
Constant Feed Fertigation
B.B.HOBBS
IRRIGATION
FERTIGATION
SINCE 1988
COMPANY
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B.B. Hobbs, Inc
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Apopka, Fl; Palmetto, Fl; LaBelle, Fl
Darlington, SC; Clinton, NC
South Carolina PE Registration only
BB Hobbs Inc. Fertigation


FERTIGATION
The practice of applying fertilizers directly through irrigation water.
In its simplest form it is just side dressing Nitrogen through the irrigation system
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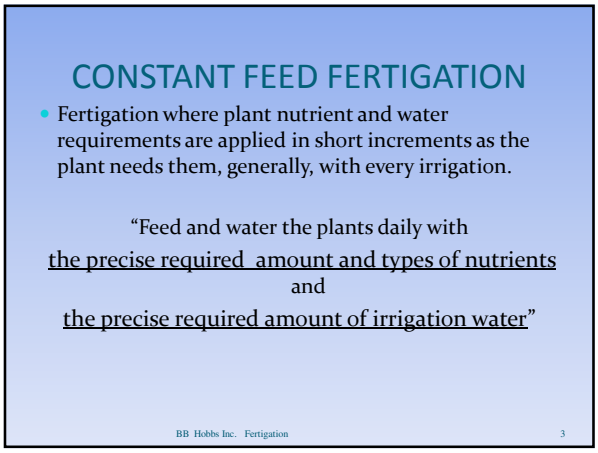
CONSTANT FEED FERTIGATION
Fertigation where plant nutrient and water requirements are applied in short increments as the plant needs them, generally, with every irrigation.
"Feed and water the plants daily with
the precise required amount and types of nutrients
and
the precise required amount of irrigation water"
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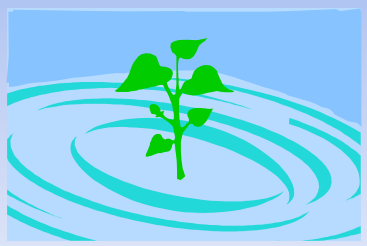
Basic assumptions:

- Nutrient uptake rates are crop- specific
- Plants need different quantities of the various nutrients at difference 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

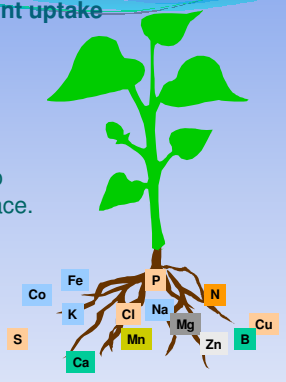
Of course, the plant can't handle it's entire annual water portion applied at once.

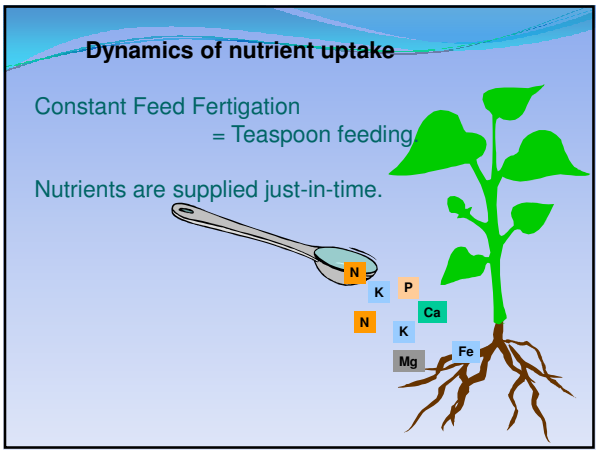


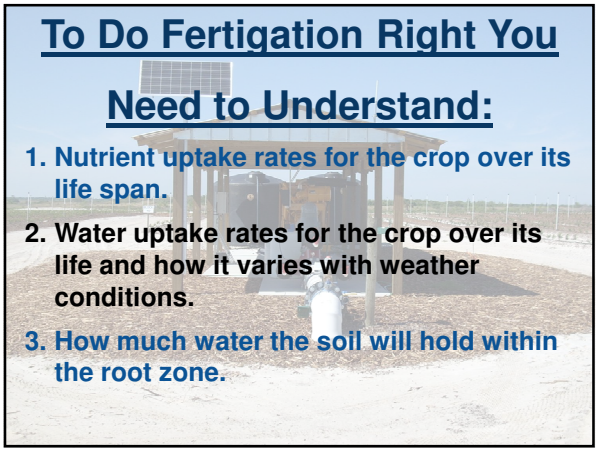
Dynamics of nutrient uptake

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.
N
K
P
Ca
N
K
Mg
Fe


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
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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 grow 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.

