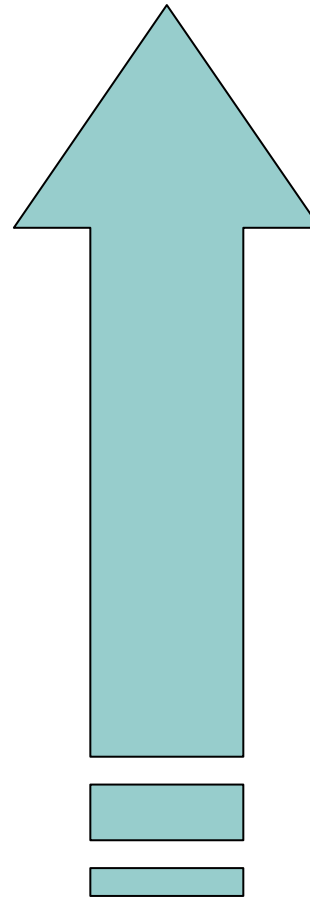


Fertility Management

**Depends upon the growing system
choose**

- **Ground/Soil**
- **Soiless Media**
- **Hydroponics**

Management Intensity



Hydroponics

Soiless Media

Soil

Show of Hands

- **Growing directly in soil in high tunnel?**



Soil Fertility Management in High Tunnels

Chris Gunter

**Horticulture Specialist
Southwest Purdue Ag. Program
Vincennes, IN**



High Tunnel Location

- **Good ground**
- **Not prone to flooding**
- **Few persistent weed issues**

Site Selection

- **Most profitable ground on the farm?**

Site Selection

- **You wouldn't swimming pool in your living room**
- **You shouldn't locate your high tunnel on poor ground**

