National Innovations in Climate Resilient Agriculture

NICRA

ANNUAL REPORT 2015-16

Shri Hanumantharaya Educational & Charitable Society

KRISHI VIGYAN KENDRA

Yagantipalle, Kurnool Dist.

National Innovations in Climate Resilient Agriculture

(NICRA)

Annual Progress Report 2015-16

Kurnool district of Andhra Pradesh is one of the drought prone districts of the state. Yagantipalle village which is located at a distance of 4 km from Banaganapalle Panchayat of Banaganapalle mandal with 70% of rainfed agriculture was selected for implementing NICRA project. Desi cotton and redgram were the main crops grown during kharif and Jowar, sunflower in rabi. Most of the crops get affected with late onset of monsoons followed by dry spells during critical crop growth periods, which in turn severely affecting yield. The short duration millets viz., Foxtail millet SIA 3085 and Surya nandi varieties of 70-75 days duration and tolerance to drought and downy mildew were introduced in place of jowar and desi cotton. Likewise inter copping systems with korra and red gram (5:1). In red gram, replacement of long duration Variety with Asha-87119 was taken up.

During Kharif Monsoon onset was late (Third week of July) and the crops experienced prolonged dry spells during grand growth period. Cotton could not be taken up due to late onset of monsoon. Jowar was sown but it was affected with terminal moisture stress. The demonstrations of short duration varieties of Seteria (KORRA) SIA 3085 and Suryanadi could escape drought due to its shorter duration. As there was no rainfall, livestock suffered from lack of green grass and fodder. Demonstration of Silage making, Hydroponic fodder production helped the farmers to come out of the situation to some extent.

As water was scarce, drip installation saved from drought, under crop diversification (paddy to vegetables) which boosted the income of the farmers. Drip irrigation was fully capitalized by the farmers in the village and they could realize some reasonable yield by minimizing cost of cultivation and diversification to floriculture and vegetables. KVK also took up non -traditional vegetables like beet root and cabbage during Rabi.

KVK also introduced poultry farming at Backyards with Rajasri birds to help small families. These birds are gradually attracting farmers attention for its potential egg production, hence more and more farmers are approaching KVK for Rajasri birds as the birds are coping up well with the village climate.

With an objective to control the calf mortality, KVK also introduced calf registration programme which was well received by the farmers. The registered calves under this programme were provided medical and nutritional attention up to six months.

For conservation of soil and water, conservation furrows and demonstrations on PUSA hydrogel application @ 2.5 Kg/ha were taken up in rain fed crops like red gram and cotton. Real time contingent management of pest and diseases in red gram and castor was taken up. Most of the soils are alkaline in nature making unfit for cultivation of common crops. Hence, reclamation of such soils was taken up as demonstration in 20 acres with gypsum treatment based on soil test.

Thirty bio gas units were established near the farmers houses for domestic gas, which was supported by NEDCAP, Kurnool. This technology attracted the attention of other farm families.

Burrakunta after desilting

A view of grazing animals are drinking the water

Farm Pond filled with water

Major Climatic Details of the Village

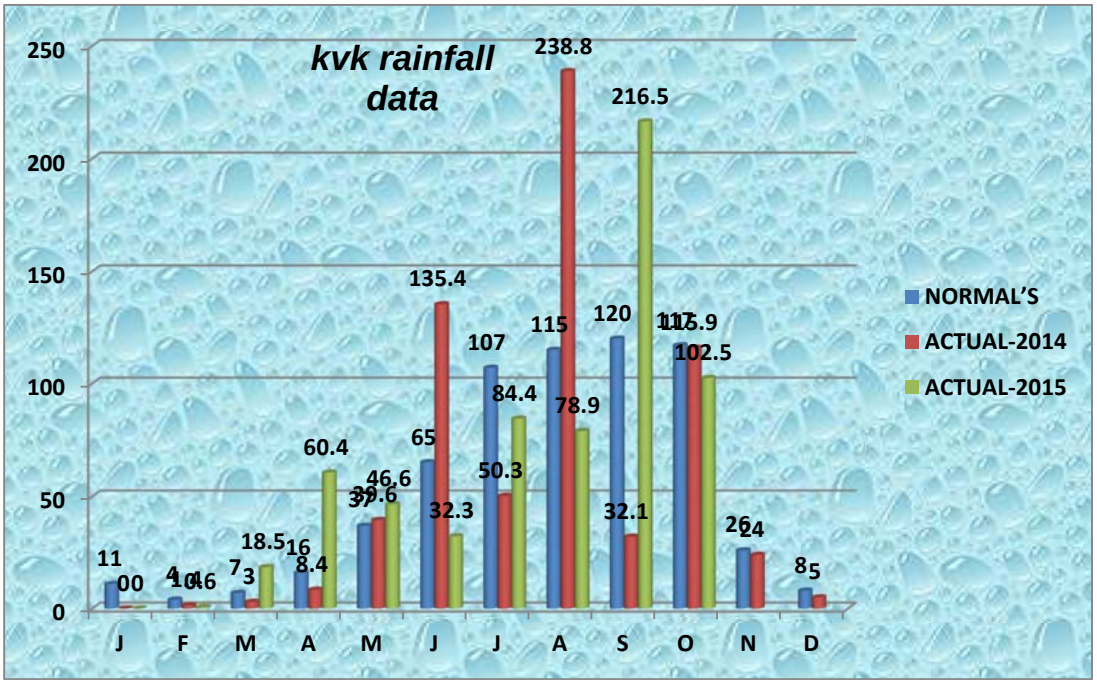
Table 1: Distribution of rainfall in comparison with normal

Month	Normal rainfall (mm) Based on min.10 years	Rainfall (mm)				Difference of rainfall in comparison with normal rainfall (mm)				% Deviation i.e., Actual – Normal × 100 / Normal			
		2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
Jan	011.0	000.0	000.0	000.0	000.0	-011.0	-011.0	-011.0	-11.0	-100	-100	-100	-100
Feb	04.0	000.0	027.7	001.4	000.6	-004.0	+023.7	-002.6	-3.4	-100	+592.5	-65	-85
March	007.0	001.0	000.0	003.0	018.5	-006.0	-007.0	-004.0	+11.5	-85.7	-100	-57.1	+164.2
April	016.0	036.2	003.8	008.4	060.4	+020.2	-012.2	-007.6	+44.4	+126.2	-76.25	-47.5	+277.5
May	037.0	007.0	079.6	039.6	046.6	-030.0	+042.6	+002.6	+9.6	-81.0	115.1	+7.0	+25.9
June	065.0	005.9	072.2	135.4	032.3	-059.1	+007.2	+070.6	-32.7	-90.9	11.1	+108.3	-50.3
July	107.0	097.2	095.3	050.3	084.4	-9.8	-011.7	-056.7	-22.6	-9.1	-10.9	-52.9	-21.1
Aug	115.0	136.0	106.6	238.8	078.9	+21.0	-8.4	+123.8	-36.1	+18.2	-7.3	+107.6	-31.3
Sep	120.0	039.4	186.0	32.1	216.5	-80.6	+66.0	-087.9	+96.5	-67.1	55.0	-73.2	+80.4
Oct	117.0	064.2	044.6	115.9	102.5	-52.8	-72.4	-001.1	-14.5	-45.1	-61.8	-0.9	-12.3
Nov	026.0	018.6	004.2	24.0	81.0	-7.6	-21.8	-2.0	+55	-29.2	-83.8	-7.6	+211.5
Dec	008.0	001.4	000.0	5.0	001.4	-6.6	-8.0	-3.0	+6.6	-100	-100	-37.5	-82.5
Total	633.0	406.9	620.0	653.9	723.1	-226.1	-13.0	+20.9	+7.7	-35.7	-2.0	3.3	14.2
Total actual rainfall during cropping season (Sowing to harvest)	Normal rainfall (mm)Based on min.10 years 633.0	362.7	508.9	601.5	514.6	-195.3	-49.1	+43.5	-43.4	-335	-8.7	7.7	-7.7

Banaganapalle Rainfall Data Normals and Actuals

Table 2: Distribution of rainfall in NICRA Village during 2015:

Day	June	July	August	September	October	November	December
1	000.0	000.0	000.0	000.0	000.0	000.0	001.4
2	000.0	000.2	000.0	000.0	068.6	000.0	000.0
3	000.0	000.0	000.0	000.0	024.0	027.8	000.0
4	000.0	000.0	000.0	055.4	001.5	000.0	000.0
5	013.8	000.0	000.0	000.0	001.0	000.0	000.0
6	000.0	000.0	000.0	050.8	000.0	000.0	000.0
7	000.0	000.0	000.0	000.0	007.4	000.0	000.0
8	009.8	000.0	000.0	002.0	000.0	000.0	000.0
9	000.0	000.0	000.0	010.0	000.0	000.2	000.0
10	000.0	000.6	000.0	002.5	000.0	000.6	000.0
11	004.6	000.0	015.3	028.2	000.0	000.0	000.0
12	000.0	000.0	005.2	000.0	000.0	000.0	000.0
13	000.0	000.0	000.0	000.0	000.0	000.0	000.0
14	000.0	065.2	000.0	012.6	000.0	000.0	000.0
15	000.0	000.2	000.0	000.0	000.0	002.6	000.0
16	000.0	000.0	000.0	000.0	000.0	005.2	000.0
17	000.0	000.0	001.2	000.0	000.0	000.0	000.0
18	000.1	000.0	000.0	000.0	000.0	000.5	000.0
19	004.0	000.0	018.2	000.0	000.0	000.1	000.0
20	000.0	000.0	020.0	000.0	000.0	003.6	000.0
21	000.0	000.0	015.0	000.0	000.0	005.8	000.0
22	000.0	018.2	004.0	000.0	000.0	000.0	000.0
23	000.0	000.0	000.0	000.0	000.0	000.0	000.0
24	000.0	000.0	000.0	000.0	000.0	000.0	000.0
25	000.0	000.0	000.0	045.2	000.0	000.0	000.0
26	000.0	000.0	000.0	001.6	000.0	000.0	000.0
27	000.0	000.0	000.0	008.2	000.0	000.0	000.0
28	000.0	000.0	000.0	000.0	000.0	000.0	000.0
29	000.0	000.0	000.0	000.0	000.0	034.6	000.0
30	000.0	000.0	000.0	000.0	000.0	000.0	000.0
31		000.0	000.0		000.0		000.0
Total:	*32.3*	*84.4*	*78.9*	*216.5*	*102.5*	*81.0*	*001.4*


