

# SOIL MOISTURE INDICATOR

*A device to assess soil moisture status and  
schedule irrigations*

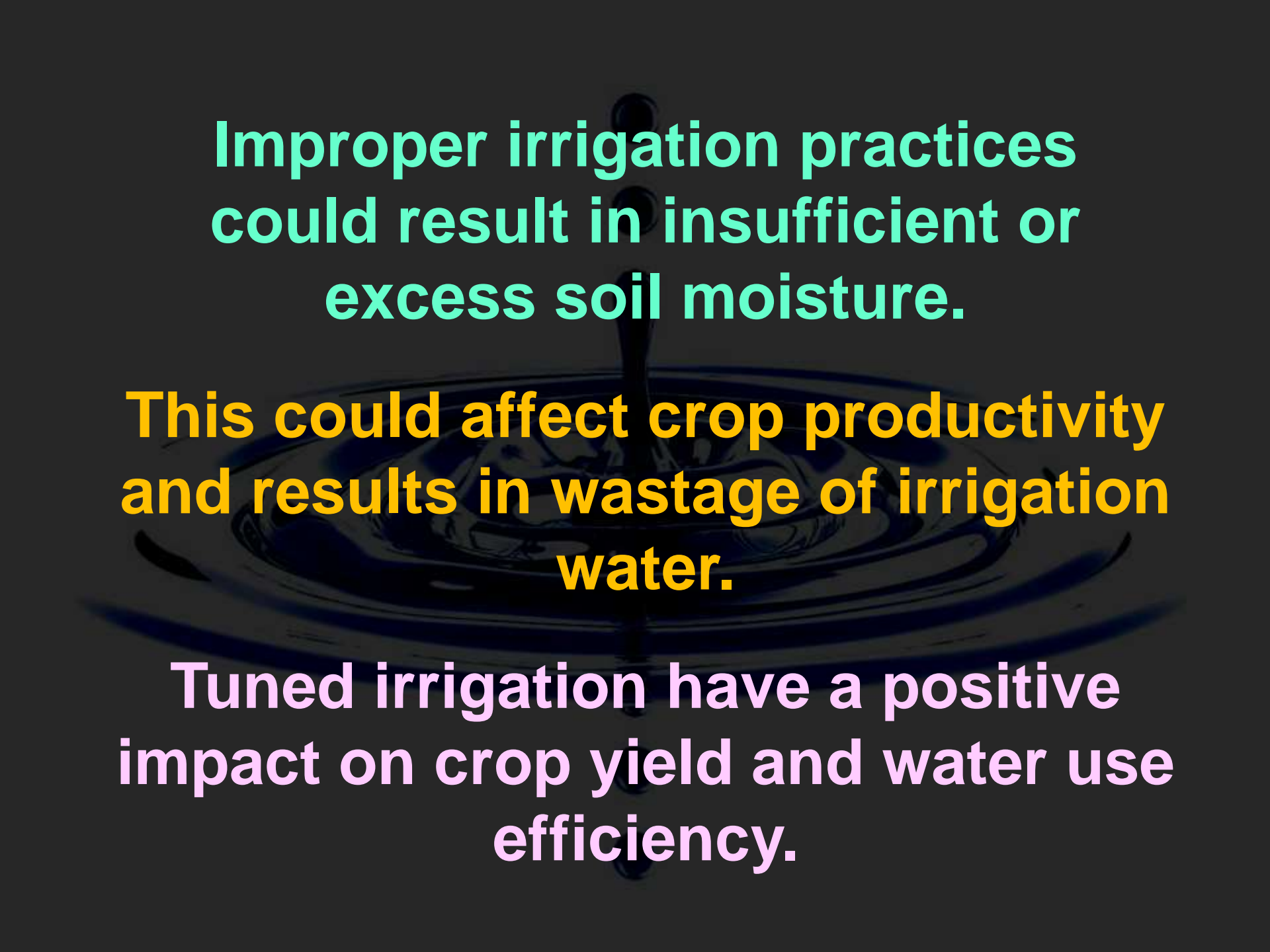


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# Introduction

- Worldwide depletion of water resources in agriculture has been a serious cause of concern
- Water - the vital input for crop production.
- Both its deficit and excess water in the soil affect crop yield.
- The crop does not suffer from water stress when the soil moisture is between field capacity and permanent wilting point.
- Shortage of water and costs of irrigation necessitate on developing methods of irrigation that maximize the water use efficiency. **More crop per drop**

A water droplet is captured mid-fall, just above a pool of water. The droplet is dark and has a bright highlight on its top surface. Below it, the water surface is disturbed, creating concentric ripples that spread outwards. The background is a dark, almost black, gradient.

