



Why should you use Central Control System

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The Intelligent Use of Water.™

Why Central Control System ?

Because COMPUTER allows

Collecting various sensor data

(flow, wind, temperature, rainfall...)

Scheduling **complex irrigation programs**
following official calculation methods

Managing **Intelligent & Automatic reactions**

From a **remote central** location

Or from **mobile devices**

Review of market concerns

- Irrigation run time is too long
- Irrigation is running when prohibited or under rain
- Water savings
 - Broken pipes/rotors cost too much
 - To not irrigate when raining
 - To use only necessary water
- Time savings
 - Programming is time consuming (labor)
 - Alarms limit on-site visits

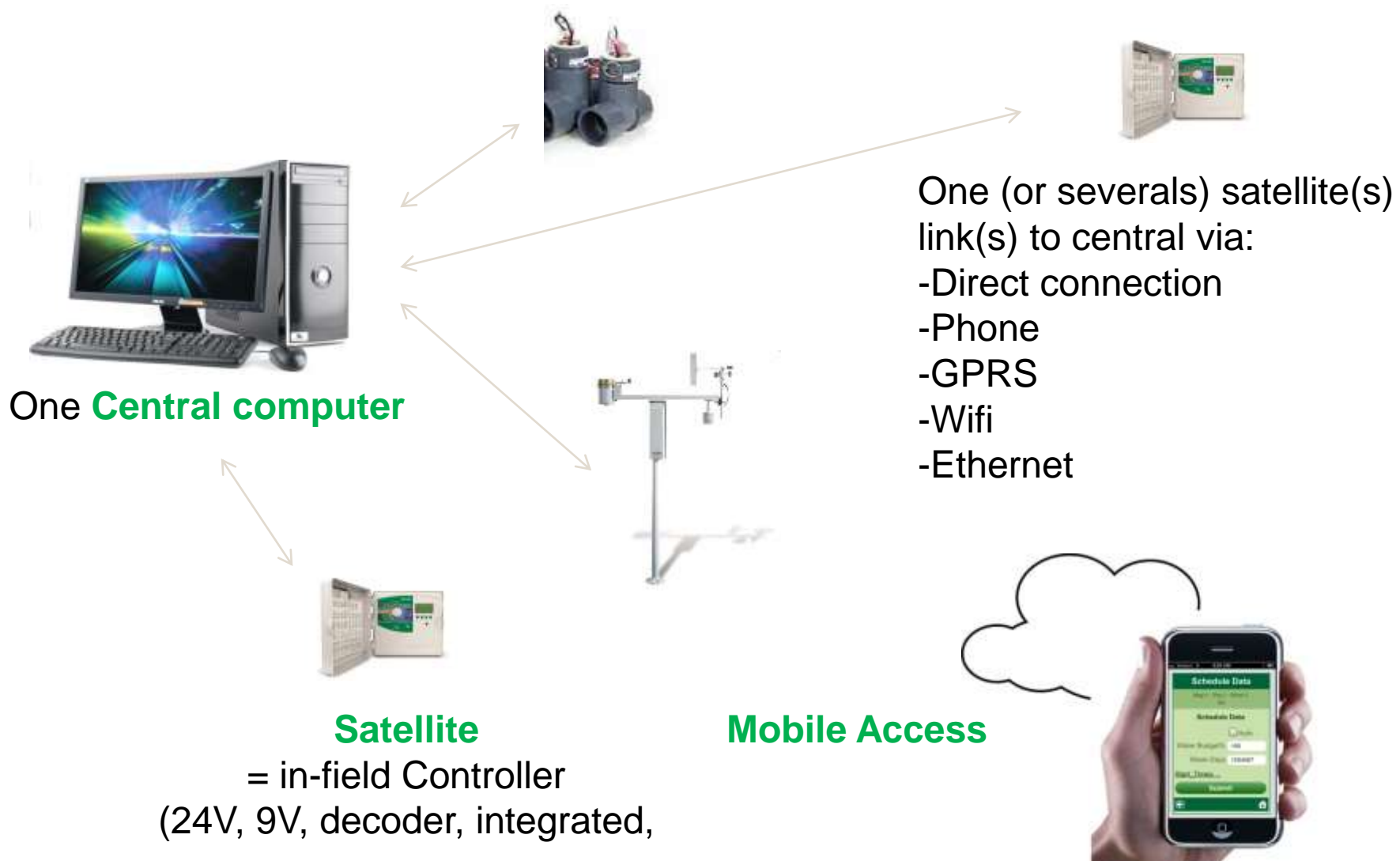


Review of market concerns

- Some more Savings (again)
 - To limit use of chemicals (fertilizer, phyto,...)
 - To limit wear on pumps
 - To reduce power consumption on pumps
 -
- **Do more with less!**
 - Healthier Turf



Central control System Overview



How it works - Agenda

- **All about Flow Management**
 - Dry run
 - Water Windows Management
 - Benefits of Flow Sensing
 - Real Time communication and intelligent reaction
- **M.A.D Method – All about ET Management**
 - Weather input
 - Soil factor
- **Mobile access**

