Developing Mechanical Harvesting of California Black Ripe Table Olives

Louise Ferguson, Uriel Rosa, Jacqueline Burns
Sergio Castro, Kitren Glozer, Neil O'Connell, Bill Krueger, Soh Min Lee
JX Guinard, Karen Klonsky, Elizabeth Fichtner, Paul Vossen,
Carlos Crisosto and John Ferguson
and
Rocky Hill Ranch and Burreson Ranch
Bell Carter Olives and Musco Family Olive Company
Erick Nielsen, Dave Loquaci, Phil Scott

50% of Gross Return

Final Goal: 1996 - 2009

- Economical mechanical harvesting that produces good quality olives
  - for existing orchards
  - future orchards

Specific Objectives: 1996 - 2009

I. Picking Technology:
   I. commercially competitive product

II. Efficient Harvester:
   I. > 80% final efficiency

III. Change Orchards:
   I. Increase harvester efficiency

Specific Objectives: 1996 - 2009

I. Picking Technology:
   I. Commercially competitive product

Evaluated two picking methods for effects on fruit quality:

- Canopy contact
- Trunk shaker s

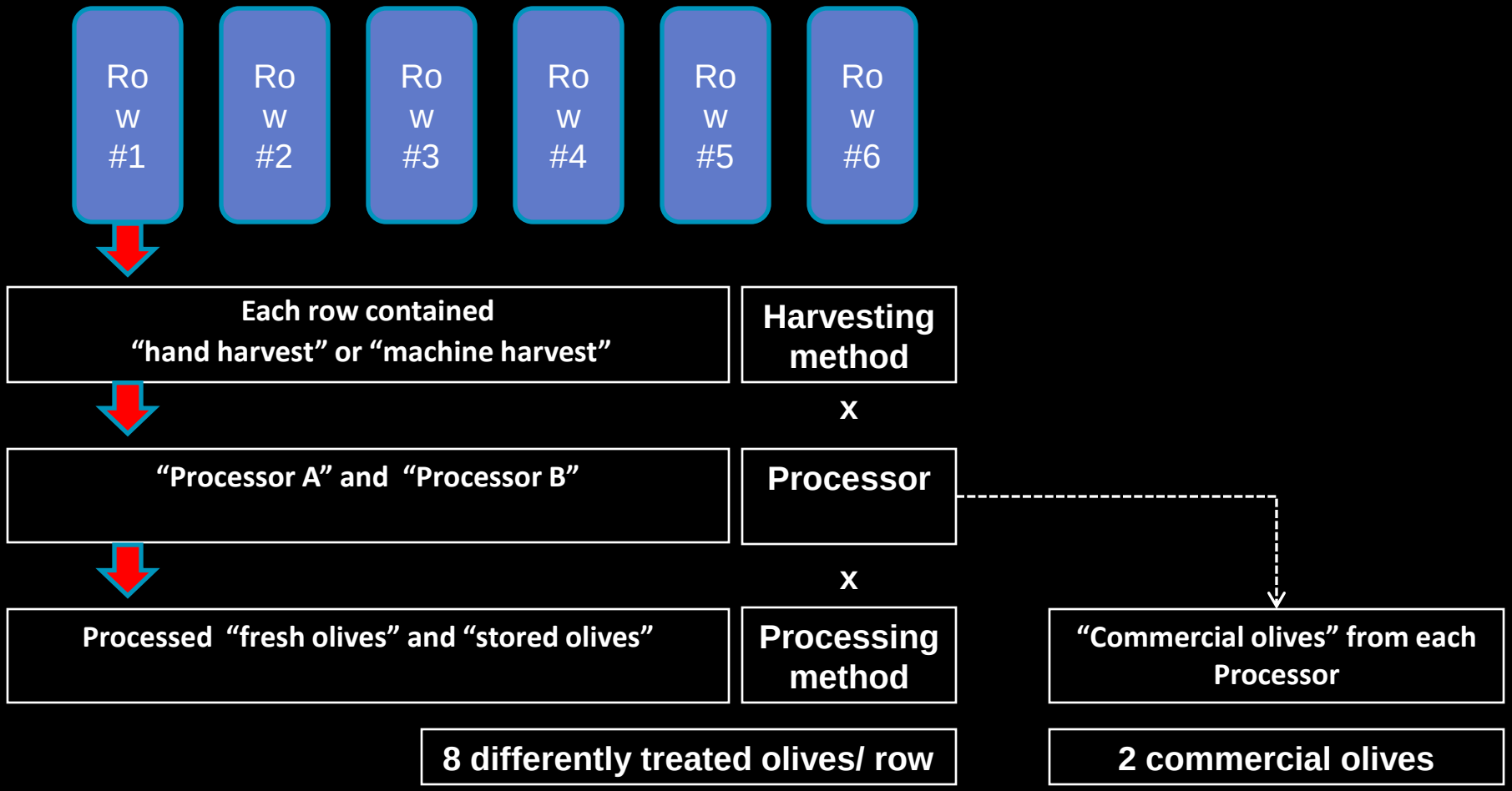
- Canopy Contact
  - 1- 3 heads
  - Passive rotation
  - Continuous harvest


Trunk Shaker

Materials and Methods:

I. Harvested olives with both harvest methods:
   I. Hand harvest control
II. Processed olives
III. Evaluated olives:
   I. Sensory panel - description
   II. Consumer panel – preferences

