

# ***Drip Irrigation***

## ***Components - Design - Installation***



**Ray MacKenzie, Design and Sales**





**4 Locations, 50 Employees**  
**Delhi is our Agricultural location**  
**(Drip, sprinkler, greenhouse, travellers)**  
**3 Toronto turf locations**  
**(Lawns, ball fields, parks, golf)**

**In the last 15-20 years we  
have seen a steady switch in  
the agricultural sector**

**A movement to more  
controlled and precise  
“water management”**



# Changing the Way We Water

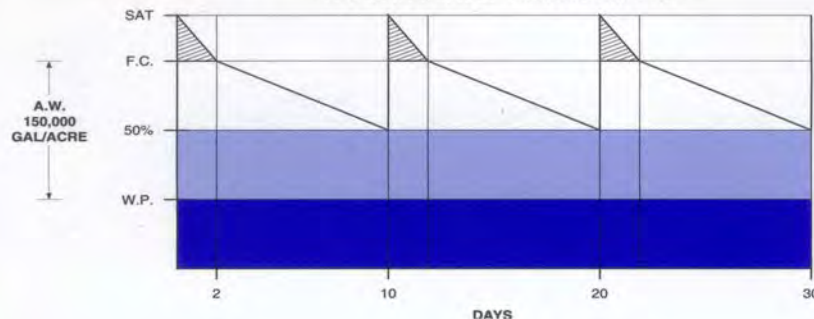


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# Changing the Way We Water

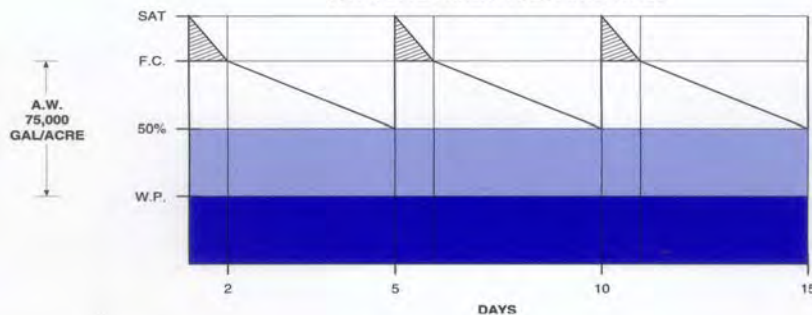
## Overhead or Flood Irrigation

100% WETTED AREA - RIGHT INTERVALS



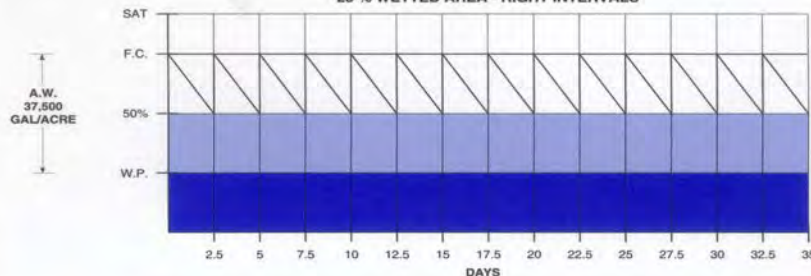
## Mini-Sprinklers

50% WETTED AREA - RIGHT INTERVALS



## Drip

25% WETTED AREA - RIGHT INTERVALS

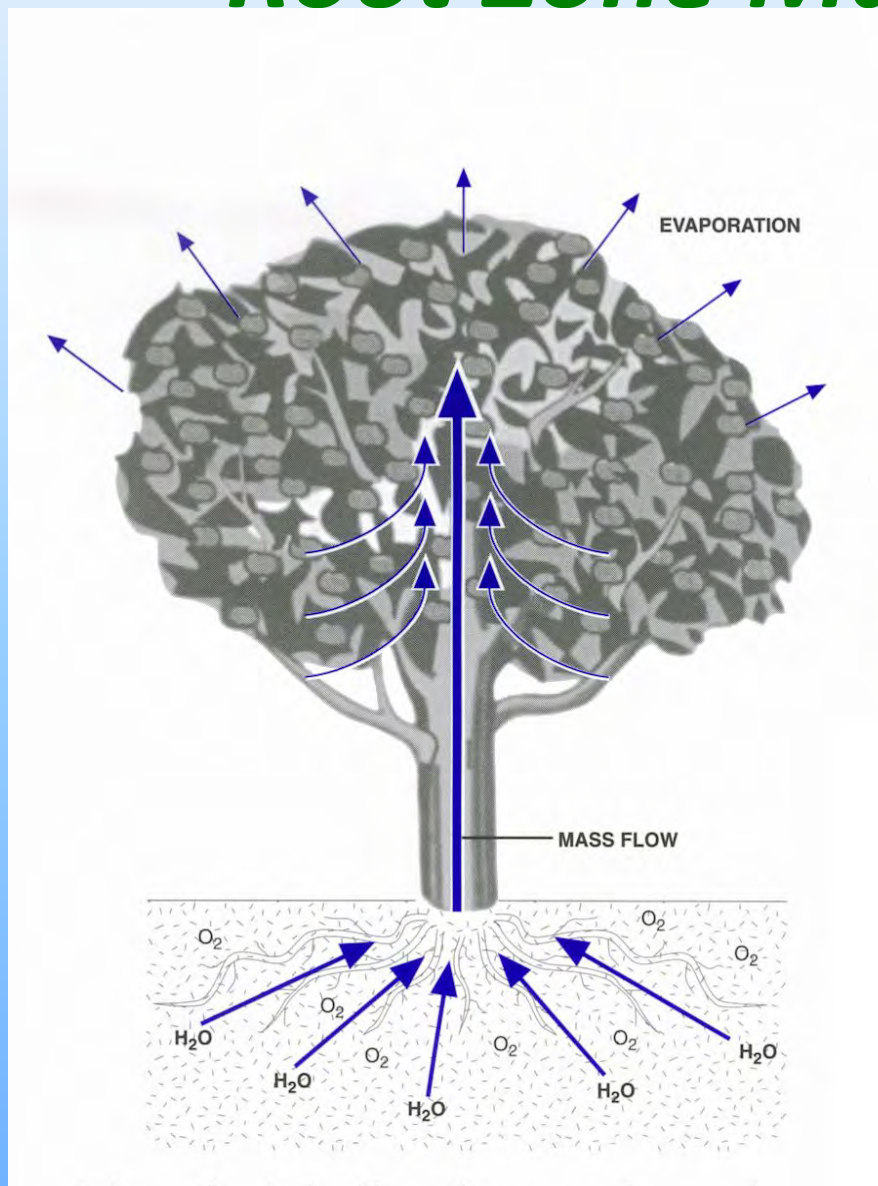


- Smaller amounts
- More frequent
- More controlled
- Balance air & water
- Fertigation

Watering by Design  
 (not by necessity)



# Root Zone Management



- Water
- Nutrients
- Soil
- Air

But Why ???

