

# Groundwater recharge using a subsurface irrigation system: A technical feasibility study

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# MOTIVATION

- Managed Aquifer Recharge (MAR)- a technique to replenish groundwater resources
- Surface spreading method- an effective MAR technology

## Limitations of surface spreading method



Evaporation loss



Installation & removal  
cost



Limited land  
use



Source: Ecotube



Can subsurface irrigation system be an alternative solution to surface spreading methods?

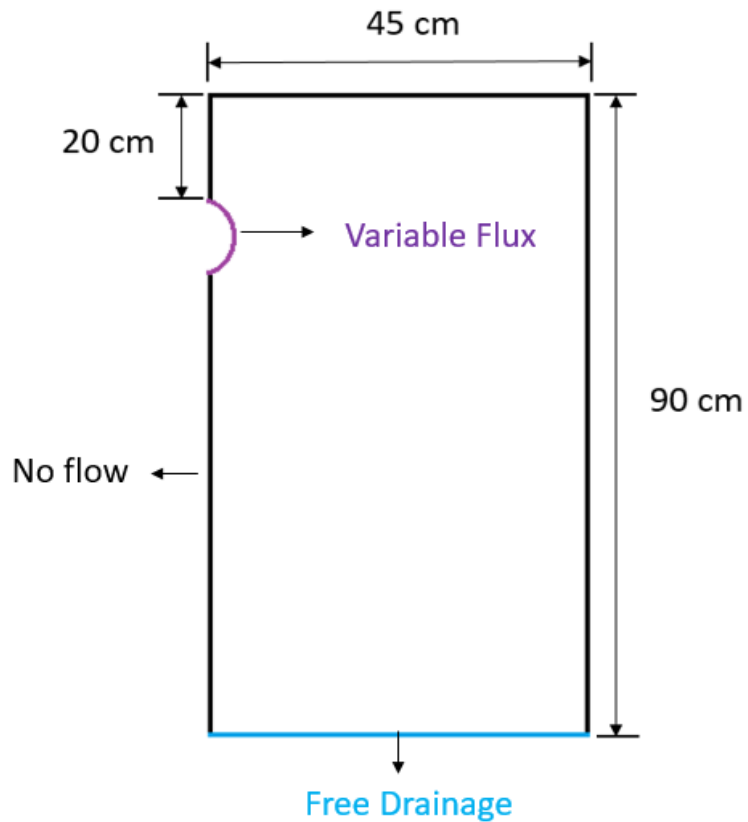


Determination of technical potential by understanding Infiltration characteristics of a subsurface irrigation system in the vadose zone numerically and experimentally

