Pitahaya Establishment Costs and Economic Prospects

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Ramiro Lobo, Gary Bender & Gary Tanizaki
UCCE San Diego

OVERVIEW

- Background
- Pitahaya Culture & Production Practices
- Marketing and Economic Prospects
- Estimated establishment costs
- What next?

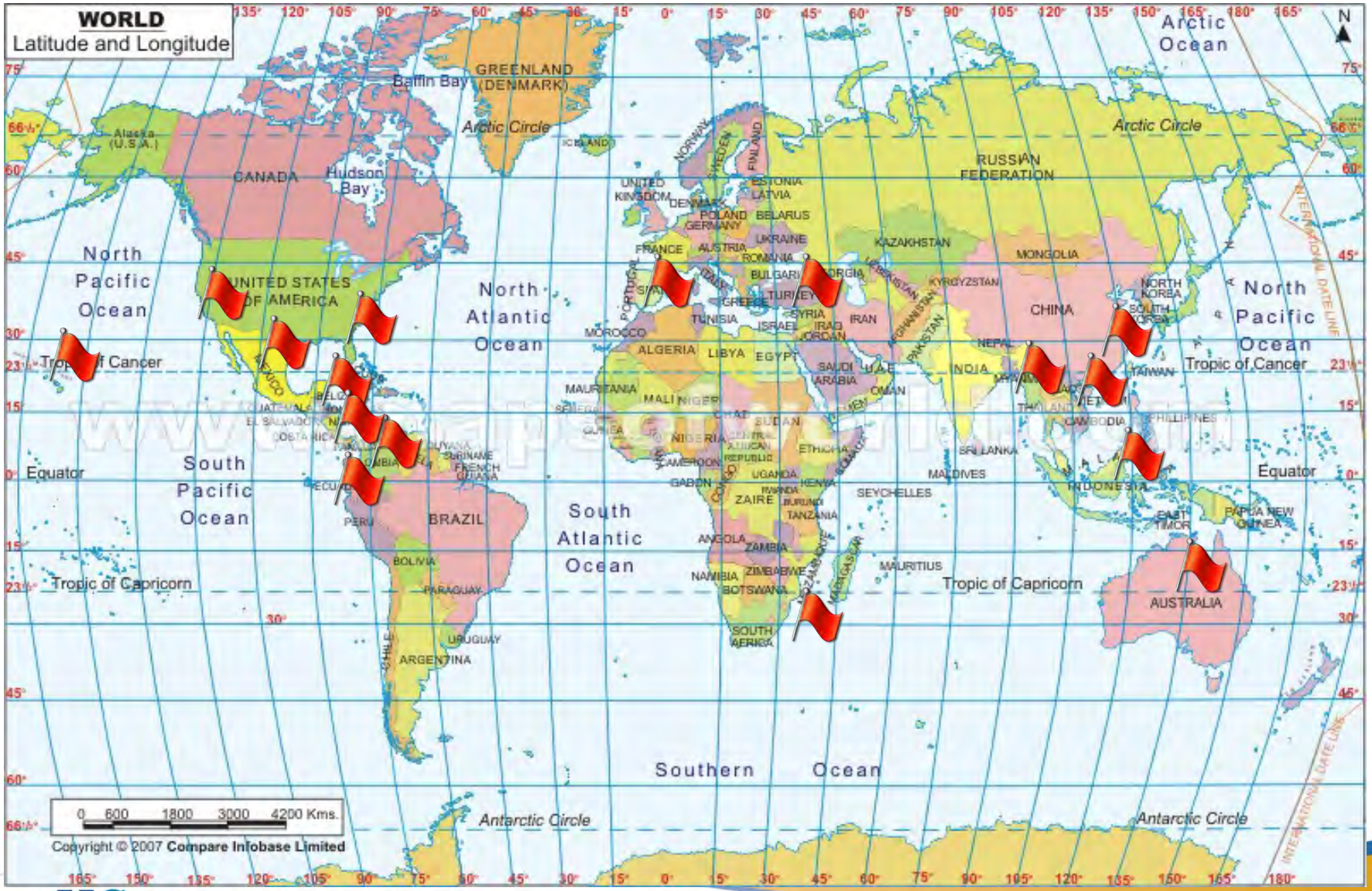
WHY PITAHAYAS?

