

NATIONAL INNOVATIONS ON CLIMATE RESILIENT AGRICULTURE



ACHIEVEMENTS



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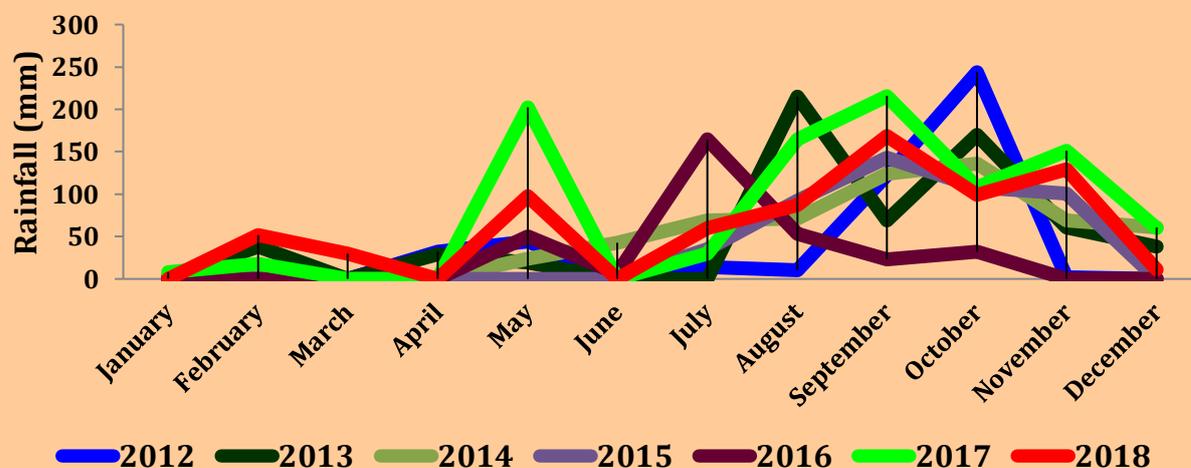
NICRA Village

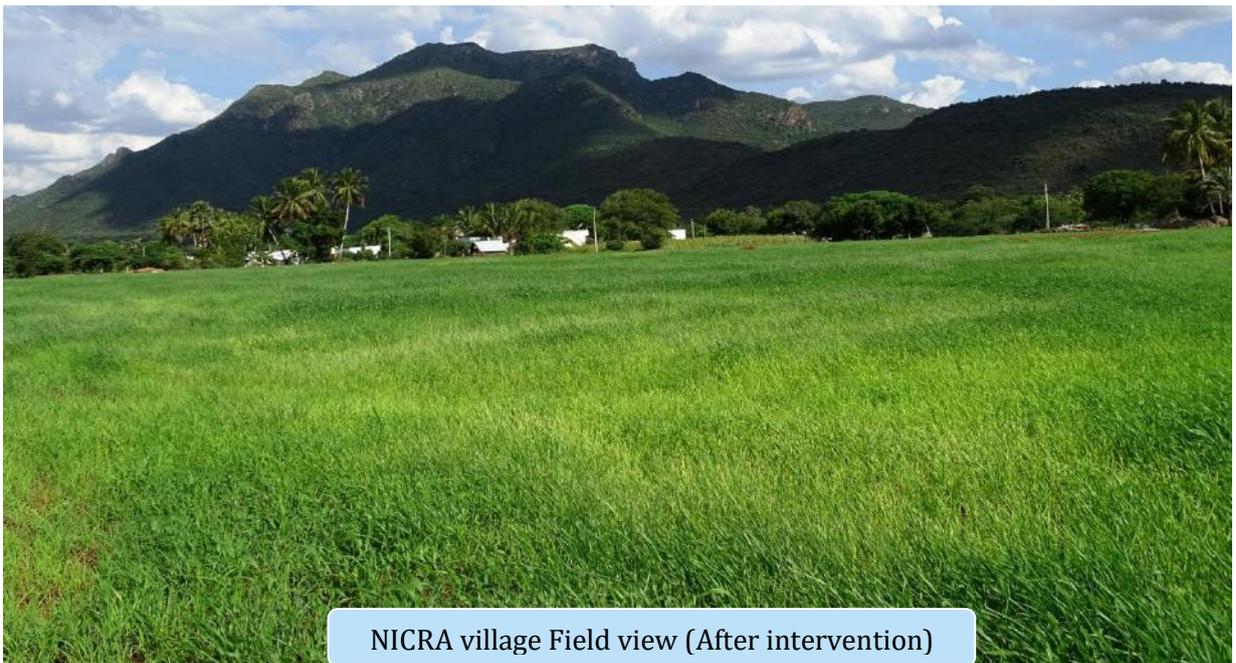
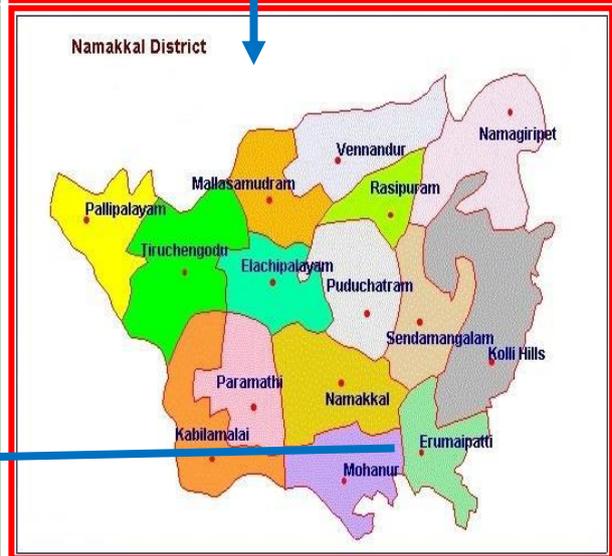
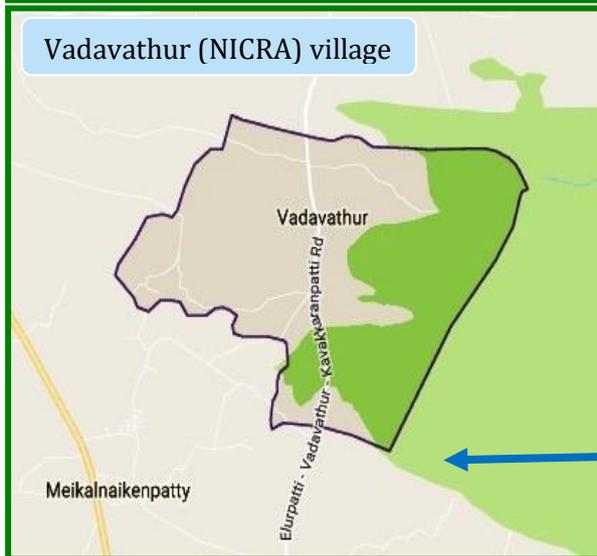
Vadavathur Village in Erumaipatty Block of Namakkal District, Tami Nadu is a drought prone village with annual rainfall of less than 400 mm. The mean maximum and minimum temperatures are 46 and 12°C. Undulating and slopy lands have aggravated the drought condition due to non percolation of rainwater in the catchment and water storage areas. This has led to mono-cropping (October to January) during north-east monsoon.