# INFILTRATION CHARACTERISTICS INVESTIGATION

## Step 1: Numerical Simulation

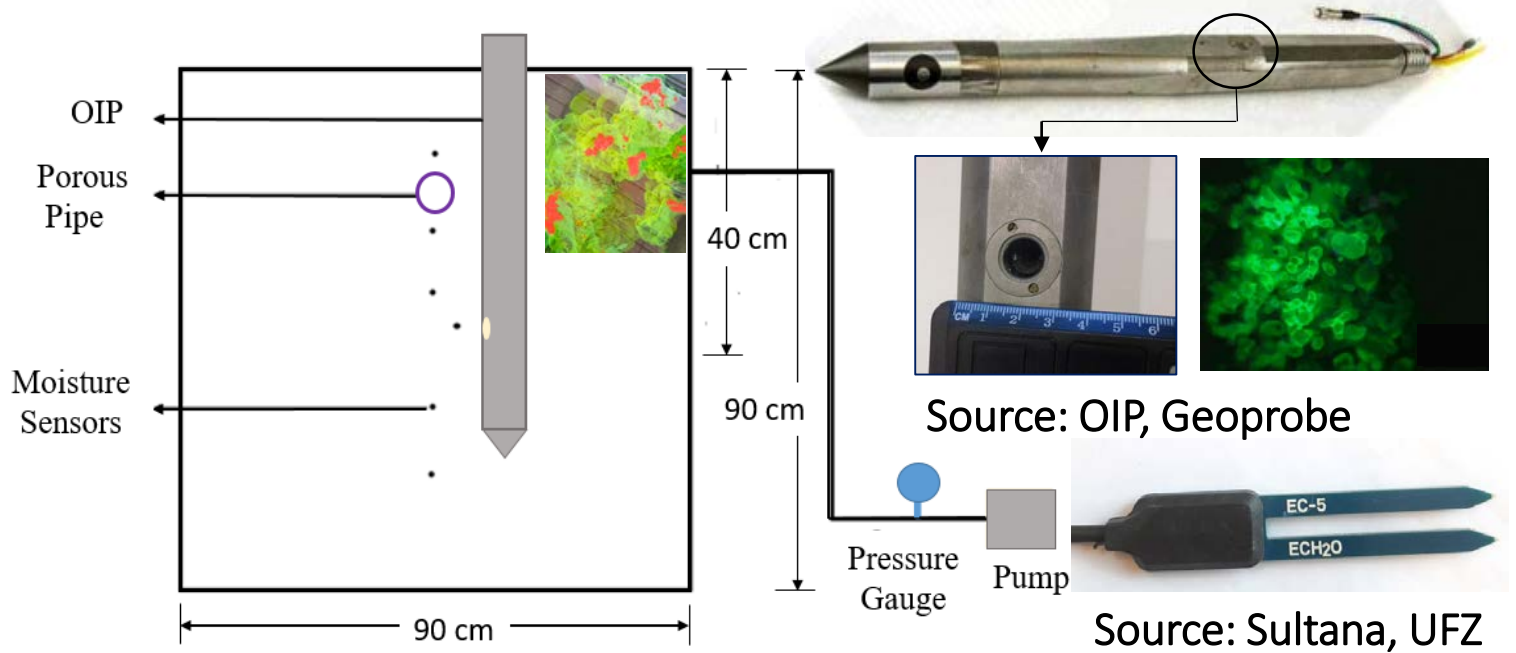
### Model domain and boundary conditions



## Step 2: Experimental Validation

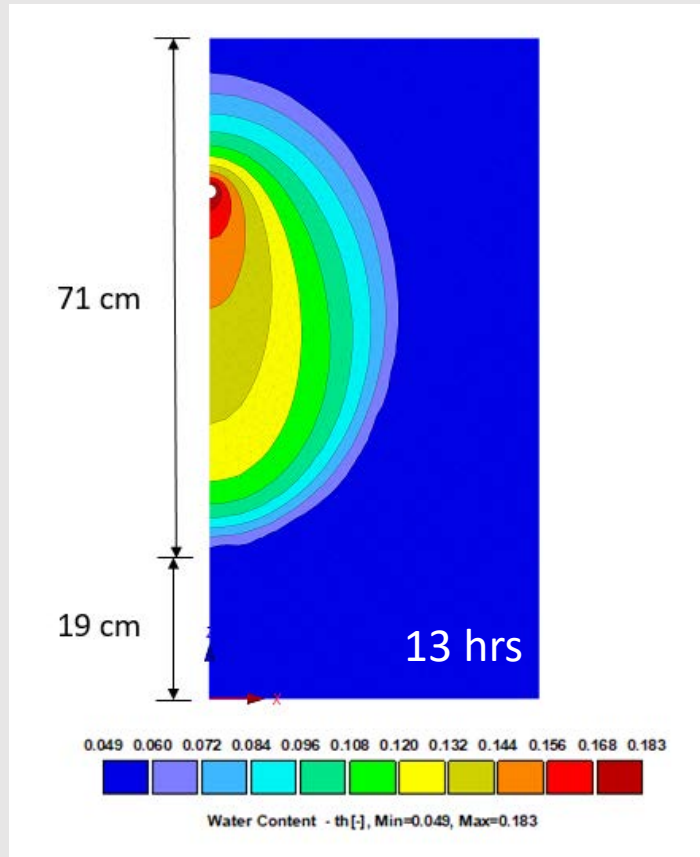
- Fine sand (0-2 mm)
- Uranine tracer

### Experimental Setup with subsurface irrigation system



# OUTCOMES

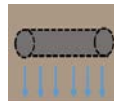
## Simulated wetting pattern in sandy soil



