Mechanical Harvesting Systems

Trunk-Shake-Catch (TSC)
A TSC set includes three machines—a shaker, a receiver, and a field truck (goat). Trunks are shaken between 5 and 10 seconds to remove fruit. Trees have to be “skirted” to allow shaker and receiving units to position underneath the tree canopy. Fruit is caught and conveyed to a cart holding up to 90 boxes of fruit.

Continuous Canopy Shake & Catch (CCSC)
One CCSC set includes a minimum of four machines—two harvesting units and two field trucks. Working in parallel, a CCSC system travels between 1 and 2 mph down each side of the tree row. Shaker heads penetrate the canopy to remove fruit. Caught fruit is conveyed to a trailing field truck. CCSC system is well suited for long rows and uniform sized trees. Trees have to be “skirted” to allow optimal fruit collection.

Tractor Drawn Canopy Shake (T-CS)
T-CS uses a harvesting mechanism similar to the CCSC. T-CS harvests fruit from one side of the tree canopy at a time, dropping fruit to the ground. A hand crew picks up ground fruit and gleans remaining fruit in the tree. Suited for older, non-uniform trees. Skirting is recommended but not necessary.

January 2006

MECHANICAL HARVESTING CAN SAVE YOU MONEY

MECHANICAL HARVESTING CRITERIA FOR SUCCESS:

1. Lower net harvesting cost
2. High labor productivity
3. Little, if any, negative impact on tree health
4. Higher on-tree returns

UNIVERSITY OF FLORIDA IFAS
A citrus initiative, passed in 2005, is funding the following IFAS scientists to continue research and education efforts in mechanical harvest:

<table>
<thead>
<tr>
<th>Name/Title</th>
<th>Unit</th>
<th>Program Focus</th>
<th>Phone/Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harold Browning</td>
<td>CREC</td>
<td>Program Coordinator IFAS Citrus Program</td>
<td>863-956-1151 <a href="mailto:hwbr@ufl.edu">hwbr@ufl.edu</a></td>
</tr>
<tr>
<td>Tom Burks</td>
<td>GNV</td>
<td>Robotics</td>
<td>352-392-1864 <a href="mailto:TFBurks@ifas.ufl.edu">TFBurks@ifas.ufl.edu</a></td>
</tr>
<tr>
<td>Jacqueline Burns</td>
<td>CREC</td>
<td>Abscission</td>
<td>863-956-1151 <a href="mailto:jkbu@ufl.edu">jkbu@ufl.edu</a></td>
</tr>
<tr>
<td>Bill Castle</td>
<td>CREC</td>
<td>Grove Design</td>
<td>863-956-1151 <a href="mailto:bcastle@ufl.edu">bcastle@ufl.edu</a></td>
</tr>
<tr>
<td>Reza Ehsani</td>
<td>CREC</td>
<td>Machine Enhancements</td>
<td>863-956-1151 <a href="mailto:ehsani@ufl.edu">ehsani@ufl.edu</a></td>
</tr>
<tr>
<td>Renee Goodrich</td>
<td>CREC</td>
<td>Food Safety</td>
<td>863-956-1151 <a href="mailto:goodrich@ufl.edu">goodrich@ufl.edu</a></td>
</tr>
<tr>
<td>Kelly Morgan</td>
<td>SWFREC</td>
<td>Tree Health</td>
<td>239-658-3400 <a href="mailto:ktm@ifas.ufl.edu">ktm@ifas.ufl.edu</a></td>
</tr>
<tr>
<td>Fritz Roka</td>
<td>SWFREC</td>
<td>Economic Evaluations Grower Education</td>
<td>239-658-3400 <a href="mailto:fmroka@ufl.edu">fmroka@ufl.edu</a></td>
</tr>
<tr>
<td>Bob Rouse</td>
<td>SWFREC</td>
<td>Grove Design</td>
<td>239-658-3400 <a href="mailto:rrouse@ufl.edu">rrouse@ufl.edu</a></td>
</tr>
<tr>
<td>Jim Syvertsen</td>
<td>CREC</td>
<td>Tree Health</td>
<td>863-956-1151 <a href="mailto:jmsn@ufl.edu">jmsn@ufl.edu</a></td>
</tr>
</tbody>
</table>

CREC– Citrus Research and Education Center, Lake Alfred
GNV– Gainesville
SWFREC– Southwest Florida Research and Education Center, Immokalee

**UF/IFAS Mechanical Harvesting Program Elements**

**Abscission**
- Enabling late season Valencia mechanical harvesting
- Develop management scenarios
- Screen alternate agents
- Support CMNP registration

**Machine Enhancements/Robotics**
- Catch-frame improvement
- Robotic systems
- Yield monitoring
- Research of pick-up machines and food safety concerns
- On-board canker decontamination

**Grower Education**
- Soliciting grower intentions
- Addressing processors concerns
- Developing new publications and extension products
- Developing decision aiding tools

**Tree Health**
- Effects of mechanical harvesting on tree health or tree longevity
- Effects of abscission on yield and tree longevity

**Grove Design**
- New nursery tree standards for mechanical harvesting systems
- Strategies for refitting existing trees or groves

**Economic Evaluation**
- System performance
- Analysis of load allocations
- Efficiency gains
- Incorporating costs and benefits of mechanical harvesting from the nursery tree to the processed juice.