



NUTRITIONAL DESCRIPTION OF PITAHAYA (DRAGON FRUIT)

DRAGON FRUIT / PITAHAYA SEMINAR

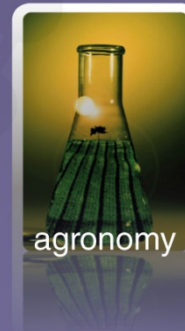
UC SOUTH COAST RESEARCH AND EXTENSION CENTER

AUGUST 2015



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Research project

Nutrient removal by Pitahaya fruits

Nutrient content in Plant tissue analysis

Establish a fertilization program





ECOLOGY AND PHYSIOLOGY

- Pitahaya, (*Hylocerus* spp.) or dragon fruit is a species of epiphytic Cactaceae.
- Original from Central & South America.
- Tropical & subtropical climates, but also arid and semiarid conditions (those found in southern California).
- Resistant to water stress/drought.
- Optimum elevation between 3000 to 4500 feet above sea level.
- Temperature 65 to 80 F (will tolerate above 100 F).
- Rainfall 20-50" per year.



Hylocereus undatus



SOIL REQUIREMENTS

- **Free draining, Sandy-Clay-Loam types**

Cactae: tolerant to harsh dry conditions for a limited time (affects plant activity, yield), and sensitive to water logging

- **pH: between 5.3 - 6.7**

Nutrient availability. Hard to find these conditions in California.

Acid management might be required

- **High Organic Matter content (over 3%)**

High CEC, High N mineralization, Moisture holding capacity

There are no more specified requirements in previous experiences

Plant Origin: South and Central America (tropical, organic, acid, wet soils)



JUSTIFICATION AND OBJECTIVES OF THE STUDY

- *Hylocereus* spp. shows high potential as an ornamental and fruit crop.
- Increasing demand in the national and international markets.
- Natural high resistance to draught and low water consumption compared to traditional crops (such as avocados).
- There are no studies that have evaluated the needs & requirements of Pitahaya in terms of macro- and micronutrients.
- There is no data for the Pitahaya in southern California establishing values of the different essential elements.



MATERIAL AND METHODS. Varieties

- **American Beauty (*Hylocereus guatemalensis*)**. Guatemala. Fuscia color pulp.
- **Lisa (*Hylocereus polyrhizus/costaricensis*)**. Nicaragua and Costa Rica. Red color pulp.
- **Physical Graffiti (*Hylocereus* sp.)**. California. Neon pink color pulp.
- **Vietnamese Giant/Mexicana (*Hylocereus undatus*)**. Florida, California & SE Asia. White color pulp.
- **El Grullo (*Hylocereus ocamponis*)**. NW of Mexico. Red blood color pulp.
- **Delight (*Hylocereus polyrhizus X undatus*)**. California. Light pink color.



MATERIAL AND METHODS

- Plant tissue analysis (fully matured growth, 2" section)
 - Fruit analysis (whole fruit, flesh + skin)



SOIL ANALYSIS AND AMENDMENTS

RESULTS

Overall good soil quality

Sandy loam

Slightly high pH

Medium fertility

Good Ca/Mg/K balance

Tested by AGQ Labs

Granulometry

Sand (%)	68
Silt (%)	12
Clay (%)	20

Chemical properties

pH	7.60
Organic Matter (%)	1.95
Nitrogen (mg/kg)	1052.90
Active Lime (% CaCO ₃)	0.48
E.C. μ S/cm	332.00
P (mg/kg)	24.80

Available bases

Ca (meq/100g)	14.86
Mg (meq/100g)	5.01
K (meq/100g)	0.98
Na (meq/100g)	1.30

Micronutrients

B (mg/kg)	0.66
Fe (mg/kg)	7.22
Mn (mg/kg)	7.52
Copper (mg/kg)	1.56
Zinc (mg/kg)	6.13

Measures of interest

C/N Ratio	11
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WATER ANALYSIS

RESULTS

High pH and Salt content

High Sodium

No Boron toxicity

No micronutrients present

Tested by AGQ Labs

Chemical properties

pH	7.5
E.C. $\mu\text{S}/\text{cm}$	1084

Anions (mg/l)

Alkalinity	203.15
Chlorides	69.34
Nitrates	27.39
Sulphates	186.70

Cations (mg/l)

Calcium	70.42
Magnesium	24.19
Potassium	13.34
Sodium	156.08

Micronutrients (mg/l)

Boron	0.33
Iron	0.00
Manganese	0.01
Copper	0.01
Zinc	0.03

Measures of interest

Total Dissolved Solids	750.60
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NUTRIENT MANAGEMENT

- **ESSENTIAL MINERAL ELEMENTS:** in its absence the plant is unable to complete a normal life cycle and that the element is part of some essential plant constituent or metabolite

