Field instrumentation

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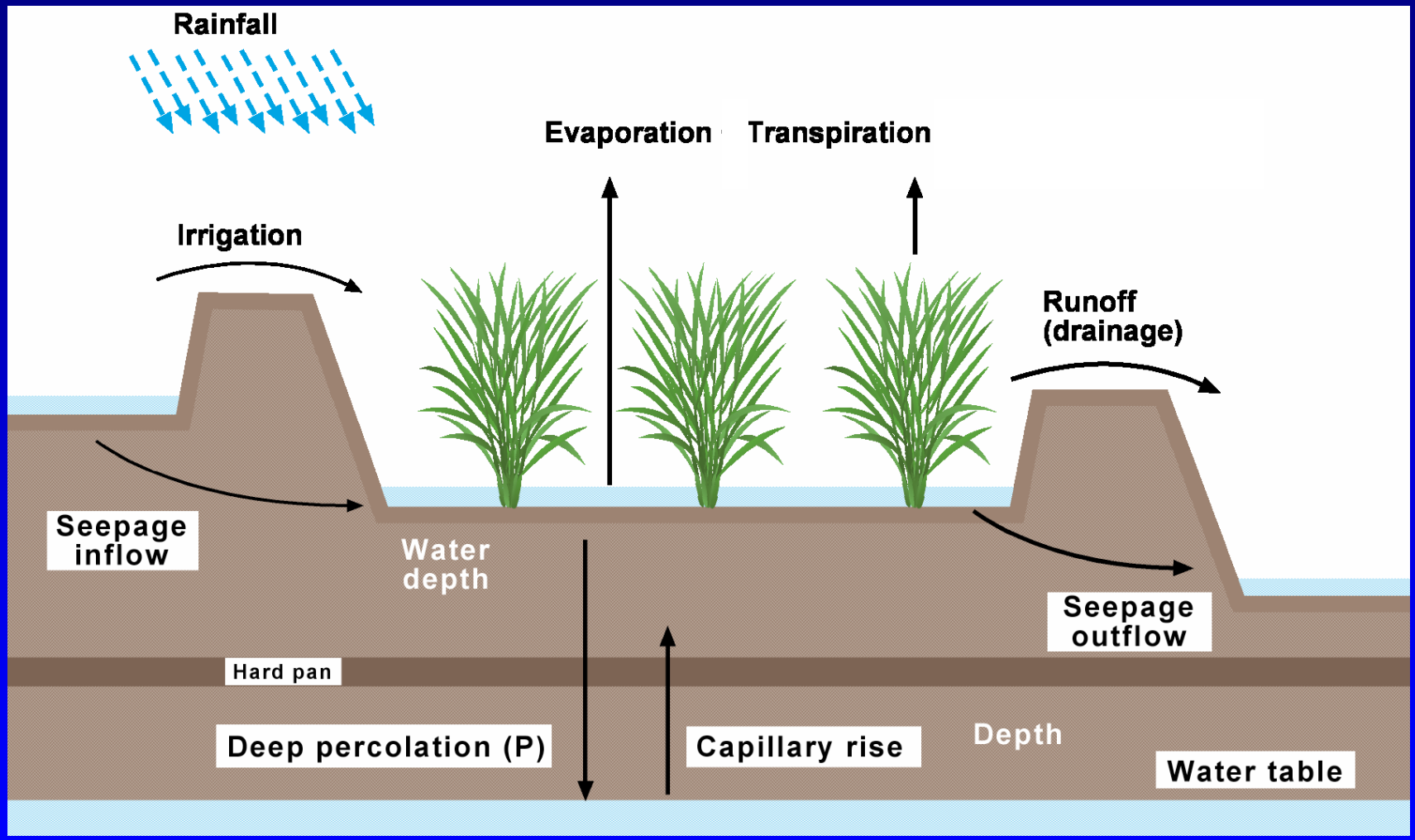
Field water balance lowland rice