Experimental design and sampling plan



Samples: 2 X 2 X 2 = 8 + 2 = 10

I. A or B Hand F or S
II. A or B Mach F or S
III. A or B Comm


Trained a sensory panel
ANNIE

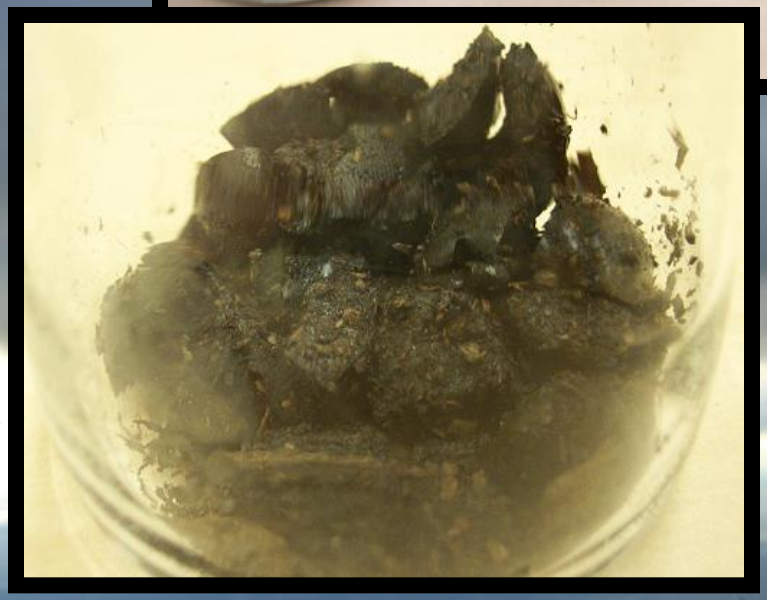
Descriptors for olives:

	Attribute	Reference		Attribute	Reference
Smell (Aroma)	Painty	Correction fluid	Taste/ Flavor	Sweetness	Sucrose solution
	Briny	Black olive brine		Saltiness	Na Cl solution
	Ocean-like	Green seaweed + anchovy*		Umami	MSG + brine
	Fermented	Sauerkraut		Bitterness	Caffeine solution
	Canny	Keys, cans		Roasted	Roasted sunflower seeds
	Earthy	Potting soil*		Buttery	Melted butter + brine*
	Sautéed Mushroom	Sautéed Mushroom*		Ripeness	Unripe ---- Ripe
	Dried Fruit	Dried Prune	Texture/ Mouthfeel	Firmness	
	Floral	Chrysanthemum tea		Juicy/ Moist release	
Appearance	Size	Small ---- Large		Crumbly	
	Oval	Round ---- Oval		Fibrous	
	Surface roughness	Smooth ---- Rough		Mouth coating	
	Glossy	Dull ---- Glossy		Briny after-taste	
	Skin brownness	Black ---- Brown		Lasting flavor	
	Flesh Brownness	Black ---- Brown		Astringent	

