
DRIP IRRIGATION DESIGN & SCHEDULING

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# DIDAS

## A USER-FRIENDLY PROGRAM FOR ASSISTING DRIP IRRIGATION DESIGN AND SCHEDULING

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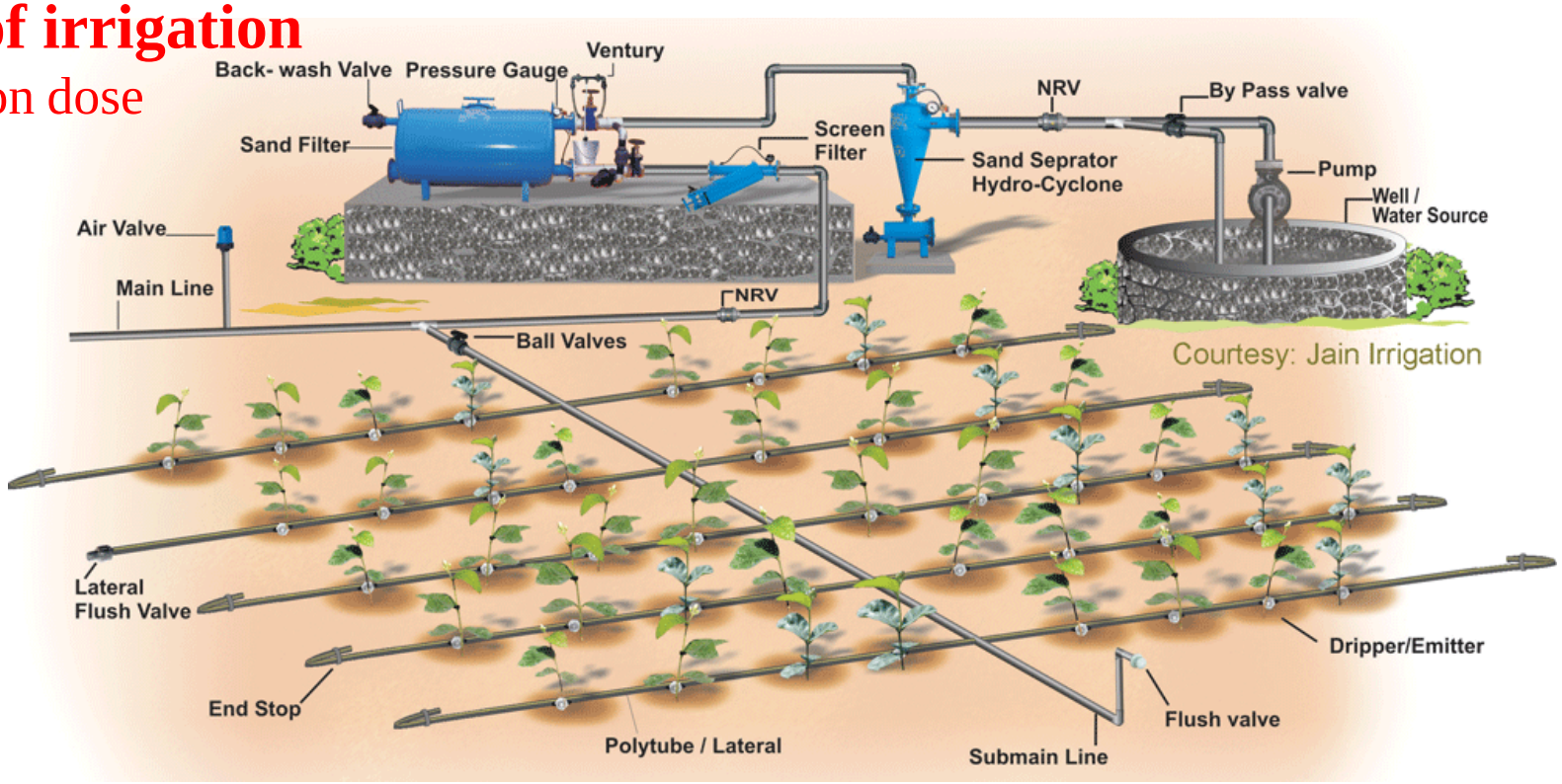
# **Design** and **Scheduling** of Drip Irrigation Systems

- **Distance between emitters along a drip line**
- **Distance between drip lines**
- **Depth of subsurface emitters**
- Emitter discharge rate
- **Irrigation frequency**
- **Starting hour**
- **Duration of irrigation**
- Daily irrigation dose



# **DIDAS** main window for choosing among the **steady**, **quasi-steady** and **unsteady** flow modeling for the **design** and **scheduling**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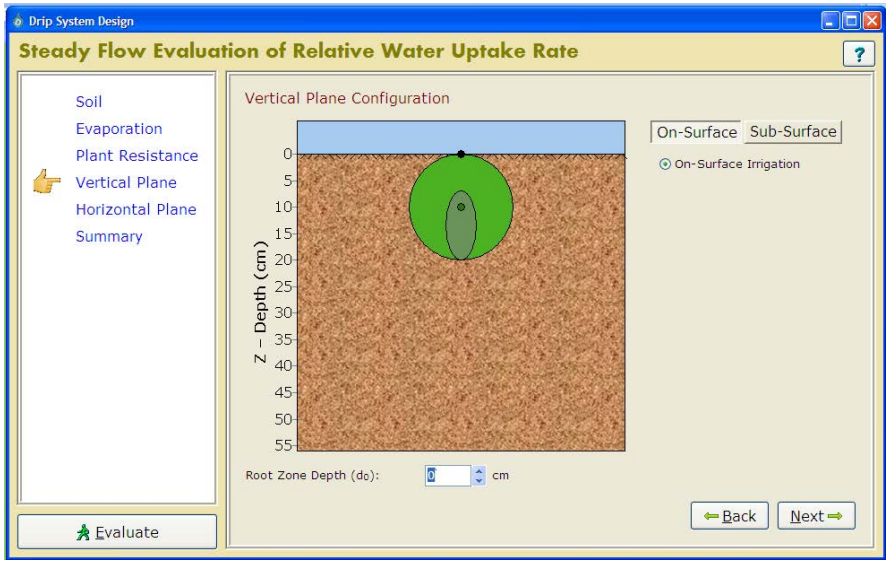
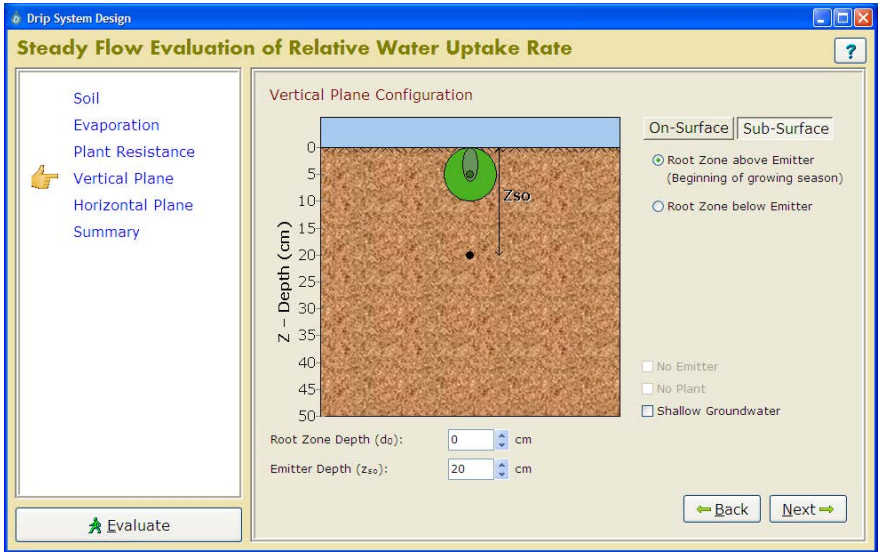
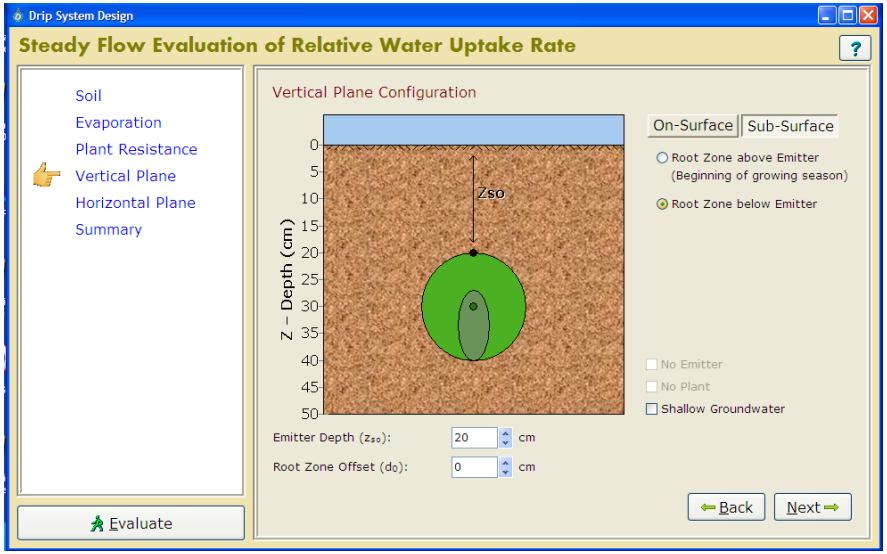
# **DIDAS** window for choosing between the

