National Initiative on Climate Resilient Agriculture (NICRA) Project

KVK, *Yagantipalle, A.P.*

Progress Report 2013-14

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 severerly affecting yield. The short duration millets viz., Foxtail millet SIA 3085 and suryanadi varieties with 70-75 days duration and tolerance to drought and downy mildew was popularised . copping systems with korra and red gram, red gram and castor were also introduced .In redgram replacement of long duration variety with PRG 158 and introduction of castor hybrid PCH 111 .

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*
Mean annual rainfall	*: 546.4 mm*

***Major cropping systems**: red gram and cotton in kharif, Jowar and sunflower in rabi.*

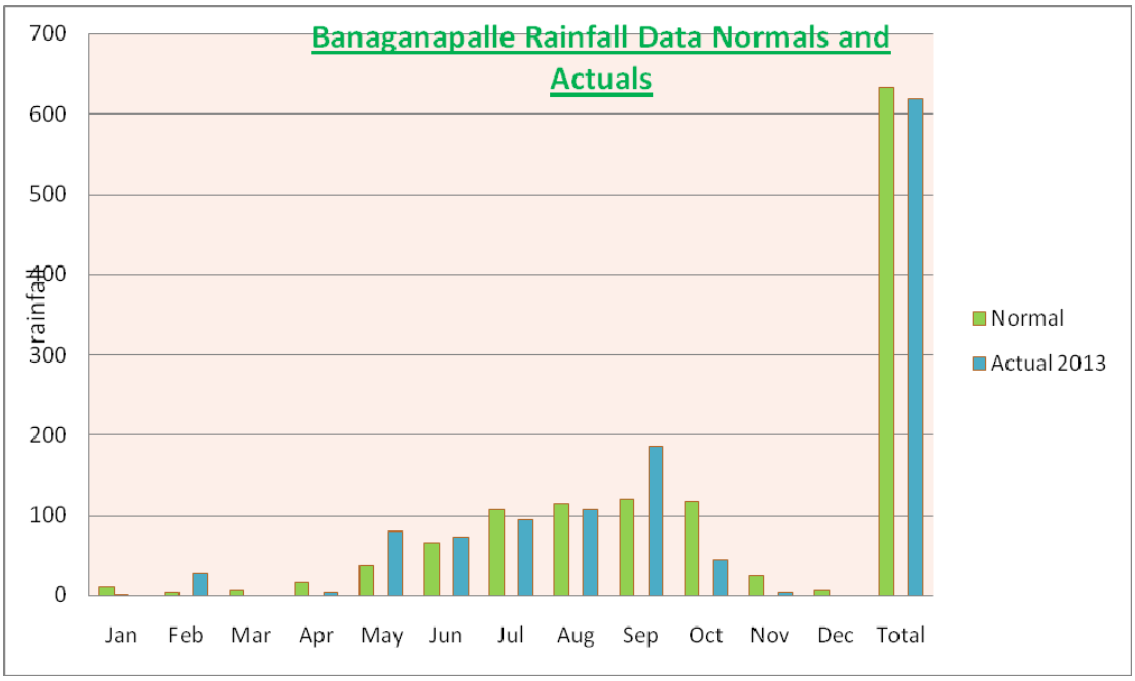
Climate vulnerability: Drought

***Major interventions:** Short duration Setaria SIA,Suryanandi & 3085, intercropping with short duration red gram PRG 158, drought tolerant Bengal gram Nandyala sanaga-1 for Rabi, conservation practices such as dead furrows in Castor ,gypsum treatment for reclamation of alkaline soils, crop diversification with Castor PCH 111 in place of desi cotton, direct and drip irrigation in mango, drumstick and vegetables as conservation of moisture under irrigated crops.*

***NRM Interventions:** bore well recharge pits, compost pits.*

***Live stock intervention:** rearing of milch animals, back yard poultry, animal health camps, promotion of fodder cultivation and fodder conservation through silage and haylage making.*

Rainfall Situation: During the period (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 good yields.



Rabi sowings i.e Bengalgram was taken up with rain rainfall received during Last week of september. All rabi crops suffered acute moisture stress as there was dearth of stored soil moisture in the early stages of crop growth and subsequently prolonged drought conditions. These aberrant weather conditions reflected badly on the crop yields.

