Labor Issues and Alternative Technologies

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Focus on CA / Central Coast Agriculture…

- Value of production $5.3B 2016.
- Fresh market crops dominate.
- Labor intensive practices: **weeding**, pruning/training, irrigation, **harvest**.
- Labor costs approx. 30 – 60% of production and harvest costs.
- Labor costs rising – many reasons.

Rising Ag Labor Costs…

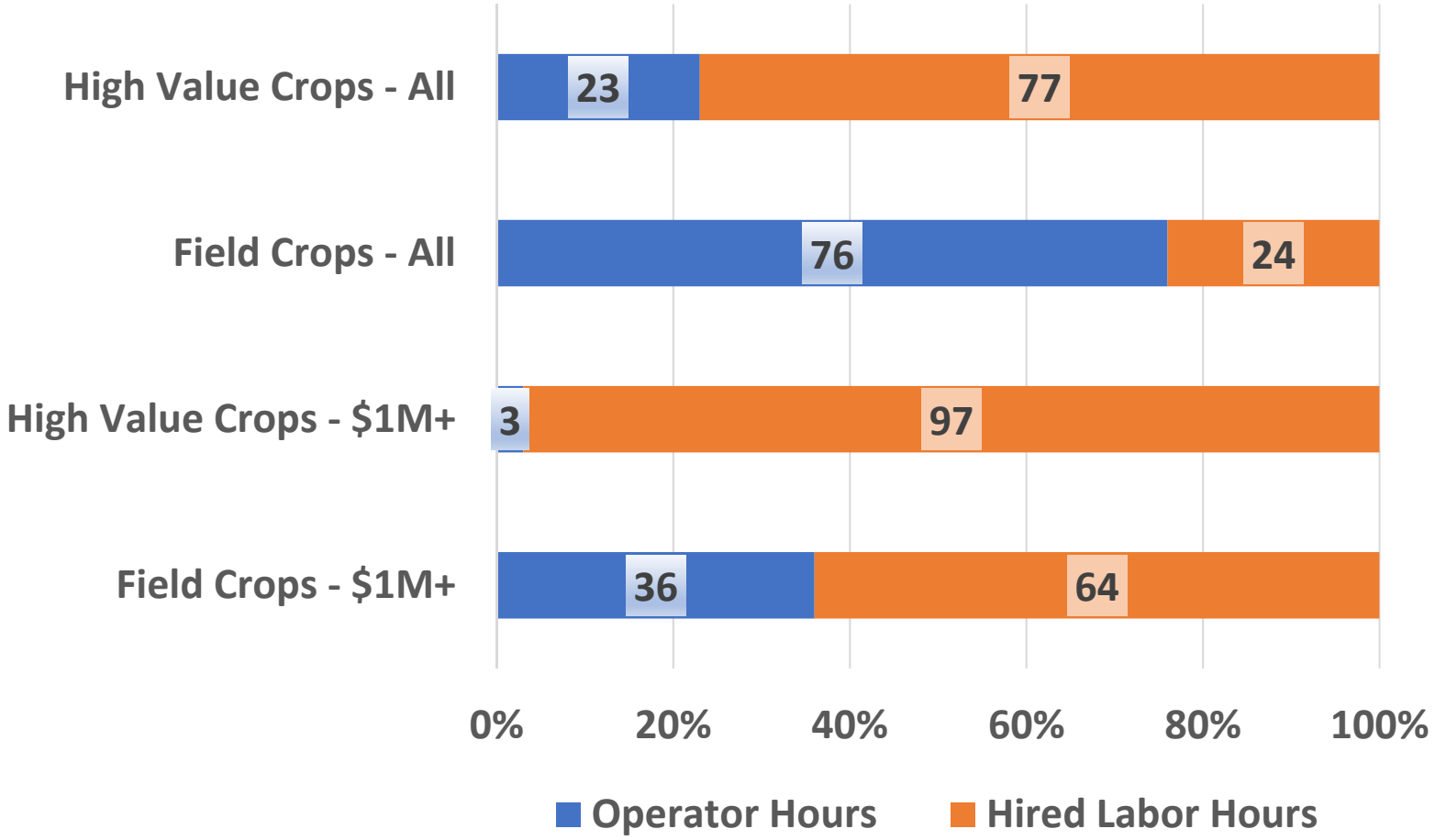
- Changing regulations – minimum wage, overtime, health care, sick leave, non-productive time.
- Foreign born workers aging and settled; few newcomers.
- Experienced workers less likely to migrate with crops production and harvest cycles.
- Industry expansion in Mexico; workforce integration and competition.

Ag Labor Costs & Issues (cont)

- Reduced supply + increased demand
- Increase in federal H-2A GW program
  - Recruitment, requirements
  - Impact on local communities
- Affordable housing constrained or lacking

***Sources: Research of Phil Martin, Ed Taylor, Diane Charlton, Others**

*Hours Worked by Farm Type and Labor Source**



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***Adapted from: Fisher and Knutson**
Uniqueness of Ag Labor Markets – AJAE - 2012

*Impact on farms and industry?**

"Disced the field"

"Lost crop and sales"

"Paid higher wages"

"Worked harder, longer hours"

"Sold out"

"Sized down"

"Nothing"

"Used mechanical harvest"

