# *Recent Developments in Hand Weeding Costs of Vegetables**

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University of California
Agriculture and Natural Resources

# *Questions for today…*

What are weed management practices and costs?

How might new labor laws impact costs?

How might mechanization impact practices and costs?

# *Recent Central Coast Cost and Return Studies -*

## Production and harvest practices and costs

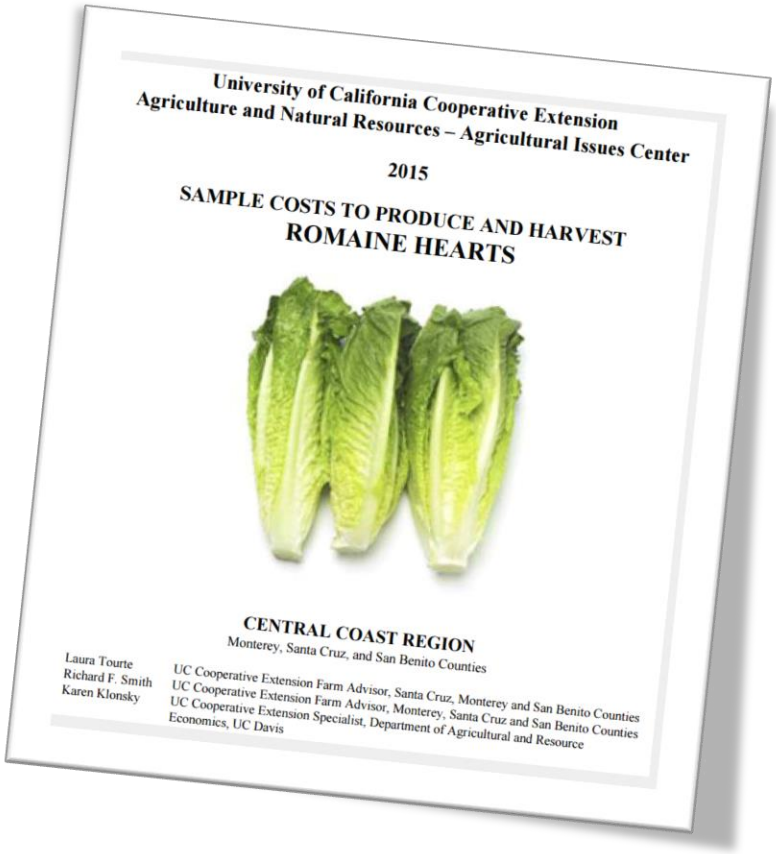
**2015**

- Romaine Hearts Lettuce
- Organic Spinach

**In progress**

- Iceberg Lettuce
- Broccoli

**http://coststudies.ucdavis.edu**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2015

SAMPLE COSTS TO PRODUCE AND HARVEST
ROMAINE HEARTS

CENTRAL COAST REGION
Monterey, Santa Cruz, and San Benito Counties

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# *Study Labor Rates – 2010 and 2015**

| Year | 2010 ($/hour) | 2015 ($/hour) | Percent Increase |
|---|---|---|---|
| Field labor (base wage) | 8.50 | **11.50** | 35 |
| Field labor with benefits† (wage + percent benefits) | 11.40 | **16.10** | 41 |
| Machine labor (base wage) | 10.00 | **15.50** | 55 |
| Machine labor with benefits (wage + percent benefits) | 13.40 | **21.70** | 62 |

*** Source: UC Cooperative Extension Cost and Return Studies. http://coststudies.ucdavis.edu.**

**† Benefits rates included in studies: 34% (2010) or 40% (2015).**

# *Production and Harvest Costs – 2015 Studies**

**Romaine Hearts**

| Category | Cost ($/Acre) |
|---|---|
| *Cultural* | *2,874* |
| Business Overhead | 1,771 |
| Investment | 324 |
| **Subtotal** | **4,969** |
| Harvest | 5,813 |
| **Total** | **10,781** |

**Organic Spinach**

| Category | Cost ($/Acre) |
|---|---|
| *Cultural* | *4,336* |
| Business Overhead | 1,261 |
| Investment | 219 |
| **Subtotal** | **5,831** |
| Harvest | 1,300 |
| **Total** | **7,131** |

Weed management included in cultural costs

* Source: UC Cooperative Extension Cost and Return Studies. http://coststudies.ucdavis.edu.

