Strawberry Irrigation

Introduction

As with most systems, an irrigation system is only as good as how well it is managed. It is important to know how much water is being applied by the system and how much water can be held within the plant's root zone. Flow meters should be installed to determine the volume of water applied over a given time period. It takes 27,154 gallons of water to apply one inch of water to one acre. It is also important to know how much water can be stored in the soil that the plant can extract. For sandy soils the plant available water holding capacity may be 1 inch or less per foot of soil while for clay loams and clays it may be more than 2 inches per foot.

To determine when to irrigate it is important to know how much moisture is in the soil. If soil moisture is relatively high, irrigation can mean wasted water. There are several instruments to measure soil-moisture including tensiometers and Watermark sensors. These instruments come with some guidance for interpretation as they infer soil moisture from what is called "soil-water tension". There are other more expensive instruments that may be beneficial as they read-out in soil-moisture rather than soil tension. Use of these instruments can help growers decide when to turn on an irrigation system.

If you install sensors to measure soil-moisture, make sure they are installed in the strawberry plant's root zone. It is a good idea to install sensors in pairs of two – one at a depth of about 6 inches and another at a depth of 12 inches, both about 4 inches from the base of the plant. If you select Watermark sensors, it is a good idea to glue the collar of the sensor into a ½ inch class 315 PVC pipe with PVC glue, and bring the wires out through a PVC elbow on the other end. This protects the wires from damage and makes location easier. If you use watermark sensors, you will need a handheld meter to read the sensor. Both tensiometers and watermark sensors have 7/8 inch diameter tubes, so if you install these in a plasticulture system, make sure you prevent rain and any overhead irrigation from preferentially flowing into the hole created when placing the sensor.

For tensiometers or watermark sensors, turn on your irrigation system when the lower sensor reads about 30 centibars or if the upper sensor reaches 40 centibars. After an irrigation, the readings should be about 5-10 centibars. If the reading is lower, e.g., 0 centibars, you have applied too much water and the water will be lost to drainage. Lessen your irrigation run time until you do not have excess water after irrigation. Tensiometers in sandy to sandy-loam soils respond fairly quickly to changes in soil-moisture and can be used to judge when to turn off a system; watermark sensors respond too slowly to use for that purpose.

More recently, sensors have been developed to read soil water content directly. These sensors are based upon the electrical properties of the soil-water-air mixture that change when water content changes. If you choose to use this type of sensor you will need to determine at what soil moisture content to turn you system on. To do this, saturate the soil around the sensor

with water (or wait for a soaking rain) then wait 12-24 hours and read the sensor. The number (in percent water per volume, or volumetric water content) at the end of this period will reflect your soil's "field capacity" or that amount of water held against drainage due to gravity. A value of 75% of this reading is a good point at which to turn your irrigation system on. For instance, if the field capacity of your soil is 30% by volume, turn on your irrigation system when the reading is about 22%. Never apply more water than it takes to fill the soil up to field capacity.

Sensors can be used to control irrigations. This can be done either by using a sensor and switch to over-ride previously scheduled irrigation events programmed into a irrigation control clock when the soil-water content is above a pre-set level (too wet), or by using sensors to both turn-on and turn-off irrigation by controlling electrically-actuated solenoid valves. Switching tensiometers have been available for years. Using one switching tensiometer, you can over-ride a irrigation control clock scheduled irrigation; and using two tensiometers, one with a reverse switch and wired in series, you can both turn on and turn off an irrigation system (by controlling solenoid valves) without a controller clock. It is a good idea to use a timer or some other method to limit irrigation run time if you use this method, in case a tensiometer or switch fails.

Tensiometers cost between $60 and $120 each depending if the ceramic tips can be replaced, the length, and upon the retail source. Watermark sensors cost as low as $25 each but require a hand held meter to read the sensors that costs between $250 and $300. Sensors that read directly in volumetric soil water content start at $70 each but also require a hand held meter to read them. Those meters cost over $300. Make sure that you match meters with the sensors they are intended to read.

Never apply more that one inch of water during any irrigation. Each field varies in soil conditions, so it is essential that you know how your soil responds to irrigation and when you need to start irrigation so that you do not waste water or allow the crop to become too moisture-stressed. The figures shown in the examples above are for rough guidance; with a modest investment and field observations to adjust your soil-moisture monitoring system, you can save money in the long-run and maintain good crop yields.

Useful web sites

www.irrometer.com
(tensiometers and watermark sensors)

http://www.decagon.com/geo/ech2o
(moisture probes that read directly in soil water content)

http://www.specmeters.com/Soil_Moisture/
(wide array of soil-moisture sensors)