## **Coupled Source-Sink Systems**

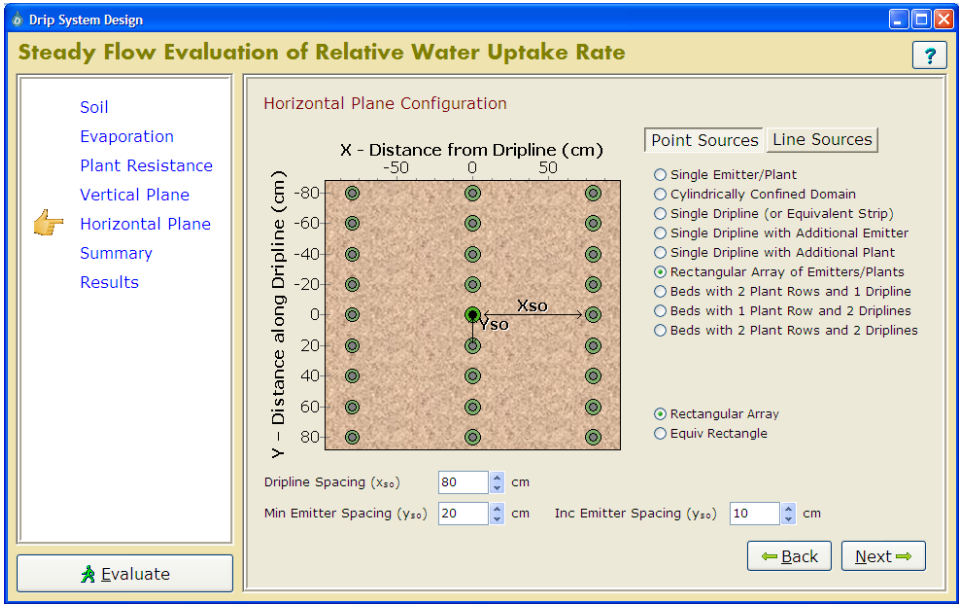
## with **On-surface** or **Sub-surface** emitters



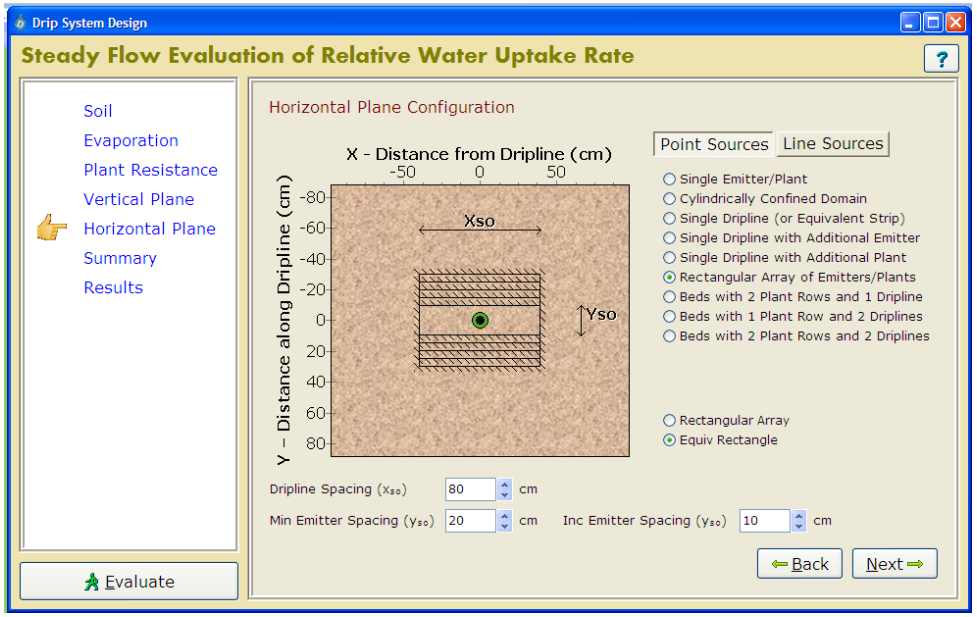
# An example of DIDAS **Scenarios for Drip Irrigation**



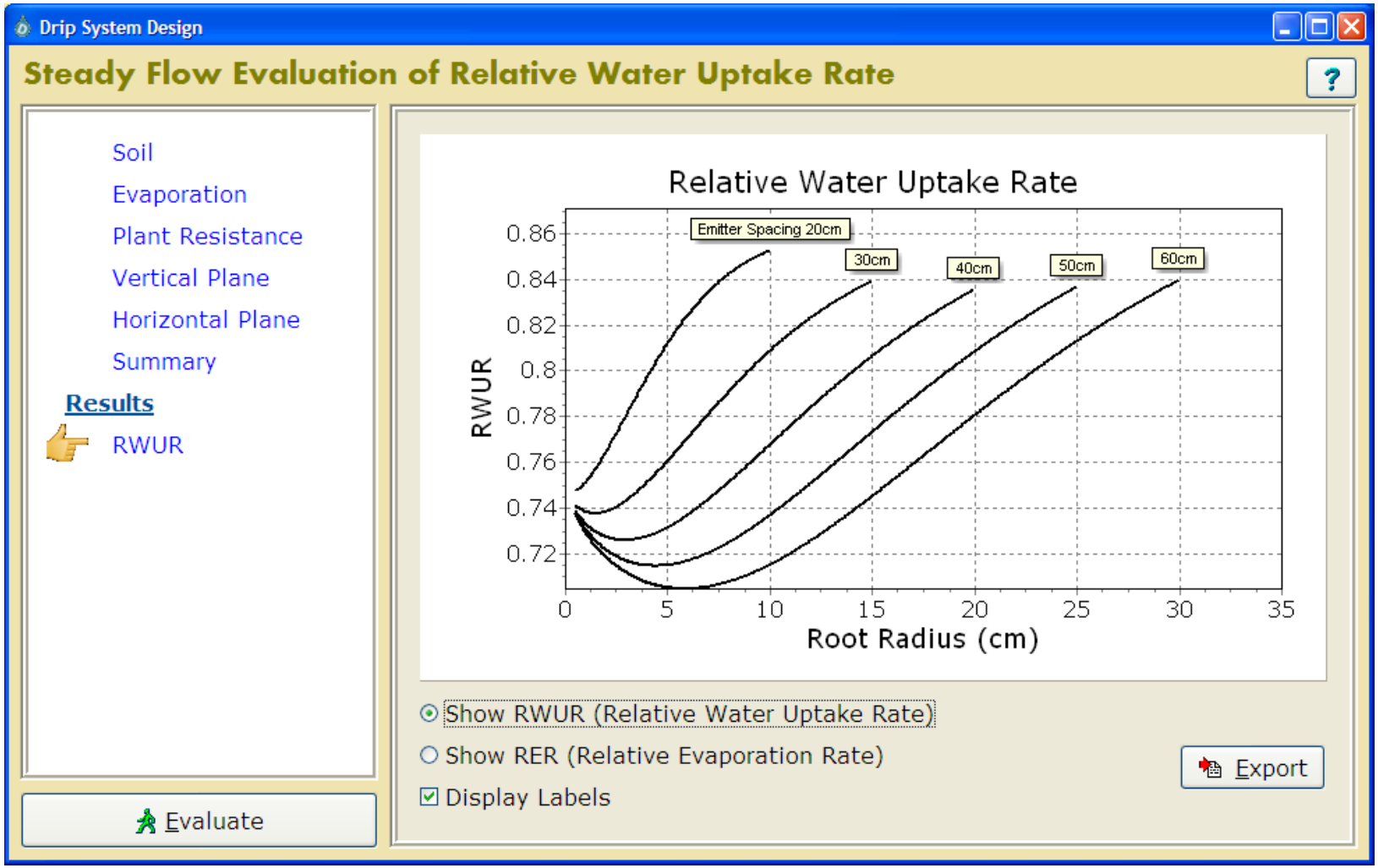

The water flow and uptake problem can be formulated in two, equivalent modes:

**1.Superposition of neighboring sources and sinks**

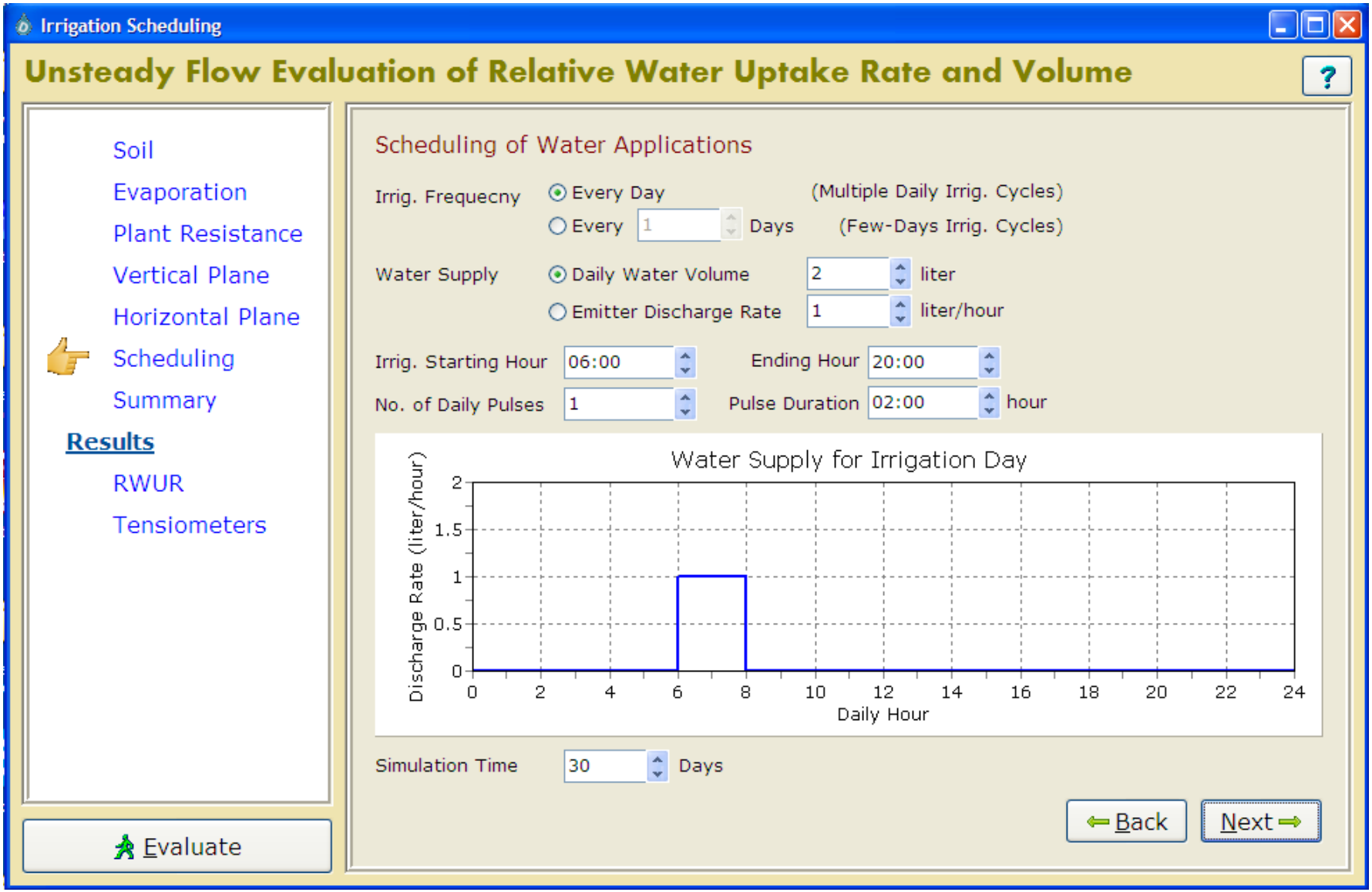
**2.Flow in a laterally-confined, equivalent domain**