Flow Management

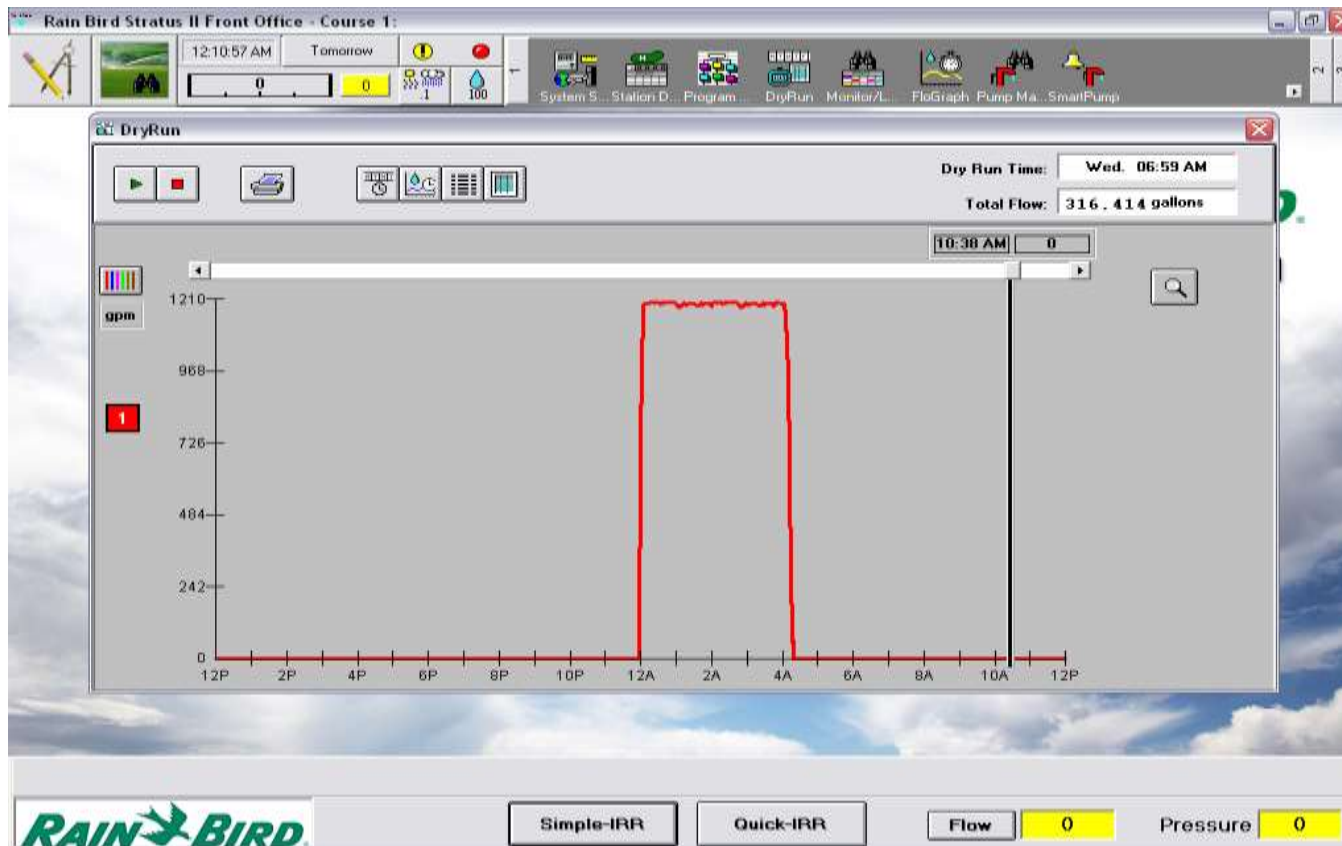
Dry Run

- When you have 10 valves, it is not difficult to schedule irrigation
- When you have 200 valves, it becomes difficult to plan when the #36 will work exactly
- When you have 1000 valves or manage a full city, and only have 7 hours to irrigate... it's **challenging** without dry run!

Flow Management

Dry Run

- Dry run makes a projection of your **theoretical flow** → 1st step of flow management



Flow Management Flow Sensor Installation

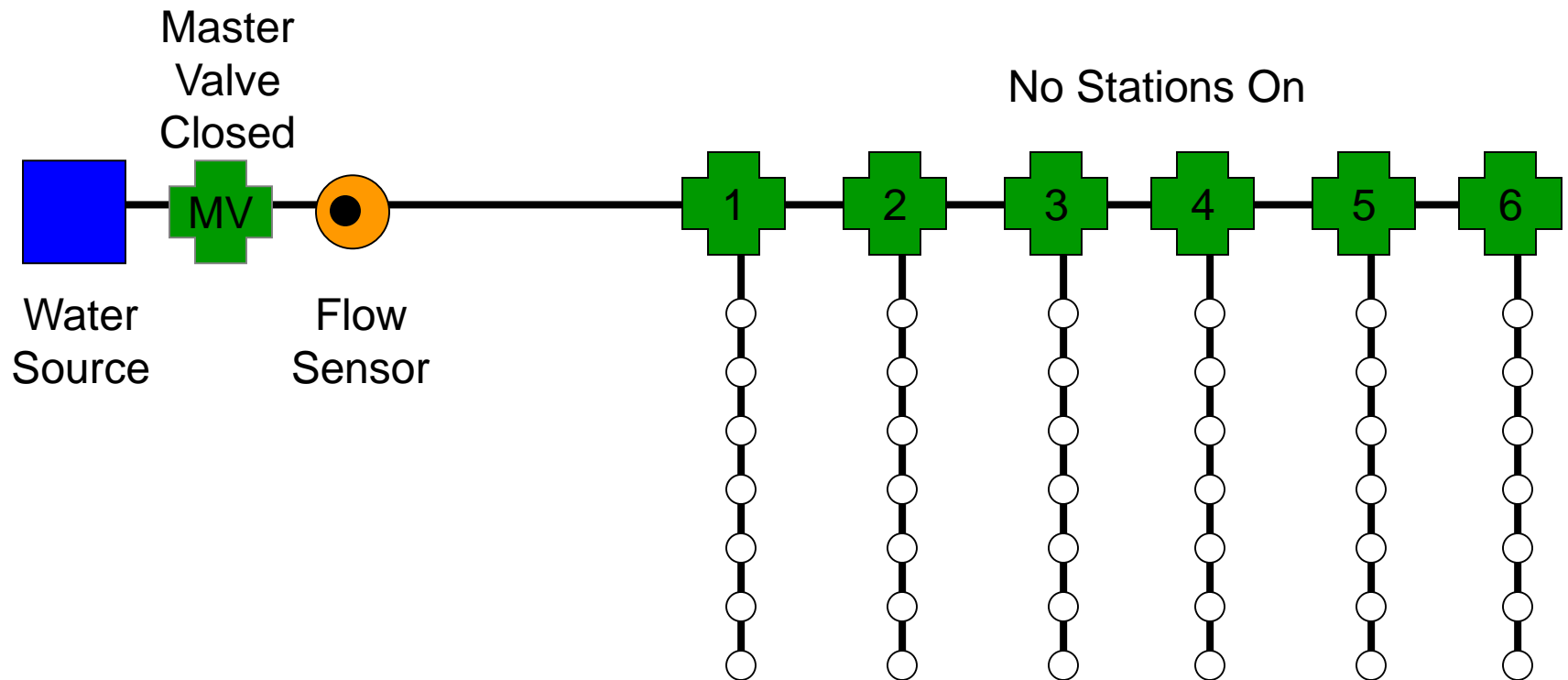
- For efficient Flow Management irrigation system **needs** Flow meter(s) and MV(s)