# *Reason #1*

## *Bigger – Better - Faster*





# *Reason #1*

## *Bigger – Better - Faster*



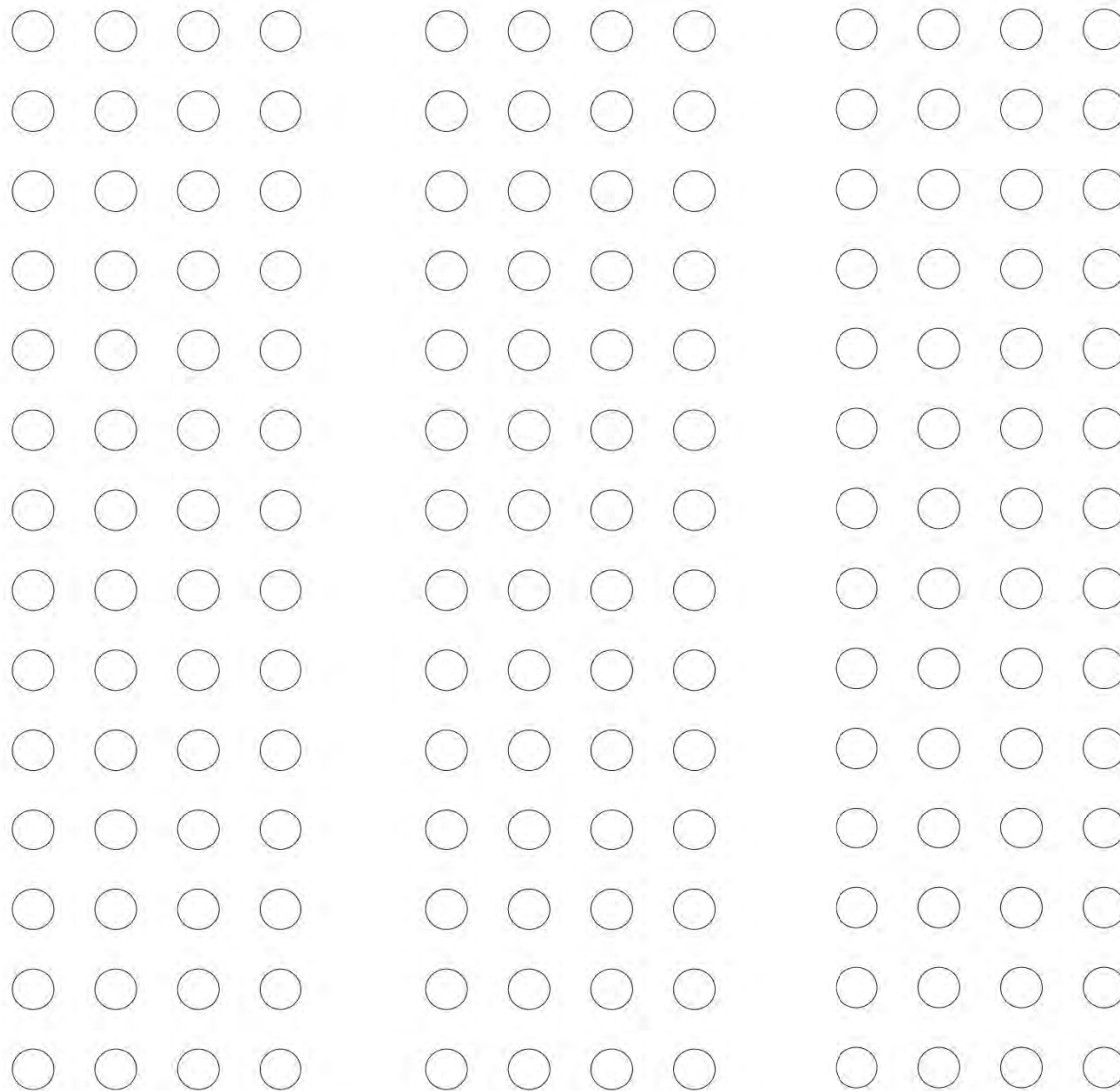
# *Reason #1*

## *Bigger – Better - Faster*





## *Reason #2 Water savings*



OVERHEAD IRRIGATION  
1 INCH PER ACRE  
= 27,152 USGAL

DRIP IRRIGATION  
1 INCH PER ACRE  
= 4,344 USGAL

**SAVE 84%**

Save water  
=  
Save energy  
=  
Save \$\$\$\$







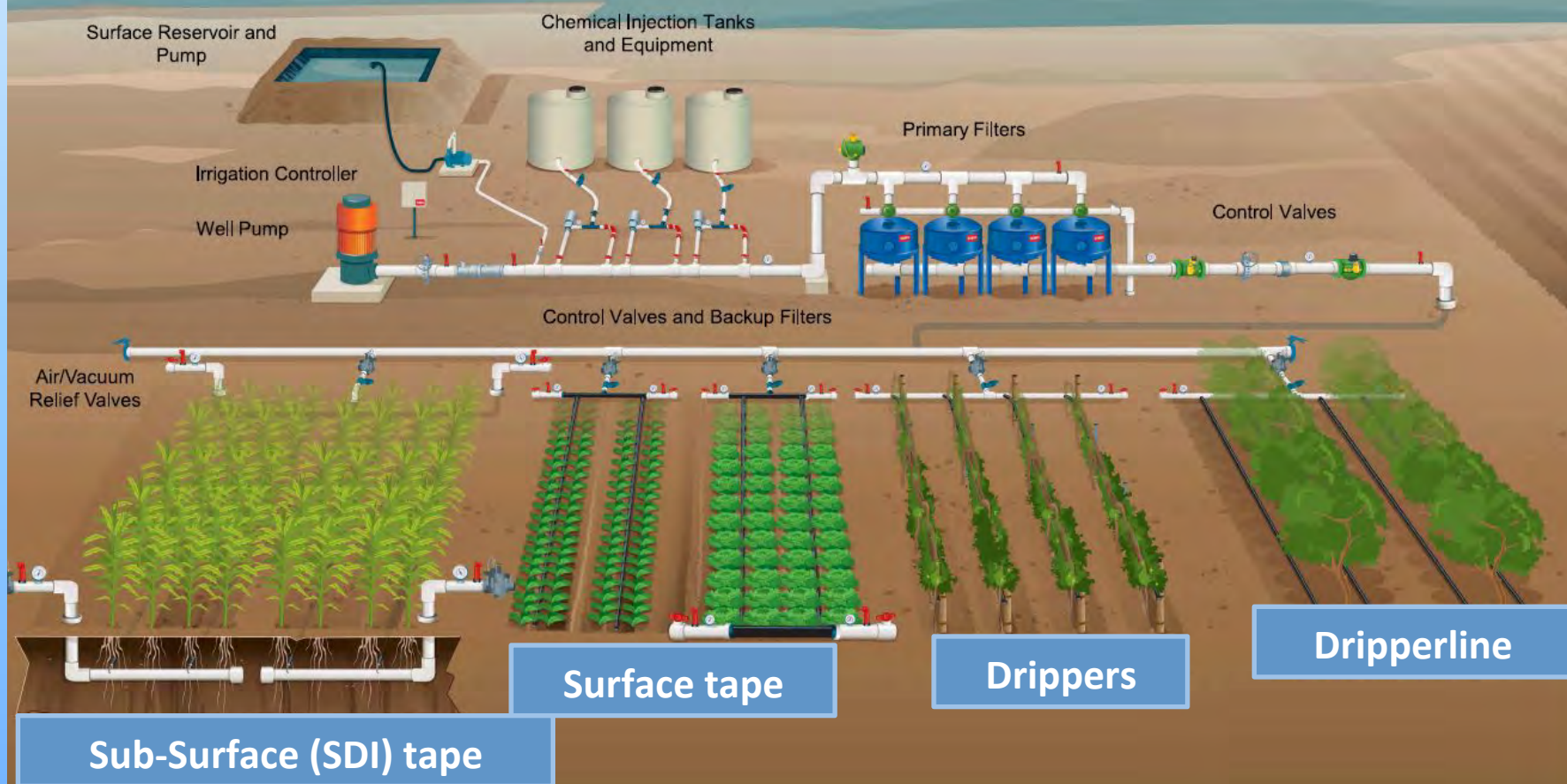
# *Reason #3 Uniformity*





- Reason #4 – Healthier plant environment
- Reason #5 – Better nutrient uptake
- Reason #6 – Less disease pressure
- Reason #7 – Less run-off / deep seepage
- Reason #8 – Lower pumping costs
- Reason #9 – Less weed pressure
- Reason #10– Better irrigation timing

