

MEDA Water



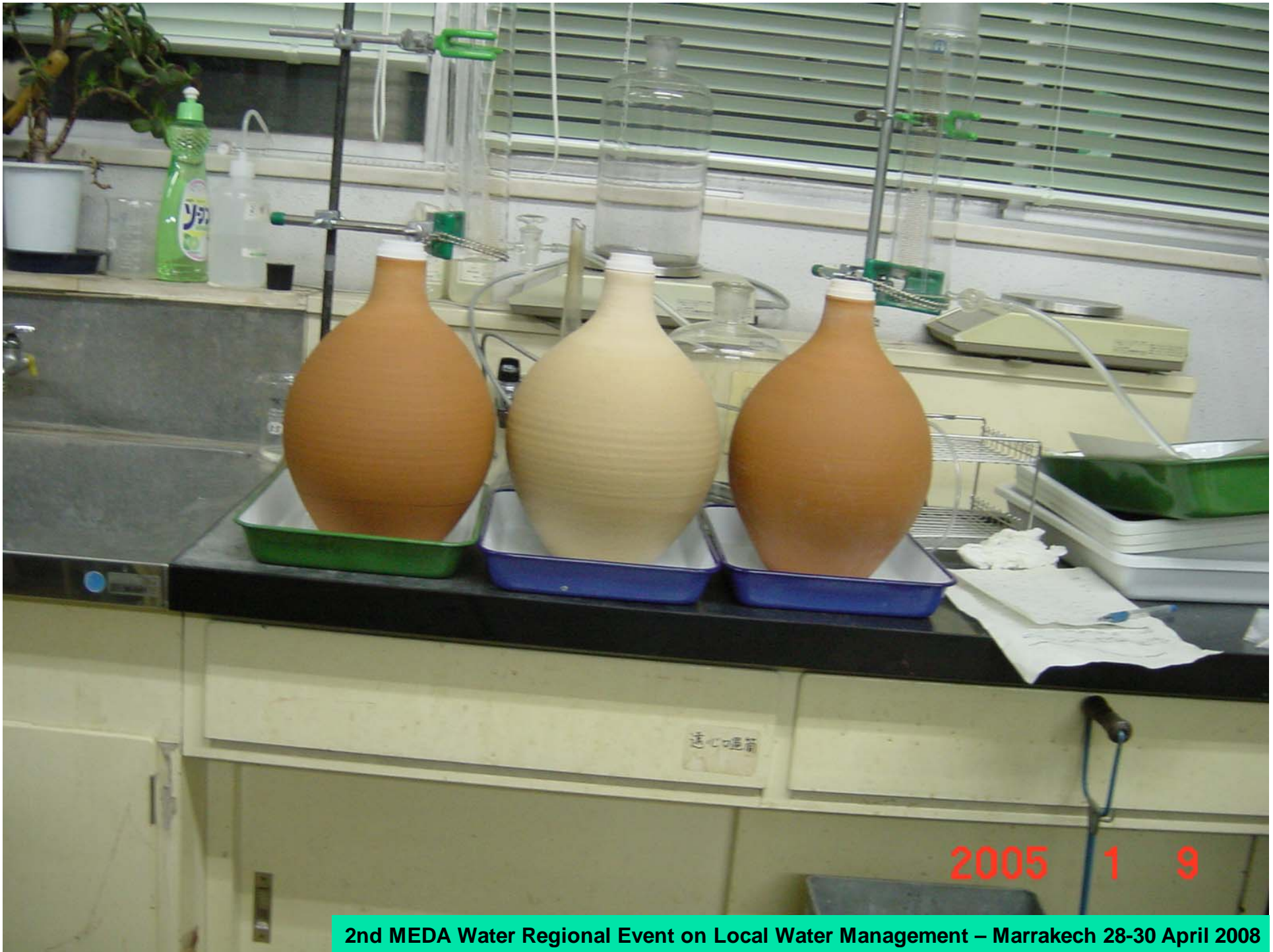
Pitcher Irrigation

2nd MEDA Water Regional Event on Local Water Management

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Technology



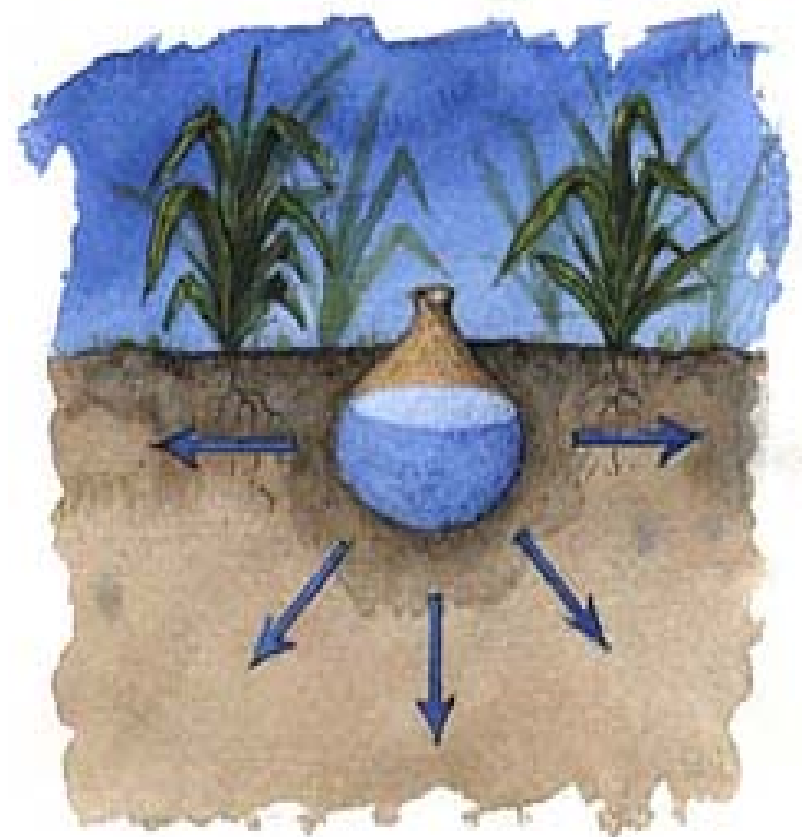
JORDAN



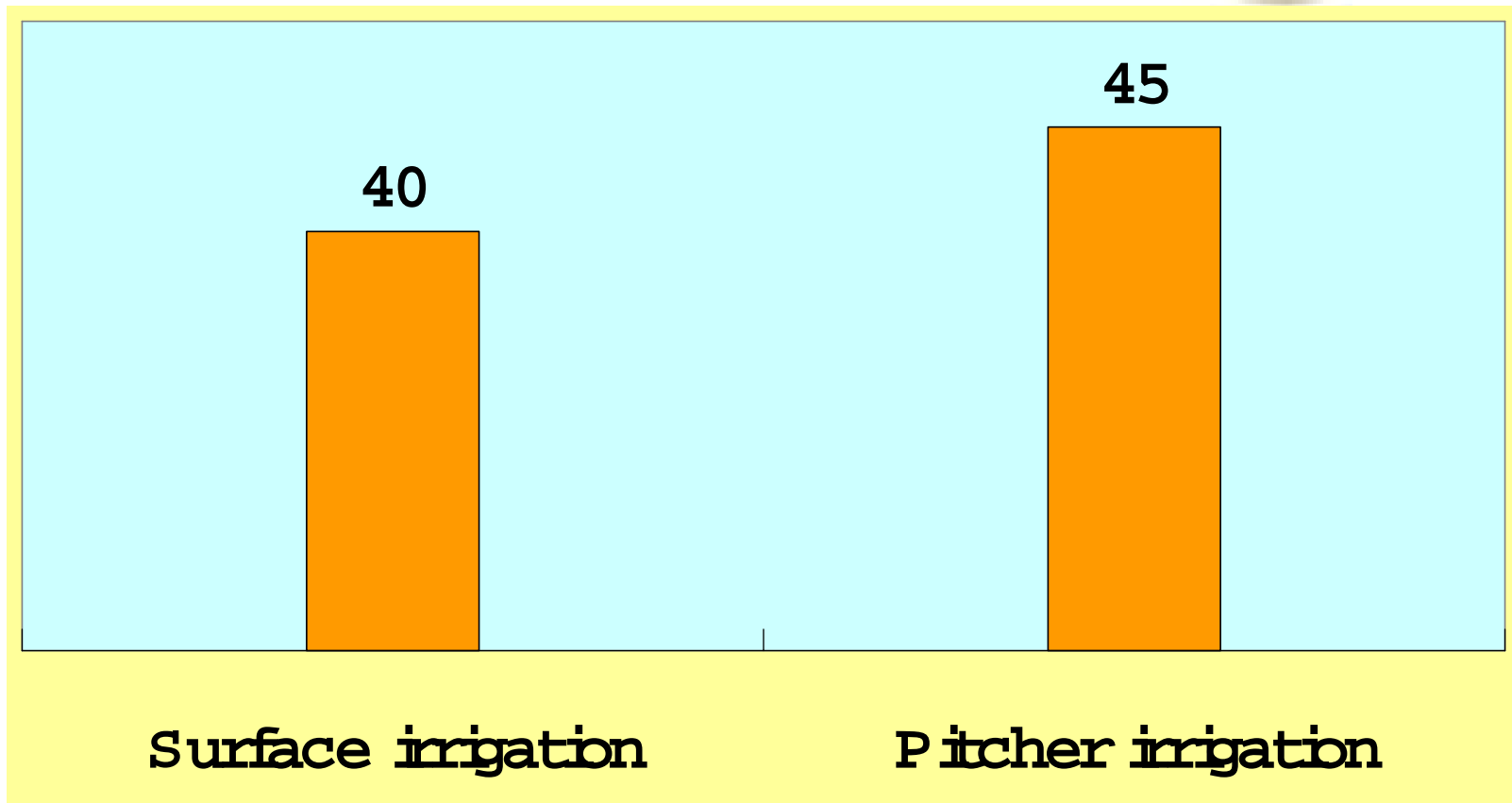
2nd MEDA Water Regional Event on Local Water Management – Marrakech 28-30 April 2008