Flow Management MV Installation

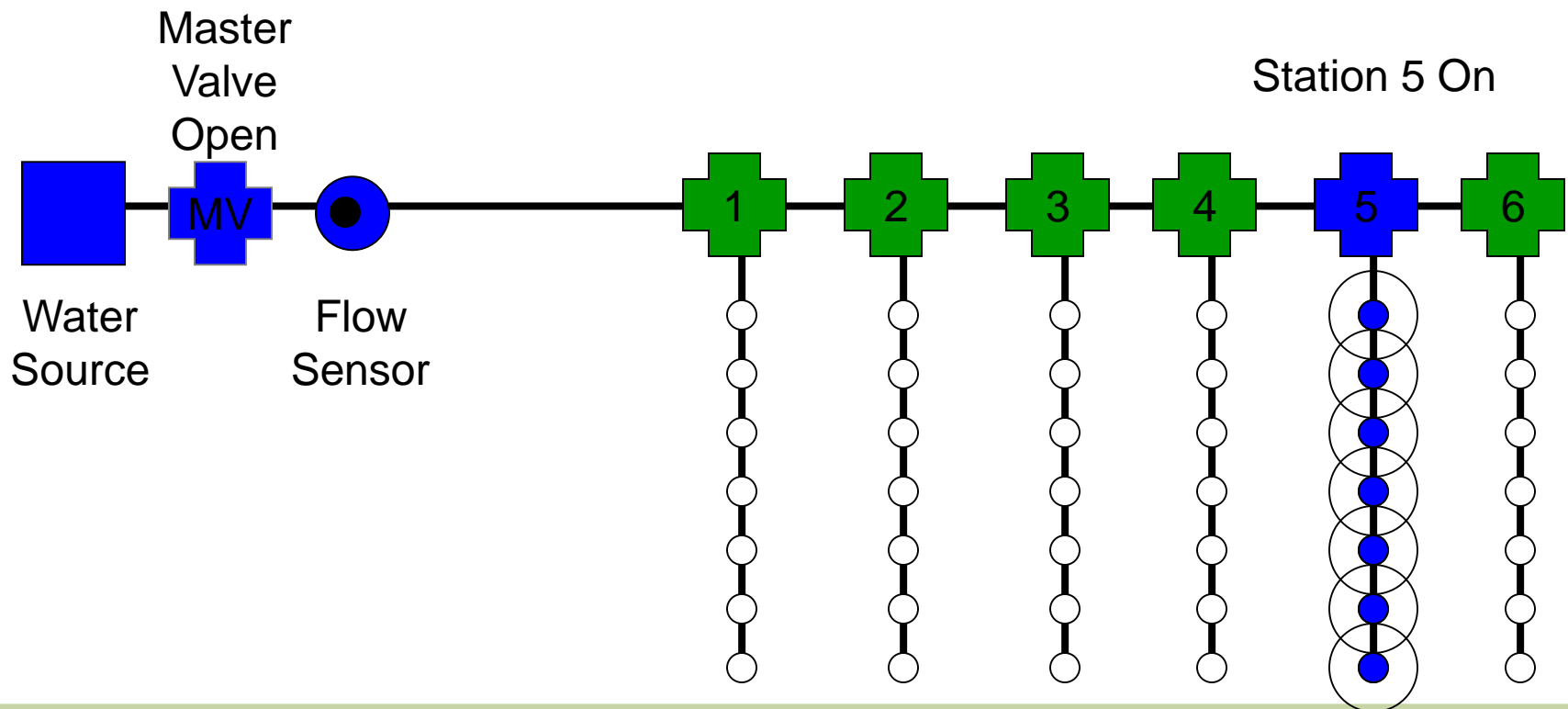
MV secures the system

No operation - Expected Flow Rate = 0 m³/h



Flow Management MV Installation

Normal single operation
MV is opening as soon as one station is opened



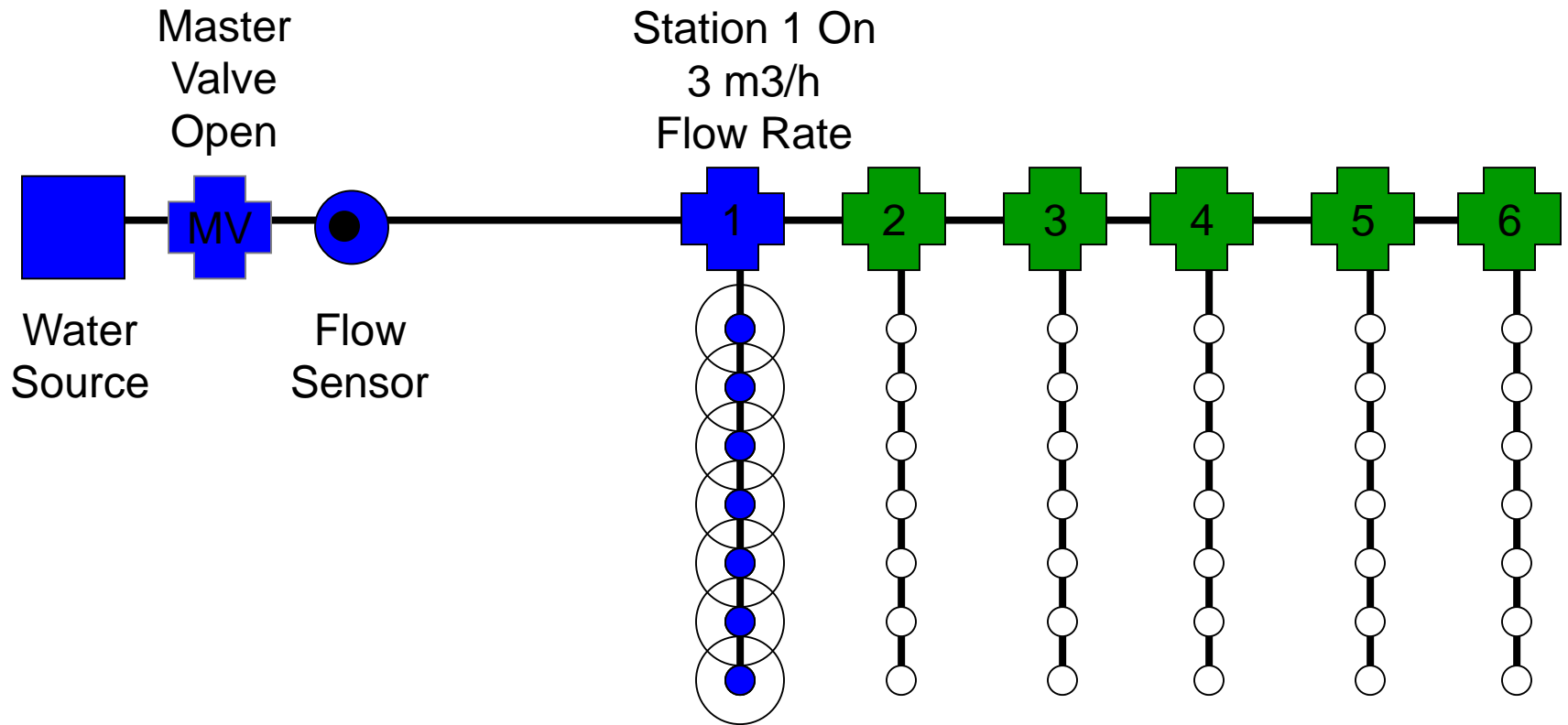
Flow Management

Learn Flow

- **To get accurate Dry run, system needs to be feed with irrigation emitters data:**
 - Theoretical flows can be calculated (using manufacturer catalogs data)
 - Or they can be learn by operating the system « perfect conditions » (better)
- **The system operates irrigation station by station and the « learn » flow is recorded as « theoretical flow »**
- **Learn flow will be available later for comparison with actual real flow during operation.**

Flow Management

Learn Flow Operation



Flow Management

Dynamic Flow sensing

- **System collects flow sensor data in real time.**
- **System knows real actual flow of each valve**
- **This allows Flow Management:**
 - If water source capacity allows opening several valves simultaneously, it will do.
 - System will automatically open as many valve as possible in order to shorten irrigation time
 - Flow management allows reducing Water Window



Flow Management

If water source is a Pump Station

- **Dynamic Flow sensing allows operating the pump station at the maximum capacity on a shorter time.**
- **The software links the pump stations to central control in order to optimize flow management**
- **The irrigation system can be run at the peak efficiency point of the pump station**
 - Reduces electrical costs
 - Reduces the water-window
 - Maximizes efficiency
 - Reduce wear on the PS



Flow Management

