Nominee Statement

MICRO IRRIGATION – A TECHNOLOGY FOR PROSPERITY

I. Describe the innovation

Andhra Pradesh is the fourth largest state with 27.4 million ha geographical area and fifth largest in population with 90 million. Over 70% of the states population depends on agriculture. The important rivers of Godavari, Krishna, Vamsadhara and Pennar contribute dependable flows of 74.14 billion cubic meters The per capita water availability of 1,400 cubic meters defines the situation as 'water scarce'. More than 82% of water resources are used for agriculture purpose. The prevailing irrigation efficiencies in most of the irrigation projects are in the range of 20 to 35% indicates the need for improved on-farm water management. The utilizable irrigation potential of ground water (GW) resources in the state is 39.6 billion cubic meters. More than 2.6 million electrified pump sets are in use lifting ground water for irrigation purpose. The average annual fall of GW table by 1.2% warrants improvements in GW usage.

Realizing the importance for economic use of precious ground water for irrigation, Government of Andhra Pradesh has launched the Andhra Pradesh Micro irrigation Project (APMIP), a unique, comprehensive micro irrigation project on 3rd November 2003 to bring 248,000 ha under MI systems in 5 years with total financial outlay of Rs 11760 million (US $ 294 million (1 US $= Rs 40)). Today more than 376,000 ha area has been covered with MI systems benefiting over 250,000 farmers.

Financial Assistance

Financial support of 70 % of the MI system cost with physical limit of Rs. 50,000 per family is provided to encourage farmers opting micro irrigation.

MI Systems

The MI systems designed and installed in the farmer's fields by the designated 20 companies are

1. On-line drip systems for wide spaced orchards
2. In-line drip systems for row crops
3. Portable sprinklers and rain guns for filed crops like groundnut, pulses etc.
4. Micro-sprinklers for raising nurseries
5. Micro-jets for oil palm, etc.

Special Features

a. Use of only ISI (Indian Standard Institute) certified products
b. Compulsory use of fertigation equipment
c. Agri-extension service to farmers for 2 years
d. Performance guarantee of MI equipment for 5 years
e. Training and capacity building of farmers and stake holders
f. Independent Monitoring and Evaluation by external agencies
g. Quality control by CIPET (Central Institute for Plastics Engineering Technology), Hyderabad

New Developments

The experience in execution of the project over last four years has helped to take new initiatives.

A. Low cost semi-permanent sprinkler system

In India portable sprinkler systems are commonly used for irrigating field crops. Standardized unit for 1 ha area consists of 25 HDPE pipes of 6 m length each fitted with Quick Action Couplers (QACs), 5 sprinkler heads of 0.5 lps discharge each with GI riser pipes. In various programs the governments provide such systems to the farmers to improve water use efficiency and crop productivity. The cost of one unit is about Rs 15,000 (US $ 375 @ Rs 40 per 1 US $). The farmers in AP purchased over 146,000 such systems during last four years.

However, it has been observed that the farmers using such a portable sprinkler system are experiencing difficulty in operating them due to

i) Portable HDPE pipes and sprinkler heads are to be stored in safe place
ii) In one shift of operation only 720 sq m area can be irrigated with 5 sprinkler heads and 14 shifts are required to cover 1 ha.
iii) Processes involved in completion of each shift of operation are laborious and time consuming.
iv) The pump set is to be switched-off after completing one shift to enable the operator to dismantle pipes, and relay in next shift area.
v) Dismantling and emptying of pipes results water ponding near QACs causing difficulty in movement.
vi) 15 to 20 minutes time is lost in every shift, which amounts to huge loss of valuable operation time.

A low cost hydraulically efficient semi-permanent sprinkler system has been designed and introduced (Fig 1) to overcome the disadvantages of the conventional portable sprinkler systems with the following characteristics.

1. 25 mm dia PVC pipes are used as the laterals
2. Laterals are laid on both sides of the submain

3. Maximum length of lateral pipe is limited to 36 m to limit pressure variation
4. Only one sprinkler head of 0.5 lps discharge is operated at a time on one lateral
5. PVC pipes of 90 mm, 75mm and 63 mm size with telescopic design are used for mains and sub mains.
6. ISI (Indian Standard Institute) certified Plastic sprinklers with flow rate of 0.5 lps are used
7. For one-hectare area total 70 risers are required to cover entire filed.
8. Based on the pump discharge the number of sprinkler heads to be operated in a shift can be decided.
9. Assuming the pump discharge of 5 lps, 10 sprinkler heads can operate simultaneously.