Two types of instruments

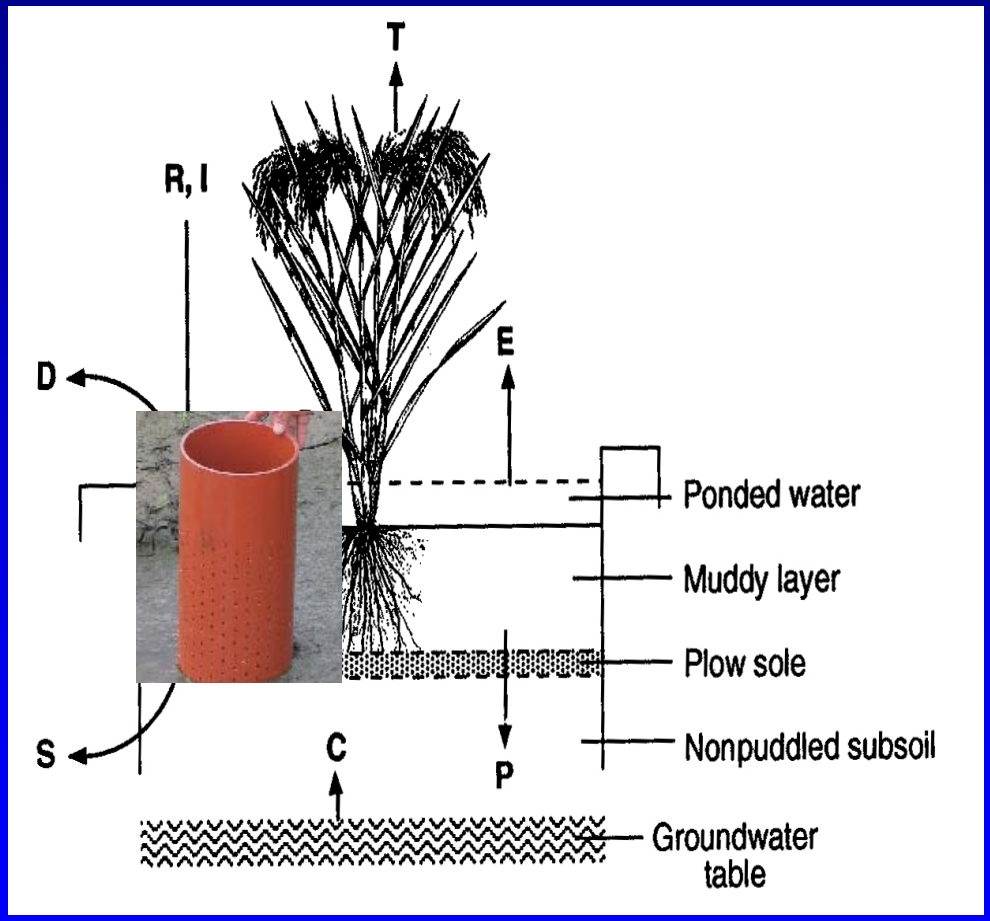
Instruments to measure water inflows and outflows

