Update on Cool Season Vegetable Production

• Richard Smith, Vegetable Crop and Weed Science Farm Advisor, Monterey County
Cool Season Vegetable Production on the Central Coast
Labor, Water & Regulations

San Antonio Reservoir
3% of capacity

Regulations from the Central Coast Regional Water Quality Control Board

Irrigated Lands Regulatory Program Overview

The Central Coast Water Board regulates discharges from irrigated agricultural lands. Requirements that applies to owners and operators of irrigated land used for commercial and residential purposes. Nutrients, and sediments – especially nitrate impacts to drinking water and Pajaro River watersheds.
Update on New Developments

• In spite of the resource limitations and regulations, now is an interesting time in the vegetable industry:
  ▪ New technological developments are coming at a rapid pace to the industry
Automated Thinner Spacing Frequency

71.1% of plants within 22.9 to 27.9 cm spacing

Hand Thinning Spacing Frequency

57.0% of plants within 22.9 to 27.9 cm spacing
Automated Thinner: Other Possible Roles

Second manifold applies nutrients and fungicides/insecticides to the keeper plants
Evaluation of Automated Weeders

• In Salinas effective cultivation has been developed to a fine art
• 70 to 80+% of the bed is cultivated
• Cultural practices, use of herbicides and hand weeding remove the remaining weeds
Automated Weeders
Both Use Split Knife Mechanism

Robovator
Frank Poulsen Engineering
Denmark

IC Steketee
Netherlands
Island of undisturbed soil is left around the plant; this undisturbed area can be adjusted to be more aggressive or less
Automated Weeder Evaluation Summary*

lettuce and weed plant/A pre and post autoweeder

<table>
<thead>
<tr>
<th>Time</th>
<th>Lettuce plants 1000’s</th>
<th>Weeds 1000’s</th>
<th>Hand Weed Hrs/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre weeding</td>
<td>37.3</td>
<td>13.5</td>
<td>6.1</td>
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<tr>
<td>Post weeding</td>
<td>35.2</td>
<td>6.6</td>
<td>9.7</td>
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</tbody>
</table>

* Mean of 4 trials
Using Rotations to Improve Nitrogen Use Efficiency
Broccoli Root Development by Depth
54 days after planting (61% of crop cycle)
<table>
<thead>
<tr>
<th>Site</th>
<th>Initial residual soil mineral N lbs/A</th>
<th>Total N fertilizer lbs/A</th>
<th>Total available mineral N lbs/A</th>
<th>Total N uptake by crop lbs/A</th>
<th>Percent total N taken up by broccoli</th>
<th>Total N potentially leached lbs/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>146.4</td>
<td>178.0</td>
<td>324.4</td>
<td>313.4</td>
<td>97.0</td>
<td>32.1</td>
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<td>Site 2</td>
<td>372.1</td>
<td>178.0</td>
<td>550.1</td>
<td>370.0</td>
<td>67.3</td>
<td>77.5</td>
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<tr>
<td>Site 3</td>
<td>134.3</td>
<td>190.0</td>
<td>324.3</td>
<td>268.1</td>
<td>82.6</td>
<td>67.0</td>
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<tr>
<td>Site 4</td>
<td>183.6</td>
<td>190.0</td>
<td>373.6</td>
<td>369.6</td>
<td>99.0</td>
<td>-14.0</td>
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<td>Site 5</td>
<td>257.4</td>
<td>240.0</td>
<td>497.4</td>
<td>220.5</td>
<td>44.3</td>
<td>214.8</td>
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</table>
Mitigating Cadmium Uptake of Spinach
The ratio of 100 zinc molecules to 1 cadmium are needed to inhibit cadmium uptake by spinach.

Soils with high cadmium can have ratios as low as 15:1.
Mitigation of Cadmium Uptake by Zinc Fertilization

![Graph showing the mitigation of cadmium uptake by zinc fertilization with different treatments and crops.](image-url)
Zinc Longevity in the Soil