Surveying the need for an electronic decision support tool for irrigation and nutrient management

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CropManage

An online decision support tool for irrigation and fertilization

Integrates information from multiple sources

- Soil and Ranch
- CIMIS ETo
- Soil nitrate test
- Field sensors
- Crop ET model
- Watering Recommendation
- Crop N model
- N fertilizer Recommendation
- Display and export water and fertilizer records

Mike Cahn, UCCE Monterey County
Steps to Using CropManage

1. Establish User Login
2. Assign to Ranch or start New Ranch
3. View Planting within Ranch or Add New Planting
4. View or enter soil tests, fertilizer, or irrigation events
Current crops supported

Vegetables:
- Romaine lettuce
- Iceberg lettuce
- Broccoli
- Cauliflower
- Cabbage
- Spinach*
- Celery*
- Onions*

Berries:
- Strawberry
- Raspberry*
- Blackberry*

Mike Cahn, UCCE Monterey County
Web-based Irrigation and N management software for lettuce

https://ucanr.edu/cropmanage

Mike Cahn, UCCE Monterey County
<table>
<thead>
<tr>
<th>Fertilizer Date</th>
<th>Soil NO3-N (ppm)</th>
<th>Crop Stage</th>
<th>Fertilizer N Recommended (lb N/acre)</th>
<th>Cumulative N Uptake</th>
<th>Fertilizer</th>
<th>Applied N (lb N/acre)</th>
<th>Applied Fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/1/12</td>
<td>12.50</td>
<td>Planting</td>
<td>0.0</td>
<td>0.23</td>
<td>3.5-12-14</td>
<td>15.0</td>
<td>36.9 gal/acre</td>
</tr>
<tr>
<td>7/24/12</td>
<td>15.00</td>
<td>1st drip fertilization</td>
<td>31.2</td>
<td>4.32</td>
<td>28-0-0-5</td>
<td>24.8</td>
<td>8.0 gal/acre</td>
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<tr>
<td>8/10/12</td>
<td>15.00</td>
<td>2nd drip fertilization</td>
<td>55.8</td>
<td>31.90</td>
<td>UAN28</td>
<td>56.7</td>
<td>19.0 gal/acre</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td>86.9</td>
<td></td>
<td></td>
<td>96.5</td>
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</table>
## Irrigation Summary

<table>
<thead>
<tr>
<th>Water Date</th>
<th>Irrigation Method</th>
<th>Recommended Irrigation Interval (days)</th>
<th>Recommended Irrigation Amount (inches)</th>
<th>Recommended Irrigation Time (hours)</th>
<th>Irrigation Water Applied (inches)</th>
<th>Kc</th>
<th>Canopy Cover (%)</th>
<th>Average Reference ET (inches/day)</th>
<th>Total Crop ET (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/8/12</td>
<td>Sprinkler</td>
<td>1.6</td>
<td>0.48</td>
<td>1.59 hrs</td>
<td>0.60 in</td>
<td>0.48</td>
<td>0</td>
<td>0.25</td>
<td>0.36</td>
</tr>
<tr>
<td>7/13/12</td>
<td>Sprinkler</td>
<td>2.8</td>
<td>0.47</td>
<td>1.57 hrs</td>
<td>0.51 in</td>
<td>0.30</td>
<td>1</td>
<td>0.24</td>
<td>0.35</td>
</tr>
<tr>
<td>7/20/12</td>
<td>Drip</td>
<td>6.3</td>
<td>0.41</td>
<td>2.70 hrs</td>
<td>0.45 in</td>
<td>0.23</td>
<td>3</td>
<td>0.22</td>
<td>0.34</td>
</tr>
<tr>
<td>7/24/12</td>
<td>Drip</td>
<td>9.4</td>
<td>0.19</td>
<td>1.25 hrs</td>
<td>0.22 in</td>
<td>0.16</td>
<td>5</td>
<td>0.25</td>
<td>0.16</td>
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<tr>
<td>7/29/12</td>
<td>Drip</td>
<td>11.2</td>
<td>0.23</td>
<td>1.56 hrs</td>
<td>0.15 in</td>
<td>0.18</td>
<td>11</td>
<td>0.22</td>
<td>0.20</td>
</tr>
<tr>
<td>8/4/12</td>
<td>Drip</td>
<td>8.2</td>
<td>0.46</td>
<td>3.03 hrs</td>
<td>0.60 in</td>
<td>0.27</td>
<td>24</td>
<td>0.24</td>
<td>0.39</td>
</tr>
<tr>
<td>8/7/12</td>
<td>Drip</td>
<td>7.6</td>
<td>0.26</td>
<td>1.76 hrs</td>
<td>0.30 in</td>
<td>0.40</td>
<td>33</td>
<td>0.19</td>
<td>0.22</td>
</tr>
<tr>
<td>8/10/12</td>
<td>Drip</td>
<td>4.9</td>
<td>0.44</td>
<td>2.95 hrs</td>
<td>0.30 in</td>
<td>0.50</td>
<td>43</td>
<td>0.25</td>
<td>0.38</td>
</tr>
<tr>
<td>8/14/12</td>
<td>Drip</td>
<td>4.3</td>
<td>0.73</td>
<td>4.90 hrs</td>
<td>0.80 in</td>
<td>0.64</td>
<td>56</td>
<td>0.25</td>
<td>0.62</td>
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<tr>
<td>8/18/12</td>
<td>Drip</td>
<td>4.1</td>
<td>0.82</td>
<td>5.49 hrs</td>
<td>0.00 in</td>
<td>0.77</td>
<td>67</td>
<td>0.23</td>
<td>0.70</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>5.36</td>
<td>29.70 hrs</td>
<td>6.03 in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.38 in</td>
</tr>
</tbody>
</table>
Clientele interest