Natural Resource management:

1. Ground water recharge pits:

Nearly 25 % of the borewells were dried up due to over exploiting of ground water without ground water recharge. A recharge pit allows the rainwater to replenish groundwater.

Excavation of recharge pit:

Dug out 4 recharge pits closely to borewells with 2x2x2m dimensions at valley point. A recharge pit filled with 40mm stone material(0.6m thickness)at bottom of the pit, then second layer with smaller stone(20mm) for 0.4m thickness, followed by coarse sand (0.3m),fine sand(0.3m) and finally with coconut coir(0.2m). However 0.2 m depth of pit is open for rainwater collection. A recharge pit can be totally invisible when finished.

2. Farm waste recycling bins:

Seventy percent soils of Yagantipalle are having low in organic carbon due to high soil temperatures and application of inappropriate quantity of organic manures. So, recycling of farm waste is vital role in enhancing soil organic carbon, so it has to improves physical properties (Aggregate stability, infiltration, drainage, and airflow), nutrient mineralization, microbial biomass activity. Most of the farmers are not recycling their farm waste and crop residues are being burnt at road sides after threshing. Hence, Composting technology is more potential to meet the organic manure requirement in both irrigated and rainfed areas. It has tremendous prospects in converting agro-wastes/ crop residues into valuable agricultural input. Burning and removing crop residues decreases SOC.

Four compost bins constructed with kadapa slabs (dimension of 20x6x4ft) near threshing yards to create awareness and motivate the farmers towards compost preparation and improve quality of manure.

III. Reclamation of sodic soils:

Although quality of water had been normal, the increase and intensification of alkalinity is primarily due to soil factors, which is impedance in drainage due to presence of an indurate layer of clay or kankar pan in sub soils . Nearly,37 % of cultivated soils of Yagantipalle village comes under high alkali category.

Ten demonstrations were demonstrations covering 10 acres on reclamation of sodic soils with gypsum as per soil test report followed by Paddy cultivation during Kharif, 2013.

Before reclamation the pH of the sodic soils was ranged from 9.03 to 9.25 and after reclamation the pH is reduced to 8.6 and 8.79 respectively due to amelioration with gypsum followed by daincha as green manuring insitu.

The results illustrated in Table 5 indicated that the average grain yield of paddy under reclamation was higher (5960kg/ha) than the grain yield produced under controlled practice (4852 kg/ha). Gross and net income were high in demonstration plots (Rs.98272 ha^{-1} and Rs. 45437ha^{-1}, respectively) as compared to controlled practice (Rs. 80537 ha^{-1} and Rs.36702 ha^{-1}, respectively). It was also observed that an amount of Rs.8735/ha was realized as additional income due to yield increments (22.02%) in demonstrations.

Table-1 : Yield and economics of demonstration plots:

S.No	Item	Demonstration (Reclamation with gypsum@2.5 tonnes/ha	Control
1	Mean yield of paddy grain (Kg./ha)	5920	4852
2	Cost of production per hectare (Rs.)	52835	43835
3	Gross returns per hectare (Rs.)	98272	80537
4	Net returns per hectare (Rs.)	45437	36702
5	C:B ratio	1.86	1.84
6	Additional income	8735	

II. Crop Interventions:

Introduced drought tolerant variety of Redgram i.e PRG-158 in medium to light soils where long duration varieties are facing moisture stress at flowering and pod dev. Stage (Terminal moisture stress).

Results of Redgram demonstrations indicated that the variety PRG-158 performed well in medium to light soils and recorded 25.0 per cent increased yield over long duration variety

Introduction of drought tolerant variety in Bengalgram: Results of Bengalgram demonstrations indicated that the variety NBeG-1 in medium to light soils has recorded increased yield over existing varieties.

Treatments	Seed yield(kg/ ha	Fodder Yield(kg/ ha	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Ra/ha)	B:C ratio	Remarks
Improved variety 1 (PRG-158)	1364	-	16663	54506	37843	1:3.27	-
Local	1095	-		43800	27137	1:2.63	-

1. No. of farmers under demonstration -30

2. Area of each Demonstration (technology) -0.4ha.

3. Cost of produce: seed--4000(Rs/q).

Treatments	Seed yield(kg/ha	Fodder Yield(kg/ha	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	B:C ratio	Remarks
Improved variety 1 (nandyalasanaga-1)	1304	-	22905	37816	14911	1:1.65	-
JG-11	1125			32625	13720	1:1.42	-

1. No. of farmers under demonstration -40

2. Area of each Demonstration (technology) -0.4ha.

3. Cost of produce: seed--2900(Rs/q

Cropping systems for drought mitigation

Introduced Redgram + Seteria (1:5) and castor +Redgram(1:1) 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.

