



**TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY  
DIRECTORATE OF EXTENSION EDUCATION**

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**NATIONAL INNOVATIONS ON CLIMATE RESILIENT AGRICULTURE  
NICRA**

**SMART PRACTICES AND TECHNOLOGICAL  
INTERVENTIONS  
FOR CLIMATE RESILIENT AGRICULTURE  
DEMONSTRATED AT NAMAKKAL DISTRICT**

**Research Highlights 2011 -2016**

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## **NATIONAL INNOVATIONS ON CLIMATE RESILIENT AGRICULTURE (NICRA)**

National Innovations on Climate Resilient Agriculture (NICRA) has been promoted in 11<sup>th</sup> five year plan by the Indian Council of Agricultural Research (ICAR) under the technical leadership of Central Research Institute for Dry land Agriculture (CRIDA), Hyderabad. This project is being implemented in 100 districts in India out of which 4 districts have been selected in Tamil Nadu viz., Namakkal, Villupuram, Ramanathapuram and Thiruvallur.

NICRA scheme at Namakkal is being initiated by Krishi Vigyan Kendra of Tamil Nadu Veterinary and Animal Sciences University at Vadavathur village which has recorded an average rainfall of only 400 mm for the past 26 years. The village has 829 families with the population of 2850 and they were benefited under NICRA in different modules. Introduction of new climate resilient technologies in Agriculture, Horticulture, Livestock, Poultry and fisheries, Rain water Storage structures and Custom Hiring Centre (CHC) for farm implements are the major activities of the scheme and it made sustenance in livelihood of the farmers.

### **I. VILLAGE INFORMATION**

Name of the village Panchayat	:	Vadavathur
No. of households	:	829
Total cultivated area	:	525 ha
Area under rain fed cultivation	:	320 ha
Major soil type	:	Red sandy loam
Climatic vulnerability of the village	:	Drought

### **II. PROJECT PERSONNELS ASSOCIATED SINCE BEGINNING**

<b>S. No.</b>	<b>Name</b>	<b>Designations</b>	<b>Period of associations in which capacity</b>
1	Dr. B. Mohan Programme Coordinator & Professor and Head	Principal Investigator (Sep 2011 to 15.12.2015)	Project monitoring, implementation and evaluation.
2	Dr. N. Akila Programme Coordinator & Professor and Head	Principal Investigator (From 16.12.2015 to Till date)	Technology demonstration in livestock and poultry management



3	Dr. S. Alagudurai Subject Matter Specialist / Assistant Professor (Agronomy)	Co - Principal Investigator (From Sep 2011 to 22.6.2017)	Technology demonstration in drought resilient field crops and fodder crops
4	Dr.P.Murugan Subject Matter Specialist / Assistant Professor (Agronomy)	Co - Principal Investigator (23.06.2017- Till date)	Technology demonstration in drought resilient field crops and fodder crops
5	Dr.C.SharmilaBharathi Subject Matter Specialist / Assistant Professor (Horticulture)	Co - Principal Investigator (From Sep. 2011 to till date)	Technology demonstration in drought resilient horticultural crops.
6	Dr.K.Senthilkumar Subject Matter Specialist/ Assistant Professor (Animal science)	Co - Principal Investigator (Sep 2011 to31.5.2016)	Technology demonstration in dairy, sheep and goat enterprise.
7	Dr. M. JothiLakshmi Subject Matter Specialist/ Assistant Professor (Animal Science)	Co - Principal Investigator ( 1.06.2016- Till date)	Technology demonstration in livestock and poultry enterprise.
8	Dr.P.Vikramachakravarthi Subject Matter Specialist/ Assistant Professor (Vety. Pharmacology&Toxi.)	Co - Principal investigator (Sep 2011 to 30.11.2012)	Technology demonstration in Poultry and Piggery enterprise, ITK and Ethno veterinary practices.
9	Dr. S. Anand Subject Matter Specialist/Assistant Professor(Fisheries)	Co - Principal investigator (Sep 2011 to 03.10.2013)	Technology demonstration in community fish farming, natural resource management, water conservation and environmental issues.



10	Dr.M.Sakthipriya Subject Matter Specialist/ Assistant Professor (Vety. Pharmacology&Toxi.)	Co - Principal investigator (Sep 2011 to31.3.2015)	Technology demonstration in Ethno veterinary practices.
11	Dr.V.Kumaravel Subject Matter Specialist/Assistant Professor(Animal Nutrition)	Co - Principal investigator (Sep 2011 to15.4.2015)	Technology demonstration in Piggery and poultry enterprise.
12	Mr.C. Sankar Subject Matter Specialist/ Assistant Professor (Agricultural Entomology)	Co - Principal investigator (24.11.2015 – Till Date)	Technology demonstration in Agricultural Entomology
13	Dr.S. Paulpandi Subject Matter Specialist/ Assistant Professor (Fisheries)	Co - Principal investigator (18.11.2015 – Till Date)	Technology demonstration in Fisheries
14	Dr. S. Sathya. Subject Matter Specialist/ Assistant Professor(Soil Science)	Co - Principal investigator (18.11.2015 – Till Date)	Soil Health Management
15	Mrs. M. Daisy. Farm Manager	Co - Principal investigator (From Sep. 2011 to till date)	Technology demonstration in Custom Hiring Centre and Village Weather Station
16	K. Paneerselvam. M.A. (Economics), B.Ed., PGDGR.	Field Assistant (Sep 2011 to30.4 2015)	Institutional intervention, Custom hiring unit, Budget, Data Base Management.
17	Mrs.R.Sangeetha M.Sc. (Plant pathology)	Senior Research Fellow (Sep 2011 to 2012)	Technology demonstration in Agricultural and Horticultural and Livestock enterprise.

18	Mrs.G. Gohila, B.Sc. (Ag.), MBA.	Junior Research fellow(JRF) (Sep 2011 to 2015)	Technology demonstration in Agrometry and livestock enterprise.
19	Mrs.R.Sangeetha, M.Sc. (Agri in Sericulture)	Junior Research Fellow(JRF) (Sep 2011 to 2015)	Technology demonstration in Agricultural, Horticultural enterprise.
20	K.Sathis Kumar M.Sc,M.Phil,Ph.D.	Senior Research Fellow (14.06.2016 to Till date)	Technology demonstration in Agricultural, Horticultural and Livestock enterprise.
21	R.Prabhakaran B.Sc. (Agri)	Field Assistant (29.06. 2016 to Till date)	Institutional intervention, Custom hiring unit, Budget, Data Base Management.

### III. RAINFALL DETAILS

Trimodal system of rainfall is prevailing in Namakkal district. Whereas, the average summer rainfall (March-May) is 81.6 mm, South West monsoon is (June-September) 187.4 mm and North East monsoon (October-December) is 199.3 mm. But Vadavathur and Jambumadai villages received 56 mm (7 rainy days) as average summer rain, 117 mm (8 rainy days) in South West monsoon and 205.4 mm (3 rainy days) in North East monsoon.

NICRA village farmers, cultivate field as well as horticultural crops in North East monsoon due to receiving higher quantity of rainfall throughout the cropping period. The rainfall distributed evenly during this period. Generally farmers cultivate short duration (green gram, black gram, onion and ground nut.) crops and also long duration crops viz., jasmine depends upon the water availability.



**Table 1: Rainfall pattern in Namakkal District**

Historical trends in rainfall		Average /Year								
		1980-90	1990-2000	2000-10	2011 (From Sep.)	2012	2013	2014	2015	2016
No. of rainy days		-	37.0	33.7	31	30	<b>24</b>	<b>38</b>	<b>30</b>	<b>16</b>
Annual rainfall		-	-	-	405.46	469.60	639	787	481.9	329.2
No. of dry spells during <i>Kharif</i> season	>10 days	-	7	6	1	3	4	-	2	0
	>15 days	-	7	3	1	1	0	-	1	1
	>20 days	-	16	22	-	2	0	-	1	6
	>40 days	-	7	7	1	1	3	-	3	4
No. of intensive rain spells	>60mm per day	-	4	1	-	-	-	-	-	1

The technical interventions through different modules of NICRA implemented at Vadavathur and Jambumadai villages, Erumaipatti Block, Namakkal District are

1. Natural Resource Management
2. Crop production and protection to combat drought
3. Livestock and Fisheries Management
4. Institutional approach for group activities

## MODULE - 1

### NATURAL RESOURCE MANAGEMENT

#### 1.1. COMMUNITY POND

There are 7 water bodies available in Vadavathur village panchayat namely Senguttai, Aayiram kuttai, Kannimar kuttai, Ponnankanni kuttai, Periyakalingikuttai, Forest kuttai and Pannai kuttai. Among these the following 4 water bodies has been renovated by NICRA based on the water holding capacity and the land covered for cultivation.

##### 1.1. A. SENGUTTAI

The area in Senguttai of (119 ft x 87 ft x 5 ft) 51,765 square feet repaired and renovated to an area of 78,750 square feet with water holding capacity of 6,571 cu.m. Which

enabled to recharge 18 numbers of open wells and 11 number of bore wells and resulted to increase the water level in adjoining areas. Increased water level during north east monsoon period would enable to provide supplemental irrigation nearly 13.6 ha of area, which leads to increase the area under cultivation at Vadavathur.

**Table 2: Measurement and impact of Senguttai before and after NICRA intervention**

Details	Before Intervention	After Intervention
Length (ft)	119	133
Breadth (ft)	87	97
Depth (ft)	5	6
Water Holding Capacity ( cu.m)	3516	6571
<b>Impact</b>		
Bore well (Nos)	6	11
Open well (Nos)	12	18
Area covered (ha)	9.2	13.6
Major cultivated crops	Onion, Sorghum	Onion, Sorghum and Ground nut.

### 1.1.B. AAYIRAMKUTTAI

Aayiramkuttai is an area of 41,904 square feet was repaired and renovated to an area of 56,960 square feet with water holding capacity of 22,999 cu.m that able to store more rainwater. It enabled to recharge 45 numbers of open wells and 112 number of bore wells in Vadavathur village. The rainwater collected during monsoon period in aayiramkuttai, results increased supplemental irrigation of 73.6 ha for crops cultivation at Jambumadai and Vadavathur villages of Namakkal District.



**Table 3: Measurement and impact of Aayiramkuttai before and after NICRA intervention**

Details	Before Intervention	After Intervention	
		2012- 2013 1 <sup>st</sup> Phase	2013-2014 2 <sup>nd</sup> Phase
Length (ft)	97	128	301
Breadth (ft)	72	89	180
Depth (ft)	6	10	15
Road formation (ft)	Nil	220	490
Water Holding Capacity ( cu.m)	1186	3224	22999
<b>Impact</b>			
Recharge of bore well (Nos)	9	17	112
Recharge of open well (Nos)	11	14	45
Area covered (ha)	12.8	21.6	73.6
Major cultivated crops	Onion and Sorghum	Onion and Sorghum	Onion, Paddy and Ground nut

**Fig. 1: Senguttai**

**Before Intervention**



**After Intervention**





**Fig. 2. Aayiramkuttai**

**Before Intervention**



**After Intervention**



### **1.1. C. PERIYAKALINGIKUTTAI**

Periyakalingikuttai with an area of 12,843 Sq.ft. was repaired and renovated to an area of 54,064 Sq.ft. with water holding capacity of 16,468 cu. m. It enhanced to recharge 45 number of open wells and 156 number of bore wells which resulted in increase in area of cultivation of 137.5 ha at Jambumadai and Vadavathur villages of Namakkal District.



**Table4: Measurement and impact of Periyakalingikuttai before and after NICRA intervention**

Area details	Before intervention	After Intervention 2013- 2014
Length (ft)	160	366
Breadth (ft)	70	106
Depth (ft)	6	15
Water Holding Capacity ( cu.m)	3803	16468
<b>Impact</b>		
Bore well (Nos)	62	156
Open well (Nos)	14	45
Area covered (ha)	68	137.5
Major Cultivated Crops	Onion and Sorghum	Onion , Ground nut and Sorghum

**1.1.D. PONNANKANNIKUTTAI**

Ponnankannikuttai with an area of 17, 265 square feet was repaired and renovated to an area of 48,048 square feet with a water holding capacity of 12,453cu.m. Which recharged 27 numbers of open wells and 75 number of bore wells, as a result 29.6 ha of area increased for cultivation of crops at Jambumadai and Vadavathur village of Namakkal District.