Watering Water Window

- **Programs only run during set times.**
- **With dynamic flow management, computer manages to run simultaneous stations in order to fit into the windows**
- **The system is totally **secured**: at the end of the water window the system is completely OFF.**



Flow Management

Flow Watch

- **Dynamic flow management allows real time **comparison** between theoretical flow (given by dry run) and actual flow (check on-field by flow sensors)**
 - If theoretical flow $>$ actual flow: probably an issue with the water source
 - If theoretical flow $<$ actual flow: can be a broken rotor or a broken pipe
 - If several valves are operating, system will pause irrigation and run valves one by one to find the defective station
 - If theoretical flow $=0$ then, system will close the MV



Flow Management

Flow Watch

- The system is able to **determine** over/low flow Conditions
- With MV, the system is able to **isolate** the valve and react accordingly
- With MV, the system is able to **eliminate** leakage
- **No more damages on landscape!**



Flow Management

Automatic & Intelligent reactions

- User set up thresholds for each data
- Whatever the discrepancy found by the computer, user receives **ALARMS**
 - E-mail, SMS
- Whatever the sensor type, user can define **specific automatic reaction** applying on irrigation schedule(s)
 - OFF, Pause, Prevent...

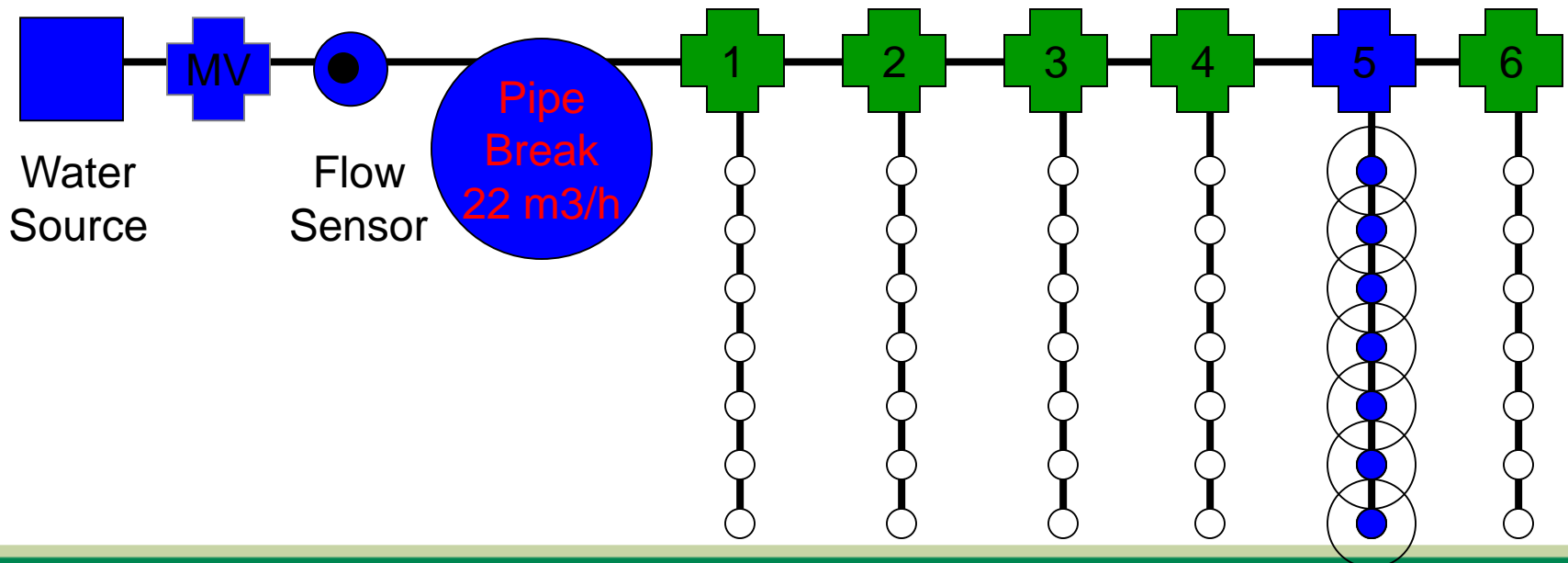
Flow Management

Flow Watch – Exceed flow alarm

Action:

- Pause Station 5, close MV, wait for Settling Time.
- Turn on MV only:
 - If flow detected after Settling Time turn off MV, quarantine all stations on this FloZone, and post Mainline Break Alarm.