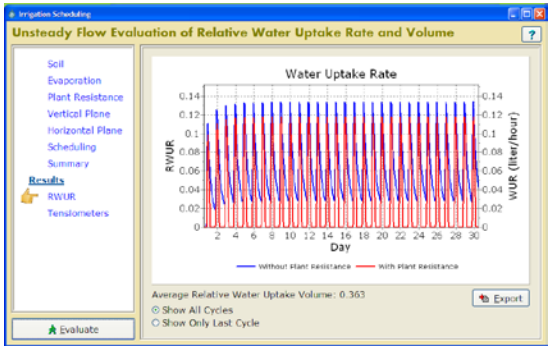
# An example of DIDAS **steady** flow modeling output: **RWUR** as function of the **radius of the root zone** for various distances of plants and emitters along the driplines

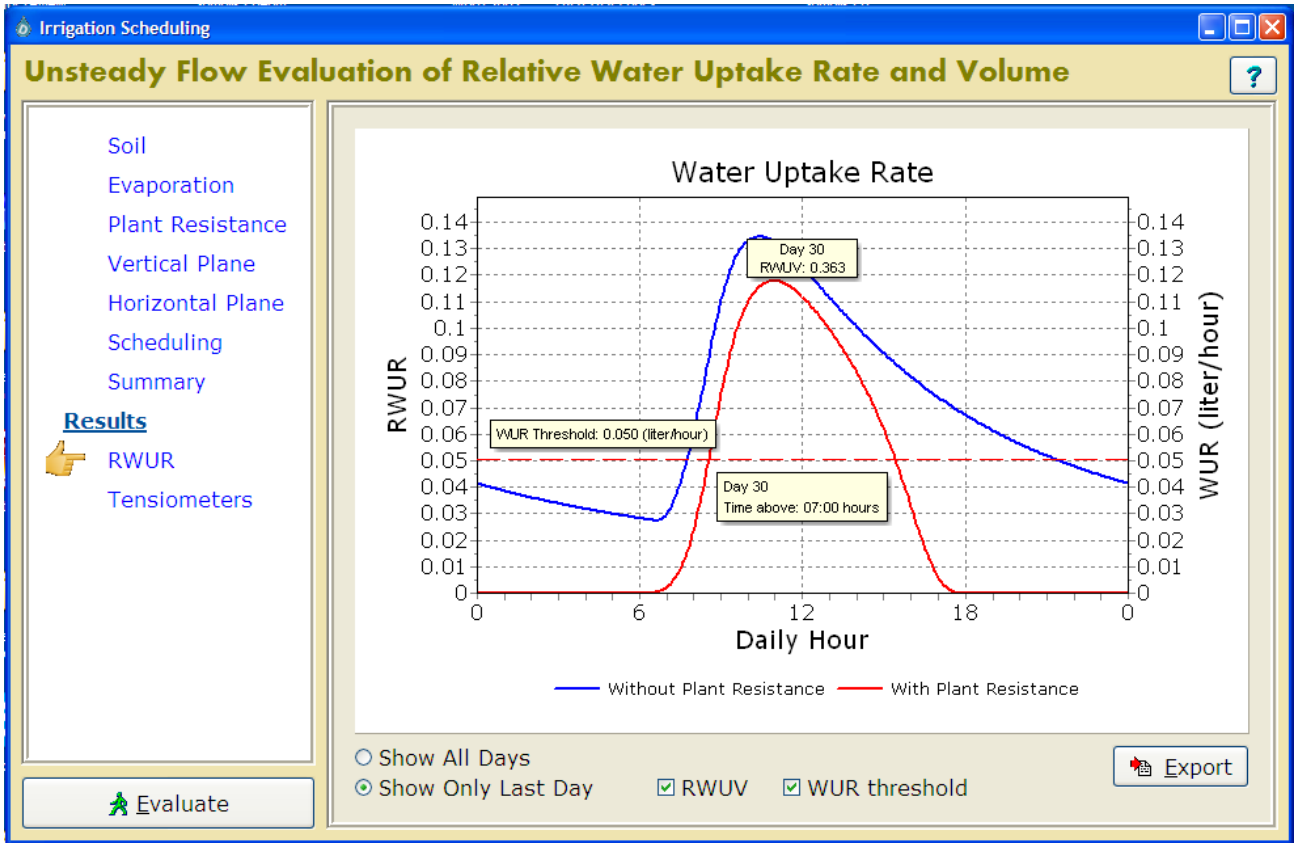


# DIDAS window defining the **irrigation scheduling scenario**:
## Daily, 2h-irrigation at 6:00



# Sample of DIDAS **unsteady** flow model output: Diurnal patterns of the **RWUR**



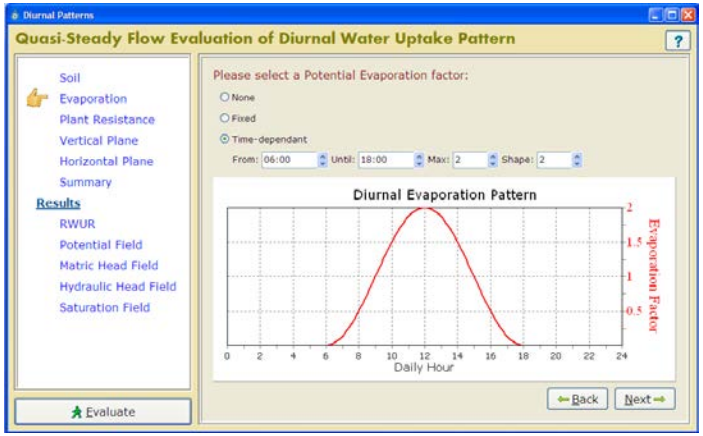
# An example of DIDAS **quasi-steady** flow modeling output: **Diurnal pattern of the RWUR**

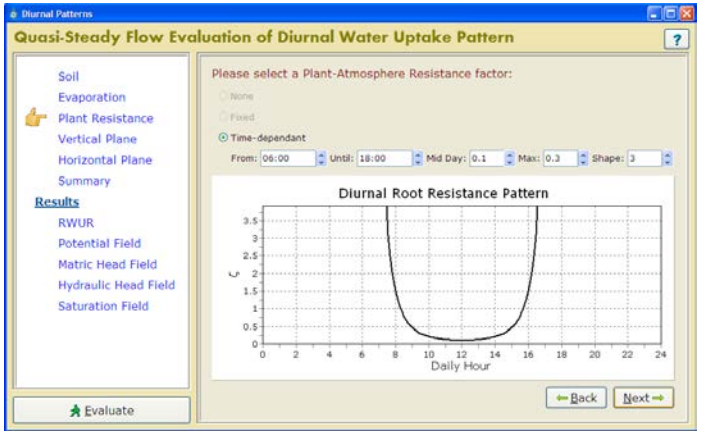
Plants of radius of root zones of 10 cm and emitters at distances of 30 cm along a single drip line