- Great potential as a new, water efficient crop for Southern California
- Increasing demand for new, healthy and exotic fruits
    - Current demand exceeds supply, current prices are high (retail @ $ 3-8/pound)
    - Relatively high antioxidant activity when compared to other subtropical fruits
- Makes great landscape plant - fruiting cactus, water efficient, very adaptable

FRUIT USES

- Used in refreshments in Central America
- Red flesh used as colorant in the processed food industry (Snapples, Sobe, Pitaya+)
- Consumed fresh, as a desert item in the US, Canada, and Europe
- Used for decoration – Southeast Asia, US
- Great potential for value added products (chips, chewy bars, wine, yarn dye, etc.)
- **Emphasis should be on Fresh Market!!**

Dragonfruit Production



Source: Bill Gerlach/Melissa's Specialty Produce

COMMERCIAL VARIETIES?

- Several species & up to 70 different clones available in Southern California – No performance data
- Five clones grown commercially in Nicaragua (Orejona, Rosa, Cebra, Lisa, San Ignacio)
- Several clones promoted as "superior" but no replicated research data available
- Improved, proprietary varieties available from Israel, Taiwan and private breeders in US
- Lack of reliable information about varieties a major challenge for commercial production and main reason for our research project

VARIETIES UNDER STUDY

- Cebra (Nic)
- Rosa (Nic)
- Orejona (Nic)
- Lisa (Nic)
- Sin Espinas (Nic)
- San Ignacio (Nic)
- Mexicana (Mex)
- Colombiana (SD/Col)
- Valdivia Roja (Mex)
- Bien Hoa Red (SD)
- Bien Hoa White (SD)
- Delight (SD)
- American Beauty (FL)
- Haley's Comet (FL)
- Physical Graffiti (FL)
- Vietnamese Giant (FL)
- Yellow Dragon (FL/Col)
- Seoul Kitchen (FL)
- Armando (Nic)
- El Grullo (Mex)

Pitahaya / Dragon Fruit Research - Results to Date

Variety/Origin	Color Skin/Flesh	Cold Hardiness	Heat Tolerance	Avg. Wt. (grams)	Brix Score	Mkt Wt/Plant (grams)	Days to Harvest
1. Cebra (Nic.)	R/R	3.5	3.5	468	15.75	8746	46
2. Rosa (Nic.)	R/R	3.5	3.5	384	16.05	7217	45
3. Orejona (Nic.)	R/R	3.25	3.75	438	15.78	4598	45
4. Lisa (Nic.)	R/R	3.75	4	465	17.02	13319	44
5. Sin Espinas (Nic.)	P/R	2.25	2.75	393	16.5	3527	43
6. San Ignacio (Nic.)	R/R	3.75	4	552	15.6	12712	48
7. Mexicana (Mex.)	P/W	3.25	3	495	14.04	9165	40
8. Colombiana (SD-Col.)	Y/W	1	1	< 200	20.90	0	150-180
9. Valdivia Roja (Mex.)	R/R	5	4.5	250	17.9	8588	40
10. Bien Hoa Red (SD)	GR/F	1.75	1.75	360	18.9	1477	41
11. Bien Hoa White (SD)	P/W	2.5	2.5	388	11.85	7394	37
12. Delight (SD)	R/PW	3	3.5	371	18.08	14931	41
13. American Beauty (FL)	GR/F	2.75	2.5	380	18.51	5566	43
14. Haley's Comet (FL)	R/F	4.5	4.25	482	16.7	5979	38
15. Physical Graffiti (FL)	R/P	4.5	4.5	374	17.93	23429	40
16. Vietnamese Giant (FL)	PR/W	3.25	3.25	338	15.6	6511	41
17. Yellow Dragon (FL-Col.)	Y/W	1	1	< 200	21.15	0	150-180
18. Seoul Kitchen (FL)	PR/W	4	4	518	12.18	15379	41
19. Armando (Nic.)	R/R	4	4	390.5	16.11	4881	41

SITE SELECTION

- In general, pitahayas grow well in frost free areas where Hass avocados grow
- They should be planted in full sun for optimal fruit production
- They adapt to various types of soils as long as drainage is not an issue
- They like soils high in organic matter
- An economic rent is used for the price of land instead of land values ($25-50 K/Acre)

PROPAGATION

- Cuttings most preferred propagation method for commercial plantings
  - Avoid soft, tender shoots, use mature wood
  - 12 to 18 inch cuttings are ideal if rooting them before planting, longer cuttings preferred if direct planting
- Seeds germinates readily
  - great potential for breeding program
  - Slow grower, may take up to 6 years to fruit
- Depending on variety, quality & quantity, cuttings cost anywhere from $3-10/cutting
- **Grafting is possible, but benefits not quite clear yet!**

