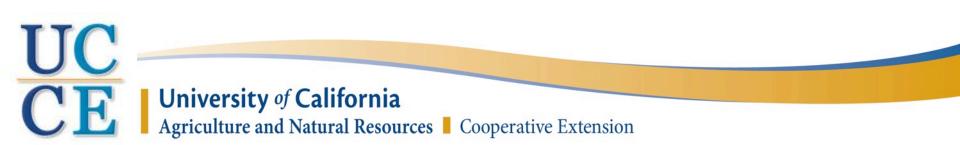
Evaluation of Pear Tissue Sampling Protocols for Improving Nutrient Management

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Current Leaf Sampling Recommendations in Calif.

- Non-bearing spur leaves in mid-summer
 - Leaves 3 months old, not strong nutrient sink
 - Static in nutrient mobilization
- Shoot or bearing spur leaves are a better indicator of nutrient status
 - Real-time status of nutrient mobilization
- Shoot leaves used throughout world
 - Also in Calif. before 1983

Spring Sampling

- With spring sampling, can make in-season fert. adjustments based on crop load
 - Reduce vigor potential
 - Anticipate fruit quality problems from nutrient imbalances



Leaf Sampling

- No benefit has ever been documented from N application when July leaf N > 2.2%
- Leaves not always indicative of fruit nutrient status, especially Ca
 - Fruit sampling may be more indicative



Objectives

- Compare nutrient levels & ratios from different tissues and timings
- Determine if a better sampling protocol can improve nutrient management
- Lead-in to likely CDFA-FREP project
- Possibly revise UC recommendations for sampling & nutrient management

Sampling

(in 4 alternating drive rows)

• Late April (after early fruit drop)

Fruits and leaves

- July
 - Mid-shoot and non-bearing spur leaves
 - Fruit just before first pick
 - Soil



Three Bartlett Blocks

- <u>Block A</u> Very productive, loam soil
- <u>Block F</u> Struggled for years, low production, drainage problems, loam soil
- <u>Block O</u> Organic transition, younger, highly uniform, higher density but one with lower production, clay soil
- No foliar nutrients applied



Soil Sampling Results

| | NO ₃ -N | Olsen-P | X-K | X-Ca | X-Mg | CEC | OM | рН |
|-------|--------------------|---------|-----|------|------|------|-----|-----|
| Block | р | pm | | % | | | | |
| Α | 5.3 | 54.3 | 1.5 | 7.4 | 3.5 | 12.5 | 2.0 | 6.1 |
| F | 10.7 | 40.9 | 1.8 | 17.6 | 6.2 | 26.7 | 3.5 | 6.9 |
| 0 | 19.8 | 46.5 | 1.3 | 21.7 | 9.5 | 33.0 | 4.9 | 6.6 |



Leaf Sampling Results – N & K

| | Block | N (%) | | K (%) | |
|--------------|-------|-------|----|-------|---|
| <u>April</u> | А | 2.86 | b | 1.44 | а |
| Mid-Shoot | F | 3.14 | а | 1.33 | b |
| | 0 | 2.95 | b | 147 | а |
| <u>July</u> | А | 2.43 | ab | 1.01 | b |
| Mid-Shoot | F | 2.52 | а | 0.98 | b |
| | 0 | 2.40 | b | 1.26 | а |
| <u>July</u> | А | 1.98 | ns | 1.65 | b |
| N-B Spur | F | 1.95 | ns | 1.73 | b |
| | 0 | 2.03 | ns | 2.16 | а |



Fruit Sampling

• No relation:

-Leaf vs. fruit analyses

- Fruit analyses in April vs. July



July Leaf Prediction Model Nonpareil Almond (Excel Spreadsheet)

- Sample all leaves of 5-8 non-fruiting spurs/tree 6 weeks after full bloom when reach full size (mid-April)
- Collect leaves from 18–28 trees /orchard, place in a single bag
 - EACH SAMPLED TREE AT LEAST 30 YARDS APART
 - 100 leaves/sample bag
- Send to lab, ask for a FULL NUTRIENT ANALYSIS
 - N, P, K, B, Ca, Zn, Cu, Fe, Mg, Mn, S



July Leaf Prediction Model – Almond

Pear Leaf Samples 2014 (mid-shoot leaves)

| En | Enter the tissue nutrient values for leaves collected in spring | | | | | | | | | | |
|----|---|-------|-----------|-------|------------|-------|-------------|-------|------------|-------|-------|
| 1 | N | Р | К | S | В | Ca | Mg | Zn | Mn | Fe | Cu |
| () | %) | (%) | (%) | (ppm) | (ppm) | (%) | (%) | (ppm) | (ppm) | (ppm) | (ppm) |
| | | | | | | | | | | _ | |
| | | | July % N | | Predicted | | July % N | | July % N | | |
| | | | Predicted | | % of Trees | | Actual | | Actual | | |
| | | Block | | | above C.V. | | (Mid-Shoot) | | (N-F Spur) | | |
| | | А | 2.41 | | 94.7% | | 2.43 | | 1.98 | | |
| | | F | 2.45 | | 97.1% | | 2.52 | | 1.95 | | |
| | | 0 | 2. | 44 | 96.6 | 96.6% | | 2.40 | | 2.03 | |



Conclusions

- Little to no relationship in nutrient values of leaves or fruit between April and July sampling dates
- Mid-shoot leaves higher in N, lower in K
- Little relationship between soil, leaf nutrients
- Strong fit of April leaf levels with predicted July leaf levels (shoot leaves)
- Would knowledge of July N levels in April affect preharvest N fertilization?



Thanks to Chris Frieders

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