**Diurnal patterns of:**

**Potential evaporation**

**Plant resistance to water uptake**



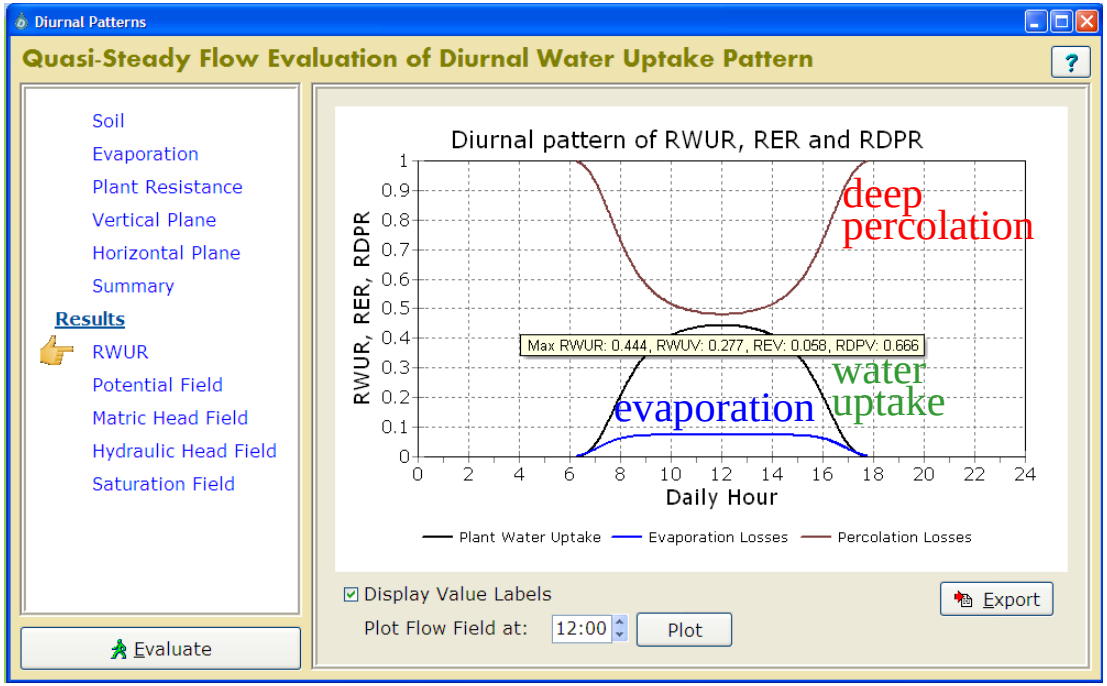




**Diurnal patterns of:**

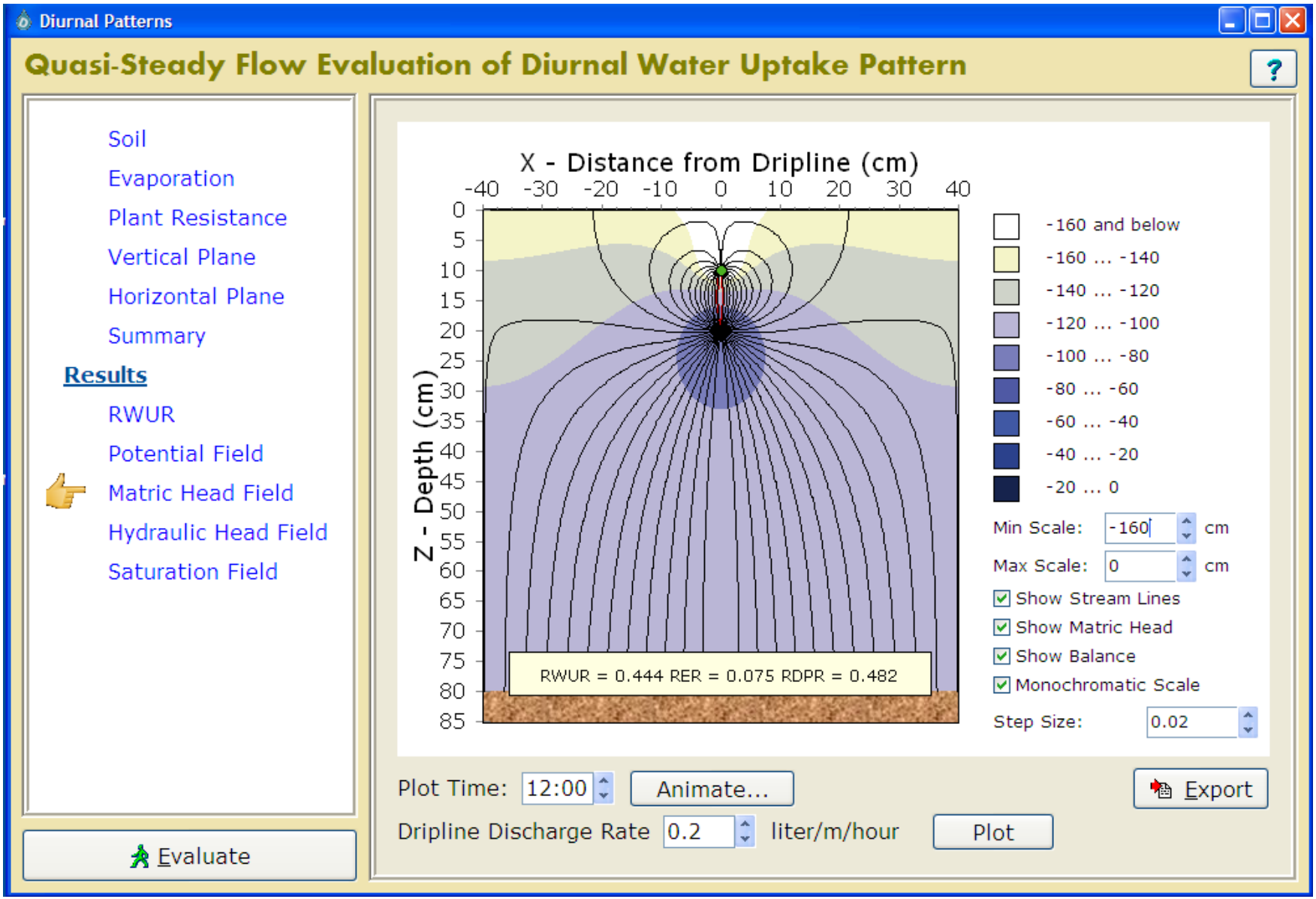
**Relative Water Uptake Rate**

**Relative Evaporation Rate**

**Relative Deep Percolation Rate**

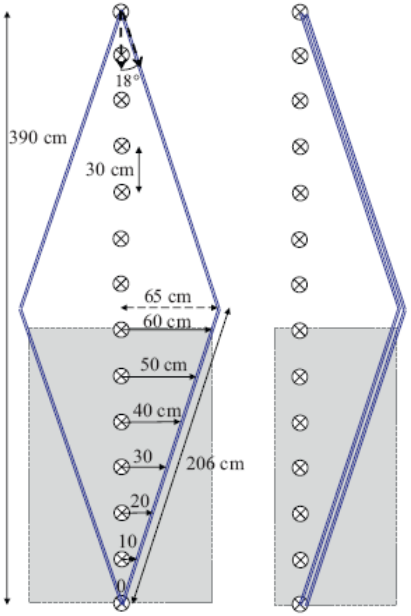


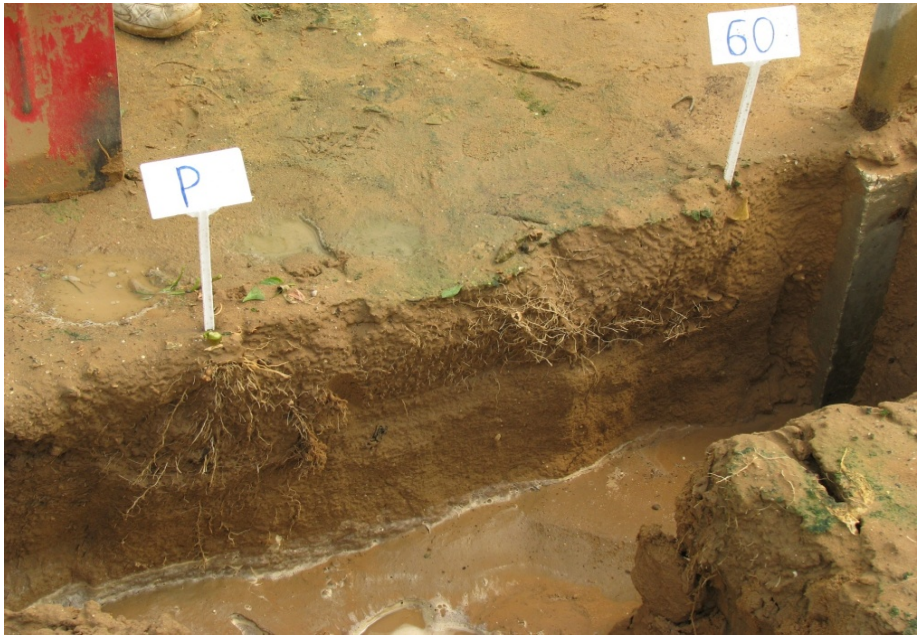
# An example a flow field depicted in DIDAS diurnal patterns module



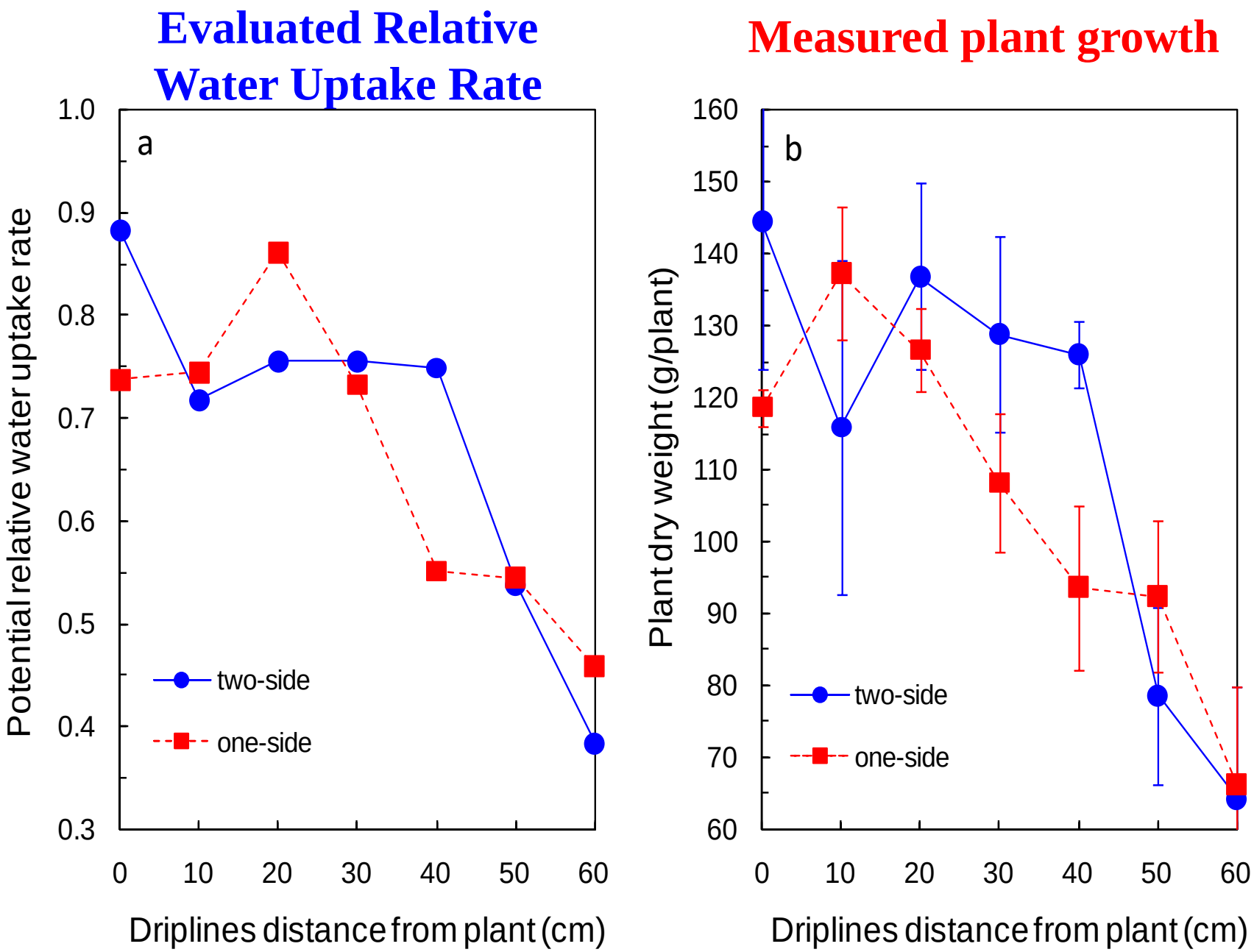
# Watering a plant row with **one or two drip lines at different distances**

