

Pomegranate Fertilization Overview and Future Projects



Shinsuke Agehara
Assistant Professor
Vegetable and Fruit Crop Physiology

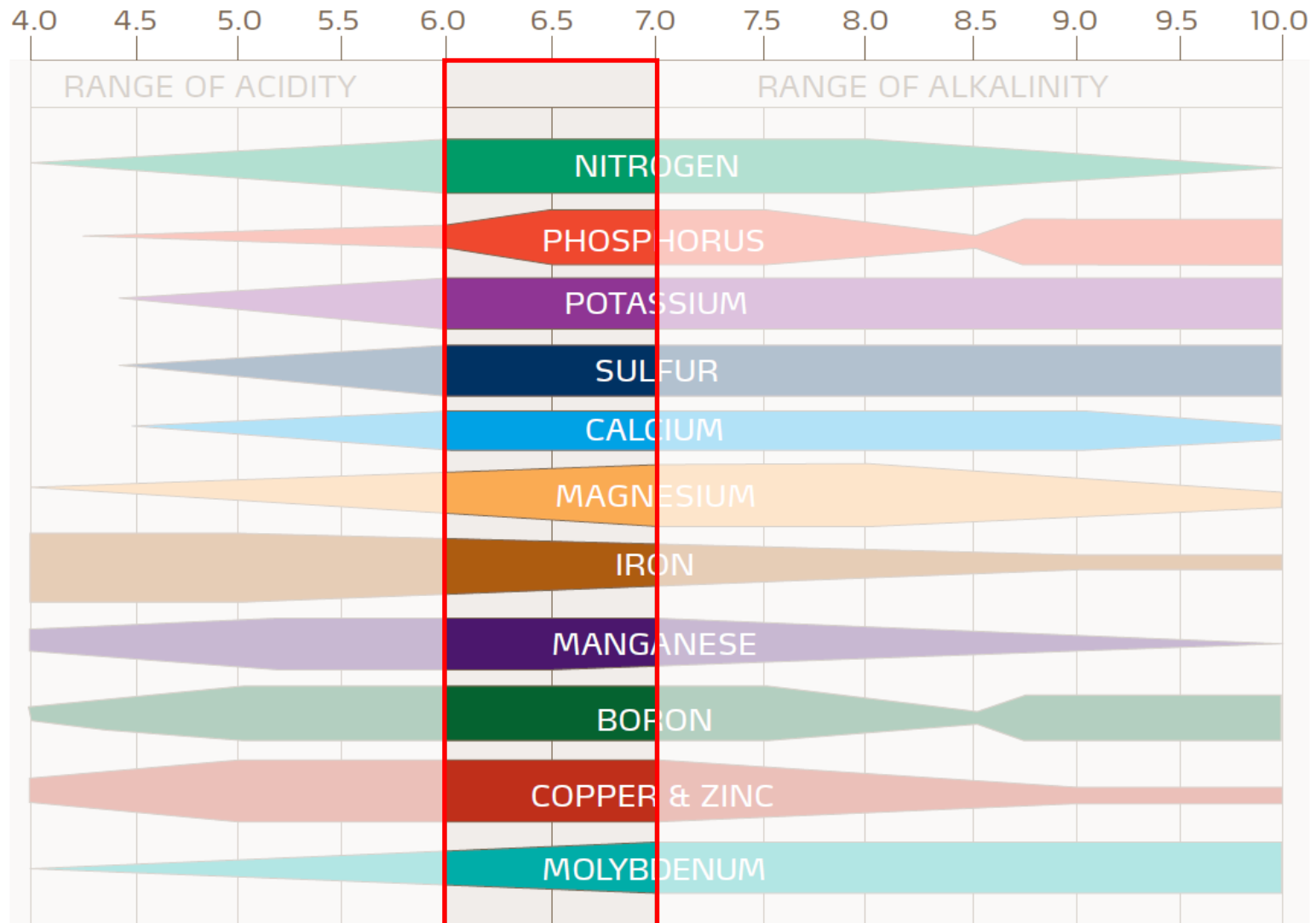
Fertilizer Requirements are Similar for Citrus and Pomegranate

| | Citrus | Pomegranate |
|---|--------|-------------|
| Expected Yield (t/acre) | 7-20 | 12 |
| N (lb/acre) | 70-171 | 137-143 |
| P ₂ O ₅ (lb/acre) | 66-89 | 54-69 |
| K ₂ O (lb/acre) | 74-197 | 185-206 |

*Recommendations by the Haifa Group

Adjust Soil pH – First Step of Fertilization

The Influence of Soil pH on Nutrient Availability



Soil pH & Liming

- Optimum soil pH is 6 to 7.
- Ideally, soil pH should be adjusted at the time of establishment.
- Calcite can react faster than dolomite.
- If soil Mg is ≥ 60 lb/acre, use calcite (CaCO_3).
- If soil Mg is < 60 lbs/acre, use dolomite [$\text{CaMg}(\text{CO}_3)_2$] (e.g. 1 ton of dolomite/acre if pH is 5).
- Liming effects are slow and can take up to 1 year.
- Factors slowing liming effects: low soil moisture, large mesh size, high soil CEC (clay soil), etc.

Nitrogen (N) & Potassium (K)

- N and K are most important nutrients for fruit production including pomegranates.
- N is a main component of leaf chlorophylls – important for canopy growth to support fruit development.
- K plays important physiological and molecular roles – important for fruit growth, size, and quality.
- Use 1:1.25 N to K₂O ratio, or even higher K for high pH or calcareous soils and heavy bearing trees.

