A Case Study in Lettuce: How Computer Vision and Precision Robotics are Raising Specialty Crop Yields 10%

*Ag Innovations Conference, Santa Maria, March 2014*

ben.c@bluerivert.com
(815) 218 5640
www.bluerivert.com
Make Every Plant Count™

• Precision lettuce thinning

• Computer vision

• Benefits of plant by plant treatment
Precision thinning requires two features

1. Detect lettuce with a computer and a camera
2. Spray killing agent with ¼-inch accuracy
Precision thinning requires two features

1. **Detect lettuce with a computer and a camera**
2. Spray killing agent with ¼-inch accuracy
Made with Microsoft Powerpoint
“Remove Background” tool
Computer Vision

Useful for simple object detection and tracking

Machine Learning

Useful for classification
Target spacing

Killed plants

Killed plants
Precision thinning requires two features

1. Detect lettuce with a computer and a camera

2. *Spray killing agent with ¼-inch accuracy*
Yield benefit of plant by plant care
<table>
<thead>
<tr>
<th>Field</th>
<th>BRT</th>
<th>Manual</th>
<th>% difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plants per acre</td>
<td>% harvested</td>
<td>Boxes per acre</td>
</tr>
<tr>
<td>1</td>
<td>32,200</td>
<td>97.5</td>
<td>1,309</td>
</tr>
<tr>
<td>2</td>
<td>29,995</td>
<td>97.4</td>
<td>1,218</td>
</tr>
<tr>
<td>3</td>
<td>29,756</td>
<td>96.0</td>
<td>1,191</td>
</tr>
<tr>
<td>4</td>
<td>29,728</td>
<td>91.6</td>
<td>1,134</td>
</tr>
<tr>
<td>5</td>
<td>33,118</td>
<td>98.3</td>
<td>1,356</td>
</tr>
</tbody>
</table>

**Total % difference:** +9.08