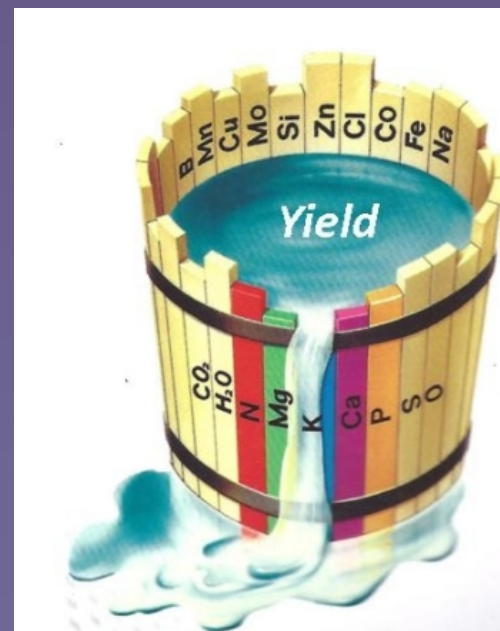
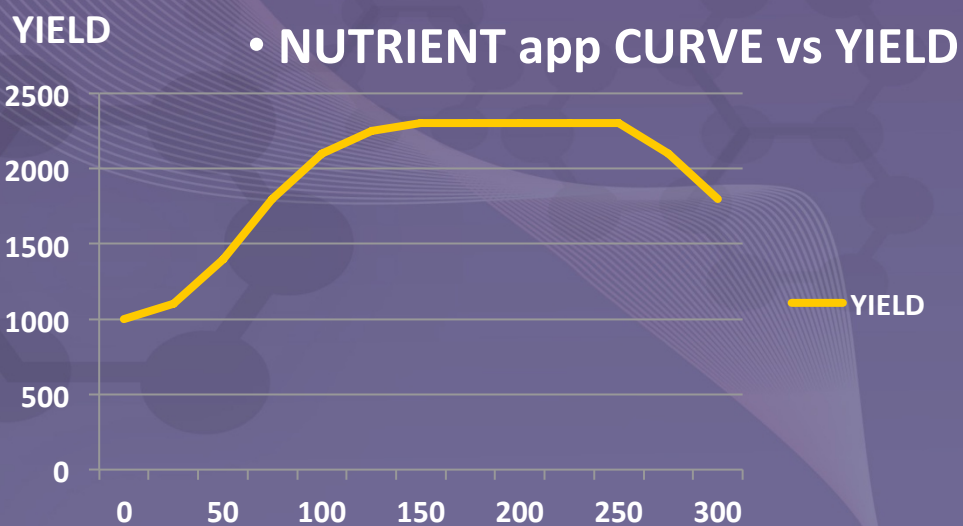
Primary Macronutrients: N, P, K

Secondary Macronutrients: Ca, Mg, S

Micronutrients: B, Fe, Mn, Cu, Zn, Mo

Others in study: Si, Na, Cl, Ni...

