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POTATO

Irrigation Scheduling for Potatoes using Tensiometers

Irrigation scheduling allows you to apply the right amount of water at the right time to your potato crop.

- Increase yields, quality and reduce the amount of disease.
- Under and over-irrigation will produce lower yields, poor quality tubers and less profit.
- Scheduling helps to minimise run-off and deep drainage losses leading to water savings and lower pumping costs.
- Scheduling reduces over watering and the amount of nutrient leaching.



Tensiometers installed in a potato crop

The potato is a moisture sensitive crop with the majority of its roots confined to the top 30-40 cm of soil. This shallow root system makes it very sensitive to water stress and efficient and accurate irrigation is important for profitable production.

Good irrigation practice matches water supply to crop needs (scheduling).

Three types of information are combined to schedule irrigation:

- a) Crop information: growth stage, leaf areas, effective root depth
- b) Soil information: soil type and its ability to hold water
- c) Weather information: including temperature, wind and evaporation

The combination of these factors at any given time makes it difficult to decide the right time and the amount of water for the crop.

What are the benefits of applying the right amount of water?

- Optimum moisture increases yield (number of tubers and size), quality and keeps nutrients in the root zone.
- Over-irrigation leads to water loss, leaching of nitrogen, aggravates soil erosion, increases fertiliser costs and nitrogen loss to groundwater.
- Uneven watering can contribute to pest and disease problems and disorders such as hollow heart and affect specific gravity.
- At planting over watering can contribute to rhizocotonia.
- Excessive moisture resulting in poor aeration and water logging reduces yield and contributes to development of powdery scab, blackleg and phoma.
- Where there is a history of powdery scab, overwatering at tuber set can lead to increased incidence.
- Soils need to be kept moist at tuber set in paddocks with a history of common scab.

Scheduling Methods

A variety of methods can be used, such as: plant observation, intuition, the soil feel method and fixed interval (calendar days since the last rainfall or irrigation) but these do not accurately measure the plant water needs, nor indicate whether or not there is too much or too little water.

More accurate methods use

- crop water budgets (evapo-transpiration)
- direct measurement of soil water

Moisture Measuring Devices

There is a range of devices to measure soil moisture levels directly.

Soil Moisture Suction

Tensiometers and resistance blocks are examples. These are easy to handle, service and low cost. Tensiometers do have a high labour requirement for frequent monitoring (almost every day), servicing, manual reading and record keeping.

Soil Moisture Content

Some devices provide a direct measure of soil water content eg. Enviroscan, Gopher and aquaflex.

These are relatively more expensive and installation and calibration are more complicated. There are advantages of lower maintenance. Data can be provided on continuous basis from these instruments and downloaded to a remote computer.

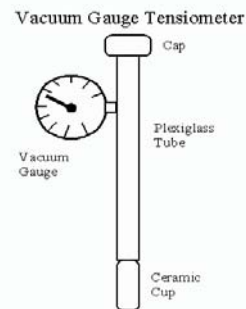
Scheduling Using Tensiometers

- Tensiometers should be installed in at least two locations in the crop.
- At each location in a potato crop, tensiometers are installed at 30 and 50-60 cm depths.
- The 30cm tensiometer is the primary scheduling tool and the crop is irrigated when it reads between 25-50kPa.
- The crop has received more water than needed if the deeper unit reads less than 10 kPa (at 0kPa the soil is saturated) after allow 24 hours.
- Within one or two irrigations the tensiometers will help you to finetune the right amount of water to apply.
- Tensiometers should read at the same time each day.
- Variation between soil types needs considered when interpreting of readings with the lower reading for sandy soils and the higher end of the scale for heavv soils.

What is a Tensiometer?

It is a rigid water filled tube with a vacuum gauge at the top and a porous ceramic tip at the bottom. The ceramic tip and lower section of the tube is buried in the root zone of the crop. As the soil is dries the surrounding soil will attempt to suck water out of the tensiometer through the ceramic tip. The vacuum created is proportional to the amount of effort the potato plant has to exert on the soil to satisfy its own water needs.

The vacuum gauge reads from 0 to 100 kPa (=centibars). If the soil is very wet, the gauge reads close to '0' and as soil dries the gauge increase gradually towards '100'kPa (which is very dry).



Want to know more?

Best management guidelines for irrigated vegetable crops. Manual on best practice irrigation in the Southern Murray Darling Basin CDROM –NSW Agriculture. Contact Bill Ashcroft at DPI, Tatura at 5833 5253 or email Bill.Ashcroft@dpi.vic.gov.au

Irrigation scheduling for vegetable crops- Agriculture Note, AG0787, DPI Victoria

Also see www.dpi.vic.gov.au go to “Agriculture and Food” then “Soil and Water”

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