In the field installation the PVC pipes are laid 60 cm below the ground to avoid damage during filed operations. The entire system cost comes to Rs 28,000 (US $ 700) per ha. Additional expenditure of about Rs 10,000 (US $ 250) per ha is incurred in trenching. By considering the advantages like labor saving, operation convenience, better working condition in the field the farmers have shown more interest in installing the semi-permanent sprinkler systems rather than the conventional fully portable system. So far, over 6000 ha area has been covered with semi-permanent sprinkler systems.

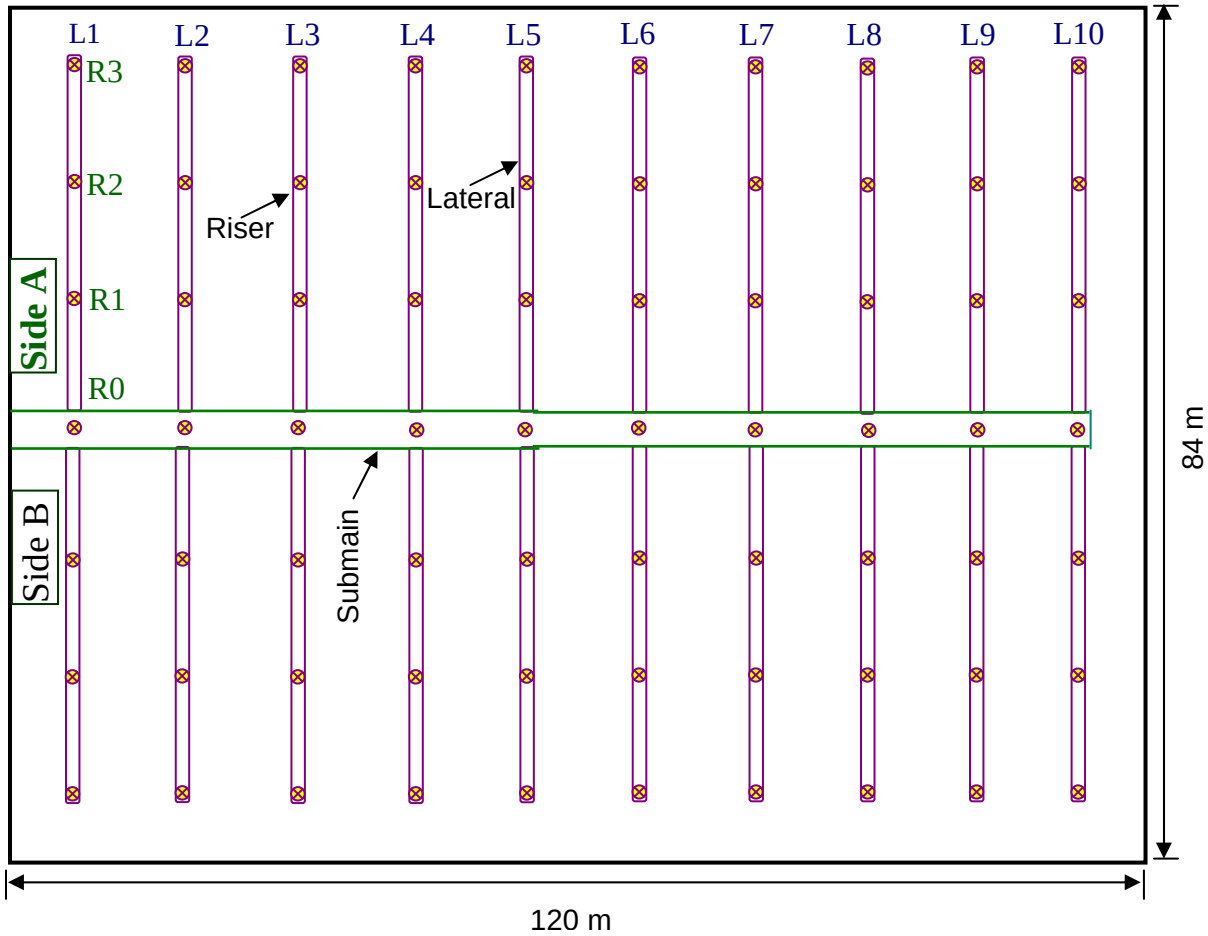

Fig 1. Layout of semi-permanent sprinkler irrigation system for 1 ha area

Sequence of operation of sprinkler heads is shown in Table 1 assuming that the pump discharge is 5 lps.

