Harvesting

Advantages of hand harvest

- Accurate maturity and grade selection.
- Less damage to product.
- Allows multiple harvest.
- Easy to increase harvest rate - just hire more pickers.

Maturity selection

Less product damage?

Strawberry picker damage

Machine harvest advantages

- Less costly, but high capital costs
- 24 hr harvest possible
- Less labor management problems
- Higher wages for workers
- Stabilizes work force size
Machine Harvested Fresh Market Crops

- Underground vegetables:
  - Potatoes, sweet potato, garlic, bulb onions, carrots, turnip, rutabaga, beets, etc.
- Vegetables:
  - Fresh cut spinach, lettuces, etc.
  - Some cabbage, sweet corn, green beans
- Tree nuts and peanuts
- Cranberries

Machine Harvesters for Processed Fruits & Vegetables

- Tree crops
  - Sour cherries, prunes
  - Some peaches, olives, juice oranges
- Vine & bush crops
  - Blueberries, raspberries, raisin & wine grapes, cranberries
- Vegetable crops
  - Peas, beans, corn, pickling cucumbers, tomatoes, peppers, celery, sweet corn, cabbage

Field vs. Shed Packing

Field Pack: Pick → Pack → Transport → Cool/store

Shed Pack: Pick → Transport → Cool/store → Pack → Cool/store

Strawberry - field pack

Night Harvest Strawberries

Tomato - shed pack

GK Machine & Musco Lighting
Pears

1960 worker positioner & fruit handling system

Pears

2005 worker positioner & fruit handling

Citrus - worker positioner

Shake-catch harvest

Catch frame

Shaker Blight
USDA Apple Harvester

- High density trellised orchard
- Use abscission chemical before harvest

Vine & Small Tree Harvesters

- Olives
- Grapes

Tree Nuts

Canopy Management

1980’s Robotic harvest

Vision Robotics 2010s
**Agrobot 2014**

**Field vs. Shed packing**

**Field Pack**

- Pick
- Pack
- Transport
- Cool/store

**Shed Pack**

- Pick
- Transport
- Cool/store
- Pack
- Cool/store

**Transport to Packing Shed**

**Hand Packing**

**Hand Pack Station**

- Box at a minimum 12° to 15° incline above horizontal
- Worker positioned so upper arms are nearly vertical
- Adjustable height floor to allow worker's forearms to be nearly horizontal
- Packaging materials
  - Lamp provides 500 to 1,000 lux at work surface
  - Box supply conveyor
  - Hand-carried box of unpacked product
  - Packed box conveyor
  - Call fruit checker
  - Call fruit conveyor
Machine Grading and Packing