## Infiltration Rates



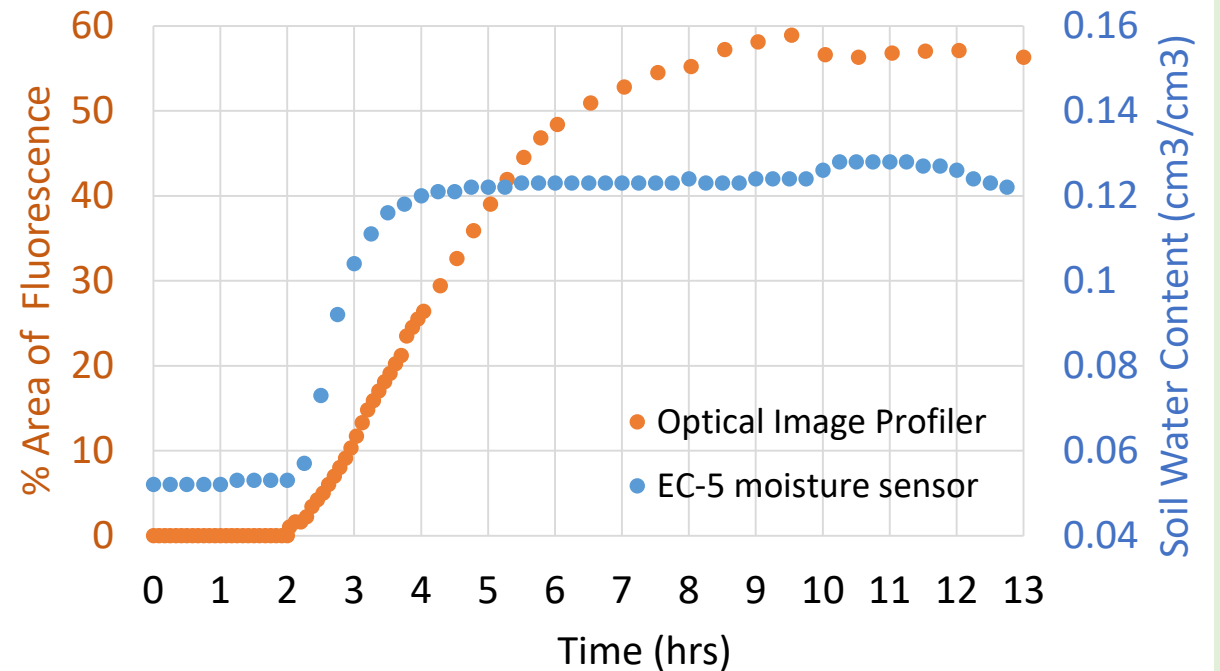
1.15 L/h/m



1.14 L/h/m

## Experimental Observation

### Wetting front velocity determination



Detection of tracer at 122 & 130 minutes by OIP & EC-5 sensor respectively

## SUMMARY

- 1 Infiltration rate of the subsurface irrigation system was 1.14 L/h/m in sandy soil
- 2 Hydrus 2D showed satisfactory performance in understanding the infiltration behavior of the system
- 3 The water percolation velocity determined using OIP was 9.34 cm/hr
- 4 Estimated infiltration rate using 40 m of subsurface irrigation system is 45.6 L/h

**The result demonstrates promising technical potential of subsurface irrigation system as an alternative recharge option to surface spreading methods**



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