(Bell pepper, sandy soil, Besor experimental station, Meiri et al., 2011)



# Comparison of measured plant growth and predicted RWUR



# One or Two drip lines per plant row

## Bell pepper, Besor Experimental Station, 2010

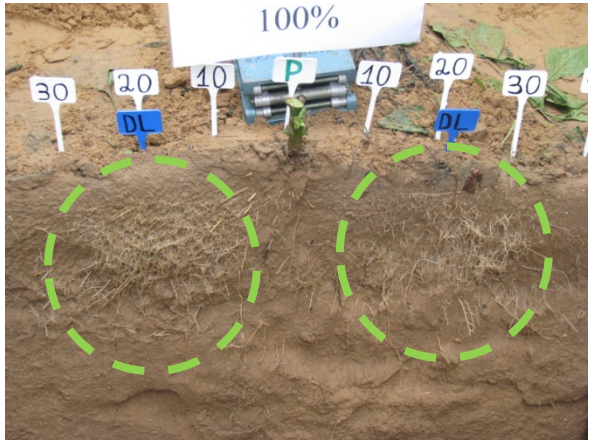
**June**

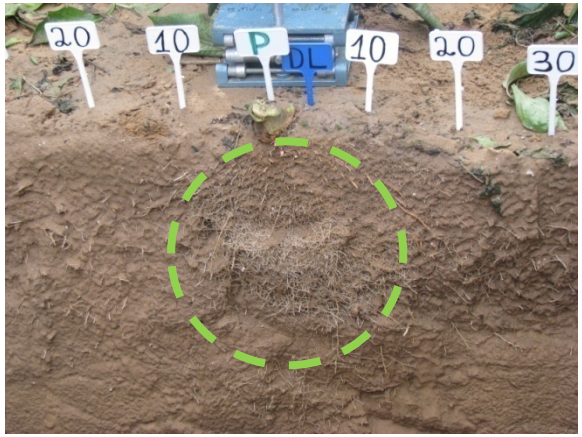
**2DL 1DL**

**September**

**2DL**

**1DL**

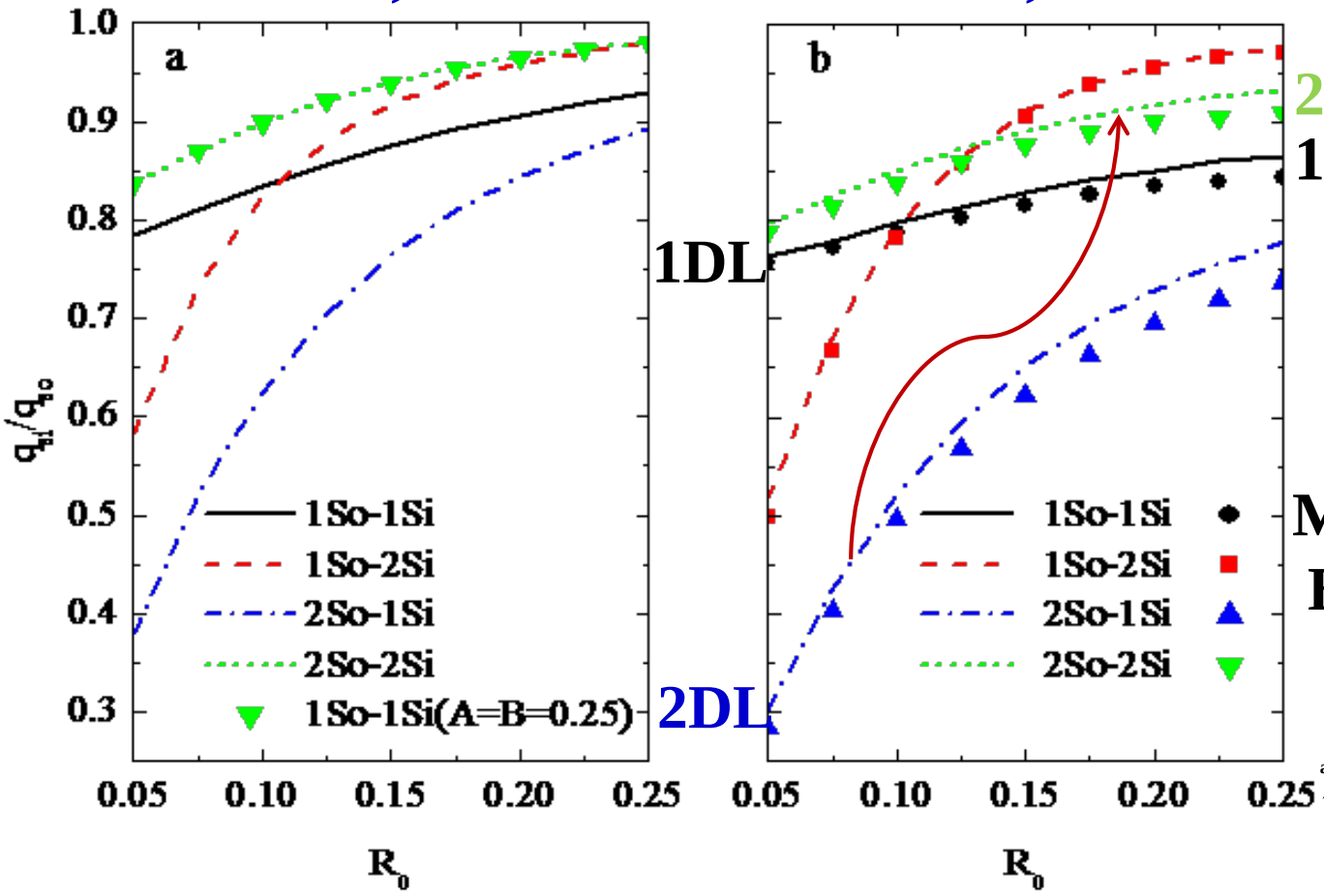