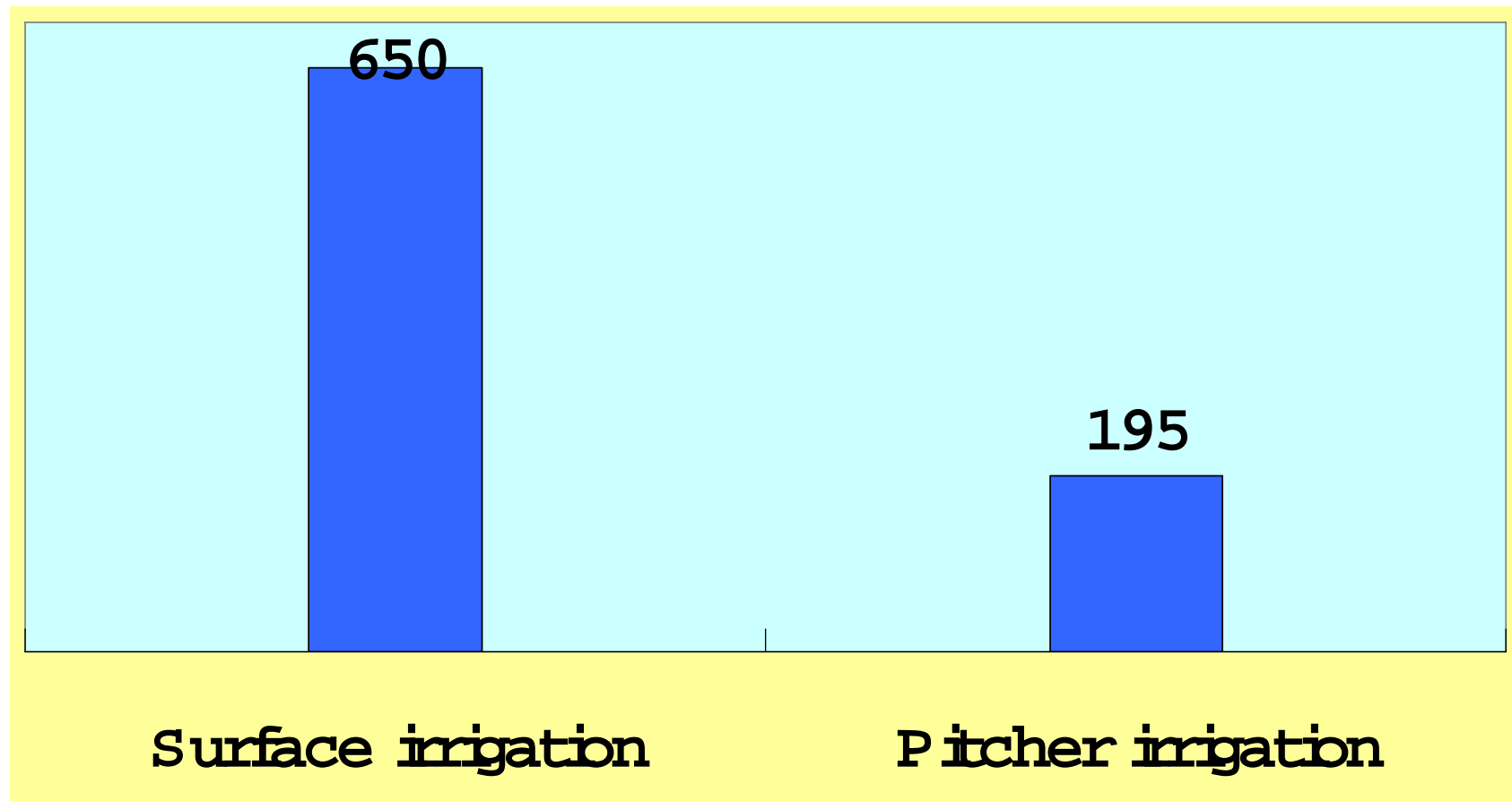
Pitcher Irrigation



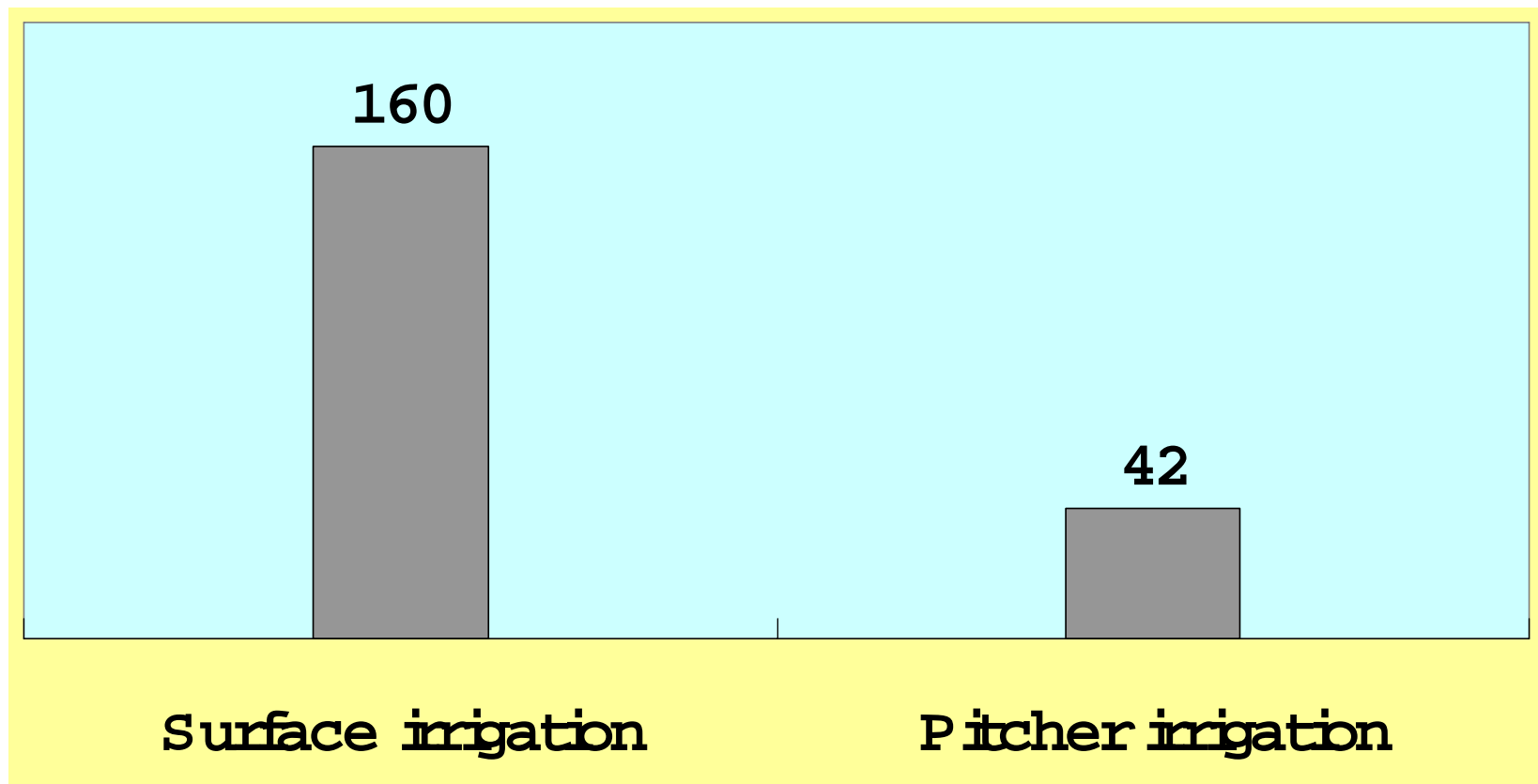
Crop Yield (Ton/ha)