PLANTING

- Rooted cuttings most commonly used, but direct planting is possible
  - Rooted cuttings may produce fruit in one year
- Spring/early summer planting preferred
- Must protect plant from rodents if present:
  - plant in a gopher or chicken wire basket or pots if gophers are a problem
  - Fencing may be needed to protect plants from rabbits
- Protect young plants from the sun with white wash (latex paint or kaolin clay)

SPACING & DENSITY

- Plant spacing depends on production system and trellis used
  - 6 by 10 feet spacing common with single post trellis (@ 726 plant/acre)
  - 4 by 6 observed in California & reported in Spain on bench-type trellis
  - 2 by 10 and 3 by 8 seen on wire trellis in commercial plantings and our field trials
- Plant material/planting can cost $8,000/Acre
- **Spacing & density depends on trellis system and plant structure desired!**

IRRIGATION/WATERING

- Pitahayas can survive with minimal water but they require quite a bit of water to maximize fruit production
- Excessive watering in poorly drained soils can be disastrous
- Dry periods are needed to induce bloom, reduce amount water applied in the Spring
- Irrigation system estimated at $1,200/Acre plus cost of water ($1,200/Ac. Ft.)

PRUNING

- Pruning will depend on trellis/support system, variety, location, goals and desired plant structure
- Three basic strategies or goals for pruning:
  - **Training:** usually prune to encourage upright growth during first year
  - **Sanitation:** removal of dead or diseased stems
  - **Thinning:** Helps improve air circulation, exposure to sunlight, and fruit size
- Pruning costs an estimated $2,200/Acre/Year