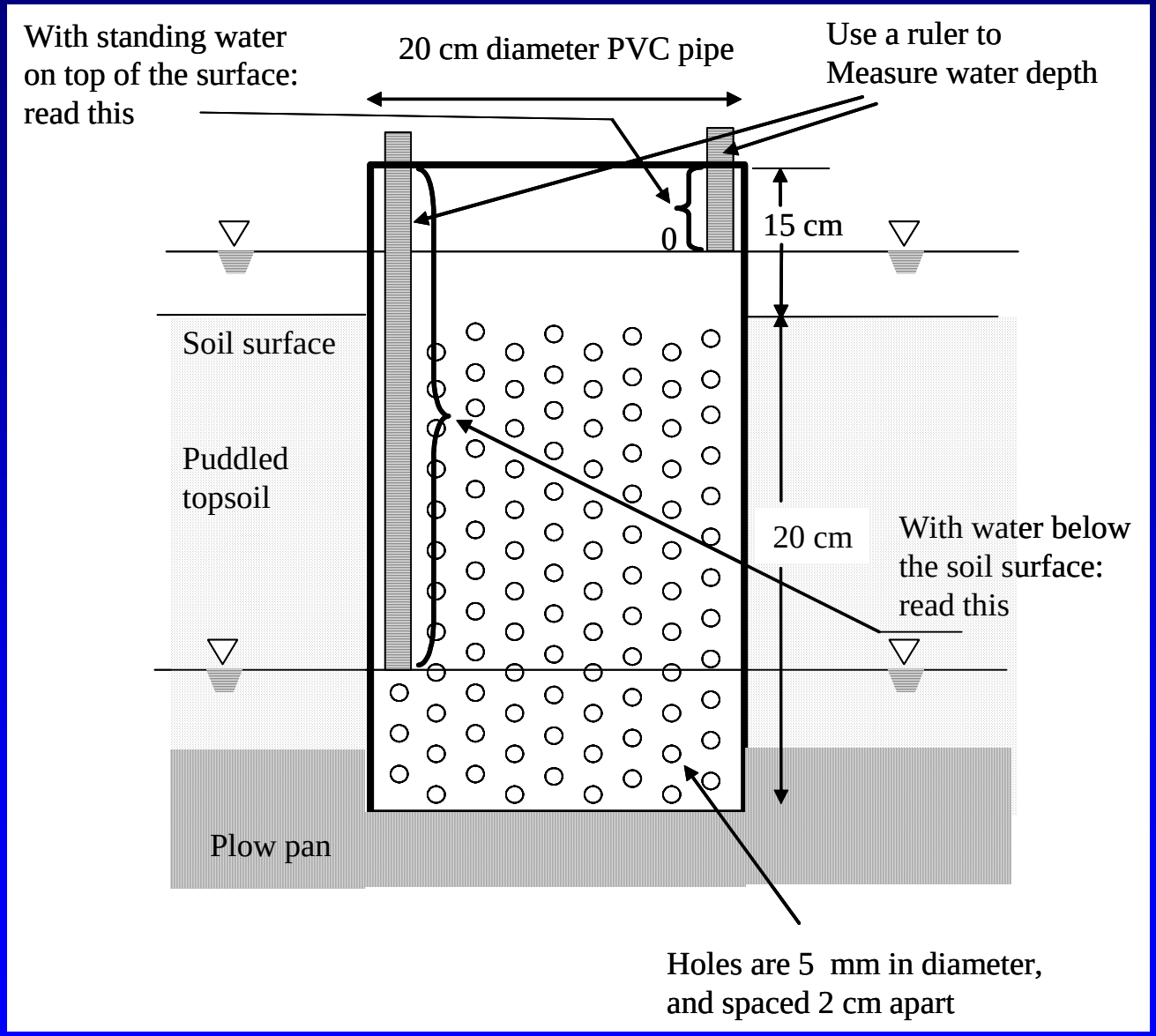
Instruments to characterize field water status and groundwater (“hidden water source”)

Two simple tools to characterize water environment and aid in field water management

- Field water tube
- Groundwater tube

Field water tube




With standing water
on top of the surface:
read this
20 cm diameter PVC pipe
Use a ruler to
Measure water depth
0
15 cm
Soil surface
Puddled
topsoil
20 cm
With water below
the soil surface:
read this
Plow pan
Holes are 5 mm in diameter,
and spaced 2 cm apart