> 550 users
> 250 Ranches
Fertilizer application vs. preplant soil residual NO$_3$-N

- Soil residual NO$_3$-N varied 23 to 219 lb, avg 80 lb
- N application ranged 115 to 320 lb, avg 190 lb

Data from Horwath et al., 2013
Web applications can be useful for repackaging research results into simple to use decision support tools

CropManage is helping lettuce growers improve water and N management on field-by-field basis and document their practices

Opportunities to expand CM to additional commodities and adding in new features and data sources

Would a “CropManage” approach be helpful for growing processing tomatoes?
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What is your main relationship to the agriculture industry?

A. Grower
B. Farm manager/foreman
C. PCA or CCA
D. Other
How do you prefer to receive information from UCCE?
Enter top choice, then 2\textsuperscript{nd}, 3\textsuperscript{rd} and 4\textsuperscript{th} choices

A. Personal contact (field visits, phone calls)
B. UCCE meetings
C. Printed form (print newsletter, print publications)
D. Online (blogs, websites, e-publications)
Which aspects of a decision support tool would be most valuable to you? Select all that apply.

A. Irrigation Management
B. Nitrogen Management
C. Recordkeeping for reporting
D. I don’t need a computer based tool
How much time would you be willing to spend each week to update a decision support tool? (time per field)

A. Less than 10 minutes
B. 10 to 20 minutes
C. 20 to 30 minutes
D. More than 30 minutes
How much money would you be willing to spend each year on soil and plant tissue sampling (per field)?

A. Less than $100
B. $100 to $200
C. More than $200
How often are fields sampled for complete soil testing?

A. Never
B. Every few years
C. Every year in some fields
D. Every year in every field
E. When problems are detected
How often are fields sampled for soil nitrate testing?

A. Never
B. Every few years
C. Every year in some fields
D. Every year in every field
E. When problems are detected
How often are tissue samples taken?

A. Never
B. Every few years
C. Every year in some fields
D. Every year in every field
E. When problems are detected
What are your irrigation decisions currently based on? Select all that apply

A. Personal experience
B. UC Guidelines
C. Recomendation by a consultant/PCA/CCA
D. Soil moisture sensors
E. Other
What are your nitrogen fertilization decisions currently based on? Select all that apply

A. Personal experience
B. UC Guidelines
C. Recomendation by a consultant/PCA/CCA
D. Soil tests
E. Plant tissue analyses
F. Nitrate in irrigation water
Thank you very much for taking the time!