

# **The Economics of Harvest Mechanization for Fruit Crops**

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The views presented here do not necessarily reflect official USDA policy

# Compare and Contrast

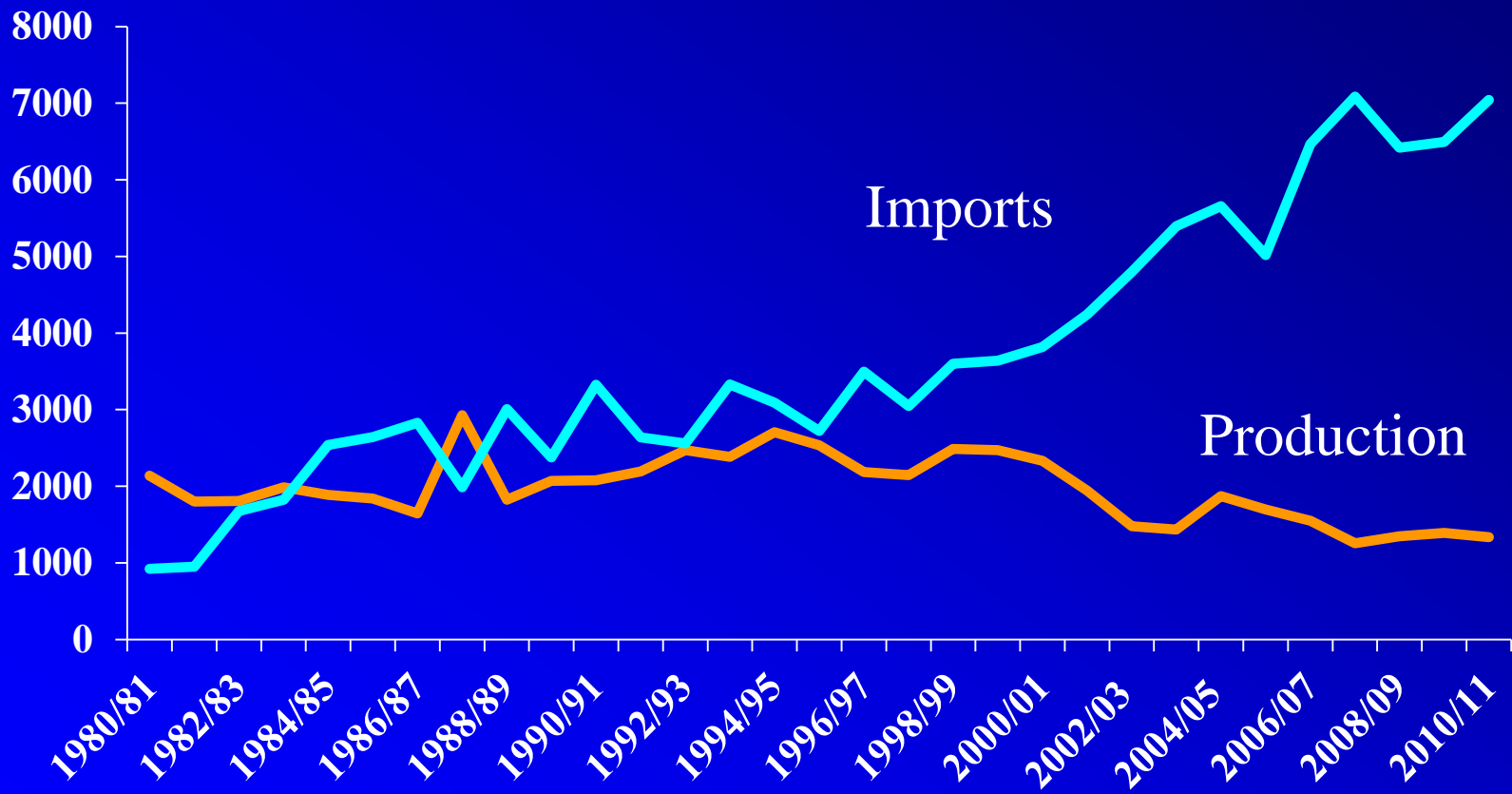
- **Mechanical Harvesting of Sweet Oranges for Juice Processing—Roka and Hyman**
- **Mechanical Harvest in U.S. Tart Cherries--Thornsberry, Woods, and McManus**
- **Preliminary Validation of Harvest Assist Systems for Washington Apples--Gallardo, Lewis, Hanrahan, and Seavert**
- **Economics of Mechanically Harvesting California Black Ripe Table Olives--Klonsky, Livingston, DeMoura, Krueger, Rosa, Miles, Castro-Garcia, Fitchner, Guinard, Lee, Gloze, Crisosto, Burns, and Ferguson**
- **Mechanical Harvesting of Northern Highbush Blueberries for Processing (and Fresh?) in Michigan—Longstroth, and Woods**