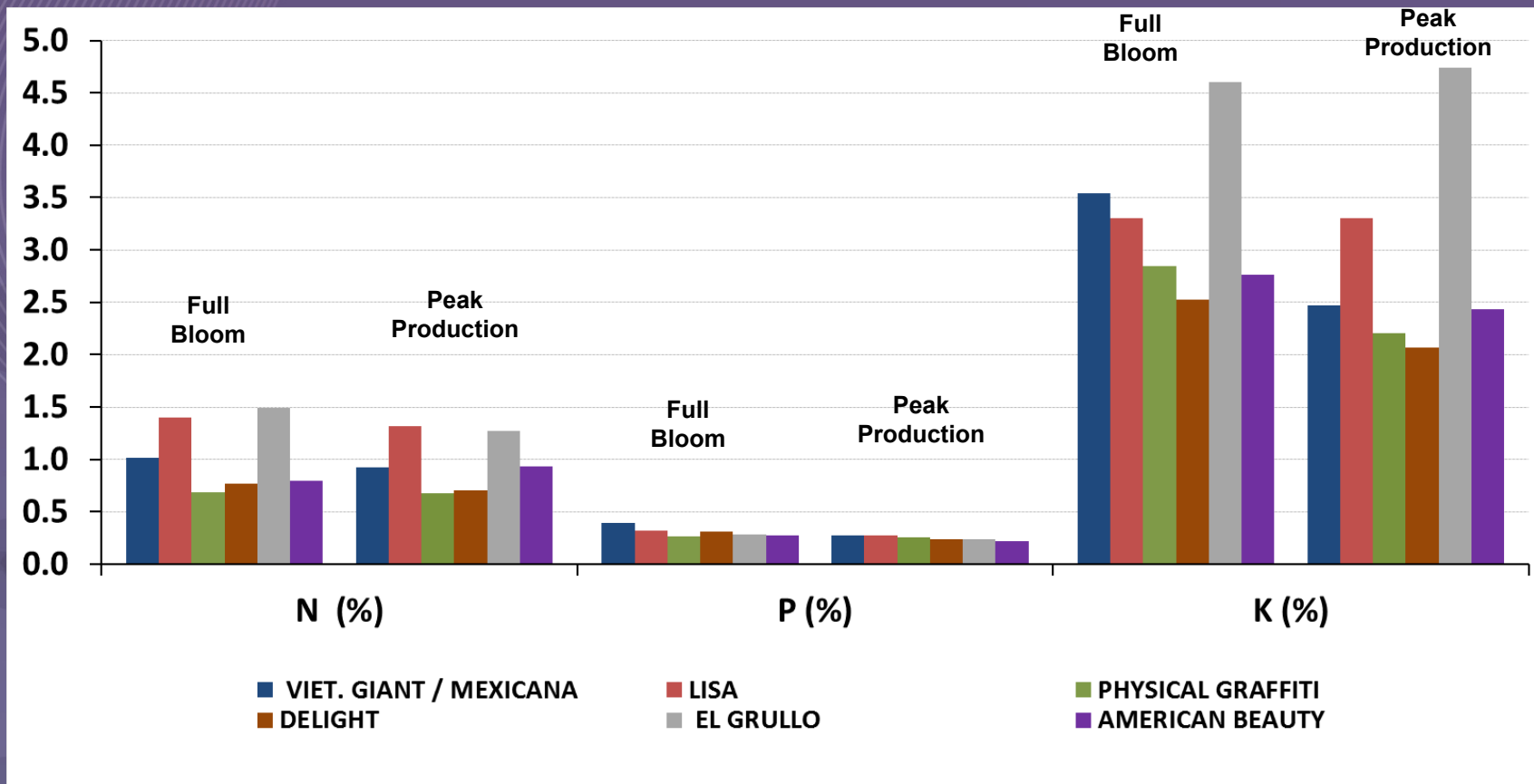
- **LIEBIG'S LAW OF THE MINIMUM**





Plant tissue samples

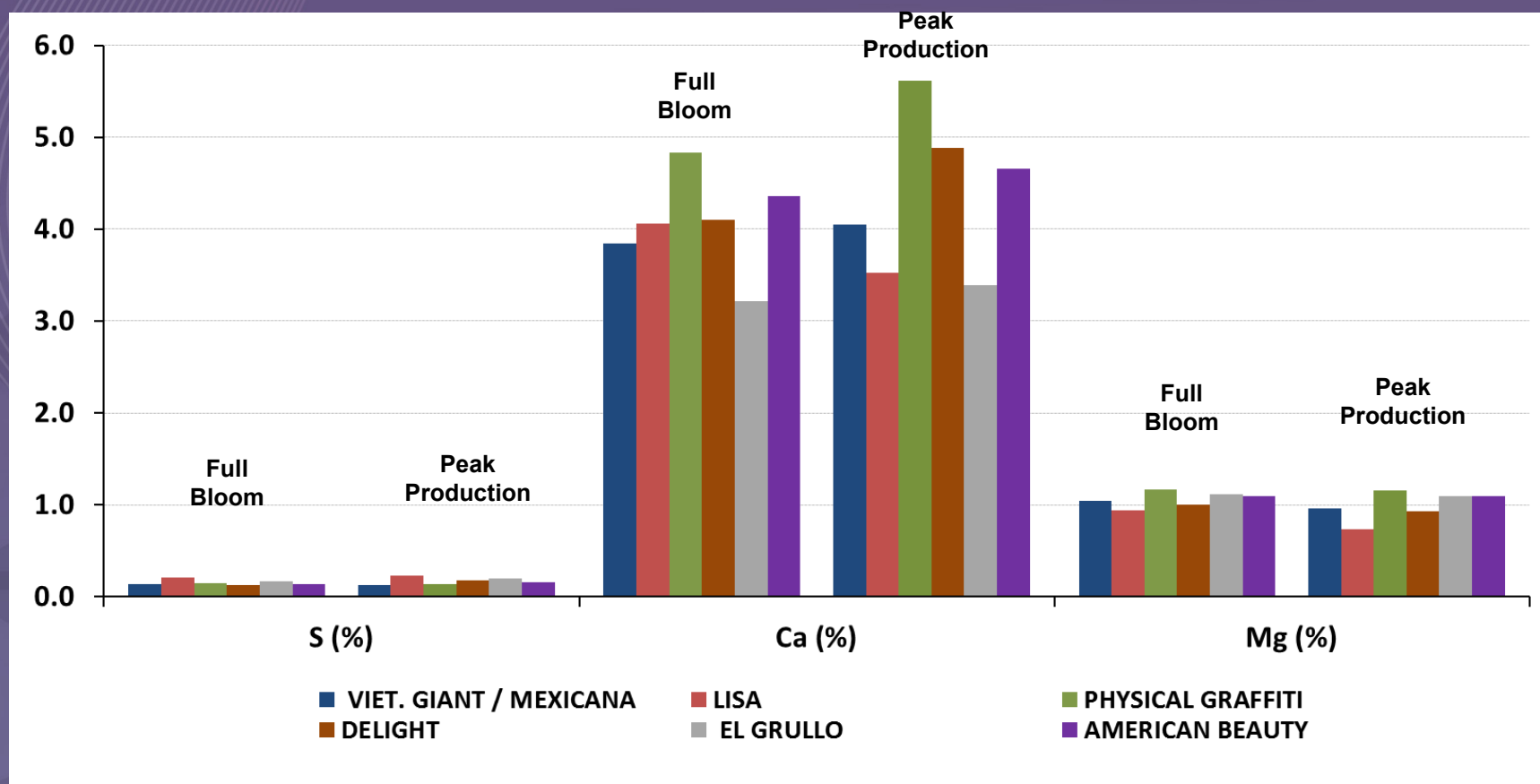
Primary Macronutrients





Plant tissue samples

