Water Conservation
FACTSHEET

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DETERMINING EVAPOTRANSPIRATION WITH EVAPORATION PANS

Irrigation scheduling using climatic data requires the use of evapotranspiration (ET) data. Evapotranspiration data can be calculated using various weather parameters obtained from a weather station or obtained directly from an evaporation pan. Guidance on how to set up, locate, maintain and operate an evaporation pan is provided in this factsheet.

Types of Evaporation Pans

Two types of pans are commonly used. Class A pan is the standard one used by research facilities and climate stations where a standard method of measurement is essential. Galvanized washtubs are often used in situations where a simpler and less expensive method of collecting ET data is desired.

Class 'A' Pan

The Class A evaporation pan (Figure 1) is a universally used standard-sized pan with a diameter of 1.2 m and a depth of 250 mm. When installed, it is elevated 150 mm off the ground. The operating water level is 175 – 200 mm deep; therefore, the water level in the pan is kept 50 – 75 mm from the rim.

A stilling well located on the side of a Class A pan has a level sensor which is used to record water depths. The measurements can be taken automatically. This pan can be purchased with an automatic refill that fills the pan back to the 200-mm depth when necessary.

Figure 1 Class 'A' Evaporation

Galvanized Washtub

The galvanized washtub (Figure 2) is approximately 0.50 m in diameter and 0.25 – 0.30 m in depth. A tub with this depth is most desired. Since the tub is located in the field, a wire cage is placed over the tub to keep away birds and animals.

Figure 2 Galvanized Washtub

A ruler is attached to the tub to measure the water level. It is important to measure the water depth at the same place in the tub every time. This is to ensure the differences in water depths in the tub are due to evaporation and rainfall, not irregularities at the bottom of the tub. Mark the inside of the tub to indicate where the measurements are to be made.

The water depth in the tub should be maintained between 50 – 75 mm from the rim of the tub. The maximum water depths should be marked on the side of the tub. After each irrigation or if the water level reaches the minimum prior to the next irrigation, the tub should be refilled to the full mark.

Rain Gauges

Rain gauges are required to monitor the amount of precipitation that falls in the evaporation pan and on the irrigated field. The measured rainfall is subtracted from the water level reading in the pan to determine the amount of moisture evaporated.

Figure 3 Automatic Rain Gauge

Rain gauges can be automated (Figure 3) or manual (Figure 4). The automated type measures rainfall automatically using a tipping bucket. These rain gauges require a datalogger to keep track of the rainfall, and are used at the packaged climate stations. It is most often used with an automated Class A pan. The manual type is simpler and less expensive than the automated one, and is usually used with the washtub evaporation pan. The manual rain gauge should be read and emptied after every rainfall event. To prevent the water from evaporating before a reading is taken, the gauge should be seeded with a few drops of light mineral oil. The mineral oil will create a floating layer on the surface of the rainwater.

Figure 4 Manual Rain Gauge

Location of Evaporation Pan

The location of an evaporation pan is very important for reliable estimates of evaporation. The tub should be placed near the field, **but not** on bare ground or next to areas with gravel or black top. These areas increase evaporation due to temperatures that are above normal. The pan should be raised 150 mm above the ground, levelled and firmly supported.

Moreover, the pan should **not** be placed under trees or near buildings where it will be shaded for part of the day. Vegetations within a 10-m radius of the tub should be kept mowed. An ideal location is a grassed area next to the irrigated area. The irrigation system should not add water to the pan. The conditions should be representative of what the crop is experiencing, taking into account wind, sunlight and temperature. Figure 5 shows a pan and a rain gauge located 30 m from the edge of an orchard.

Figure 5 Manual Rain Gauge Location

Using Pan Data

A pan crop coefficient (K_c) must be applied to the pan evaporation data to reflect the crop water use (ET_p). Factsheet 577.100-5 Crop Coefficients for Use in Irrigation Scheduling provides more information on selecting the appropriate pan crop coefficient for use with different crops. The information collected from the evaporation pan can be used in a water budgeting approach to schedule irrigation. Further information can be found in the following factsheets:

577.100-3 Sprinkler Irrigation Scheduling Using a Water Budget Method
577.100-4 Trickle Irrigation Scheduling Using Evaporation Data

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