kvk rainfall data
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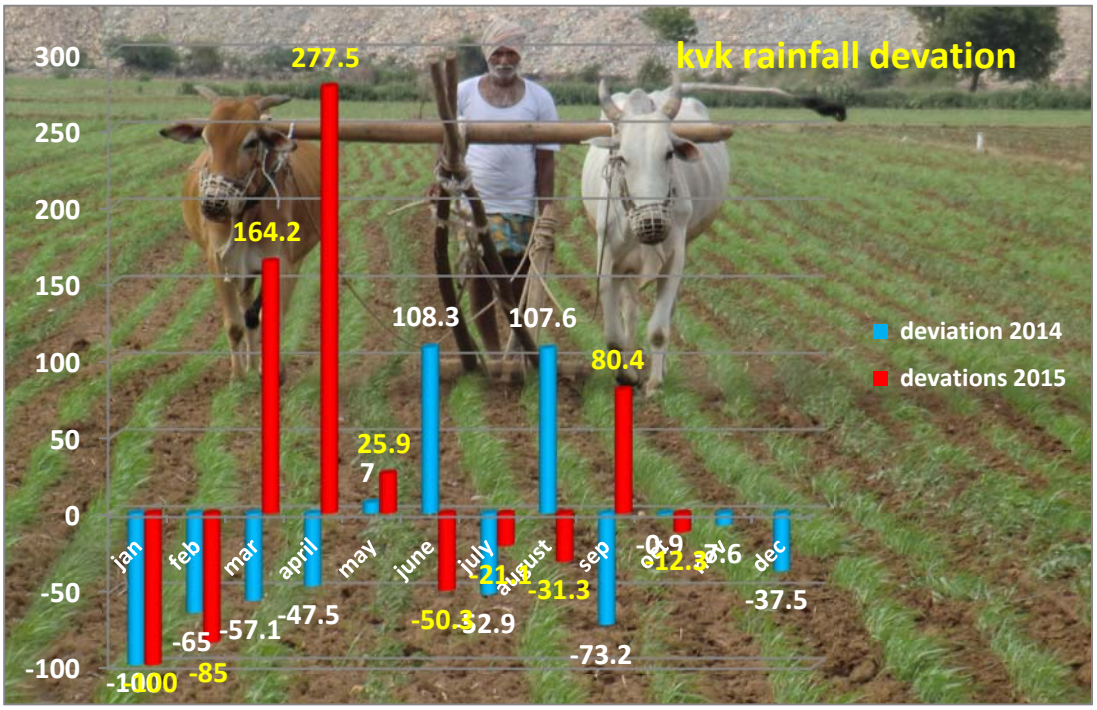
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-31.3
-73.2
-12.3
-37.5

Rainfall characteristics for the year 2015-16

Kharif 2015		JUN	JULY	AUG	SEP	oct	Nov	Dec	ANNUAL
Rainfall received in (mm)		32.3	84.4	78.9	216.5	102.5	81.0	1.4	723.1
No. of dry spells during kharif season 2015	>10days								
	>15days		23rd to Aug 10th (19)	Aug 23rd to sep 3rd (12)					
	>20days	20th to 13th july (24)			8th to oct 2nd (26)			Nov30th to Dec (32)	
No. of intensive rain spells (2015)	>60 mm per day		65.2						
	Water logging observed (days)		14.07.15 (65.2)		3 days(55.4), 4.09.15 6.09.15 (50.8), 25.9.15 (45.2)				

During the Kharif-12(Jan- December) a total quantity of 406.9 mm rainfall was received as against normal rainfall of 633.0 mm. Kharif sowings were taken up with the rain fall received during last week of July and crops faced severe moisture stress during grand growth period of September . Among the kharif crops Seteria and castor performed well with reasonable good yields.

During the Kharif-13 (Jan- December) a total quantity of 620 mm rainfall was received as against normal rainfall of 633.0 mm. Kharif sowings were taken up with the rain fall received during last week of July. Among the kharif crops Seteria, redgram and castor performed well with reasonable yields.

During the Kharif-14 (Jan- December) a total quantity of 653.9 mm rainfall was received as against normal rainfall of 633.0 mm. Kharif sowings were taken up with the rain fall received during last week of July. Among the kharif crops Seteria, redgram and castor performed well with reasonable yields.

During the Kharif-15 (Jan- october) a total quantity of 514.6 mm rainfall was received as against normal rainfall of524.0mm. Kharif sowings were taken up with the rain fall received during 3rd week of July. Among the kharif crops Seteria, redgram and castor performed well with reasonable yields.

Rabi sowings i.e Bengalgram were taken up with rain rainfall received during 1st nd week of October.

Weather – Crop – Pests & Diseases Situation in NICRA Village (2015-16)

Item /Month	June,2015	July, 2015	August, 15	Sep., 15	October, 15	Nov., 15
Rainfall	32.3 (4)	84.4 (2)	78.9 (6)	216.5 (8)	102.0 (3)	27.8 (1)
Temperatures	20.2 – 41.4^{0}C	18.5 - 38.6^{0}C	19.5 - 38.4^{0}C	17.0 - 36.4^{0}C	17.0 - 36.0^{0}C	19.8 – 34.0^{0}C
Dryspells	20th – 30th	Upto 13th & 23rd - 31st	Upto 10th		8th - 31st	Upto 2nd
	24 days,		19days		27 days	
Setaria		17th to 5th Aug		Vegetative to PI stage	Grain Maturity & Harvesting	
Pest/Disease				Spodoptera (1 – 3 %) Blast (less than 5%)		
Redgram		17th to 5th Aug		Vegetative	Vegetative	Bud initiation
Pest/Disease					Jassids, Webber (1-3%)	Jassids, Webber (1 to 3%)
Bt Cotton		17th July to 15th Aug		Vegetative/ Square	Square/Flowering/Boll	Flower/Boll
Pest/Disease					Jassids, Thrips, Whiteflies	Jassids, Whiteflies, Thrips
Maize	20th to 30th	Vegetative	Tassling	Cob formation	Grain maturation to harvest & Rabi Sowing	Harvesting & Rabi crop in vegetative stage
Pest/Disease		Stem borer (5-8%)		Helicoverpa (6-10%)		
Jowar				17th to 10th October		Vegetative
Pest/Disease					Shoot fly (10-12%)	Aphids (8-10%)

Incidence of biotic and abiotic stress:

1. **Setaria:** No pest incidence was observed during the crop growth period, but incidence of Spodoptera was observed after the rains of September, when the crop was at grain filling to maturation stage. Some farmers have taken up spraying of Thiodicarb @ 0.1%, for management of the pest. No other problems were observed in the season. The crop sustained dry spell during July and August (19 days). Good rains of September helped the crop for good grain formation and filling, thus resulted in good yields (8 to 10 q/ac).
2. **Bt. Cotton:** The crop was sown during last week of July. During early vegetative stage, crop received good rains and growth was good. But due to increased temperatures in August and September, Incidence of sucking pests (Aphids 6% and Jassids 8-10/leaf) were observed in

August and September and (Jassids 10-12/leaf and Whiteflies 6-8/leaf) in October due to dry spell prevailed. The square drop is also high.

3. **Jowar:** The crop was sown with good rains of September. The growth of the crop is affected due to continuous dry spell after sowing. Incidence of shoot fly (8%) was also observed during this period.
4. **Maize:** The crop was sown in 2nd FN of July. Due to rains of August and September, helped the crop for good vegetative growth and cob formation. With one irrigation in dryspell of October (24 days), the crop yields are good (22-24 q/ac).
5. **Redgram:** Majority of the crop was sown during 2nd FN of July. The rains of August and September helped the crop to put forth good vegetative growth. But due to drought in October (24 days), jassids and webber incidence were noticed. Now the crop is at flower bud initiation stage, experiencing moisture stress.