# **RWUR** as a function of **root system size** for the **various scenarios**

**B = 0.25 ; A/B = 2**

**B = 0.25 ; A/B = 4**




**1DL**

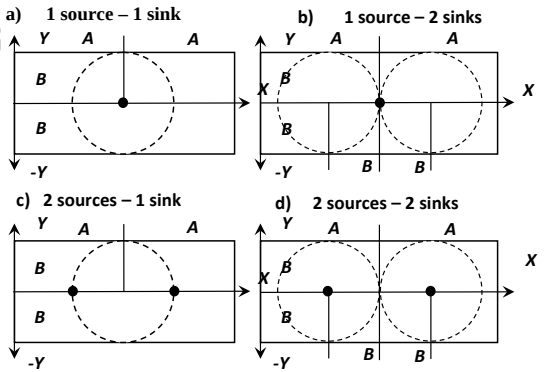
**2DL**

**2DL**

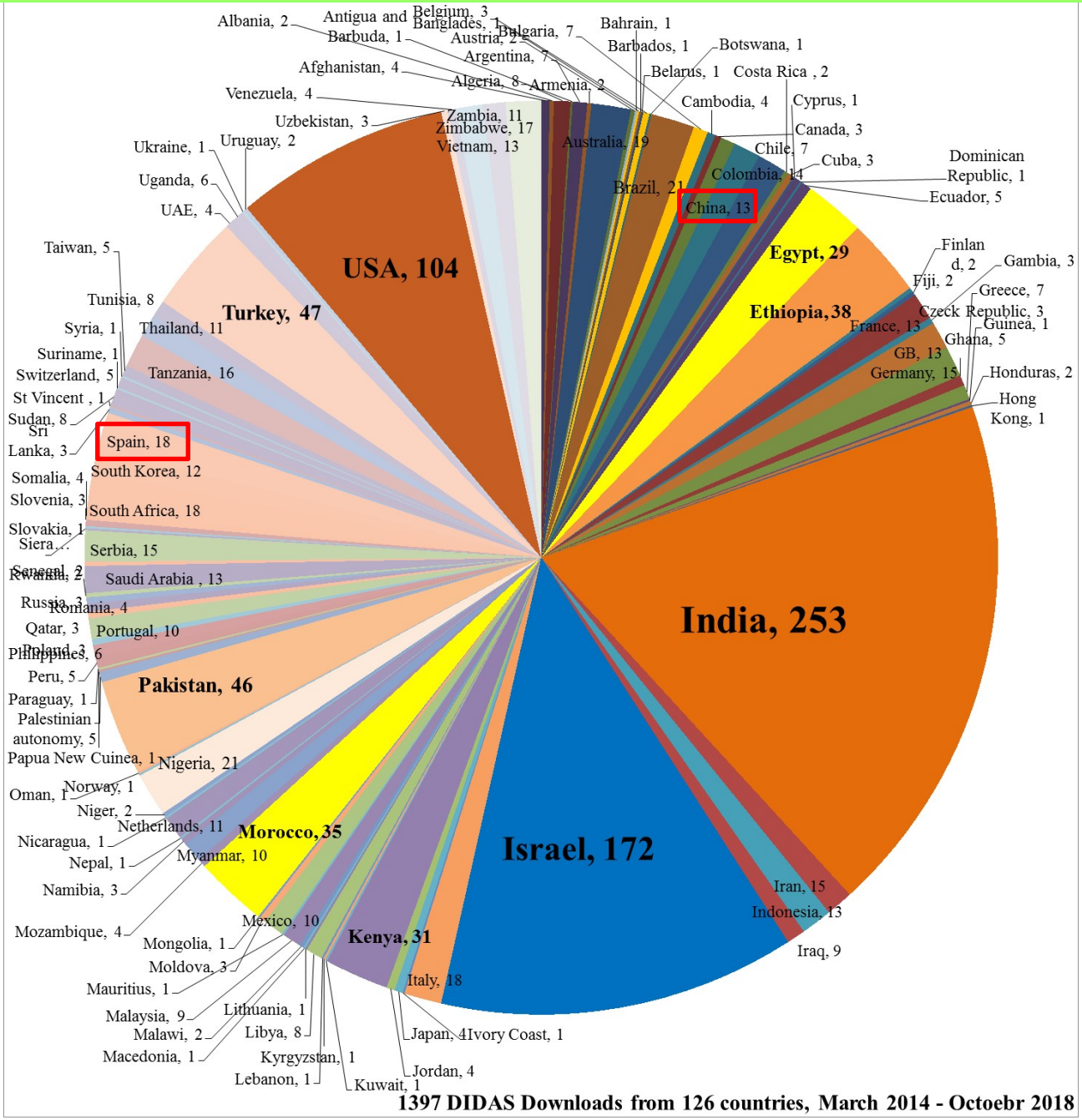
**1DL**

**Markers:**

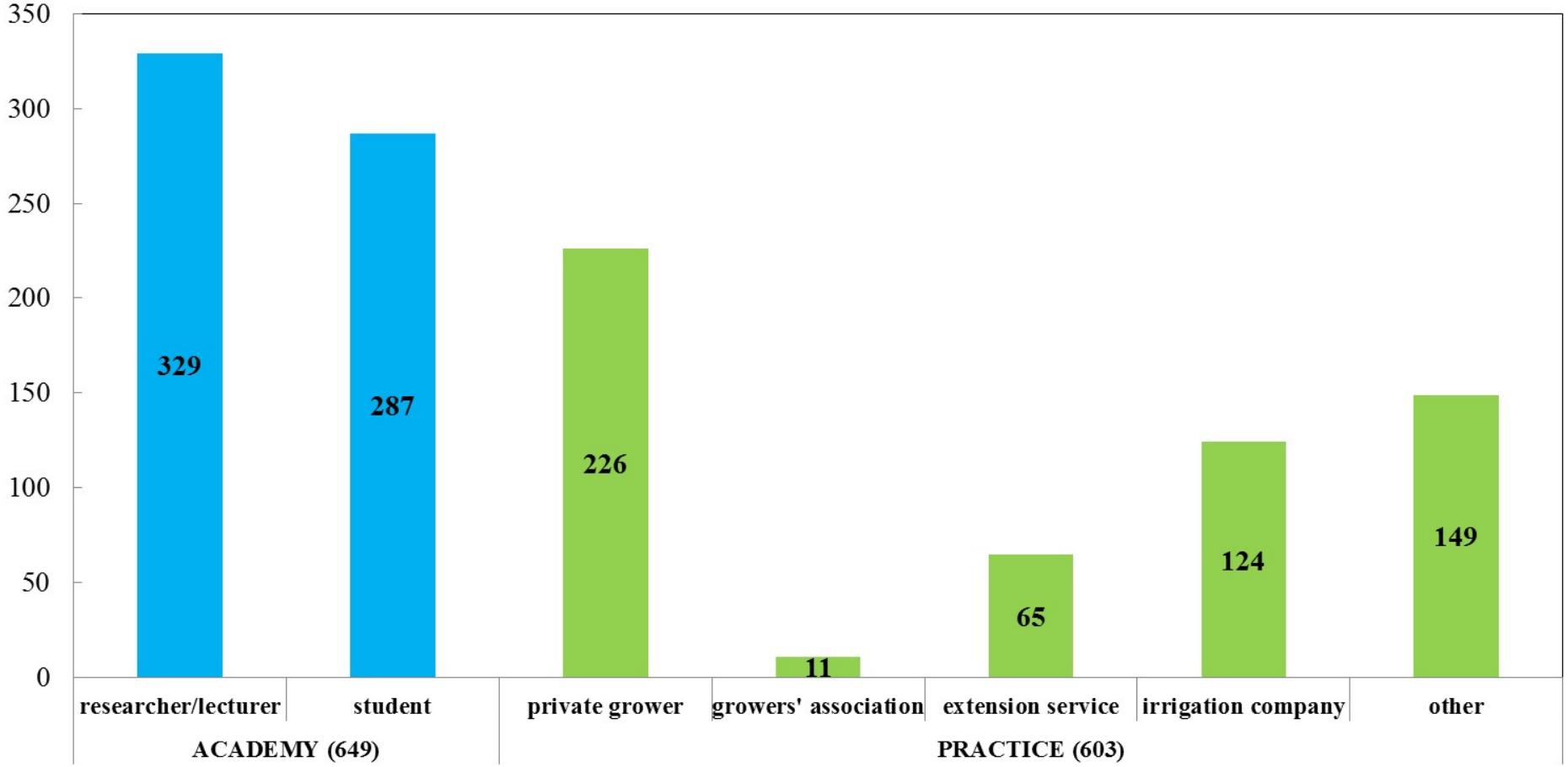
**B = 0.25 ; A/B = ∞**



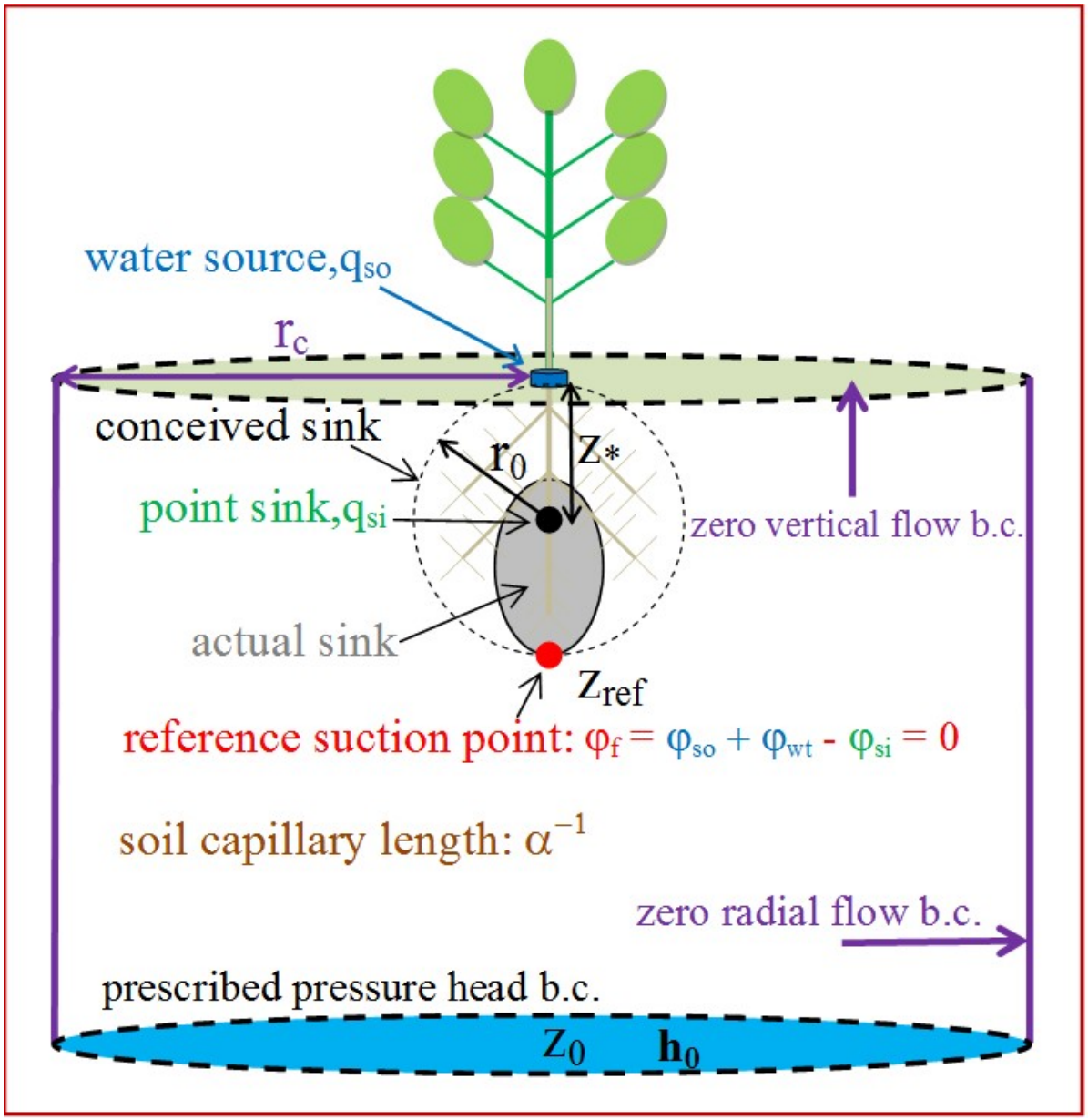
# 1397 DIDAS downloads sorted by country