Water Source Quality

- **Well Water**
- **Municipal Water**
- **Surface Water**

Well Water

- **High in alkalinity (pH)**
- **Clog drip lines**



Municipal Water

- **Treated water (“city water”)**
- **May contain fluoride**



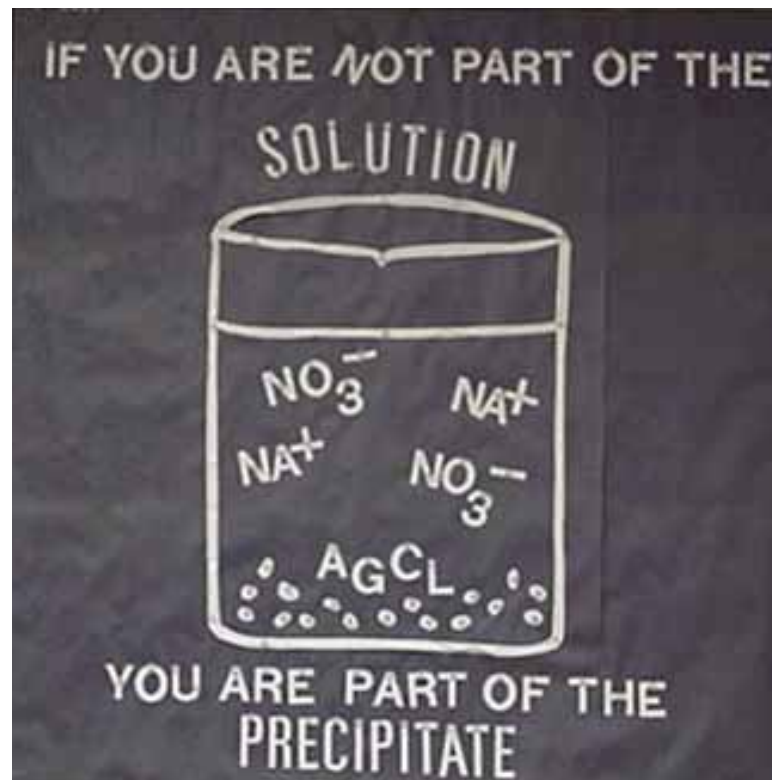
Surface Water

- **Silt**
- **Particulates**
- **Disease Organisms**



Drip Fertigation

- **Fertilizer Incompatibility**



Soil Test

Basis for Any Applications

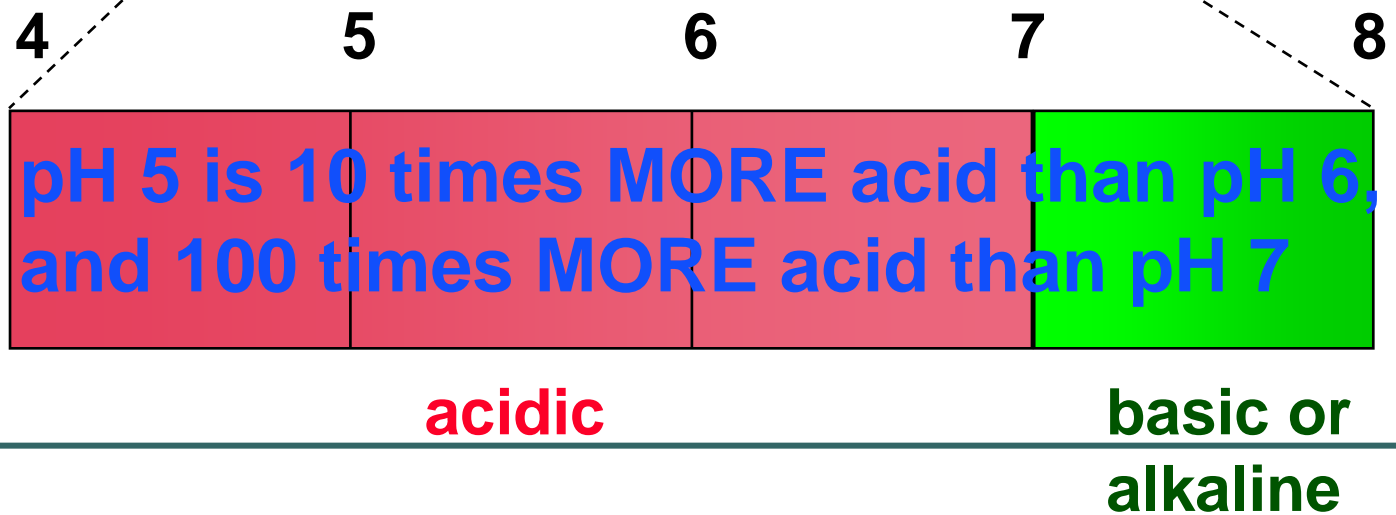
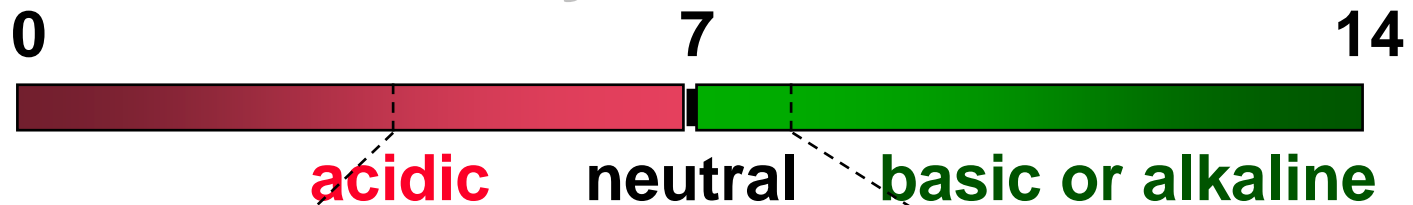
- **Nutrient Status of Soil**
- **pH**
- **Organic Matter**