Station 5 On
5 m³/h Learned
Flow Rate



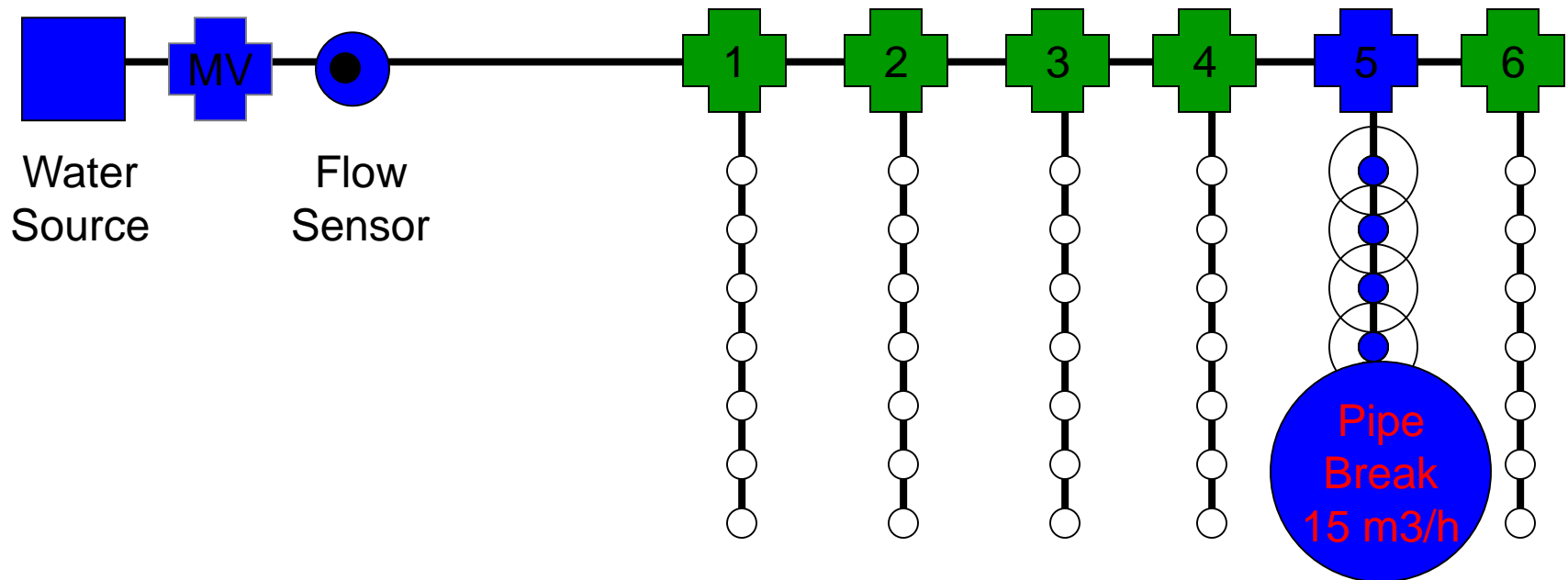
Flow Management

Flow Watch – Exceed flow alarm

Action:

- Pause Station 5, close MV, wait for Settling Time.
- Turn on MV only:
 - If zero flow detected resume Station 5 with open MV.
 - If flow is still above Threshold after Settling Time quarantine Station 5 and post Lateral Line Break Alarm.

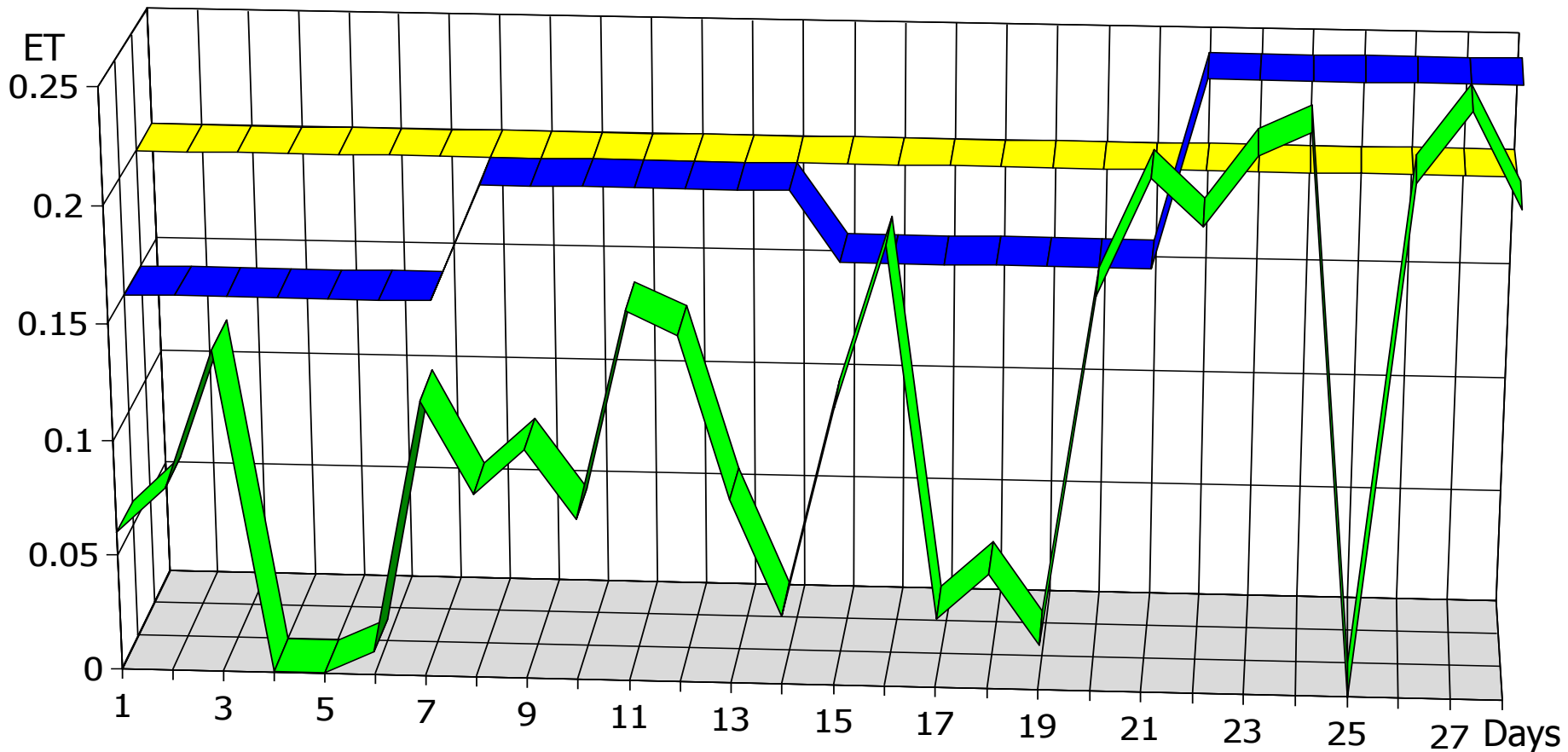
Station 5 On
5 m³/h Learned
Flow Rate +15m³/h
Pipe Break Flow