Table. 1 Operation sequence of sprinkler heads with pump discharge of 5 lps

N	Sequence of operation of sprinkler heads
10	Shift 1: R_0L_1, R_0L_2, R_0L_3, AR_0L_4, R_0L_5, R_0L_6, R_0L_7, R_0L_8, R_0L_9, R_0L_{10} Shift 2: AR_1L_1, AR_1L_2, AR_1L_3, AR_1L_4, AR_1L_5, AR_1L_6, AR_1L_7, AR_1L_8, AR_1L_9, AR_1L_{10} Shift 3: AR_2L_1, AR_2L_2, AR_2L_3, AR_2L_4, AR_2L_5, AR_2L_6, AR_2L_7, AR_2L_8, AR_2L_9, AR_2L_{10} Shift 3: AR_3L_1, AR_3L_2, AR_3L_3, AR_3L_4, AR_3L_5, AR_3L_6, AR_3L_7, AR_3L_8, AR_3L_9, AR_3L_{10} Shift 4: BR_1L_1, BR_1L_2, BR_1L_3, BR_1L_4, BR_1L_5, BR_1L_6, BR_1L_7, BR_1L_8, BR_1L_9, BR_1L_{10} Shift 5: BR_2L_1, BR_2L_2, BR_2L_3, BR_2L_4, BR_2L_5, BR_2L_6, BR_2L_7, BR_2L_8, BR_2L_9, BR_2L_{10} Shift 6: BR_3L_1, BR_3L_2, BR_3L_3, BR_3L_4, BR_3L_5, BR_3L_6, BR_3L_7, BR_3L_8, BR_3L_9, BR_3L_{10}

R: Riser; L: Lateral

In sprinkler irrigation, generally 2 cm depth of water is applied in each irrigation based on the soil type, type of crop and crop stages. Each sprinkler head covers 144 sq m area with the spacing of 12 x 12 m. A sprinkler head with rated discharge of 0.5 lps needs to run for 96 minutes to supply 2 cm depth of water. Hence in a day of 7 hours power supply total four shifts can be run with the total running time of 6 hrs 24 minutes. There is no loss of shift time and the entire duration of power availability can be effectively utilized.

B. Micro irrigation in Canal Commands under Major Lift Projects (LIMIP)

The success of the micro irrigation in Andhra Pradesh has resulted in introduction of micro irrigation in the canal commands to improve the water use efficiency and crop productivity by increasing duty of water from 4000 to 6000 ha per 27 million cubic meters (one TMC). Model layout of water distribution in LIMIP is shown in Fig 2. In LIMIP required quantity water is delivered to each farm at sufficient pressure to operate MI system. The water from the minor is drawn to sump by gravity through a feeder pipeline and from sump pumped to individual field through a buried pipeline.

The Government has issued GO Ms No. 34 dt 09-02-2007 stating that under all major lift irrigation projects 100% ayacut is to be proposed for micro irrigation under LIMIP. A massive program is designed to bring about 800,000 ha area under micro irrigation in next five years under major lift irrigation projects. A pilot project covering one distributory with 2160 ha in of AMRP Lift project, Nalgonda district is nearing completion. Pilots have been commenced in LBC and PBC of Kadapa district also.