Effect of Dry spells on standing crops and management practices:

Crop/cropping system	Time of drought	Management strategies
Redgram	Early season drought (July 23rd to Aug-10)19 days dry spell after sowing)	Foliar spray of 2% urea or 1.0% kno3 Formation of conservation furrows between two rows of Redgram as preventive measure
	Vegetative stage(Oct-8 th to oct-31)(24 days)	Frequent inter cultivation to conserve soil moisture Foliar spray of 2% urea or 1.0% kno3
	Reproductive phase	Foliar spray of 2% urea or 1.0% kno3
Seteria	Vegetative stage(July 23rd to Aug-10)19 days dry spell after sowing)	Frequent inter cultivation to conserve soil moisture Foliar spray of 2% urea or 1.0% kno3
	Reproductive phase	-
Bt cotton	Vegetative stage to(Oct-8 th to oct-31)(24 days)Reproductive phase	Frequent inter cultivation to conserve soil moisture Spray of urea/DAP @2%.
		Boran application @0.2% Supplemental irrigation with harvested rain water in farm ponds
Jowar	Early season drought (24 days dry spell after sowing)	Foliar spray of 2% urea or 1.0% kno3 Formation of conservation furrows .
Maize	Vegetative stage(July 23rd to Aug-10)19 days dry spell after sowing)	Earthing up to conserve soil moisture Foliar spray of 2% urea or 1.0% kno3
	Flowering stage to cob formation (Oct-8 th to oct-31)(24 days)	Foliar spray of 2% urea or 1.0% kno3

8. Impact of contingency measures (Relate the dry spells with crop and their growth stages)

S. No	Dry spell (no. of days)	Duration (from --- to--)	Crop name*	Crop stage	Intervention taken up	Number of farmers involved	Impact on crop yields (q/ha)	
							Farmers' practice	Demo
1	25	June 20th to July 13th	Cotton,	Vegetative Stage	Spraying of1% kno_3 Solution Followed by 2% urea Solution	20	2150	2350
2	19	July 23rd to Aug 10th	Seteria,	Seedling stage	Spraying of1% kno_3 Solution Followed by 2% urea Solution	20	2002	2250
	12	Aug 23rd to Sep 3rd		Vegetative stage				
3	19	July 23rd to Aug 10th	Redgram	Seedling stage	Spraying of1% kno_3 Solution Followed by 2% urea Solution	20	775	856
	12	Aug 23rd to Sep 3rd		Vegetative stage				
	24	Oct 8th to Oct 31st		Bud initiation stage				
	11	Nov 4th to Nov 14th		Flowering & pod formation stage				
4	24	Oct 8th to Oct 31st	Jowar,	Vegetative	Spraying of1% kno_3 Solution Followed by 2% urea Solution	20	1816	1972
	11	Nov 4th to Nov 14th		Panicle Initiation stage				
5	24	Oct 8th to Oct 31st	Bengal gram	Seedling stage	Spraying of 1% kno_3 Solution Followed by 2% urea Solution	20	1065	1210
	11	Nov 4th to Nov 14th	Bengal gram	Pre Flowering Stage				

Major threat to reduce growth and yield of a plant is drought stress (Souza *et al*., 2004). This shortage of water occurs in region of low rainfall. Nutritional status of the plant is the indicator of its response to environmental stress. Cakmak (2005) reported that potassium enhanced drought tolerance in plants by mitigating harmful effects by increasing translocation and by maintaining water balance. Crop can more easily take nutrients when applied foliarly and in return crop yield increased (Arif *et al*., 2006).

Average crop yield increased in K fertilized plots. Potassium has the major role in osmo regulation, photosynthesis, transpiration, stomatal opening and closing and synthesis of protein etc.(Cakmak, 2005;

Low grain yield resulting from water deficit could be overcome by increasing K supply (Damon and Rengel, 2007). Results reviewed in this section indicate that under water limited conditions, yield losses can be minimized by the sufficient supply of K.

Drought stress at all three critical growth stages adversely affected plant height, spike length, number of spikelets per spike, number of grains per spike, 1000-grain weight and grain yield .Foliar application of K at critical growth stages improved the drought tolerance of plants and improved the growth and yield components, however, grain filling stage was found more responsive.

Conclusion:

Water deficit at any critical crop growth stage severely restrained the growth and yield .Foliar application of K and 2. % urea at critical stages improved all the yield components; grain filling stage being more responsive in all crops.

Annual Report (NICRA-TDC) - 2015-16

Name of the KVK /village: SHE&CS KRISHI VIGYAN KENDRA, YAGANTIPALLI

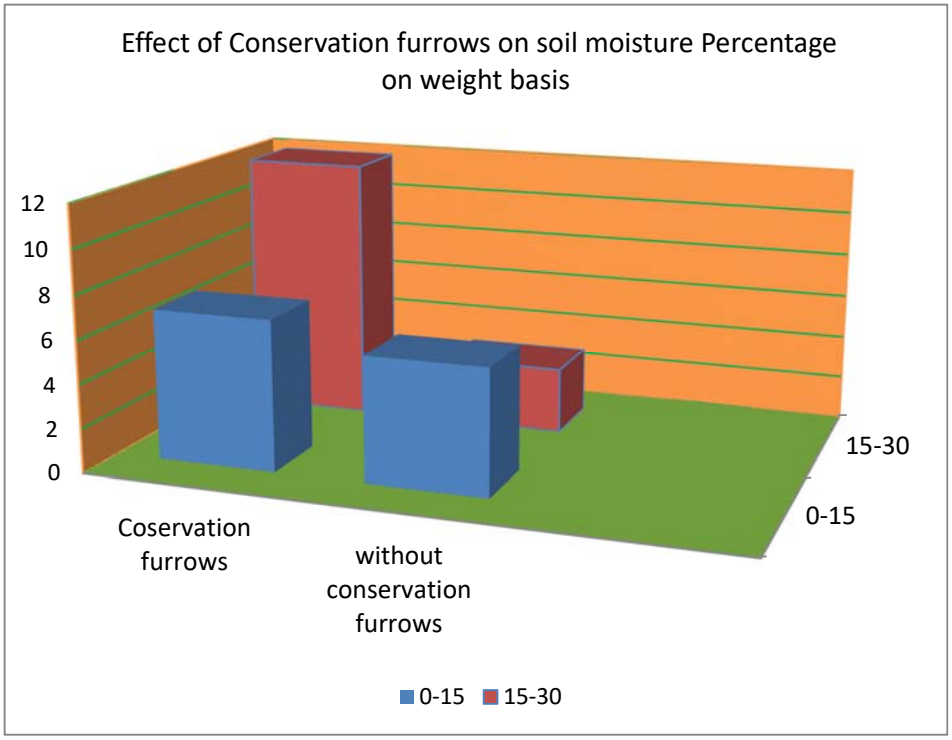
Module-1: **Natural Resource Management**

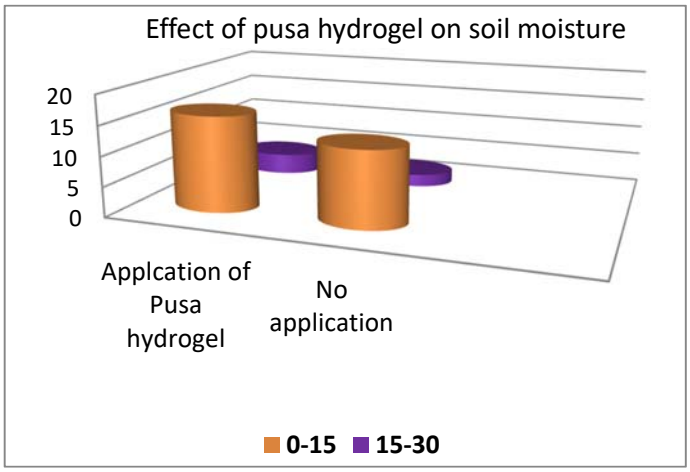
Interventions	Technology demonstrated along with the crop	Critical inputs (Machinery, cost for renovation, irrigation systems)	No. of farmers benefitted	Area under practice (ha)		Measurable indicators Crop yields* (q/ha)		Economics of demonstration (Rs./ha)			
				After intervention	Before intervention	Demo	Local practice	Gross Cost	Gross Return	Net Return	BCR
In-situ moisture conservation RCT	Red gram	Deep ploughing with coutry plough.	15	50.0	---	1028	930.9	19865	92520	72655	1:4.6
Moisture conservation through Pusa hydrogel in Redgram	Red gram	Pusa hydrogel @2.5 kg/ha	10	4.0	---	1086.5	966	22506	97785	75279	1:4.4
Water harvesting and recycling for supplemental irrigation(Farm ponds)	Jowar	Oil Engine and pipes	02	2.0	---	2362.5	1832.5	15750	37800	22050	1 :2.4
	Red gram	Oil Engine and pipes	02	2.0	---	1285	918.5	24400	115250	92634	1:4.7
Water saving irrigation methods (Micro irrigation System)	Jasmine	Drip irrigration	10	04	----	4220	3500	201600	422000	220400	1:2.09

This area falls under scarce rainfall zone and frequent prolonged dry spells at critical crop growth stages resulting poor yields were observed. To cope up with this problem, in- situ moisture conservation measures by formation of conservation furrows between rows of redgram during Kharif in an area of 10 ha and application of pusa hydrogel @ 2.5 kg/ha in an area of 4.0 ha was taken up.

1. Effect of Conservation furrows on soil moisture retension/ conservation in Redgram:

Sno	Treatments	Wet weight (gm)		Dry weight (gm)		Mass of water (gm)		Soil moisture %	
		0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
1	Redgram with conservation furrows	141.6	184.7	132.4	164.8	9.2	19.9	6.9	12.0
2	Redgram without conservation furrows	114.3	97.41	108.1	94.5	6.2	2.9	5.7	3.0





2. Effect of Pusa hydrogel on soil moisture retension/ conservation in Redgram:

Sno	Treatments	Wet weight (gm)		Dry weight (gm)		Mass of water (gm)		Soil moisture %	
		0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
1	Application of pusa hydrogel @2.5kg/ha	191.4	156.2	164.9	150.8	26.5	5.4	16.0	3.5
2	without application	141.8	170.1	125.7	166.6	16.1	3.5	12.8	2.1

The results showed that, the available soil moisture at 0-15and 15-30cm depths were higher under in opening of furrows (30 DAS) and application of pusa hydrogel @ 2.5 kg/ha treatments at vegetative of crop growth .