Crop Water Consumption (mm/season)



Water Use Efficiency (m³/ton)





Objectives

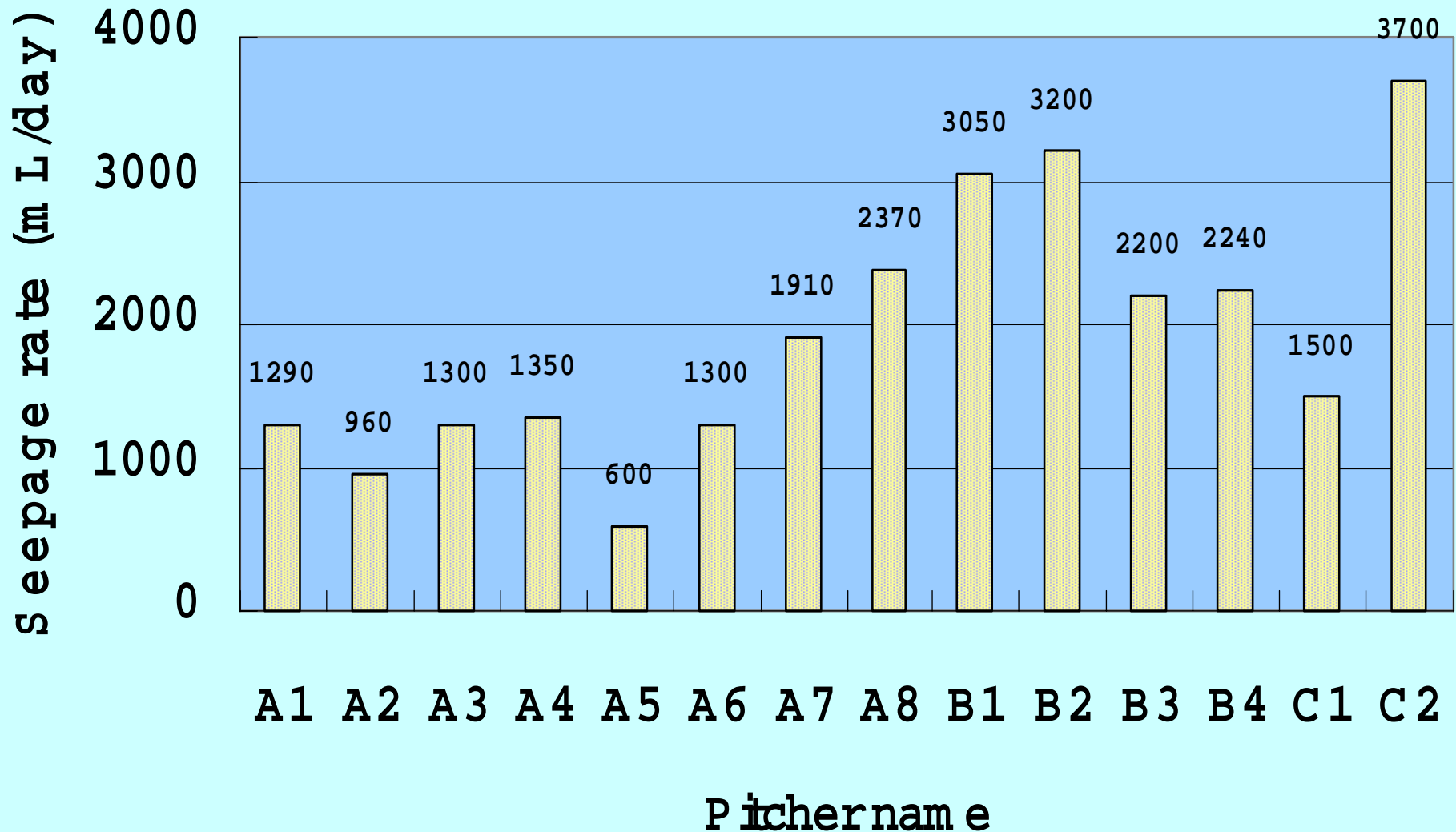
- To quantify the seepage rate of pitchers under various climatic conditions
- The Auto-regulative seepage of pitchers



Experimental works

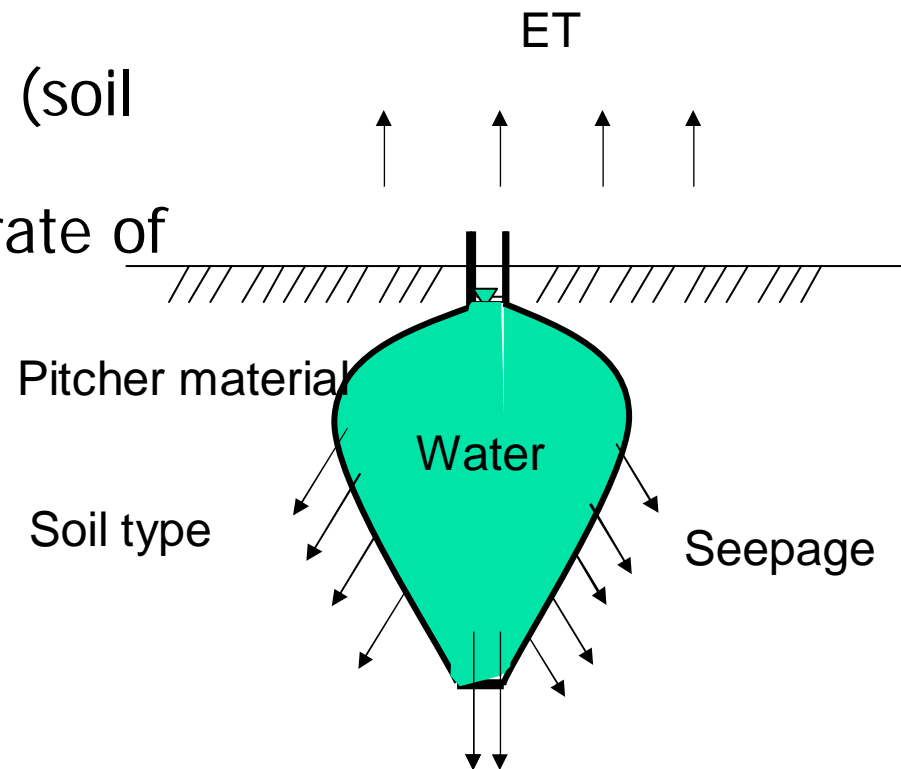
- Laboratory experiment to explore the relationship between pitchers properties and seepage rate
- Field experiment to quantify seepage rate of pitchers in the field
- Laboratory Experiment to explore the Auto regulative capability of pitchers (Variable ETo)

Seepage rate (14 pitchers)



Seepage rate

- Hydraulic conductivity of pitcher wall
- Soil matrix potential (soil properties).
- Evapotranspiration rate of plants.
- Water quality
 - fresh water
 - brackish water.