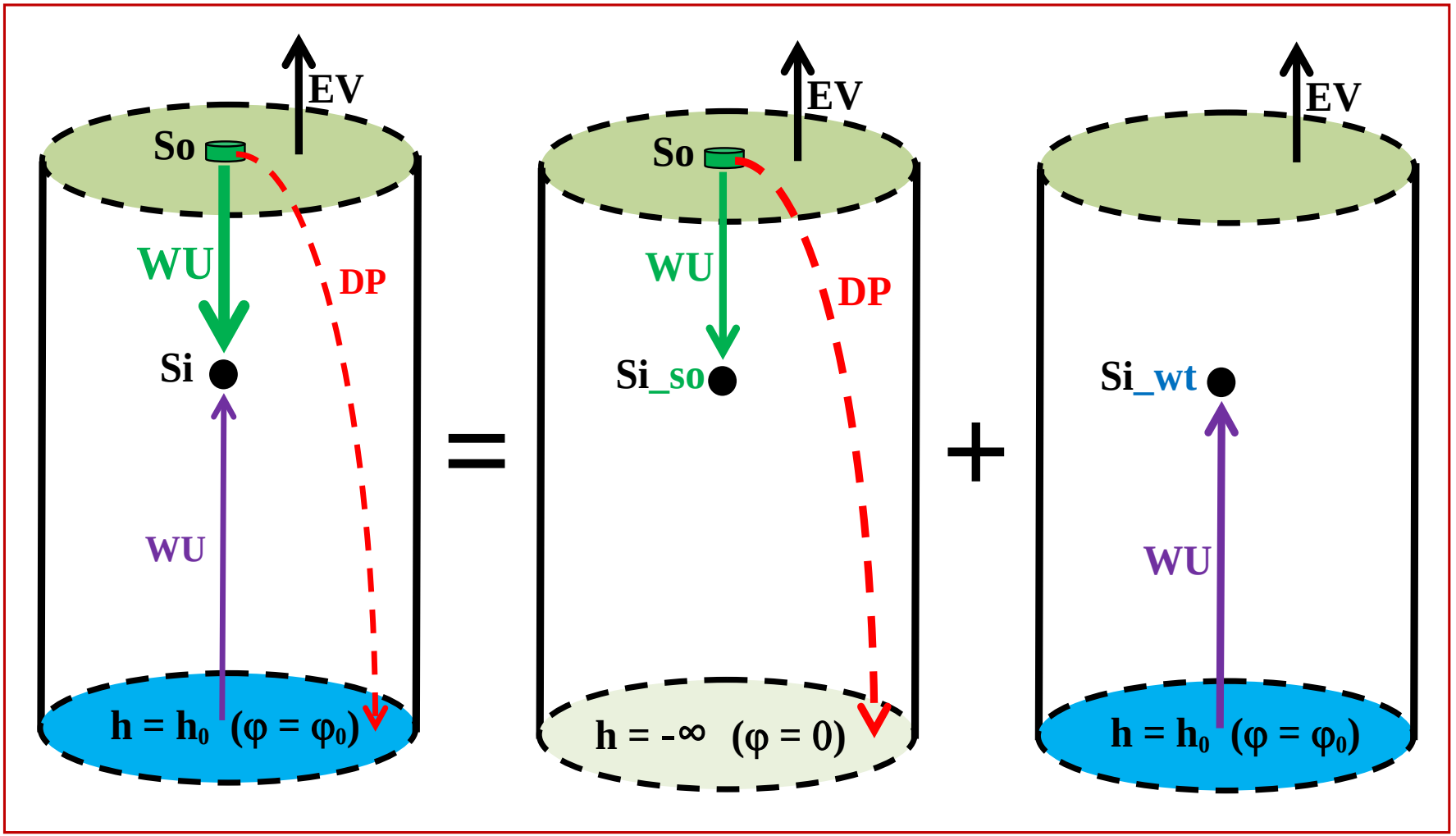
# Sorted by **Academy/Practice** and sub-groups



# **Supplemental** drip irrigation over **shallow groundwater**



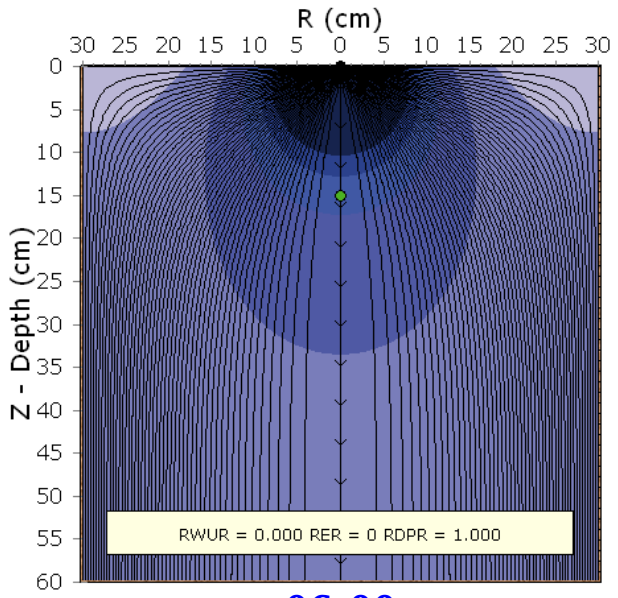
# Decomposition of the overall **So-Si-WT** problem to two independent **So-Si** and **Si-WT** problems



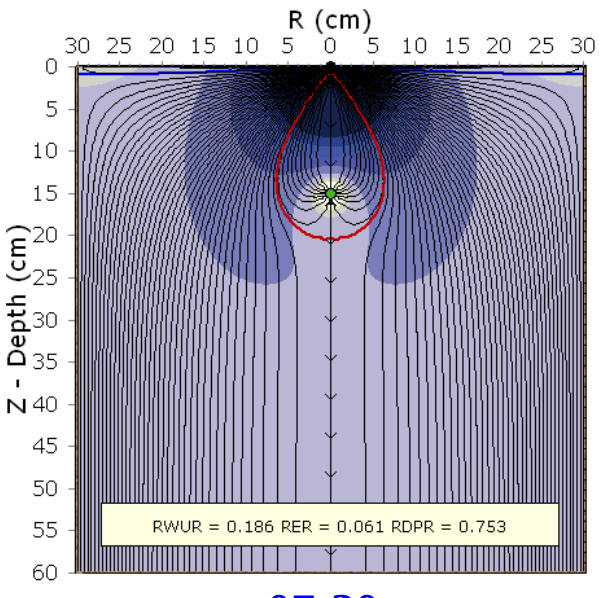

$$\nabla^2\varphi - \alpha\frac{\partial\varphi}{\partial z} = 0 \qquad \varphi = \int_{-\infty}^{h} K(h)\,dh = \frac{K_s\, exp(\alpha h)}{\alpha}$$

# A module for **salinity management** in drip irrigation

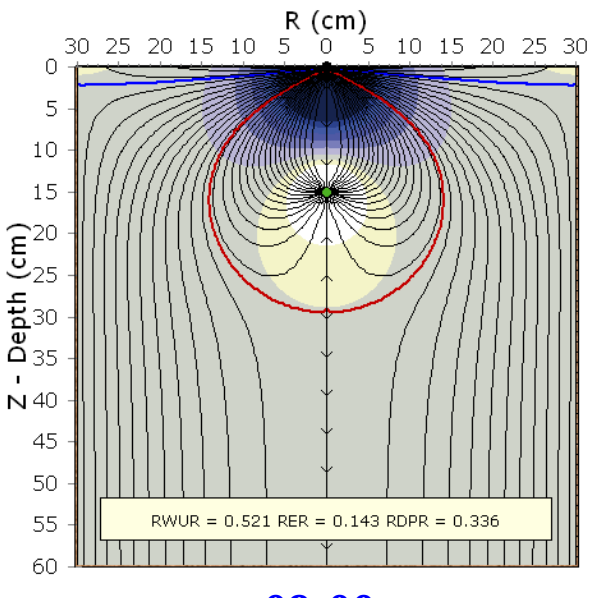
# Diurnal pattern of water flow and uptake