Field water tube - installation

Push tube by hand vertically

Drive cylinder using mallet

Check clearance from soil surface

Appearance of installed PW tube

Remove soil inside the tube

Check and level the Top of the tube

Field water tube – measurement

Water depth = H – D

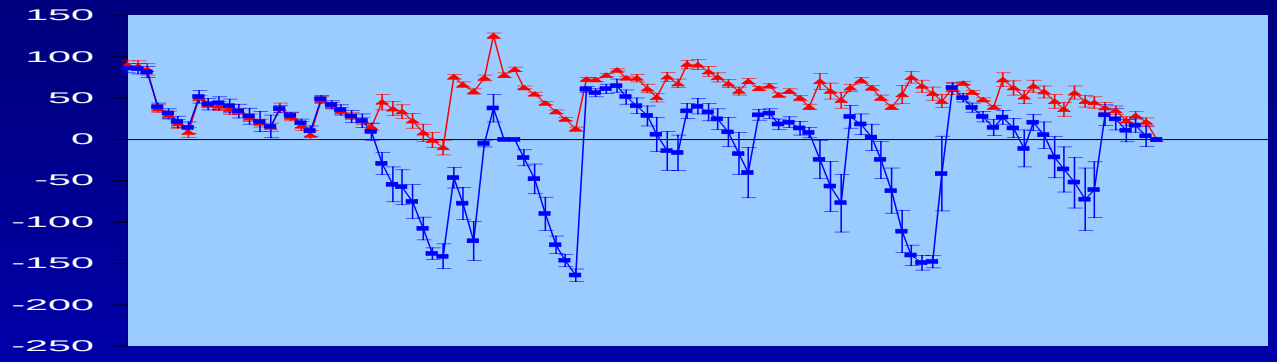
D = depth of field water table

H = height from soil surface to the top of the tube

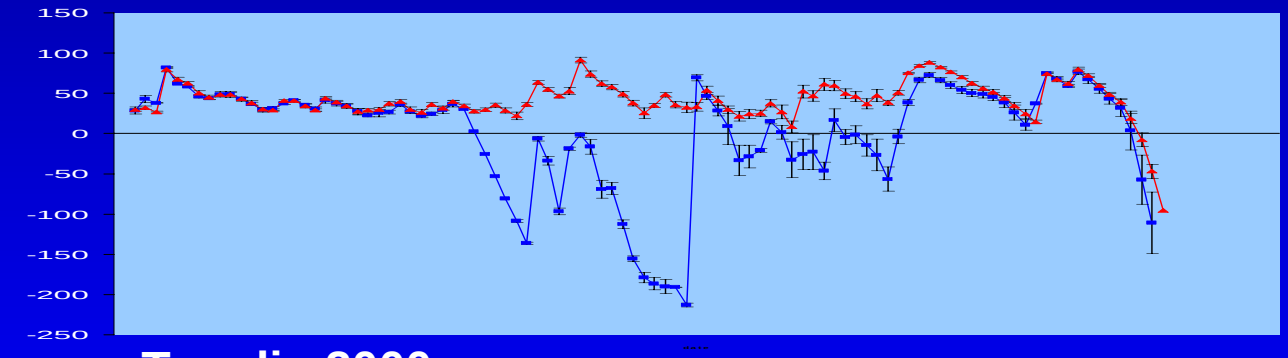
A practical indicator for water in field