**Improper irrigation practices could result in insufficient or excess soil moisture.**

**This could affect crop productivity and results in wastage of irrigation water.**

**Tuned irrigation have a positive impact on crop yield and water use efficiency.**

**Under Indian situations, the irrigation scheduling based on soil moisture is not in practice**

**due to**

**the non-availability of simple soil moisture indicating devices to farmers and**

**lack of awareness on irrigation scheduling based on the soil moisture.**

- ICAR-Sugarcane Breeding Institute has conducted field demonstrations in different locations of Tamil Nadu to sensitize farmers on various water conservation techniques.
- To assess the irrigation water, 'Tensiometer' was introduced to farmers to plan irrigations based on soil moisture status.

**Tensiometer based irrigations resulted in reduction of number of irrigations and consequently saving in irrigation water.**



# Problems associated with tensiometer

- ❖ Permanent installation of multiple units (10 units/ha)
- ❖ **Blocking / of ceramic cup**
- ❖ Regular filling of water in the reservoir tube
- ❖ **Vacuum leakage problems**
- ❖ Chances for breaking the ceramic cup
- ❖ **Expensive (@Rs. 6500/- per unit)**
- ❖ Other maintenance problems.



**This has necessitated  
the requirement for a simple soil moisture  
indicating device better than tensiometer  
that can help the cane grower  
to assess the status of soil moisture and  
aids in planning irrigation.**

- ❖ **Measuring soil moisture is a tricky and difficult procedure.**
- ❖ **The standard method is gravimetric oven drying method, which is practically not possible under field situations.**
- ❖ **Other available devices viz., neutron moisture probe, ultrasonic Doppler systems etc. are highly sophisticated and are very expensive. These devices are beyond the reach of the farmer.**



**ICAR-SBI has developed  
a simple electronic device  
to indicate soil moisture named as  
“SOIL MOISTURE INDICATOR” (SMI)**

- A team of scientists tested the device in farmers fields.
- This device was fine tuned based on the requirement and feedback received from farmers
- The device was evaluated by farmers under their field conditions for the suitability.



# SOIL MOISTURE INDICATOR

- Principle - soil electrical conductivity is directly proportional to soil moisture content. Similar to gypsum block technique.
- This soil moisture indicator has been designed to objectively indicate soil moisture between above permanent wilting point and field capacity.
- The electronic circuit is designed in such a way to display approximate moisture level by glowing any one coloured led out of the ten.



**Metal sensor rods, when inserted in soil and on pressing the switch, single light glows indicating the moisture status.**



## **MOISTURE STATUS**

- ✓ **High soil moisture - Blue.**
- ✓ **Sufficient soil moisture – Green - no need for immediate irrigation**
- ✓ **Slightly above permanent wilting point - orange - immediate requirement for irrigation.**

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# Evaluation of SMI in farmers' fields

Item	Conventional Irrigation	Irrigation based on SMI
Cane yield (t/acre/crop)	55.8	60.4
No. of irrigations / crop	42	36

Average of 14 farmers' fields



## Problems associated with SMI

- ❖ SMI will not measure exact soil moisture, can only be used for objective indication of soil moisture and not for quantitative measurement.
- ❖ It is possible to get varied results / errors depending on different situations / conditions viz., heavy clayey or sandy soil, salinity, high soil and irrigation water EC etc.
- ❖ These problems can be addressed by fine tuning the device before use.

# Conclusions

- ✓ **Water will become a scarce commodity in the years to come and there is a need to improve the water use efficiency in sugarcane agriculture.**
- ✓ **Trials using SMI in the farmers' fields, in participatory mode, proved that sugarcane yields were not affected when irrigated based on SMI indication.**
- ✓ **SMI will be very helpful to the farmers for its simple objective indication, ease of handling, sturdy, low cost and suitability for field use.**
- ✓ **Can be used for sensitizing the farmers about efficient use of irrigation water and scheduling irrigations based on soil moisture status.**



**THANK YOU**