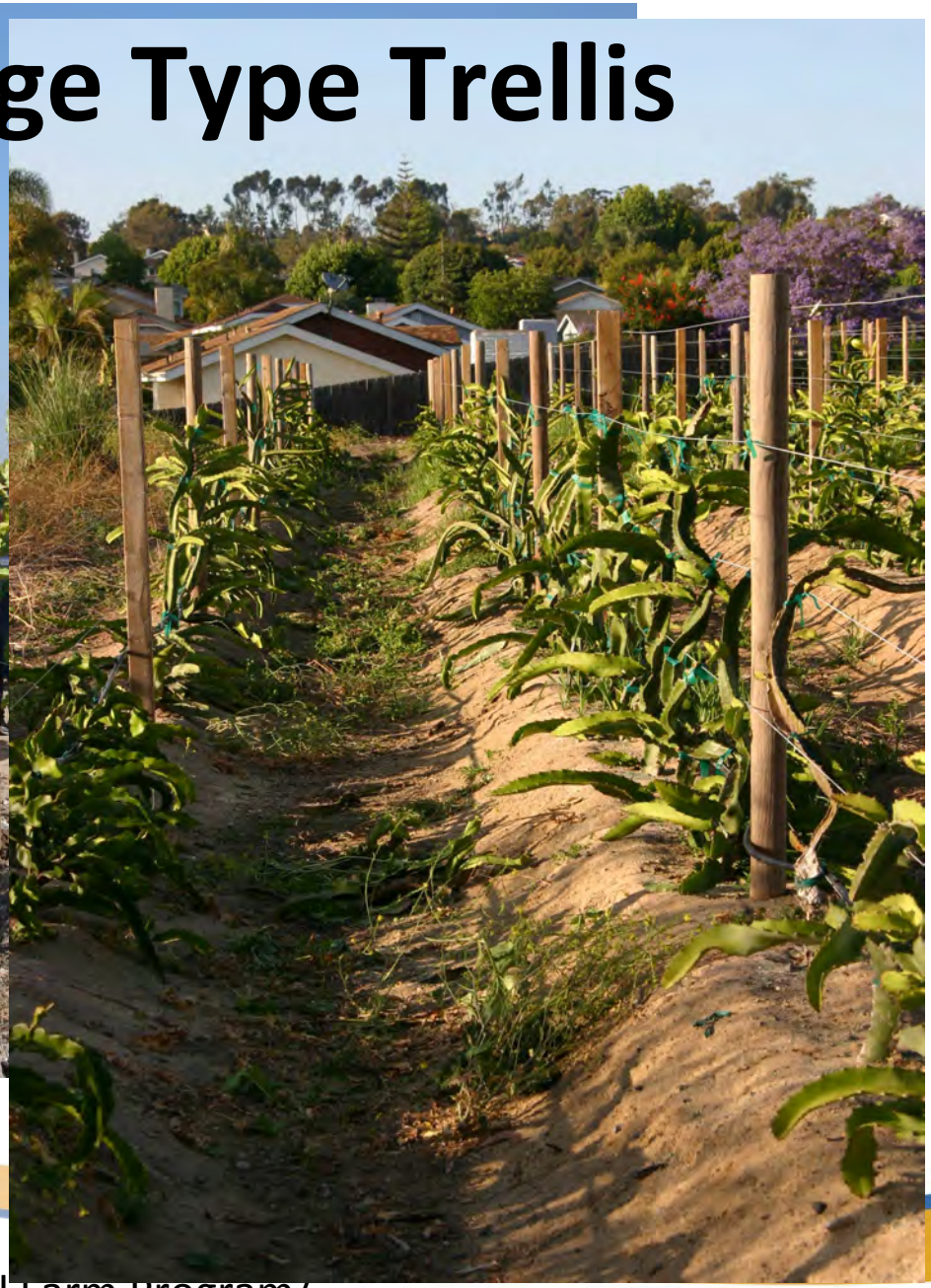
TRELLISING

- Pitahayas need trellis or support structure for support or to grow on
- Type of trellis determined desired plan structure, variety and location
- Different types used in producing areas
  - Anything that can support a plant can be used
  - Live tutors used in Central America, but not an option in California
  - Concrete posts used in Southeast Asia
  - Combination of metal pipes and treated posts used in San Diego
- Trellis system can cost over $10,000/Acre

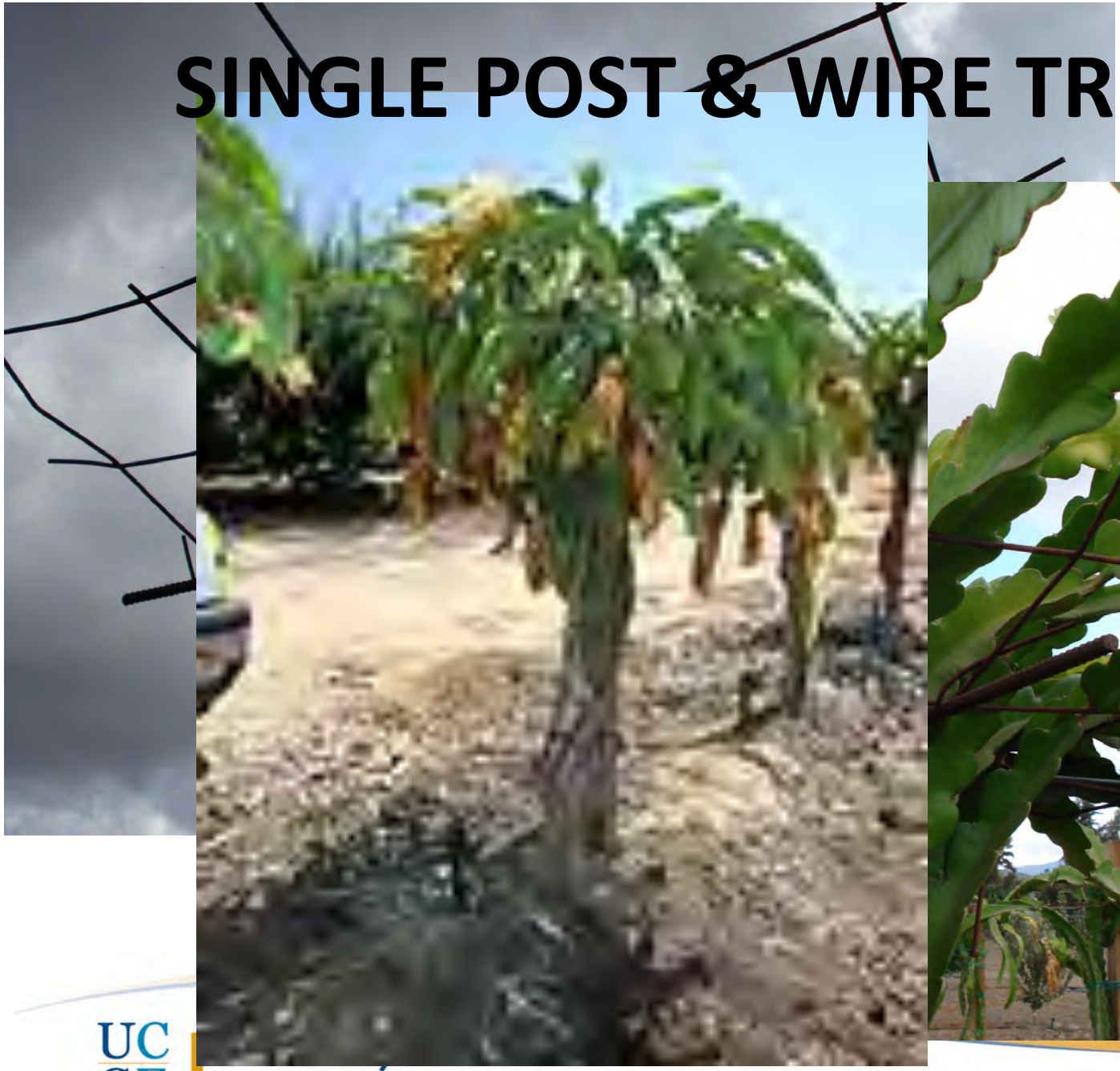
Single Post (with or w/o “T”)