**Table5: Measurement and impact of Ponnankanni kuttai before and after NICRA intervention**

Details	Before Intervention	After Intervention 2013- 2014
Length (m)	23	64
Breadth (m)	35	35
Depth (m)	6.5	6.5
Water Holding Capacity (cu.m)	3456	12453
<b>Impact</b>		
Bore well (Nos)	36	75
Open well (Nos)	13	27
Area covered (ha)	14	29.6
Major Cultivated Crops	Onion and Sorghum	Onion, Groundnut, Sorghum and vegetables



**Fig. 3: Periyakalingi kuttai**

**Before Intervention**



**After Intervention**



**Fig. 4: Ponnakanni kuttai**

**Before Intervention**



**After Intervention**







### 1.2. TEMPORARY WATER STORAGE POND

Usually the farmers from NICRA village pump the water from open and bore wells and store it in unlined temporary water storage pond and then irrigate to the fields. Moreover the soil type is red sandy loam. Seepage loss from these soil is quit high and therefore water stored in the unlined ponds was quickly lost. Under the NICRA scheme nineteen temporary water storage ponds were lined with HDPE 200 GSM UV irradiated plastic sheets. Most of the farm ponds were of the size of 65 ft. length, 45 ft. breadth and 6 ft. depth with water holding capacity of 17,550 cu.ft. When water was stored in plastic sheet lined ponds, the seepage loss was minimized to ½ ft. only in 15 days compared to ½ ft. of water loss within 3 days in unlined storage ponds.

**Table 6: Year wise details of ponds taken under NICRA scheme during 2011-2012**

S. No.	Name & address of the farmer	Mobile. No.	Total Land Hold-ings	Area of Temporary water storage pond	Area irri-gated	Major crops cultivated
1	K. Nagarajan S/o Kannusamy Vadavathur	9600796890	4.75 acres	57 x 40 x6 (ft.) 387 cu.m	1.5 acres	Onion, Ground nut and Sorghum
2	P. Ramar S/o Perumal Vadavathur	9585587336	3 acres	70 x 60 x 6 (ft.) 713 cu.m	2 acres	Onion, Sorghum and Vegetable crops.
<b>2012 – 2013</b>						
1	B. Dhanalakshmi W/o Balusamy Jambumadai	9786820627	7 acres	72 x 55 x 6 (ft.) 672 cu.m	3.5 acres	Onion, Sorghum, Paddy and Ground nut.



2	T.Pannerselvam S/o Thalamanaidu Jambumadai	9994670112	5 acres	70 x 50 x 5 (ft.) 495 cu.m	2 acres	Vegetable, Sorghum and Ground nut.
3	B.Ashok S/o Balusamy Jambumadai	9500444521	2 acres	54 x 48 x 8 (ft.) 587 cu.m	1 acre	Onion and Jasmine
4	P.Balusamy S/o Poochinaidu Jambumadai	9629726332	2.5 acres	75 x 55 x 6 (ft.) 700 cu.m	2 acres	Jasmine, Pandhal Vegetable, Onion and Fodder Sorghum CoFS - 29.
5	P.Gopalsami S/o Poochinaidu Jambumadai	-	1.5 acres	53 x 45 x 6 (ft.) 405 cu.m	1.5 acre	Onion, Vegetables , Jasmine and Ground nut.
6	M.Subramani S/o Mallunaidu Jambumadai	9943689749	2 acres	68 x 42 x 11 (ft.) 889 cu.m	2 acres	Onion, Sorghum, Paddy and Ground nut.
7	M.Kanagaraj S/o Mallunaidu Jambumadai	9994357507	2 acres	53 x 45 x 6 (ft.) 405 cu.m	2 acres	Onion, Vegetables, Sorghum, Paddy and Ground nut.
<b>2013 – 2014</b>						
1	V.Veerasley S/o. Veerasley 4/84 A, New Street Jambumadai	9786628653	4.5 acres	54 x 50 x 6 (ft.) 458.73 cu.m	2 acres	Onion and Sorghum
2	P.Malnaidu S/o. Palanisamy 3/168, New Street Jambumadai	9751957432	1.5 acres	46 x 34 x 5 (ft.) 222.8 cu.m	1.5 acres	Onion, Ground nut and Sorghum
3	K.Palanisami S/o Kaminaidu Jambumadai	9790041546	11.5 acres	70 x 45 x 6 (ft.) 535 cu.m	4 acres	Paddy, Onion and Sorghum
4	V.Selvaraj S/o.P.Veerasley 3/40, Jambumadai,	8870877597	6.5 acres	70 x 68 x 5 (ft.) 673 cu.m	2 acres	Onion, Ground nut, Sorghum and Paddy.
5	K.Dhanagopal S/O/T. Krishnasamy 4/87, Jambumadai	9952357669	5 acres	65 x 50 x 5 (ft.) 460 cu.m	2 acres	Onion, Sorghum and Ground nut.
6	C.Govindarasu Jambumadai	9952215028	7 acres	56 x 67 x 5 (ft.) 531 cu.m	2 acres	Onion , Sorghum, Ground nut and Paddy

## IMPACT

- i. The water seepage loss was minimized to only ½ foot in 15 days.
- ii. The irrigation interval was reduced from 15 days to 10 days.
- iii. Through this intervention moisture stress was avoided in onion and groundnut crops which resulted in year round cultivation of crops.
- iv. Seeing the success of this intervention **nineteen farmers** in the same village have adopted this technique of lining temporary storage ponds with HDPE 200 GSM UV irradiated sheets on their own cost.
- v. So far thirty four farmers have adopted this technology in Vadavathur village panchayat.
- vi. Through this technology evapotranspiration and percolation loss minimized at a depth of 15 cm in 15 days interval in farm ponds.
- vii. From temporary water storage pond water is pumped through compressor pump from bore wells and it can be filled in duration of 5 days in summer and 2 days in rainy season.

**Fig. 5: Temporary Water Storage Pond**

**Conventional Method**



**After NICRA intervention**





## NRM Activities Disseminated in NICRA village



### 1.3. MANUAL WEATHER STATION

Before intervention farmers were not aware about climate based agriculture and it was difficult to make pre plan decision about farm activities like time of sowing, number of irrigation, maturity, proper time of harvesting and storage or sale of agricultural products. Hence the installation of manual weather station and daily display of weather data with weather alert system created at Vadavathur village panchayat through NICRA scheme, which is highly helpful to know the short range weather forecast prevailing in that village, especially rainfall and temperature.

The main impact of weather station is that the farmers come to know about the daily weather conditions prevailing in that village and make suitable decision in agricultural and animal husbandry activities. They also received weather advisory services from KVK for sustainable agriculture. The data recorded in the weather station since installation given in Annexure I.



**Fig. 6: NICRA weather station in Vadavathur village**



## **MODULE - 2**

### **CROP PRODUCTION AND PROTECTION TO COMBAT DROUGHT**

#### **2.1. AGRONOMY**

Climate change is likely to bring more frequent episodes of severe drought, with potentially devastating impact on the world's ability to feed a growing population. Therefore a sustainable agricultural system is needed that makes the most efficient use of water and reduces expensive and environmentally challenging inputs such as seeds of drought resistant crop varieties, fertilizer and pesticides.

Drought resistant, short duration, Pest and disease resistant variety of Black gram (CO.6, VBN.6), Green gram (VBN.3,CO.8), Groundnut (TMV.13,CO.6), Red gram (VBN.3,CO.7) and fodder crops (CO.30,K.8 &COFS.29) were demonstrated under the scheme in crop module. The main objective of the intervention is to study the drought resistant capability of new varieties, performance of intercropping system, yield potential, crop equivalent yield and economics of intercropping system under drought condition.

**Table 7: Drought Resilient Variety Demonstrated**

Year	Crop	Variety	Quantity (Kgs)	No. of farmers	Area covered (ha)
2011-12	Sorghum	Co.30	50	20	3.2
		K.8	28	9	2.0
	Black gram	Co.6	43	18	2.2
	Green gram	VBN.3	84	34	4.2
	Red gram	CO-7	47	16	2.4
	Groundnut	TMV.7	400	10	2.0
		TMV.13	180	3	0.9
	Castor	YRCH.1	2	2	0.8
	Hedge lucerne	-	4	10	0.5
	Fodder sorghum	CoFS.29	6	11	1.2
Cumbu Napier grass	Co.4	89,200 nos	59	2.2	
2012-13	Sorghum	Co.30	80	40	5.2
	Black gram	Co.6	43	18	2.2
	Green gram	VBN.3	168	268	8.4
	Groundnut	TMV.13	400	10	2.0
		CO.6	760	17	3.8
	Castor	DCH.177	2	2	0.8
	Red gram intercropped with Groundnut	CO(RG)7	4	2	1.4
	Fodder sorghum	CoFS.29	22	38	4.8
	Hedge Lucerne	-	4	4	0.5
	Agathi	-	7	22	2
2013-14	Paddy	ADT.49	4	2	0.5
	Green gram	VBN.3	5	5	0.6
	Groundnut	TMV.7	110	3	0.6
	Castor	YRCH.1	3	3	1.2
	Hedge lucerne	-	1	3	0.2
	Fodder sorghum	CoFS.29	2.7	4	0.5



<b>2014-2015</b>	Groundnut	CO.6	500	12	2.2
	Red gram intercropped with Groundnut	CO(RG)7	5.5	12	2.2
	Black gram	Co-6	2	2	0.8
	Green gram	VBN 3	1	1	0.4
	Castor	YRCH -1	2	2	0.4
	Sorghum	APK -1	12	2	0.8
	Fodder sorghum	CoFS 29	10	11	5
	Hedge lucerne	-	2.5	4	0.4
<b>2015-2016</b>	Green Gram	Co-8	11.75	12	5
	Red Gram	Co-7	15.300	22	-
	Black gram	VBN-6	29.5	30	-
	Black gram	Co-6	29.500		-
	Fodder sorghum	CoFS 29	8.250	10	5
	Groundnut	Co-6	60	1	1
	Sorghum	Payur 2	2	2	0.4
	Groundnut	K6	120	2	1
	Hedge lucerne	-	4	2	0.4
<b>2016-2017</b>	Green Gram	Co-8	78	24	10
	Black Gram	MDU1	15	5	2.08
	Red gram	VBN2, VBN6	10	9	2.08
	Sesamum	TMV7	70	30	12.5

### 2.1. A. Cultivation of drought tolerant Groundnut var. TMV.13, CO.6 with red gram intercropping

Groundnut cultivation in *kharif* season was mainly under rain fed condition whereas in *rabi* season cropping is under irrigated condition. The existing Groundnut variety is TMV.7 (Old and low yielding variety), sole cropping was the predominant cropping system followed in Vadavathur village. Plant population was also less (20 nos/m<sup>2</sup>) when compared to optimum plant population (33 nos/m<sup>2</sup>). Frequent occurrence of drought during the cropping period is also a major constraint in groundnut cultivation. Pod yield as 1500kg/ha and halums yield as 2800 kg/ha with B:C ratio of 2.3:1. The main technological intervention introduced was drought resistant semi spreading groundnut variety CO.6 inter cropping with short duration red gram Co (RG) 7) under rain fed

condition. Both crops are same duration (120-125 days) and have complementary interaction. The critical technologies introduced were sowing under assured moisture condition to enhance germination, maintaining optimum plant population, soil test based fertilizer, gypsum application @ 400 kg/ha and application of crop booster like Groundnut rich @ 5kg /ha.

### Extent of adoption

- 45 No. of farmers cultivated the new variety with intercropping.
- Total area covered -13 ha.

**Table 8: Impact of Groundnut with red gramintercropping**

Crop	Farmers practice	Technological intervention by KVK
Ground nut	-	<b>Yield</b> Pod yield – 1900kg/ha Halums Yield – 3500kg/ha BC ratio – 3.1:1
<b>Economics</b>		
Ground nut	❖ Net income: Rs.52, 000/ha.	❖ Net income : Rs.65,000/ha ❖ Additional income through intercropping: Rs.20, 000/ha.

- Seedswere produced and supplied by the farmers.
- No. of farmers adopted the varietyare 62 farmers in 24 ha in NICRA village and 13 farmers in 7 ha in adjoining village.

### 2.1. B. Cultivation of short duration, synchronized matured varieties of blackgram and greengram

Blackgram, greengram and redgram are major pulses crop cultivated in Vadavathur village with an average area of 30 ha. Blackgram and Greengram cultivated in both *kharif* and *rabi* season whereas redgram cultivated in *kharif* season only.



