

# Irrischeduler — a Simple Device for Scheduling Irrigations

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*A simple device, namely, irriseduler, was developed to indicate the time for irrigation, based on the soil moisture level. The developed device does not require the user to read from a gauge, which was reported by farmers as cumbersome in their perception. Performance evaluation of the developed device indicated that it could be used for most type of soils, excepting sandy and highly clayey soils. In the present study, evaluation of the farmers' decisions revealed 5% to 30 % variations from the appropriate soil moisture for scheduling irrigations.*

**Keywords :** Tensiometer; Irrigation scheduling; Simple device

## INTRODUCTION

The dominant method of irrigation practiced in large parts of the country consists of diverting a stream from the head of a field into furrow or borders and allowing it to flow down the grade by gravity. Generally, under these surface irrigation methods, the crop utilizes only less than one half of the water released. A good part of the applied water is lost in conveyance, application, runoff and evaporation and hence the efficiency of surface irrigation methods is low. Higher irrigation efficiencies can be realized in the farmers fields if, as a first step, amount of water applied and the time of application of available water are fixed appropriately<sup>1</sup>.

Tensiometers can provide the information required to make proper irrigation decisions<sup>2</sup>. A tensiometer consists of a porous cup, normally constructed of ceramic because of its structural strength as well as permeability to water flow<sup>3</sup>. A tensiometer records soil water potential under field conditions<sup>4</sup>. The range of operation of a tensiometer is generally limited between 10 cb and 85 cb<sup>5,6</sup>. A tensiometer needs to be placed at 63 % of the depth of the roots representing the average extraction level<sup>7</sup>.

In the present study, participatory rural appraisal was conducted in village Lakhan, district Hapur, Uttar Pradesh to investigate the farmers' perceptions for non adoption of available tools like resistance block and tensiometers for monitoring soil moisture for scheduling of irrigations. Based on their responses, the existing tensiometer was modified and an irriseduler was developed. The article presents the details of the developed device, namely, irriseduler, its calibration using a standard tensiometer and discusses its appropriateness in scheduling irrigations under different type of soils.

## MATERIAL AND METHODS

### Development of an Irriseduler

A regular tensiometer was modified to develop it into an irriseduler. Figure 1 presents the line sketches of a tensiometer and an irriseduler. In the irriseduler a transparent tube (rigid plexiglass) and a coloured float is used to indicate the level of water in it. The porous cup (ceramic) is used at one end of the tube and the tube is filled with water and is sealed from the other end with the help of a

watertight cork. The ceramic cup is installed in the soil at an appropriate depth. The irriseduler provides an opportunity to monitor soil moisture fluctuations through change in water level in its tube. It may also enable marking one value on the tube indicating maximum permissible drop of water level to indicate the time for scheduling next irrigation. The relationship between the fall of water level inside the irriseduler tube and the reading of the vacuum gauge of the tensiometer with decreasing soil moisture were developed. Characteristic curves of irriseduler and tensiometer are presented in Figure 2.

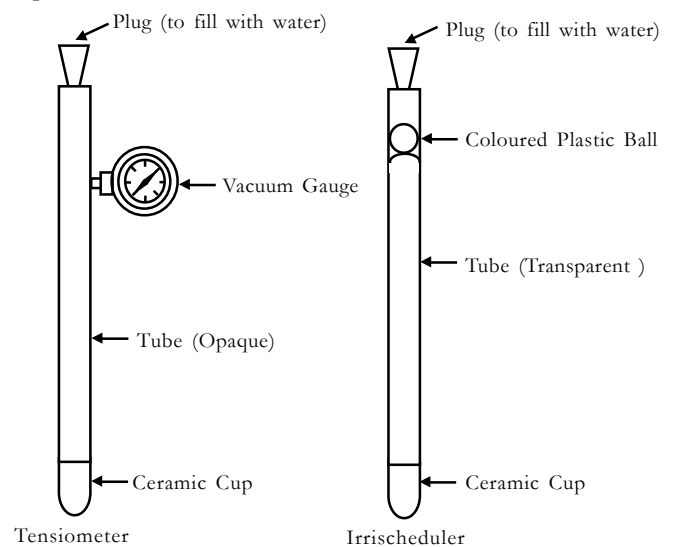


Figure 1 Line sketches of a tensiometer and an irriseduler

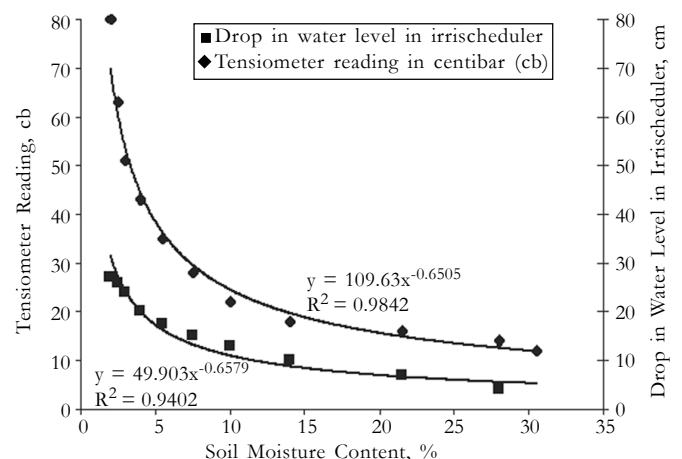


Figure 2 Characteristic curves of a tensiometer and an irriseduler (loamy sand soil)

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This paper (re-modified) was received on September 23, 2004. Written discussion on this paper will be entertained till February 28, 2006.