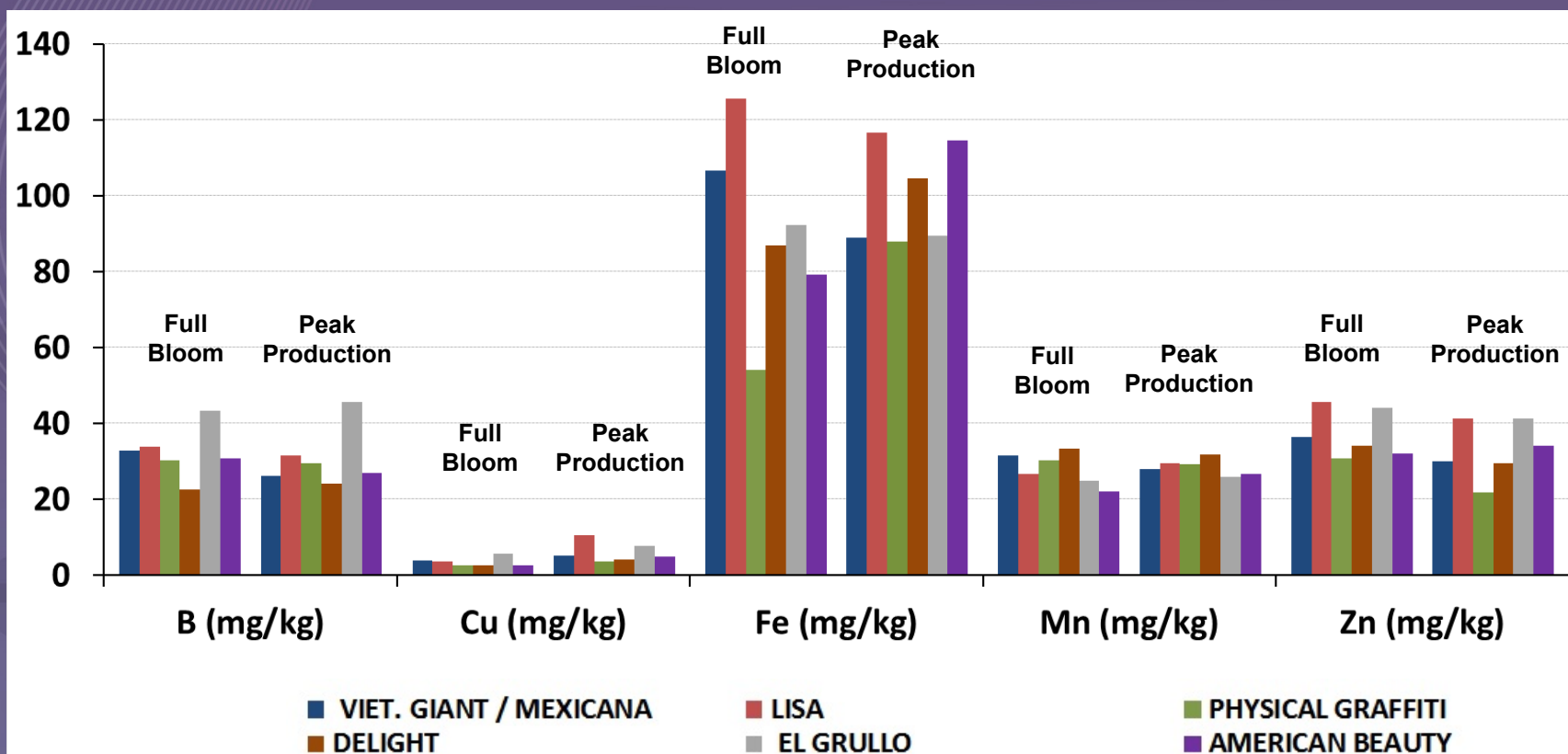
Secondary Macronutrients





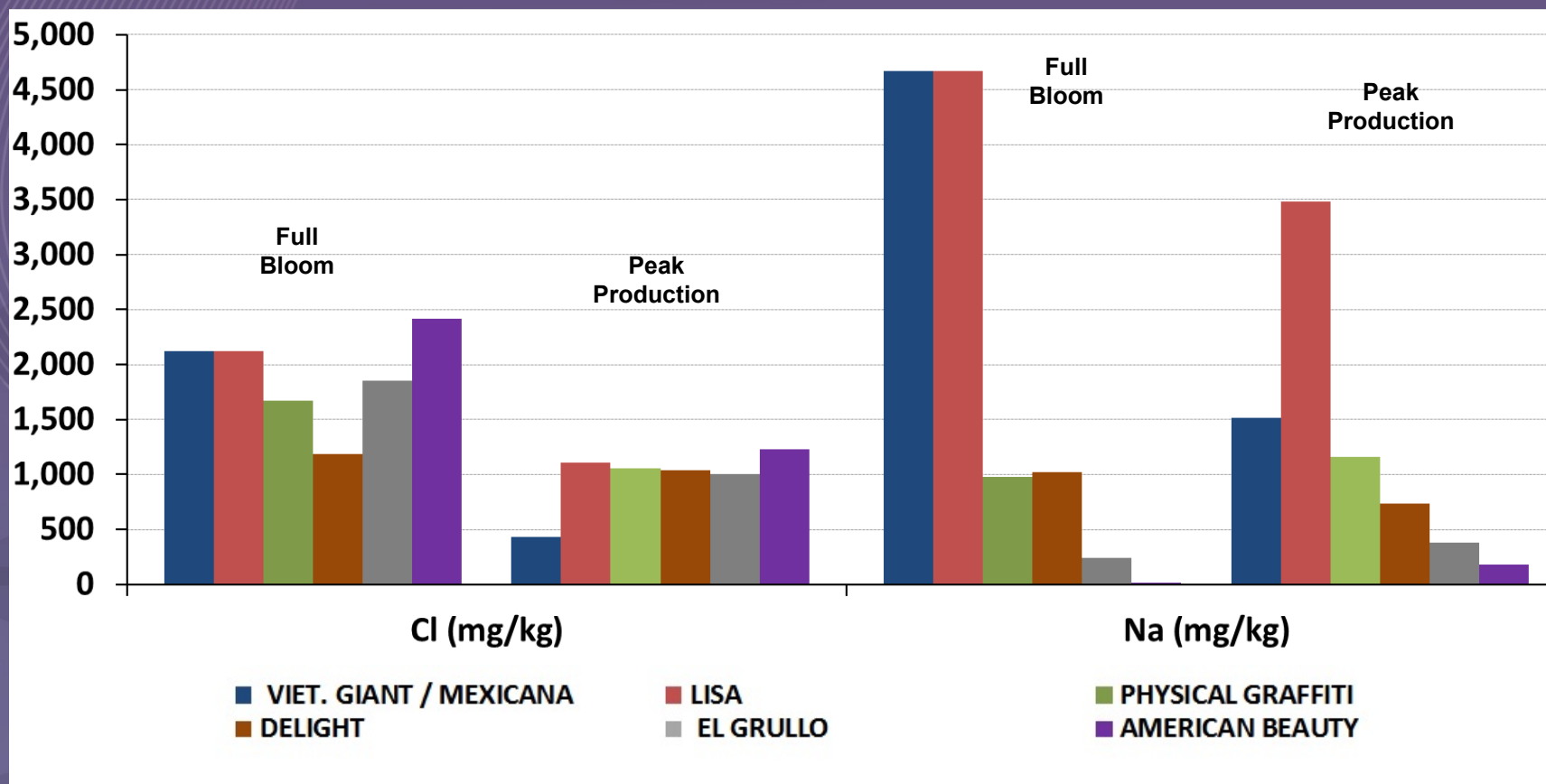
Plant tissue samples

Micronutrients





Plant tissue samples





Nutrient removal (lbs/acre) by aerial growth biomass