**Table 9: Impact of pulses cultivation in NICRA village**

Sl. No	Crop	Farmers practice	Technological intervention by KVK
1	Black gram	Susceptible to Yellow Mosaic Virus and uneven maturity. (Variety –T9) <b>Yield - 720 kg/ha</b>	High yielding, Short duration variety. Resistant to yellow Mosaic Virus and synchronised maturity. (Variety -Co.6) <b>Yield - 840 kg/ha</b>
2	Green gram	Susceptible to Yellow Mosaic Virus and uneven maturity. (Variety – CO.6) <b>Yield - 700 kg/ha</b>	High yielding Short duration variety. Resistant to yellow Mosaic Virus and synchronised maturity. (Variety –VBN 3) <b>Yield - 850 kg/ha</b>
3	Red gram	Long duration (180 days) Variety. <b>Yield - 900 kg/ha</b>	Short duration (125 days) Variety. CO(RG)7 <b>Yield - 1000 kg/ha</b>

**Extent of adoption**

- 128 No. of farmers cultivated the new varieties of pulses in 63 ha.

**2.1. C. Cultivation of drought tolerant, perennial and nutritious fodder crops for livestock**

Sorghum var.CO.4 was cultivated in Vadavathur village for grain cum fodder purpose with an average area of 150 ha. Mostly sorghum crop stover used as a dry fodder after grain threshing. Availability of green fodder for livestock is meagre in Vadavathur village, to solve the above said problem, introduction of perennial drought tolerant fodder sorghum along with Hedge Lucerne is very important for profitable livestock production.

**Table 10: Impact on fodder cultivation in NICRA village**

Sl. No	Crop	Farmers practice	Technological intervention by KVK
1	Sorghum	Low yielding, local Variety (CO.4) <b>Yield</b> <b>Grain – 1000 kg/ha</b> <b>Dry fodder – 5 t/ha</b>	High yielding dual purpose variety K8, APK -1, Co.30 <b>Yield</b> <b>Grain– 1500 kg/ha</b> <b>Dry fodder – 7 t/ha</b>
2	Fodder Sorghum	Low yielding local variety (Red sorghum) <b>Dry fodder yield -5000 kg/ha</b>	Multicut fodder sorghum 5 - 6 harvest /year(variety - CoFS 29) <b>Dry fodder yield - 10000 kg/ha</b>
3	Hedge lucerne	Non adoption	Introduction of legumes fodder variety - Hedge lucerne <b>Yield - 8000 kg/ha</b>
4	Cumbu Napier grass	Cumbu Napier hybrid grass - CO2, CO3 <b>Yield – 200 t/ha</b>	High yielding Cumbu Napier hybrid grass CO.4 <b>Yield – 350t/ha</b>

### Extent of adoption

- No.of farmers adopted – 720 (NICRA village & Nearby villages)
- No.of farmers cultivated the new varieties of fodder- 32 nos.
- Total area covered – 7.5 ha

### Conclusion

Among the field crop varieties demonstrated, the following crop varieties created much impact in NICRA farmers' field. Groundnut var. TMV.13 and CO.6, Intercropping with redgram var.CO. 7 observed more pod yield and withstand the drought condition. Green gram var. CO.8 produced pods of synchronized maturity with YMV resistance and also observed more pod yield with short duration (60 days only). With respect to fodder crops, fodder sorghum COFS.29 produced more green fodder yield with multi cut ability and tolerance to drought condition.





### Fig. 7: Agronomy Activities

**Groundnut intercropping with Red Gram**



**Groundnut var. TMV 13**





**Sorghum (K8)**



**Fodder Crop (Co-4)**



**Fodder Sorghum (CoFs-29)**



**Green Gram**







### Black gram



## 2.2. COMMUNITY SEED BANK

Community Seed Banks are places of storage where indigenous seed varieties are conserved and managed by community members. These ex-situ conservation sites provide farmers with free and easy access to traditional seeds under the condition that a farmer returns twice the amount of seeds they borrowed. The seed banks not only reduce farmers' dependence on seed companies but also help to conserve the agro-biodiversity of their villages. The community seed bank was initiated for the following seeds

**Table 11: Seed bank developed in NICRA village**

Crop	Varieties	2012-13		2013-14		2014-15		2015-16	
		Qty. produced	Farmers benefitted	Qty. produced	Farmers benefitted	Qty. produced	Farmers benefitted	Qty. produced	Farmers benefitted
Black gram	VBN.6								
Green gram	CO.6	132 kg	15	-	-	-	-	-	-
Red gram	VBN 3								
Vegetable seeds	-	10 kg	15	-	-	-	-	-	-
Groundnut	CO6	-	-	215kg	1	850 kg	5	-	-
Green gram	VBN 3	-	-	25kg	1	20kg	1	-	-
Paddy	ADT 49	-	-	-	-	80kg	1	-	-
Seed onion	CO-5	-	-	-	-	2kg	1	-	-
Green gram	CO.8	-	-	-	-	-	-	220 kg	4
Black gram	VBN.6							385 kg	
Groundnut	CO.6							1250 kg	



## Outreach

- Convergence with line department and 8 ha covered with new variety of seed.
- Encouraged groundnut seed production and seed supply through PPP mode in variety TMV.13-750 kg and CO.6- 2400 kg was received.
- Convergence with State Agricultural Department (Area covered: 25 ha).
- Seed produced and supplied to NFSM, cluster FLD programme (Black gramseed: 240 kg, Green gram seed: 150 kg).
- Encouraged pulses seed production and supply through PPP mode (Black gram seed: 4000 kg, Green gram seed: 3850 kg).
- Multicrop fodder production models developed (Combination of Bajra Napier grass, Fodder sorghum, Hedge Lucerne and tree fodder cultivation) – 8 nos
- Convergence with Department of Animal Husbandry (Area covered: 15 ha)
- Encouraged fodder seed production and supply through PPP mode (Fodder sorghum var. COFS. 29: 650 Kg, Hedge lucerne: 125Kg)

**Fig. 8: Sun drying of seeds in NICRA village**





## 2.3. HORTICULTURE INTERVENTIONS

### 2.3.A. Protective irrigation in small onion through temporary water storage pond

Major crop cultivated in the village is small onion in an area of 425 ha with a productivity of 160 q/ha. In Vadavathur village, small onion is cultivated in two main seasons *viz.*, Early *kharif* (May –August) and Rabi (November – December). The *kharif* crop is mainly used for seed purpose for raising next crop whereas the *rabi* crop was used for vegetable purpose. CO 4 and Valayapatti local is the predominant variety cultivated at Vadavathur. The duration of CO 4 and Valayapatti local are 75 days for seed and 90 days for vegetable.

Before NICRA intervention, in Vadavathur village usually farmers irrigated the onion crop once in fifteen days using the water stored in temporary unlined storage ponds. Whereas, when the water was stored in plastic lined ponds after NICRA intervention, they could irrigate once in 10 days as a result of which the onion bulb yield (180q/ha) increased by 11%.

All the fifteen farmers cultivated onion using the water stored in temporary plastic lining ponds. Through this intervention moisture stress was avoided due to increased frequency of irrigation by once in 10 days,

### 2.3. B. Management of tip drying in small onion due to dew drops

Small onion is mainly affected by dew drops during the month of November to January, where the minimum temperature falls between 12 to 14°C for 17 days and caused tip drying. Presence of dew drops in tip of onion leaf sheath for long time may lead to death of terminal leaf tissue resulted reduced yield from 0.7 to 2 tonnes/ha and also lead to purple blotch disease incidence.

Farmers were not aware about the management strategy against tip drying and they sprayed fungicide (Copper oxy chloride @ 3gm/litre of water) at weekly intervals for 7 times. The tip drying of small onion due to dew drops was controlled in Vadavathur village panchayat under NICRA scheme by two methods *viz.*, a). Spraying of water through mobile sprinkler and b). Using rope method. In rope method, the nylon rope was paped over the onion crop during early morning by two labourers for 2 hours/0.4 ha area in 3 days interval.

In mobile sprinkler method, sprinkler sprinkles the water with a discharge rate of 200 LPM over the onion crop for 1 hour covered in an area of 0.4 ha on cost basis @ Rs.150/ hour in weekly intervals. By these method the dew drops present on the tip



of onion leaves got down and washed out and also purple blotch disease incidence was minimized. Demonstration plots recorded higher yield of 13.0 t/ha compared to farmers practice of 12.3 t/ha with a B: C ratio (Benefit Cost Ratio) of 3.17:1 and 2.31:1 respectively. Mobile sprinkler method as one of the climate resilience practice followed against tip drying in small onion due to dew drops in selected village, which effectively protect the crop during adverse weather condition and also improved the quality of onion bulbs.

### Impact

- 70 % onion growers in the village, now widely used the rope method as well as mobile sprinkler method for the management of tip drying due to dew drops. Especially the farm women easily adopted the rope technology during dew periods.
- Due to wide spread of this technology through training programmes, weather advisory services, mass media coverage, exposure visit by other onion farmers and by line department, 50 % of farmers from major small onion cultivating blocks of Namakkal district viz., Valayapatti, Mohanur, Puduchathiram, Vennandhur, Rasipuram and Namagiripettai were successfully controlled the tip drying.

### 2.3. C.Drought tolerant Jasmine cultivation as a crop diversification for livelihood security and resilience to climate variability

In Vadavathur village, small onion is the major crop cultivated as annual crop in more than 300 acres and it is the only source of income. In scarce rainfall situations in NICRA village of Vadavathur and Jambumadai, practice of sole cropping is predominant but is risky and often results in low yields or sometimes even in crop failure due to erratic monsoon rainfall and skewed distribution. To alleviate these problems in such areas of NICRA village of Namakkal district crop diversification with perennial crop is a feasible option to minimize risk in crop production, ensure reasonable returns with limited care for small land holders.

Small onion, ground nut and pulses are the main crops cultivated in NICRA village which are affected due to late onset of monsoon followed by dry spell at critical crop growth stages. Crop diversification of onion with Jasmine is more profitable and is a key drought coping strategy especially for small and marginal farmers.

The objective of Jasmine cultivation has emerged as an alternative source of livelihood for small and marginal farmers in drought hit areas. Income for farmers, who



were entirely dependent on agriculture, was very low because of dwindling natural resources and erratic weather condition. Jasmine cultivation was adopted because of various advantages associated with it, such as less seed capital requirement since it was a small-scale cultivation, it generated sustainable income compared to other farming due to easy management practices and also withstood drought/dry spells in critical crop growth stages.

Crop diversification of Jasmine var.Ramanathapuram Gundu Malligai showed that the perennial cropping system was more profitable with highest benefit cost ratio in all the 4 years despite prolonged dry spells of 270 days in 2011, 287 days in 2012, 242 days in 2013, 258 days in 2014 and 263 days in 2015 without irrigation. During 2011 and 2012, supplied 10,000 number of three months old rooted cuttings of jasmine variety Ramanathapuram Gundu malligai to fourteen number of farmers covering in an area of 5 acres as a sustainable livelihood income generating activity to mitigate drought and poverty.

Jasmine being a hardy crop withstood drought, long dry spells and survived to yield flowers throughout the year and was a perennial source of income (average profit Rs.40000/20 cent /year) that helped sustaining interest of the farmers.Jasmine variety Ramanathapuram Gundu malligai withstood high temperature (37.5 – 42.40 C) as well as prolonged dry spells ranged from 242 to 287 days per year and yielded maximum (21.2 – 542.6 kg) from 20 cent area per year for the past five years.Performance of the crop diversification with drought and high temperature tolerant Jasmine variety Ramanathapuram Gundu Malligai gave the highest benefit cost ratio ranging from 3.9 to 4.0 compared to the sole crops of small onion (3 to 3.2).

### Economics

- The flower rates in the market varied daily on the basis of demand and supply.
- The farmers were paid on a monthly basis after deducting the expenditure incurred on marketing.
- Each member spent 10 % of the sale price towards transport and marketing.
- The price of one kg flower bud of *Jasminum Sambac* ranged between Rs.100 – 300/- February to July.
- Thereafter, the price of one kg of Jasmine flower fetched around Rs.700.
- The total cost of cultivation ranged from Rs.15,000 to Rs.17,500 / 20 cent / Year.



- Flower yield obtained was in the range of 545 to 600 kg/ 20 cent from 4<sup>th</sup> years onwards.
- Highest net returns of Rs.73575 to 1,20,000/ 20 cent area and benefit cost ratio of 3.9 to 4.0 was obtained by cultivation of drought as well as high temperature tolerant Jasmine variety Ramanathapuram Gundu Malligai.