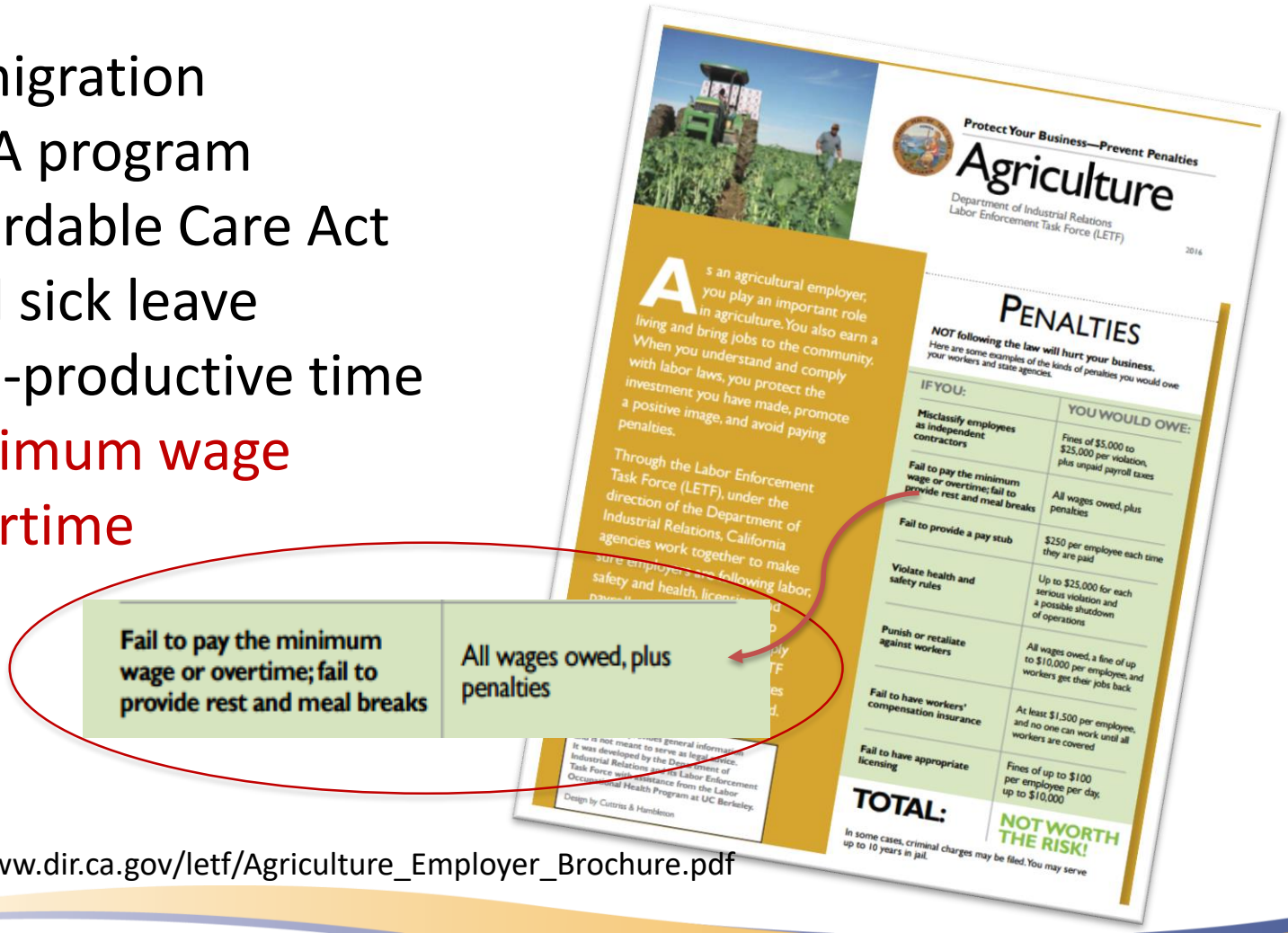
# *Weed Management Practices & Costs 2015**

| Practice | Romaine Hearts ($/acre) | Organic Spinach ($/acre) |
|---|---|---|
| Herbicide application | 43 | 0 |
| Mechanical cultivation | 40 | 39 |
| Hand weeding | 143 | 440 |
| ***Total weed mgt cost*** | ***236*** | ***479*** |
| Percent (of cultural costs) | 8 | 11 |
| ***Field+machine labor costs*** | ***185*** | ***461*** |
| Percent (of weed mgt cost) | 78 | 96 |

* Source: UC Cooperative Extension Cost and Return Studies. http://coststudies.ucdavis.edu. Costs per acre include materials, equipment, and labor ($16.10/hr. field; $21.70/hr. machine).

# *Labor Challenges: Availability and Higher Costs*

- Immigration
- H-2A program
- Affordable Care Act
- Paid sick leave
- Non-productive time
- Minimum wage
- Overtime




http://www.dir.ca.gov/letf/Agriculture_Employer_Brochure.pdf

# *Minimum Wage Law (SB 3): Phase-In Schedule**

| Date | $/hour - 26 or more employees | $/hour – 25 or fewer employees |
|---|---|---|
| Current | 10.00 | 10.00 |
| Jan 1 2017 | 10.50 | 10.00 |
| Jan 1 2018 | 11.00 | 10.50 |
| Jan 1 2019 | 12.00 | 11.00 |
| Jan 1 2020 | 13.00 | 12.00 |
| Jan 1 2021 | 14.00 | 13.00 |
| Jan 1 2022 | **15.00** | 14.00 |
| Jan 1 2023 | 15.00 | **15.00** |

* Source: California Legislative Information Senate Bill No. 3.
Notes: Governor may suspend increase in years with budget crises.
In 2024 minimum wage will increase with inflation.
Less than 5% of affected workers are in agriculture.
(UC Berkeley Labor Center – March 2016).

