**Nutrient Management Triangle**

- Inter-relationships form basis of nutrient management
- A change in one influences performance of others

**Fertilization**
- Framework focuses on Physical & Chemical dimensions of nutrient management
- Biological properties also interact, as well

**Substrate ↔ Irrigation**
- Substrate physical properties and irrigation frequency
  - Less water is applied to tighter mixes

**Substrate ↔ Irrigation**
- Percolation rate
  - Too fast through loose mix
  - Drip tube irrigation system may not be compatible
**Substrate ↔ Irrigation**

- Pore size and quantity
  - Subirrigation requires tight enough mix to result in solution movement into pot through holes in bottom of pot

**Substrate ↔ Irrigation**

- Components like clays increase water retention of substrate and decrease irrigation frequency

**Irrigation ↔ Fertilization**

- As amount of leaching is reduced, rate of fertilizer concentration applied should also be decreased

**Irrigation ↔ Fertilization**

- Large leachate volume = higher fertilizer concentration
- Small leachate volume = lower fertilizer concentration

**Overhead systems**

**Open systems**

**Subirrigation system**

No leaching
Fertilizer concentration lower

**Volume leached**

**Volume applied**

Volume leached / Volume applied = Leaching Fraction
Best Leaching Fraction is dependent on…
- Sensitivity of crop to salts
- Substrate porosity
- Irrigation water quality
- Volume of water to wet root zone
- Many other factors

Clear irrigations
- Leaches nutrients from pot, especially with large volume applications
- Alternated with high soluble feed rates
- Used to reduce unwanted salt build-up in substrate

Substrate ↔ Irrigation
- Match substrate to irrigation system needs
  - Percolation rate
  - Water uptake via capillarity

Substrate ↔ Fertilization
- Mixes impact irrigation frequency, and thus frequency of soluble feed application

Nutrient Management Triangle
- Use more porous substrate earliest in season when winter temps and light levels low (= slower growth, plants don’t dry out but need to get fertility to them), e.g. increase perlite %
- Use tighter mix for later crops when temps higher and light brighter (= more rapid growth, fertigating all time!), e.g. decrease perlite %

Pre-plant amendments are part of over-all fertilization program
**Substrate ↔ Fertilization**

- Substrate chemical properties & nutrient retention

**Nutrient Management Triangle**

Flexible substrate recipe
Adjust for:
- Different crops’ requirements
- Seasons of the year
- Frequency of watering

**Monitoring Nutrition**

- What is the impact of the tray under the pot on:
  - Frequency of irrigation?
  - Fertilizer rate?
  - Substrate selection?

- Production environment—temperature, light, humidity, CO₂—also interact with nutrient management