ADC

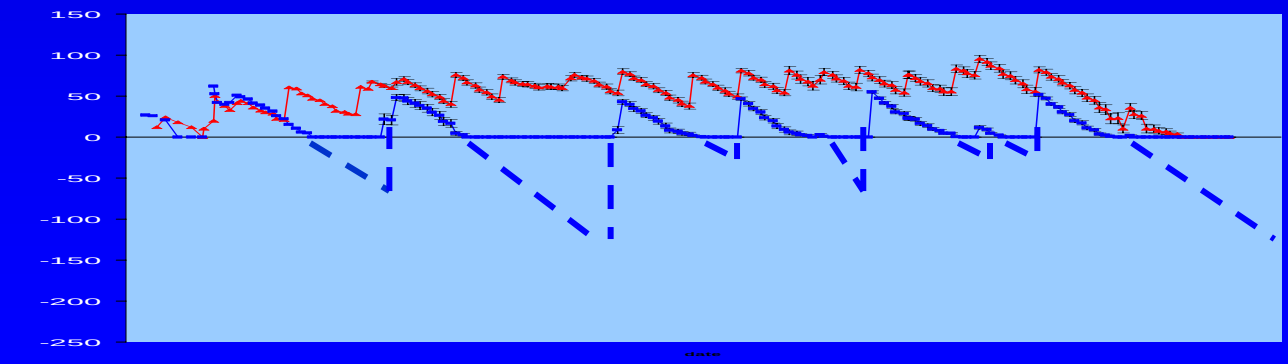
Field water depths



Tuanlin 1999



Tuanlin 2000



PhilRice 2001

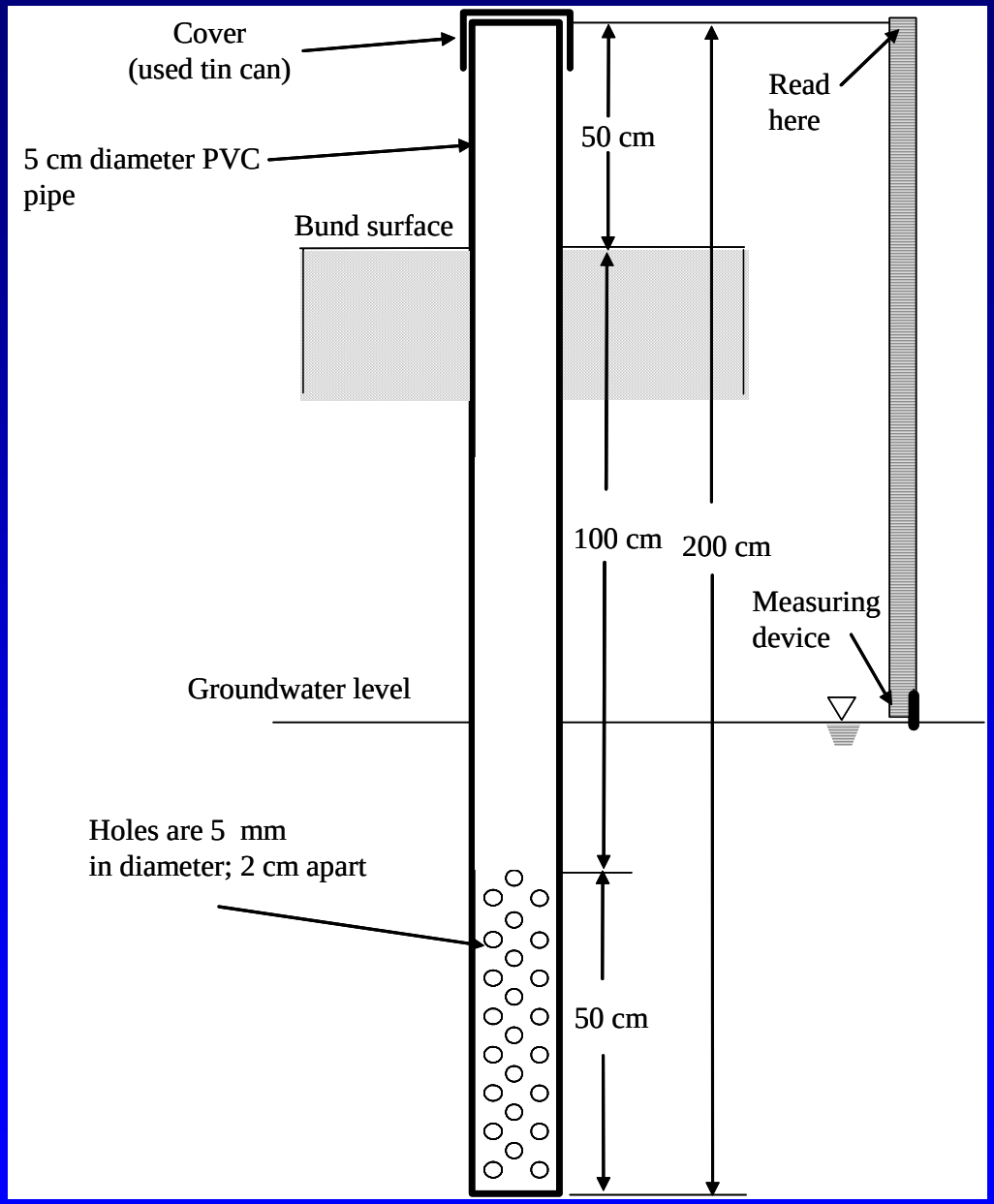
Water depth [mm]