Name of the village	: Vadavathur
Name of the district	: Namakkal
No. of Households	: 869
Total cultivated area	: 525ha
Major soil type	: Sandy loam
Mean annual rainfall	: 400 mm
Major cropping systems	: Onion, sorghum & Groundnut
Climate vulnerability	: Drought

Geographical location of
Vadavathur village
11°05'.20'
78°17'.14'

Rainfall in NICRA vilge (2012-18)





NICRA village Field view (After intervention)

NICRA Implementation - 2011



National Innovations on Climate Resilient Agriculture (NICRA)

has been promoted in 11th five year plan by 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 Thiruvavur. NICRA scheme at Namakkal is being initiated by Krishi Vigyan Kendra of Tamil Nadu Veterinary and Animal Sciences University in 2011 at Vadavathur village panchayath comprising Vadavathur and Jambumadai villages with 829 families and with population of 2850 different modules under NICRA were implemented.

1. Natural Resource Management
2. Crop Production
3. Livestock management
4. Institutional Intervention

The efforts to preserve the available water in the village by the scheme and its impact created many water storage structures in the village is the success of the Natural Resource Management module of NICRA in Vadavathur and Jambumadai.

MODULE-I

NATURAL RESOURCE MANAGEMENT

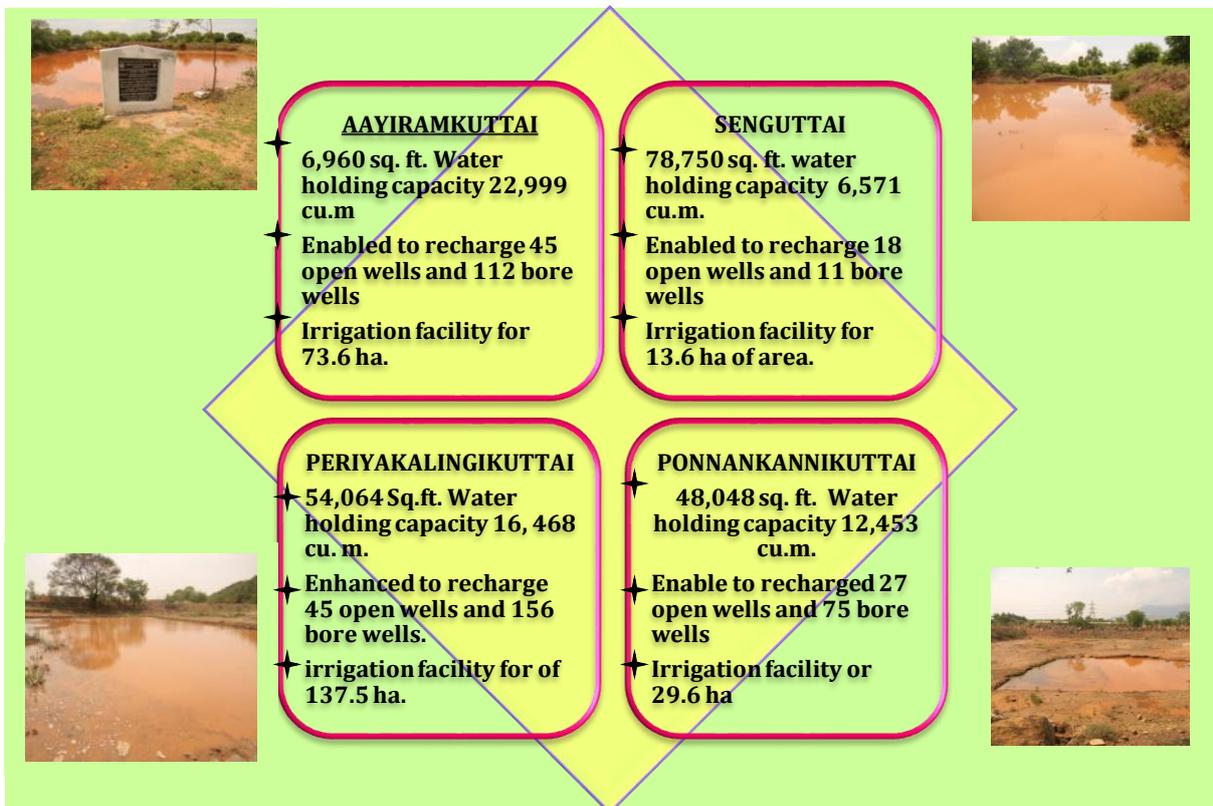


Natural resource management is an approach to sustain both renewable and non-renewable resources for present and future use. By considering how best to use the particular resource, its productivity is prolonged, and its relationship with the environment is protected. One example of natural resource management could include the efforts of a number of organizations to preserve water availability and quality around the world. Management of water is becoming especially important as regions of the globe become warmer and drier under the influence of global warming.



Intervention-I

Renovation of Community Ponds



Out of 11 community ponds situated in NICRA village (Senguttai, Aayiram kuttai, Ponnankanni kuttai, Periyakalingi kuttai, Kannimar kuttai, Forest kuttai, Pannai kuttai, Kuruman kuttai, Eallaipallam kuttai, Thalaimalai adivara kuttai and Usilamkuttai) were renovated to hold more rain water and two became barren land.

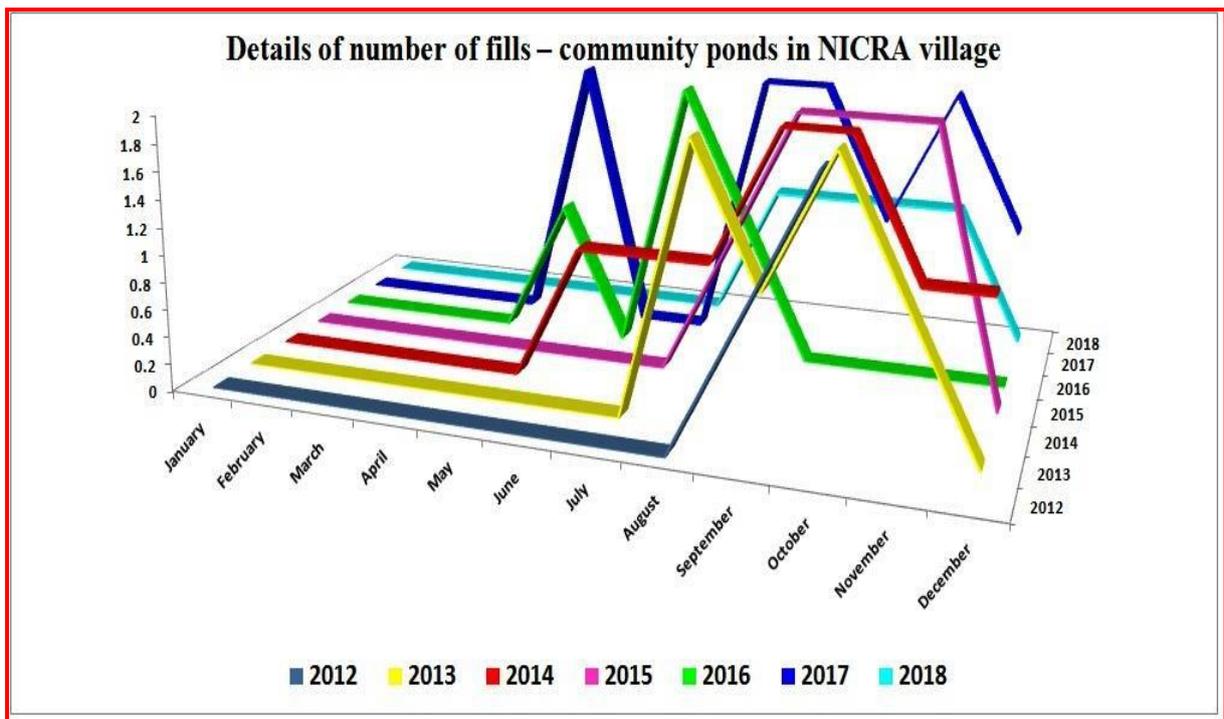
Among these, TWO ponds became barren lands.