# Typical Drip System Layout





# System Components

Controls



Drip Line



Filtration



Distribution



Injection



Measurement



Flow Meter



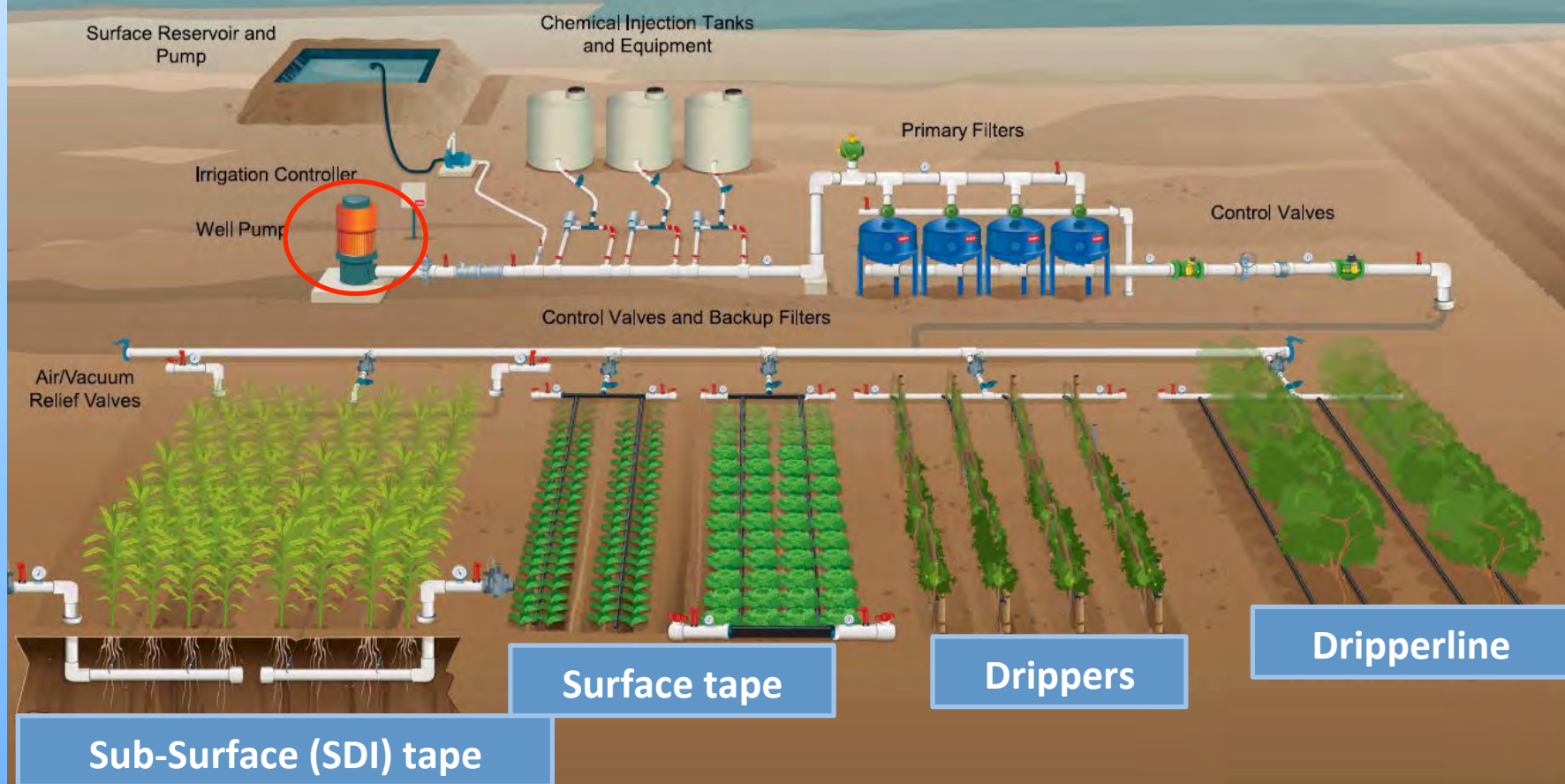
Pumps



Valves & Vents



# Pumps





# Pumps

*Electric*



*Small gas*