Continuously flooded

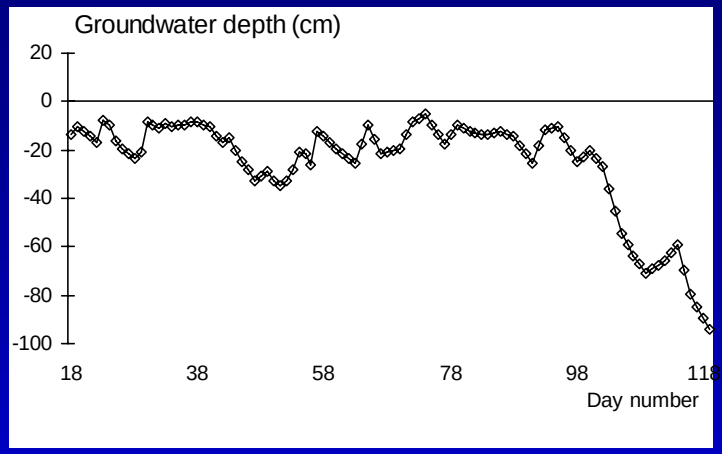
Controlled Irrigation

Groundwater tube

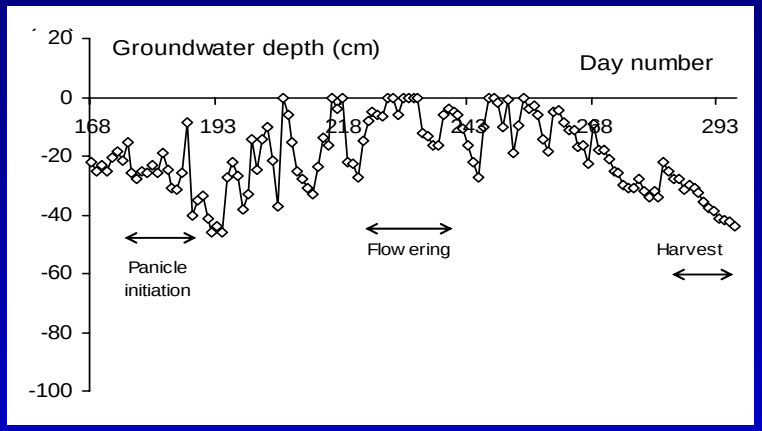
- Made of 5-cm diameter PVC pipe, 175-200 cm long, with perforations (0.5 cm diameter) in the bottom 50 cm.
- Installed into a bund using an auger (soil dril) of the same diameter to the required depth
- Should stick out about 50 cm above bund surface
- Use stick to measure water depth


Cover
(used tin can)
5 cm diameter PVC
pipe
Bund surface
50 cm
Read
here
100 cm
200 cm
Measuring
device
Groundwater level
Holes are 5 mm
in diameter; 2 cm apart
50 cm