**Table 12: Jasmine Flower yield/20 cent from July 2012- May 2017**

Year	Month	Flower yield (Kgs)	Sales amount (Rs)	Debit amount (Bus fare @ 10 % in total sales amount (Rs.))	Net sales amount (Rs.)
2012	July 12 – Oct 12 Total	23.9	4561	456	4105
2013	Jan 13 – Nov 13 Total	296.05	46272	4627	41645
2014	Jan 14 – Nov 14 Total	420.1	64195	6419	57776
2015	Jan 15 – Nov 15 Total	545.6	81750	8175	73575
2016	Jan 16 – Nov 16 Total	505.2	101040	10104	90936
2017	Jan 17 – May 17	320.6	32060	3206	28854
	<b>Grand Total</b>	<b>2111.45</b>	<b>329878</b>	<b>32987</b>	<b>296891</b>

### Impact

- 14 number of farmers benefitted under NICRA scheme. By seeing the success of this technology 26 number of farmers in the same village and adjoining villages of N.Pudhupatti, Vazhavanthi and Mekkalnayakanpatti up scaled the Jasmine cultivation in an area of 20 acres.

### 2.3. D. Community small onion nursery as a contingency measure for delayed planting

In NICRA village, small onion is cultivated in two main seasons *viz.*, Early kharif (May –August: Small onion are around 50 acres) and Rabi (November – December: More than 300 acres). However, Vadavathur experienced aberrant rainfall situations with minimum rainy days for the past 5 years during sowing season especially during Rabi,



impacting adversely small onion production and livelihood of farmers. It appears that failure of rain and prolonged dry spells.

Delay in sowing of small onion affects productivity in terms of delayed sprouting, slow growth of vegetative characters and reduction in yield. The existing practice has led to use of high seed rate (Totally 12.5 – 15.0 q of seed bulb is required for small onion cultivation in an area of 1 hectare), high cost involved for seed purpose (Rs. 25000 – 30,000 / ha).

To mitigate these problems, farmers' preferred low seed rate variety which withstand drought during bulbing stage, ready availability of seedlings for transplanting at the time of rainy period to establish quickly with minimum rains is overwhelming and often wait for transplanting in rain fed areas till end of December in anticipation of rains. During 2011 and 2012 Rabi season, KVK, Namakkal implemented this strategy and demonstrated the concept of community small onion nursery in Vadavthur village. 21 farmers adopted this technique and jointly produced seedlings to ensure timely transplanting of seedlings for higher productivity and reduce the risk associated with deficit/delayed onset of monsoon.

During Rabi 2013, 2014 and 2015 small onion nurseries were taken up by the community with staggered sowings on 1<sup>st</sup> October and 15<sup>th</sup> October could be used for transplanting in November after receipt of rain in an area of 20 ha. These farmers' benefitted with an additional yield of 1.8 to 2 tonnes/ha (25% increase in yield) compared to farmers who directly sown bulbs during November.

### Impact

- By seeing the success of this technology, State Department of Horticulture, Erumapatti block has supplied small onion var.Co(On) 5 seed under 50 % subsidy to NICRA village farmers for promoting farmer managed community nurseries under assured irrigation to make available onion seedlings for transplanting to meet contingent situations.
- Under this scheme, a community nursery in an area of 0.8 ha was raised and transplanted in 20 acres in 20 farmer's field in Jambumadai and Vadavathur village.
- The total cost of cultivation ranged from Rs.78,000 to Rs.87,306 / ha. Bulb yield obtained was in the range of 250 -275 bags/ ha (@ 81 kg/bag = 20.2 tonnes to 22.3 tonnes/ha) using 40 days old small onion seedlings which was raised in the month of October.



- Highest net returns of Rs.3,03,750/- and benefit cost ratio of 3.4 was obtained by transplanting of onion seedlings which coincides with rainy days during November.

### 2.3.E. Integrated Pest and Disease management practices in small onion

Small onion is mainly affected by bulb rot, thrips and onion fly, resulting in a yield loss of 20 – 30%. It may be due to prevalence of high temperature (up to 37°C) and prolonged dry spell. Farmers sprayed profenophos @ 2 ml/ liter from 30 days after sowing at 15 days interval thrice for thrips management and also followed seed treatment with SAAF @ 3 g/kg to control bulb rot. They spent Rs. 6000/- for chemical spray, but after the intervention under, IPDM on onion was conducted in 20 ha area covering 40 farmers.

A package of IPDM Practices was followed for entire crop duration, which included seed treatment with bio control agents *Trichoderma viride* @ 4g/kg of bulb + *Pseudomonas fluorescence* @10g/kg of bulb was done 12 hrs before sowing. Five days after sowing of bulbs, a barrier crop maize variety NK 6240 was sown around the field and ridges at a spacing of 1 foot, to prevent the entry of thrips from the outside field. Blue sticky traps were installed at 10 m interval with a total of 20 traps/ acre at one feet height above the onion plant. It attracted 92 % of thrips and onion fly within the field in 30-40 days after sowing.

All the IPDM practiced farmers did not spray any chemical for the entire crop cultivation period and could save upto Rs. 6000/0.4 ha for unwanted chemical spray in addition to getting an yield of 8100 kg/0.4ha. Farmers obtained 14.2 tonnes of small onion per hectare against 6.8 tonnes in the farmer practice and sold at the rate of 20,000/ tonne. They spent Rs.1,25,000/- for cultivation and earned Rs.1,59,000/ ha- as net profit in 3 months duration.

#### Impact

- 20 % of farmers adopted the barrier cropping as well as bulb treatment for both the crop.

### 2.3. F. Additional crop cultivation during excess rainfall

In NICRA village annual vegetable crops such as hybrid tomato, bitter gourd, ribbed gourd, snake gourd, lab lab, annual moringa were cultivated in an area of 112 acres during rabi season by 167 farmers. Tomato farmers got a yield potential of 17.5 tonnes/0.4 ha in 7 months. Whereas cucurbitaceous vegetable cultivated farmers fetched the yield of 1.7 tonnes in 50 cent area in 4 months. Farmers directly sold their products



in *Uzhavar santhai*(Farmers Market) every day without middleman interference and getting appreciable income through additional cropping.

**2.3.G. Foliar spray of PPFM in small onion and jasmine to mitigate drought during 2016**

In Rabi 2016, small onion cultivated in 350 acres severely affected by drought. Under water stress condition foliar spray of Pink Pigmented Facultative Methyltrophs (PPFM) bacteria solution was sprayed to small onion during bulbing stage and flowering stage in jasmine in an area of 83 acres @ 1ml/litre of water. The PPFM individually achieved the highest increases in the number of leaf sheath per plant, leaf chlorophyll, bulb number and yield per plant in onion and flower yield in jasmine during rabi season compared to the control plots.

**Table 13: Convergence with line departments**

Purpose	Number of beneficiaries	Name of the department
Marketing of small onion & Vegetables at Uzhavar santhai, Namakkal (For getting Uzhavar santhai Card)	64	Department of Agri Business and Marketing, Namakkal.
Supply of Co5 small onion seed	25	Department of Horticulture, Erumapatti block, Namakkal.
Installation of Drip	7 farmer/5 ha	
Pandhal vegetable cultivation	5 farmer/1 ha	

**Fig. 9: Small onion field in NICRA village**

**Management of tip drying by mobile sprinkler**



**Management of tip drying by rope method**





### Co5 onion nursery



### Harvested Co5 onion



### Seed treatment with bio control agents



### Hybrid maize as a border crop to trap thrips





**Demo on blue sticky trap installation against thrips**



**Fig. 10: Additional crop cultivation during excess rainfall**

**Traditional system**



**Pandal system of bitter gourd cultivation**



**Pandal system of Ribbed gourd & snake gourd cultivation**





### Hybrid tomato cultivation at NICRA Village



### Direct sale of vegetables at Uzhavar santhai by NICRA farmers



**Fig. 11. Demo on PPFM spray to combat drought condition in small onion**





## 2.4. Soil Health Management

Soil health management is most important practice in crop cultivation and it is a basic medium for crop growth. Continuous cropping with high yielding crops, unbalanced fertilization without soil testing may be the reason behind deterioration of soil fertility. To sustain the soil fertility as well as to improve the crop yield, 344 soil samples collected at Vadavathur & Jambumalai from 2011 to 2017 & analyzed various soil parameters namely, soil pH, EC, Organic carbon, available nitrogen, available phosphorus, available potassium, available sulphur, available zinc & available boron. The following procedure was adopted for the analysis. Based on the soil results, soil health cards were issued to the farmers with integrated fertilizer recommendation.

**Table 14: Methodology adopted to soil analysis**

S.No.	Parameter	Method adopted	Reference
1	Soil reaction	Potentiometry	Jackson (1973)
2	EC (dS m <sup>-1</sup> )	Conductometry	Jackson (1973)
3	Organic carbon (%)	Chromic acid wet digestion method	Walkley and Black (1934)
4	Available nitrogen (kg ha <sup>-1</sup> )	Alkaline KMnO <sub>4</sub>	Subbiah and Asija (1956)
5	Available phosphorus (kg ha <sup>-1</sup> )	0.5 M NaHCO <sub>3</sub>	Olsen <i>et al.</i> (1954)
6	Available potassium (kg ha <sup>-1</sup> )	1N NH <sub>4</sub> OAc (pH 7.0)	Stanford and English (1949)
7	Available sulphur (mg kg <sup>-1</sup> )	PUSA STFR Soil Testing Kit developed by W/S Telematics Pvt Ltd, New Delhi	
8	Available zinc (mg kg <sup>-1</sup> )		
9	Available boron (mg kg <sup>-1</sup> )		

**Table 15: Details of soil analytical results**

S. No.	Parameters	Low/Acidic/Deficiency		Medium/Neutral/Sufficiency		High/Alkaline	
		No. of sample	%	No. of sample	%	No. of sample	%
1	Soil reaction	22	6.40	299	<b>86.92</b>	23	6.69
2	Electrical Conductivity (dS m <sup>-1</sup> )	100% Non saline					
3	Organic carbon (%)	265	<b>77.03</b>	59	17.15	20	5.81
4	Available nitrogen (kg ha <sup>-1</sup> )	269	<b>78.20</b>	47	13.66	28	8.14
5	Available phosphorus (kg ha <sup>-1</sup> )	58	16.86	241	<b>70.06</b>	45	13.08
6	Available potassium (kg kg <sup>-1</sup> )	98	28.49	208	<b>60.47</b>	38	11.05
7	Available sulphur (mg kg <sup>-1</sup> )	58	16.86	240	<b>69.77</b>	46	13.37
8	Available zinc (mg kg <sup>-1</sup> )	195	<b>56.69</b>	149	43.31	-	-
9	Available boron (mg kg <sup>-1</sup> )	150	43.60	194	<b>56.40</b>	-	-

- The results reported that 86.92 per cent of samples recorded neutral soil pH and all the soil samples recorded non saline.
- The results also stated that organic carbon content was also found to be deficient in 77.03 per cent. Poor recycling of organic wastes & inadequate application of organic manures may be associated with decline in soil organic carbon status.
- With regard to available nutrients, 78.20 per cent of samples observed low in available nitrogen (<280 kg ha<sup>-1</sup>), 70.06 per cent of samples recorded medium in available phosphorus (11-22 kg ha<sup>-1</sup>), 60.47 per cent of samples recorded medium in available potassium (< 118-280 kg ha<sup>-1</sup>), 69.77 per cent of sample recorded low in available sulphur (10-15 ppm).
- Regarding the available micronutrients, 56.69 percent of samples recorded deficient in available zinc & 43.60 per cent recorded deficient in available boron. The response of crops was more to nitrogen & zinc.