Characters of pusa hydrogel:

- Absorbs a minimum of 350 times of its dry weight in pure water and gradually releases it
- Low rate of application (1—1.5 kg/acre)
- Effective in soil for at least one crop season
- Improves physical properties of soils and soil less media
- Improves root growth and density
- Helps plants withstand extended moisture stress
- Reduces irrigation and fertigation requirements of crops
- Delays onset of permanent wilting point

De-silting of existing percolation tank:

The project committee proposed to de-silt the existing percolation tank (Burrakunta) for deepening and use of tank silt for marginal soils to improve soil physical properties and fertility. Focus group interactions were held with the villagers to sensitize them on the importance of water harvesting and application of tank silt. The de-silting of Burrakunta (PT) was taken up during July 2012 and 1260 Cu.mt silt was excavated. The silt was applied to 6 ha covering 10 farmers and transportation cost was borne by the farmers.

Chemical properties and nutrient status of tank silt was analyzed before application into the fields and the average pH and EC of tank silt was 7.95 and 0.35 dSm^{-1} respectively which were under normal range. The organic carbon content of silt was high (0.89 %), available phosphorus (112 ppm), Potassium (883ppm), Calcium (52me.eq/100gsoil), magnesium (5.5me.eq/100gsoil), ferrous (33.5ppm), copper(3.62ppm) were found in high range. The farmers were ready to transport the tank silt to their poor soils, since it was good nutrient status.

Out comes:

- Deepening of percolation tank increased the additional water storage capacity (12.60 lakh litres)
- It was observed that number of defunct borewells decreasing from 2013-14 to 2015-16 and recharge of defunct borewells increasing from 2013 to 2015 due to more storage water in Burrakunta by desilting (Table.1).
- Water table is increased during monsoon period.

Table. Impact of desilting of Burrakunta on borewell recharge during the year 2015-16

Month	Water table in the bore well (ft)	Availability of water in Water storage structure (ft.)	Average area irrigated acre / Bore well	Rainfall (mm)
June-15	110 ft	1.5	-	32.3
July-15	115 ft	1.2	2.0	84.4
August-15	106 ft	5.0	3	78.9
September-15	062 ft	10.0	4	216.5
October15	051 ft	10.0	4.6	102.5

(Details (Average of Six bore wells taken for data)-Total number of borewells-40

Table.:Year wise impact of Burrakunta on borewells recharge:

Year	No. of borewells under Burrakunta	No.of defunct borewells during summer	No. of defunct borewells recharged during monsoon period	Depth of water table(ft.) during summer	Depth of water table(ft.) during monsoon period	Average rainfall(mm)
2013-14	110	70 (64%)	64 (91 %)	158.4	71.4	594.3
2014-15	110	63(57%)	60 (95%)	150.2	74.6	668.6
2015-16	114	26(23%)	26(100%)	145.4	106.4	621.6 (Till to date)

Introduction of drought tolerant variety of Redgram i.e Asha-87119, which is tolerant to drought, suitable for medium to light soils with 150 days duration, where long duration (180 days) varieties were facing moisture stress at flowering and pod dev. Stage (Terminal moisture stress).

Module 2: Crop Production

Interventions	Technology demonstrated	Critical input (Variety, Fertilizer / Machinery, etc)	No. of farmers benefitted	Area (ha)	Measurable indicators of yield* (q/ha)		% increase in yield	Economics of demonstration (Rs./ha)				Economics of Local (Rs./ha)			
					Demo	Local		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Introducing of short duration varieties (Suryanandi)	Drought tolerant varieties	Seed	55	22	2483	510	-	14820	51699	36879	3.4	13800	20394	6594	1:1.4
Redgram (ICPL-87119)	Drought tolerant varieties	Seed	50	20	1025	775	32.2	24341	92081	67741	3.78	25566	72930	47364	1:2.85
Advancement of planting dates of rabi crops in areas with terminal heat stress	Drought tolerant varieties	seed	50	20	1250	1100	13.60	25450	58750	33300	2.3	26600	51700	25100	1:1.94
Location specific intercropping systems with high sustainable yield index	Intercropping	Seed	50	20	2151+ 401(R)	2170	-	21432	79123	57417	3.69	16290	45254	28942	1:2.77
Custom hiring centres for timely planting	Jowar	Seed Drill	10	25	2362	1832	28.9	18625	37792	19167	2.02	19625	29312	9687	1:1.49
Sucking pest management in Bt cotton	Pest management	Applicators-2, Monocrotophos-250ml Confidor-100ml	25	12	1689	1455.4	16.05	39908	67560	27652	1.6	42968	58216	15248	1:1.3
Production of Organic Redgram	Resource conservation	Vermicopost, Neem poweder	02	01	900	925	-	23125	81000	57875	1:3.5	25625	83250	57625	1:3.2

1. Setaria as Alternate crop:

In View of drought tolerance and minimum requirement of water seteria crop is preferred, Sustainable yield and income was obtained under harsh weather conditions. Inview of its superior performance the crop area increased from 40 to 1200acres in the villages during k harif 2015. Area expansion under this crop is expected during ensuing season also .*The adoption of seteria crop by the farmers was due to its suitability to delayed monsoon, its duration and additional benfit of fodder. The market price of seteria is also catching the attention of the farmers.*

With this high yielding variety Farmers were getting on an average of 24.82 q /ha of grain and more fodder yield.

2.Introduction of drought tolerant variety of Redgram i.e Asha-87119, which is tolerant to drought, suitable for medium to light soils with 150 days duration, where long duration (180 days) varieties were facing moisture stress at flowering and pod dev. Stage (Terminal moisture stress).

The data clearly indicated that Asha gave higher grain yield(1025 Kg/ha), which was 32.2 per cent more than that of obtained with farmers practice in red soils under rainfed situation.

The Economic Viability of improved technology over farmers practice was calculated depending on prevailing prices of input and output costs. The improved technologies resulted increased income with cost benefit ratio of 1:3.78/2.85.

3. Introduction of drought tolerant variety in Bengalgram:

Results of Bengalgram demonstrations indicated that among desi varieties NBeG-3 Perfomed well in medium to light soils. These varieties are fairly tolerant drought with well developed root system and also tolerant to wilt diseases.

The increased grain yield with Improved production technologies was mainly because of more no of pods/plant and higher 100 grain weight. Economics of demonstration and Farmers practice indicated that the cultivation of Nandyala sanaga-1 with improved technologies, additional returns of Rs 7050/- /ha were obtained with BC ratio of 1:2.3/1.94. ***The performance of nandyal senega was superior to the control for its rooting traits and heat tolerance.***

4. Inter Cropping systems for drought mitigation:

Adverse weather conditions like delay onset of rains and prolonged dry spells during the crop period is very common in rainfed situation. Such situation results in economic losses to the farmers due to the partial or total failure of the sole crops. In order to utilize the bi-model distribution of rainfall and also to insure against crop failure due to drought during crop growth period, millet based inter cropping systems were demonstrated.

Introduced Redgram + Seteria (1:5) inter cropping systems in the village, along with sole crop of Redgram/Seteria/Castor in order to increase cropping intensity and net returns of the farmers.

- Results of demonstration on intercropping of Redgram + Seteria in row ratio of 1:5 indicated that the gross income was higher (Rs.79123/-) than sole crop of seteria (Rs. 45254/-)

- The results on cropping system oriented demonstrations against drought mitigation clearly indicates that above inter cropping systems are economically advantageous than sole crops under rainfed situations. In the long run the fertility and microbial activity of the soil also increases with addition of biomass of redgram.

6. Sucking pest management in Bt cotton:

During the season the incidence of Jassids, Aphids and Whiteflies were observed in bt cotton, due to dry spells prevailed, during October (24 days) and due to continuous high temperatures in August, Septembe and October months. Stem application with Imidacloprid and Monocrotophos at 40 and 60 DAS, effectively managed Aphids. And spraying of Triazophos with Neem oil 0.03% checked the incidence of whiteflies effectively in the demonstrations.

During the season the incidence of Aphids and Whiteflies were observed in bt cotton, due to dry spells prevailed. Stem application with Imidacloprid and Monocrotophos at 40 and 60 DAS, effectively managed Aphids. And spraying of Triazophos at 90 DAS checked the incidence of whiteflies effectively in the demonstration, which resulted in 16.05 increased yields.

7. Organic Redgram:

This demonstration was taken up in 1.0 ha with 2 farmers. Critical inputs Neem oil, Beauveria and Trichoderma enriched vermicompost were given. The results indicated that in organic farming there is 2.7% reduction in yield (900 kg/ha) over farmers practice (925 kg/ha.