Conductance

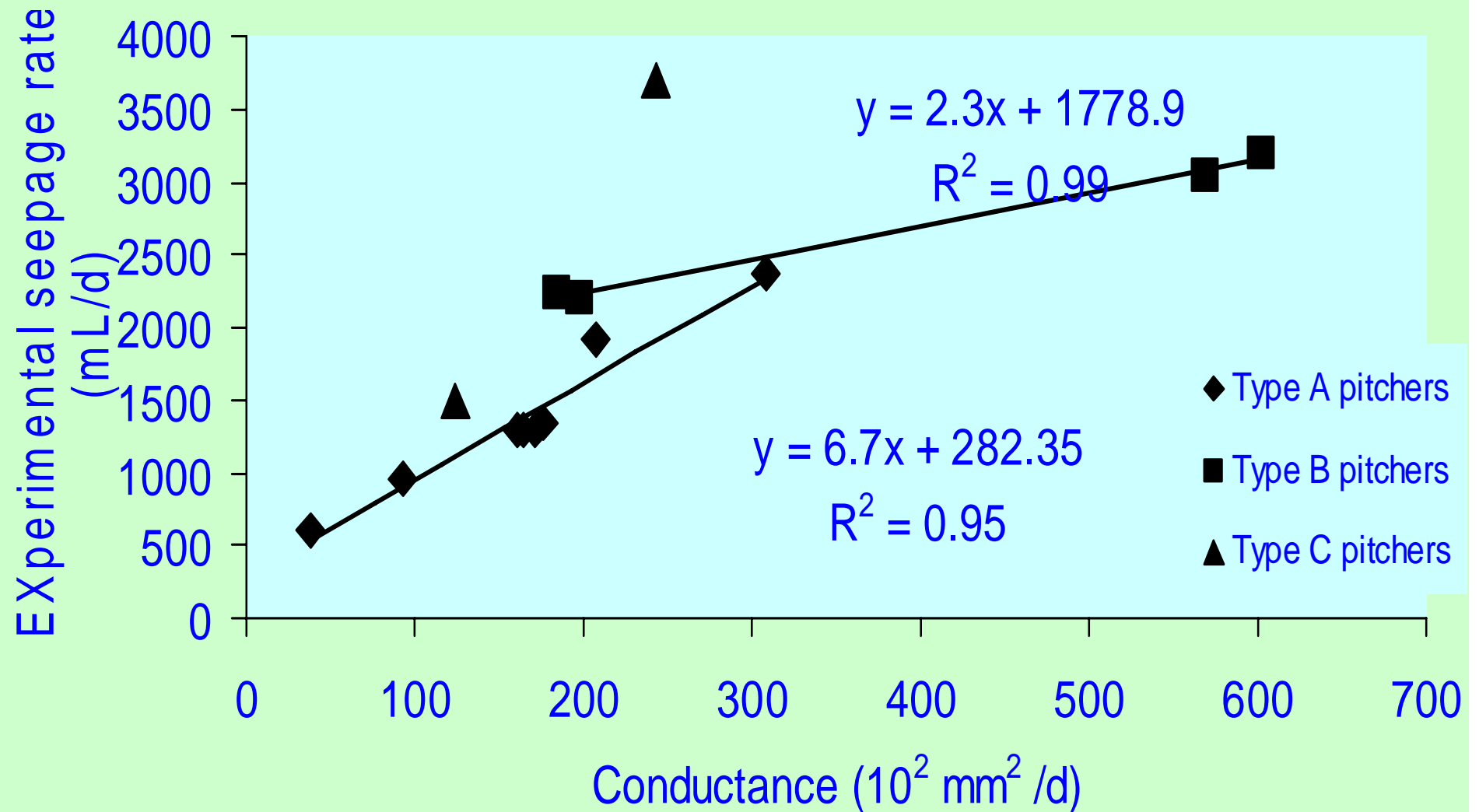
K_s

Wall Area (A)

Wall Thickness (h)


$$CD = K_s \cdot (A) / (h)$$

Seepage vs Conductance (CD)

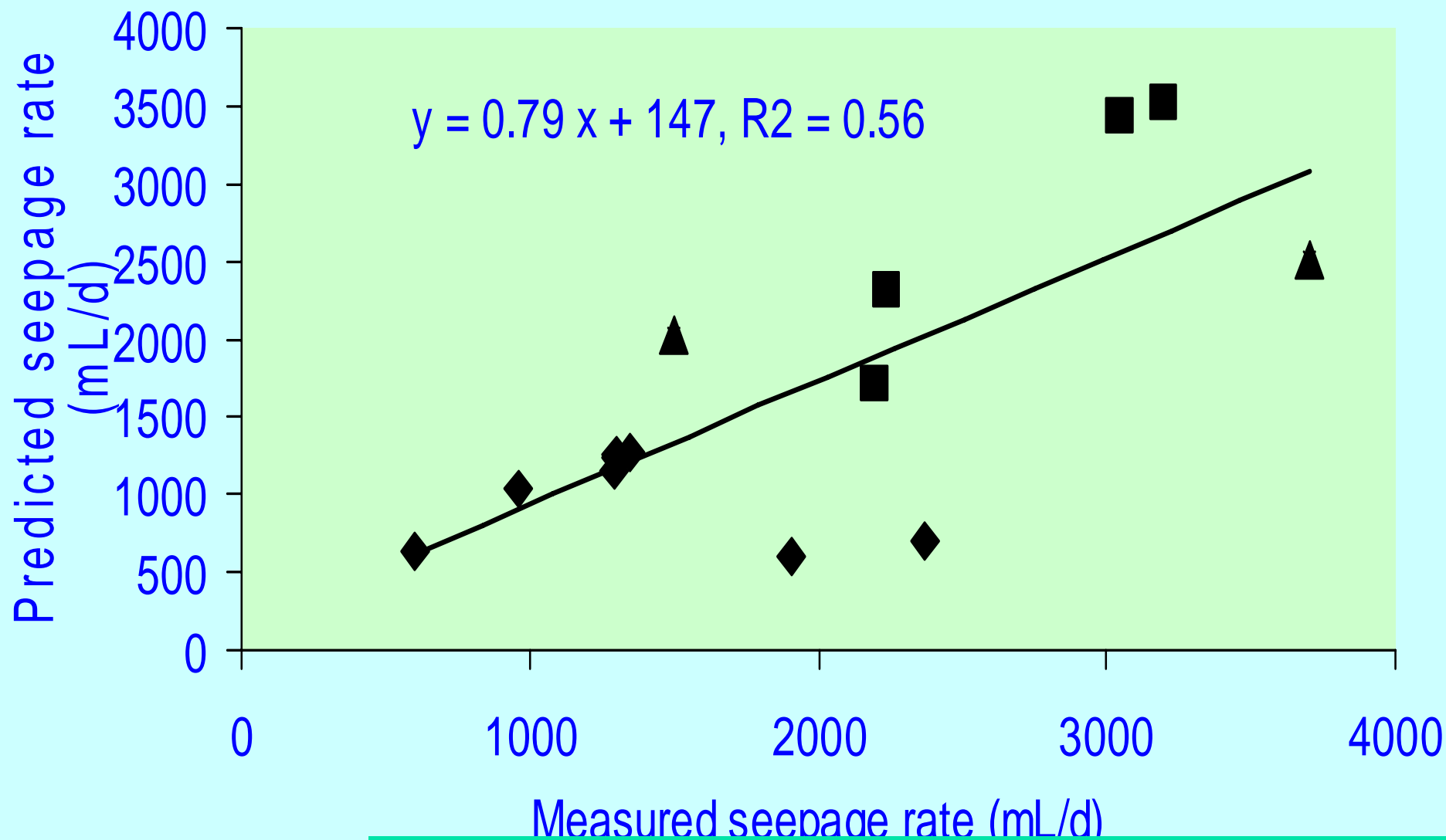




Mathematical Model

$$Q_p = \left(\frac{A_b}{A_s}\right).CD.h + \left(1 - \frac{A_b}{A_s}\right).CD.h_e$$