- Hence to improve the fertility status of soil following steps were taken during past four years.
- 1. Training on importance of soil & water sampling, balanced fertilization in agricultural crops & fertility management in drought condition was conducted at NICRA village.
- 2. Bio fertilizer application - soil application of azospirillum & phosphobacteria each @ 2.5 kg per ha of land as basal.
- 3. Soil test based macro nutrient application - 344 soil health cards were issued with integrated soil fertility management.
- 4. Micronutrient mixture enriched farm yard manure application - Methodology for preparation of enriched manure was demonstrated at three fields. Farmers were applied pulse micronutrient mixture for black gram (4 ha), red gram (8 ha) & groundnut micronutrient mixture for groundnut (10 ha) to sustain the fertility status of soil.
- 5. Soil health campaign was conducted on World Soil Day - 05.12.2016 at Vadavathur. Totally 431 people were participated & benefitted in the event. Of which, 390 nos. (Male: 250 nos. & Female: 140 nos.) were farmers & 41 nos. (Male: 32 nos. & Female: 9 nos.) were extension personnel. Soil health cards about 156 nos. also issued to farmers during the programme. Totally 20 stalls related to technologies of Agriculture, Horticulture, Livestock & Fisheries were exhibited in the event.
- 6. Training on soil fertility management under rainfed condition was given to farmers during the month of November 2016. Totally 24 farmers were participated. Summer ploughing, manuring with farm yard manure or green manures, enriched manure application was taught to farmers. Pamphlet on “Soil Fertility Management under Rainfed Condition” was distributed to farmers.

### Impact

- Farmers were enlighten about importance of soil testing. They come forward to test soil at their own interest after getting exposure to training programmes.
- 344 soil health cards issued with fertilizer recommendation.
- Farmers were trained to maintain the soil fertility even under drought condition.



**Fig. 12: Demonstration of soil sampling in NICRA village**



**Distribution of soil health card**



## **MODULE – 3**

### **LIVESTOCK AND FISHERIES MANAGEMENT**

Livestock plays a major role for livelihood of the farmers in Vadavathur and Jambumadai. But drought created a severe hardships and resulted in low productive and reproductive performance of livestock. Hence under NICRA scheme, the following interventions were made since 2011 to 2016 under livestock module.

- I. Introduction of superior germplasm
- II. Construction of improved shelters for reducing heat stress in livestock
- III. Fodder production and dry fodder storage bank.
- IV. Interactions in feeding management.
- V. Disease preventive measures undertaken.





### 3.1. Introduction of superior germplasm

#### 3.1.1. Sheep and goats

Most of the farmers reared nondescript animals which are resistant to heat and disease tolerant but with poor production potential. The birth weight of kids/ lambs were very low (1.00 to 1.25 kgs), the animal produced single kid/Lamb, kid/ lamb mortality was 7-10 % and marketable weight of the animal at 6 month was 8-9 kgs.

#### 3.1.2. Dairy

In the village, most of the dairy farmers reared Cross bred jersey and some of them reared cross bred Holstein Friesian which had poor heat tolerance, susceptible for more disease occurrence and these animals showed salivation, higher respiratory and pulse rate during hot climate. Rarely some farmers reared native animals which showed greater heat and disease tolerant but with poor production potential.

**Table 16: Introduction of new breeds in NICRA village**

Interventions	Name Improved breeds introduced	No. of animals introduced			
		2011-12	2012-13	2013-14	2014-15
Poultry	-	59	-	-	-
Sheep	-	6	-	-	-
	Bharath merino	-	38	-	-
	Nari – swarna	-	6	-	1
	Bharath merino and NARI swarna	-	-	18	-
Goat	-	5	-	-	-
	Boar Sirohi cross	-	36	-	-
	Telicherry	-	6	-	1
	Sirohi and Telicherry	-	-	38	-
Turkey	white and black beltville	13	-	-	-
Duck	khaki campbell	13	-	-	-
Fish fingerlings	koicarp	300	-	-	-
	Carp	2060	1500	2000	-



### Technical Intervention Made

- Sirohi, Boer and Tellicherry goat breeds were introduced.(18 number of bucks were supplied)
- Bharath merino and NARI SWARNA sheep breeds were introduced (45 rams were supplied)
- Conservation of superior native germplasm (Artificial insemination using tharparkar semen in 100 native/ crossbred dairy animals).

### After Intervention

The supplied ram/bucks were used to breed native female goat/sheep and resulted in

- The higher birth weight of kids/ lambs (2.200 to 3.00 kgs)
- Kid/ lamb mortality was reduced to 3 %
- Twinning or triplets during kidding/ Twinning during lambing was noticed
- Marketable weight of the animal at 6 month was 12-15 kgs
- By cross breeding using tharparkar semen in more than four generations resulted in younger ones with stress tolerance and the capacity for production of approximately 1980 kg per lactation.

### Impact

By seeing the performance, 51 goat farmers and 32 sheep farmers continued to upgrade the non descript female animals with Tellicherry, Boer in goats and NARISWARNA in sheep respectively. By crossbreeding the farmers able to get higher birth weight with meagre new born mortalities and increased the meat production performance of the small ruminants. More than 100 dairy farmers adopted artificial insemination of tharparkar semen in their dairy animals continuously and reported higher milk productivity in non descriptive animals.

**Fig.14: Breed introduction (NARI –SWARNA)**



**3.1.3. Animal Housing / Improved shelters for reducing heat stress in livestock**

In Vadavathur village most of the farmers were of small holders and they did not have proper housing for their animals and these animals were tied in open space under tree shades / other shades before implementing the scheme. In this condition the animals were susceptible for heat stress, prone to vector borne diseases and the production performance of the animals were low.

**Table 17: Demonstrations of improved shelter for livestock/ animals**

Interventions	Type of shelter	Number of farmers involved					
		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Cow	Improved shelters	-	-	-	1	-	-
Poultry	Improved Night shelters	-	-	-	11	11	10
	Back yard poultry shed	-	-	-	1	-	-
Sheep	Improved shelters	-	1	-	2	-	5
Goat	Slatted floor shed	-	-	1	-	-	5

**Technical Intervention Made**

- Improved shelter for dairy animals
- Low cost thatched roof shed for sheep



- Slatted floor goat shed
- Night shelter for poultry birds

### After Intervention

#### In dairy animals

- Average milk Production was (10 lt /day) with fat (4.0) and SNF (7.8) %
- Incidence of silent heat was reduced (20 % to 10%)
- Conception rate was improved (AI/conception was reduced from 3 to 2)
- Onset of postpartum oestrous was earlier (From 90 days to 60 days)

#### In Small Ruminants

- Kidding/Lambing interval was reduced from 10 month to 8 month
- Average birth weight of kid was improved from 1.5 to 1.75 kg
- Kid mortality was reduced from 10% to 3 %
- Average daily body weight gain was increased from 40 gm to 75 gms from
- Weight at marketable weight (6 month) was increased from 9 to 12 kgs
- Incidence of disease was reduced from 10 % to 5 %.

#### In Poultry

- Weight at marketable weight of 1.5 kgs was obtained at 4 month against 6 month of age
- Clutch size increased from 12 to 15
- Chick mortality was reduced to 2 to 3% from 10 to 20%

#### Impact

The improved shelter helps the animal to dissipate the heat, increase the comfort of the animal and sustained production. The roof material should have the insulation property to overcome the hot climate. The farmers perceived that animal shelter with standard spacing helps to increase the production performance i.e. enhanced daily milk production by 300-500 ml in dairy animals, increased weight daily gain of 75 gm in small ruminants and increased egg production 12-15 eggs per clutch in desi birds even during hot weather.

### Up scaling of Technology

The farmers were adopted planting trees nearby the shelter and wetting of gunny bags and applied it over the roof and sides during hot summer, to protect the animal from direct sunlight with the advantage of alleviating heat stress in animals and increase the feed conversion ratio.

**Fig. 15: Improved shelters for Desi bird, Sheep & Goat**

**Mrs.P.Gandhimathi, Jambumadai**



**Mr.K.Nagarajan, Vadavathur**



**Mr.A.Perumal,Jambumadai**



**Mrs.K.Kangambal, Jambumadai**







### **3.1.4. Dry fodder storage bank**

The farmers normally kept fodder heaps in open area and not protected from direct sunlight and rain. The fodder heap during rainy season was affected by moulds and fungus which caused food poison in livestock

#### **Technical Intervention Made**

The dry fodder storage bank by putting aluminium sheet over the fodder was demonstrated in the scheme in 76 dairy farmers.

#### **Impact and Up scaling of Technology**

The farmers reported that fodder stored using aluminium sheet helped to preserve their fodder for longer period without affecting its keeping quality and nutrient content. More than 125 dairy farmers of NICRA village also adopted this technique as it was very much compatible with cost and simplicity in usage.

#### **Intervention in Feeding Management**

##### **Before Intervention**

The farmers allowed their animal for grazing and not followed balanced feeding and they were not aware of micro nutrient feeding (Mineral block and Mineral Mixture) to their livestock. In this nutritional regime, infertility and low productive performance in livestock were noticed widely.

##### **Technical Intervention Made**

- Demonstration of Low cost concentrate feed preparation
- Feeding of Mineral mixture and Mineral block

##### **After Intervention**

Using locally available feed ingredients low cost concentrate feed preparation was demonstrated for farmers to reduce the feed cost by purchase of concentrate and in addition resulted in enhanced milk production from 1.5-2.0 litres and fat percent by 3-4% and animal showed good reproductive performance in the adopted village.

A demonstration on feeding of mineral mixture was taken up in NICRA village of Vadavathur. Improved practice of feeding includes feeding of mineral mixture 30 g/ day along with paddy straw which resulted in increased milk yield 200-300 ml, milk and fat content enhanced to 4.0% and 7.5%. Ultimately revenue through sale of milk increase from Rs. 10 to Rs. 20 and calves health and body weight improved.

Mineral block feeding to small ruminants help to increase the weight gain of animal (by 6-9 %) and improved the reproductive performance of animal (Kidding/Lambing interval reduced) and mortality reduced in young ones.

**Feedback and Up scaling of Technology**

Almost all of the dairy farmers and handful of small ruminant farmers adopted feeding Mineral mixture and Mineral block and the adoption is continuing till now as state animal husbandry department and Aavin also provided this under free/ subsidized rate go combat drought which is exhibited well by improved health status of animal.

**Fig.16: Improved fodder storage method**

**Before NICRA intervention**



**After NICRA intervention**



**3.1.5. Disease preventive measures undertaken**

**Before Intervention**

The farmers in adopted village had lack of knowledge on ecto and endo parasitic control measures / dosage (50%), Inadequate knowledge on methods / dosage (30%), they followed improper deworming whenever time permits which resulted in Parasitic infestation (55 %), Anemic & alopecia (20 %) and Low weight gain (40 %) in small ruminants.

The farmers in adopted village had lack of knowledge on Ranikhet disease control measures in poultry, PPR in goat, Blue tongue in sheep and inadequate knowledge on vaccination schedule (95%) in poultry birds. The farmers were aware of FMD vaccination in cattle but they did not follow proper vaccination in dairy animals too.



**Table 18: Number of animal health camps conducted in NICRA village**

Focus	Number of animals treated					
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Goat (PPR) Deworming	50	250	130	588	260	-
Sheep (ET) Deworming	60	325	200	845	320	-
FMDcow & Deworming	50	125	54	632	107	-
Lasota	100	350	320	213	213	-
Oral pellet vaccine	100	-	-	-	-	-
RDVK	100	1850	836	632	632	483
Fowl pox	100					-
Albendazole		1840	330+1156	756	845	-
Blue tongue vaccination	-	-	-	-	-	150

### Technical Intervention Made

Animal health camp conducted regularly which helps to cater the needs of livestock animals of the adopted village. The following disease preventive measures undertaken

- Deworming of young ones and needy animals and birds
- Vaccination of animal-FMD in cattle, PPR in goat, Blue tongue in sheep and RDVK in poultry.
- Treatment of disease affected animals

### After Intervention

Calves, Lamb & Kids mortality was reduced to 1-3% due regular health care service, less morbidity due to worm and disease outbreaks. Avg. Monthly Weight gain was improved to 30kg in calves 2.8 kg in lambs and kids.

### Feedback and Up scaling of Technology

Now the farmers regularly followed vaccination and deworming of their animal helps to prevent the disease outbreak, decreases the treatment cost and increases the profitability of the small holder farmer.

**Fig. 17: Animal Health camp and deworming in NICRA village**  
**Mineral Mixture supplementation**                      **Foot and mouth disease (FMD)**  
**vaccination camp**



**Goat Deworming**



### 3.2. Fisheries

India is the second most largest fish cultivating country in the world, especially Tilapia cultivation is widely spreading in country. Because of the following reasons,

- i. Tilapia can easily survey in all types of water.
- ii. Can survey in low oxygen.
- iii. Can tolerate in high temperature.
- iv. Can cultivate salt and marine water.
- v. High growth rate.
- vi. No need of vaccination and other medicines.
- vii. Can cultivate in low cost.