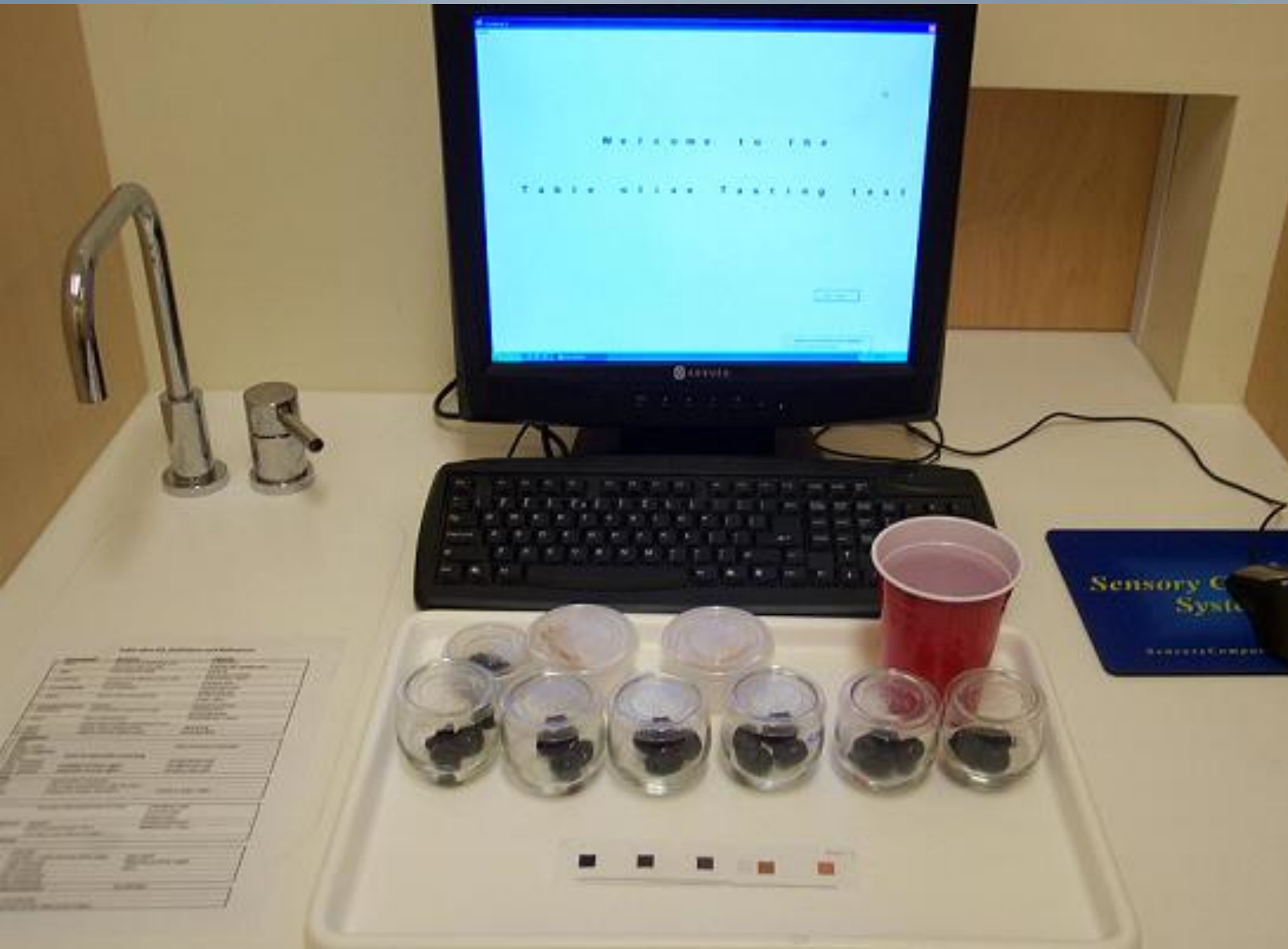
* Mixed with olives

Reference Samples:

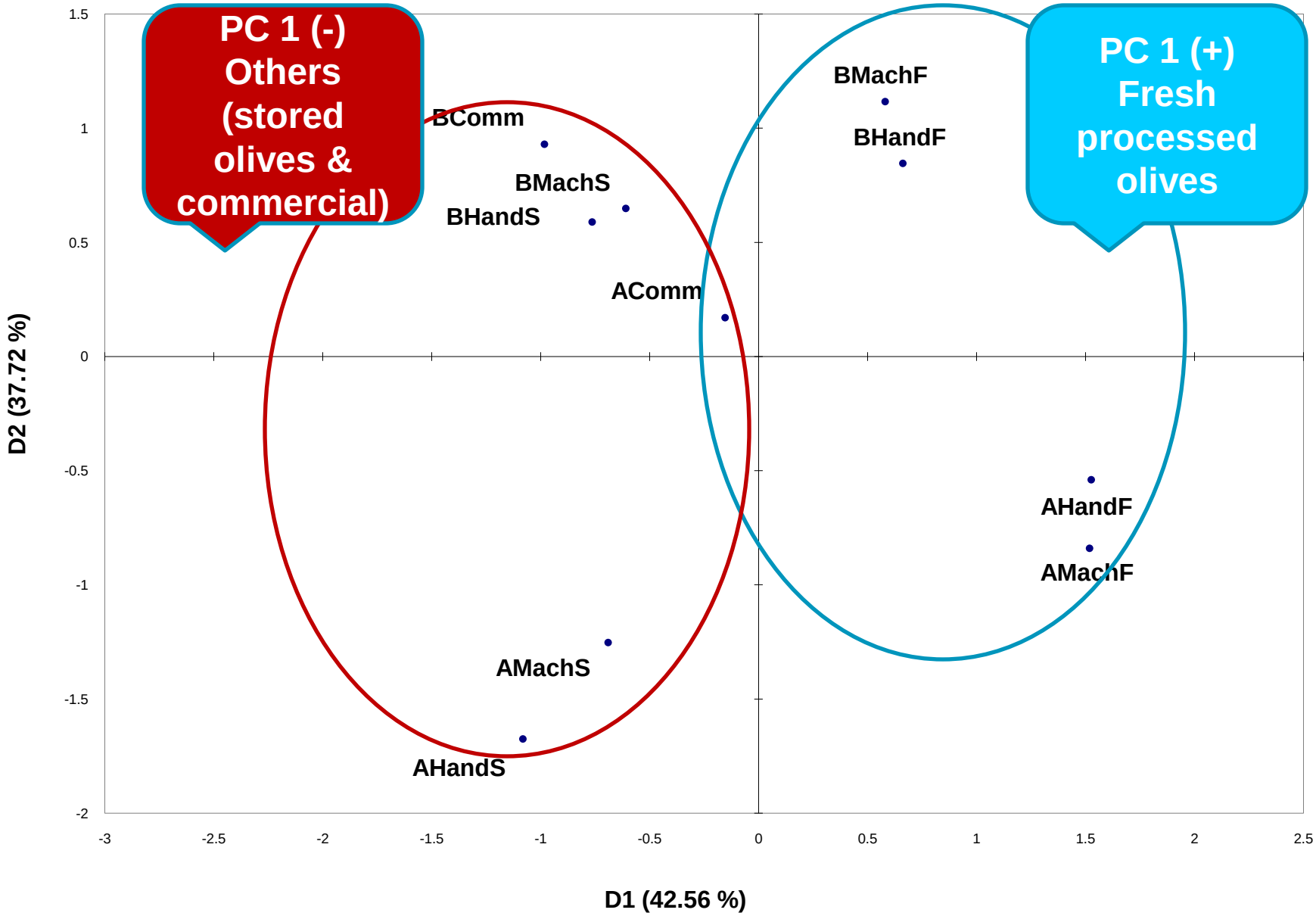
'Earthy' = soil + olives



'Ocean – like' = green seaweed + anchovy + olives


Welcome to the
Table olive Tasting test

Results. Principal component analysis of the descriptive analysis data showing the products (axes D1 and D2: 80.29% of variance)



Descriptive Analysis Results

- Trained sensory panel could **not** distinguish:
  - hand harvested olives
  - mechanically harvested olives.