FOUR ponds were renovated by NICRA based on the water holding capacity and the land covered for cultivation.

Followed by NICRA

❖ ONE pond renovated by NABARD.

❖ THREE ponds renovated by MGRS.



Distribution of community and rain water storage farm ponds in NICRA village
Before the NICRA intervention After the NICRA intervention



Intervention II

Rain Water Storage Farm Pond



With the successful intervention of the Natural Resource Management structures created in NICRA village, farmers became aware of rain water storage and created rain water harvesting structures in their own field with the assistance from MGRS. This may fill during the monsoon, able to store 55 cu.m. of water in pond in their field, that assist to recharge their open wells and bore wells.



**Rain water storage structure
(20 ft x 20 ft x 5ft).**



Distribution of check dams in NICRA village

Before the NICRA intervention



After the NICRA intervention



Moisture conservation



Summer ploughing

- ❖ Breaking of hard crusted upper layer of the soil and deep ploughing, the infiltration capacity and permeability of the soil increases which increased insitu moisture conservation.
- ❖ Tillage improves soil aeration which helps to multiplication of micro organism.
- ❖ Deep ploughing, over turning uproots the weeds.

Compartmental bunding

- ❖ An effective moisture conservation measure in fry land.
- ❖ Suitable for lesser rainfall areas.
- ❖ Small compartments act as a dam and store the rainfall received in the compartments for longer period.
- ❖ It increases the water holding capacity of the soil.

Intervention III

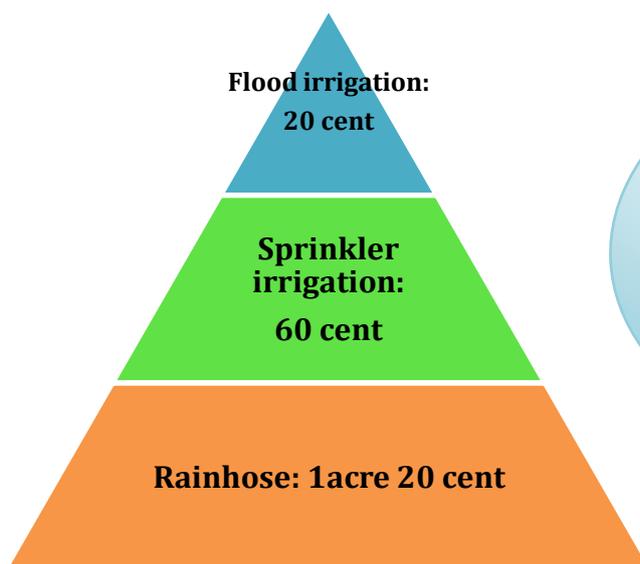
Check Dam Construction



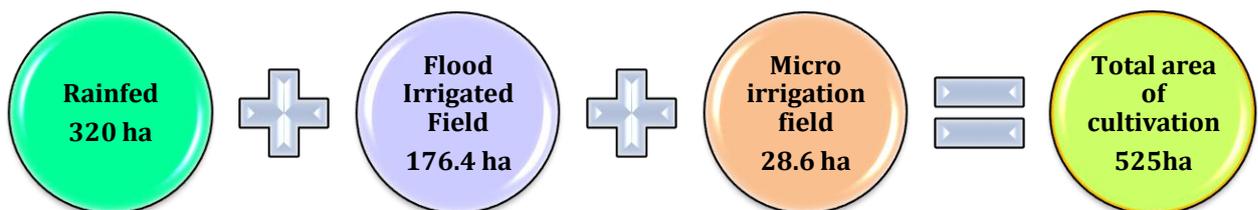
Only one check dam constructed in NICRA project at Vadavathur village, with the successful intervention of this check dam, till date 14 check dams has been created with the help of different funding agency viz., NABARD, Forest Department and MGRS scheme in NICRA village and prevent over flow during rain, which increases the recharge of ground water.

Intervention IV

Micro Irrigation



Awareness created to utilize the stored water in a more efficient manner by micro irrigation system to minimize the use of water and increase the area of cultivation for all crops and 28.6 ha covered till 2018.



Irrigation pattern in NICRA village

Manual Weather Station

Manual weather station and daily display of weather data with weather alert system created at Vadavathur through NICRA scheme, which assists to know the short range weather forecast prevailing in village, especially rainfall and temperature.



Impact

Farmers come to know about the daily weather conditions prevailing in their village and make suitable decision in agricultural and animal husbandry activities. They also received weather advisory services from KVK for sustainable agriculture.

Intervention II

CROP PRODUCTION

Problems and focus

- Less annual average rainfall (410 mm)
- Prolonged dry spell (20 - 30 days)
- Crop failure due to drought
- Higher sucking pest incidence due to higher temperature
- Non adoption of drought resistant / tolerant varieties
- Poor yield.