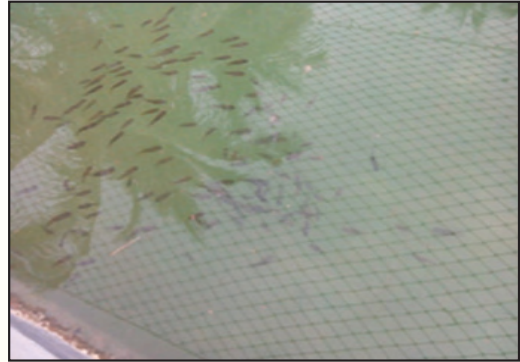
According to Namakkal district fish cultivation is not playing major role, due to water scarcity. Very few people are doing fish cultivation. Before the intervention in NICRA village no one was aware of fish cultivation due to drought, but after the intervention demo units as temporary water storage ponds were created in farmers field and introduced drought tolerant fish species for cultivation, during storage of water from open well or bore well seed fish introduced and monitoring regularly water quality and quantity, and the excess amount of water open for irrigation and for additional income.

Monosex culture of Tilapia is advantageous as they grow fast and uniform in size. The genetically Improved Farm Tilapia (GIFT) and carp was introduced in the village and the details are as follows.

**Table 19: Data on fish cultivation at NICRA village**

2011-12		
Technology demonstrated Critical input (Variety, Fertilizer / Chemicals doses,)	No. of farmers	Unit/ No. / Area (ha)
Temporary water storage tank -Two UV irradiated polythene sheet	2	4428 and 3933 ft
Ornamental fish - koicarp (300Nos.)	1	300
Carp	2	2060
2012-13		
Carp	3	1500
2013-14		
Carp	8	2000
2016-17		
<i>GIFT Tilapia</i>	5	10000

**Fig. 18: Fisheries activities in NICRA village**



**Fish catching in Temporary water storage pond**



## **MODULE - 4**

### **INSTITUTIONAL INTERVENTIONS**

#### **4.1. Income Generation Activity**

The main thrust of the income generation activities would be to assist farmers' establishment of income generation in or near the home. This could be also one of the main objectives of the farmers groups formed with the support of the Project through its reinforcement of group promotion activities. Income Generation Activity (IGAs) tends to give farmer a higher status within the family. In Vadavathur village panchayat two income generation activity groups were formed for the production of Agro based Bio input Viz., *Panchakaviya* namely

- 1. Gomatha KVK Group, and**
- 2. Aishwaryam KVK Group** (Group members details given in Annexure II)

For the preparation of panchakaviya materials were supplied to each group separately. They are, Plastic drum with cover lid (25 liter capacity 5 nos), Cow dung 5 kg, Cow urine 3 litres, Milk 2 litres, Curd 2 litres, Thunder coconut 3 litres, Ghee 1 litre, Sugarcane juice 3 litres, Banana 15 nos, Grapes 2 kg and Pamphlet regarding preparation and application of Panchakaviya for different crops and also many demo classes & training programmes were conducted in this village.

All materials, technology and guidance were provided to the groups for the preparation of good quality of Panchakaviya, and the prepared panchakaviya has been sprayed in farmers fields, based on the results other farmers were interested to buy and use panchakaviya for their crop fields in low cost.

### Production and Sale

258 litres of Panchakaviya produced and sold worth of Rs 19,350/- (Rupees nineteen thousand three hundred and fifty only), from this they got additional income of Rs.14,550/- (Rupees fourteenthousandfive hundred and fifty only) in short duration as they worked very short free time in a day.

**Table 20: Production and sales details of Panchakaviya**

Production (l)	Sale (l)	Spent Amount (Rs)	Income generated (Rs)
<b>Gomatha KVK Group</b>			
135	135	2,500/-	10,125/- (-)2,500/-
Total			<b>7,625/-</b>
<b>Aishwaryam KVK group</b>			
123	123	2,250/-	9,225/- (-) 2,250/-
Total			<b>6,925/-</b>



**Fig. 19: Income generation activity in NICRA village**



**4.2. Custom Hiring Farm Implements**

Before NICRA intervention farmers were hiring agricultural instruments from private persons and from long distance in high cost, hence the instruments were not available in opted time for agricultural purpose but after NICRA intervention all necessary machineries are available in same village itself so the farmers are hiring implements in opted time in low cost and at correct time.

The Custom hiring farm implements unit is successfully operating in the village where it is managed by Climate Risk Management Committee (Thalamalayan Pasumai Iyakkam) with 19 members, who have jointly purchased the tractor. So far **1385** numbers of farmers were benefited by the usage of this farm implements. The total gross income through the custom hiring was Rs.7,90,441 from the year 2011 to 2016. The year wise usage of CHE implements is given in Annexure III.





**Fig. 20: Custom Hiring Farm Implements**



### 4.3. Village Climate Risk Management Committee (VCRMC)

Village Climate Risk Management Committee (VCRMC) is functioning in NICRA village with 18 members. These members communicate prevailing situation of NICRA village to KVK during the abnormal weather conditions found in villages, they are getting remedial information and conveyed the message to farmers regarding Agriculture, Horticulture, Animal husbandary, Fisheries and soil science. This VCRMC is also maintaining the Custom Hiring Center (CHC)



**Table 21: Groups formed at NICRA village**

S. No.	Name of the Group	Name of the Village	Total No. of Members
1	ThalamalaiyanPasumaiIyakkam	Vadavathur	18
2	PorkalanjiamPasumaiIyakkam	Jambumadai	13
3	Mullai Group	Jambumadai	15
<b>2012-2013</b>			
1	KaravaiMaduValarppor Group	Jambumadai	17
<b>2013-2014</b>			
1	UdhayamPasumaiIyakkam	Jambumadai	13
2	SigaramPasumaiIyakkam	Jambumadai	15
<b>2016-2017</b>			
1	Gomatha KVK Group	Vadavathur	15
2	Aishwaryam KVKThozhilKuzhu	Jambumadai	15

**Table 22: Extension Activities  
2012 -2013**

Name of the activity	Exposure visit made by	Number of programmes	No. of beneficiaries		Remarks
			Male	Female	
Exposure visit	KVK, Namakkal	5	37	24	<ul style="list-style-type: none"> <li>✓ Visited Regional exhibition – Trichy and Karur.</li> <li>✓ Visited Agri and Horti exhibition – Coimbatore.</li> <li>✓ To visit KVK, Kattupakam and Perambalur.</li> <li>✓ Visited Value added units to Thanjavur.</li> <li>✓ To conduct the uzharperuvizha, pongalvizha, farmers scientist meet, Collector visit, field day, TV and FM radio recording.</li> </ul>



Method Demonstration	KVK, Namakkal	5	66	33	Mushroom cultivation, Azolla cultivation, Onion tip drying method demonstrations was done.
Commodity groups	KVK, Namakkal	11	98	42	To visit the various commodity groups.
Awareness	KVK, Namakkal	8	130	45	Given the awareness on new technologies.
Field day	KVK, Namakkal	2	163	65	Field day was conducted at Vadavathur.
<b>2013 -2014</b>					
Exposure visit	KVK, Namakkal	3	21	15	<ul style="list-style-type: none"> <li>✓ Visited Regional exhibition.</li> <li>✓ Visited fisheries Research and information centre Bangalore and Dry land agricultural technology, Chettinad.</li> </ul>
Method Demonstration	KVK, Namakkal	2	19	6	Seed onion nursery technology and micro irrigation techniques.
Commodity groups	KVK, Namakkal	7	78	20	To visit the various commodity groups.
Awareness	KVK, Namakkal	5	63	6	Given the awareness on new technologies.
<b>2014 -2015</b>					
Exposure visit	KVK, Namakkal	2	21	4	<ul style="list-style-type: none"> <li>✓ Visited National Horticulture exhibition, Codissiya, Coimbatore.</li> <li>✓ Visited TNAU, Coimbatore.</li> </ul>



Method Demonstration	KVK, Namakkal	8	92	81	<ul style="list-style-type: none"> <li>✓ Demonstration on Vegetable micro nutrient mixture for improving the small onion Bulb size.</li> <li>✓ Bio – control agent <i>Trichodermaviride</i> and <i>Pseudomonas fluorescence</i> treatment for small onion bulb or basal rot management.</li> <li>✓ Conducted the demonstration on soil sample collection method.</li> <li>✓ Summer ploughing techniques.</li> <li>✓ Value added product in milk.</li> <li>✓ Water management techniques using mobile sprinkler.</li> <li>✓ Frost management in small onion by rope method.</li> <li>✓ Seed onion (CO-5) nursery management techniques.</li> </ul>
Commodity groups	KVK, Namakkal	6	87	19	To visit the various commodity groups.
Awareness	KVK, Namakkal	2	178	33	Given the awareness on new technologies



Field day	KVK, Namakkal	2	52	14	<ul style="list-style-type: none"> <li>✓ Conducted the field day on Blue sticky trap pest (Thrips) control in small onion field.</li> <li>✓ Conducted the field day on Bio – control agent <i>Trichoderma viride</i> and <i>Pseudomonas fluorescence</i> treatment for small onion bulb or basal rot management.</li> </ul>
<b>2016-17</b>					
Exposure visit	KVK, Namakkal	4	88	63	<ul style="list-style-type: none"> <li>✓ Visited PGP College, Namakkal, for “South Indian Chamber of Commerce and Industry”</li> <li>✓ Visited Agri Expo, Erode (Jambumadai Farmers)</li> <li>✓ Visited Agri Expo, Erode (Vadavathur Farmers).</li> <li>✓ Visited XIII Agri Expo, Bengaluru</li> </ul>
Method Demonstration	KVK, Namakkal	27	411	297	<ul style="list-style-type: none"> <li>✓ Crop management</li> <li>✓ Fish farming</li> <li>✓ Fodder and feed management</li> <li>✓ Live stock management</li> <li>✓ Management of horticultural crops</li> <li>✓ Vegetable production</li> </ul>
Field day	KVK, Namakkal	2	27	16	<ul style="list-style-type: none"> <li>✓ IPM Practice in small onion.</li> <li>✓ Soil nutrient enrichment.</li> </ul>





**Fig. 21: Extension activities**  
Exposure visits of NICRA farmers



**Table 23: Training Programmes Conducted  
2011 -2012**

S.No.	Date	Title	Total beneficiaries		
			Male	Female	Total
1	09.09.2011	Mushroom Cultivation	8	5	13
2	21.09.2011	Azolla Production	4	28	32
3	30.09.2011	Dairy Cow Feeding	19	19	38
4	14.10.2011	Ornamental Fish Farming	5	5	10
5	04.11.2011	Backyard Poultry Rearing	5	9	14
6	11.11.2011	Fodder Production	8	3	11
7	09.02.2012	Preparation of value added dairy products	3	4	7
8	10.02.2012	Preparation of value added dairy products	3	4	7
9	06.03.2012	Preparation of value added dairy products	5	21	26
10	07.03.2012	Preparation of value added dairy products	6	30	36
<b>Total</b>			<b>66</b>	<b>128</b>	<b>194</b>
<b>2012 -2013</b>					
1	04.4.2012	Mushroom production	4	6	10
2	24.5.2012	Diseases management in livestock	3	4	7
3	11.7.2012	Inter cropping methods.	5	1	6
4	27.7.2012	Onion cultivation	9	13	22
5	03.8.2012	Fodder seed production technology.	6	-	6
6	24.8.2012	Disease management in poultry.	36	32	68
7	11.9.2012	Nutrient management in onion.	32	13	45
8	18.10.2012	Seed onion cultivation techniques.	4	5	9
9	16.11.2012	Vegetable cultivation	12	10	22
10	29.11.2012	Cultivation of fodder crops.	8	2	10



11	07.12.2012	Backyard poultry rearing.	10	5	15
12	04.1.2013	Water management techniques.	7	4	11
13	24.1.2013	Inter cropping systems in onion.	10	7	17
14	08.2.2013	Jasmine cultivation	15	13	28
15	15.2.2013	Nutrient management in vegetable crops.	8	4	12
16	23.2.2013	Pest and diseases management in onion.	14	9	23
17	06.3.2013	Preparation of value added dairy products.	3	8	11
18	15.3.2013	Azolla production	63	44	107
19	22.3.2013	Vermicompost technology	8	5	13
Total			<b>257</b>	<b>185</b>	<b>442</b>
<b>2013- 2014</b>					
1	05.4.2013	Cultivation of fodder crops	3	6	9
2	20.6.2013	Pest and diseases management of livestock's.	5	7	12
3	08.8.2013	Ground nut cultivation techniques	5	-	5
4	04.9.2013	Seed onion nursery technology management.	14	3	17
5	06.9.2013	Ethno veterinary technology in livestock.	22	10	32
Total			<b>49</b>	<b>26</b>	<b>75</b>
<b>2014- 2015</b>					
1	21.1.2014	Small onion storage methods	31	2	33
2	11.3.2014	Drip irrigation techniques	27	5	32
3	15.4.2014	Summer Management in Desi bird farming.	9	2	11
4	10.7.2014	Groundnut+ Red gram intercropping systems.	12	2	14
5	8.09.2014	Groundnut nutrient management techniques	23	5	28