Predicted vs Observed Seepage Rate

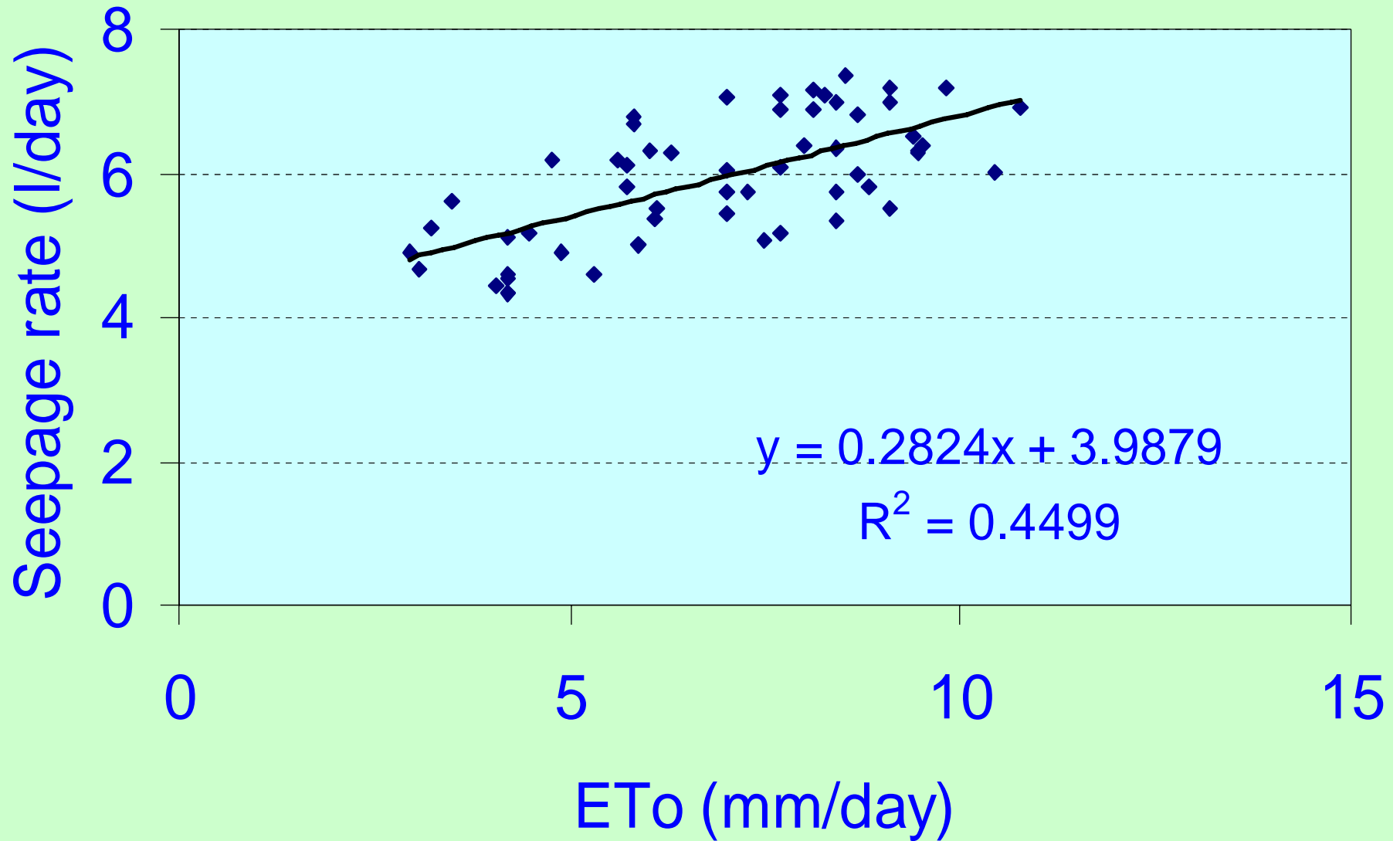


Second Experiment

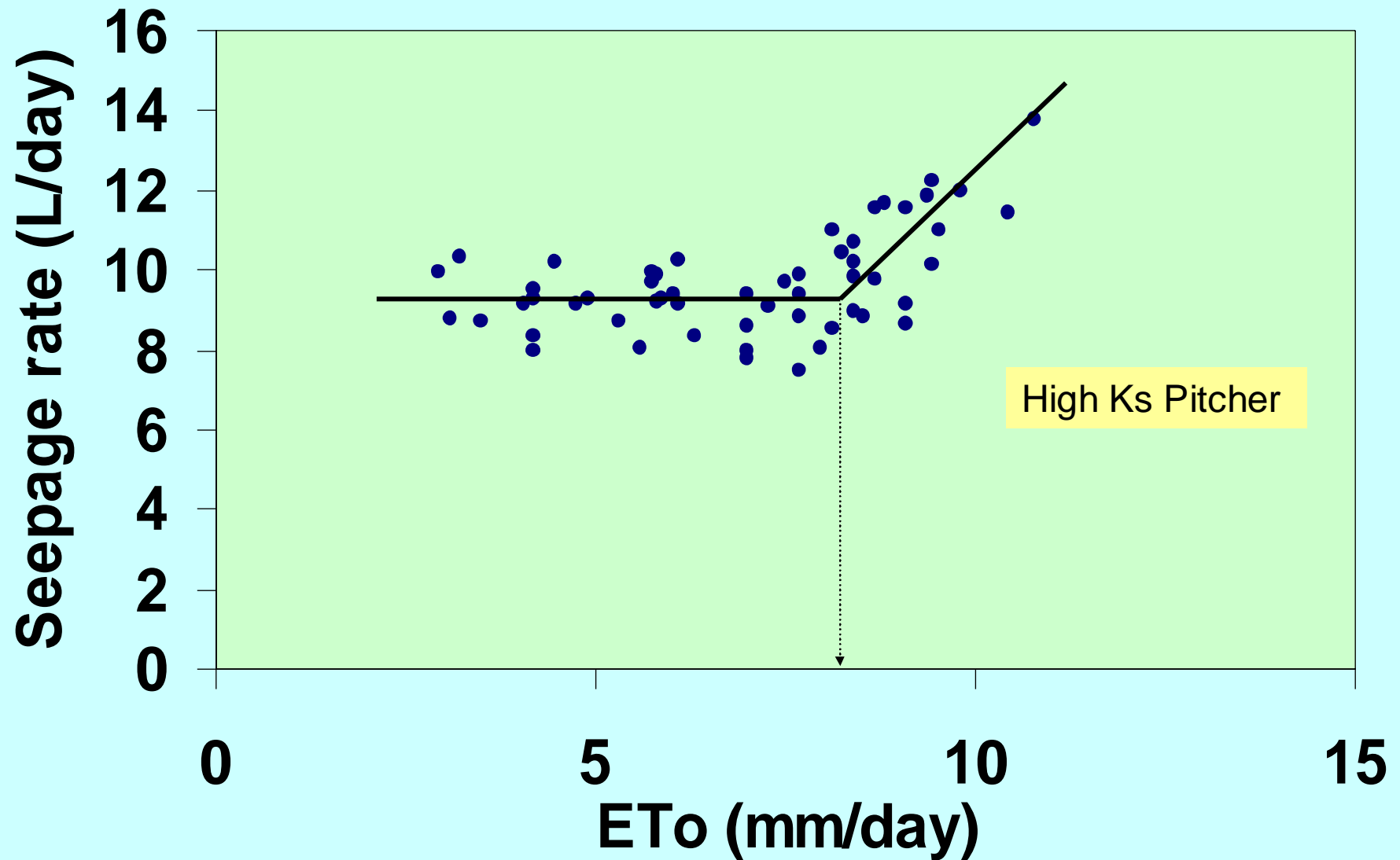
Field Experiment

- to quantify seepage rate of pitchers in the field (variable ET) inside soil profile