Phosphorus (P)

- Optimum soil P level is ≥ 60 lb/acre.
- P does not leach easily when soil pH is ≥ 6 , and crop removal is little.
- Regular P applications are not necessary.
- P is a component of nucleic acid and energy molecule – important for cell division and new tissue development.
- P deficiency can result in insufficient root growth, weak winter hardiness, and slow maturity.

Optimum Leaf Macronutrient Levels

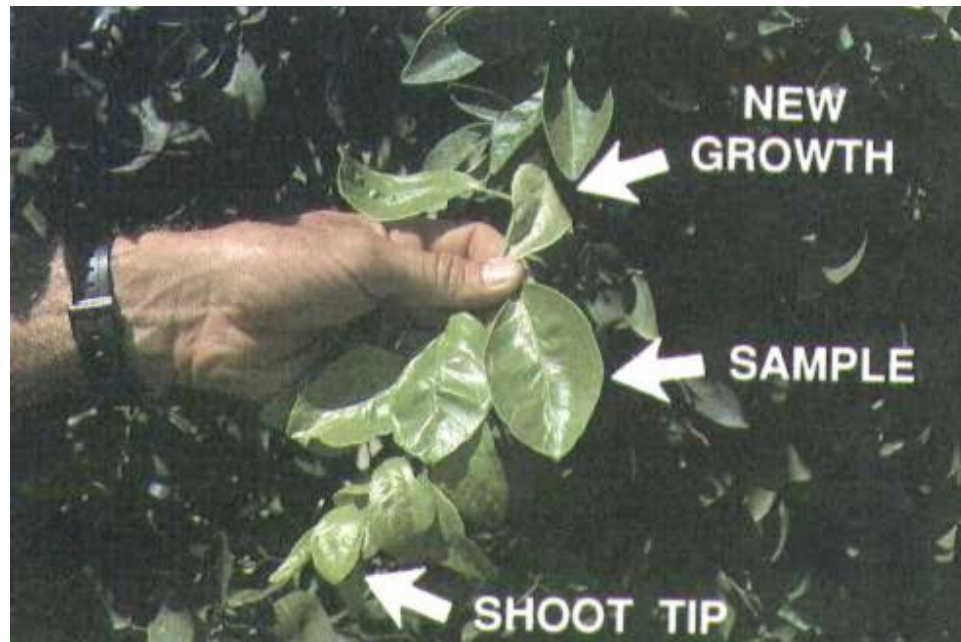
| | Citrus | Pomegranate |
|---------------|------------------|----------------|
| N (%) | 2.5-2.7 | 1.8-2.5 |
| P (%) | 0.12-0.16 | 0.1-0.2 |
| K (%) | 1.2-1.7 | 0.8-1.2 |
| Ca (%) | 3.0-4.9 | 0.7-1.5 |
| Mg (%) | 0.3-0.5 | 0.3-0.4 |

Optimum Leaf Micronutrient Levels

| | Citrus | Pomegranate |
|----------|--------|-------------|
| Mn (ppm) | 25-100 | 20-70 |
| Zn (ppm) | 25-100 | 40-70 |
| Fe (ppm) | 60-120 | 60-120 |
| B (ppm) | 36-100 | 10-20 |
| Cu (ppm) | 5-16 | 10-20 |

Leaf Sampling for Tissue Analysis

- 100 spring cycle leaves from 20-25 trees (one leaf from each tree quadrant).
- Leaves on non-fruiting shoots at the middle third of the branch
- Uniform trees of similar age
- June to July



NPK Application Rates

| Age (year) | N (lb/tree/yr) | P₂O₅ (lb/tree/yr) | K₂O (lb/tree/yr) |
|-----------------------|---------------------------|--|--|
| 1-2 | 0.33-0.50 | 0.33-0.50 | 0.33-0.50 |
| 3 | 0.50-0.67 | 0.50 | 0.50-0.67 |
| 4 | 0.67-1.0 | 0.50 | 0.67-1.0 |
| +5 | 1.0 | 0.50 | 1.0 |

*Recommendations by Dr. Zekri at IFAS

Fertilization Timing

- Fertilizers should be applied twice a year: early spring and early summer.
- No fertilization after August, late fertilization can promote new growth which may be subjected to freeze damage.
- Fertilizers can be applied more frequently with fertigation.

Suggested Fertigation Programs

| Month | Suggested Program 1 | Suggested Program 2 |
|---------------|----------------------------|----------------------------|
| March | 5% | 20% |
| April | 25% | 20% |
| May | 25% | 20% |
| June | 20% | 20% |
| July | 15% | 20% |
| August | 10% | |

*Recommendations by Dr. Zekri at IFAS

Other Fertilization Practices

- Foliar K spray – increase fruit size and yield and reduce fruit splitting
- Foliar sprays of Zn, Mn, B, and Cu when tissue analysis shows deficiency
- Soil application of Fe chelates – safer and more reliable than foliar spray
- Compost
- Mycorrhiza

Future Projects

- Monitor soil and tissue nutrient levels at commercial farms.
- Assess the effects of fertility programs on plant nutrient status and fruit productivity.
- Record nutrient deficiency symptoms.
- On-farm evaluation: compost, foliar sprays, etc.

Sources

- Dr. Mongi Zekri, Pomegranate nutrition, University of Florida, IFAS extension

[http://www.crec.ifas.ufl.edu/extension/pomegranates/pdfs/Zekri_Mongi%20_Nutrition.pdf](http://www.crec.ifas.ufl.edu/extension/pomegranates/pdfs/Zekri_Mongi%20Nutrition.pdf)

- M.D. Sheets, M.L. Du Bois and J.G. Williamson, The pomegranate, University of Florida.

<http://edis.ifas.ufl.edu/pdffiles/MG/MG05600.pdf>

- Haifa Group website

http://www.haifa-group.com/knowledge_center/recommendations/fruit_trees/pomegranate_fertilization.aspx