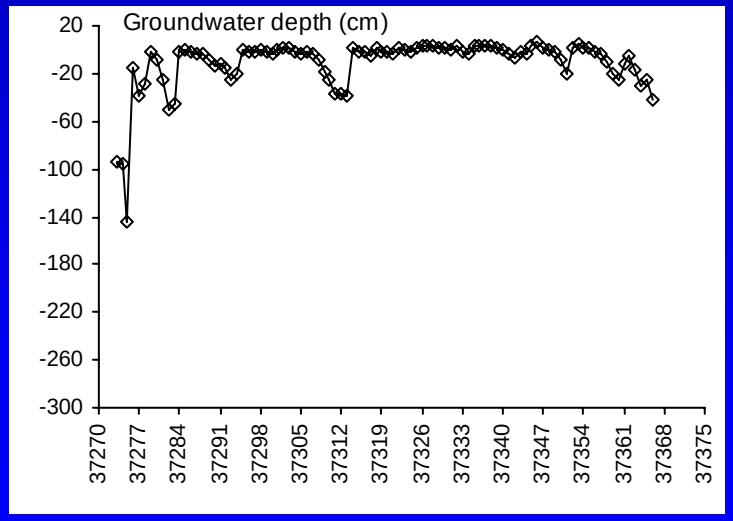
Groundwater measurements



Tuanlin, China, 2002



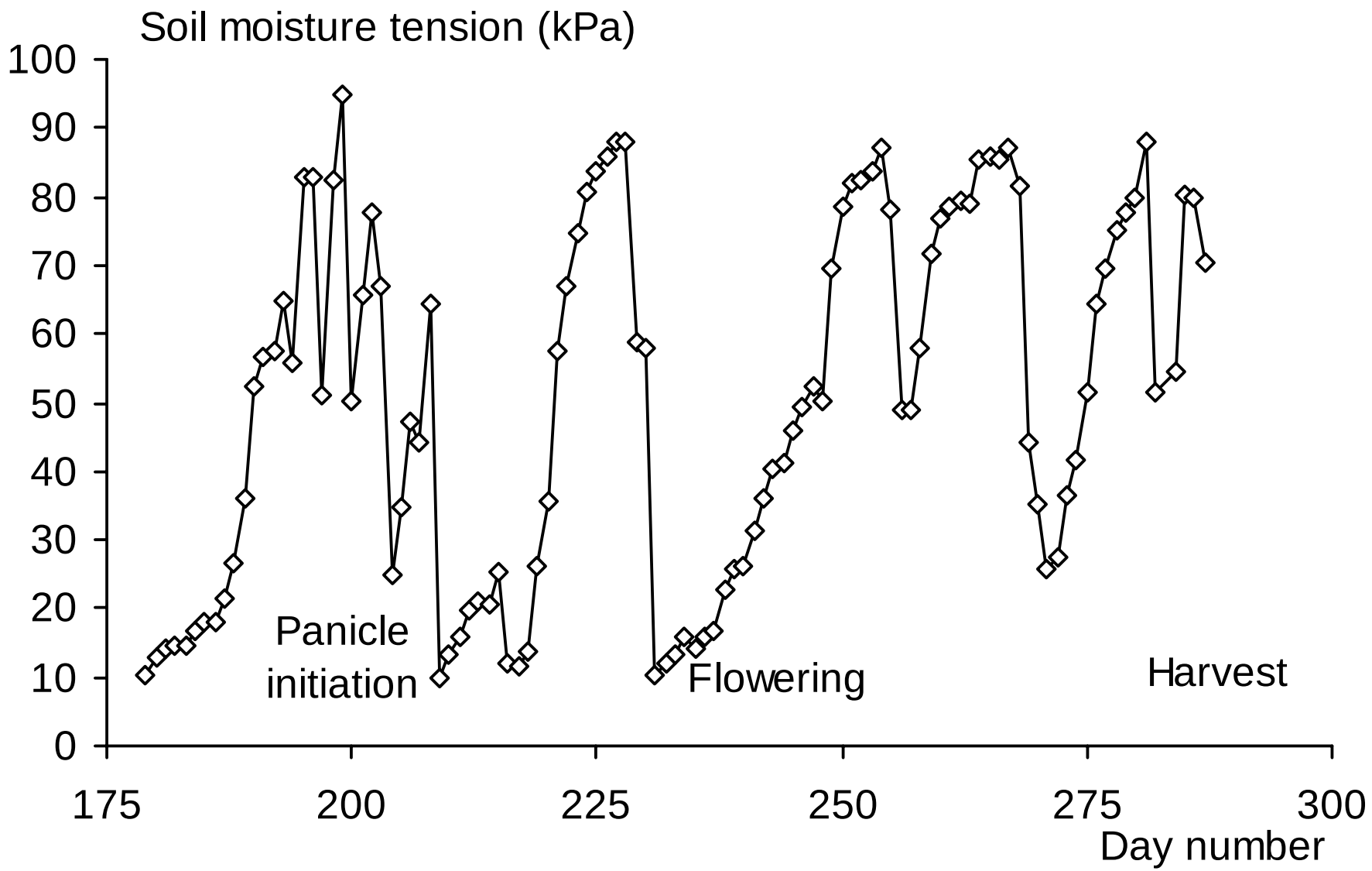
Changle, China, 2002



Dolores, Philipines, 2002

Soil water tension meter

Soil water tension in an aerobic soil



Instruments to measure water flows

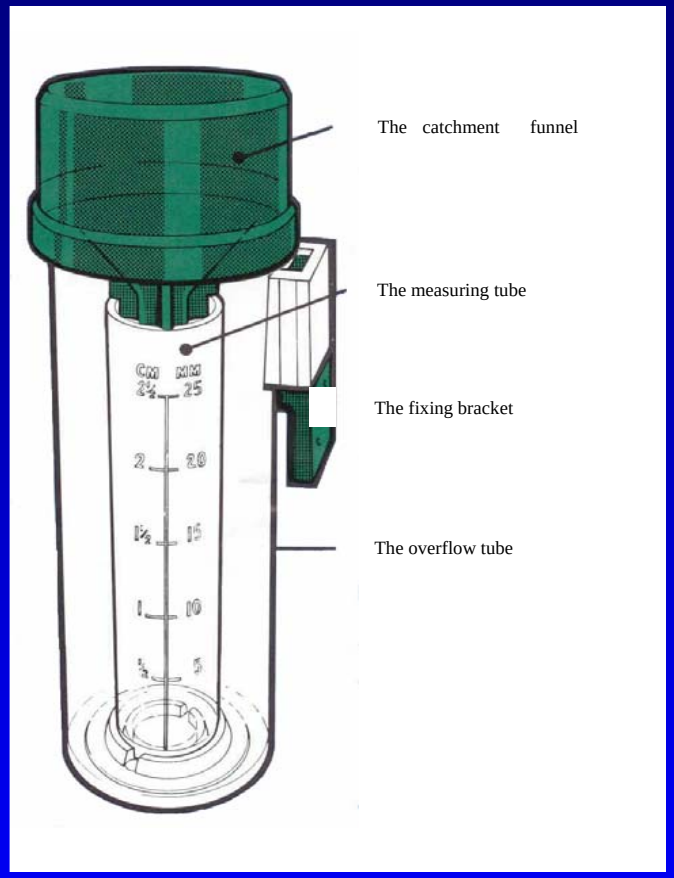
Rain + irrigation = evaporation + transpiration
+ percolation + seepage
+ overbund flow + d(storage)

Specialized equipment:

- Inflows: rain gauge, flow meters
- Outflows: evaporation pan, percolation ring, seepage (?), surface water in channels

Weather station to calculate evaporation and transpiration

Rainfall rain gauge



- Raingauge
- collector area
  150 to 200 cm^2
- 30 cm to 1 m above the ground

Irrigation
Flow meter in pressure pipes

Irrigation
Box weir for surface water

Irrigation/drainage Simple weir for surface water

Irrigation/drainage Flume for surface water

Evaporation pan

- Keep away from other instruments (2x ht)
- Level the pan
- Install the stilling well and the fixed point
