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***Research Article***

# A CASE STUDY ON PERFORMANCE OF DRIP IRRIGATION SYSTEM IN SELECTED MANDLAS OF GUNTUR DISTRICT, ANDHRA PRADESH

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## ABSTRACT
Water is the precious natural resource, a basic human need and a prime national asset. The extent to which the water is plentiful or scarce, clean or polluted, beneficial or destructive, profoundly influence the extent and quality of human life. The relentless increase in population and the resulting spurt in the demand for water require careful planning and management of the limited water resources.
Drip irrigation, also known as trickle irrigation is a method which minimizes the use of water and fertilizers by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network system of valves, pipes, tubing, and emitters. As the drip systems are found giving some troubles in some of the farmer's fields and farmers experience some maintenance problems under drip irrigation systems installed in their fields under APMIP, a study has been taken up, to evaluate and assess the performance of the systems in some of the fields of farmers in selected mandals of the Guntur District. The evaluation of technical parameters in the selected fields of Lingayapalem village reveal that all the fields are performing good in terms of discharge of emitters but a few fields with less pump size than the required fail to develop the required pressure

***Keywords:*** *Irrigation, Discharge, Emitter, Lateral, Pressure Head*

## INTRODUCTION
Water is the precious natural resource, a basic human need and a prime national asset. The extent to which the water is plentiful or scarce, clean or polluted, beneficial or destructive, profoundly influence the extent and quality of human life. The relentless increase in population and the resulting spurt in the demand for water require careful planning and management of the limited water resources. The available water resources are to be optimally harnessed and beneficially utilized with appropriate priorities of use.
Sustainability of food production depends on sound and efficient water use and conservation practices consisting mainly of irrigation development and management. Drip irrigation, also known as trickle irrigation or micro irrigation is an irrigation method which minimizes the use of water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network system of valves, pipes, tubing, and emitters.
The modern technology of drip irrigation was invented in Israel by Simcha Blass and his son Yeshayahu. Instead of releasing water through tiny holes, blocked easily by tiny particles, water was released through larger and longer passageways by using velocity to slow water inside a plastic emitter. The first experimental system of this type was established in 1959 when Blass partnered with Kibbutz Hatzerim to create an irrigation company called Netafim. Together they developed and patented the first practical surface drip irrigation emitter. This method was very successful and subsequently spread to Australia, North America, and South America by the late 1960s.
Realizing the importance for economic use of precious ground water for irrigation, the Government of Andhra Pradesh, one of the leading states in India, launched the Andhra Pradesh Micro irrigation Project (APMIP), the first of its kind on November 3rd 2003. The project is aimed at bringing 2.50 lakh ha area under micro irrigation systems in 22 districts of Andhra Pradesh and is reaching its targets.
As the drip systems are found giving some troubles in some of the farmer's fields and farmers experience some maintenance problems under drip irrigation systems. The following study has been taken up to evaluate and assess the performance of the systems in some of the fields of farmers in some selected

Mandals of Guntur District.

To survey the performance of drip systems taking pressure and discharge relationship in to consideration in some selected mandals of Guntur district, Andhra Pradesh, India.

## MATERIALS AND METHODS

### *Study Area*

As many farms are installed with drip systems under Andhra Pradesh Micro Irrigation Project (APMIP) in Mangalagiri and Thullur mandals, some of the villages namely Mandadam, Venkatapalem, Lingayapalem, Rayapudi from the Thullur mandal and another three villages namely Nuthakki, kaza, Needamarru from Mangalagiri were selected in Guntur District for present study.

### *Collection of Data on the Performance of Drip Systems in the Study Area*

The performance of the drip irrigation systems installed in various farmers fields in the selected villages were evaluated technically and the problems pertaining to the farmers in maintaining the same were found out by interacting with them. A simple one page questionnaire was prepared for this purpose and interviewed some of the farmers in the selected villages.

### *Evaluation of Pressure Variation*

As per the standard practice of drip irrigation system a pressure variation of 20% is allowed in the Indian conditions for the better performance of the systems. To ascertain the same in the farmer's fields of the selected village, Lingayapalem of Thullur Mandal, about ten farmer's fields covered with drip system were chosen according to the extent of the land viz. one acre owner, two acres owner and so on and one lateral is randomly chosen in each of the field and the pressure at the inlet end and at the end plug were measured with the help of a pressure gauge.

### *Evaluation of Discharge Variation*

As per the standard practice, a variation of 8-10 % may be allowed in the discharge from the inlet to the end plug of the lateral. To ascertain the same, the discharges of the emitters a randomly selected lateral at three locations i.e., at the inlet, middle and near end plug were measured. The average discharge of the emitters is also calculated. The discharge of the emitters was measured accurately by volumetric method with the help of a 1 litre measuring cylinder and a stopwatch used for the measurement of time.