Table: Yield and economics of Inter crops.

Cropping System	Yield (Kg/ha)		Cost of cultivation (Rs/ha)	Gross income Rs/ha	LER	CB Ratio
	Seteria	Redgram				
Redgram+ Seteria(1:5)	2084	815	18960	58650	1.50	1:3.09
Castor + Redgram (1:1)	1063	900	21668	67890	1.54	1:3.13

- No. of farmers under demonstration :40,
- Area of each Demonstration (technology) :0.4ha.
- Cost of produce: seed :1200 (Rs/q).
- Castor:3000 (Rs/q) Redgram : 4000/-

Results of demonstrations on intercropping of Redgram + seteria in row ratio of 1:5 indicated that the gross income was higher Rs58650/- than sole crop of seteria(27532/-).

- Similarly higher gross income was obtained with castor + Redgram (1:1) Rs 678900/- than sole crop of castor Rs 36180/-.

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 situation.

Introduction of Alternate crops

Farmers in the village normally grown desi cotton, if on-set of monsoon is well in time. During last three year due to late receipt of rains, seteria, castor hybrid i.e. PCH-111 as alternate crops were introduced in place of desi cotton

Results on performance of Seteria as alternate crop to desi cotton revealed that highest gross income was obtained with Seteria 27532/- with CB ratio of 1:2.13

Treatments	Seed yield(kg/ ha	Fodder Yield(kg/ ha	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Ra/ha)	B:C ratio	Remarks
Improved variety (SIA-3085)	2320	-	12955	27532	14577	1:2.13	-
Local(Desi cotton)	375	-	12350	16875	4525	1:1.37	-

1. No. of farmers under demonstration :25
2. Area of each Demonstration (technology :0.4ha.
3. Cost of produce: seed :1200 (Rs/q).
4. Fodder : Rs 40/q

In View of drought tolerance, the seteria crop is preferred for introducing in the village. So as reap maximum yield and higher returns under harsh weather conditions. In view of its superior performance the crop area increased from 40 to 300 acres in the village during kharif 2013. Area expansion under this crop is expected during ensuing season also.

Treatments	Seed yield(kg/ ha	Fodder Yield(kg/ ha	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Ra/ha)	B:C ratio	Remarks
PCH-111	1206	-	18459	36180	17721	1:1.96	-
Private hybrid	1086	-		32580	14121	1:1.76	-

1. No. of farmers under demonstration -20
2. Area of each Demonstration (technology) -0.4ha.
3. Cost of produce: seed—3000/- (Rs/q).

In situ-moisture conservation measures:

This area falls under scarce rainfall zone and frequent drought during critical crop growth stages to cope with this problem, in- situ moisture conservation measures by formation of dead furrows of size 30cm were made between rows of castor during Kharif in an area of 10 ha. This technology conserved runoff rain water and helped to cope with terminal moisture stress in castor.

Organized demonstrations to create awareness on in- situ moisture conservation measures i.e formation of dead furrows between rows of Castor inorder to conserve runoff water and to avoid terminal moisture stress.

Effect moisture conservation practices on Yield of castor

Treatments	Seed yield(kg/ha	Fodder Yield(kg/ha	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Ra/ha)	B:C ratio	Remarks
Farmers method (Castor)	1156	-	22181	34680	12499	1:1.56	-
Improved conservation measure (Castor)	1335	-	22681	40050	15283	1:1.77	-

2. Area of each Demonstration(technology) .**0.4 ha**.
3. Cost of produce: seed 3,000/- (Rs/q).

The increased yield mainly due to reduced runoff and retention of higher soil moisture. Due to this practice resulted in higher production of secondary spikes were also observed.