- Add water until the water reaches the tip of the fixed point and can be seen as a small dot

Evaporation rings
Soil evaporation

Percolation ring

- 20 cm in diameter cylinder - open on both ends
- Covered – to avoid evaporation and rainfall

Percolation meter - installation

Push cylinder by hand vertically

Drive cylinder using mallet

Check clearance from soil surface

Check and level percolation tube

Percolation meter - measurement

Put a mark on the wall of the cylinder.

Always measure at this point

Set water levels inside = outside.

Reset water level if not. Take readings after reset

Take readings d_i and d_f from water surface to the top of tube. Compute

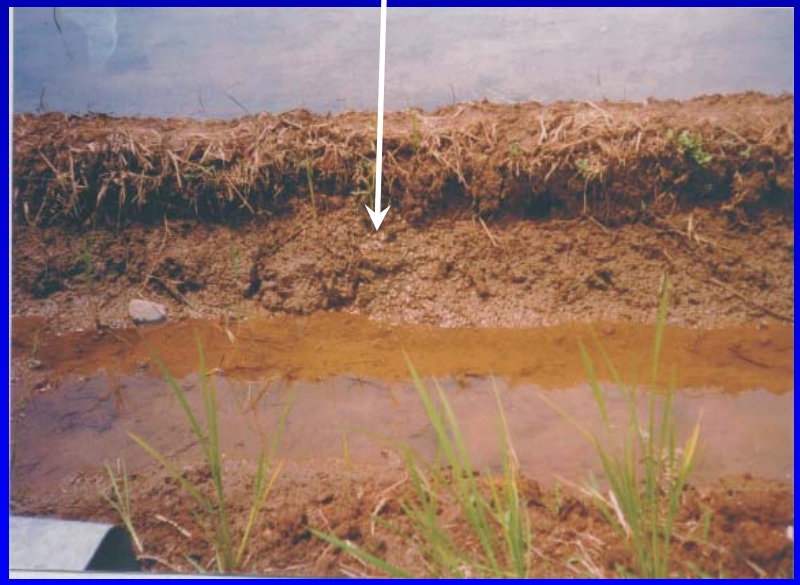
$P = d_i - d_f$

After each reading, cover the cylinder to prevent other losses (rain, evaporation)

Large percolation ring in field

Rain + irrigation = evaporation + transpiration + percolation + seepage + overbund flow + d(storage)

As surface flow in drain



As “rest term” of balance

Weather station (o.a., calculate ET)