ET Management

Typical Irrigation System - Adjustment Frequencies

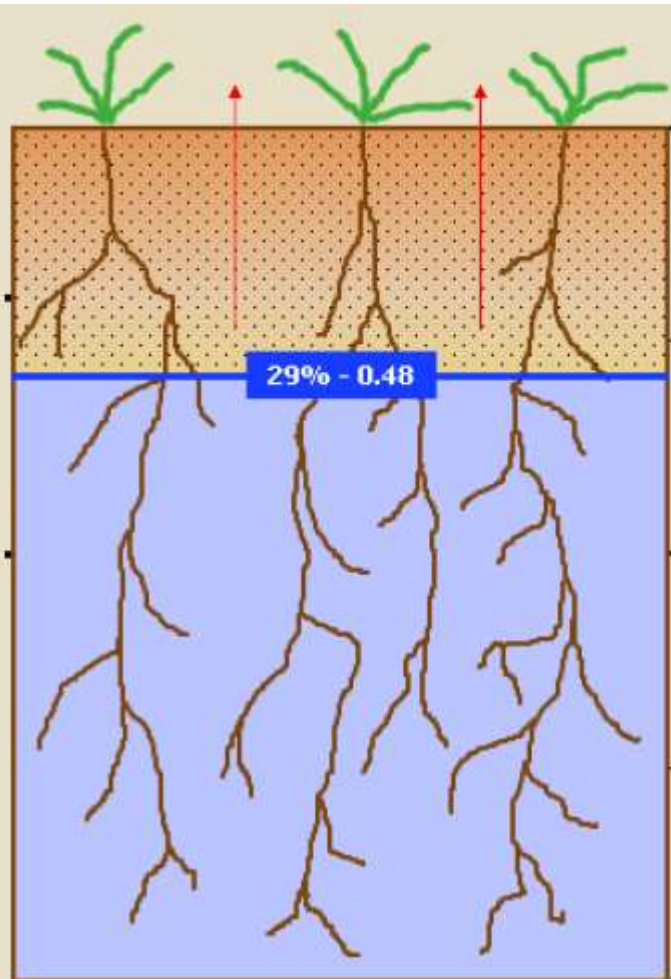
- Inches of Irrigation used with Daily ET Adjustments
- Inches of Irrigation Used with Weekly Adjustments
- Inches of Irrigation Used with Monthly Adjustments



ET Management

Factors that decrease soil moisture

Evapo-transpiration (ET)
The sum of the water lost from the soil surface (evaporation) and the water used by the plants (transpiration)



Influence by:

- Soil condition:
 - Elevation
 - Latitude
 - Composition
- Landscape coefficient
 - Species factor
 - Density
 - Maturity
- Weather conditions
 - Solar radiation
 - Relative humidity
 - Wind run
 - Temperature
 - Rain

ET Mangement

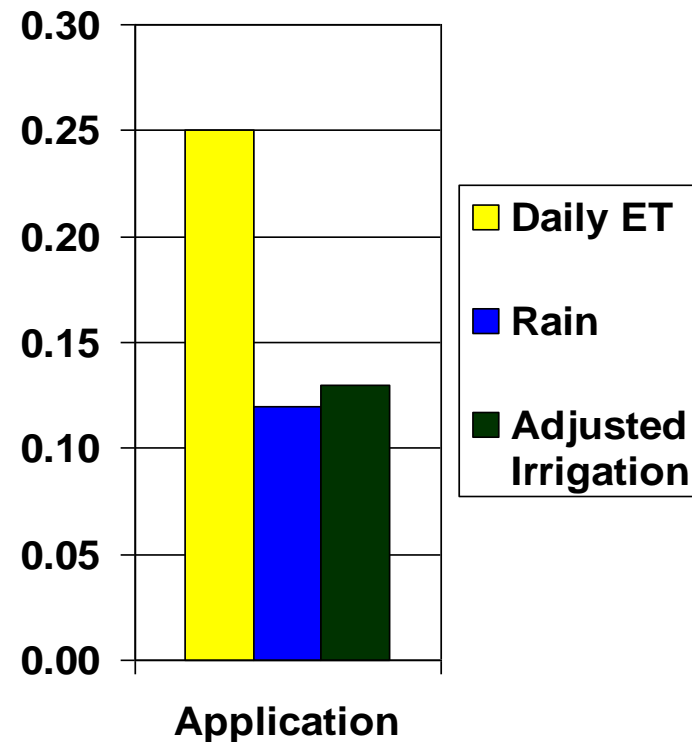
- **The weather station collects weather data all day long and can also generates alarms:**
 - Temperature (high and low)
 - Relative humidity
 - Wind run
 - Solar radiation
 - Rainfall
- **The system uses this data to :**
 - Calculate ET Requirements
 - Adjust irrigation run times