- Results indicated that Formation of ridges and furrows at first inter cultivation (30-35 DAS) recorded 15.4 percent increased yield over farmers practice and gross income of Rs 40050/-was obtained with CB ratio of 1:1.56/1.77

Weather based Pest management in Castor:

The demonstration was laid in Yagantipalle and Meerapuram villages during July, 2013. The temperatures prevailed during September (28.4 – 35.9 ^{0} C) and RH (80 – 97%) predisposed the incidence of Castor Semilooper. The intermittent rains received during 8 rainy days in September and 5 rainy days in October with overcast conditions from 1st week of September to 3rd week of October, predisposed the incidence of Botrytis grey mold. Spraying of Chlorpyriphos @ 2.5 ml/lt and Carbendazim @ 1g/lt along with sticker was taken up in demonstrations for management of Semi looper and Botrytis respectively.

The results indicated that in FLD there is 12.1 % increased yield in Castor (1233 kg/ha) compared to farmers practice (1100 kg/ha), which is mainly attributed to management of Botrytis, Castor semi looper and borer in time. The incidence of borer was reduced by 47.7 % in FLD over farmers practice and Botrytis disease was reduced by 61.1 % in FLD over control, with additional net returns of Rs. 6,184-00 per ha.

Component	Borer (%)		Incidence of Botrytis (%)		Yield (Kg/ha)		% increase	Additional net returns Rs./ha	C:B Ratio
	FLD	FP	FLD	FP	FLD	FP			
Weather based crop protection	3.4	6.5	2.8	7.2	1233	1100	12.09	6,184	1:2.00/ 1:1.6

Weather based pest management in Redgram :

The demonstrations were taken up in Yagantipalle of Banaganapalle mandal. The Max. temp. ranged between 28.2 ^{0}C to 33.2 ^{0}C during December and 29.2^{0}C to 31.7 ^{0}C during January,14 respectively. And the RH (Max.) ranged between 73 – 94% in Dec., 13 and 80 - 88% in Jan, 14 respectively without any rainfall and overcast conditions. During this period, the crop was at flowering stage and moderate incidence of Maruca and Pod borer was noticed. For management of these pests, Chlorpyriphos @ 2.5 ml/lt and Dichlorovos @ 1.0 ml/lt was sprayed in all the demonstrations.

The results indicated that there is 9.7 % increased yield in demo (1360 kg/ha) compared to farmers practice (1240 kg/ha), with a net benefit of Rs. 5,032-00 per ha, which includes the saving of Rs. 590-00 per ha on cost of plant protection. The incidence of Maruca and Pod borer in FLD were (2.8 % and 2.5 %) lower compared to farmers practice (7.0 % and 5.5 %).

Component	Maruca (%)		Pod borer (%)		Average yield (kg/ha)		% Increase	Addl. Returns (Rs./ha)	C:B ratio
	FLD	FP	FLD	FP	FLD	FP			
Weather based crop protection	2.8	7.0	2.5	5.5	1360	1240	9.67	5,032.00	1:3.3/ 1:2.8

Organic farming in Red gram: This demonstration was taken up in 2.4 ha with 6 farmers. During this period, the crop was at flowering stage and moderate incidence of Maruca and Pod borer was noticed. For management of these pests, Chlorpyriphos @ 2.5 ml/lt and Dichlorovos @ 1.0 ml/lt was sprayed in all the demonstrations. Neem oil 0.03% @ 5 ml/lt, Beauveria @5g/lt were used for Pest management and Trichoderma enriched vermicompost was applied to soil for Wilt management. The results indicated that in organic farming there is 7.7 reduction in yield (1223 kg/ha) over farmers practice (1325 kg/ha), however due to saving in cost of PP and premium price of produce, an additional returns of Rs. 4,897/- per ha. were obtained in Organic farming of Redgram, with same level of crop protection.

Component	Cost of Cult Rs./ha		Gross income (Rs/ha)		Average yield (kg/ha)		% Increase	Addl. Returns (Rs./ha)	C:B ratio
	OF	FP	OF	FP	OF	FP			
Organic farming in Redgram	19230	22092	55035	53000	1223	1325	-7.69	4,897	1:2.86/1 :2.40

Livestock activities:

Calf registration programme: To reduce the calf mortality and to increase growth rate, calf registration programme taken up. Under the programme 30 buffalo calves and 20 cattle calves were selected and registered immediately after birth. Health card issued to all registered calves. De-worming, vitamin supplementation was provided every month up to six months age and periodical vaccination against FMD and HS was done. Calf starter and mineral lick was provided. Data on body weight was collected at monthly interval. The data revealed that body weight increase in 150days was 43.1% and 27% in Buffalo calves and cattle calves, respectively.