Module-3: Livestock & Fisheries

Interventions	Technology demonstrated	Critical input (Variety, Breed, etc)	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output*		% increase	Economics of demonstration (Rs./ha)				Economics of demonstration (Rs./ha)			
					Demo	Local		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Improved fodder/feed storage methods	Conservation of green fodder	Silage bales	10	10	5.8	4.81	20.58	2540	12180	9640	4.79	2886	10100	7214	3.4
Round the year fodder production	Lucerne Fodder Production	Lucerne seed	10	0.5	247.2	228.3	8.28	2152	8404	6252	3.9	1710	6392	4682	3.72
	Hydroponic Fodder production	Hydroponic trays	04	10	259.8	240.3	8.11	1430	7794.00	6364	5.45	1802	7209	5407	4.0
Effect of Urea molasses mineral blocks or Feed blocks	UMMB	UMMB	10	10	3.7	3.1	19.35	1965	9990	8025	1:5.08	1395	6770.4	5375.4	1:4.8
Calf Registration	Scientific method of calf rearing	Periodical De-worming and Vit. Supp.	50	50	78.6	64.4	22.04	270	1496	1226	5.54	-	900	900	-

Conservation of green fodder through silage making:

The demonstration was conducted with 10 farmers at Yagantipalle village. Silage bales of 400kg were supplied to the farmers @Rs.2.00 per kg. The silage was fed to milch animals @ 5kg per day along with farmers practice of Jowar straw and regular feed during fodder scarcity period. The results indicated that 20.58% increase in milk yield with additional net income of Rs.2426.00 was observed compare to farmers practice.

Results: Silage feeding (2015-16):

Particulars	Demonstration	Farmers practice
Milk Yield (for 90 days)	522.0	432.9
% increase in milk yield	20.58%	-
Additional net Income over farmers practice	2426.00	-

Low cost hydroponic fodder production:

Low cost hydroponic technology was demonstrated at NICRA villages to overcome the green fodder scarcity with available limited source of water. It is very effective technology suitable to drought areas. 8kg fodder can be grown from 1kg maize seed within seven days.

Each animal was offered with 12kg hydroponically grown maize fodder along with 7kg jowar straw every day. The results indicated that there was increase of 8.11% milk yield with the additional net income of Rs.32.00 per day. It was also observed that, through feeding of hydroponic fodder the concentrates can be reduced.

Particulars	Demonstration	Farmers practice
Milk Yield (for 30 days)	259.8	240.3
% increase in milk yield	20.58%	-
Gross income	7794.00	7209.00
Cost of concentrates	1430.00	1802.00
Additional net income per day	32.00	-
B:C ratio	5.45	4.0

Cultivation of Lucerne during Rabi:

In order to encourage the farmers towards cultivation of legume fodder crops during rabi with an object of round the year fodder production, Lucerne (MYGROW hybrid) was supplied to 10 farmers of the village. The Lucerne was fed to animals @5kg per day along with regular green and dry fodder for 30 days.

The results indicated that there increase of 8.28% in milk yield along with increase in %fat in milk. As it is having 18% CP, the cost on concentrate feeding was reduced with additional net returns of rs.2012.40 over farmers practice.

Particulars	Demonstration	Farmers practice
Milk yield	247.2	228.3
% fat in milk	6.57	5.03
Increase in milk yield	8.28%	
Cost of intervention (30 days)	2152	1710
Gross income	8404.8	6392.4
Additional income (30days)	2012.4	
CB ratio	3.90	3.73

Supplementation of Urea Molasses Mineral Blocks to milch buffaloes:

Protein and energy are the major factor influencing milk yield in milch animals. Supplementation of protein and energy along with minerals through UMMB is very effective and economical in low and medium production animals.

The demonstration was conducted selecting 10 milch buffaloes. The animals were allowed to lick the block twice daily for 30 min. at the time of milking. The results indicate that increase of 19.35% in milk yield along with %fat in milk.

Particulars	**Farmers practice**	**Demonstration**
Milk yield/day	3.1	3.7
% fat in milk	7	7.65
Increase in milk yield		19.35%
Total milk yield for 60 days	186	222
Increase in % fat in milk		9.28%
Gross income	6770.4	9990
Cost	1395	1965
Additional income per day		26.4
CB ratio	4.85	**5.08**

Calf Registration and Healthy calf programme:

Calf registration programme was initiated under NICRA project during 2011 and continued every year with an object to reduce the calf mortality and to improve growth rate in the calves. During 2015-16 the programme was conducted registering 50 buffalo calves in Meerapuram village. Health camps were organized every month and the medication was given as per the schedule.

Schedule of medication:

Age of the calf	Medication
7th Day	Deworming
1 month	Dewoming + Vit. A
2 months	De worming + Vit.A
	FMD Vaccination
3 months	Deworming + Vit A + B Complex
4 months	Deworming + Vit A + B Complex
5 months	Deworming + Vit A + B Complex
6 months	Deworming + Vit A + B Complex
	FMD vaccination

Result:

The registered calves gain 76.8kg in 5 months of age where as control group gain 64.4kg only. As the growth rate was more, the calves exhibited heat early at 2 years age. The programme created a great impact among the farmers about calf rearing.

Particulars	Registered calves	Control
Body weight gain (in 150 days)	76.8	64.4
% increase in body weight	22.04%	
Mortality (%)	3%	18%

Impact of the programme:

Year	No of calves registered		No. animals exhibited heat (within 2 years of age)	
	White	Black	White	Black
2011-12	60	40	22	6
2012-13	50	50	9	3
2013-14	25	25	7	3
2014-15	-	25	4	-
2015-16		50	-	6
	135	**190**	**42**	**18**

Horticulture

Introduction of drip irrigation in Horticulture crops:

Total cultivable area is 1600 acres, of which 70 % is rainfed and remaining area is under irrigation. Main source of irrigation is bore wells. It is one of the examples, where ground water is over exploited, hence declared as noted village under APWALTA act, for arresting further drilling of bore wells. In last ten years water table depleted rapidly from 60 feet to 150feet.In view of the above alarming situation, drip irrigation is one of the water saving technology with better WUE.

Total area under irrigation	**600 Acres**
Area under Horticulture crops	215 Acres
Number of bore wells	150
Area brought under drip irrigation	**125.21 Acres**
Area under pipeline	20 Acres
Target	40 Acres

Details of the area brought under Drip irrigation.

Based on problem identified through PRA conducted in the village, Demonstrations were proposed under NICRA for 2012-15 to extend drip irrigation for horticultural crops in an area of fifty acres and installation was completed in 30 acres. Among total expenses 90% was contributed from APMIP and remaining 10% was contributed by NICRA and farmer equally. A total of 125.21 acres covered during the period 2012-15.

Fifty one farmers cultivating different horticultural crops were selected and the drip system was installed.

Crop	Number of farmers	Area(Acre)
Papaya	02	16.0
Mango	24	72.36
Jasmine	7	10.4
Drum stick	02	5.0
Banana	01	1.0
Vegetable	15	20.45
Total	**51**	**125.21**

Area wise Particulars of Drip Irrigation under NICRA 2012-15

S. No	Name of the farmer	Crop	Area (ac)
1	Yama Karunamma W/o Srinivas reddy	Drum stick	2.75
2	Yama Pulla reddy S/o Rami reddy	Drum stick	2.25
		2	**5**
1	S.Venkat reddy S/o Pedda Pulla reddy	Jasmine	0.7
2	S.Venkata Siva reddy S/o Pedda pulla reddy	Jasmine	1.2
3	Bandi Bali reddy S/o Maddileti reddy	Jasmine	1
4	M.Maddileti	Jasmine	2
5	K.Laxmi narayana	Jasmine	1.5
6	G.Narayana reddy	Jasmine	2.5
7	M.Subramanyam S/o M.Kasaiah	Jasmine	1.5
		7	**10.4**
1	Y.Varalakshmamma W/o pedda Pulla reddy	Mango	1.86
2	S.Venkat reddy S/o Yella reddy	Mango	1.8
3	P.Subba Nagaraju S/o Rajendra	Mango	1.5
4	Suryanarayana	Mango	4.5
5	Karim	Mango	3.5
6	K.Ravi Prakash reddy	Mango	5.2
7	S.Ravi sankar reddy	Mango	2.5
8	K.Gur reddy	Mango	10
9	S.vijaya baskar reddy	Mango	2.8
10	Y.malleswaramma	Mango	2.6
11	K.Ramachandra redddy	Mango	3.8
12	M.surya narayana	Mango	4
13	M.Nassirhusseain	Mango	1
14	S.Sivaprasadreddy	Mango	1
15	B.Baskar reddy	Mango	3
16	Y.Madhusudhanreddy	Mango	1
17	b.Manmadareddy	Mango	3
18	B.Gopalreddy	Mango	0.5
19	P.S.Nagaraja	Mango	2.19
20	M.Magbul basha	Mango	2.2
21	B.Rammohan reddy	Mango	3

22	Y.Viswanath reddy	Mango	1.4
23	K.V.Rajeswara Reddy	Mango	5
24	K.Rami Reddy	Mango	5
		24	**72.36**
1	S.Tirupam reddy S/o Timma reddy	Turmeric	1
		1	**1**
1	S.Ramasubba reddy S/o Pedda Subba reddy	Vegetable	1.2
2	B.Jagadeeshwar reddy s/o Boreddy	Vegetable	1
3	B.Srinivas reddy S/o Boreddy	Vegetable	1.2
4	B.Sudhakar reddy	Vegetable	1.3
5	V.Pulla reddy	vegetables	0.5
6	M.Subramanyam	Vegetable	0.8
7	S.Rameswar reddy	Vegetable	0.5
8	M.Krishnudu	Vegetable	1
9	M.Maddilety	Vegetable	0.5
10	B.V.Sudhakar reddy	vegetables	0.5
11	B.Sanjeeva reddy	Vegetable	0.5
12	B.Sivasatyam reddy	Vegetable	1.4
13	S.Siva Reddy	Vegetable	5.0
14	B.Rameswara Reddy	Vegetable	2.5
15	M.Subramanyam	Vegetable	2.5
		15	**20.4**
1	K.Rami reddy	Papaya	**7**
2	K.V.Rajeswra reddy	Papaya	**9**
		2	**16**
1	M.Subramanyam	Banana	**1**
		1	**1**
TOTAL:			**125.21**

INSTITUTIONAL INTERVENTIONS:

FARM MACHINERY:

CHCs are basically a unit comprising a set of farm machinery, implements and equipment meant for custom hiring by farmers. Though certain implements and equipment are crop specific,. Therefore, an ideal model envisaged in this project comprise farm machinery that are commonly used for tillage operations for all crops, multi crop equipment and a minimum of crop specific machinery.