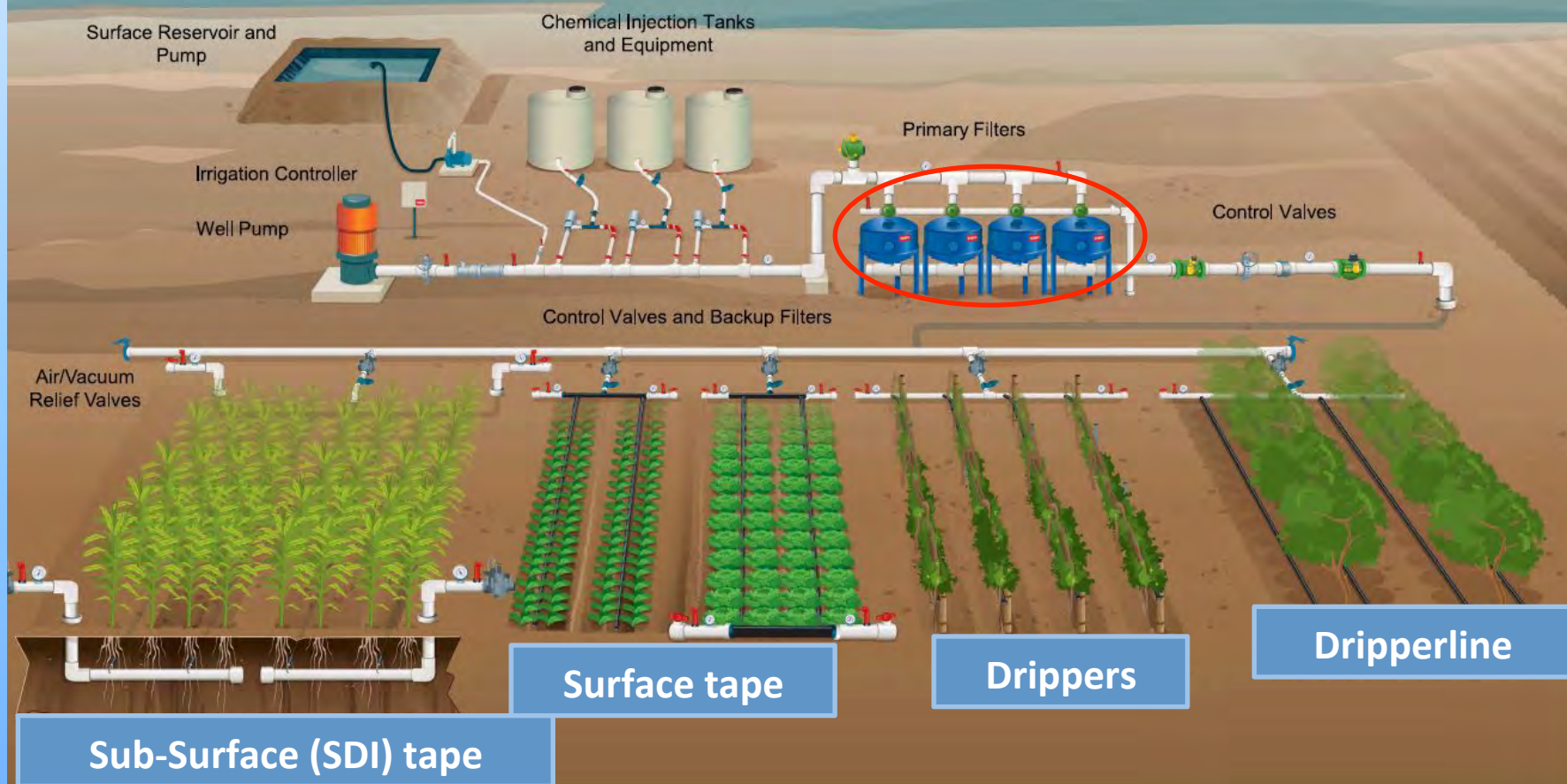
*Diesel unit*



*PTO*

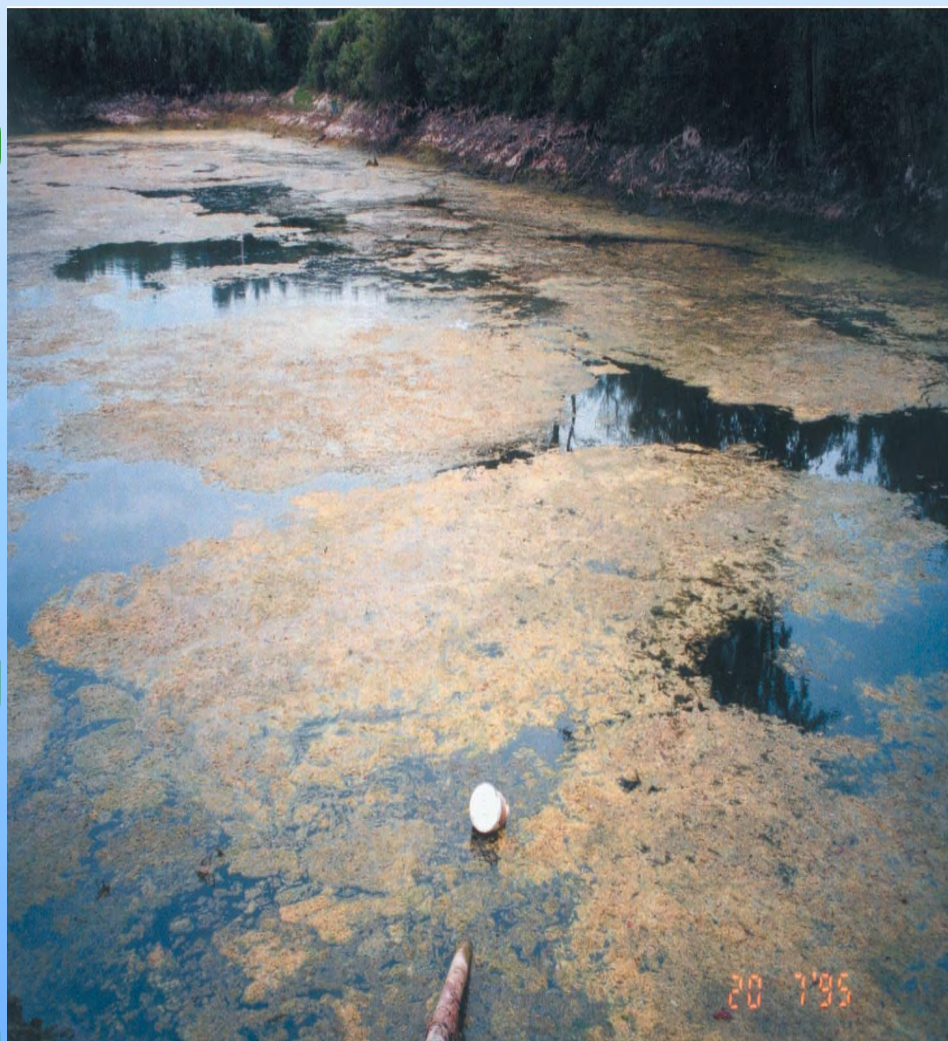


# Filtration





*Look what I have to deal with!*





# *Water Quality*



Although pond water is visually dirtier, well water may pose more difficulty in drip systems.