Nutrient Status of Soil

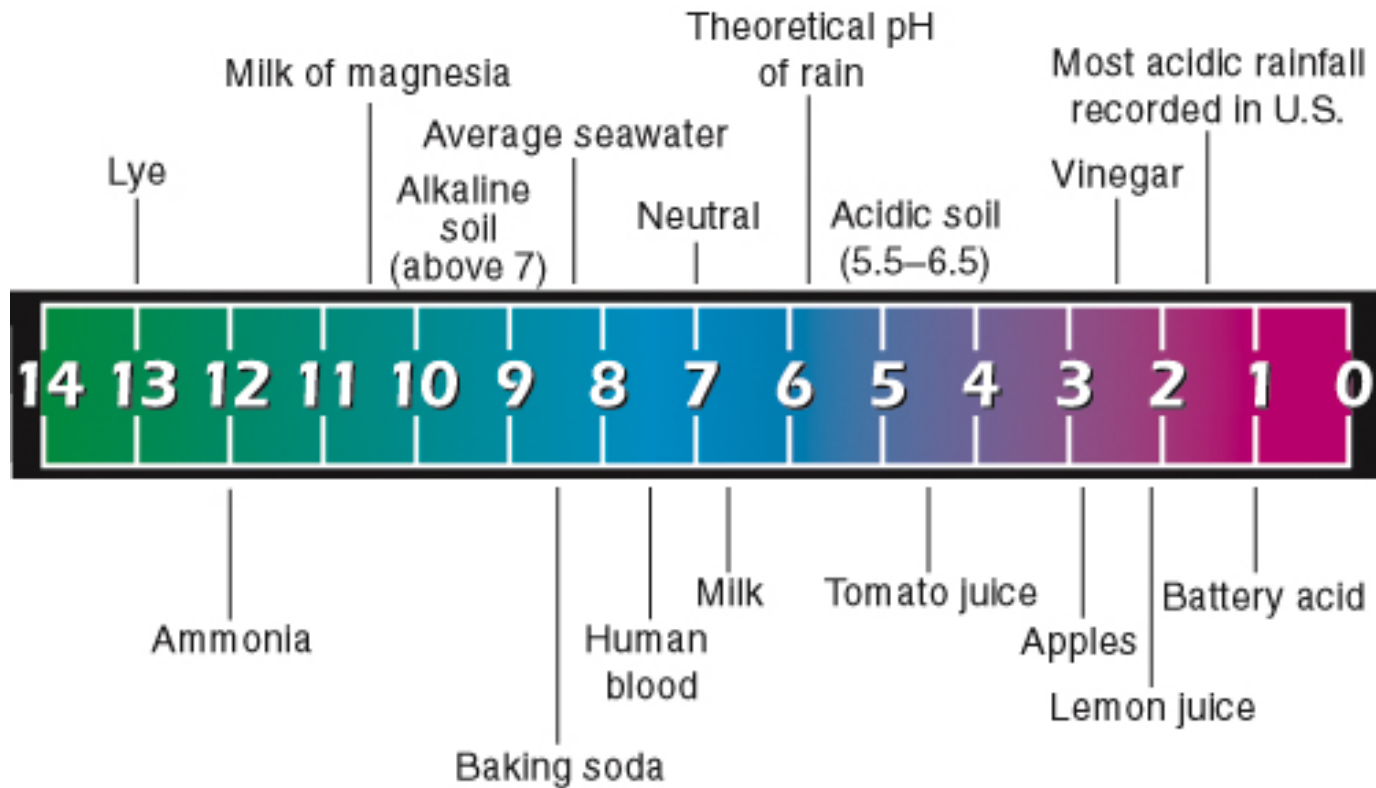
- **Usually reported in a High, Medium, Low basis**
- **Likelihood of seeing a response**

