**FERTIGATION**

The practice of applying fertilizers directly through irrigation water.

In its simplest form it is just side dressing Nitrogen through the irrigation system

**CONSTANT FEED FERTIGATION**

- Fertigation where plant nutrient and water requirements are applied in short increments as the plant needs them, generally, with every irrigation.

  “Feed and water the plants daily with the precise required amount and types of nutrients and the precise required amount of irrigation water”
Basic assumptions:

- Nutrient uptake rates are crop-specific
- Plants need different quantities of the various nutrients at different stages of their growth cycles.
  - Vegetative, Flowering, Fruit Development, Hardening, etc
- Each nutrient has a specific purpose and can limit production and/or quality if deficient at the time it is required.
- There is no such thing as "something for nothing". If you want higher yields and better quality, higher, more efficient, or more timely inputs are required.
- Nutrients should be available to the plants "Just-in-Time" to reduce leaching losses, salt stress, and avoid luxury feeding.

Dynamics of nutrient uptake

Of course, the plant can’t handle it’s entire annual water portion applied at once.

Dynamics of nutrient uptake

Same holds true for nutrients, too.

Nutrients should be applied according to their requirement pace.
Dynamics of nutrient uptake

Constant Feed Fertigation
= Teaspoon feeding
Nutrients are supplied just-in-time.

K P Ca Mg N

To Do Fertigation Right You
Need to Understand:
1. Nutrient uptake rates for the crop over its life span.
2. Water uptake rates for the crop over its life and how it varies with weather conditions.
3. How much water the soil will hold within the root zone.

Watering Practices and Fertilizers
Cannot be separated from each other
ESPECIALLY
With shallow rooted crops
And
With soils or media with low water holding capacity
IF YOU OVERWATER YOU UNDER-FERTILIZE

- It is easy to leach fertilizers out of the root zone of low water holding capacity media with shallow rooted.
- Overwatering with overhead and dry fertilizers leach fertilizers easily PLUS can cause high salt conditions.
- With drip and conventional fertilizer practices, roots grew into the wet area while dry fertilizers are easily leached out of the wet area.
- With constant feed fertigation we can put what the plant needs into the "sweet spot" every day in small increments.

The Benefits of Fertigation: Fertilizer Savings and Efficient Utilization

Nutrients in solution & fed to the plants daily for ready uptake by the roots.

Without fertigation, drip tends to leach fertilizers out of the root zone to edges.

Plant water requirements

- Are proportional to the rate of evapotranspiration (ET) which depends on:
  - Stage of plant development—Crop Curves and Kc Curves
  - Meteorological conditions (temp., wind, radiation, humidity)—from weather stations and ET measurement devices
Weather Stations & ET Gauges

- Extensive Research shows that Evaporation data is proportional to crop water use.

Both measure evaporation in Inches per day

A good Fertigation program is based on proper water management, considering:

- Soil types and their characteristics

Irrigation of Blueberries on Bark and Light Soils

Net Application per Irrigation at 60% Available Moisture for various root depths

<table>
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<tr>
<th>Soil Type</th>
<th>Avail Diameter (in)</th>
<th>irrigation root zone single (in)</th>
<th>Irrigation Distance (in)</th>
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<th>irrigation root zone double (in)</th>
<th>Irrigation Distance (in)</th>
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Automation with Drip is practically a must for success
The Benefits of Constant Feed Fertigation

**Advantages for the plant:**
- Nutrients are directed to the active root zone.
- Uniform and precise distribution of nutrients.
- Nutrients are already dissolved, hence ready for uptake by the roots.
- Plant enjoys continuous nutrition. No temporary deficiency should occur.
- Less salt stress—NEVER a high Salt level because of spoon feeding.
- Higher Yields and Quality.

Yield Differences Can Be Seen

Same Farmer, 3 days younger, Drip & Fertigation

Yield Results of SC Tomatoes

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<th>Type</th>
<th>Yields 25 #</th>
<th>Average</th>
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Soil Sample

Areal with GPS Boundary

Overlay Soil Types

Soil Sample

Color Soil Types

Smart Sample

Fertigation Basics

- Have a plan to follow
- But be ready to modify it by:
  - Visual observations
  - Tissue samples
Fertigation Success Is Not Automatic
- There is really no recipe
- Hard work and close attention to the crop is required.
- There is always a lot of learning to do with each new soil and crop.
- Proper water management is a must for

Typical Micro-Irrigation System

Drip Irrigation Systems
Safety Interlocks and BFPs

Chemigation Valve, NC Valve & Fert Meter

FERTILIZER INJECTORS

- Water driven pumps
- Positive displacement pumps
- Venturi injectors

- All fertilizer pumps give some trouble!!!!
- Easy to maintain and parts is the key.
Water Driven Fertilizer Pumps

- No power requirements
- Economical
- Easy to install
- Pressure sensitive
- Maintenance required

Electric Positive Displacement Pumps

- Large Volume
- Easy to maintain
- Maintenance required

Venturi Fertilizer Pumps

- Inexpensive
- 15 psi differential required.
- Should use with booster pump for best economy
Fertigation Maintenance

- Maintain pumps per manufacturers recommendations.
  - Seals
  - Weep holes.
- Check fert meters by comparing tank withdrawal with computer count.
- Salt out. Liquids will salt out. Make provisions to easily flush crystals from lines.
So neither he who plants nor he who waters is anything, but only God who makes things grow.

1 Corinthians 3:7 NIV