Drip irrigation system and irrigation management for vegetable production

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Water is applied in a time or volume base, regardless of weather and soil water conditions.

This method consists of a calendar-based scheduling according to previous seasons, where water is applied according to the crop evapotranspiration (ETc). This method should account rainfall events.

Water application is based on soil moisture content, typically, supplying a percentage of soil available water in the crop root system. This method should account for rainfall events.
Soil water properties

Saturation, Field capacity, Permanent wilting point

Source: da Silva et al., 2018 Vadose Zone Journal
Soil water status Method

Irrigation Moisture Sensors

Source: da Silva et al., 2018 Vadose Zone Journal
Soil water status Method

Source: da Silva et al., 2018 Vadose Zone Journal
Soil water movement
Irrigation Management

Two irri strategies for Zucchini

- **Fixed irrigation (SYS)**
  - 2 hours continuously;
  - Equivalent to 0.21 inches per day (5.5mm);

- **Controlled irrigation (SMS)**
  - 5 possible irrigation windows controlled;
  - 0.042 inches (1.1 mm) per irrigation event;
  - Controlled by soil moisture sensors set at soil FC;

Source: Zotarelli et al 2008. Scientia Horticulturae
Irrigation Management

<table>
<thead>
<tr>
<th>Irrigation time</th>
<th>8am</th>
<th>10am</th>
<th>12pm</th>
<th>2pm</th>
<th>4pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Time Irrigation</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Soil Moisture Sensor</td>
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</tbody>
</table>

Source: Zotarelli et al 2008. Scientia Horticulturae
Irrigation Management

- Controlled Irrigation
- Fixed Irrigation
- Controlled Irrigation
Soil sensor-based irrigation

Fixed time irrigation

Credit: Dr. Zotarelli
Irrigation Management

N = 28 % +

Source: Zotarelli et al 2008. Scientia Horticulturae
## Irrigation management

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled irrigation</td>
<td>24,649 A</td>
</tr>
<tr>
<td>Fixed irrigation of 2h/day</td>
<td>18,316 B</td>
</tr>
</tbody>
</table>

Source: Zotarelli et al 2008. Scientia Horticulturae
Impact on tomato

60% Water Savings Compared to SMS

40% Water Savings Compared to SMS

Irrigation water use (gal/acre)

Tomato yield (lb/acre)
Impact on watermelon

70.49% Water Savings Compared to SMS

55.00% Water Savings Compared to SMS
Impact on bell pepper

29% Water Savings Compared to **SMS**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (box/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil moisture sensor</td>
<td>925 A</td>
</tr>
<tr>
<td>Systematic</td>
<td>835 B</td>
</tr>
</tbody>
</table>
Importance of irrigation strategy:

- Reduction of irrigation water (Sustainability)
- Reduction of fertilizers application (Savings)
- Maintenance/increase of yields (Profit)

Tools for water scheduling are available.
Thank you