2nd SIGHT BIOSCIENCE
Engineering Better Solutions for the Ag Industry

Dr. Kevin R. Oldenburg, Ph.D
CEO and Founder
1. Automation in Any Organization: Technogeeks, Pragmatists, Naysayers

2. Automation usually requires a change in process and/or procedure
   - It is Neither efficient nor cost effective to automate exactly what you do now
   - Robots/automation are not human

3. It cannot solve all of your problems

4. 80% of the problem can be resolved with 20% of the cost – use a human to cover the rest!

5. Automation can make fewer people more efficient. Doesn’t necessarily mean that you want to let those people go.

6. Works best on repetitive processes that humans find tiresome/boring

7. Needs to be as uniform and consistent as possible.
BioTwines: Bioplastic made from corn. Comprised of PLA (Polylactic acid). Compostable and Biodegradable
## 2019 Twine Testing Results

<table>
<thead>
<tr>
<th>Partners</th>
<th>Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roy Farms</td>
<td>Pekko, CT2, Centennial</td>
</tr>
<tr>
<td>Wyckoff Farms</td>
<td>Azacca, Zeus, Summit</td>
</tr>
<tr>
<td>Perrault</td>
<td>Pahto, Eldorado, Cascade</td>
</tr>
<tr>
<td>Congdon</td>
<td>Citron, Mosaic, Simcoe, Palisade, etc.</td>
</tr>
<tr>
<td>Oasis</td>
<td>various baby varieties</td>
</tr>
<tr>
<td>Olsen Brothers</td>
<td></td>
</tr>
<tr>
<td>Golden Gate</td>
<td></td>
</tr>
</tbody>
</table>
• 2\textsuperscript{nd} Sight provided 21’ lengths of twine to Growers
  Either PLA from Lankhorst (brown) OR
  PLA from SiCor (white)
  100 lb tensile strength
  (28,600 of each)

• Growers hand tied twine as usual testing hop growth on
  1 or more varieties

• 2\textsuperscript{nd} Sight tied twines via a metal wrap at Olsen Brothers

• Growers harvested as usual
Results

- Tiers HATE this material: Too limp to tie by hand.
- ALL tested varieties grew normally
- No breakage of any twines
- Initial Breaking Strength (~100 lbs)
- Harvest Breaking Strength (~92 lbs vs. 45 lbs)
- Top Cutters Harvested OK – some binding
- Processed OK – some issues with tangling in choppers
# Twine Comparisons

<table>
<thead>
<tr>
<th>Material</th>
<th>Pros: consistent, strong, automation friendly</th>
<th>Cons: new, supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLA*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td>Pros: consistent, available</td>
<td>Cons: not automation friendly, Cu treat</td>
</tr>
<tr>
<td>Coir</td>
<td>Pros: standard</td>
<td>Cons: not consistent, treatment, degrades, supply</td>
</tr>
<tr>
<td>Jute*</td>
<td>Pros: consistent, strong, automation friendly</td>
<td>Cons: new, supply</td>
</tr>
<tr>
<td>Hemp*</td>
<td>Pros: consistent, strong, automation friendly</td>
<td>Cons: new, supply</td>
</tr>
</tbody>
</table>
Fully Automated Twining and Staking System (FATSS)

**Base Platform for attachment of multiple implements**
Fully Automated Twining and Staking System (FATSS) Test Bed
Specifications:

Twine and Stake 250 acres in ~6 weeks

Need ~7 sec/operation
~1/10,000 failure rate
## Twining Costs

<table>
<thead>
<tr>
<th>Costs/Acre</th>
<th>2020</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>$210.00</td>
<td>Range $190-$220/acre</td>
</tr>
<tr>
<td>twine (3,000/acre)</td>
<td>$338.25</td>
<td>Coir @ $0.0055/ft</td>
</tr>
<tr>
<td>twine processing</td>
<td>$50.74</td>
<td>labor for soaking, etc.</td>
</tr>
<tr>
<td>twine holding</td>
<td>$6.77</td>
<td>Cost to hold 6 months</td>
</tr>
<tr>
<td>Overhead</td>
<td>$175.67</td>
<td>29% of above costs, low estimate</td>
</tr>
<tr>
<td>Stringing Losses (2%)</td>
<td>$30.00</td>
<td>50% restring</td>
</tr>
<tr>
<td></td>
<td>$150.00</td>
<td>50% Loss</td>
</tr>
<tr>
<td>Total Cost/Acre</td>
<td>$961.42</td>
<td></td>
</tr>
<tr>
<td>Cost/500 Acres</td>
<td>$480,710.36</td>
<td></td>
</tr>
</tbody>
</table>
**FATSS Schedule**

**2020:** Finish design and build of mobile platform  
Beta test tying test bed on mobile platform  
Goal: to twine ~20 acres  
Finish design of staking mechanism  
Test staking mechanism in Fall 2020  
Test twines over winter

**2021:** Supply 4-6 units on initial lease  
Systems may/may not have staking  
Engineers in area during testing for support

**2022:** Release 4-6 units

2023 and beyond: Release units as needed
Cost: Approximately $240,000/year
5 year lease

FATSS Mobile Platform

Service and Support
1 prestringing visit
1 post stringing visit
Repair service during season
Driver Training

Twine
2nd Sight will source, order, and deliver
Thank You!

Questions?