# *Projection of weed management costs with increase in minimum wage - example**

| | 2015 | 2022 | Difference |
|---|---|---|---|
| Field labor ($/hour)† | 11.50 | 15.00 | $ 3.50 |
| Machine labor ($/hour) | 15.50 | 20.15 | $ 4.65 |
| Labor cost ($/acre) – romaine hearts | 185 | 241 | $ 56.00 |
| Labor cost ($/acre) – organic spinach | 461 | 599 | $ 138.00 |

* Exercise projecting 30% increase for field labor and similar increase for machine labor, using 2015 UC Cooperative Extension Cost and Return Studies http://coststudies.ucdavis.edu.

† Hourly wage figures do not include a benefits package.

# *Overtime Law: AB 1066 – Phase-In Schedule**

| Date | Hours/day 26 or more employees | Hours/week 26 or more employees | Hours/day 25 or fewer employees | Hours/week 25 or fewer employees |
|---|---|---|---|---|
| Current | 10.0 | 60 | 10 | 60 |
| Jan 1 2017 | 10.0 | 60 | 10 | 60 |
| Jan 1 2018 | 10.0 | 60 | 10 | 60 |
| **Jan 1 2019** | **9.5** | **55** | 10 | 60 |
| Jan 1 2020 | 9.0 | 50 | 10 | 60 |
| Jan 1 2021 | 8.5 | 45 | 10 | 60 |
| **Jan 1 2022** | **8.0** | **40** | **9.5** | **55** |
| Jan 1 2023 | 8.0 | 40 | 9.0 | 50 |
| Jan 1 2024 | 8.0 | 40 | 8.5 | 45 |
| **Jan 1 2025** | 8.0 | 40 | **8.0** | **40** |

Start 26 or more

Start 25 or less

* California Legislative Information Assembly Bill No. 1066.
Law includes provisions for different overtime compensation and days of rest.

# *Average hours per week for U.S. hired farm workers**

| | April 2015 | July 2015 | October 2015 | January 2016 | Overtime hours† |
|---|---|---|---|---|---|
| U.S. | 40 | 41 | 42 | 39 | |
| California | 42 | 44 | 44 | 41 | 1-4 |
| Arizona | <----------46-47----------> | | | | |

* Source: Martin, P.L. Labor cost challenges facing California agriculture, ARE Update 20(1), using limited data from USDA's Farm Labor Report. Caveats: CA average hours/week includes long-season and livestock workers; data does not include workers from farm labor contractors.

† For CA if AB 1066 were in place during this time period.

# *Considerations**

- Overtime law most likely to affect irrigators and equipment operators because of nature of work.
- Slowdown in Mexico – U.S. migration since recession; few newcomers.
- Labor availability constrained – many employers likely to improve efficiency in scheduling or pay overtime rather than try to recruit and train additional workers.
- Many new workers are H-2A guest workers.

* Source: Martin, P.L. Labor cost challenges facing California agriculture. ARE Update 20(1). http://giannini.ucop.edu/publications/are-update/.

# *4-S Responses to Higher Wages**

***Satisfy*** – retain workers through added benefits or bonuses

***Stretch*** – workforce with mechanical aids[5]

***Substitution*** – replace workers with machines

***Supplement*** – current workers with H-2A guest workers

**Are there additional S's to consider?**

***Shift* – shift to alternative crops that require less labor ??**

***Shrink* – production acreage and/or operation ??**

* Source: Martin, P.L. Labor cost challenges facing California agriculture. ARE Update 20(1). http://giannini.ucop.edu/publications/are-update/.

# *Mechanization as substitute for labor*

- Successfully developed and introduced for some crops over time.
- Mechanization in fresh market crops has not been as straightforward.
  - Quality attributes of fresh products.
  - Labor availability and cost.
  - Investment cost.
- Recent developments in planting, thinning, weed management (and harvest).

# *Mechanized Thinning, Weeding, Planting - Examples*

Blue River Technology
Automated Thinning

Steketee

THE ROBOVATOR

Automated
Weeding

Plant Tape
Automated Transplanting

## *Why Mechanize? (Incentives)*

- Labor constraints
- Higher cost labor
- Reduced herbicide use/access
- Gains in knowledge/skills
- Opportunity for business and workers

## *Why Not Mechanize? (Drawbacks)*

- Investment cost
- Knowledge/training needs
- Change of practices/production
- Level of “comfort” with technology and change

***“Mechanization is a process, not an event”***

Phil Martin – Professor Emeritus, UC Davis

# *Weed Management Mechanization Projects*

**Past: Machine Assisted Inter- and Intra-row Cultivators**

- Reduced hand weeding times (in many cases)
- Higher rate of precision in transplanted crops
- Lower yield with less precision
- Net returns to growers inconsistent

**Present: Automated Weed/Crop Differentiation**

- Evaluation of potential investment cost
- Evaluation of operational cost
- Evaluation of yield and net returns to growers

*The process continues….*

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