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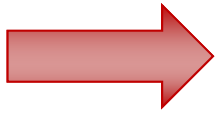
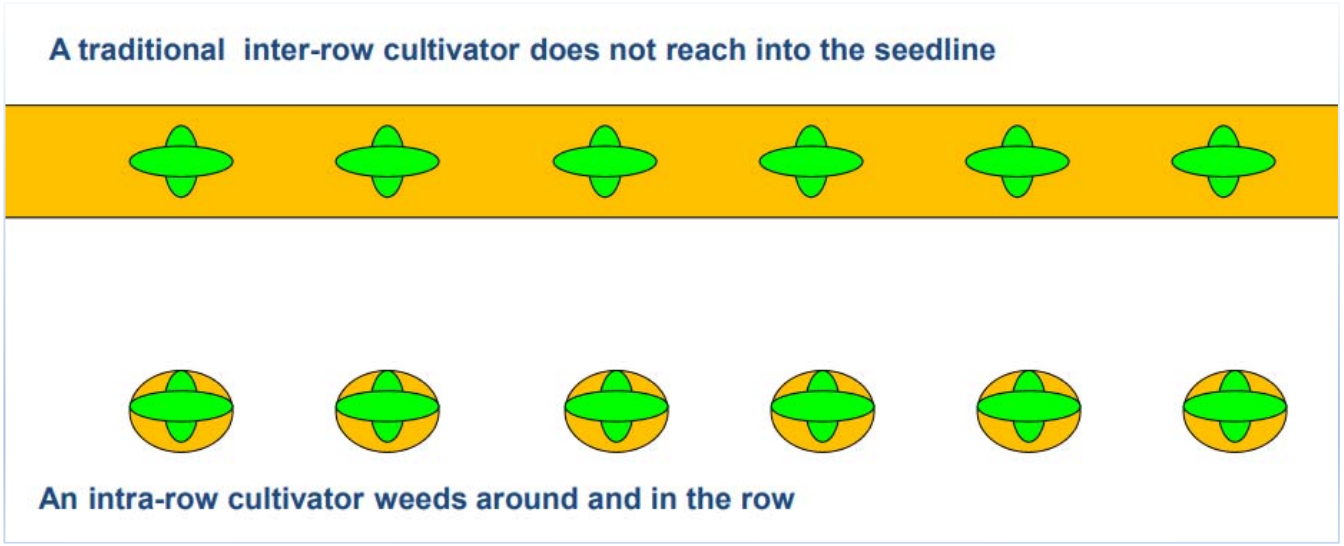
**Survey responses from Fruit Grower News May 2018*

*"The Race in the Fields…."**

- **Rising imports?**
- **More foreign guest workers?**
- **Mechanization/automation?** 

* Source: Martin, P.L. 2017. The race in the fields: Imports, machines and migrants. California Agriculture. http://calag.ucanr.edu/.

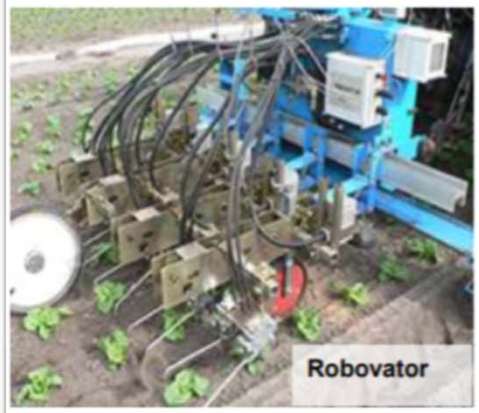
Prior Research, Multiple Projects…



"Mechanization is a process not an event"

(Phil Martin)

Intelligent Cultivators



Developed in Europe – now commercially available in U.S.

All use same basic technology:
camera (detection), computer (decision), "kill mechanism"

"Crop Signaling" in Vegetable Crops

- Funded by USDA – NIFA - SCRI.
- Collaborators: UCD, UCCE, UA, WSU.
- Design/develop machine - decrease reliance on labor and herbicides.
- Evaluate investment and operation costs and impact on labor, yield, net returns at farm level.
- Assess implications for vegetable industry.
- Initial focus on lettuce and tomatoes.

Crop Signaling – "Value Added"

Same basic technology plus "signal" or "tag" at planting
Machine trained / learns how to distinguish crop from weeds
Removes weeds by cultivation or micro-dose spray.

*Preliminary evaluations – hand weeding – Iceberg lettuce**

STANDARD CULTIVATION	***ACRE***	***FARM (250 ACRES)***	***INDUSTRY (89,500 ACRES)***
Labor hours	9.5	2,375	850,250
Labor cost/hour ($)	16.90	16.90	16.90
Labor cost ($)	161	40,250	14,409,500
AUTOMATED CULTIVATION†			
Labor hours	5.9	1,475	528,050
Labor cost ($)	100	25,000	8,950,000
Change ($)	61	15,250	5,459,500

** Standard cultivation from 2017 UC cost and return study for iceberg lettuce. Per hour labor cost is base wage of $12 plus 41% benefits (rounded). Industry acreage is for 2016.*

† Field trials estimate that auto. cult. (Robovator) reduces hand weeding (hrs) by 38% (ranges from ~ 23 – 55%). Crop signal field trials in progress.

*Standard vs Automated Weed Technology**

COSTS / DETAILS	*STANDARD*	*ROBOVATOR*	*CROP SIGNAL*
Equipment cost (unit)	9,500	149,000	?
Equipment cost (acre)	38	596	?
Years of life	10	10?	?
Salvage value	1,680	?	?
Capital recovery	1,097	19,296	?
Taxes and insurance	61	811	?
Annual cost	1,158	20,107	?
Cost per acre	$5	$80	?

** Assumptions: standard (sled) cultivator data from 2017 UC lettuce cost and return study; farm size (block size) = 250 acres; Robovator cost (single row) from Pacific Ag Rentals, Salinas. Crop Signal ?? (TBD)*

New Technologies – Questions

- Purchase price / development cost?
- Years of life?
- Repairs and maintenance?
- Salvage value vs obsolescence?
- Training costs / higher operator wages?
- NPV? Other?
- Risk / uncertainty?

Comments / Discussion Welcome

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