Action taken

- Demonstration of drought resilient and short duration pulses and oil seed varieties.
- Demonstration of ICM practices in rain fed crops
- Demonstration of pest and disease resistant varieties.
- Introduction of Foliar nutrition in pulses and groundnut

Achievements

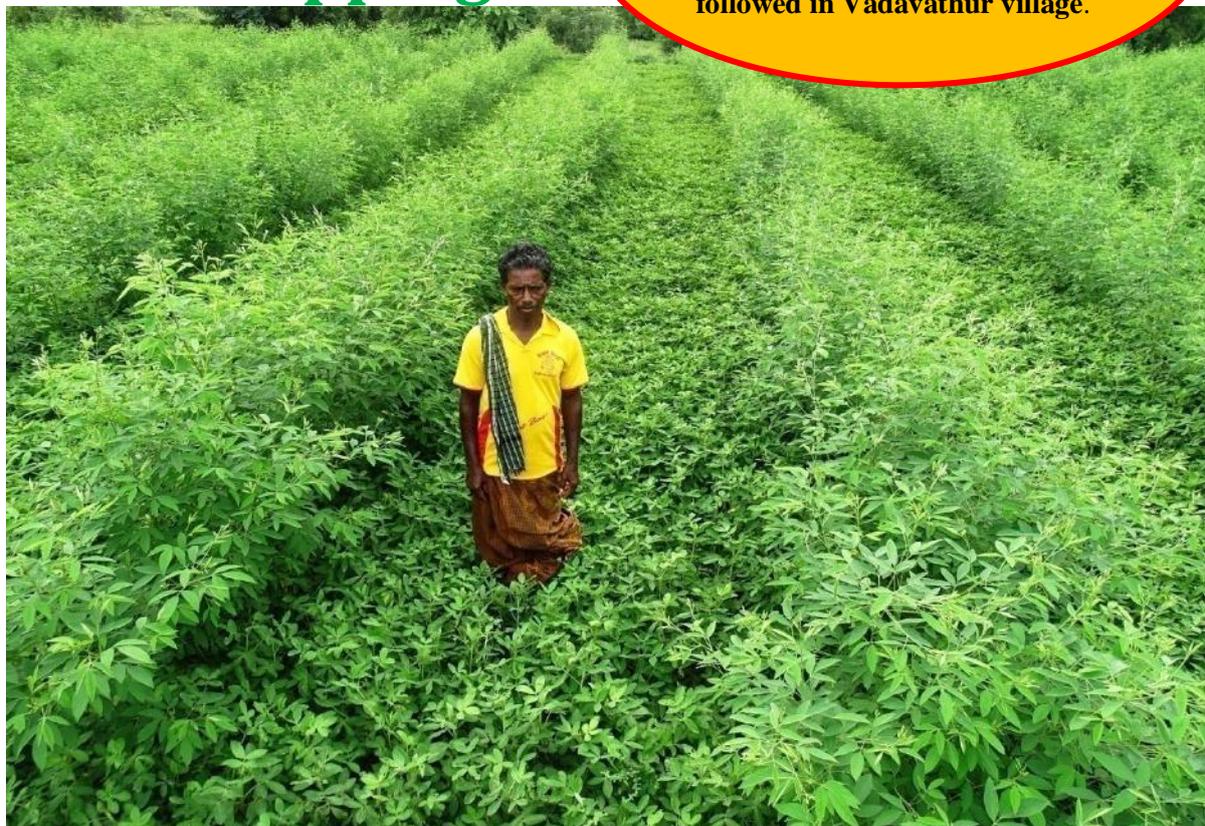
- ❖ 60% of farmers adopted to improved varieties of pulses and oil seeds of seeds in NICRA village.
- ❖ 50 farmers were adopted in NICRA adjoining villages.
- ❖ Spread 92 ha in Namakkal district.

Intervention I

Inter Cropping

Problem Observed

Sole cropping of groundnut cultivation was the predominant cropping system followed in Vadavathur village.



Action Taken

Introduced 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.

Yielding pattern	Solo crop	Inter crop
❖ No. of pod/plant	22.4	30.5
❖ Pod yield(kg/ha)	1322	1680
❖ Haulm yield (kg/ha)	2250	2855
❖ Red gram yield (kg/ha)	Nil	312
❖ Groundnut pod equivalent yield(kg/ha): Nil		507
❖ Cost of cultivation (Rs/ha):	32100	37560
❖ Gross income(Rs/ha)	71652	109560
❖ Net income (Rs/ha)	39552	72000
❖ B:C ratio	2.23	2.91

Achievement

- 45 % of people adopted technology.
- 75 farmers adopted in near by villages.
- Around 250 ha adopted in Namakkal district.

Intervention II

Improved Varieties



Achievement
26 ha adopted in NICRA village and 35 ha spread over in Namakkal District.

Crop	Farmers practice	Technological intervention by NICRA
Black gram	Susceptible to Yellow Mosaic Virus and uneven maturity. (Variety –T9) Yield - 720 kg/ha	High yielding, Short duration variety. Resistant to yellow Mosaic Virus and synchronised maturity. (Variety -Co.6) Yield - 840 kg/ha
Green gram	Susceptible to Yellow Mosaic Virus and uneven maturity. (Variety – CO.6) Yield - 700 kg/ha	High yielding Short duration variety. Resistant to yellow Mosaic Virus and synchronised maturity. (Variety –VBN 3) Yield - 850 kg/ha
Red gram	Long duration (180 days) Variety. Yield - 900 kg/ha	Short duration (125 days) Variety. CO(RG)7 Yield - 1000 kg/ha



Achievement
24 ha adopted in NICRA village and 35 ha spread over in Namakkal District.