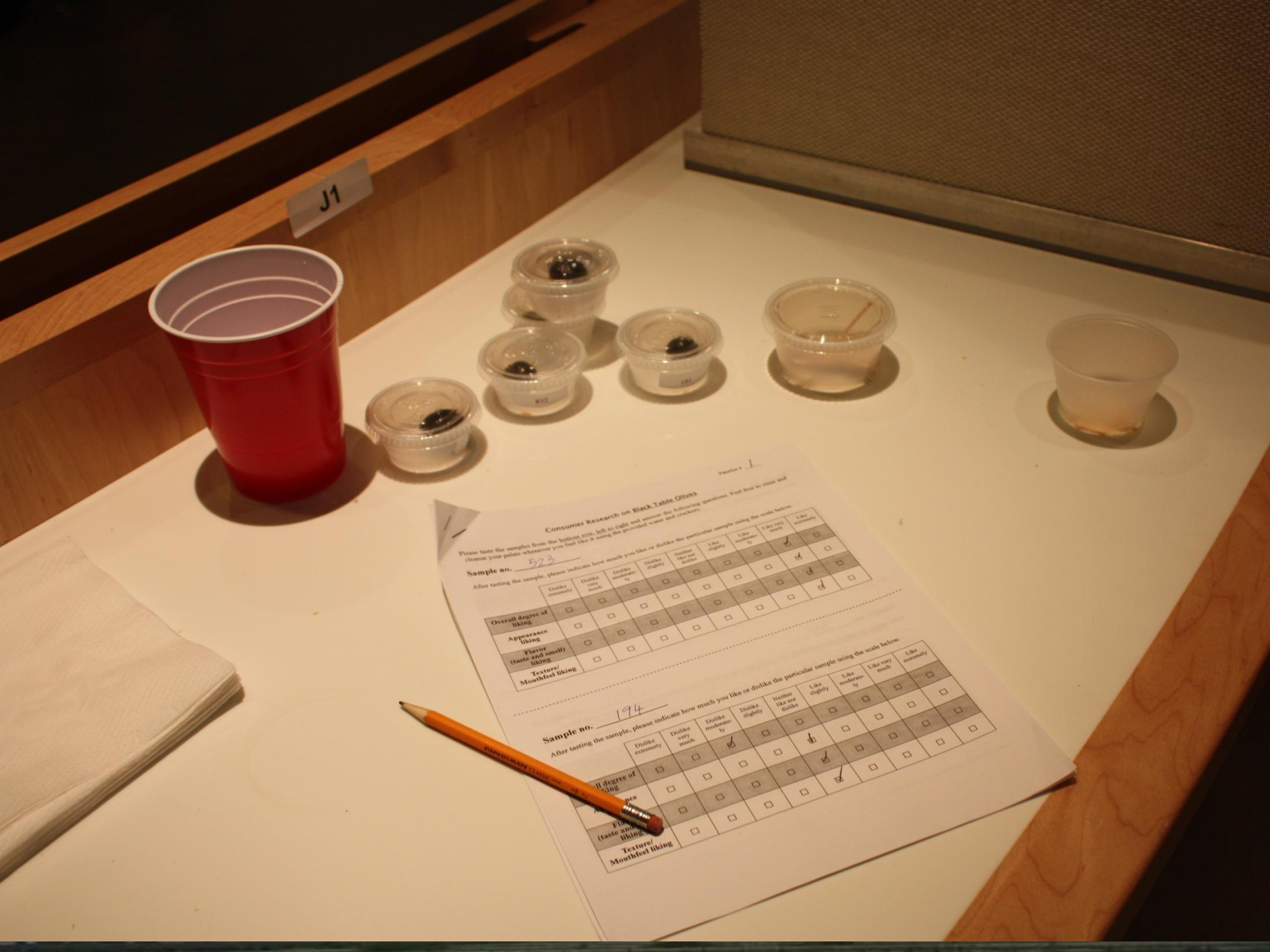
UC DAVIS OLIVE CENTER

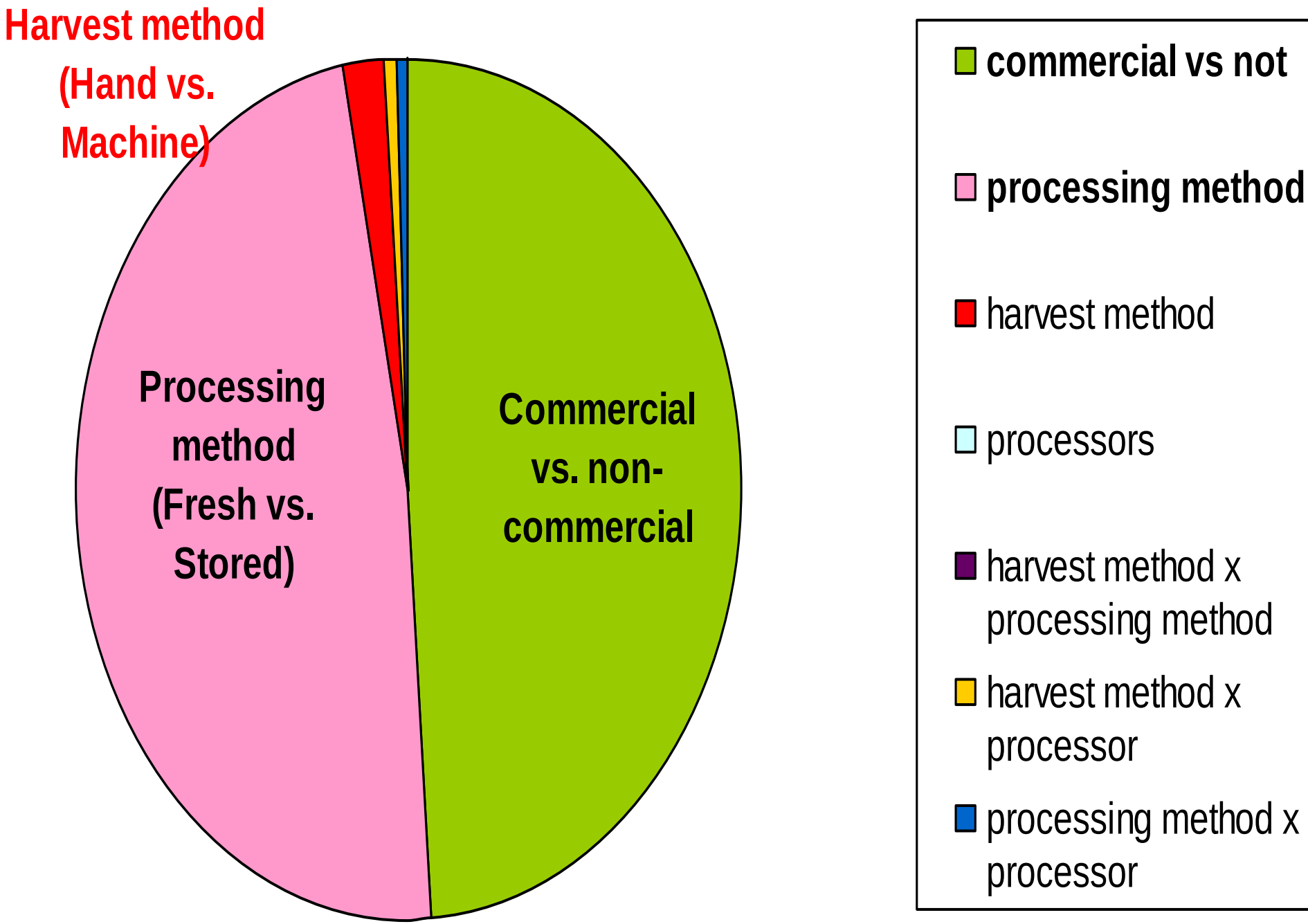
Taste Test for Black Olives

1~ 3 pm
RMI Sensory Rm.1000

Consumer Preference Panels

10 ~ 3 pm


J1
Consumer Research on Black Table Olives
Please taste the samples from the bottom row, left to right and answer the following questions. Feel free to rinse and cleanse your palate whenever you feel like it using the provided water and crackers.
Sample no. 523
After tasting the sample, please indicate how much you like or dislike the particular sample using the scale below.
Dislike extremely
Dislike very much
Dislike moderately
Dislike slightly
Neither like nor dislike
Like slightly
Like moderately
Like very much
Like extremely
Overall degree of liking
Appearance liking
Flavor (taste and smell) liking
Texture/ Mouthfeel liking
Sample no. 194
After tasting the sample, please indicate how much you like or dislike the particular sample using the scale below.


Harvest method (Hand vs. Machine)
Processing method (Fresh vs. Stored)
Commercial vs. non-commercial
commercial vs not
processing method
harvest method
processors
harvest method x processing method
harvest method x processor
processing method x processor

Results of Consumer Testing

- No significant difference in consumer acceptability:
- Hand Harvested Olives
  - vs.
- Machine Harvested Olives