pH

Measure of acidity

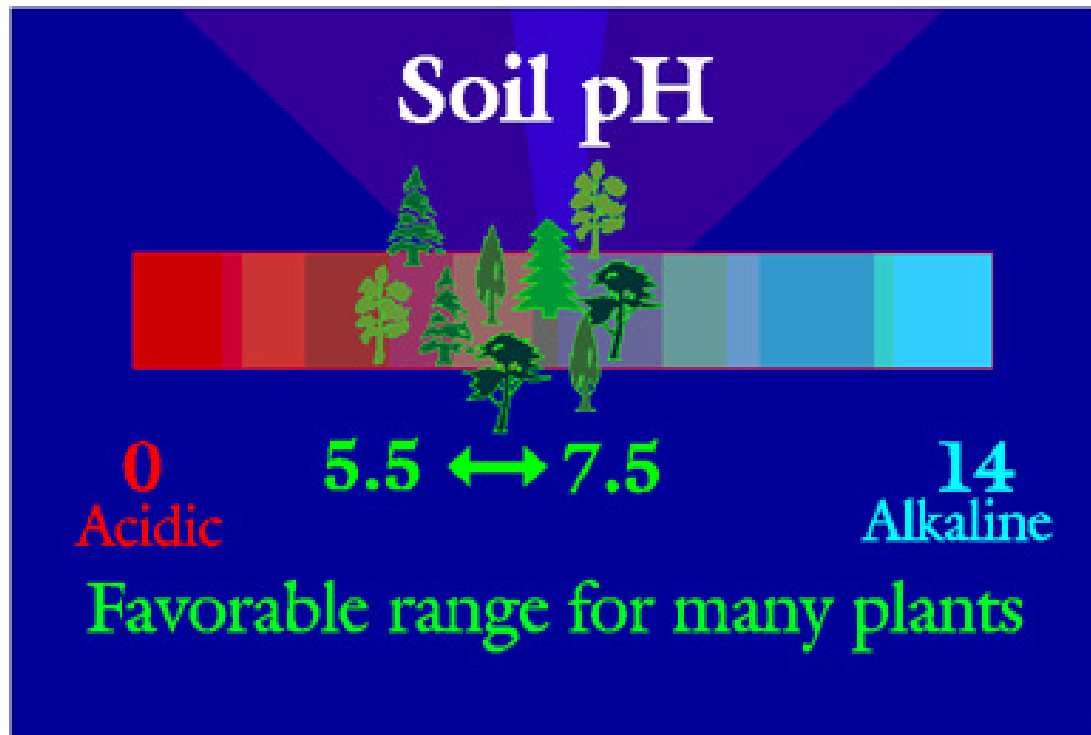


pH

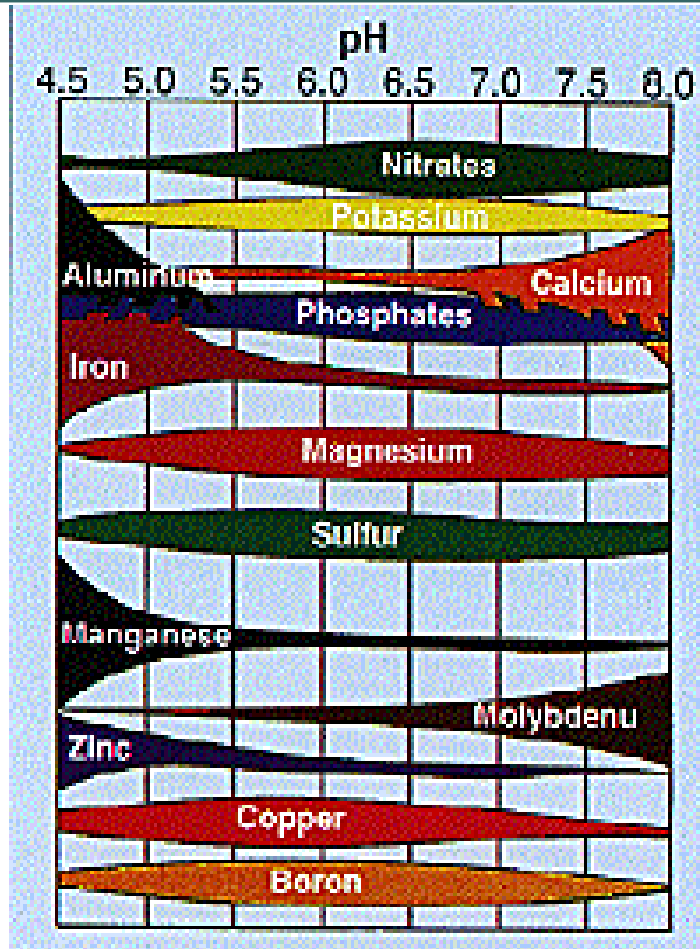


pH

- **Acidity and Alkalinity of Soil**



pH and Nutrient Availability



Organic Matter

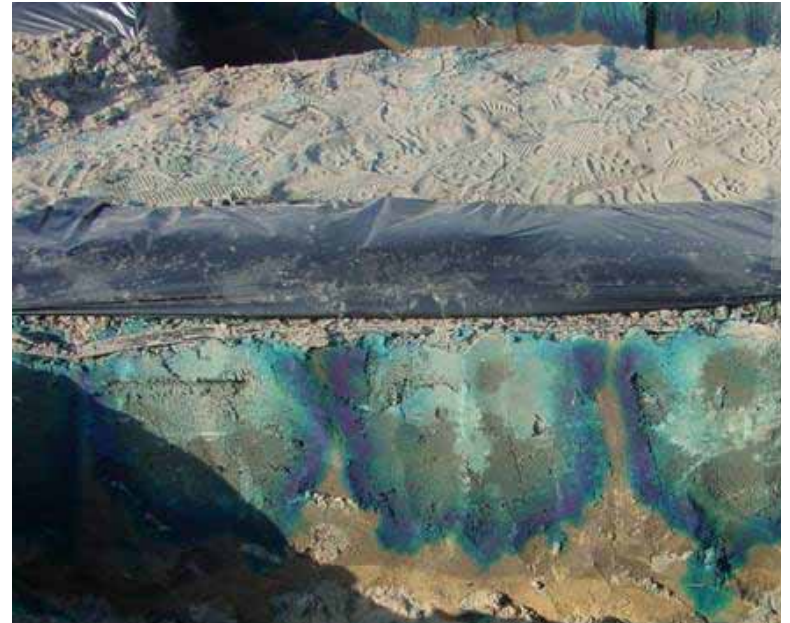


Adjusting Nutrients - Preplant

- **pH**
- **Organic Matter – Cover Crops, green manures, compost**
- **Preplant N-P-K Application**

Adjusting Nutrients – Post Plant

- **Drip Injection**



Foliar Fertility

- **Not Recommended**
 - **Wet foliage**
 - **Inadequate Uptake**



Tissue Testing

- **Sample Method Varies by Crop**
- **Not compatible with Foliar Feeding**
- **Tomato Example**

Tomato Tissue Sampling

- **Time of Day – Temperature and Time of day influence reading – be consistent**
- **Leaf Age – Most Recently Matured Leaf – Fully Expanded**
- **Whole leaf petiole, leaflets stripped off**
- **Number of Leaves - ~20 for 5-10 acre field**

Test Kits – Cardy Meters

- **Separate meters for N and K**
- **Sap expressed on to electrode**
- **Proper calibration required**
- **Store meters properly**