Objectives:

- To make available various farm machinery / equipments to small and marginal farmers
- To improve mechanization in places with low farm power availability
- To provide hiring services for various agricultural machinery/implements applied for different operations.
- To expand mechanized activities during cropping seasons in large areas especially in small and marginal holdings.
- To provide hiring services for various high value crop specific machines applied for different operations.

Custom Hiring center:

Custom hiring center with seed drills, Rotavator, Drumseeders, Taiwan sprayer, sprinklers with Pumpset and sheep de- worming gun etc. was established and the same is running successfully.

Table: Performance of custom hiring center

Year	Crops in demand for servicing custom hiring center	Area covered with hiring services (ha)	Amount realized due to services with custom hiring services (Rs)	Amount spent on contact service personnel For running the center	Amount incurred in maintenance of tools and center	Net amount realized due to custom hiring center	Any other information
2015	*Kharif*						
	Redgram						
	Castor						
	Rabi						
	Bengalgram						
	Jowar						
	Total	**86.8**	**7100-00**	**-**	**-------**	**7,100-00**	

- **Contribution from Farmers : Rs 1,43,748-00**

S.No.	Name of the implement	No of Units
1	GPS unit	1
2	Seed drills	3
3	Rotavator	1
4	Power weeder	1
5	7- Tyned gorru	1
6	Sprinkler set	2
7	Oil engine	1
8	Tiwan Spryers	3
9	De-worminggun	1
10	Soil augers	5

Farm implements purchased during 2015-16 under NRC

S.No.	Name of the implement	No of Units
1	Seed drills	1
2	Rotavator	1
3	2-plough set	1
4	7- Tyned gorru	1
5	Sprinkler set	2
6	Oil engine	1
7	Tiwan Spryers	6
8	Sub -soiler	1
9	Mobile chaff cutter	1

Custom Hiring Centre

Land preparation with Rotavator

Sowing with seed drill

Sowing with seed drill

Supplemental irrigation with Pipes

Oil Engine for lifting Irrigation water

Spraying with Tiwan Sprayer

Seed production (Seed bank):

Quality seed of improved varieties is an important basic input for enhancing productivity of any crop species. The existing mechanisms are not adequate to meet the seed requirements of small-scale farmers and have serious limitations. Particularly to small holder farmers at affordable prices and at the right time to enhance crop productivity and household food security.

The baseline studies in the project area identified key problems related to seed supply system. Lack of timely availability of good quality seeds of high-yielding varieties is one of the major constraints contributing to stagnant yields of crops in the project area.

The project devised alternate seed systems, which ensure availability of quality seed of improved varieties at local level. The concept of village seed banks was promoted and successfully validated in the project village. It not only ensured timely availability of quality seed of farmer-preferred varieties at affordable prices at local level but also enhanced crop productivity and local seed enterprises leading to higher incomes to farmers.

During this kharif seed production in Paddy (BPT-5204) Redgram (Asha-87119) and Korra (SIA-3088) and Bengalgram (NBeG-3) was taken up to establish seed bank in the village.

Module-5: Capacity Building taken up (HRD)

Sl. No.	Thematic area	Title of training	No. of Courses	No. of beneficiaries		Date	
				Male	Female	from	to
1	Crop Production	Crop management	04	87	16	12.06.2015 23.07.2015 15.09.2015 12.10.2015	12.06.2015 23.07.2015 15.09.2015 12.10.2015-
2	Horticulture	Pruning of Mango trees	01	22	-	18.11.2015	18.11.2015
3	NRM	Soil health management	01	31	06	13.07.2015	13.07.2015
4	Crop production	Contingent crop planning& Management	01	35	07	17.07.2015	17.07.2015
5.	Livestock	Live stock management	03	67	24	26.05.2015 17.07.2015 05.08.2015	26.05.2015 17.07.2015 05.08.2015
6.	Livestock	Training Programme conducted hydro phonic fodder production	01	35	05	16.09.2015	16.09.2015
7.	Crop Production	Pest and disease management	04	90	23	12.08.2015 09.09.2015 06.10.2015	12.08.2015 09.09.2015 06.10.2015
8.	Horticulture	Nursery raising	01	18	06	10.07.2015	10.07.2015
9.	Custom Hire centre	Farm implement of machineries	01	22	06	09.06.2015	09.06.2015
10.	NRM	Nutrient management	01	28	09	12.08.2015	12.08.2015
11.	NRM	Natural resource management	03	63	26	10.08.2015	10.08.2015
12	Livestock	Fodder and feed management	01	21	04	24.11.2015	24.11.2015
Total			**22**	**519**	**138**		

Institutional Interventions:

S.No	Name of interventions undertaken	No.of units	Area covered	No.of farmers covered	Remarks
1	Custom hiring for timely Operations	1	62.4	83	1
2	Seed bank	4	3.0	8	2
3	Community fodder production	5	7.9	30	3
	Total	**10**	**73.3**	**121**	

Extension Activities:

KVK Kurnool extended their services in transferring technologies related to climate resilient agriculture. The other activities include group dynamics, method demonstration, seeding devices, awareness programmes were also organized on climate resilient agriculture. Agro advisory services through mobile alert systems, exposure visits and kisan melas etc., the details are annexed below.

Module-6

Name of the activity	Number of programmes	No. of beneficiaries		Remarks
		Male	Female	
Method Demonstrations	04	81	13	
Field days	02	105	25	
Method demonstrations	8	75	12	
Awareness	04	106	23	
Agro advisory services	96	3312	984	
Micro irrigation systems	02	74	14	
Diagnostic visits	20	422	88	
Total	**136**	**4175**	**1159**	

9. Adoption of successful intervention in the NICRA village & the adjoining villages

Successful Interventions	Extent of adoption in the village in ha.			
	2012	2013	2014	2015
1. In-situ Moisture Conservation	10	20	35	50
2.Seteria (As a alternate crop)	120	225	300	315
3.Intercropping (Redgram+Seteria)1:5	25	56	65	85
4.Drought tolerant varieties ICPL-87119,PRG-158 Etc	62	74	86	90
5.Bengal gram(NBeG-3)	12	24	26	32
6.Biogas units	06	12	23	30
7.Calf registration	--	110	160	210
8.Micro Irrigation	24	82	104.0	106
9.Fodder production through Hydroponic units	---	---	---	04

Success stories/ Up scalable Technologies under NICRA Project

Foxtail Millet Alternate to Cotton:

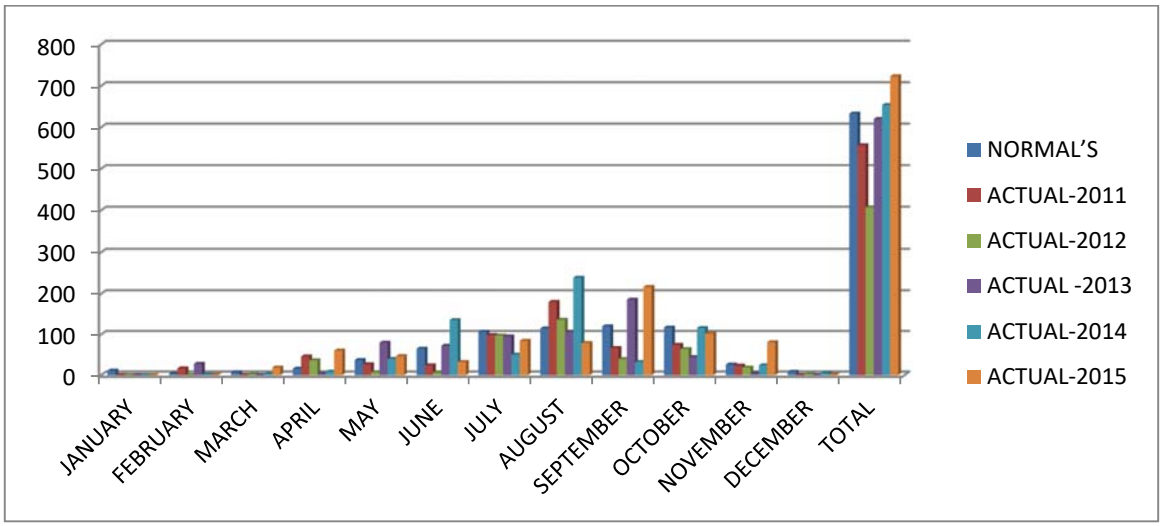
1. Background Information:

Yagantipalle village which is located at a distance of 4 km from Banaganapalle Panchayat of Banaganapalle mandal with 70% of rainfed agriculture was selected for implementing NICRA project.

Name of the village : Yagantipalle
District : Kurnool
No. of households : 361
Total cultivated area : 640 ha
Area under rainfed : 70%
Major soil types : Sandy clay loam to clay loam, Medium black soils.
***Major cropping systems**: red gram and cotton in kharif, Jowar and sunflower in rabi.*
Climate vulnerability: Drought

Rainfall analysis:

During the last five years on an average a total quantity of 592.10 mm rainfall was received as against normal rainfall of 633.0 mm. Kharif sowings were taken up with the rain fall received during last week of July. Among the kharif crops Seteria, redgram and castor performed well with reasonable yields. Rabi sowings i.e Bengalgram were taken up with rain rainfall received during 2nd week of October. All rabi crops suffered acute moisture stress as there was dearth of stored soil moisture in the early stages of crop growth .



