRMC)

No. of members	Meetings held	Decisions taken
Chandraiah, President	25.01.2011	Impact of climate change
Yogesh, Vice President		
Mahesh, Secretary	29.03.2011	Selected climate resilient
Members :		Interventions
Sharadamma	03.10.2011	Discussed on performance of
Sahabjan sab		interventions conducted & regarding
Rupa		Conducting of Ragi field day
Vishwesharaiah	15.12.2011	Selected of farmers for compost pit
Gangaraju		making
Papanna	04.01.2012	Soil sampling and testing
Jayarangaiah		
Mylarappa	18.07.2012	Discussed on contingency plan
Suresha		
Siddalingappa		
Laxmamma	13.08.2012	Regarding Value addition to Ragi in
Radhamma		collaboration with Marketing Board.

Details of Bank Accounts

Name of the VCRMC	Village name	No. of members	Bank details	
			A/C No.	Amount (Rs.)
VCRMC, D. Nagenahalli	D. Nagenahalli	15	8500401540-0	21,100=00
Custom Hiring Center (FMCHC)	D. Nagenahalli	5	8500400812-9	

CKGB-B14D
CAUVERY KALPATHARU GRAMEENA BANK



BRANCH :
URDIGERE BRANCH

Phone No :
CAUVERYKALPATHARUGRAMEENABANK

Working Hours : 8500401540-0

C R M C NIKRA YOJANA

D NAGENAHALI . KORTAGERE TALUK


572140

22/05/2012

Please paste photo
Do not use staple pins
Photograph(s) needs to be attested by issuing authority

Account No. :
Name & Address :

CKGB-B14D
CAUVERY KALPATHARU GRAMEENA BANK



BRANCH :
URDIGERE Branch,
Tumkur Taluk

Phone No :
CAUVERYKALPATHARUGRAMEENABANK

Working Hours : 8500400812-9

FMCHC NIKRA YOJANE

D NAGENAHALI

KORTAGERE TALUK 572140

21/02/2012

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Account No. :
Name & Address :

Attended 2nd High Level Monitoring Committee Meeting



Date: 12th December 2011



Dr. S. Ayyappan, DG, ICAR visited NICRA Village



Dr. S. Ayyappan DG (ICAR) and Dr. Prabhu Kumar Zonal Project Director interacting with farmers



Dr. S. Ayyappan DG Inaugurating Seed Bank

Farmers interacting with Dignitaries



Name	Designation
Dr. A K Singh	DDG(NRM)
Dr. B.Venkateswarlu	Director(CRIDA)
Dr. A.S. Sidhu	Director (IIHR)
Dr. Sreenath Dixit	Coordinator (TDC,NICRA)
Dr. D.V. Srinivas Reddy	P S,ZPD VIII