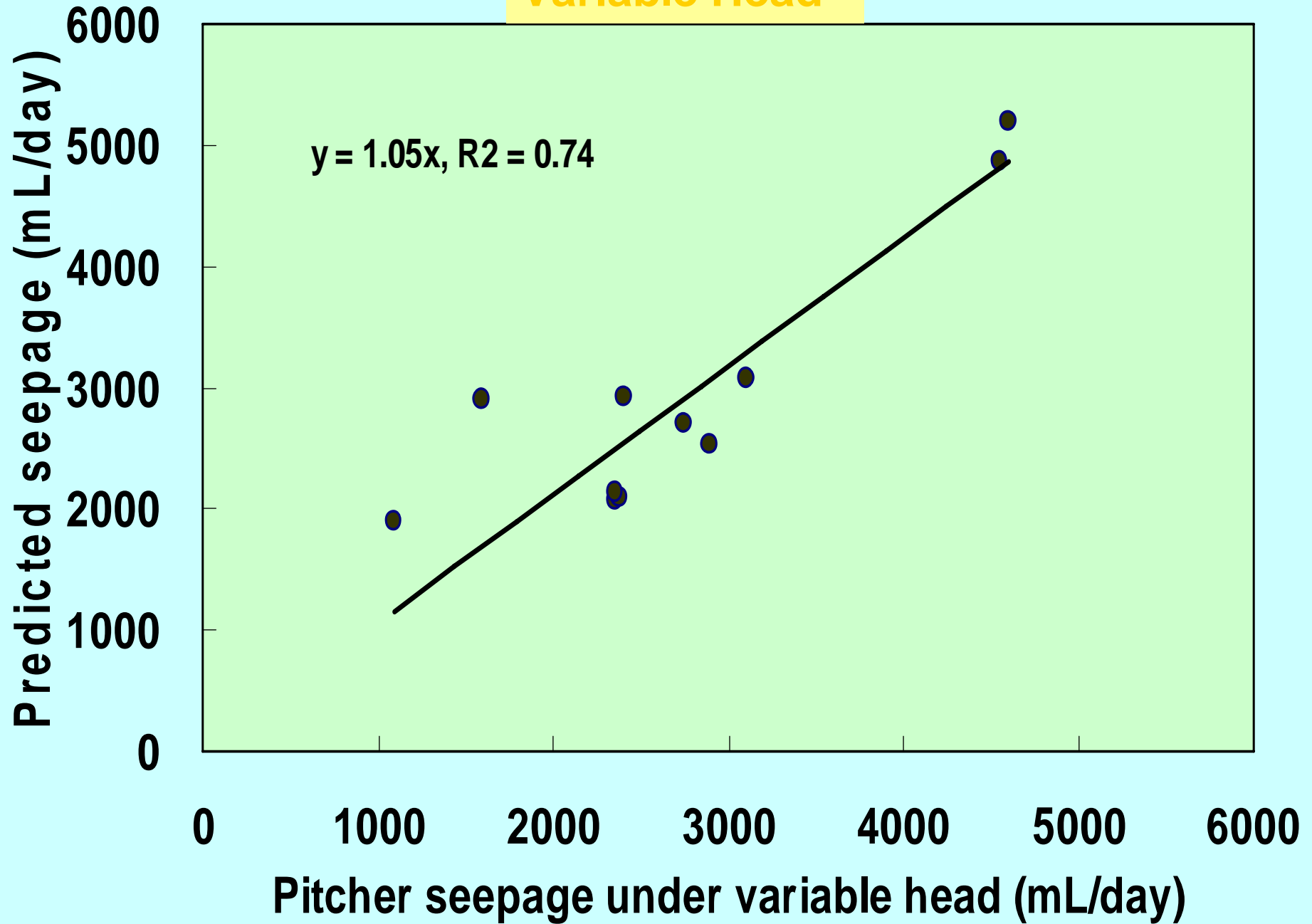
Seepage vs ETo



Seepage vs ETo



Variable Head



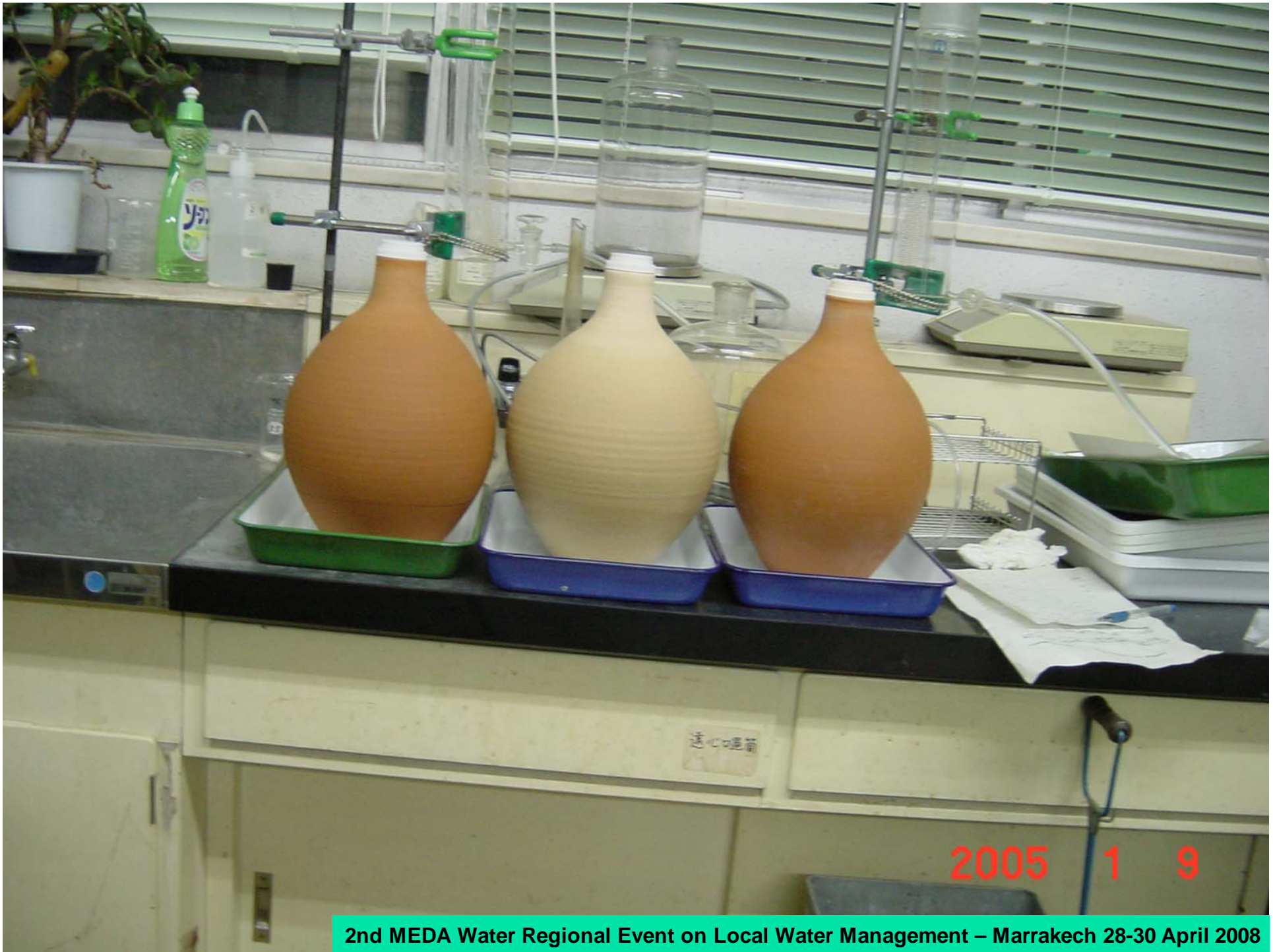


Laboratory Experiment

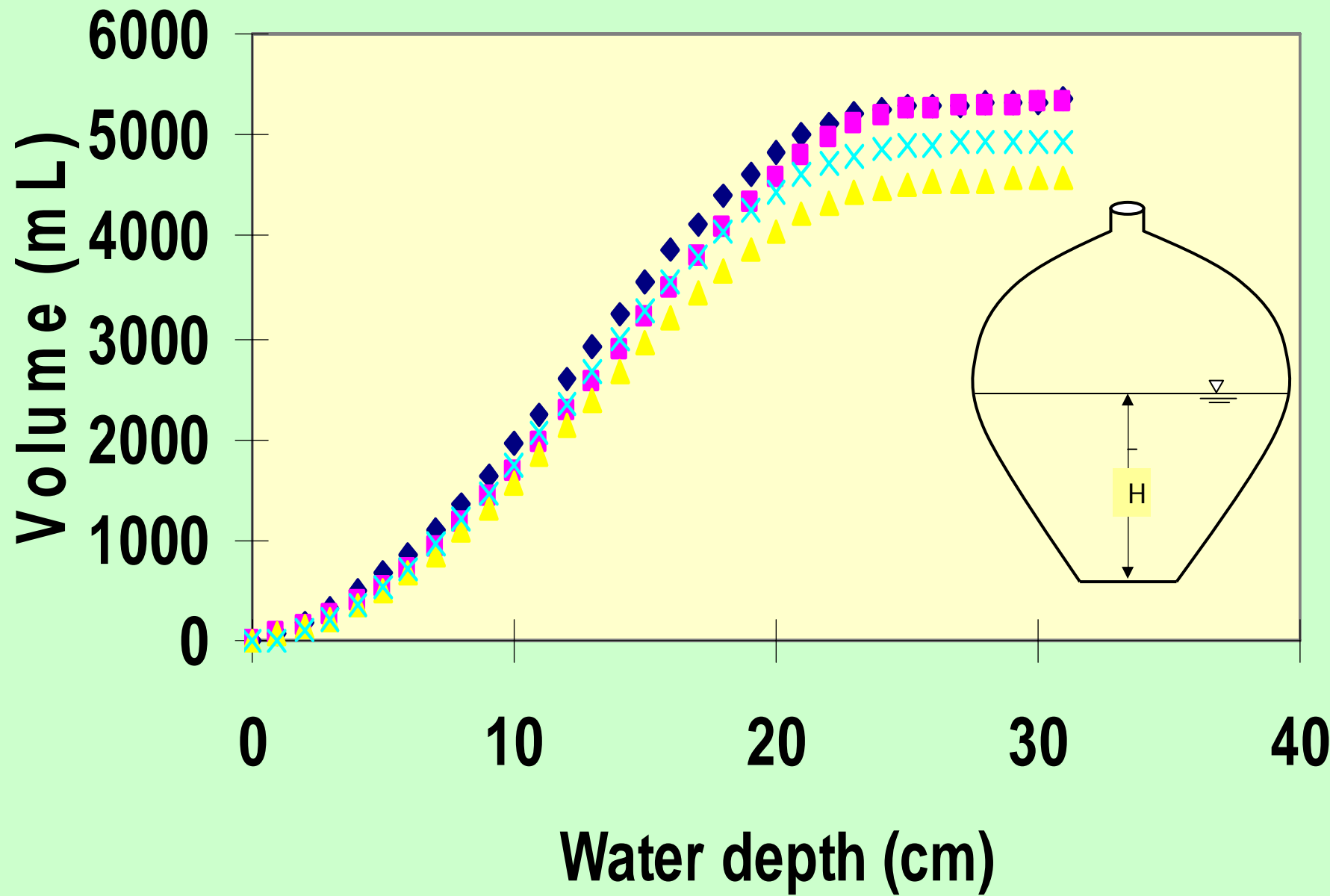
3rd Experiment

- to quantify the auto-regulative capability of pitchers.