Always have well water tested before using for drip systems



# Filtration





# *Disk filters*

Good for most water  
Small footprint  
Manual or auto

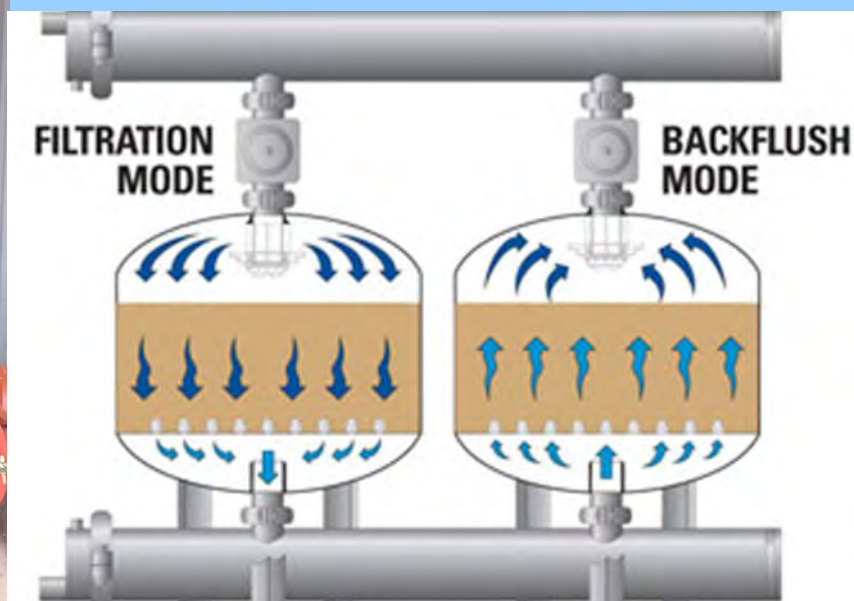




# *Sand Filtration*



Good for most water  
Sand with a back-up screen  
Auto backwash  
Two or more tanks



# *Screen filters*



Used for:

Back-up to sand filter

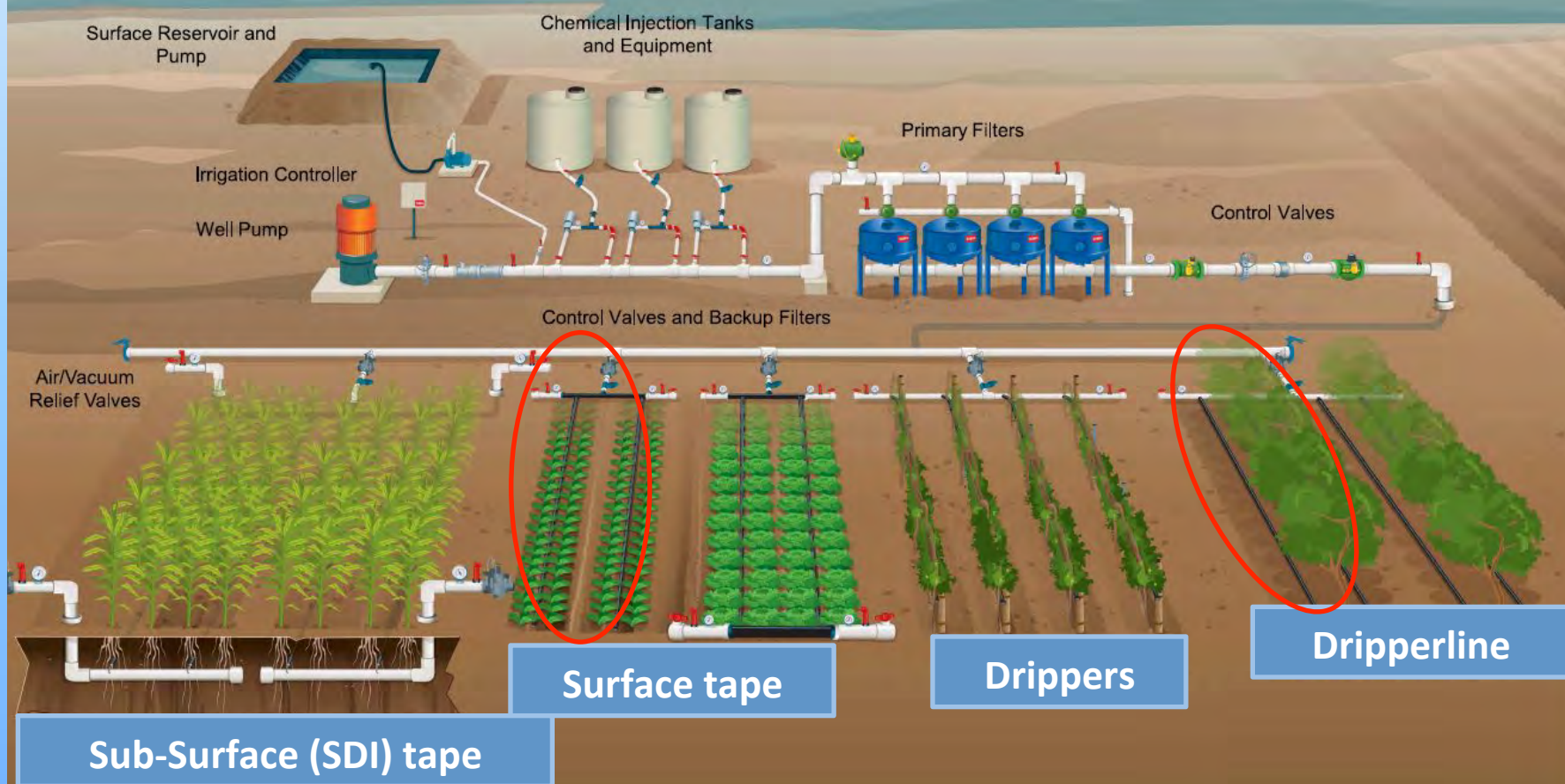
After injectors

Well water

High sand loads



# Drip lines



# *Drip Lines*

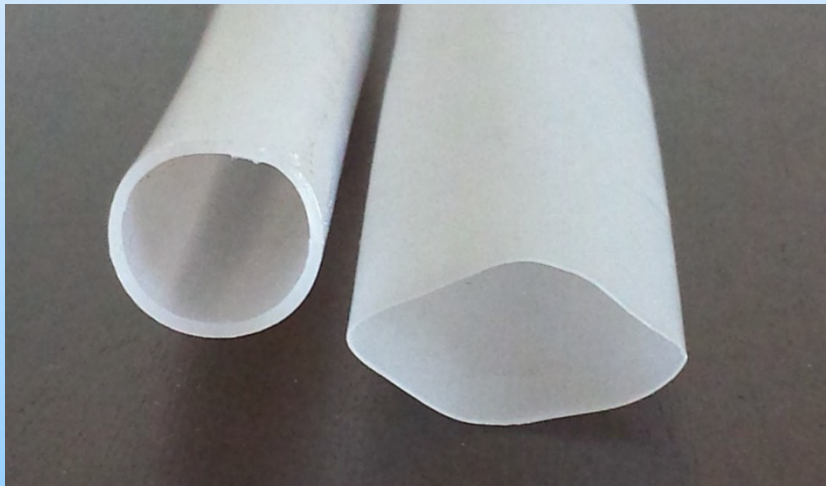
- Conveys water to the root zone of the crop
- Controls amount of water
- Spaces the water out uniformly