Delegates from Ghana (Africa) visited to NICRA Village



China Students visited to NICRA Village



Media meet visited to NICRA Village

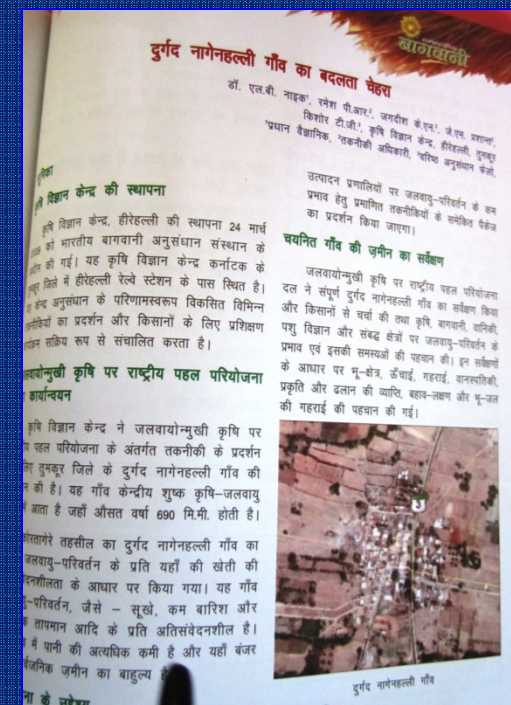
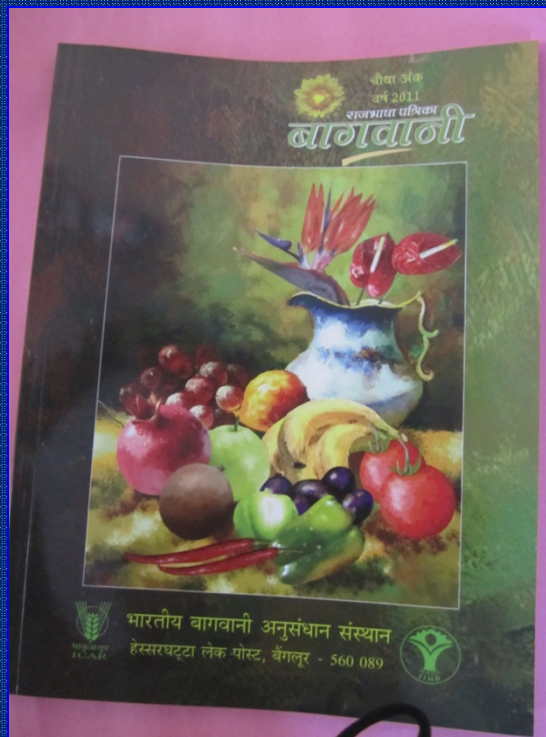


Documentation and Publication

Documentation and Publication		
Interventions	Title	No. of Copies
Documentary Film	Technology demonstration component NICRA KVK Hirehalli	30 (English, Kannada and Hindi)
Publications	Land Resources Assessment of D. Nagenahalli (NICRA adopted village)	50
	Rajabasha Patrika Bhagvani (IIHR)	200



Documentary Film



Intervention in Nutshell

Soil and Water Conservation: Leveling & Compartments

Trench cum Bunding,

Contour Bunding,

Tank-Silt Application

Deep ploughing

Ploughing across the slope

Live Bunds

Crop Mulching &
Stubble mulching.

Water Harvesting Structure:

New Farm Ponds,

Recharge of Borewells ,

New Check Dams,

Percolation Pond,

Desilting & Widening of
Channels,

Desilting & Widening of Defunct
Farm Ponds,
Blocking of Leakage of Lake,
Renovation of Defunct Check
Dams.

Water Storage Structure

Intervention in Nutshell

Micro Irrigation:

Drip Irrigation

Sprinkler Irrigation

Tree Based Farming:

Mango, Amla, Tamarind, Lemon

Melia dubia, *Acacia auriculiformis*,

Planting on Trench cum Bunding &

Fodder Seeds.

Crop Intervention:

Ragi, Red gram, Aerobic Paddy

Ground nut, Maize, Ragi + Red gram,

Maize + Red gram, Groundnut + Red

gram,

Ragi + Dolichos, Tomato, Chilli &

Brinjal.

Intervention in Nutshell

Agri + Horti + Silvi systems :

Teak + Groundnut, Amla + Groundnut,
Ragi + Mango + Teak + Subabul + GuineaGrass,
Ragi + Tamarind + Cashew + Guinea Grass,
Ground nut + Mango + Tree Sp. + Guinea Grass &
Integrating Farming System

Natural Resource Survey :

Soil Health Card for 100 Farmers
Land Suitability Assessment for
Major Crops

Institutional Arrangement:

Climate Risk Management Committee
Custom Hiring Centre Management
Committees,
Small Weather Station

Major Lesson Learnt

1. Custom hiring centre saved labour cost and potential use of water tank for watering.
2. **NRM interventions are crucial to build resilience against climate variability.**
3. Farm pond and check dam helps farmers for supportive irrigation to crops, recharge the underground water and increases the cropping intensity.
4. **Tree spp. were planted on the bunds increase the vegetative cover and meets the fodder requirement.**
5. Performance of Improved varieties of Ragi, Red gram, Groundnut, Paddy, Maize etc., are significantly superior to local varieties.
6. **Arrested the soil erosion by trench cum bunding, Leveling, Cover crops.**
7. Desilting and widening of channels increased the water storage capacity.
8. **Drip and sprinkler irrigation increases the irrigation efficiency.**

Thank You

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