MONTH	NORMAL'S	ACTUAL-2011	ACTUAL-2012	ACTUAL -2013	ACTUAL-2014	ACTUAL-2015
JANUARY	**11.0**	0	0	0	0	0
FEBRUARY	**4.0**	16.6	0	27.7	1.4	0.6
MARCH	**7.0**	0	1	0	3	18.5
APRIL	**16.0**	45.8	36.2	3.8	8.4	60.4
MAY	**37.0**	26.6	7	79.6	39.6	46.6
JUNE	**65.0**	24	5.9	72.2	135.4	32.3
JULY	**107.0**	98.6	97.2	95.3	50.3	84.4
AUGUST	**115.0**	180.4	136	106.6	238.8	78.9
SEPTEMBER	**120.0**	66.6	39.4	186	32.1	216.5
OCTOBER	**117.0**	74.6	64.2	44.6	115.9	102.5
NOVEMBER	**26.0**	23.4	18.6	4.2	24	81
DECEMBER	**8.0**	0	1.4	0	5	1.4
TOTAL	**633**	**556.6**	**406.9**	**620**	**653.9**	**723.1**

2. Existing Practice: Desi cotton and redgram were the main crops grown during kharif and Jowar & sunflower in rabi. Most of the crops get affected with late onset of monsoon followed by dry spells during critical crop growth periods, which in turn severely affecting the crop yields.

3. Resilient practice: The short duration millets viz., Foxtail millet (SIA 3085, Suryanandi) varieties with 70-75 days duration and tolerance to drought and downy mildew were introduced in place of jowar and desi cotton in 25 acres in 2011 Kharif.

4. Performance: Due to late onset of Monsoon (Third week of July) and the crops experienced prolonged dry spells during grand growth period. Cotton could not be taken up due to late onset of monsoon. Jowar was sown but it was affected with terminal moisture stress. These varieties of Setaria (KORRA) could escape drought due to its shorter duration. The area of fox tail millet in the village is more than 1200 acres at present. With the availability of quality seed with seed banks at KVK , NICRA seed farmers and RARS the crop was taken up in surrounding villages and mandals as the onset of late monsoon become phenomenon.

The yield and Economics of both farmers practice and resilient technology during 2011-2015

Treatments	Variety	Yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	B:C ratio
2011						
Farmers practice	Desi cotton	380	8950	12160	3210	1:1.36
Improved technology	SIA 3085	1885	11972	23900	11928	1:2.20
2012						
Farmers practice	Desi cotton	285	7570	9975	2405	1:1.32
Improved technology	SIA 3085	1462	15973	21936	5963	1:1.37
2013						
Farmers practice	Desi cotton	375	12350	16875	4525	1:1.37
Improved technology	SIA 3085	2320	12955	27532	14577	1:2.13
2014						
Farmers practice	Desi cotton	375	12350	16875	4525	1:1.37
Improved technology	SIA 3085	2080	12955	39520	26565	1:3.05
2015						
Farmers practice	Desi cotton	386	12850	14668	1818	1:1.04
Improved technology	SIA 3085	2067	12955	39273	26318	1:3.03

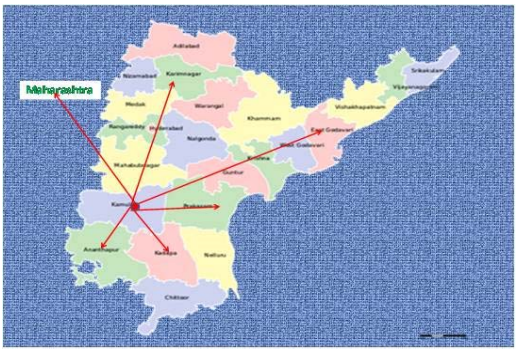
In View of drought tolerance and minimum requirement of water seteria crop is preferred, Sustainable yield and income was obtained under harsh weather conditions. Inview of its superior performance the crop area increased from 40 to 1200acres in the villages by kharif 2015. Area expansion under this crop is expected during ensuing season also .The adoption of seteria crop by the farmers was due to its suitability to delayed monsoon, its duration and additional benfit of fodderalong with its better marker price.

5. Scope for Upscaling and Horizontal Spread of Technology:

The sustainable performance of Seteria coupled with market price is attracting the rainfed farmers of Prakasham, Cuddapah Anantapur and Kurnool district. The fore warning given by IMD and messages of scientist about deficient rain fall made farmers to grow seteria as a climate resilient crop.

To make the seed availability KVK took up seed production at farm and supplied 25 quintals to different farmers in the district. As a part of NICRA programme trained farmers in seed production for seed bank pupose. Vijaya baskar reddy who received best NICRA farmer award took up seed production with his fellow farmers and with guidance of kvk, supplied 150 quintals of seed, which approximately covered 5000 acres in this kharif.

S.No	Name of the mandal	Quantity (qt)
1	Kurnool	4.5
2	Dhone	2.5
3	Maddikera	8
4	Tuggali	6.5
5	Devanakoda	0.6
6	Peapully	8
7	Yemmiganuru	46
8	Nandikotkur	1.5
9	Pamulapadu	1
10	Aluru	0.6
11	Bethamcherlla	5
12	owk	2
13	Sirvel	2
14	Koilakuntla	1.5
15	Gospadu	1.5
16	Orvakal	3
17	Banaganapalli	15
18	Adhoni	1
Total:		**109.20**



Spread of seteria seed within the district

S.No	Name of the district	Quantity (qt)
1	Anantapuram	26
2	Cuddapah, YSR Dt.	1
3	Ongole	1
4	East Godavari	0.2
5	**Nandurbar (Maharastra)**	0.2
6	**Karimnagar (Telangana)**	0.2
Total		**28.60**

The adoption of seteria crop by the farmers was due to its suitability to delayed monsoon, its duration and additional benefit of fodder.

2. Redgram/seteria intercropping system for drought mitigation:

NICRA Village Yagantipalle, Banaganapalle Mandal, Kurnool District, Monsoon onset was late

(Third week of July) and the crops experienced prolonged dry spells during grand growth period. Cotton could not be taken up due to late onset of monsoon. Jowar was sown but it was affected with terminal moisture stress. Most of the crops affected with late on set of monsoon followed by dry spell during critical crop growth periods, which in turn severely affected the yield and income of the dry land farmers.

Small millets are important cereal crops. In recent years, there has been increasing recognition of the importance of millets as a substitute for major cereal crops viz., rice, wheat, maize and sorghum. The millets are the crops that have potentiality of contributing to increase food production both in developing and developed countries. Small millets are grown on marginal lands with poor managem ent practices, and their growing is limited to dry lands. Pulses in general and red gram in particular provide more stability and ensure better monetary returns. However to provide stability in the returns, it is always advisable that a cereal or short duration

pulse crop is introduced as a component crop with pigeon pea without any considerable reduction in the yield of main crop.

Resilient practice: Intercropping is an age old practice being followed by subsistence farmers to achieve their domestic needs. The main advantage of the intercropping is that the component crops are able to use the growth resources differently and make better overall use of growth resources than grown separately. Pigeon pea is a late maturing, tall growing, wide spaced crop with deep root system can accommodate rapidly growing, short duration and short statured crops like millets and would prove to be a viable intercropping system.

Adverse weather conditions like delay onset of rains and prolonged dry spells during the crop period is very common in rainfed situation. Such situation results in economic losses to the farmers due to the partial or total failure of the sole crops.

To develop climate resilient alternative crop management systems and to insure against crop failure due to drought during crop growth, KVK adopted, Redgram + Seteria based intercropping systems.

This practice has emerged as a significant drought coping strategy and resulted higher yields per unit area through better use of the bi-model distribution of rainfall.

Performance :

The yield and Economics of both farmers practice and resilient technology during 2011-2015

Treatments	Variety	Yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	B:C ratio
2011-12						
Farmers practice	Sole crop	17.78	11972	22543	10571	1:1.8
Improved technology	R+S	16.50(S)	13987	27975	13988	1:2.0
		2.45(R)				
2012-13						
Farmers practice	Sole crop	1462	15973	21936	5963	1:2.05
Improved technology	R+S	1386(S)	18570	33927	15357	1:174
		345(R)				
2013-14						
Farmers practice	Sole crop	2320	16075	27532	11457	1:2.13
Improved technology	R+S	2084(S)	18960	58650	39690	1:3.09
		815(R)				

2014-15						
Farmers practice	Sole crop	1700	16370	49700	33330	1:3.0
Improved technology	R+S	2073(S)	14350	63747	49397	1:4.4
		675(R)				

- Results of demonstration on intercropping of Redgram + Seteria in row ratio of 1:5 indicated that the gross income was higher (Rs.46074/-) than sole crop of seteria (Rs. 30427)/-
- The results on cropping system oriented demonstrations against drought mitigation clearly indicated that above inter cropping systems are economically advantageous than sole crops under rainfed situations.

Farmers' feedback:

- Redgram and seteria intercropping system found to be remunerative than sole crop of seteria/redgram even under drought conditions.
- Fodder needs of cattle and milch animals were met.
- While maintaining the yield levels of the sole crop, additional yields with the intercropping component have been realized.
- Since, a food legume is involved in the system, it will not only enhance the income of the farmer, but also provide with the much-needed protein to supplement the predominantly cereal diet of farmers, besides adding fertility to the Soil.