# *Drip Lines*

## Heavy wall vs. Drip Tape



## Pressure Compensation



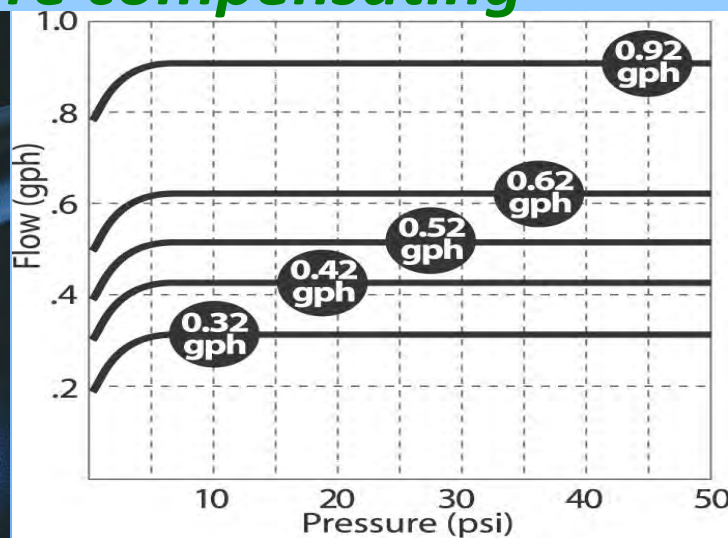
vs. non-Comp

# Heavy wall drip line

*Used for permanent crops*



*Normally pressure compensating*



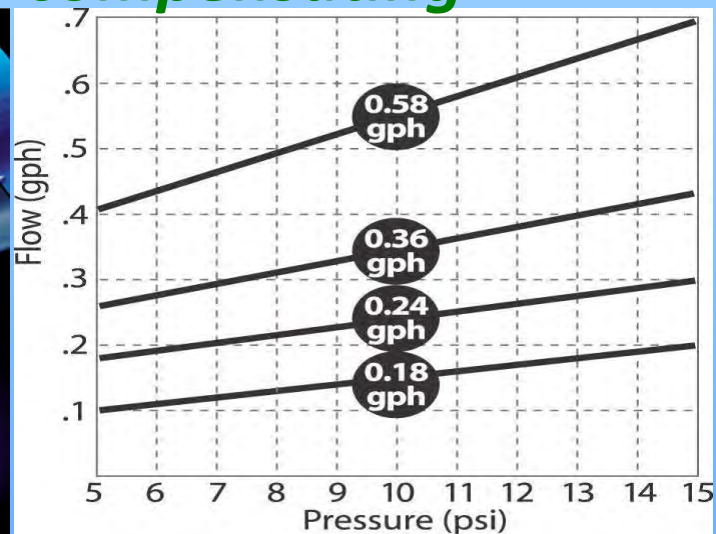


# Thin wall drip line

*Used for short term crops*



*Normally non-compensating*





# ***Drip line Placement***

***Suspended***



***On ground***



***Shallow burial***



***Deep burial (SDI)***





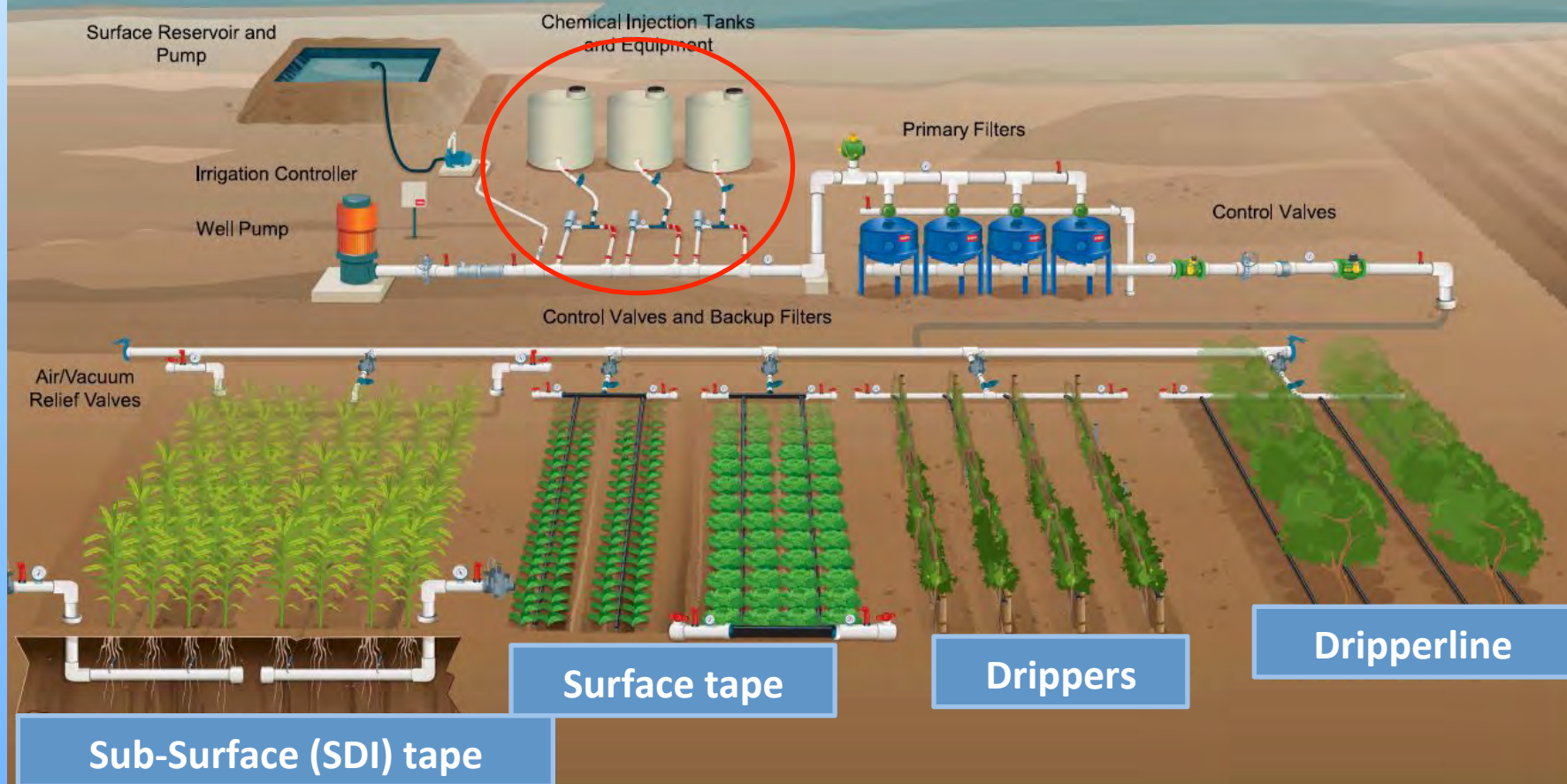
# *Drip line Placement*

*Under plastic mulch or ground cover*





# Injectors

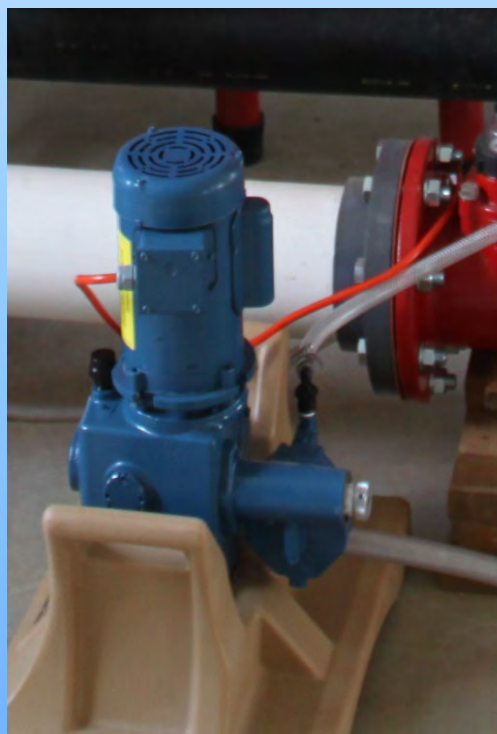




# ***Fertilizer injection***

**Apply the nutrients to the root zone**

*Electrical*



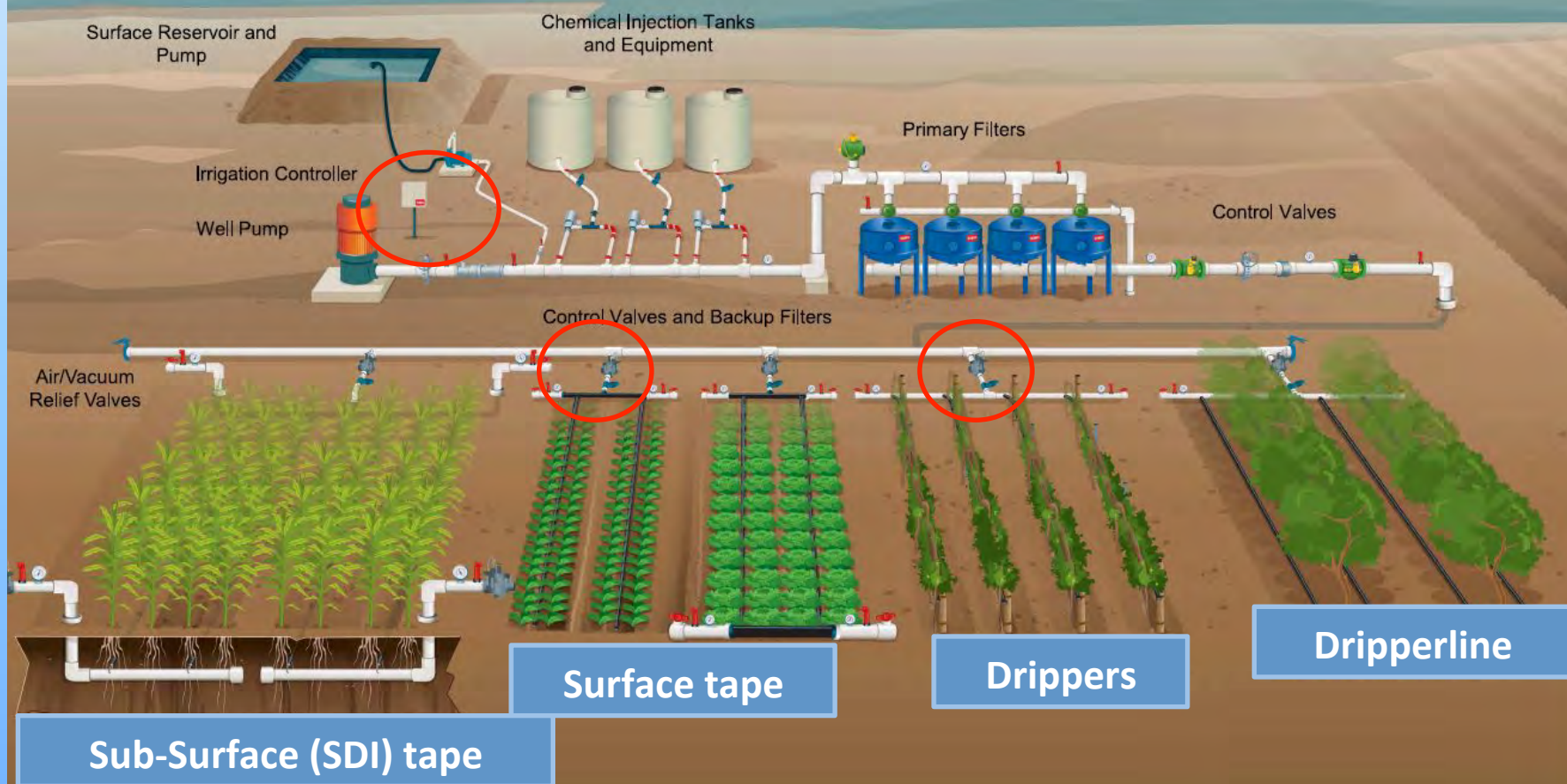
*Fertilizer  
Acid  
Chlorine*



*Water driven*



# Controls





# Controls

Systems may be  
 Operated manually  
 or electrically



*Controllers can:*

- Operates valves
- Flushes filters
- Turns pump on/off
- Controls injector

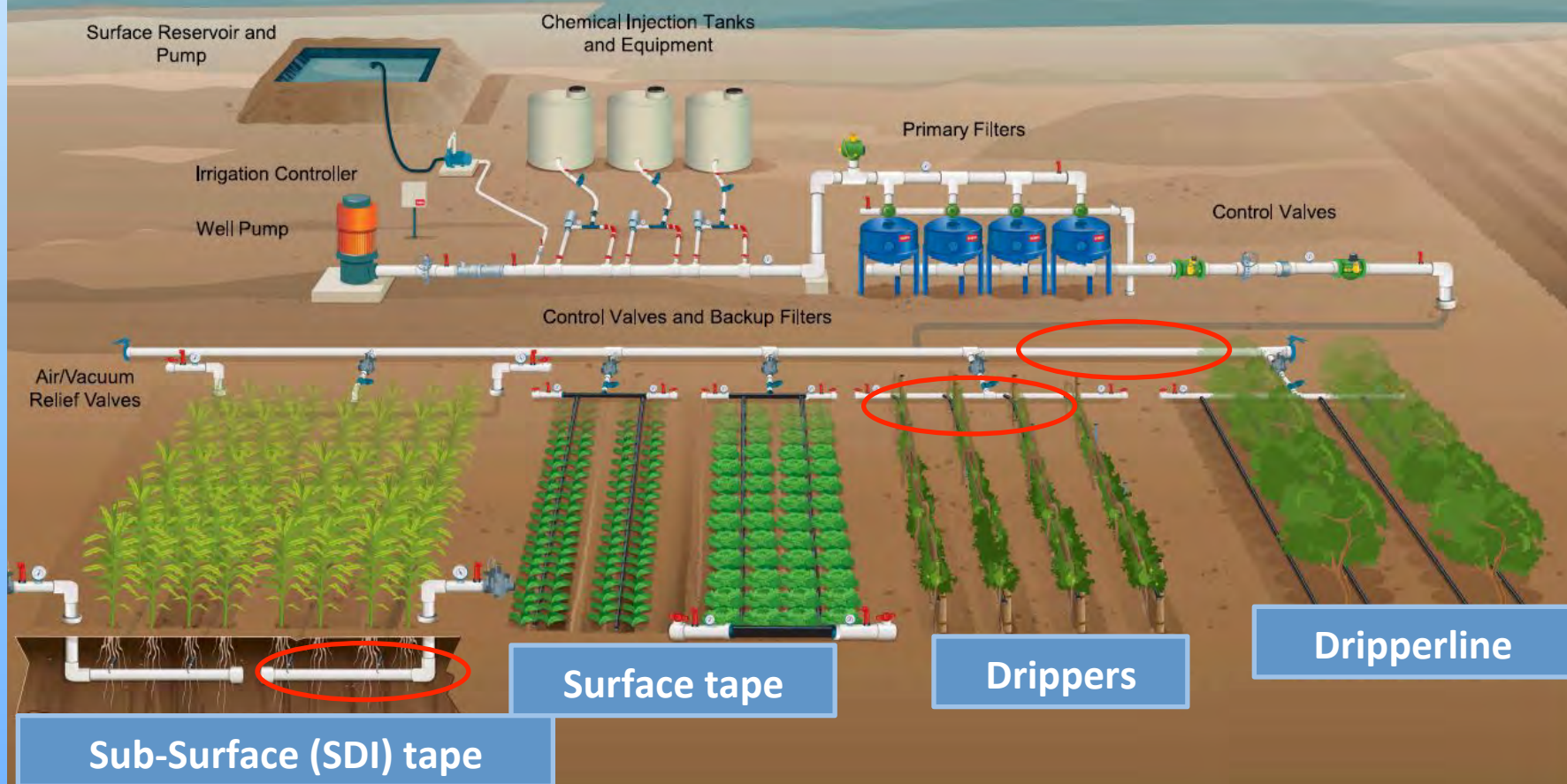