Based on UCCE estimations for Physical graffity

-Spacing 10' x 6'; UCCE Irvine field plot 726 plants/acre

-Pruning 200 lbs/plant-year; 145,200 lbs/acre

N	P2O5	K2O
138	46	461

-Intensive 10' x 3'; Fillmore field plot 1452 plants/acre

-Pruning 200 lbs/plant; 290,400 lbs/acre

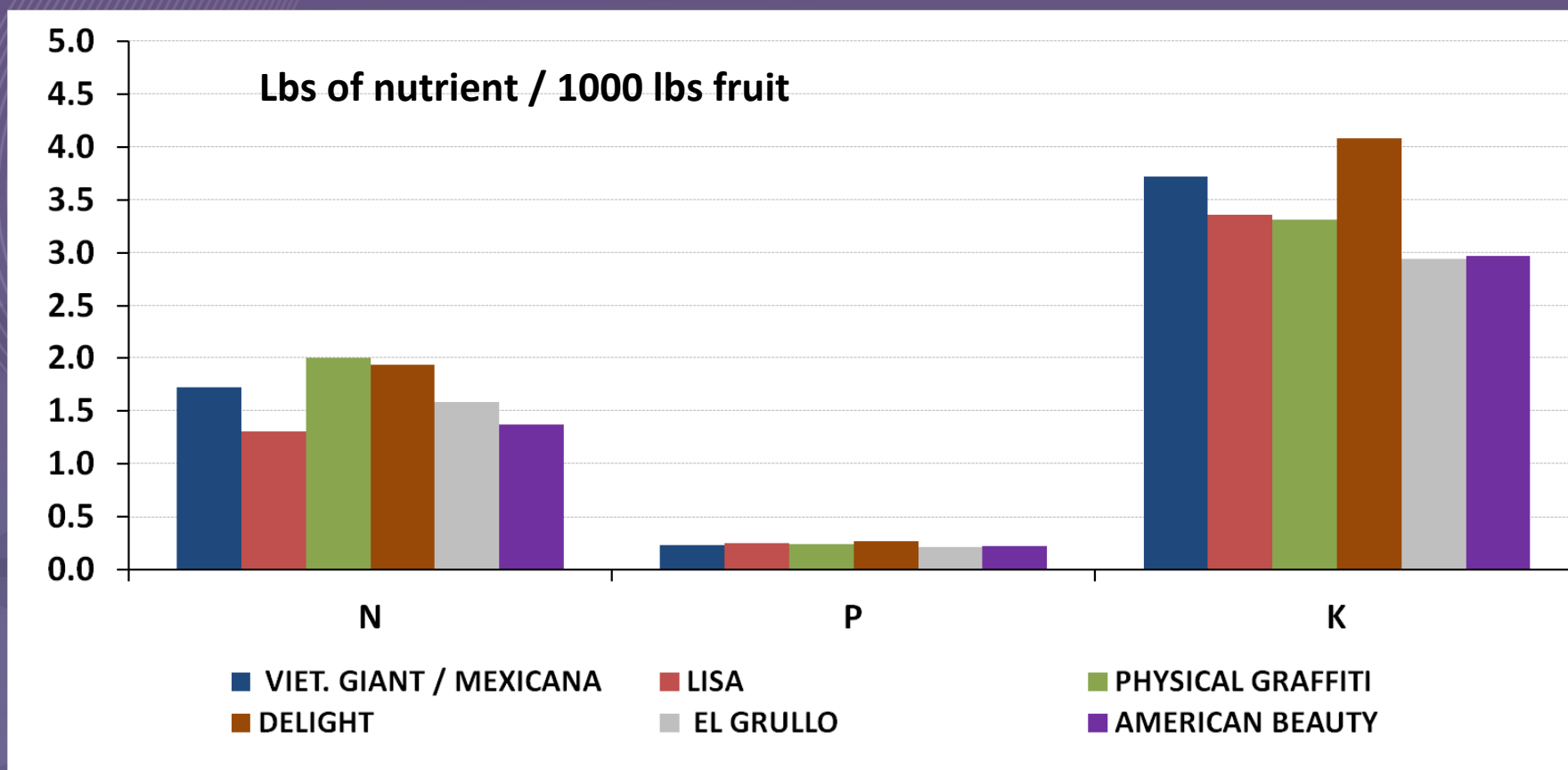
N	P2O5	K2O
276	92	922

Incorporate prunnings;

plant health issue??

