Increasing work efficiency and reducing production costs in table grape vineyards through mechanization

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Issues and Challenges

Labor issues

- Decline in workforce pool
- Increase in minimum wage
- Aging agriculture workers

Mechanization is an important solution for labor issues, but remains challenging in table grape vineyards

Challenges of mechanization in table grapes

- Open gable system (picture above) is the most used trellis system in California table grape vineyards
- Highly structured trellis makes mechanization difficult
- Table grape production requires more control over number and positions of shoots and clusters
- Currently available technology cannot achieve such level of precision

Project Example: Evaluate Pruning Mechanization Technologies

Driven by need assessment

- Pruning is labor intensive and expensive
- Pruning mechanization is identified as the research priority by grower survey conducted by CA table grape commission (CTGC)
- Growers express strong interests on novel pruning technologies during informal interviews

Supported by industry

- Project was funded by CTGC
- One medium-size and two large-size growers participated in research
- Two manufacturers and one local dealer provided equipment for the evaluation
- More than 30 people presented at the field demonstration

Knowledge delivered in different methods

- Presentations at industry meetings
- Podcasts
- Trade journal articles
- Communication with growers during farm calls
- Video demonstration (upcoming)
- Pruning mechanization calculator (upcoming)

Table. Cost saving resulted from pruning mechanization (expressed on per acre basis)

<table>
<thead>
<tr>
<th>Spur pruned vineyard</th>
<th>Cane pruned vineyard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andros pre-pruner (S$7,000 – S$2,480)</td>
<td>S$40 – S$120 (based on trellis system and unit model)</td>
</tr>
<tr>
<td>Klima cane pruner (S$18,000)</td>
<td>S$120 – 160</td>
</tr>
<tr>
<td>Battery powered pruner (~ S$1200)</td>
<td>S$15 – 35</td>
</tr>
<tr>
<td>Battery powered tying machine (~ S$1500)</td>
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</tbody>
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Impacts observed one year after the evaluation

- Two growers started to adopt mechanical tools that were evaluated in this trial
- The success of this evaluation promotes collaboration with other manufacturers and allow incorporation of grower needs at the development stage of new technologies

Other Ongoing Projects on Mechanization

- Explore mechanizing options for shoot thinning and leaf removal
- Evaluate tools and technologies for accurate yield estimation
- Assess novel instrument for measuring berry composition non-destructively
- Continue exploring methods for effective knowledge extension

Figure. Vineyard on an open Gable trellis system

Figure. Field demonstration for battery powered pruning tools

Figure. Evaluate pre-pruner at grower field