## RESULTS AND DISCUSSION

### *Performance Evaluation of Drip Irrigation Systems*

Two of the important design parameters pressure and rated discharge of the emitters are measured for different laterals in drip systems of about ten farmer's fields. The evaluation of technical parameters was taken up to check whether the operation of the drip systems is under the limits of the standards or not. The literature provides the information that a pressure drop 20% in the lateral indicates the best performance of the system and a variation of 20% to 40% is acceptable for the operation of the system. The variation of 10% in the rated discharge is acceptable for a drip system **(Al-Ghobari, 2005)**. The observations of the pressure and rated discharge at different locations of the lateral are given in the following table.

**Table 1: Pressure and discharge measurements in the experimental fields**

| S. No | Field No | Discharge (lph) | | | | Pressure (kg/cm$^2$) | | |
|---|---|---|---|---|---|---|---|---|
| | | Location 1(Inlet) | Location 2(Middle) | Location 3 (Endplug) | Average | At Inlet | Endplug | Pressure Drop,% |
| 1. | $F_1$ | 4.0 | 3.8 | 3.8 | 3.9 | 1.0 | 0.75 | 25 |
| 2. | $F_2$ | 3.0 | 2.9 | 2.9 | 2.9 | 1.2 | 0.9 | 20 |
| 3. | $F_3$ | 3.0 | 3.0 | 3.0 | 3.0 | 1.25 | 1.1 | 12 |
| 4. | $F_4$ | 3.8 | 3.8 | 3.6 | 3.7 | 1.1 | 0.8 | 27 |
| 5. | $F_5$ | 4.0 | 3.9 | 3.8 | 3.9 | 1.2 | 0.9 | 25 |
| 6. | $F_6$ | 3.8 | 3.7 | 3.5 | 3.67 | 1.0 | 0.6 | 40 |
| 7. | $F_7$ | 3.8 | 3.7 | 3.7 | 3.7 | 1.1 | 0.7 | 36 |
| 8. | $F_8$ | 3.7 | 3.5 | 3.5 | 3.6 | 0.9 | 0.5 | 44 |
| 9. | $F_9$ | 3.8 | 3.8 | 3.7 | 3.8 | 1.0 | 0.7 | 30 |
| 10. | $F_{10}$ | 4.2 | 4.0 | 4.0 | 4.1 | 1.2 | 0.8 | 33 |

The results of the study reveal that out of the ten fields inspected, two fields proved the best with pressure variation between 12% and 20% ($F_3$ and $F_2$). The other seven fields except $F_8$ are in the acceptable range with the pressure drop of 20 to 40%. The field no. $F_8$ is beyond the standards with poor performance having a low pressure of 0.9 kg/cm2 at the inlet and 0.5 kg/cm2 at the end plug position.
From Table 1,it is observed that the of discharge of drippers of all the fields show a little variation from the rated discharge and the variation of discharge is not more than 10% of the rated discharge. The drippers of fields $F_1$, $F_3$, $F_5$ and $F_{10}$ are very close to the rated discharges of 4.0 lph, 3.0 lph, 3.0 lph and 4.0 lph respectively.

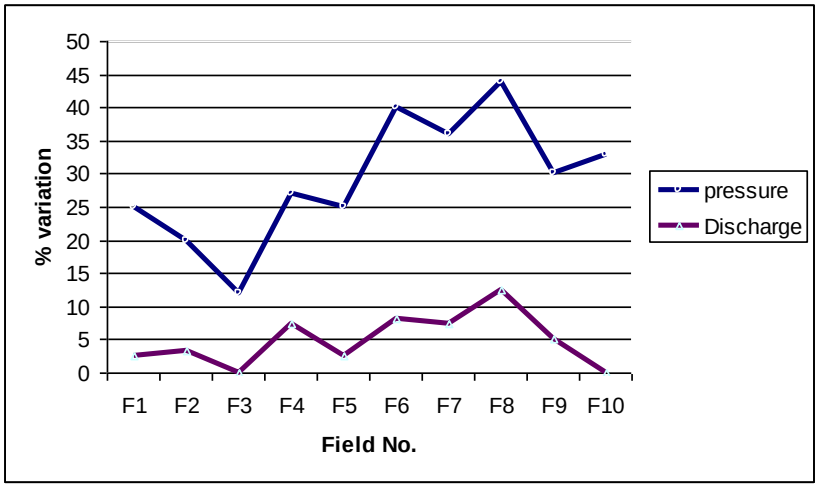


**Figure 1: Variation of pressure and discharge in the drip Irrigation systems**

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