No. of trials	Initial B.wt		Final B.wt		Weight gain in (150days)		% increase in body weight gain (150days)	Mortality	
	Control	Demo	Control	Demo	Control	Demo		Control	Demo
Buffalo calves 20	28.2	26.8	64.4	78.6	36.2	51.8	43.1	4	0
Cattle calves 30	36.8	33.6	64.2	68.4	27.4	34.8	27.0	3	1

1. **Mitigation of mineral deficiency in milch buffaloes:** Regional specific mineral mixture was supplied to fifty Graded Murrah buffaloes to feed daily @ 80grams/day. The data on milk yield improvement and the reproductive performance was recorded. Among the buffaloes 18 (36%) buffaloes came to heat after feeding of mineral mixture and 15.3% milk yield improvement was recorded during the trial period of 90 days.

Title	No. of trials*	Technology	Parameters of assessment	Data on the parameter	Results of assessment
Effect of RSMM on reproduction and production performance in milch buffaloes.	50animals	T1: Farmers practice (No feeding of mineral mixture)	No. of animals responded	18 36.0%)	The results indicated that 36% animals exhibited heat symptoms and 15.3% increased milk production was recorded through supplementation of RSMM in the feed.
		T2: Feeding of regional specific mineral mixture @ 80gm/day)	Milk production (90 days)	400.5 (T1) 461.7 (T2)	

Livestock population trend in NICRA villages:

Meerapuram

Animal	2010-11	2011-12	2012-13	2013-14 (Up to Dec'13)
Buffaloes	600	700	820	900
Cows	20	25	30	40
Sheep	75	75	80	100
Goat	150	180	200	250
Poultry	700	1000	1200	1500
Milk Production/month	15000	18000	20800	24480

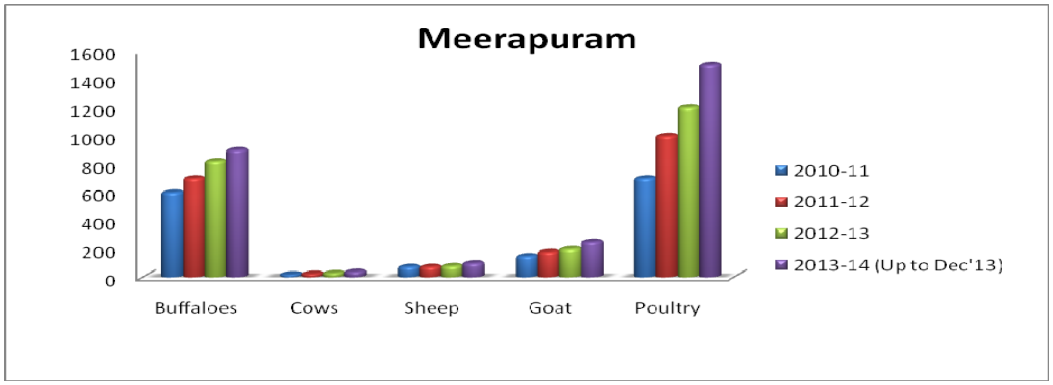
Yagantipalle

Animal	2010-11	2011-12	2012-13	2013-14 (Up to Dec'13)
Buffaloes	850	900	1000	1200
Cows	-	150	200	400
Sheep	200	200	250	300
Goat	150	150	200	200
Poultry	2400	2400	2500	3000
Milk Production/month	25000	30000	42000	51000