6	11.10.2014	Seed Onion (CO-5) cultivation techniques	32	24	56
7	13.11.2014	Small Onion cultivation techniques	18	7	25
8	16.12.2014	Small Onion Pest control technique	42	36	78
<b>Total</b>			<b>194</b>	<b>83</b>	<b>277</b>
<b>2016- 2017</b>					
1	5.5.2016	Fish culture preparation	12	8	20
2	21.07.2016	Drought mitigation in onion through temporary water storage pond	23	11	34
3	2.8.2016	Integrated weed management in groundnut	20	14	34
4	15.11.2016	Application of PPFM in small onion	8	2	10
5	21.09.2016	Application of micronutrients in groundnut	10	6	16
6	29.9.2017	Preparation and application of Panchakaviya in small onion	8	12	20
8	17.10.2016	Vaccination of blue toungu programe on sheep	21	4	25

**Fig. 22: Training programmes conducted at NICRA village**







### NICRA Achievements

In addition to the above mentioned, the following achievements has made in the village

- Community ponds helped to increase the water level in bore wells and open wells that led to increase the cropping intensity and area in NICRA village.
- Form ponds helps to increase the cropping intensity in NICRA village.
- *Panthal* vegetable cultivation and Jasmine cultivation used for NICRA farmers to improve their regular income.
- Night shelter for poultry helps to prevent the chicks from heat, rain and natural enemies.
- Livestock Vaccination and deworming helps to prevent disease outbreak in NICRA village.
- Introduced fish farming at NICRA village that leads extra income to farmers.
- Fodder cover sheets helps to farmers to prevent fodder from heat and rain for long time.



- Improved shelter for sheep and goat is used to prevent heat and rain that leads minimize the death rate and maximise the productivity.
- Introducing NARI swarna ram to improve twinning in sheep form.
- Aavin milk society has been created in Vadavathur which is very helpful to milk producing farmers.
- Agricultural implements available in required time at low cost in NICRA village through custom hiring centre (Thalamalayan Pasumai Iyakkam) made the farmers self empowered.
- New Bank branch (Indian Bank) created in Vadavathur to easy transaction of farmers.
- Bus facility created to Namakkal *Uzhavar santhai* (Farmers Market) to carry their agro products.

**Table 24: Awards and Recognitions Received**

Name of award	Award given by	Name of the person	Year
Best NICRA KVK award	ATARI Bengaluru	KVKNamakkal	2014
Best NICRA Farmer award	CRIDA Hyderabad	1. Mrs. Dhanalaxmi 2. Mrs. Balamani	2015
Best Custom Hiring Centre	-	VCRMC, KVK, Namakkal	2015
Best Innovative farmer award	CRIDA Hyderabad	Mr. C. Soundharasan	2017

**Fig. 23: Awards and Recognitions Received**

**Best NICRA KVK award 2014**



**Best NICRA Farmer award 2016  
(Mrs. Dhanalaxmi)**





**Best NICRA Farmer award 2016  
(Mrs.Balamani)**



**Best NICRA Farmer award 2017  
(Mr.C.Soundhararasan)**



**Table 25: Booklets/Brochures/Leaf Lets Published**

S. No.	Author	Title	Year of publications
1	KVK Namakkal	NICRA-Salient Activities	2015
2	Sankar.C	Plant Protection in Natural Agriculture	2016
3	Sankar.C	Integrated Pest and Disease Management in sesamum	2016
4	Sankar.C	Integrated Pest and Disease Management in Small onion	2016
5	Sankar.C	Integrated Pest and Disease Management in Groundnut	2016
6	Sathya .S	Soil fertility management under rain fed condition	2016
7	JothiLakshmi.M	Summer management in live stock	2016
8		Hydroponic fodder production	2016
9	KVK Namakkal	NICRA 2011-16	2017



**Table 26: Distinguished Visitors to NICRA Village**

Date	Name of visitors
30.07.2011	Dr. S.Ayyappan, Director General of ICAR
30.07.2011	Mrs.Sanathi, Member of Legislative Assembly (Senthamangalam)
2012	QRP Visit
30.07.2011	Mr. Kumaraguruparan, District Collector (Namakkal)
28.02.2013	Mr. Thatchinamoorthi, District Collector (Namakkal)
18.06.2013	DDG-ICAR
24.09.2013	ATARI-Director
Feb 2015	DDG visit
11.02.2017	Dr. Srinivasa Rao, CRIDA-Director

**Fig. 24: Distinguished Visitors to NICRA Village**

**NICRA Inauguration at Vadavathur - Dr.S. Ayyapan, DG, ICAR, Dr.R.Prabhakaran, VC, TANUVAS, Dr.Murugesaboopathi, VC, TNAU, Th.Kumargurubaran, District Collector and Mrs.Sanathi, MLA Senthamangalam**



**NICRA exhibition visits by Mr. Kumaragurubaran, District Collector, Dr.S. Prabu Kumar, Zonal Project Director & DG, ICAR**



**Dr.D.V. Srinivasa Reddy, NICRA Nodel Officer, Zone VIII& PCs of Zone I KVKs**





**QRT Team visit**



**The District Collector, Namakkal**



**Zonal Monitoring Committee visit**



**Dr. G. Rajagopal, DDG-ICAR,  
Dr. Y.G. Prasad, CRIDA Director,  
Dr. Srinath Dixit, ATARI Director**



**Dr. Srinivasa Rao, CRIDA Director**



**Mr. Dhaksinamoorthi,  
District Collector Namakkal**



**NICRA Review Teamvisit**



**Dr. Srinivasa Rao, CRIDA Director**



**Table 27: Details of budget**

Year	Opening Balance	Budget sanctioned	Budget released	Receipts realized	Total	Expenditure incurred	Closing Balance
2010-11	0	30,35,000	30,35,000	0	30,35,000	4,33,123	26,01,877
2011-12	26,01,877	22,36,000	1,37,827	48,367	27,88,071	27,07,923	80,148
2012-13	80,148	18,60,000	17,79,852	6,517	18,66,517	18,59,606	6,911
2013-14	6,911	11,40,000	11,33,089	8,774	11,48,774	11,40,000	8,774
2014- 15 up to January 2015	8,774	19,50,000	13,85,000	-	-	12,11,000	7,39,000
2016-17	7,39,000	13,58,000	13,58,000	-	-	13,58,000	7,39,000





**Annexure - I**

**Table 28: Weather parameter recorded at NICRA village from Sep 2011 – Sep 2017**

Month/Year	Temperature (°C)		Relative Humidity		Rainfall (mm)	Rainy days
	Max	Min	Max	Min		
<b>2011</b>						
September 2011	34.30	23.50	89.90	53.6	88.86	7
October 2011	33.00	22.00	80.80	56.0	202.6	15
November 2011	31.40	21.20	86.30	59.2	95.00	7
December 2011	30.70	20.10	82.51	57.6	19.00	2
<b>Average/Total</b>	<b>32.35</b>	<b>21.70</b>	<b>84.80</b>	<b>56.6</b>	<b>405.46</b>	<b>31</b>
<b>2012</b>						
January 2012	32.7	13.10	83.90	59.51	1.00	0
February 2012	33.60	14.60	87.10	60.51	0.00	0
March 2012	36.60	17.90	79.30	50.50	0.00	0
April 2012	37.40	22.40	75.03	44.03	32.00	3
May 2012	40.06	22.64	80.70	51.48	44.00	4
June 2012	41.97	24.40	79.80	46.10	0.00	0
July 2012	37.90	24.20	81.40	43.30	14.20	2
August 2012	39.50	23.50	85.90	43.70	10.00	2
September 2012	39.20	23.60	88.70	43.70	122.60	6
October 2012	33.40	22.30	88.50	78.80	243.80	13
November 2012	33.40	21.90	80.60	53.80	2.00	0
December 2012	33.30	22.40	83.50	51.80	0.00	0
<b>Average/Total</b>	<b>36.59</b>	<b>21.08</b>	<b>82.87</b>	<b>52.26</b>	<b>469.60</b>	<b>30</b>
<b>2013</b>						
January 2013	36.58	22.74	81.90	50.94	0.00	0
February 2013	38.80	23.10	81.90	55.60	38.00	2
March 2013	40.23	23.42	79.90	41.55	0.00	0
April 2013	40.00	23.20	77.40	42.30	29.00	2
May 2013	42.40	23.20	78.40	44.90	19.00	2
June 2013	36.70	23.10	77.10	47.30	0.00	0



July 2013	37.83	23.09	79.06	46.54	0.00	0
August 2013	35.87	23.35	76.61	50.74	215.00	5
September 2013	36.50	24.20	82.10	45.80	69.00	3
October 2013	38.70	23.60	83.90	42.50	170.00	5
November 2013	37.00	22.00	78.10	57.00	61.00	1
December 2013	32.70	19.7	81.20	48.8	38	4
<b>Average/Total</b>	<b>38.55</b>	<b>23.15</b>	<b>79.03</b>	<b>47.83</b>	<b>639</b>	<b>24</b>
<b>2014</b>						
January 2014	37.5	19.3	79.1	47.3	0	0
February 2014	37.60	20.6	79.1	47.3	0	0
March 2014	38.36	22.05	79.03	57.13	0	0
April 2014	40.45	26.43	77.33	53.83	0	0
May 2014	36.45	24.23	77.65	52.48	24	2
June 2014	36.40	23.30	78.2	54.10	43	3
July 2014	36.23	23.80	77.25	53.42	69	3
August 2014	37.43	24.25	78.29	55.23	71	3
September 2014	37.6	24.0	79.3	52.9	124	3
October 2014	34.7	23.7	83.0	55.1	136	12
November 2014	32.80	23.5	79.5	52.6	69	6
December 2014	31.0	24.6	78.4	54.9	61	2
<b>Average/Total</b>	<b>37.5</b>	<b>23.1</b>	<b>79.3</b>	<b>51.7</b>	<b>787</b>	<b>38</b>
<b>2015</b>						
January 2015	33.7	22.5	83.0	54.4	3.4	1
February 2015	-	-	-	-	-	-
March 2015	-	-	-	-	-	-
April 2015	-	-	-	-	-	-
May 2015	-	-	-	-	-	-
June 2015	38.60	24.43	81	78	0	0
July 2015	39.74	24.23	80	78	35.00	3
August 2015	37.40	23.67	83	82	92.00	7
September 2015	37.23	23.32	81	80	143.00	9
October 2015	36.41	23.48	89	79	108.00	6
November 2015	34.28	23.37	85	74	100.5	4



December 2015	35.7	23.7	80	70	0	<b>0</b>
<b>Average/Total</b>	<b>36.63</b>	<b>23.58</b>	<b>82.75</b>	<b>74.42</b>	<b>481.9</b>	<b>30</b>
<b>2016</b>						
January 2016	23.21	37.25	76	81	0	0
February 2016	23.82	38.03	76	84	0	0
March 2016	24.15	39.55	79	82	0	0
April 2016	23.53	40.83	79	80	0	0
May 2016	23.83	38.22	80	85	50	4
June 2016	23.84	38.24	80	81	6.5	1
July 2016	22.7	36.4	87	89	164.7	5
August 2016	23.66	37.08	79	82	53	3
September 2016	23.87	36.69	80	82	23	1
October 2016	23.71	38.19	79	80	32	2
November 2016	24.2	39.62	77	82	0	0
December 2016	24.5	40.2	79	81	0	0
<b>Average/Total</b>	<b>23.75</b>	<b>38.35</b>	<b>79.25</b>	<b>82.41</b>	<b>329.2</b>	<b>16</b>
<b>2017</b>						
January 2017	23.88	37.30	76.58	79.16	8	2
February 2017	23.66	37.25	83.25	81.35	18	1
March 2017	24.35	39.83	79.50	82.2	-	-
April 2017	24.17	40.2	79.10	81.40	-	-
May 2017	24.19	39.88	80.35	79.19	202	4
June 2017	24.52	39.43	76.94	83.21	-	-
July 2017	24.54	39.25	81.21	78.34	30	1
August 2017	25.26	38.32	80.68	79.33	164.5	5
September 2017	23.64	38.54	83.13	78.02	189	6