Testing Guidelines – Petiole

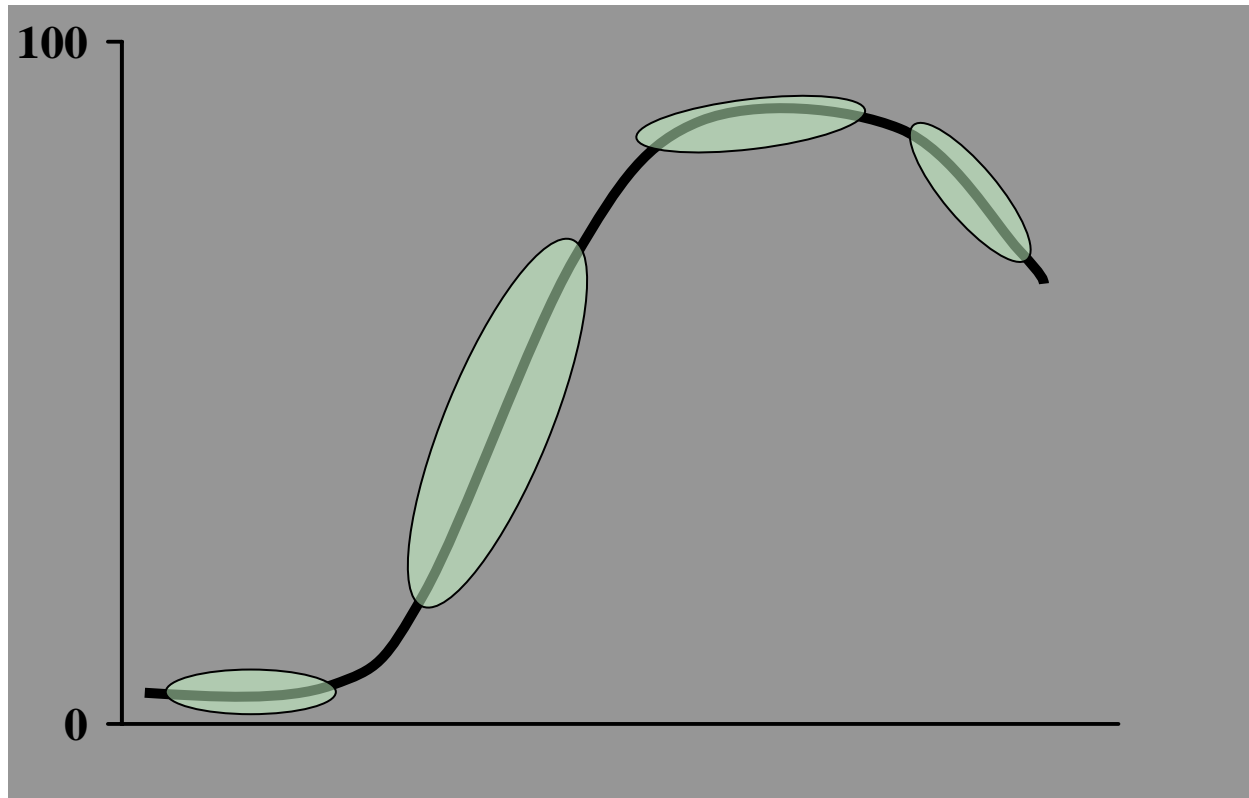
| Fresh Petiole Sap Concentration (ppm) | | |
|--|-------------------------|-----------|
| Stage/Timing | NO₃-N | K |
| First Bud | 1000-1200 | 3500-4000 |
| First open flowers | 600-800 | 3500-4000 |
| Fruits 1-inch | 400-600 | 3000-3500 |
| Fruits 2-inch | 400-600 | 3000-3500 |
| First harvest | 300-400 | 2500-3000 |
| Second harvest | 200-400 | 2000-2500 |