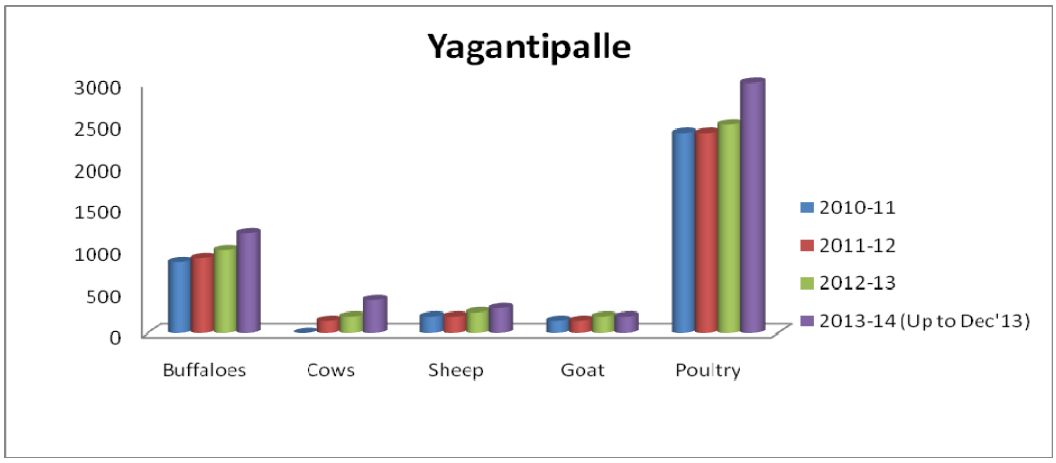
Milk Production Particulars

Village	2010-11	2011-12	2012-13	2013-14 (Up to Dec'13)
Meerapuram	15000	18000	20800	24480
Yagantipalle	25000	30000	42000	51000

Graphical representation of livestock population in Meerapuram village



Graphical representation of livestock population in Yagantipalle village



Institutional Interventions

Seed bank:

Quality seed of improved varieties is an important basic input for enhancing productivity of any crop species. Existing mechanisms to meet the seed requirements of small-scale farmers are not adequate and have serious limitations. Particularly to smallholder farmers at affordable prices and at the right time to enhance crop productivity income 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 price 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 (PRG-158) and Korra (SIA-3085) and Bengalgram (NBeG-1 , Vihar and JAKI-9218)was taken up to establish seed bank in the village.

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.

Rotavator

Seed drill

- **Contribution from Farmers**

Through Activities	**: Rs. 1,32,488-00**
Through Custom Hiring	**: Rs. 44,582-00**
Total	**: Rs. 1,77,070-00**

- **Amount invested to purchase implements : Rs 66900-00**
- **Net amount realized :Rs1,10,170-00**

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

Meteorological observatory:

Meteorological observatory was established to record weather parameters on rainfall, Min, max temperatures and R.H

Automatic weather station at KVK

Weather station at Yagantipalle village

Bio-gas units:

- Established Six biogas plants
- Replacement of other rural energy sources : Biogas is fully capable of replacing other rural energy sources like wood, hard coal, kerosene, plant residues etc.Reduction in drudgery for rural women folk: Biogas unit will help the women folk for reducing drudgery in collecting firewood. This also helps in reducing physical problems like bronchial complications. Cooking is also easier with a gas stove and takes less time.
- Ecologically Safe: 1 biogas plant is computed to save 32 liters of kerosene and 4 tons of firewood every year.
- Environmental benefits on a global scale: Biogas plants significantly lower the greenhouse effects on the earth's atmosphere. The plants lower methane emissions by entrapping the harmful gas and using it as fuel.

- Economic benefit: Rs 500/- will be the cost of LPG cylinder for a family per month and this helps in saving an amount of Rs. 6000/- per annum

STATEMENT OF HEAD -WISE EXPENDITURE FOR THE YEAR 2013-14

Name of the KVK:: SHE&CS, Krishi Vigyan Kendra, Yagantipalle, Kurnool.

(Rupees)

S.No	Items of Expenditure	Opening balance as on 1st April, 2013	BE for 2013-14	Amount released during 2013-14	Expenditure from 1st April 2013 to January - 2014	Closing balance as on 1st February - 2014 Col.(3+5-6)	
1	2	3	4	5	6	7	
	A. Recurring Contingency						
1	Operational expenses (Labour, skilled staff, POL, Supplies etc.,) Contractual Services etc.,	4,278-00	7,81,000-00	7,75,000-00	7,91,442-00	-10,442-00	
2	TA	1,688-00	25,000-00	25,000-00	6,220-00	18,780-00	
	Total	**5,966-00**	**8,06,000-00**	**8,00,000-00**	**7,97,662-00**	**8,338-00**	

Signature of Principal Investigator

Signature of Finance & Accounts Officer/ Comptroller/Chartered Accountant