

# Irrigation and Soil Moisture measurement

# Definitions

- The **Wilting point**, also called the permanent **wilting point**, may be defined as the amount of water per unit weight or per unit **soil** bulk volume in the **soil**, expressed in percent, that is held so tightly by the **soil** matrix that roots cannot absorb this water and a plant will **wilt**. **If its starting to wilt you have impacted upon your yield.**
- **Field Capacity** is the amount of soil moisture or water content held in the soil after excess water has drained away and the rate of downward movement has decreased. This usually takes place 2–3 days after rain or irrigation in pervious soils of uniform structure and texture.

# Conflicts of Interest

- Aquaflex – invented at Lincoln Agritech. Now off patent – no royalties.
- We sell an irrigation design package called IRRICAD to 90 countries in eight languages.
- [www.irricad.com](http://www.irricad.com)

# Irrigation designs

- The correct design is important
- Need to understand your soil type
- Crop type and thus potential evapotranspiration.
- Topography
- Water sources – amount, quality
- Climate
- Without the correct design you may not be able to keep up with plant water demands.

# Irrigation types

- Centre Pivot – Not applicable
- Overhead
- Microsprinkler
- Drip

# Soil moisture measurement methods

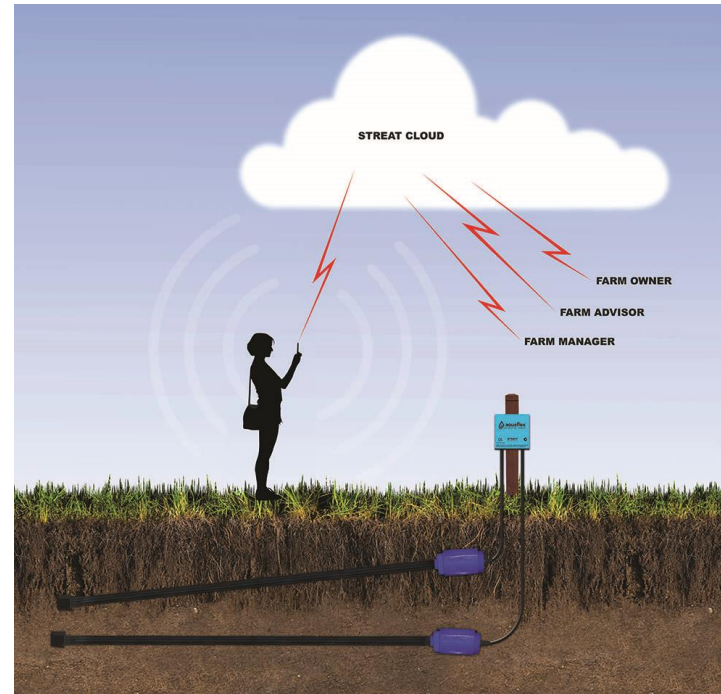
- Spade
- Gravimetric
- Neutron Probe
- Transmission Line Oscillator
- Capacitance
- Tensiometer
- Gypsum Block
- Heat Pulse probe
- TDR = Time Domain Reflectometry

# Aquaflex

## Commercial product

- Aquaflex is a robust soil moisture measurement tool.
- Uses a buried transmission line (3m) as an oscillator feedback loop to measure time delays caused by moisture via a frequency shift.
- Designed by Lincoln Agritech and commercialised by Streat Instruments, now OnFarm Data.

*“Aquaflex soil moisture meters overcome the problems associated with measuring the soil moisture content at one point only and in a relatively small amount of soil.”  
(Streat Instruments)*



# Aquaflex under Hazelnuts





- Switch windows and show Watermetrics on screen

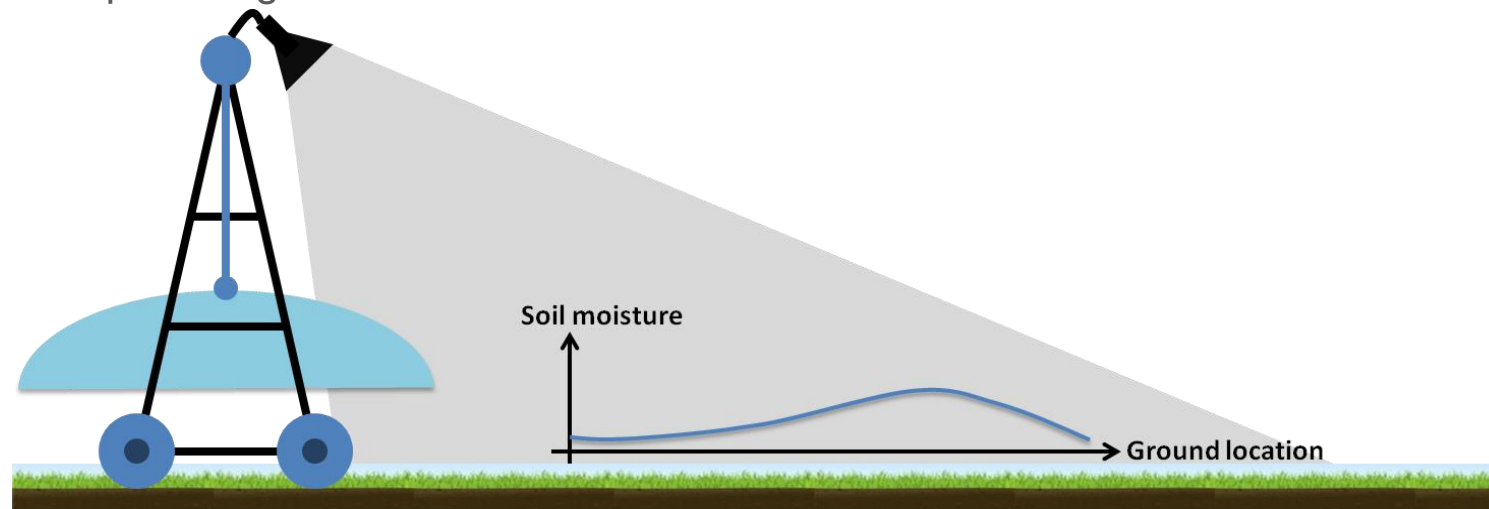
# My thoughts

- In Canterbury anyway, water is the most limiting factor on yields
- Visited many orchards at field days, and think they are under moisture stress.
- Theory that Lichen growing on trees is a sign of moisture stress.
- Don't wait until you can see it in the leaves. Measure it in the soil.

# Remote soil moisture sensing

## Commercial product

- Reduce water required to irrigate crops, increasing land area that can be irrigated from existing water takes.
- Reduce nutrient leaching caused by over irrigation, reducing fertiliser costs to farmers and minimising groundwater contamination.
- Cost-effective microwave-based moisture sensor for sensing soil moisture under pasture at the metre scale while mounted on a moving vehicle or centre pivot irrigator.



# Useful links

- [www.aquaflex.co.nz](http://www.aquaflex.co.nz)
- <https://www.irrigationnz.co.nz/>
- Soil Moisture monitoring, Irrigation NZ.