Testing Guidelines – Whole Leaf

| | % | | | | | ppm | | | | | | |
|---------------------------|----------|----------|----------|-----------|-----------|------------|-----------|-----------|-----------|----------|-----------|-----------|
| | N | P | K | Ca | Mg | S | Fe | Mn | Zn | B | Cu | Mo |
| First Bud | 3.0-5.0 | 0.3-0.6 | 3.0-5.0 | 1.0-2.0 | 0.3-0.5 | 0.3-0.8 | 40-100 | 30-100 | 25-40 | 20-40 | 5-15 | 0.2-0.6 |
| First open flowers | 2.8-4.0 | 0.2-0.4 | 2.5-4.0 | 1.0-2.0 | 0.3-0.5 | 0.3-0.8 | 40-100 | 30-100 | 25-40 | 20-40 | 5-15 | 0.2-0.6 |
| Fruits 1-inch | 2.5-4.0 | 0.2-0.4 | 2.5-4.0 | 1.0-2.0 | 0.3-0.5 | 0.3-0.6 | 40-100 | 30-100 | 20-40 | 20-40 | 5-10 | 0.2-0.6 |
| First harvest | 2.0-3.5 | 0.2-0.4 | 2.0-4.0 | 1.0-2.0 | 0.3-0.5 | 0.3-0.6 | 40-100 | 30-100 | 20-40 | 20-40 | 5-10 | 0.2-0.6 |

Nutrient Demands Change

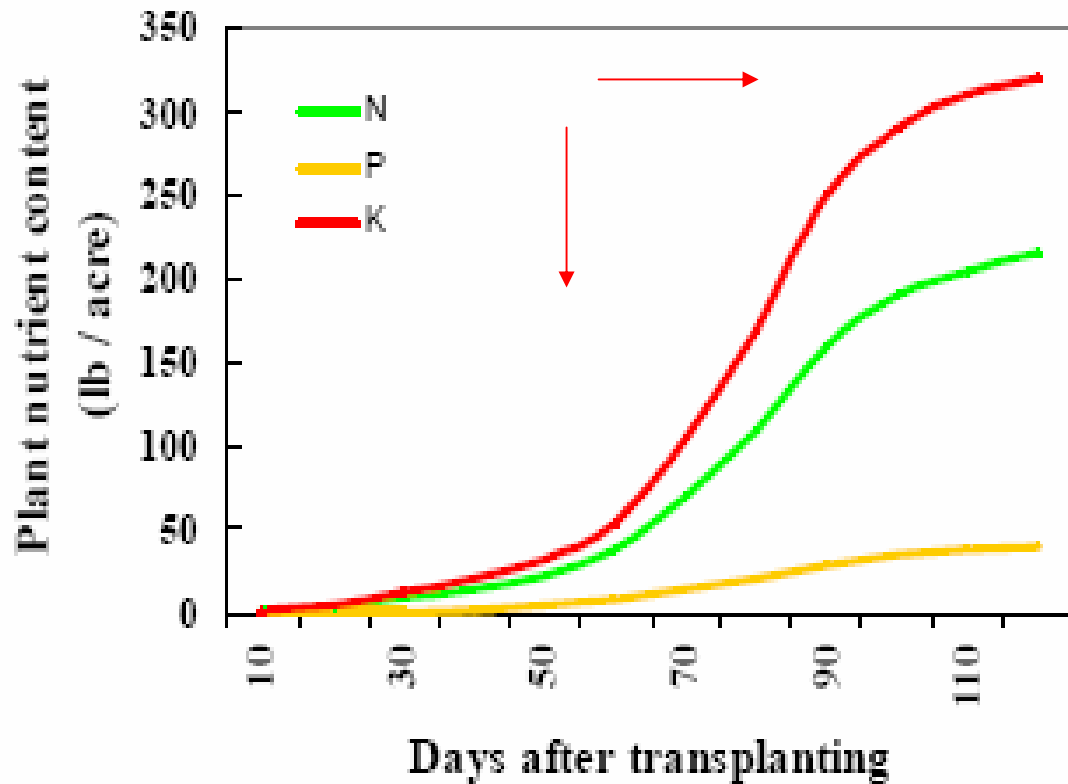
Relative Nutrient Demand



Crop Growth Stage

Feed the Plant When it needs it

**Target K
application to
flowering stage**



Compost

- **Compost mineralization**
- **Compost quality**
- **Compost vs. Aged**
- **Compost problems – herbicide and source**

Ideas for the Future?