Intervention III

In-Situ Moisture Conservation



Aim

To hold the rain water and increase the water holding capacity.

Problem diagnosis

In farmer practice entire field was sown without any compartments/segments.

Impact

- ❖ 20% higher grain yield recorded in compartmental bund field.
- ❖ Crops did not show any moisture stress (withered) condition 25 days dry spells.



Impact

Adopted 50 farmers in and around NICRA villages and which spread over more than 100 ha in Namakkal district.

Intervention IV

Integrated Farming System

Objective

To get maximum productivity per unit area, year round income, effective recycling of farm resources.

IFS components demonstrated in NICRA village

- ❖ Green gram
- ❖ Sorghum
- ❖ Onion
- ❖ Vegetables
- ❖ Desi bird
- ❖ Dairy
- ❖ Biogas
- ❖ Vermicompost







Impact

- ❖ **Increased farm income through proper residue recycling and allied components**
- ❖ **Sustainable soil fertility and productivity through organic waste recycling**
- ❖ **Inclusion of biogas and agro forestry in integrated farming system will solve the prognosticated energy crisis.**
- ❖ **Cultivation of fodder crops as inter cropping and as border cropping result in the availability of adequate nutritious fodder and animal components like milk cow, goat and sheep**
- ❖ **Generation of regular employment for the farm family members of small and marginal farmers.**

Activity V

Crop Diversification with Perennial Crop

Aim and Focus

Before implementing NICRA, small onion is the major crop cultivated as annual crop in more than 300 ha and it is the only source of income. To alleviate this problem crop diversification with perennial crops was thought a feasible option to minimize risk in crop production, ensure reasonable returns with limited care for small land holders. Drought tolerant Jasmine var. Ramanathapuram gundu malligai demonstrated in 12 farmer's field to ensure the year round income from farmer's field.



Action taken

Drought tolerant Jasmine var. Ramanathapuram gundu malligai demonstrated in 23 farmer's field to ensure the year round income from farmer's field.

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 Mekkalanayakanpatti up scaled the Jasmine cultivation in an area of 24 acres.

Small onion vs Jasmine (80:20 ratio)

Particulars	Small Onion + Jasmine 80:20 cents	Onion 1 acre
Yield	4.8t onion 545kg jasmine	5.2 tons
Gross cost (Rs.)	64690	47190
Gross return (Rs.)	187075	96000
Net return (Rs.)	122385	48810
BCR	2.89	2.3



Activity VI

Additional Crop Cultivation

Problem observed

After the cropping season in many fields the excess water of bore wells and open wells during the normal year, which has been effectively, utilize for the cultivation of additional crops which may enhance the farmer's income during the summer season.



Action taken

Brinjal, Bendi, Tomato, Chilli, Annual Moringa and cucurbitaceous vegetables cultivation demonstrated in farmer's field.

Achievements

- ❖ Vegetable crops are being cultivated in an area of 44.8 ha during *rabi* season by 167 farmers and 11 farmers adopted panthal system for vegetable cultivation on their own cost and contribution of MSDA scheme in and around NICRA villages.
- ❖ Farmers directly sold their products in *Uzhavar santhai* (Farmers Market) every day.

Vegetable crops cultivated in NICRA village



Intervention III

Livestock Management

Aim

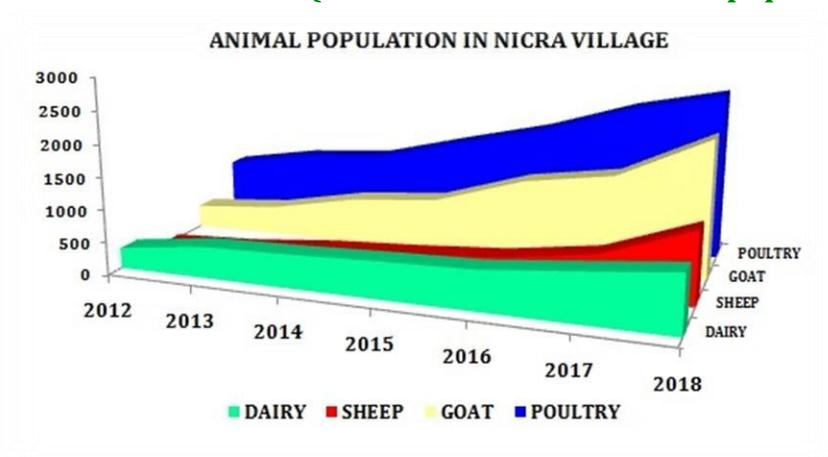
Livestock plays a major role for livelihood of the farmers in NICRA village. But drought created severe hardships and resulted in low productive and reproductive performance of livestock.



Action taken

- Improved shelters.
- Green Fodder development.
- Disease preventive measures undertaken.