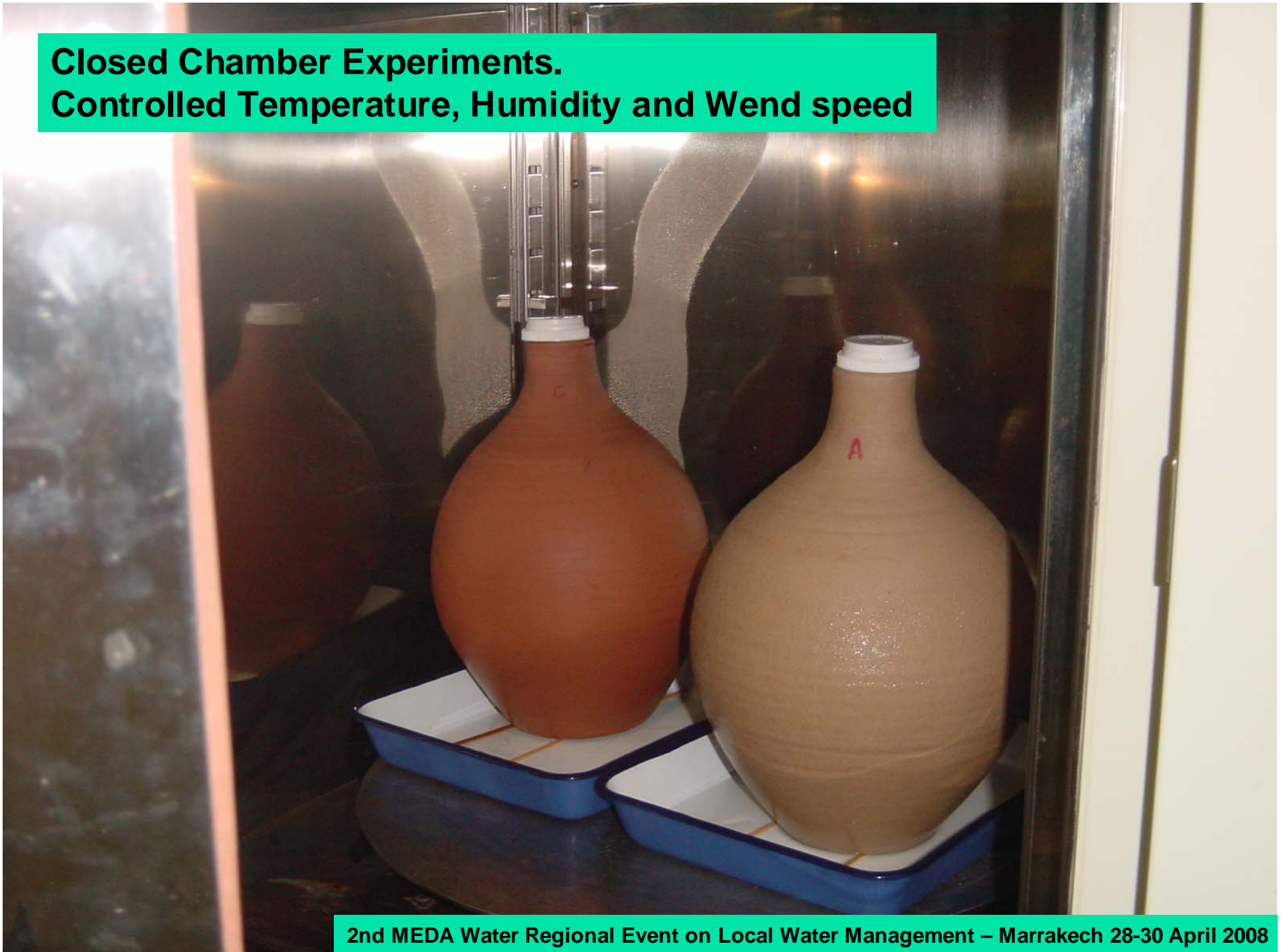
Can pitcher's seepage rate responds to crop water requirements?



2nd MEDA Water Regional Event on Local Water Management – Marrakech 28-30 April 2008



