Irrigation schedules site specific

By KEN JOHNSTON

THE turf grass root zone is a dynamic environment that is constantly changing according to climatic conditions. Effective irrigation scheduling is all about meeting the required turf quality for its usage while using the minimum amount of irrigation water.

The first step is to collect site-specific information for each site (e.g. grass type, soil type, rooting depth, mowing height, precipitation rate of irrigation, infiltration rate). The second step is to use one or more forms of monitoring to assist in making irrigation scheduling decisions.

Look and feel approach

This method is where turf managers irrigate using their own experience. This generally involves regular visual inspections of the turf, and irrigating to avoid wilting and drought stress. Observations of soil moisture content based on the feel and appearance of the soil are also helpful in deciding when to irrigate. Relying on experience may be an effective method of maximising turf quality; however it may not result in the most efficient use of irrigation water.

Budgeting approach

This method uses historical weather data such as pan evaporation and rainfall to assist in dividing the water allocation for a site into weekly or monthly amounts. This approach is very effective at meeting the overall allocation, however, it may result in either over or under-watering of turf when un-seasonal conditions occur.

Also by the very nature of the approach it is not designed to conserve water in years when water requirement is lower than average.

Weather Station approach

Daily turf water use is estimated using measurements from a weather station on site or at some remote location. These daily readings need to be converted using an adjustment factor that is based on the turf type or use of the turf.

The benefit of this type of monitoring is that it measures fluctuations in weather conditions and provides a useful guide to changes in turf water requirements to assist irrigation scheduling decisions.

However, it does have some limitations. Allowances have to be made for site variations when scheduling irrigation, and the soil moisture status is not taken into account.

Irrigating on the basis of replacing estimated turf water use relies on having adequate soil moisture levels. If the soil is too dry, irrigating just to replace water use will be insufficient to overcome turf stress. Alternatively, if the soil is too wet, water will be wasted by excessive irrigation.

Soil moisture monitoring approach

An understanding of the water holding capacity of soils is essential for managing turf irrigation. It is important to know the optimum soil moisture content range for turf growth, which will vary depending on the soil type. The most efficient way to measure soil moisture levels in the field is using sensors.

There is a range of soil moisture sensor equipment available to the turf manager. Hand held moisture sensors are suitable for doing spot checks as required by taking moisture readings in the surface at random locations. Portable moisture probes allow monitoring of multiple fixed locations by manually taking moisture readings on a regular basis at different depths. Alternatively, sensors can be installed permanently in the ground for continuous monitoring of soil moisture levels.

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The limitation to the soil moisture monitoring approach is that somebody needs to be regularly taking readings in the field or looking at the data collected and then making an irrigation decision on a daily basis.

Sensor-controlled irrigation approach

Advances in soil moisture sensor and computer technology, coupled with the improved mobile phone network and the internet, has produced an exciting new approach where real-time soil moisture data can be used to make or guide irrigation decisions on-site.

The sensors can be used to indicate when the soil has dried out to the point where irrigation is required, and also when the soil profile is full of water and irrigation is not required. The data from the sensors can be connected directly to the irrigation controller to either enable or disable irrigation events programmed into the controller.

The critical aspect for sensor-controlled irrigation to work effectively is to accurately establish the thresholds where irrigation should begin and end. This is site-specific and will vary considerably depending on the soil type.

To determine these trigger points, it is helpful to monitor the soil moisture levels through wetting and drying cycles.

The ‘refill point’ should be set at the minimum moisture content to avoid any stress symptoms or decline in turf condition. The ‘full point’ indicates the maximum level of moisture retention in the soil after free water drains off.

● **See case study page 44.**