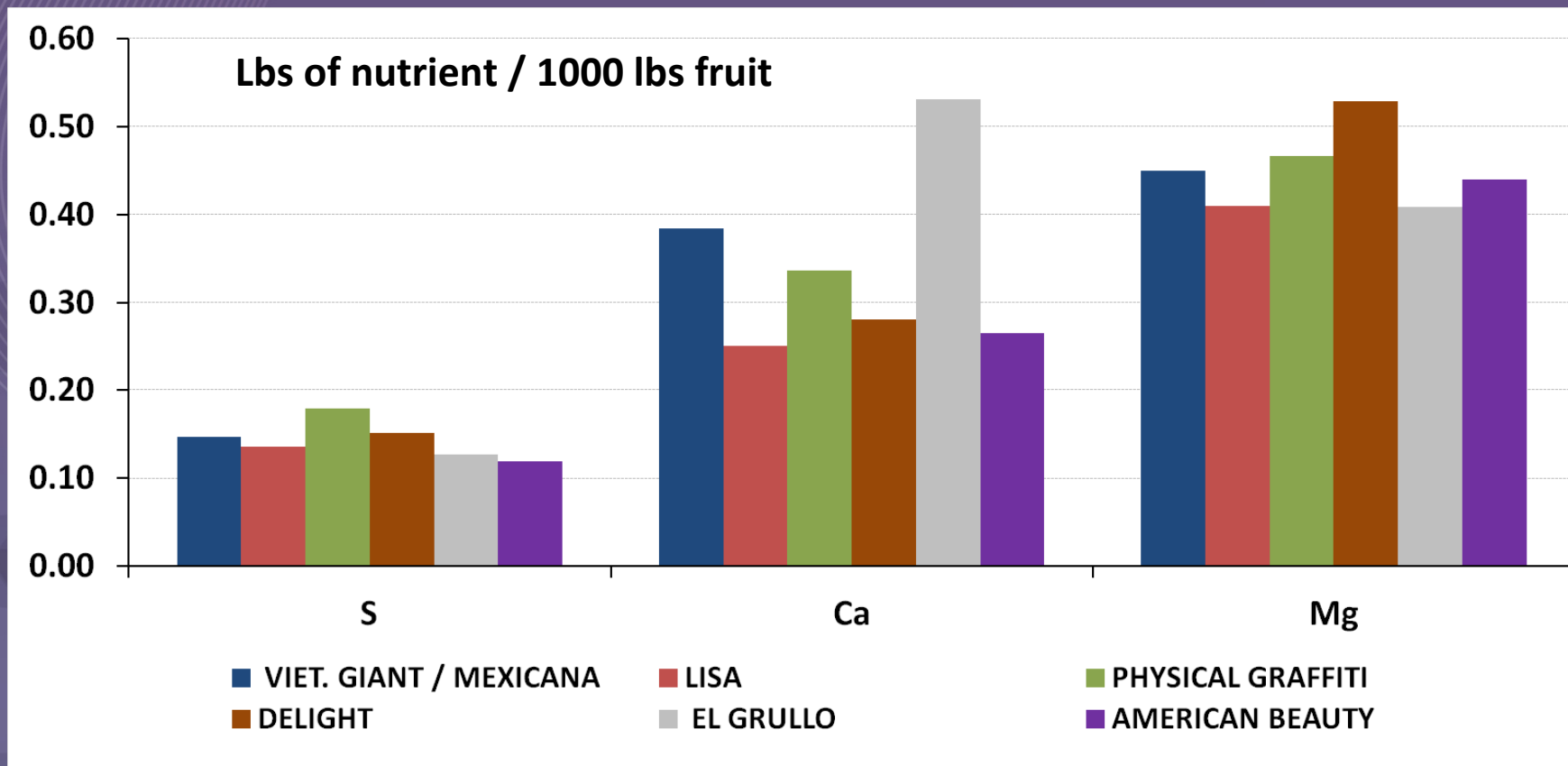


Fruit samples (skin+flesh) Primary Macronutrients



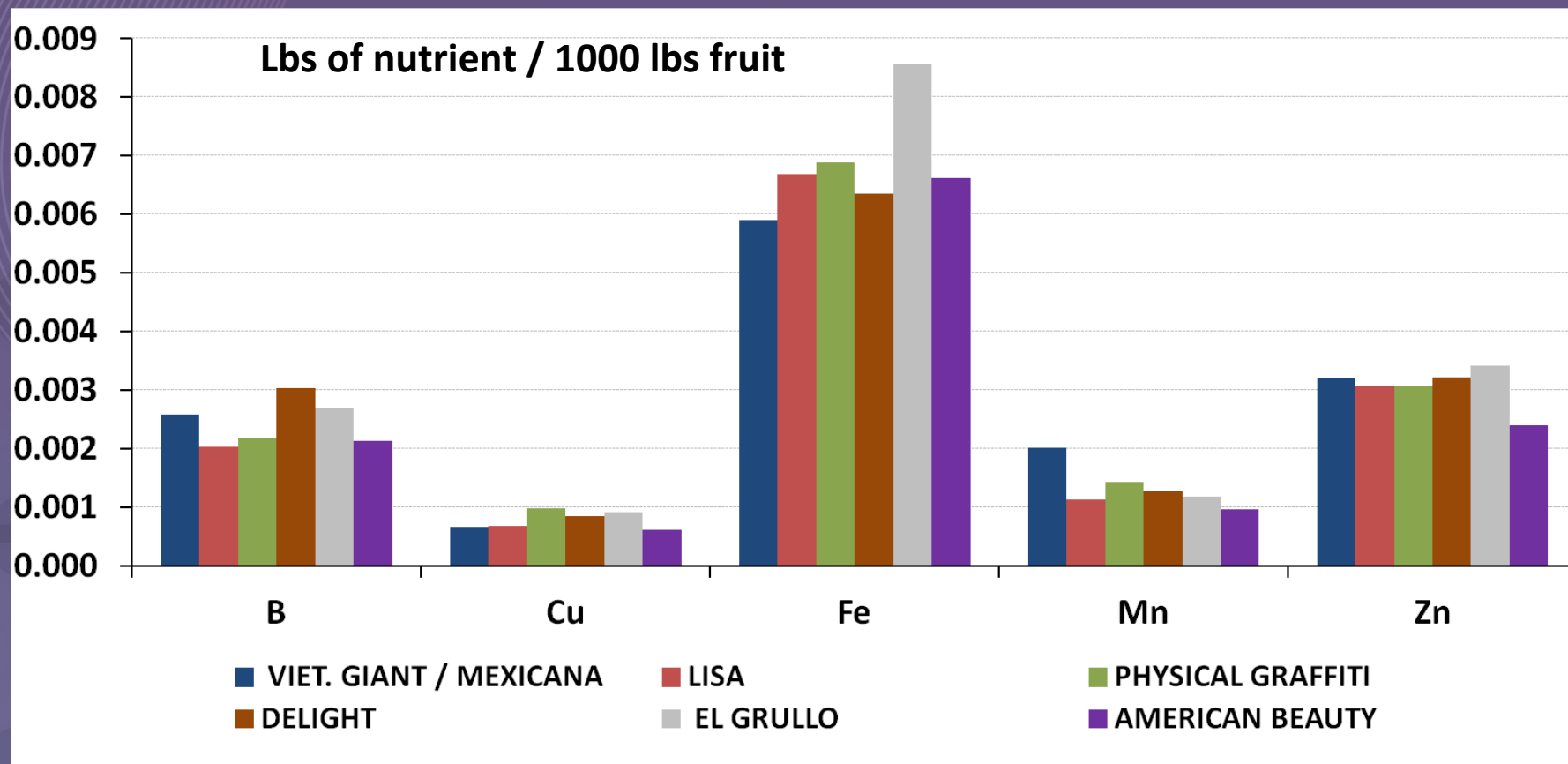


Fruit samples (skin+flesh) Secondary Macronutrients



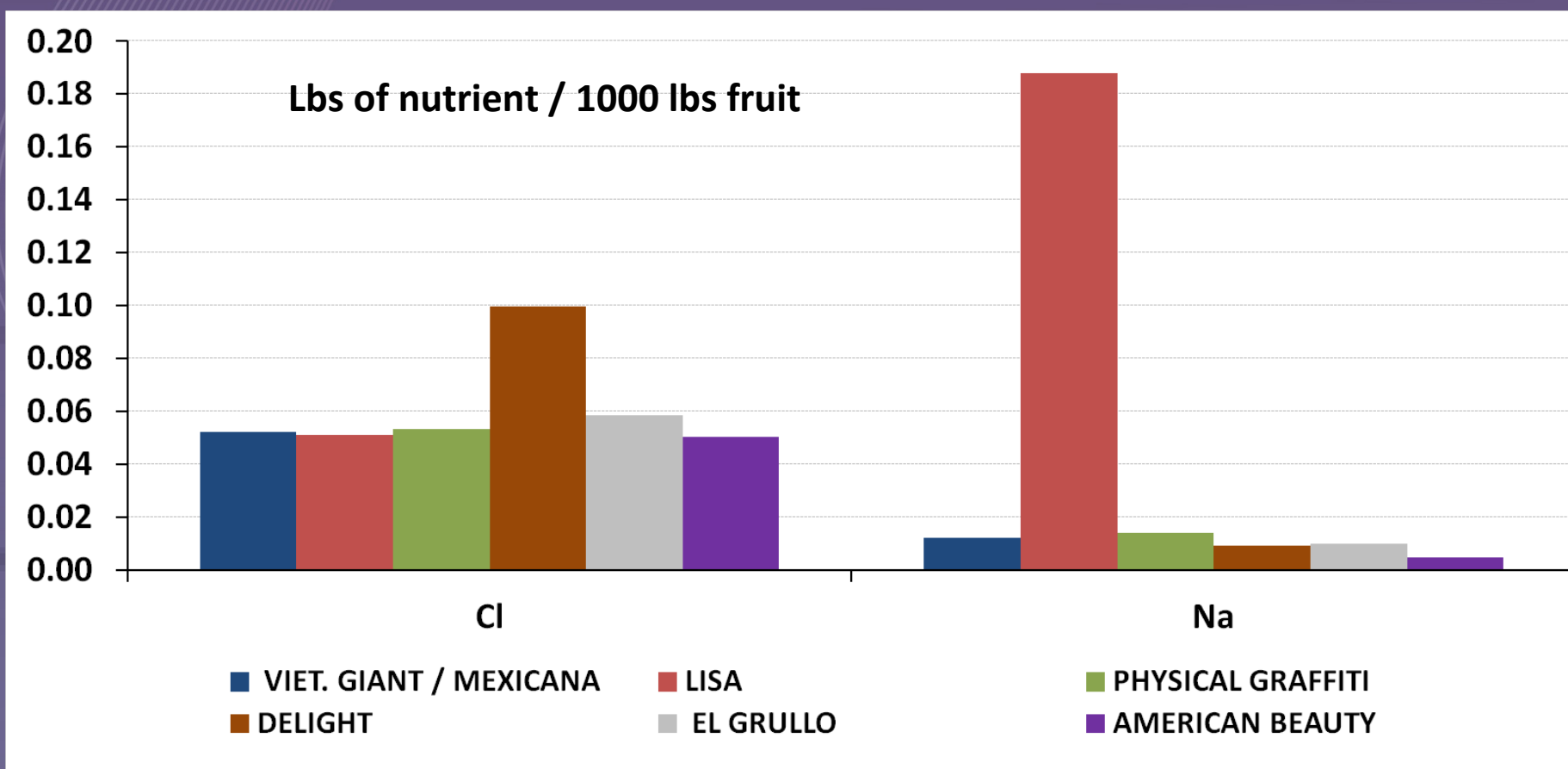


Fruit samples (skin+flesh) Micronutrients





Fruit samples (skin+flesh)





Nutrient removal (lbs/acre) by fruit

Based on UCCE estimations for Physical graffity

-Spacing 10' x 6'; UCCE Irvine field plot 726 plants/acre

-Conservative 20 lbs/plant; 14,520 lbs/acre

-Potential 50 lbs/plant; 36,300 lbs/acre

N	P2O5	K2O
29	8	57
73	20	142

-Intensive 10' x 3'; Fillmore field plot 1452 plants/acre

-Conservative 20 lbs/plant; 29,040 lbs/acre

-Potential 50 lbs/plant; 72,600 lbs/acre

N	P2O5	K2O
58	16	113
145.2	40	284



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