Specific Objectives: 1996 - 2009

I. Picking Technology:
   I. commercially competitive product

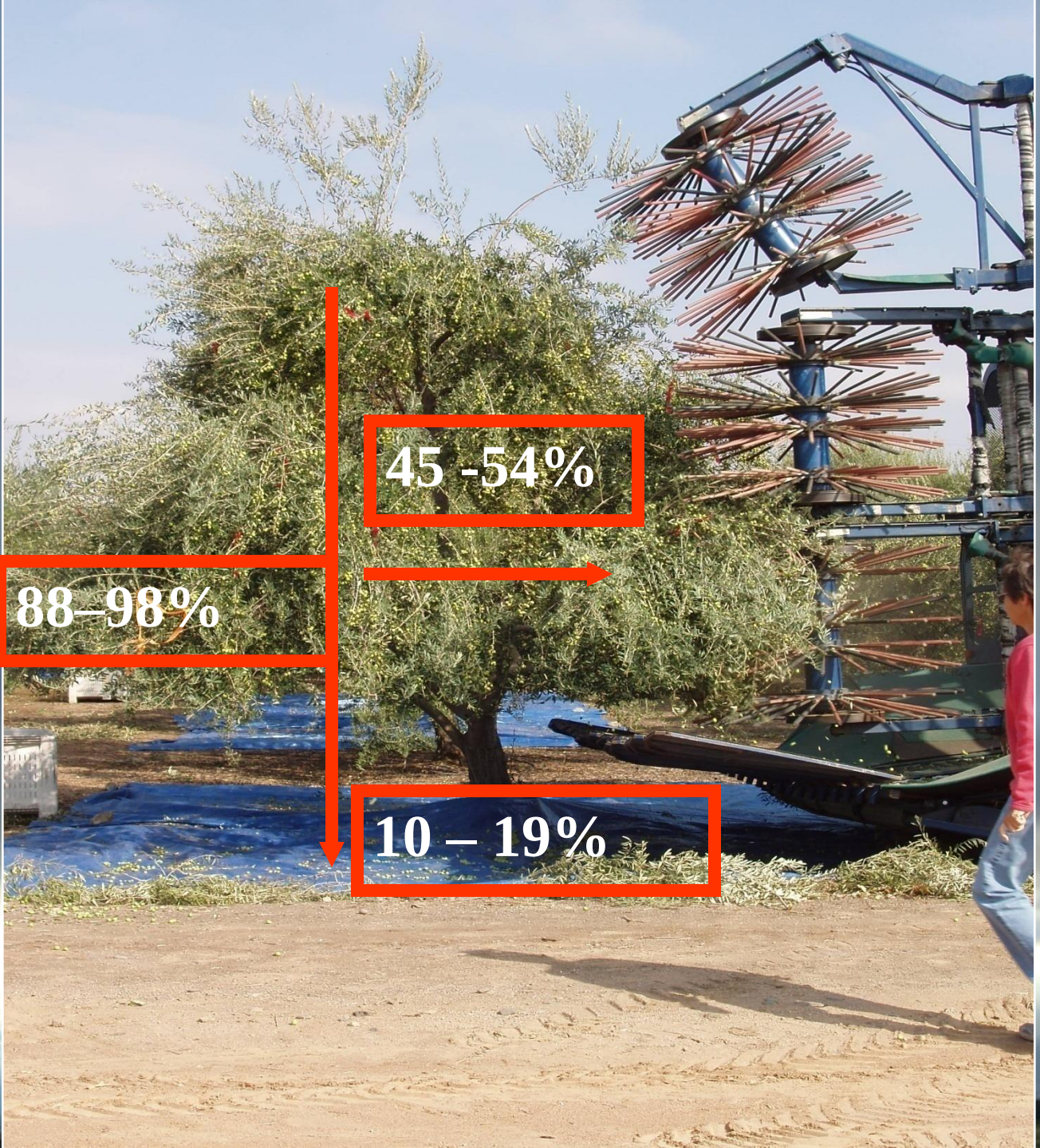
II. Develop an efficient harvester:
   I. > 80% final efficiency

II. Evaluated harvesters for efficiency:

- Canopy Contact Harvesters

DSE 006, 007, 008

DES 008



Improve efficiency:

- ground speed/CPM
- fruit accessibility
- pruning

Agright Olivia


agright
ENTERPRISES
DMF

Evaluated harvesters for efficiency:

- Trunk Shaker


Coe


ENE Inc
Star
1998


Noli


Clamp Strength < 800 PSI

Final Harvester Evaluations

- Trunk Shaking (2009)
- Removes fruit closer to trunk
  - 64% efficient
  - 95% cannable*
  - $1,146/ton*
  - decreased barking

- Canopy Contact (2008 and 2009)
- Removes more exterior fruit best
  - 68% efficient
  - 94% cannable*
  - $1,072/ton*
  - minor limb breakage