## RESULTS AND DISCUSSION

The results of soil moisture contents at which the farmers actually applied their irrigations for wheat crop during 2001-2002 were observed. Appropriate soil moisture levels as given in Table 1 were determined using a hydraulic properties calculator<sup>8</sup> for scheduling irrigation. Farmers having exclusively canal irrigation facility irrigated four times when the canal was in operation and they could not schedule their irrigations otherwise. The farmers having tube well irrigation facility did tend to irrigate more frequently than required and allowed much less soil moisture depletion than what was appropriate. It may also be noted from Table 1 that the farmers never allowed the soil moisture to deplete up to allowable level and irrigated at soil moistures 5% to 30% above the appropriate soil moisture level. It may also be noted from Table 1 that use of irrischeduler could save one to two irrigations in case of fields having tube well as well as in the fields having both tube well and canal irrigation facilities.

Participatory rural appraisal was conducted in village Lakhan involving all the selected 15 farmers. No farmer used any instrument or device for the purpose of scheduling irrigation. Demonstration of the use of a regular tensiometer was found cumbersome by farmers, as it required reading from a gauge.

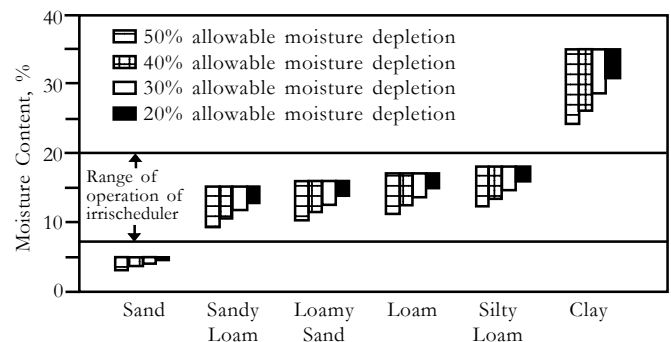
Based on the estimated appropriate soil moisture for scheduling irrigation for a field as given in Table 1, its corresponding level of water level in irrischeduler was determined and marked on its body. The farmer then had to schedule next irrigation of his field when the water level in the irrischeduler felt below that mark. On the day of irrigation, irrischeduler tube was filled with water completely and sealed with its cork.

The values of field capacity and wilting point are a function of soil texture. The range of available soil moisture varies with soil type. Also different levels of moisture are allowed before scheduling next irrigation based mainly on the crop type. Figure 3 indicates the range of soil moisture (under allowable soil moisture depletions of 50%, 40%, 30% and 20% of total available soil moisture) for different type of soils. Irrischeduler operates normally between 7% and 20% soil moisture contents. Soil moisture range (of available water) for

**Table 1 Inaccuracy in farmers decisions in scheduling irrigations**

Sl No	Name of Farmer	Source of Water	Appropriate Moisture for Irrigations,%	Error in Scheduling Irrigations,% of Irrigations	Possible Saving in Number of Irrigations
1	Gyan Singh	C	15	-33 to +13	0
2	Jagpal	T	17	+11 to +29	2
3	Harchanda	C	18	-27 to +11	0
4	Ramveer Singh	T	18	+11 to +22	2
5	Dinesh Singh	T	19	+ 5 to +21	1
6	Chhidda Singh	T	20	0 to +15	0
7	Jagpal Singh	C	16	-31 to 0	0
8	Ompal Singh	T	19	+5 to +21	1
9	Chandar	C	19	-26 to 0	0
10	Bhule Singh	C+T	17	+17 to +35	2
11	Veer Singh	C+T	20	+10 to +25	2
12	Bhagvan Singh	T	19	+10 to +21	1
13	Indraraj	C	19	-26 to - 5	0
14	Khoobi	C	20	-30 to +10	0
15	Ranhool Singh	C	15	-33 to +13	0

Note : C= Canal, T= Tube well



**Figure 3 Range of operation of irrischeduler and allowable moisture in different soils**

sandy as well as clayey soils fall outside the operational range of irrischeduler indicating its unsuitability for these soil types.

## CONCLUSION

Irrischeduler is a much simpler device in comparison to a tensiometer but possesses all its positive attributes, therefore, it can be used to schedule irrigations effectively. An irrischeduler costs about Rs 250 only. Farmers having their own tube wells or any other source of water may make a good use of irrischeduler and reduce the number and amount of irrigations and save energy, time and money. The use of irrischeduler could save up to two irrigations, in tube well irrigated wheat crop, by indicating appropriate time for irrigation. The developed irrischeduler can be used to schedule irrigations in most soils except sandy soil and highly clayey soils.

## ACKNOWLEDGEMENT

The authors gratefully acknowledge the financial support of National Agricultural Technology Project through its sub project on 'Improving skills and instrumentation for water application in fields for enhanced water use efficiency' for the present study.

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