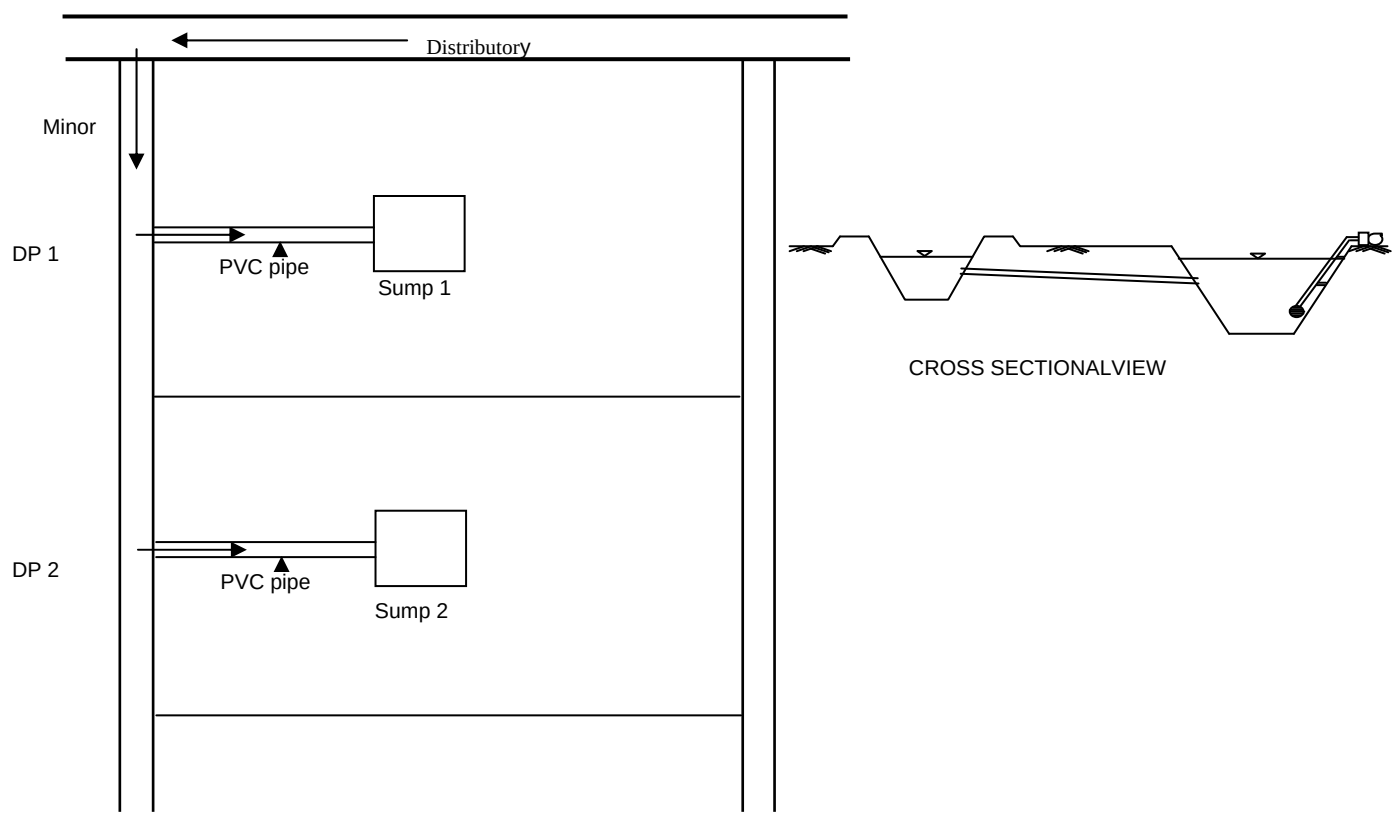

FIG 2. WATER DISTRIBUTION NETWORK OF LIMIP

II. Describe how the innovation saves water

Micro irrigation is the method of irrigating plant and not the soil. Since the water is carried through pipeline and delivered as per plant water requirement, all losses due to conveyance, distribution are totally eliminated. Under drip method 60-70% and sprinkler method 40-50% saving in water over surface method are attainable. Major lift projects are originally designed for surface irrigation with duty of water as 4000 ha per 1 TMC (27 million cubic meters). Now by conversion to micro irrigation the duty is revised to 6000 ha per 1 TMC, indicating increase of 50%. This will help in irrigating tail end areas in canal commands under lift projects. Semi-permanent sprinkler systems eliminate ponding of water near the pipe joints and improves working atmosphere.

III. Describe how the innovation was introduced and spread

Implementing agencies are setup at state level and district level for implementation of the project. At state level the Commissioner of Horticulture implements the program under the chairmanship of APC & Principal Secretary. All policy decisions are taken up in the standing committee, which comprises the heads of line departments, officers and experts from various institutes. Technical committee headed by the Technical expert (OSD Technical) examines all issues and recommends to the standing committee. A state level senior official heads the project as Project Officer supported by five senior officers of different disciplines.

At district level the District Collector acts as the chairman of the project. The Project Director, APMIP heads the project. One Assistant Project Director, a senior officer from Agriculture/Horticulture/Sericulture departments, acts as the Nodal Officer. For technical support two Micro irrigation Engineers are posted in each district to examine the survey reports and designs. For agri-extension services and capacity building a core team comprising of one Agricultural Engineer, One entomologist and one Agronomist/Horticulturist are provided. At mandal level Micro irrigation Area Officers (MIAOs) are placed (10 to 30 based on the size of district) for providing services to the farmers.