ET Management

Use rain as an extension of your system

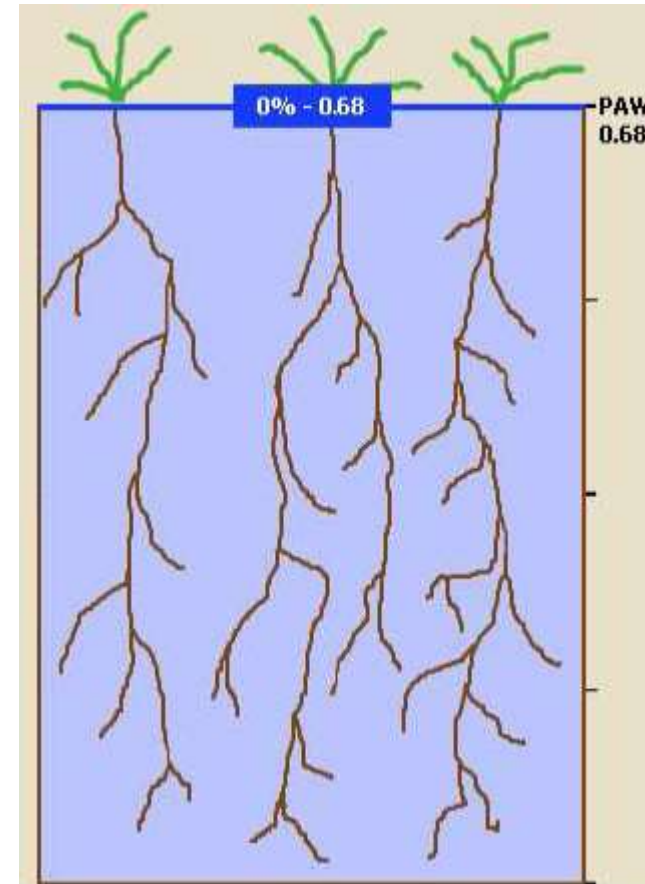
- **Systems operates with Etp**
- **The central will pause all irrigation during a rain event**
- **The system will measure the collected rainfall**
 - If the collected amount is more than the remaining programmed irrigation, all programs will be stopped.
 - If less than the remaining irrigation event is collected, the irrigation system applies the difference



ET Management

Ask for the method !

- Rain Bird Systems use M.A.D. method (preferred by I.A.) – Use:
 - Weather data and Rain fall
 - Soil characteristics
- Management Allowed Depletion (MAD) is the **maximum amount of Plant Available Water allowed to be removed from the soil before irrigation refill occurs.**



Plant Available Water

ET Management

Irrigation Quantity & Frequency

Frequent light watering

Less Frequent Deep watering

Weaker Plants

Healthier Plants

More water lost to evaporation

Less water lost to evaporation

Less Oxygen in the soil

Water/Oxygen Mixture in soil

Shallow roots

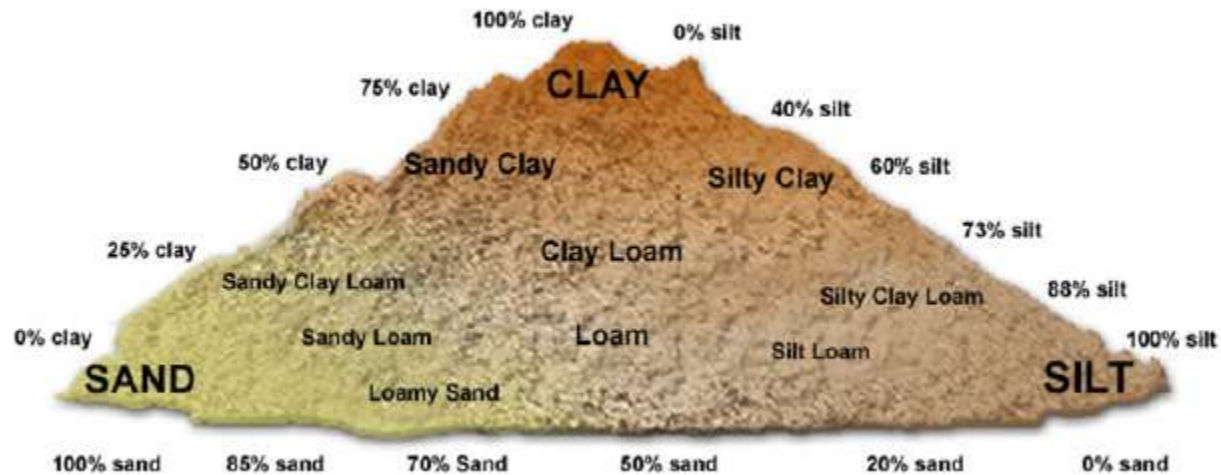
Deeper roots

Water waste

Water savings

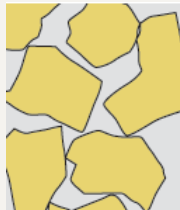


ET Management Water/soil Relation



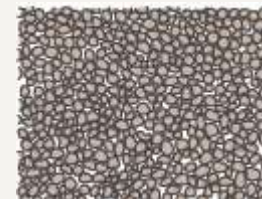
Sandy Soils:

- Large soil particles
- High water infiltration rate
- Low water retention rate



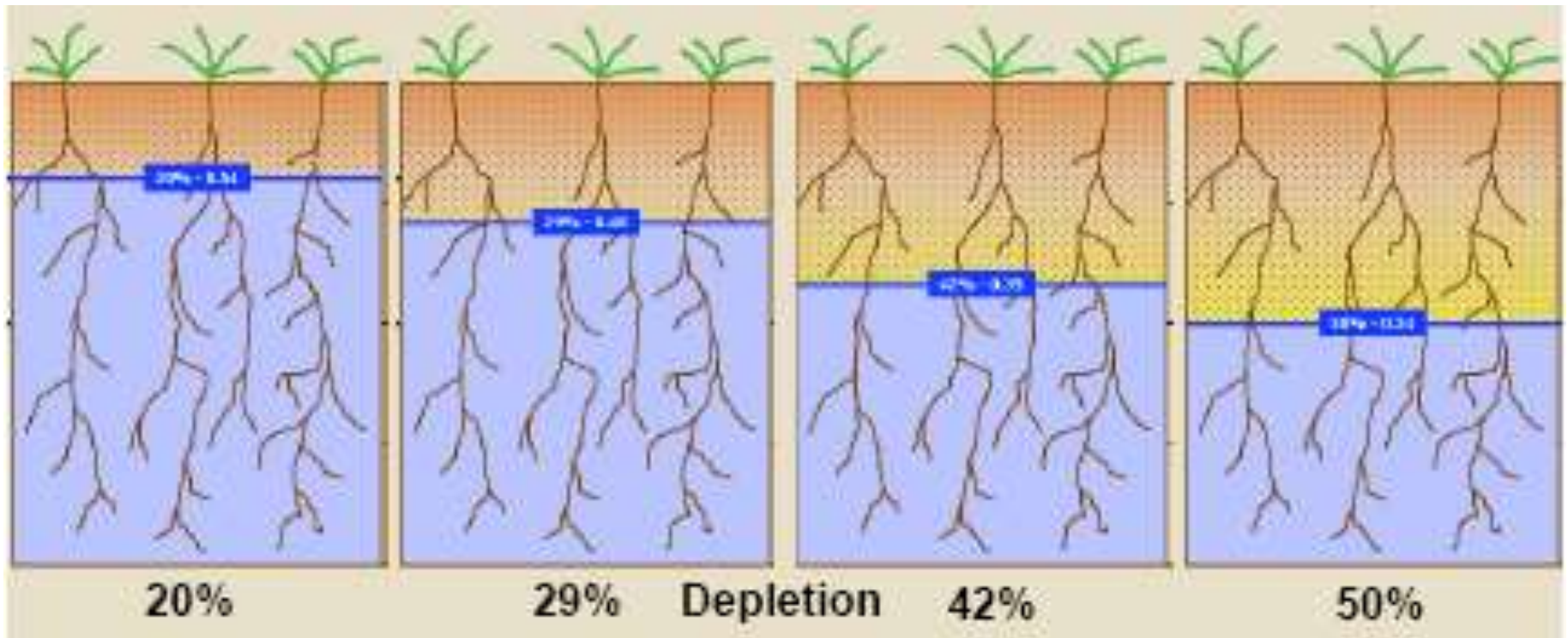
Clay Soils:

- Small soil particles
- Low water infiltration rate
- High water retention rate



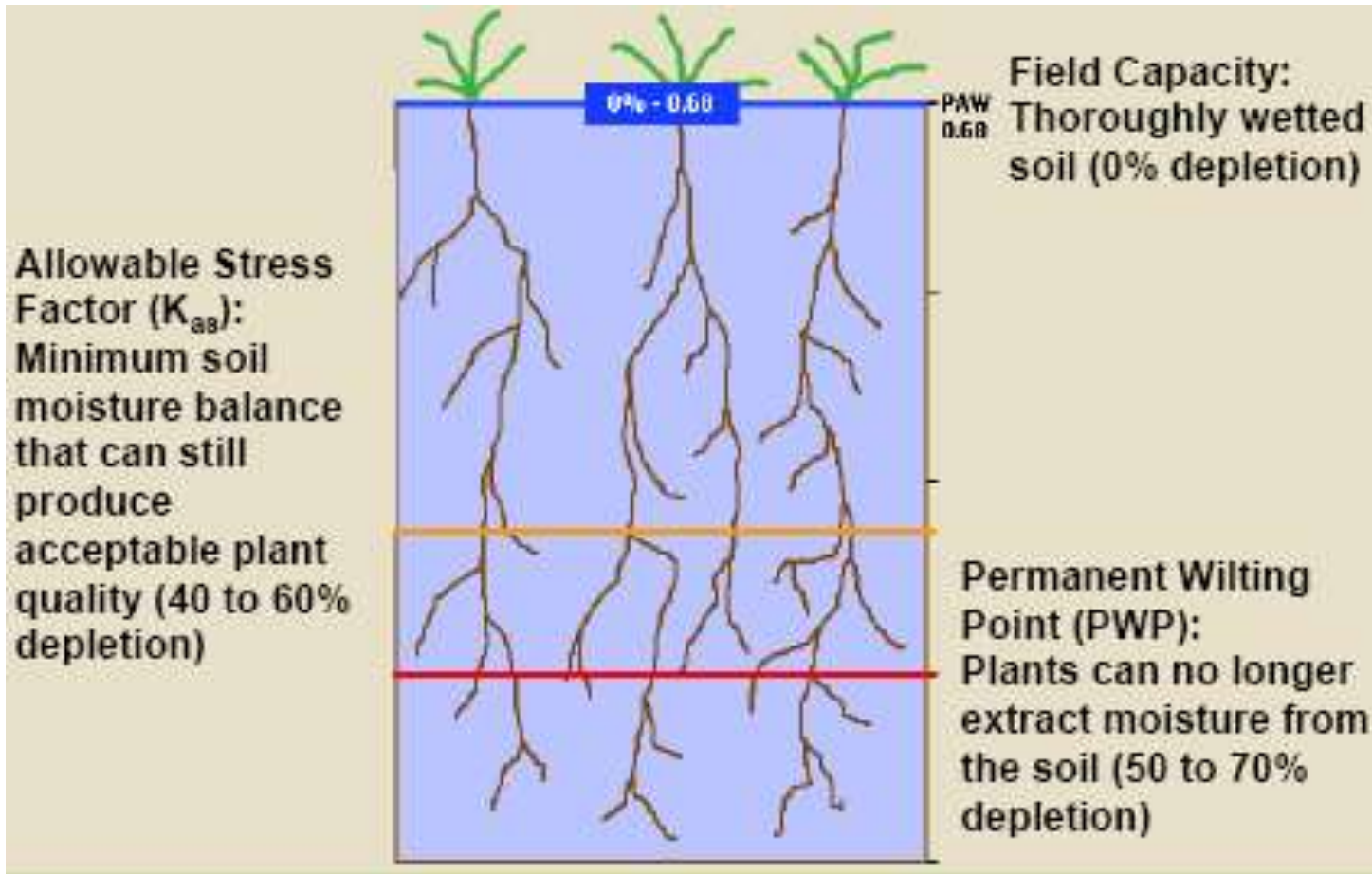
ET Management

Depletion Management



ET Management

Soil Moisture Balance conditions



Our Goal!

**Use less
water &
do better**



**Only
done with
central
control**

And all this can be done from everywhere in the world

- From tablet or smartphone connected to internet



Central Control

- **Most of the new users see water consumption reduction by 30% the first year.**
- **To get the better results, work on **Distribution Uniformity****
- **Work on:**
 - Rotors/Spray heads positioning (head to head)
 - Consistent nozzling (=flow)
 - Do not mix sprinkler w/different precipitation rate on the same network
 - Adapt rotor nozzles to irrigation sector
 - Manage constant pressure
 - Use PRS if necessary

Central Control

- **Learn real flow**
- **Compare learned flow to current flow in real time**
 - React to exceptions
- **Collect weather data and calculate ET**
 - React to exceptions
- **Adjust run time, knowing soil composition**

Thank you!