# Why mechanize?

- Unpredictable labor availability due to legal issues
  - Between 2005-07, 52 percent of the hired workers in crop agriculture were unauthorized immigrants (DOL)
- Expensive labor
  - Labor makes up 42 percent of the variable production expenses for U.S. fruit and vegetable farms.
  - In 2009, the California minimum wage was \$8.00 *per hour*; the minimum wage in Mexico ranged from \$3.49 to \$4.16 *per day*.

- Most commodities operate in a global trade environment
  - Imports: 30 percent of *fresh* fruit consumption

# U.S. apple juice production and imports



Source: USDA, Economic Research Service, Situation and Outlook Fruit and Tree Nuts Yearbook

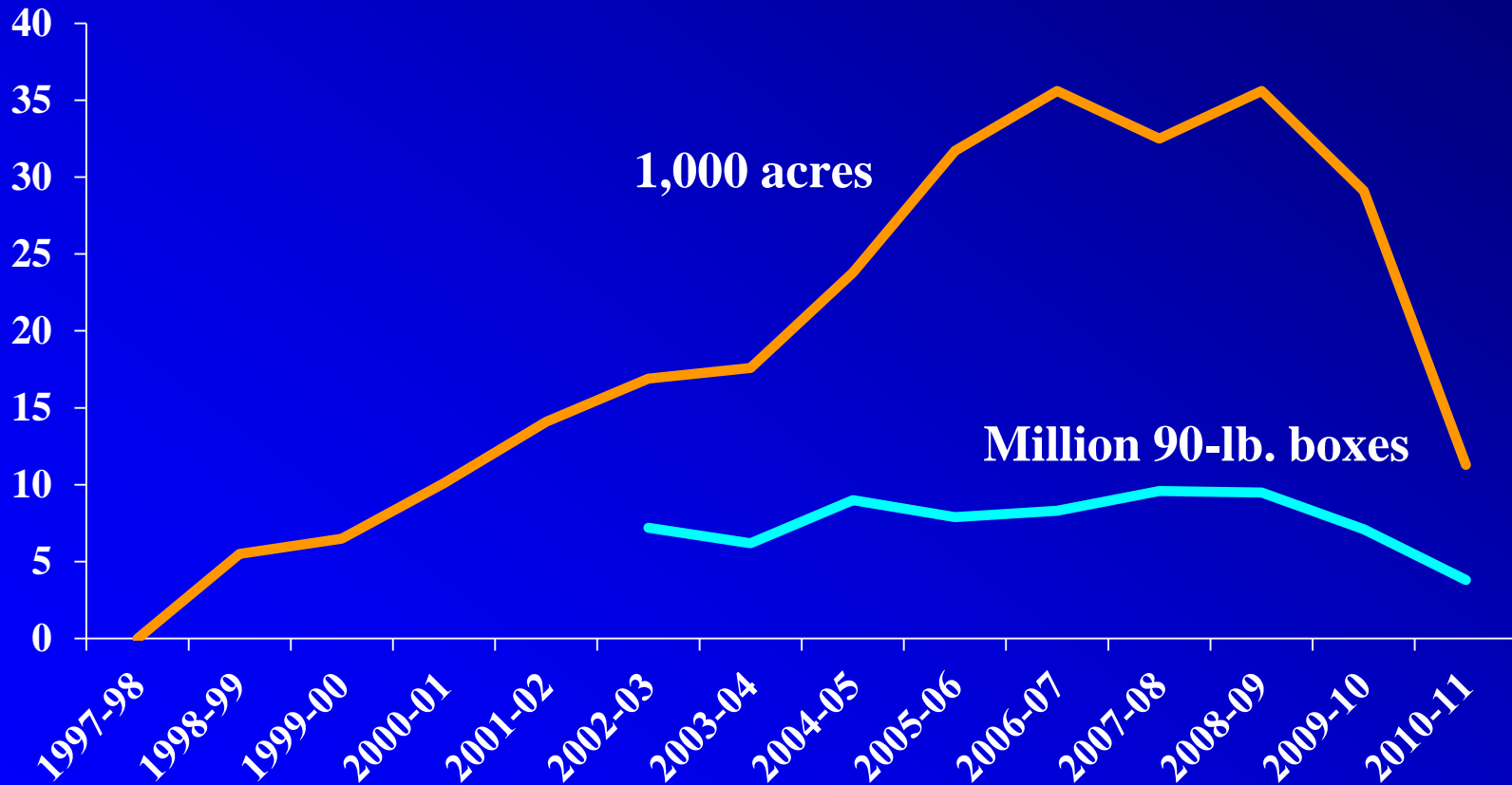
# Who can mechanize?