## Annexure - II

**Table 29:Details of the group members  
Gomatha KVK group**

S. No.	Name & Address of the Trainee	Community	Sex	Phone Number
1.	P. Sagunthaladevi w/o Palaniyandi Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	9789747932
2.	P. Sathya w/o Periyasamy Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	9688705158
3.	S. Kavitha w/o Sathishkumar Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	9786187975
4.	V. Laxmi w/o Veramalai Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	8489694921
5.	N. Laxmi w/o Nadesan Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	9789616401
6.	M. Selvarani w/o Muthukaruppan Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	9047396020
7.	V. Manimegalai w/o vasanthakumar, Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	9500714424
8.	M. Valarmathi w/o Periyannan Thanga Nagar Vadavthur Po, Namakkal Dt.	MBC	Female	9159457407
9.	N. Mahalaxmi w/o Nallaiyan Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	9629175760
10.	B. Dhanalaxmi w/o Balasubramani Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	-
11.	V. Thangammal w/o Vairan Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	9842523012



12.	M. Parvathi w/o Mani Thanga Nagar, Vadavthur Po, Namakkal Dt.	MBC	Female	9585063048
13	K. Bathmini W/o Krishnasamy Pillaiyarkovilst. Vadavathur, Namakkal Dt.	BC	Female	9003823890
14	S. Jeyakodi W/o Selvam Thanga Nagar, Vadavathur, Namakkal Dt.	MBC	Female	8940355111
15	G. DevikaW/o Govindharaj Vadavathur, Namakkal Dt.	MBC	Female	-

**Table 30: Aishvaryam Kvk Group**

S.No.	Name & Address of the Trainee	Community	Sex	Phone Number
1.	Bairanaidu S/o Palanisamy Jambumadai, Vadavathur, NamakkalDt	BC	Male	9600410873
2.	NAgalaxmi W/o Senthilkumar Jambumadai, Vadavathur, NamakkalDt	BC	Female	7639253054
3.	Selvaraj S/o Mallunaidu Jambumadai, Vadavathur, NamakkalDt	BC	Male	7708496177
4.	Saroja W/o Veerasamy Jambumadai, Vadavathur, NamakkalDt	BC	Female	9566911455
5.	Vijayalaxmi W/o Dhanapal Jambumadai, Vadavathur, NamakkalDt	BC	Female	9994190742
6.	Dhanalaxmi W/o Selvaraj Jambumadai, Vadavathur, NamakkalDt	BC	Female	8489227302
7.	Usharani W/o Govindhasamy Jambumadai, Vadavathur, NamakkalDt	BC	Female	9629145602
8.	BharathiS/o Govinthasamy Jambumadai, Vadavathur, NamakkalDt	BC	Female	-





9.	Rengaraj S/o Alagirisamy Jambumadai, Vadavathur, NamakkalDt	BC	Male	9597230843
10.	BathmaW/o Dhanapal Jambumadai, Vadavathur, NamakkalDt	BC	Female	7708737931
11.	Krishnasamy S/o Kaminaidu Jambumadai, Vadavathur, NamakkalDt	BC	Male	-
12.	Thamilselvam S/o Veerasamy Jambumadai, Vadavathur, NamakkalDt	BC	Male	9500530453
13	Selvaraj S/o Alagiri Jambumadai, Vadavathur, NamakkalDt	BC	Male	8098914267
14	Pannerselvam S/o Thalamanaidu Jambumadai, Vadavathur, NamakkalDt	BC	Male	9994670112
15	Seetha W/o Rajagopal Jambumadai	BC	Female	-



### Annexure III

**Table 31: Machineries at CUSTOM HIRING CENTRE in NICRA village from 2011 – 2016**

S. No.	Name of machinery	Receiving Date	Suitability		Custom hiring rate	
			Crop	Operation	Rs/hr	Rs/ha
1	Rotovator	27.8.2011	Onion, Groundnut, Green gram, Black gram	Residue Incorporation	650	1083
2	Cultivator with spring	27.8.2011	Onion, Groundnut	Ploughing	400	1000
3	Seed cum fertilizer driller	27.8.2011	Groundnut	Sowing	700	1750
4	Ridge former	27.8.2011	Onion	Ridges forming	800	2000
5	Bund former	27.8.2011	Onion	Bund forming	700	1750
6	Chain block	27.8.2011	Onion, Groundnut, Tapioca	To lift motor and pipes from bore wells.	200	500
7	Chisel plough	27.8.2011	onion	Deep ploughing	500	1250
8	Battery operator power sprayer	27.8.2011	Onion, Groundnut, Green gram, Black gram	Pest and disease management	10	25
9	Mobile sprinkler	27.8.2011	Onion, Groundnut, Green gram, Black gram, Fodder sorghums CoFS29	Sprinkling water during scarcity.	100	1000
10	Electronic weighing balance	27.8.2011	Onion, Vegetables, Desi birds.	-	Rs. 2/ bag	-
11	Egg Incubator	27.8.2011	Desi birds	-	Rs. 5/ egg	-

**Table 32: List of Implements in Custom Hiring Centre**

Details of the implement							
Name of Implement	Actual No. of users	Total number of times implement used	Av. land area (acre) covered	Crops	Activities carried out	Income generated out of hiring (Rs/ year)	Average No. of man days saved by using the implement
<b>2011-13</b>							
Spring Cultivator	45	142	78	Onion, groundnut, green gram	Deep and shallow Ploughing	1,40,822/-	1 man day/1ha
Seed driller	22	26	19.6	Groundnut	Sowing seeds and dropping fertilizers	26,415/-	10 man days/ acre
Rotavator	48	136	76	Onion, groundnut, Green gram, black gram	Incorporation of crop residue after harvest	96,130/-	Under drip 8 man days/acre Under channel irrigation 4man days/acre
Mobile sprinkler	-	-	-	Onion, groundnut	-	-	-
Chain block	8	8	-	Onion, groundnut,	To lift the motor from open well for further maintenance	4,000/-	-
Weighing balance	4	12	-	-	measure the weight of agro products/ inputs	145/-	-
<b>Total</b>	<b>127</b>	<b>324</b>	<b>173.6</b>	<b>-</b>	<b>-</b>	<b>1,41,512</b>	<b>-</b>
<b>2013-14</b>							
Spring Cultivator	21	62	23.6	Onion, groundnut, green gram	Deep and shallow Ploughing	32,000/-	1 man day/1ha
Seed driller	23	29	11.6	Groundnut	Sowing seeds and dropping fertilizers	13,720/-	10 man days/ acre
Rotavator	29	81	43.2	Onion, groundnut, Green gram, red gram	Incorporation of crop residue after harvest	83,300/-	Under drip 8 man days/acre Under channel irrigation 4man days/acre



Bund former	4	4	1.6	Onion, groundnut	Bund forming with recommended spacing	1,750/-	3man days/acre
Mobile sprinkler	4	7	3.9	Onion, groundnut	Foliar spraying of water for drought management	1,200/-	-
<b>Total</b>	<b>81</b>	<b>183</b>	<b>83.9</b>	<b>-</b>	<b>-</b>	<b>1,31,970/-</b>	<b>-</b>
<b>2014-15</b>							
Spring Cultivator	44	126	47.2	Onion, Groundnut, Green gram	Deep and shallow Ploughing	51,140/-	1 man day/1ha
Seed driller	21	27	19.2	Groundnut	Sowing seeds and dropping fertilizers	10,910/-	10 man days/ acre
Rotavator	25	81	26	Onion, Green gram, Groundnut	Incorporation of crop residue after harvest	41,580/-	Under drip 8 man days/acre Under channel irrigation 4man days/acre
Mobile sprinkler	-	-	-	Onion groundnut	Foliar spraying of water for drought management	-	-
Chain block	4	4	-	-	To lift the motor from open well for further maintenance	1,200/-	-
<b>Total</b>	<b>94</b>	<b>238</b>	<b>92.4</b>	<b>-</b>	<b>-</b>	<b>1,04,830/-</b>	<b>-</b>
<b>2015-16</b>							
Spring cultivator	36	108	34.89	Onion, Groundnut, green gram	Deep and shallow Ploughing	70,980/-	1 man day/1ha
Rotavator	59	239	58.32	Onion, Groundnut, Green gram, Black gram	Incorporation of crop residue after harvest	1,98,230/-	Under drip 8 man days/acre Under channel irrigation 4man days/acre
Seed cum fertilizer driller	20	25	11.42	Groundnut	Sowing seeds and dropping fertilizers	27,475/-	10 man days/ acre



Bund former	2	2	1.2	Onion, Groundnut	Bund forming with recommended spacing	920/-	3man days/acre
chain block	2	2	2 bore wells	-	To lift the motor from open well for further maintenance	1000/-	-
weighing balance	2	5	62 gunny bags	-	measure the weight of agro products/ inputs	124/-	-
<b>Total</b>	<b>121</b>	<b>281</b>	<b>105.83</b>	-	-	<b>2,98,729/-</b>	-
<b>2016-17 (Till December 2016)</b>							
Spring cultivator	23	65	86.95	Onion, Groundnut, Green gram	Deep and shallow Ploughing	26,000/-	1 man day/1ha
Seed driller	9	12	12	Groundnut	Sowing seeds and dropping fertilizers	8,400/-	10 man days/ acre
Rotavator	18	60	52.7	Onion, groundnut, Black gram	Incorporation of crop residue after harvest	39,000/-	Under drip 8 man days/acre Under channel irrigation 4man days/acre
Five arm Cultivator	12	28	32.7	Onion, groundnut	Deep ploughing	22,400/-	-
Trailer Cum water tank	25	176 trip	-	-	-	17,600/-	-
<b>Total</b>	<b>37</b>	<b>341</b>	<b>184.35</b>	-	-	<b>1,13,400/-</b>	-





**Table 33:Publications**

Sl. No.	Author	Title	Journal	Year	Page No.
1	B. Mohan, R. Sangeetha, S. Alagudurai, C.SharmilaBharathi, K. Senthilkumar, S. Aanand, M. Daisy, K. Panneerselvam and G. Gohila	Case study of Water Saving Through Temporary Water Storage Ponds in Village Vadavathur in Namakkal District	J KrishiVigyan	2013	2(1) : 5-7
2	B. Mohan, S. Alagudurai, C.SharmilaBharathi, K. Senthilkumar, S. Aanand, K. Panneerselvam, G. Gohila and R. Sangeetha.	Climate Resilient Initiative in farming at Vadavathur – A drought prone village in Namakkal Dt, Tamil Nadu.	Presented at Conference on Farm first for conserving Soil and Water resources in Southern Region at Bangalore.	March 14-16, 2013.	31-33
3	C.SharmilaBharathi B. Mohan, S. Alagudurai, R. Sangeetha, G. Gohila and K.Panneerselvam	Empowerment of women through Jasmine cultivation	Journal of KrishiVigyan (Special issue)	2015	27-31
4	C. SharmilaBharathi B Mohan, R Sangeetha, G. Gohila and K. Paneerselvam	Front Line Demonstration on Multiplier Onion (Allium cepaL. varaggregatum Don) to Reduce Cost of Production.	Journal of KrishiVigyan,	2015	4(1):30-36
5	C. Sharmila Bharathi B.Mohan,S.Alagudurai, G.Gohila,R.Sangeetha and K.Paneerselvam.	Integrated Pest and Disease management in Small onion at NICRA village in Namakkal District of Tamil Nadu.	Research abstract Abstract on First KVK Symposium Zone VIII.	2016	-



6	C. Sharmila Bharathi B.Mohan and N.Akila	Yield enhancement in small onion by frequent irrigation through HDPE lined temporary water storage pond in NICRA village of Namakkal	Research abstracts published in XIII Agricultural Science Congress	2017	-
7	C. SharmilaBharathiB. Mohan and N.Akila	Management of tip drying in small onion due to dew drops in NICRA village of Namakkal District.	Research abstracts published in XIII Agricultural Science Congress	2017	507
8	C.Sharmila Bharathi and B.Mohan	Drought tolerant Jasmine ( <i>Jasminun sanbac</i> ) cultivation as a crop diversification for livelihood securityand resilience to climate variavility	International J. of trends in Biosciences	2017	10(19) 3483-89