Achievement (observed increased animal population)



Activity I

Improved Shelters

Problem Observed

- In NICRA village animals were susceptible for heat stress, prone to vector borne diseases and the production performance were low.

Action taken

- Till date one improved cow shed, 46 improved poultry shads, 17 sheep sheds and 6 slatted floor goat sheds were demonstrated in NICRA villages.



Achievements

- 120 farmers were adopted for improved housing in NICRA village.
- More than 400 farmers were adopted improved housing in Namakkal District.

Impact

- Improved shelters helps to dissipate the heat, increase the comfort of animal and sustained production.
- Which enhanced daily milk production by 300-500 ml in dairy animals.
- Increased daily weight gain of 75 gm in small ruminants.
- Increased egg production 12-15 eggs per clutch in desi birds.



Activity II

Disease Preventive Measures

Problem Observed

- Parasitic infestation, Anemic & alopecia and Low weight gain in small ruminants.
- Inadequate knowledge on vaccination schedule for goat, sheep and poultry birds.
- Farmers aware of FMD vaccination in cattle but they did not follow proper vaccination in dairy animals too.



Action taken

- ✓ 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

Impact

Calves, lamb & kids mortality has been reduced from 1 to 3 %, less morbidity due to worm and disease outbreaks. Average monthly weight gain was improved to 30 kg in calves 2.8 kg in lambs and kids.

Achievements

- More than 70% of farmers in NICRA village following proper vaccination to their animals properly.
- More than 50% of the farmers in Namakkal District following proper vaccination for their animals.

Activity III

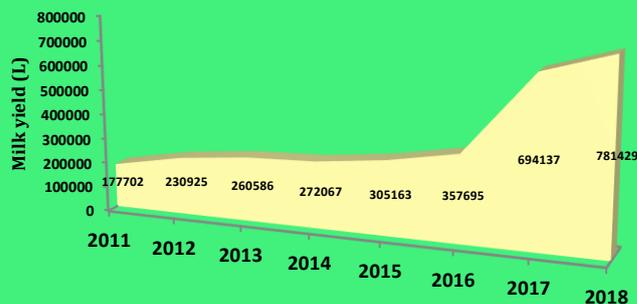
Green Fodder Development

Problem observed

Mostly sorghum crop Stover used as a dry fodder after grain threshing. Availability of green fodder for livestock is meagre in Vadavathur village.



MILK YIELD IN NICRA VILLAGE (2011 - 2018)



Impact

- Milk yield increased.
- Green fodder production increased in farmers field.
- Livestock population increased in NICRA village.

Achievement

Till date 320 farmers (NICRA village & nearby villages) adapted to CoFs-29 around 5-7 ha.

Module IV

Custom Hiring Farm Implements

Problem observed

Instruments were not available in opted time for agricultural purpose.

Action taken

All necessary machineries provided to NICRA village itself so the farmers are hiring implements in opted time in low cost and at correct time.



Name of the implements available with CHC

Spring Cultivator, Seed driller, Rotavator, Chain block, Chain pulley, Bund former, Chisel plough, Electronic weighing balance (50 kg), Electronic weighing balance (500 kg), Electronic weighing balance (100 kg), Community incubator, Liquid Nitrogen Container (35 l capacity), Liquid Nitrogen Container (3 l capacity), Mobile sprinkler, Mobile sprinkler accessories, Ridge farmer, Five tyne cultivator, Spring loaded nine tyne cultivator, Tractor attached tanker; Tractor attached sorghum harvester. Maize cob harvester.



Implementation

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

From the revenue generated

- 36% is used to purchase of diesel.
- 10% is for labor charges
- 20 % is for repair and maintenance cost

34% of Profit is gained from the amount realized

Achievement

- 1500 farmers were benefited by usage these farm implements.
- Total gross income through the custom hiring was Rs.7,90,441.

Success story I

Community Pond



Mr. Rajagopal
S/o Veerasamy
(Contact Number: 9047825803), living in Jamumadai village of Earumaipatti Block, Namakkal District, he had 4.2 acre own cultivated land with one open well and also he had one dairy animal, water has been available only in rainy season in his open well, remaining seasons it was dry. Groundnut, Sorghum and Small onion is major crops, often he face crop failure due to insufficient water and did only one cropping season per year, to

manage this problem he dug a bore well, but he didn't get water even in 700 feet also. Due to insufficient water facility he don't have interest in livestock management.

After initiate the NICRA intervention in his village, he asked to renovate one community pond which available near by his field namely Aayiram kuttai, which renovated from **41,904 to 56,960 sq. ft with Water holding capacity 22,999 cu.m.** Once the Aayiram kuttai filled within one or two days his open well and 700

feet bore well get water facility for one cropping season, now he having many crops in his field there after he did not face any crop failure. Small onion, pulses, sorghum, groundnut and Jasmine crops are found in his field, now he established his field from 4.2 acre to 4.7 acre and have 10 dairy animals, 7 goat and 16 desibirds in his field, also he dug out 4 bore wells. He constructed two farm houses with few vehicles to transport.