Success story on drip irrigation in Mango Orchard:

K.Rami reddy is having Mango orchard in Yagantipalli village of Banaganapalli mandal in an area of 10 acres. He had only one bore well to irrigate the entire orchard. Every year he was irrigating orchard by basin method of irrigation with field channels which took 12 days to irrigate entire orchard. In the year 2013-14, he was convinced by KVK to install drip irrigation system under NICRA programme . Drip irrigation was installed with double lateral having four drippers of 8 lit/hour on each side of the tree.

After installation of drip irrigation each Mango tree got 300 liters of water every day, which is more than the peak requirement of Mango tree (Peak water requirement of Mango tree150 lit / day.) There was no soil compaction and weed growth under tree basins. Since the water was given only in tree basins, hence, frequent inter-culture operations also avoided. Before flower initiation light irrigation was given for emergence of the flower panicle. In traditional flooding method of irrigation there is no control over the quantity of irrigation given to the tree, where as in drip method of irrigation we can adjust the quantity of water per tree in the range of 30 lit/day to 300 lit/day.

As the water is given every day at effective root zone depth which maintained the equilibrium of air and moisture at the root zone, which increased the number of fruiting trees in the orchard, number of fruits per plant , Average weight of the fruit compared to the orchards with flooding method of irrigation.

The Economic Viability of improved technology over farmers practice was calculated depending on prevailing prices of input and output costs. The improved technologies resulted increased income with cost benefit ratio of 1:4.6/2.8.

Treatments	Fruit yield (kg/ha)	Fodder Yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	B:C ratio	Remarks
Basin method in mango	8342	-	1,02,540-00	2,91,970-00	1,89,430-00	1:2.8	
Drip irrigation	12542	-	95250-00	4,38,970-00	3,43,720-00	1:4.6	

The data clearly indicated that with drip irrigation gave higher fruit yield (12542 Kg/ha), which was 50.0 per cent more than that of obtained with farmers practice of basin method of irrigation.

Gender Mainstreaming in Climate Change By Establishment of Bio-Gas Units - A Whole Village Approach under NICRA Project :

Introduction:

Krishi Vigyan Kendra adopted Yagantipalle village under NICRA Project and survey was conducted on cooking methods followed by women in the village and it was found that nearly most of the households are using open fire wood chulhas. Even though several households are using LPGs in their kitchens located in the houses, they prefer to cook on open fire wood chulhas. Cooking on open firewood again depends on the dietary pattern of the villagers i.e, for preparation of Jowar rotis which requires high flame. It was also found that more than 50% of the households are having LPG connections and are paying Rs.550/- per cylinder and they have to wait for long time after booking. It was also noticed that, the households are having two to three milch animals and the dung is not properly utilized and disposed in their backyards which creates environmental problems. This can be easily overcome with construction of Bio-gas Plants.

Methodology:

During Group discussion held with the women folk of that village it was found that, fetching of fire wood for long hours in hillocks and jungles induces drudgery i.e, body pains, scratches and

injuries on hands and legs, dust on hair and high risk and social security problem. The women also expressed that, hazards of wrong handling of LPG when all them go out for farm activities creates psychological stress. It was also found that, they are unaware of proper utilization of dung which is a main component for Bio-Gas.

The women were explained about the advantages of Bio-Gas and its usage; they were quite convinced about importance of construction of Bio-gas units and its usefulness vs health hazards and difficulties with open fire wood cooking. The advantages of Bio-Gas plants created awareness among farm women and six innovative women came forward for construction of units in the first instance. So for 22 Bio-gas units were constructed during the period from 2012 to 2014 under NICRA Project in this village.

Impact:

After Construction and using of the units, the farm women are very happy and expressed that the bio-gas.,

- Reduced drudgery in searching of firewood and avoids scope for social insecurity
- Improved their quality of life/life style and helped them for using their leisure time for enhancing their economic productivity by attending skill works.
- Reduced expenditure (i.e, Rs.12,950/-/year) on other rural energy resources like Wood, Hard coal, kerosene, plant residues (Saves seven cylinders @Rs.550/- per cylinder, Saves 32 lts of kerosene & 11/2 of tractor loads of firewood @ Rs 5000/- tractor, amounting to 12,950/- per annum).
- The dung is being effectively utilized for production of bio-gas and the slurry produces quality compost of 10 tonnes/unit/year.
- The slurry from bio-gas units is the best organic manure and are applying in their farms in place of chemical fertilizers which improves soil health and reduced cost of cultivation.
- Reduced health risks i.e, respiratory diseases, eye ailments, burning accidents etc.for women and children associated with open fire.
- This Energy form is clean burning and completely natural so it has no adverse effects on the environment. It also reduces the amount of methane and carbon dioxide released into the environment.
- Reduced the risks and tensions associated with LPG when they leave home for farming activity and also booking the gas supply.
- It also improves the sanitary condition of back yard and its surroundings by disposal of plant and animal wastes.

Visit of dignitaries –NICRA village (2015-16):

Date	Name and address of the visitor	Comments on performance
18-9-2015	**Dr. J.V. N.S. Prasad, Principal scientist, CRIDA**	Visited NICRA village and also Farmers fields where the interaction was taken up. Excellent work done. All most all households of the village got benefited from TDC component of NICRA.
5-10-2015	**Monotoring team along with Director, IIMR, Dr. Nageswar Rao.**	Visited NICRA village as a part of FLD visit, very happy to see the all components of TDC NICRA village.

Budgetary details of the NICRA center (2015-16):

S. No	Budgetary Head	Amount Rs in lakhs			Remarks
		Sanction	Release	expenditure	
1	Recurring contingency	8,00,000	6,19,993-00	7,08,847-00	**OB-66545-00 (I)19382-00 12,69,993-00 (R) 13,55,920-00 (T)**
2	TA	50,000	50,000-00	49,783--00	
3	**NRC**	**6,00,000**	**6,00,000**	**5,95,882-00**	
	Total	**14,50,000**	**12,69,993-00**	**13,54,452-00**	

List of contributors for implementing the NICRA Programme:

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3	Sri K.V.Ramanaiah	SMS(Soil Science)		9440238071
4	Sri. D.Balaraju	SMS(Plant Protection)		9493836890
5	Sri.K.V.Rajeswara Reddy	SMS(Horticulture)		9848609233
6	Sri.A.Krishnamurthy	SMS(AH)		9493619020
7	Smt.K.Lakshmipriya	Pro.Asst(Hsc)		9441192765
8	R.Venkat Naik	S R F		9666747842
9	P.Vishnu Mohan Reddy	S R F		9963875833

List of Annexures to be enclosed in Annual report

ANNEXURE-I

Rainfall details in NICRA village -2015

Days	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	001.4
2	000.0	000.0	018.5	000.0	005.0	000.0	000.2	000.0	000.0	068.6	000.0	000.0
3	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	024.0	027.8	000.0
4	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	055.4	001.5	000.0	000.0
5	000.0	000.0	000.0	000.0	000.0	013.8	000.0	000.0	000.0	001.0	000.0	000.0
6	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	050.8	000.0	000.0	000.0
7	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	007.4	000.0	000.0
8	000.0	000.0	000.0	000.0	000.0	009.8	000.0	000.0	002.0	000.0	000.0	000.0
9	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	010.0	000.0	000.2	000.0
10	000.0	000.0	000.0	000.0	000.0	000.0	000.6	000.0	002.5	000.0	000.6	000.0
11	000.0	000.0	000.0	025.0	000.0	004.6	000.0	015.3	028.2	000.0	000.0	000.0
12	000.0	000.0	000.0	013.4	000.0	000.0	000.0	005.2	000.0	000.0	000.0	000.0
13	000.0	000.0	000.0	002.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0
14	000.0	000.0	000.0	009.8	002.8	000.0	065.2	000.0	012.6	000.0	000.0	000.0
15	000.0	000.0	000.0	000.0	005.8	000.0	000.2	000.0	000.0	000.0	002.6	000.0
16	000.0	000.0	000.0	000.0	010.8	000.0	000.0	000.0	000.0	000.0	005.2	000.0
17	000.0	000.0	000.0	000.0	004.0	000.0	000.0	001.2	000.0	000.0	000.0	000.0
18	000.0	000.0	000.0	000.0	000.0	000.1	000.0	000.0	000.0	000.0	000.5	000.0
19	000.0	000.0	000.0	000.0	017.0	004.0	000.0	018.2	000.0	000.0	000.1	000.0
20	000.0	000.0	000.0	000.0	000.0	000.0	000.0	020.0	000.0	000.0	003.6	000.0
21	000.0	000.0	000.0	000.0	000.0	000.0	000.0	015.0	000.0	000.0	005.8	000.0
22	000.0	000.0	000.0	000.0	000.0	000.0	018.2	004.0	000.0	000.0	000.0	000.0
23	000.0	000.0	000.0	006.5	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0
24	000.0	000.0	000.0	003.2	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0
25	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	045.2	000.0	000.0	000.0
26	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	001.6	000.0	000.0	000.0
27	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	008.2	000.0	000.0	000.0
28	000.0	000.6	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0
29	000.0		000.0	000.5	000.0	000.0	000.0	000.0	000.0	000.0	034.6	000.0
30	000.0		000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0	000.0
31	000.0		000.0		001.2		000.0	000.0		000.0		000.0
Total	000.0	000.6	018.5	060.4	046.6	032.3	084.4	078.9	216.5	102.5	81.0	001.4
Rainy days	0	0	1	5	6	4	2	6	8	3	6	0

Burrakunta Tank after desilting