**Closed Chamber Experiments.
Controlled Temperature, Humidity and Wind speed**

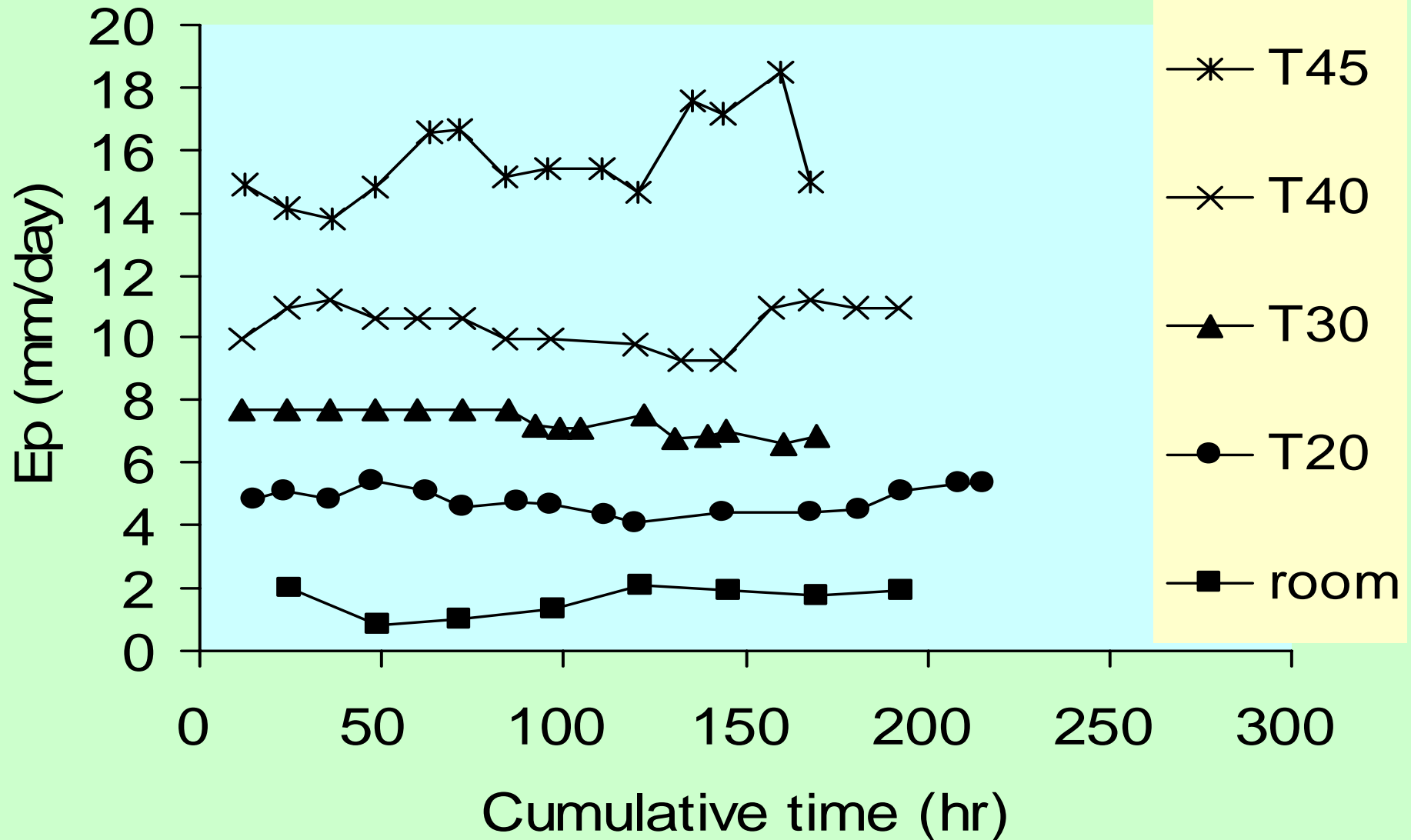


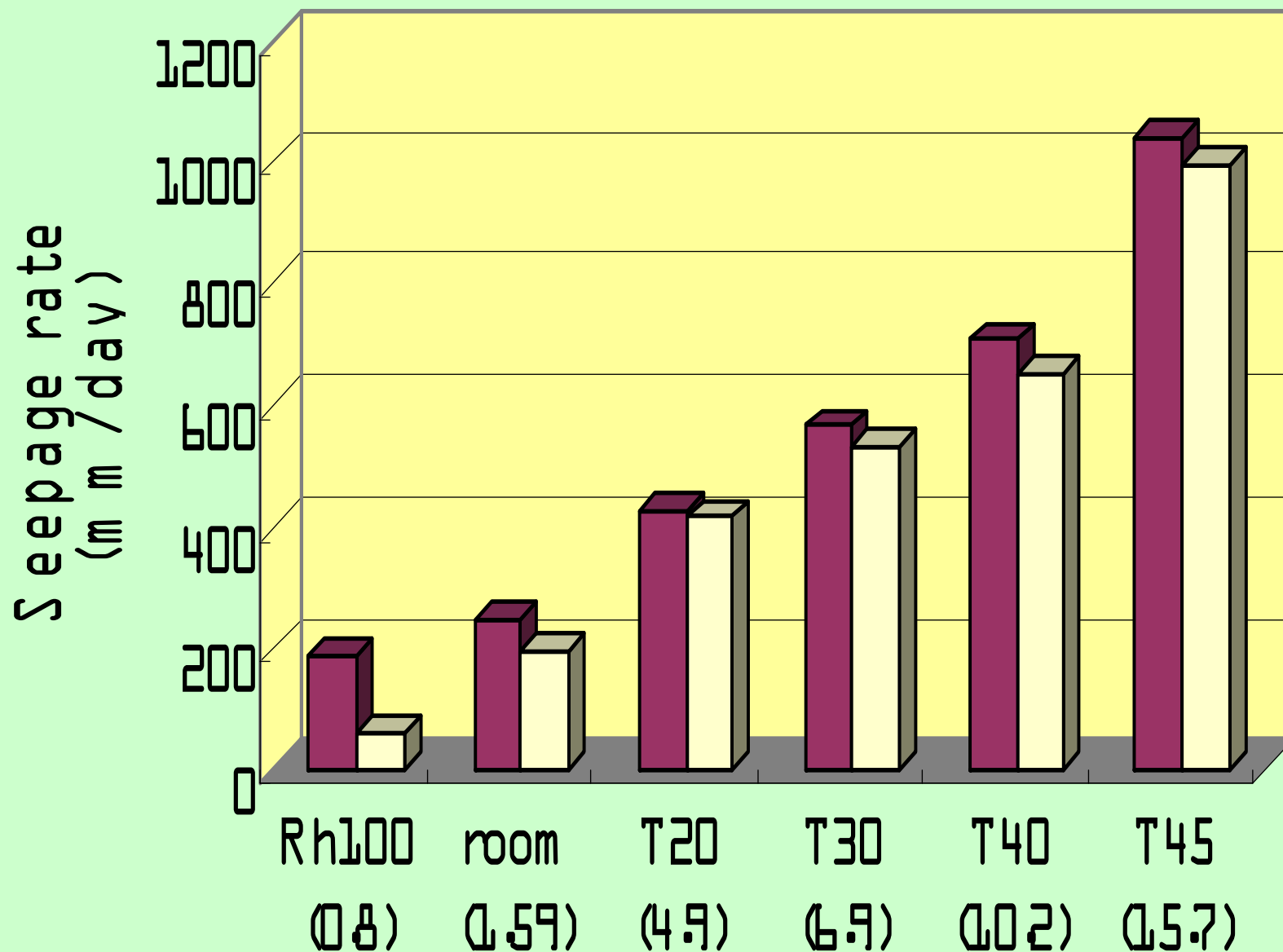


Experimental conditions

- Room temperature
- Closed chamber-5 settings
 - $T = 20$, Wind speed = 1.5 m/s, RH = 60%.
 - $T = 30$,
 - $T = 40$,
 - $T = 45$, RH = 30%
 - $T = 20$, RH = 100%

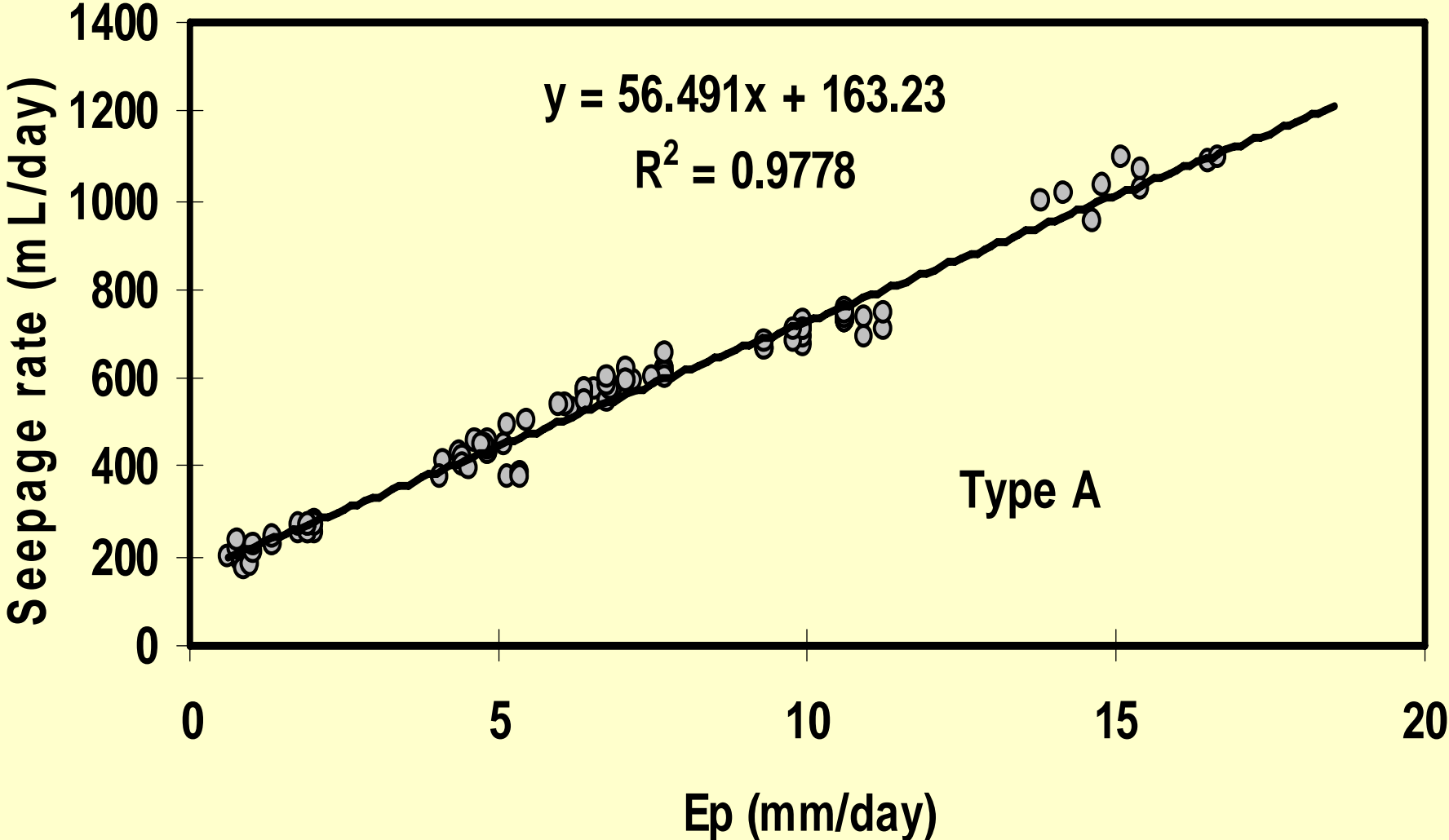
Ep (mm/day)





Environmental Conditions (Ep - m m / day)

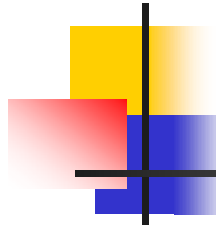
Seepage Vs. Evaporation





Conclusions

- Pitcher irrigation has high auto-regulative capabilities
- High water saving potential
 - Low evaporation
 - No deep percolation
- Suitable for small scale and green house agricultural systems
- Low cost



THANK

YOU!