Ladder Type Trellis

Wire/Hedge Type Trellis



SINGLE POST & WIRE TRELLIS



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FLOWERING/FRUITING

- Flowering usually starts in the Spring, in late April and intensifies in June
  - Flowering can be induced with water stress
- It takes an about 20-21 days from bud break to bloom, and about 40 days from bloom to harvest
- Flowers bloom at night and remain viable for one night only

POLLINATION

- Night blooming cactus, large flowers, some with strong scent
- Pollinized by moths and bats in Central America; mostly bees in Southern CA.
- Research emphasis on on self fruitful or self pollinating clones
- Hand and cross pollination improves fruit set and fruit size considerably
- **Self-fertility important but not a limiting factor for successful pitahaya production**

POLLINATION

- Hylocereus pollen can be stored for long periods of time in a household freezer if moisture content reduced to within 5-10 %
- Temperatures below 0 Celsius should be used for long term storage
- Pollen storage can help ensure yields in commercial commercial orchards
- Critical for breeding efforts because crossing could be made regardless of the flowering period

Metz, et. al. 2000

FLOWERING/FRUITING

FERTILIZATION

- Fertilizer requirements of pitahaya not well understood yet.
  - 0.25 lbs/plant every 2 months in first year with gradual increases to 0.75 – 1 lb/plant of complete formula in year 4 is recommended in Florida. (Crane and Balerdi)
  - We apply 4 ounces/plant/quarter of a complete formula (triple 20), and 4 ounces of slow release triple 14 plus minor elements in the Spring
- Based on growers' accounts, pitahayas respond well to foliar fertilization

PEST/DISEASES

- **Gophers, squirrels, and rabbits** can feed on and kill plants and be significant problem.
- **Birds feed on fruits** - reduce marketable yield, bird netting may be needed
- **Scale, Ants, aphids and snails** can cause problems, damage young shoots and flower buds
- **No major diseases/pathogens identified yet** (disease like symptoms usually physiological)
- **Weeds can be a problem**, increase production costs - Mulch helps with suppression
- Cactus virus X isolated from samples

HARVEST/HANDLING

- It takes an average of 40 days for the fruit to develop and mature
- Harvest & handling is critical to preserve fruit internal quality and external appeal
- Must pay attention to variety differences when picking & storing
- Fruit usually harvested too late in SoCal
- Fruit stored at 10-12 C and 85-90 % HR has a shelf life of 2-3 weeks (Cantwell)

PACKING/MARKETING

- Few handlers/packers available in SoCal, may have to pack on your own
- Most buyers want fruit commercially packed in 10 pound boxes (6-8 fruit/box)
- Market preference for red/colored flesh varieties, over $ 1.00 more per pound
- Most imports from Vietnam, but questionable quality a problem
- Quality, flavor, local…our selling points!

PACKING/MARKETING

(Vietnamese fruit at LA Terminal Market)

Marketing Pitahaya or Dragon Fruit: 10 Things a Distributor Wants (Frieda's Handout)

Understand your customer's business	Labeling and Trace Back
Participate in Marketing	Food Safety and Insurance
Don't be Greedy	Quality Control
Target Dates and Yield Estimates	Pack Size & Pricing
Post-Harvest Control	Variety & Flavor

Success in agriculture depends on marketing what you grow at a profit. Do your homework, develop a business/marketing/food safety plan and spend time talking to prospective buyers or consumers!!

Economic Prospects

- Great potential as a commercial crop despite increasing imports
- Establishment costs are high and can range from $15000-25000/per acre
- Downward pressure on price will continue because of increased domestic production and import volume (~ $3.00/lb. farm gate price)
- Red fleshed varieties usually sell at a higher price than white fleshed varieties (~ $1-2/lb. difference)
- Value per acre can be significant if yield and quality are sustained ($\geq$20,000 lbs./acre)
- Risky Business…BE CAUTIOUS!!

Questions??

Ramiro Lobo
Small Farms and Agricultural Economics Advisor
UCCE San Diego County
151 E. Carmel Street
San Marcos, CA 92078

(760)745-4716
relobo@ucdavis.edu
http://cesandiego.ucdavis.edu