Success story II

Crop production



Mr. Govindharaj S/o Cindhuminaidu

(Contact Number: 9047119715), living in Jamumadai village of Earumaipatti Block, Namakkal District, he had 4 acre own cultivate land with one open well and one bore well.

Before starts the NICRA intervention, he cultivated long duration variety of pulses, groundnut and sorghum in rain fed condition.

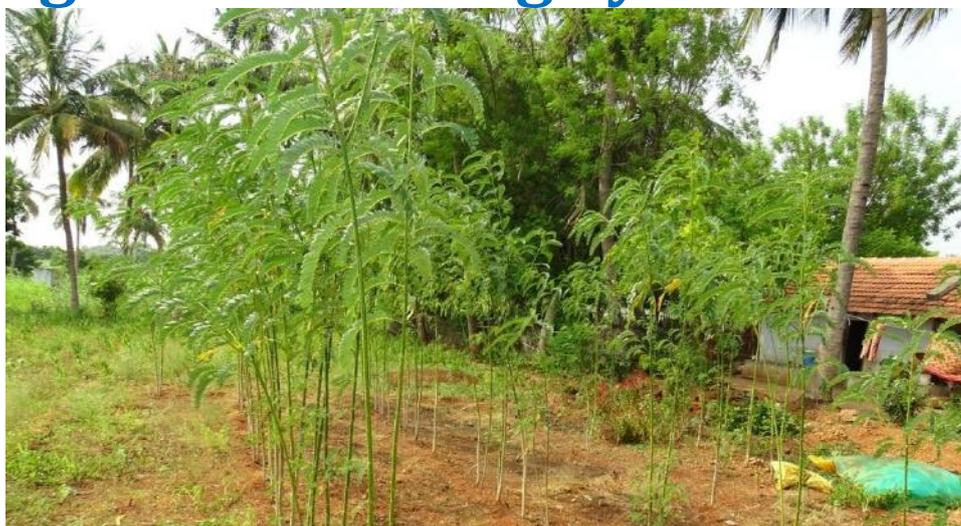
Often he met crop failure due to insufficient water facility during the crop in flowering stage or in pod forming stage.

After NICRA intervention he adopted for improved varieties of groundnut (TMV-7), green gram (CO-8), black gram (VBN-6) and red gram (VBN-3), which need minimum quantity of water and the irrigation interval

also high, so after NICRA intervention he didn't face any crop failure problems; also he sold their grains for seed purpose for extra income than selling of grains. Now he established his land with complete fence and extra bore well. Now he completely changed their cropping pattern to improved varieties.

Success story III

Integrated Farming System



Mr. Manikandan S/o Balusamy (Contact Number: 6381073619), living in Jamumadai village of Earumaipatti Block, Namakkal District, he had 12 acre own cultivate land in same place with one open well 7 bore wells.

Before started the NICRA intervention he followed monotonous cropping system *Viz.*, long duration pulses, small onion and groundnut. He faced marketing problem due to the huge production of same kind of crops that times he depend only intermediators at the same time he don't have livestock in his field.

After NICRA intervention he slowly converted his field to multi cropping *viz.*

Pulses, oil seeds and horticultural crops also included with livestock, slowly he converted his field as integrated farming system with improved varieties. Also he is using micro irrigation system. He cultivates green fodders (CoFS-29 and Agathi) on his field along with vegetable crops like brinjal, small onion, tomato and cucurbitaceous vegetables. Now he gets income from pulses, groundnut, small onion, dairy animal. Cow dung used for the production of bio gas (which reduce his home fuel expenses) cow dung used for vermicompost production (which reduce the fertilizer cost), now he is getting multi income from his field.

Success story IV

Jasmine Cultivation



Mr. Saravanan
S/o **Ramasamy**
(Contact Number: **7639971808**), living in Jamumadai village of Earumaipatti Block, Namakkal District, he had 3.5 acre own cultivate land with one open well and two bore well.

Before NICRA intervention he cultivated green gram, Black gram and small

onion in his field which gives only seasonal income, remaining seasons he went to some other company works to Namakkal and Thiruppur.

After NICRA scheme jasmine Var. Ramanathapuram gundumalligai introduced in his field for 0.5 acre, due to this incident after 6 months he getting regular

income from his field. He no need to migrate from his village, slowly he extend the area of jasmine cultivation today he have around 2.45 acre of jasmine cultivation.

Success of this intervention he getting Rs. 15000/- to 25000/- per month as regular income from his field.

Success story V

Livestock Management



Mr. Paramasivan S/o Krishnasamy (Contact Number: 9629281717), living in Jamumadai village of Earumaipatti Block, Namakkal District, he had 3 acre own cultivate land with one bore well.

Before NICRA intervention he concentrates only in

agriculture practices, from this he getting insufficient income, due to crop failure.

After NICRA intervention year-round green fodder developed in his field (CoFS-29) in large scale, and he bought dairy animals now he having 6 dairy animals, 24 sheep and

30 desibirds in his field. He improved feeding management for live stock and getting more income than agriculture practice

Success of this work Rs. 20000 to 25000 as an income per month from his livestock.

NICRA Achievements

- **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.**