* NSD

Specific Objectives: 1996 - 2009

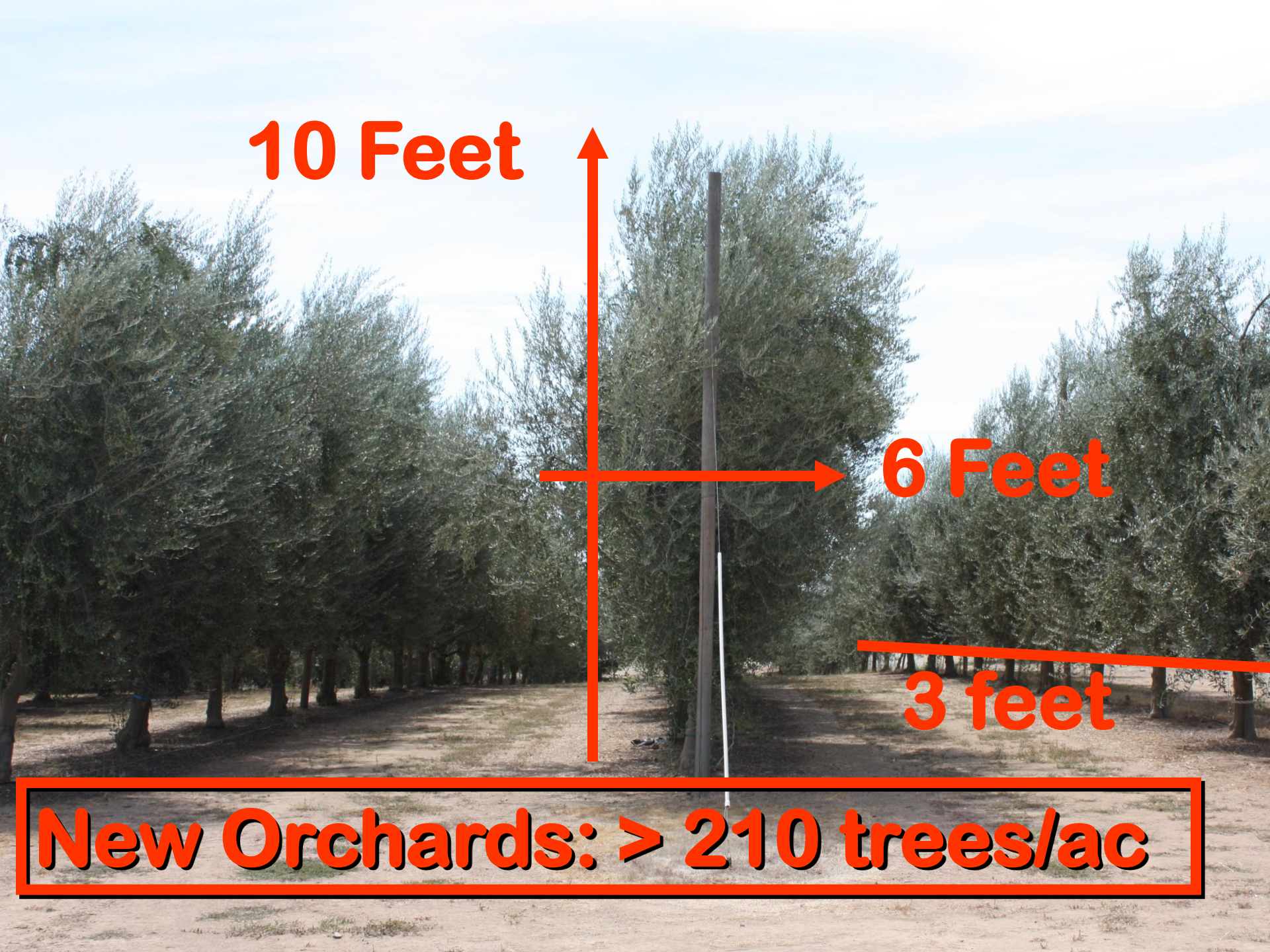
I. Picking Technology:

II. Efficient Harvester

III. Change Orchards:
    I. Prune or train to increase fruit removal efficiency

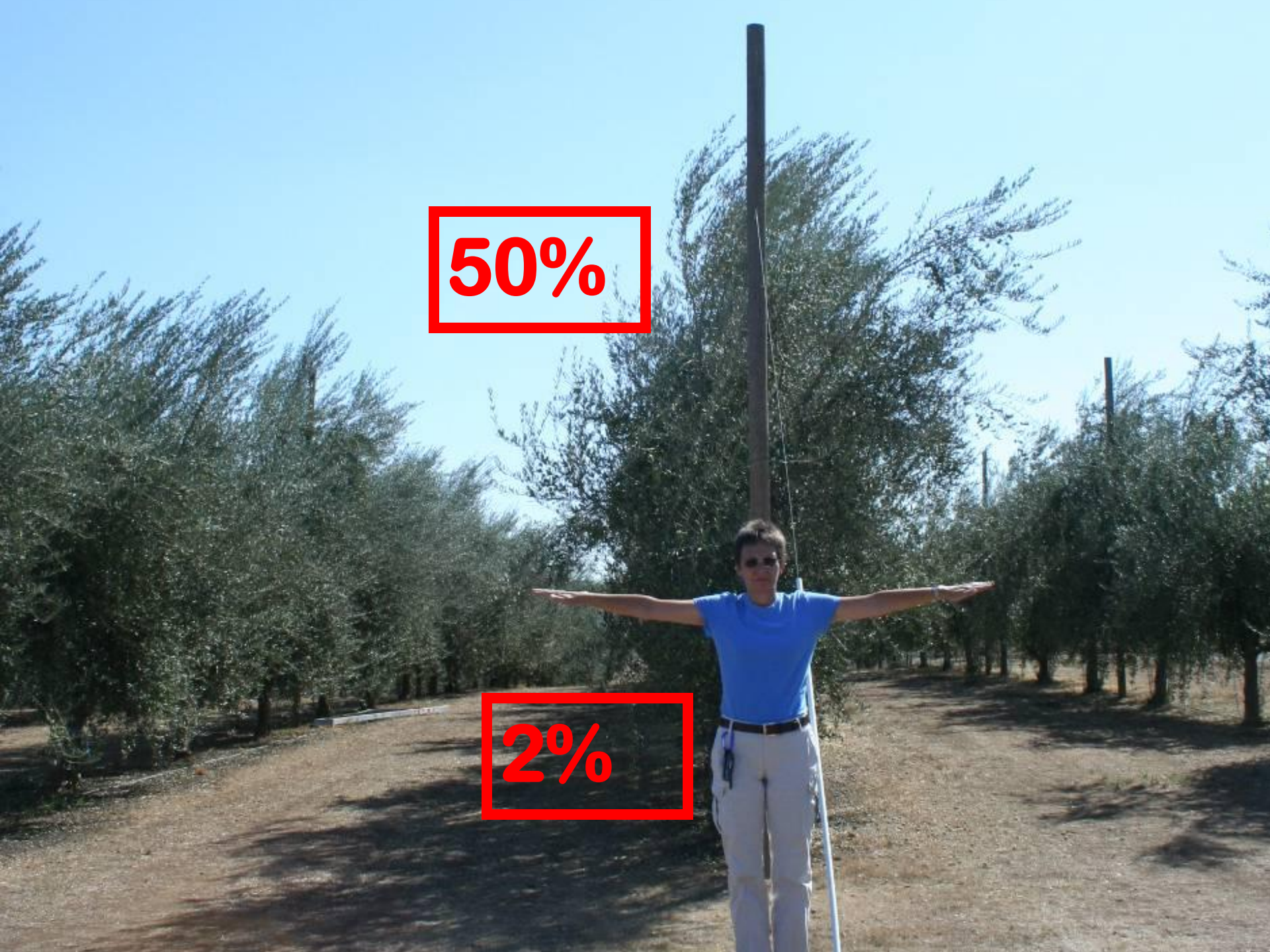
Mechanical Pruning reduces yiel


Goal :
Maximum net return per square foot of orchard floor!


10 Feet
6 Feet
3 feet
New Orchards: > 210 trees/ac

Conclusions: 1996 - 2009

I. We can produce good processed olives
II. Increase harvester efficiency;
    I. > 80% final efficiency
III. Change orchards to increase efficiency
    I. Prune existing trees
    II. New orchards with higher densities: > 200 trees/ac


50%
2%

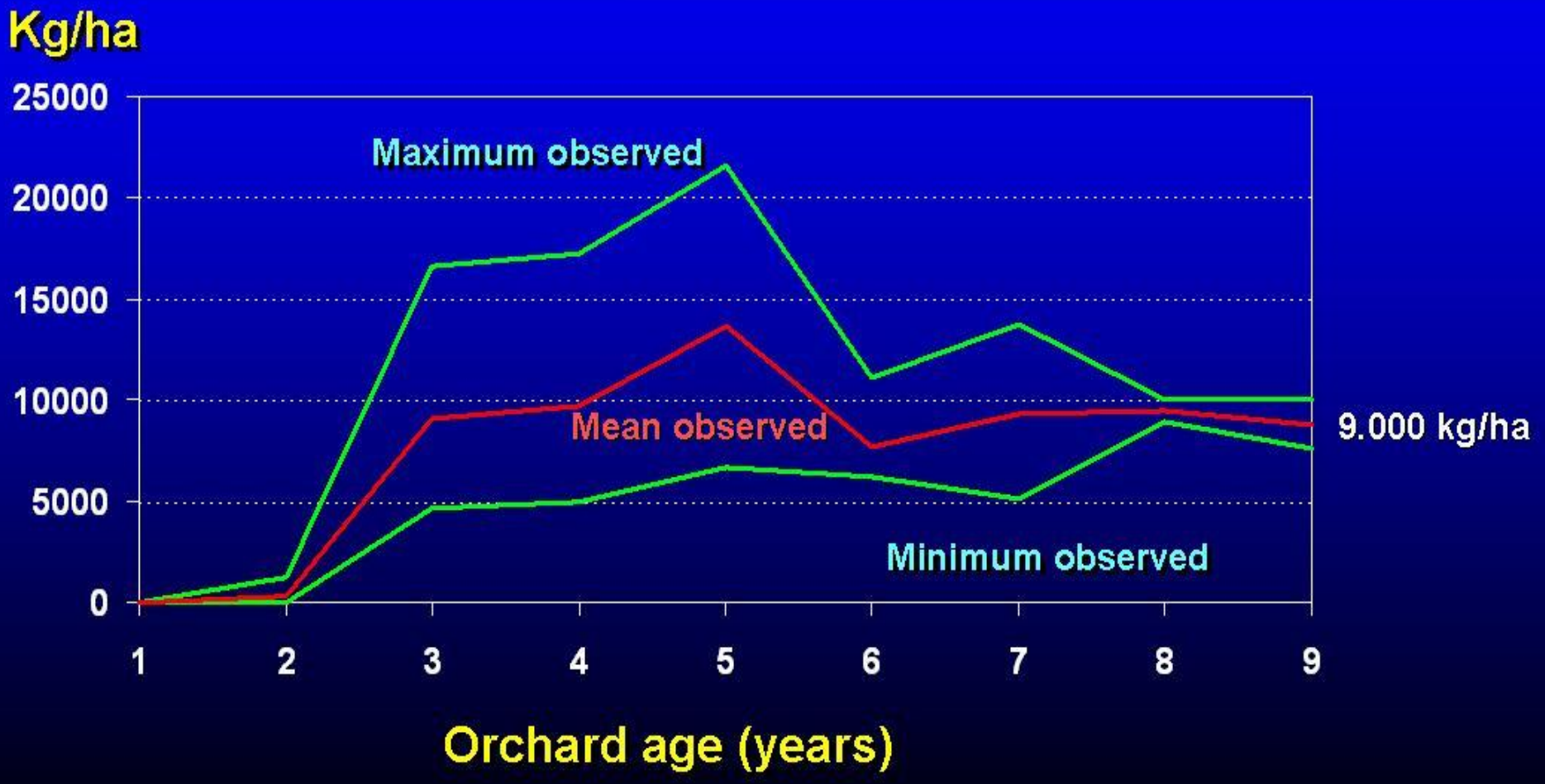

COE


Oxbo

OXBO Harvester


Movie Time

Very high density orchards:
Arbequina potential yield (kg/ha)



Average Production: years 6 -12