Awareness camps and Resource Centers

i) Distribution of leaflets and display of demos during farmers camps in every village
ii) Conducting awareness programs and exposure visits to the needy farmers
iii) Establishment of 500 Resource centers in potential blocks to provide spares at local level
iv) Conducting service camps frequently in cluster areas

Reach of Micro irrigation

The project, with farmer's active participation, made inroads into the fields of 250,000 agricultural families and helped them in reaping true benefits of micro

irrigation. During last four years over 0.376 million ha under micro irrigation with 0.236 million ha under drip systems and 0.140 million ha of sprinkler systems has been achieved.

Table 2. Year wise area covered under sprinkler and drip systems

Year	Sprinkler area, ha	Drip area, ha	Total area, ha
2003-04	20,770	3,780	24,550
2004-05	40,020	24,905	64,925
2005-06	25,000	51,811	76,811
2006-07	23,750	66,258	90,008
2007-08	30,000	90,000	120,000
	139,540	**236,754**	**376,294**

The benefits of drip irrigation in terms of i) higher yield, ii) better quality, iii) reduction in labor, iv) advantages in fertigation, v) reduced pest and diseases, vi) saving in water, have created positive influence in the farming community and today many farmers say that 'without drip no plantation'.

Micro irrigation Pays Huge Dividends

In order to assess the benefits of the project 500 detailed case studies were carried out on different crops from the farmer's fields and economic analysis is carried out. The summary of the analysis is as follows:

I. Total Area Covered : 3.76 lakh ha
- a) Drip : 2.36 lakh ha
- b) Sprinkler : 1.40 lakh ha

II. MI system cost
- a) Total : Rs 11220 million
- b) Farmers contribution : Rs 3930 million

III. Annual cost (CRF 0.2055) based on
- a) Total cost : Rs 2300 million
- b) Farmers contribution : Rs 810 million

IV. Additional yield
- @Rs 15,000/ha minimum : Rs 564 million

V. Payback period (II/IV) based on
- a) Total cost : 2.0 years
- b) Farmers contribution : 0.7 years

VI. Every rupee on MI yields (IV/III) based on
- a) Total annual cost : Rs 2.5
- b) Farmers contribution : Rs 7.0

It shows that for every rupee invested in micro irrigation gives an additional yield of worth Rs 2.5. By considering the financial contribution by the farmer only, the additional yield per every rupee spent is worth Rs 7. Since the pay back period is very attractive number of bankers are showing interest to fund farmers for MI systems.

Additional Benefits:

1. Water saving: 1880 MCM (@5,000 cu m per ha)
2. Energy saving: 188 million units (@500 units per ha)
3. Employment generation: Over 4000 professionals are employed by APMIP and MI companies
4. Prevention of migration: Labor migration is reduced substantially due to more crop activity
5. Poverty alleviation and Improved quality of life

Farmers views on Micro irrigation:

'Drop by drop irrigation changed our lives'- A woman farmer cultivating roses in remote village of AP	
'Drip irrigation is a Kamadhenu' (Sacred cow milking every day)- Farmer rising papaya and marigold as intercrop.	
'Drip irrigation saved us from going to Gulf countries as laborers' – Farmer cultivating banana crop in one of the drought districts of AP	

‘No drip - no plantation’- Opinion of number of farmers across the state.	

IV. Describe the scope for further expansion of the innovation

Andhra Pradesh has 4 million ha area suitable for micro irrigation systems. The coverage made so far counts less than 10% of the potential. The newly developed ‘Low cost semi-permanent sprinkler system’ has huge potential for at least 2.5 million ha in field crops grown areas for raising groundnut, pulses, sunflower, cotton etc. For the year 2008-09 measures are taken to cover 150,000 ha area under APMIP and 80,000 ha under LIMIP. It shows the scope for the micro irrigation technologies in Andhra Pradesh.

V. Describe the roles of the individual nominees

Dr. K. Yella Reddy as Technical Head of APMIP (OSD Technical), responsible for all technical activities of the project. He is responsible for design of MI systems for different crops, enlisting MI companies for design and installation of MI systems in farmers fields, organizing Monitoring and Evaluation of the systems through third party agencies, appointment of MI Engineers and their capacity building, ensuring Quality control of MI equipment with the help of CIPET, Hyderabad. As convener of the Technical committee responsible for discussing all issues in the Technical Committee and taking them to standing committee at Govt level for approval.