*Valves:*

- Electric or Manual
- Pressure regulating
- Above grade or buried



# Pipe network





# *Mainlines and headers* may be permanent or removable



**Permanent Crops:  
Buried PVC**

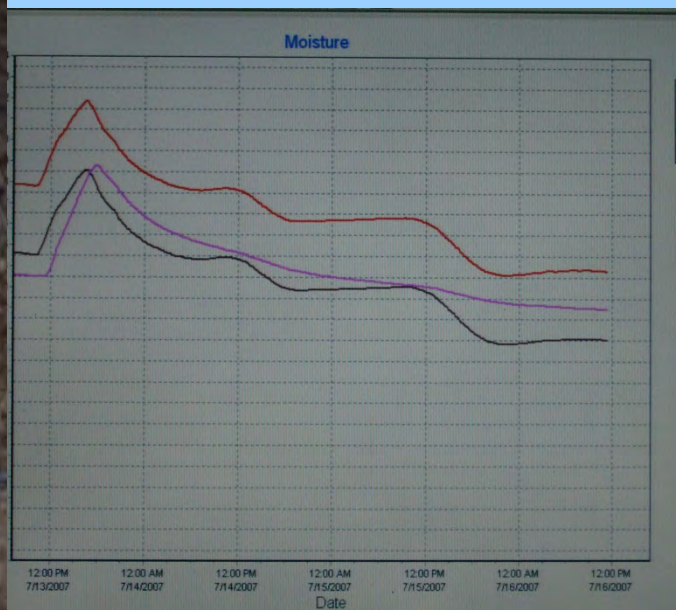


**Seasonal Crops:  
Above ground flexible**



# Moisture Measurement

**Automatic or manual**  
**Record to show trends**  
**Many types available**





# *Which system is right for you?*

**Your system needs will depend on:**

- **Topography**
- **Soil**
- **Water source**
- **Availability of hydro**
- **Availability of labour**
- **High water table**
- **Intercropping**
  
- **Budget**



# 10 Acre permanent system



## Components:

Heavy walled drip line (2 ft dripper spacing)	28,000ft
Lateral connections	42
Electric valves	3
Controller and wire	1
Header pipe 2"	660
Mainline 3"	300
Filter (manual disk)	3"
Elec. pump	5hp H-Press
Injector	1"
-3" manifold	
Vents, flushes, check valve, fittings	

Approx. cost \$14,000 – \$16,000



# 10 Acre 3-5 year system



## Components:

Heavy drip tape (2 ft dripper spacing)	28,000ft
Lateral connections	42
Manual valves	2
2" Oval hose	660
Mainline 3"MD hose	400
Filter (manual disk)	3"
Gas pump	5hp H-Press
Injector	1"
-3"manifold	
Vents, flushes, check valve, fittings	

Approx. cost \$7500 - \$10,000

*Thank you*





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**Drip Irrigation Worksheet**

Client: **Sample**  
Project Description: **Hazelnuts**

Crop	Tree Fruit (Low Density)
Area (Acres)	10
Row Spacing (ft)	16
Plant Spacing (ft)	8
Soil Type	Loam
Soil Depth (ft)	4
Nearest E.T. Station	Simcoe
Desired number of Zones	3
Emitter Spacing (inches)	24
Emitter Flow (GPH)	0.52



Gal/Plant/Day Theoretical	10.55
Gal/Plant/Day Actual	11.69

Zone flow rate (Avg.)	39.3	GPM
Liner feet of Dripper line	27225	FT

	Maximum (Full ET)		Normal 1/3 Max.
Run time per zone	5.6	Hours/day	1.9
Total Run Time	16.9	Hours/day	5.6
Total Gallons per day	39777		13126

Note: As water requirements for Hazelnuts is uncertain, Low density tree fruit have been used to obtain these numbers