- An industry with a mechanical harvester that is more economical than hand labor.
- Not everyone within an industry will be able to mechanize. Growers will have to consider the trade-offs in annual labor savings and upfront investment in new machines and new orchards if that is required.

# Mechanical Harvesters Available?

Crop	Processing market	Fresh market	Status
Oranges for juice	YES, partially mechanized		Mechanical harvester is available but it has some problems
Tart cherries for processing	YES, completely mechanized		Experimenting with a second wave of mechanical harvester and orchard design that might increase profitability
Olives for canning	NO		Experimenting with mechanical harvester for olives for canning.
Blueberries for fresh and processing market	YES, berries for processing are completely mechanized	Yes, but low adoption rates	Experimenting , in particular, with better harvesters for the fresh market.
Apples for the fresh and processing market	NO	NO	Experimenting with harvest aid platforms for harvesting

# Citrus Mechanically Harvested: Acreage and Boxes



Source: University of Florida, Citrus Mechanical Harvesting Program



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# Motivation for Mechanization

Crop	Labor costs	Imports	Change in Production (1990-92 to 2008-10)	Change in per capita consumption (1990-92 to 2008-10)	Other?
Oranges for juice	YES	YES	-40% since 1997/98 peak	-20%	HLB, canker
Tart cherries for processing	NO	YES	+4%	Canned:-53%	
Olives for canning	YES	YES	-26	+6%	Olive fruit fly
Blueberries for fresh and processing market	YES	NOT for fresh summer season	Fresh:+301 Processing: +152	Fresh:+506% Frozen: +40%	
Apples for the fresh and processing market	Yes	NOT for fresh, YES for processing	All apples:-4% Fresh: +13 Processing:-28	Fresh:-16% Juice: 33%	

# Constraints to mechanization

- A proven technology that is an economical alternative to hand labor
- Lingering concerns about tree or plant health with mechanical harvesters
- High costs of machinery/replanting
- Adjustments in processing plants to deal with machine harvested fruit
- Managerial challenges for growers
- Uncertainty about future markets

# Conclusions

- Almost all commodities are motivated by
  - Labor costs (except tart cherries)
  - Import competition (except summer blueberries and fresh apples)
- Constraints
  - Economical technology alternatives
  - Ability to invest in new technologies



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