Sri K V Satyanarayana as Project Officer is the Administrative Head of the project responsible for total administration. Overall responsibility of effective implementation of the project lies with him. He conducts frequent videoconferences in the presence of all officials with the district cells and discusses all issues and offers suggestions. Annual targets are prepared for implementation of the project in the districts. Required funds from the government are obtained based on the district needs. Attending meetings at national and sate level and coordinating with line departments for integration. Organizes state level conferences, workshops, demonstrations and exhibitions.

Mrs G. Andal as Horticultural Officer assists OSD Technical and prepares progress reports and analyses technical data. Frequently interacts with the district cells and provides needed inputs. Helps in organizing training programs, review meetings, and report preparation.

Field installation of sub main, laterals, and risers

Semi-permanent sprinkler system in operation

Sprinkler irrigation of sunflower crop

Micro sprinklers for tobacco nursery (plants are covered by mulch)

Demonstration of various micro and sprinkler irrigation systems

Field demonstration/ training to field officers

Women folk harvesting rose flowers grown on micro irrigation

A women farmer using semi-permanent sprinkler system on her small holding

ఆంధ్రప్రదేశ్ మైక్రోఇరిగేషన్ ప్రాజెక్ట్

గౌరవ ముఖ్యమంత్రి వర్యులు డా॥ వై.ఎస్.రాజశేఖర రెడ్డి గారికి సూక్ష్మ నీటిసాగు గురించి వివరిస్తున్న ఉద్యాన శాఖ కమిషనర్ శ్రీ అనిల్ పునేత, ఐ.ఎ.ఎస్.,

MICROIRRIGATION

ఆంధ్రప్రదేశ్ మైక్రోఇరిగేషన్ ప్రాజెక్ట్
ఉద్యాన శాఖ
(ఆంధ్రప్రదేశ్ సూక్ష్మ నీటిసాగు పథకము)
ఉద్యాన శాఖ, ప్రభుత్వ భవనం నెం. 30, రెడ్ హిల్స్, హైదరాబాద్ - 04, ఆంధ్రప్రదేశ్, ఇండియా
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ANDHRA PRADESH MICROIRRIGATION PROJECT

Dr. Y. S. Rajasekhara Reddy
Hon'ble Chief Minister of Andhra Pradesh

The First Comprehensive Microirrigation Project in the country

Details of APMIP

- Project cost-Rs. 1176 Crores
- Govt. subsidy -Rs. 588 Crores
- Credit to farmers by Banks-Rs. 588 Crores
- Project area -Rs. 2.48 Lakh ha.
- Eligibility of farmers-All farmers having source of water (Bore/Well)

Subsidy patterns-

Districts	Subsidy for Drip irrigation system	Subsidy for Sprinkler irrigation System
21 Districts (except Ananthapur)	60%	50%
Ananthapur District	70%	66%

- 90% subsidy for Bio-diesel plantation (Jatropha) in notified ten rain shadow districts.

  1. Anantapur 2. Kurnool3. Kadapa4. Chittoor5. Nellor
  6. Prakasam 7. Mahaboobnagar8. Rangareddy
  9. Nalgonda 10. Medak

- Maximum subsidy ceiling of Rs.50,000/- per beneficiary family.

Sectoral Allocations

S.No	Sector	Area Planned
1	Agriculture	0.487 lakh Ha.
2	Horticulture	1.410 lakh Ha.
3	Sericulture	0.246 lakh Ha.
4	Sugar	0.338 lakh Ha.
	TOTAL	2.481 lakh ha

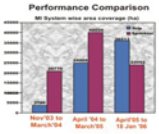
Sri. N. Raghuveera Reddy
Hon'ble Minister for Horticulture, Agriculture, Food, Civil Supplies, Legal Metrology & Consumer Affairs

Targets for 2005-06

- Target of 1.00 lakh ha with 25:75 ratio for sprinkler and drip systems respectively
- Sector wise allocation

Sector	Area, ha
Horticulture	42,500
Agriculture	25,000
Sugarcane	10,000
Jatropha	10,000
Sericulture	5,000
Oil palm	5,000
Tobacco	2,500
Total	1,00,000

Performance Comparison



Progress

(Area in ha)

MI System	Nov'03 to March'04	April '04 to March'05	April'05 to 18 Jan '06	Total
Drip	3,780	24,905	36,513	65,198
Sprinkler	20,770	40,020	24,092	84,882
Total	24,550	64,925	60,605	1,50,080

Every Drop Counts...

ANDHRA PRADESH MICROIRRIGATION PROJECT
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Popularizing micro and sprinkler irrigation through posters prepared both in local language (Telugu) and English