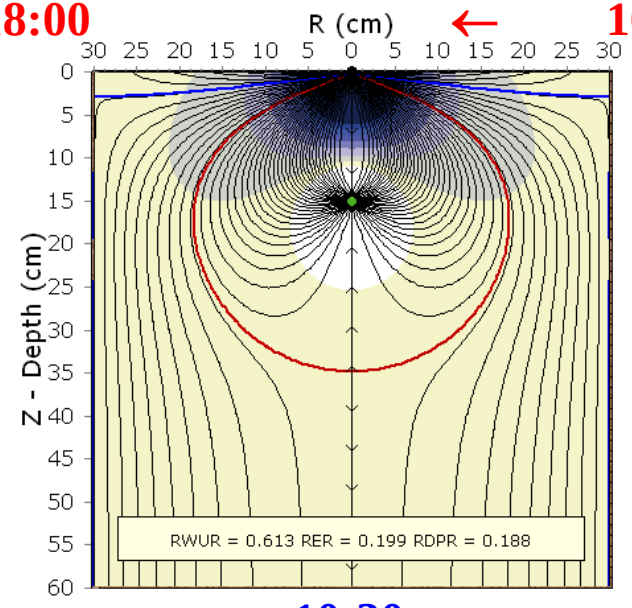

06:00 → 18:00



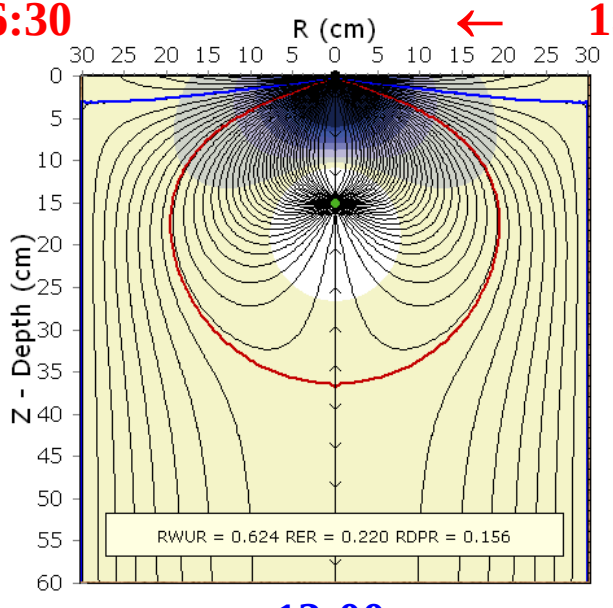

07:30 → 16:30




09:00 → 15:00

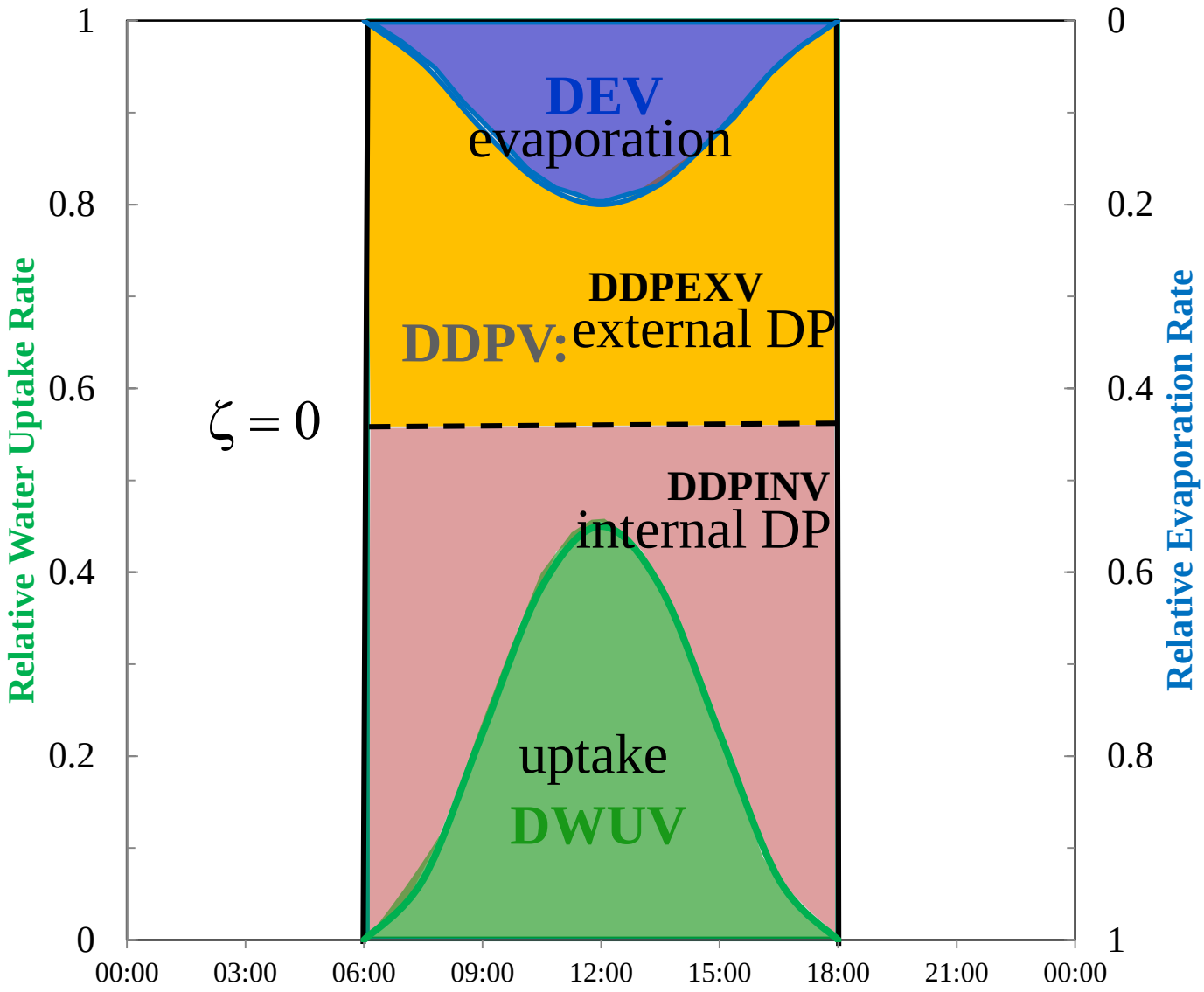



10:30 → 13:30

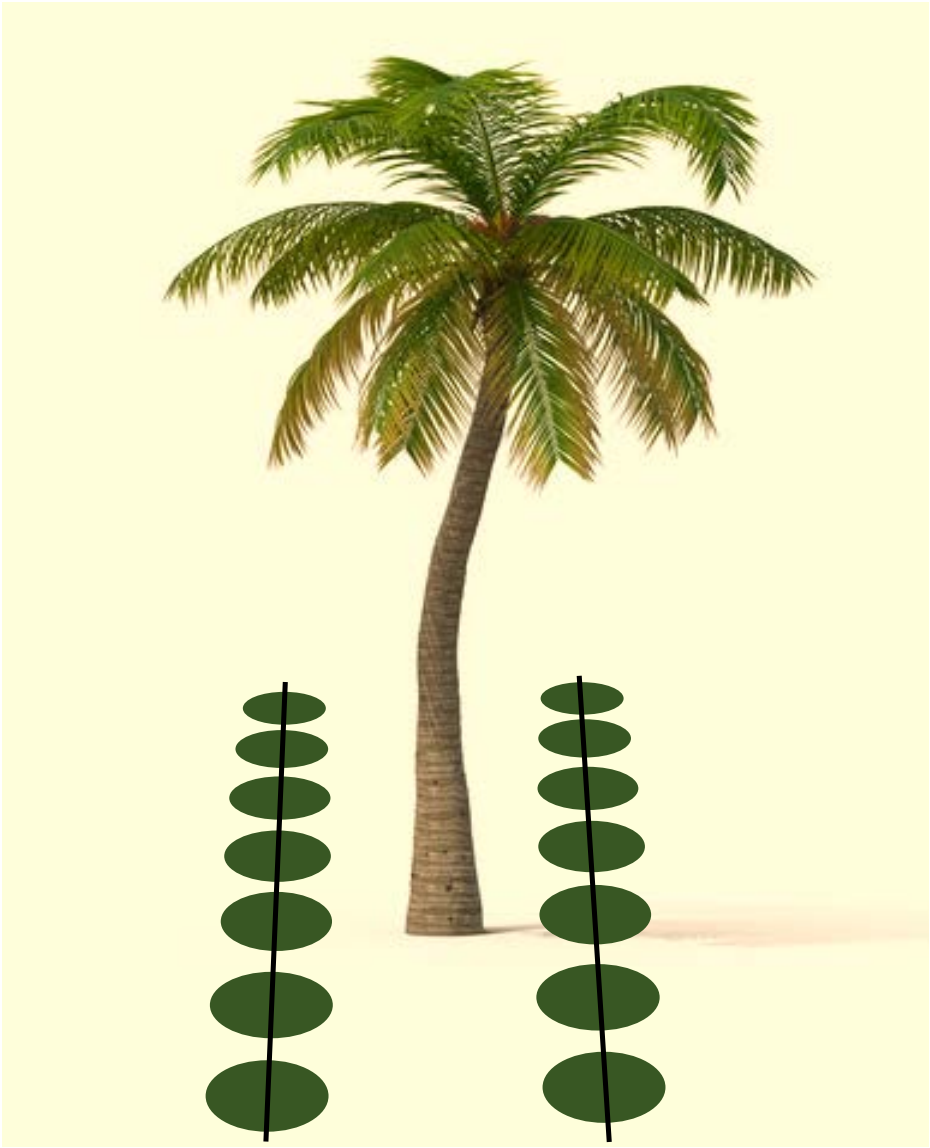


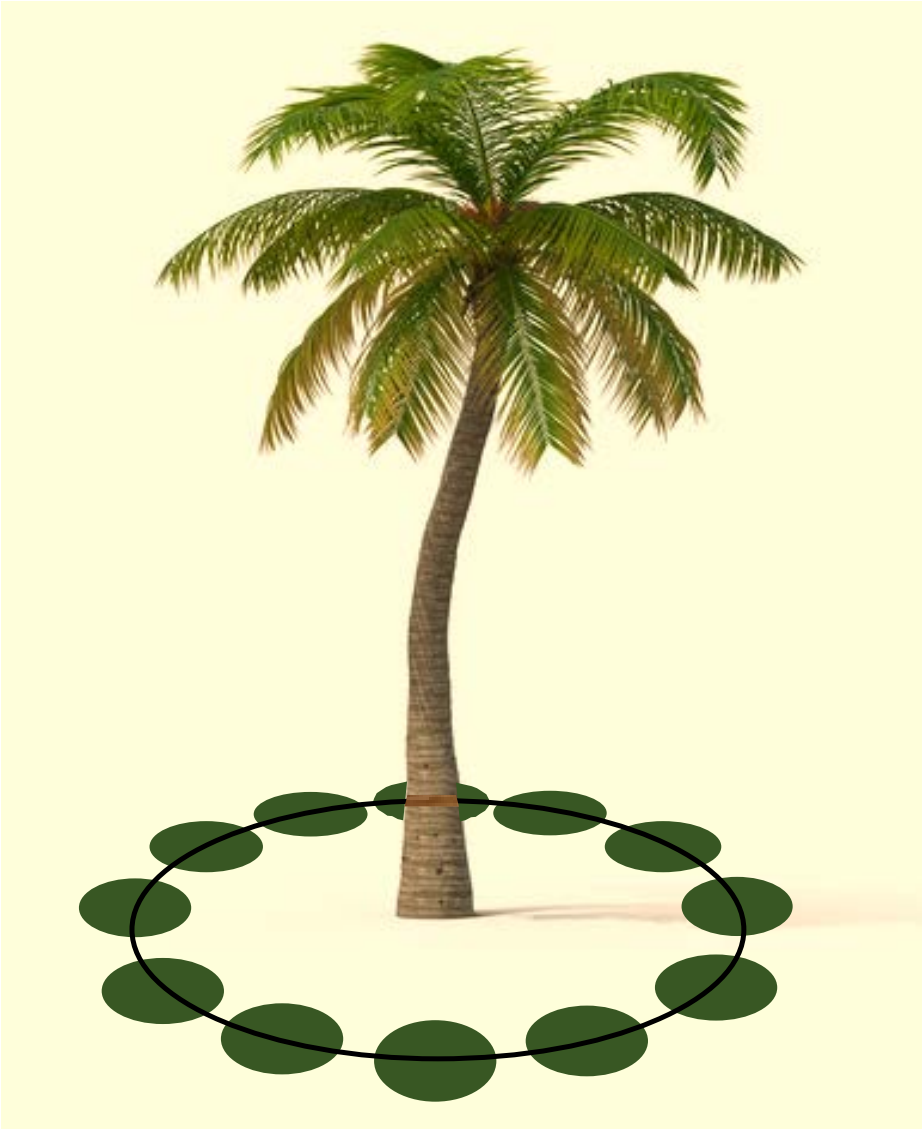

12:00 → 12:00

# Components of (daily) water balance



# Additional configurations: **Ring source**





# **Sprinkler irrigation** of row crops with 2D or 3D root zones