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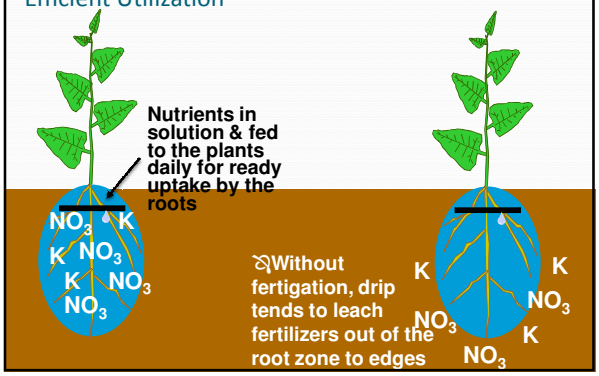
The Benefits of Fertigation: Fertilizer Savings and Efficient Utilization



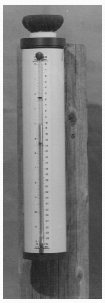
Plant water requirements

- 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

Weather Stations

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



ET Gauge

Both measure evaporation in Inches per day

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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.

		FC %	PWP%	Avail Moist %	Diameter spread	irrigation level	root zone ft	gallons per acre single	gallons per acre Double
New Bark ---(similar to loamy sand)	Drip	0.13	0.04	0.08	1	0.4	0.75	500	900
	Overhead	0.13	0.05	0.08	3.5	0.4	0.75	2800	8000
Old Bark--(similar to Sandy Loam)	Drip	0.21	0.10	0.11	1.25	0.4	0.75	700	1400
	Overhead	0.21	0.10	0.11	3.5	0.4	0.75	3800	10857
sand-	Drip	0.09	0.02	0.07	1	0.4	1.5	700	1400
	Overhead	0.09	0.02	0.07	4	0.4	1.5	5500	
Loamy Sand	Drip	0.14	0.04	0.10	1.25	0.4	1.5	1300	2500
	Overhead	0.14	0.04	0.10	4	0.4	1.5	7900	
sandy loam	Drip	0.23	0.09	0.14	1.5	0.4	1.5	2100	4200
	Overhead	0.23	0.09	0.14	4	0.4	1.5	11000	
sandy loam-OM	Drip	0.29	0.1	0.19	2	0.4	1.5	3800	7500
	Overhead	0.29	0.1	0.19	4	0.4	1.5	14900	
Loam	Drip	0.34	0.12	0.22	4	0.4	1.5	8700	17300
	Overhead	0.34	0.12	0.22	4	0.4	1.5	17300	

Automation with Drip is practically a must for success

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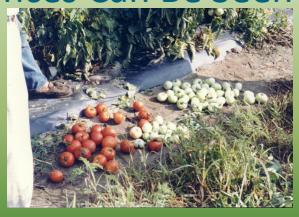
The Benefits of Constant Feed Fertigation

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

Dry Fertilizer & Traveler



Same Farmer, 3 days younger, Drip & Fertigation

Yield Results of SC Tomatoes

Yields 25 #

Type	Average	High
Dry	900	1400
Sprinkler	1350	1550
Drip	1400	1600
Fertigated	2000	2800


5-2-07
9-24-07
Jewell
Jewell
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5-2-07
9-24-07
Rebel
Rebel
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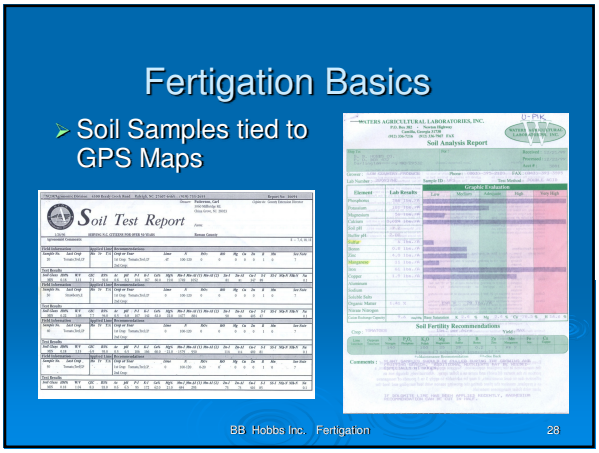
Fertigation Basics
Soil Samples tied to GPS Maps
Soil Test Report
Soil Analysis Report
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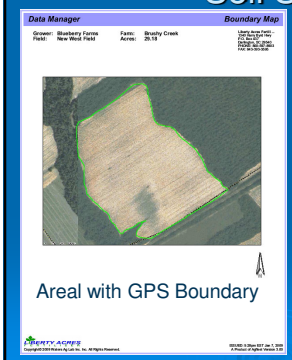
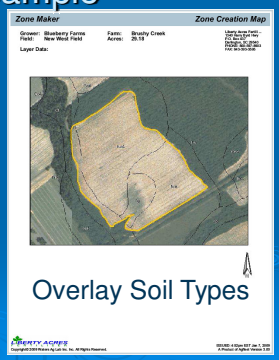
Soil Sample

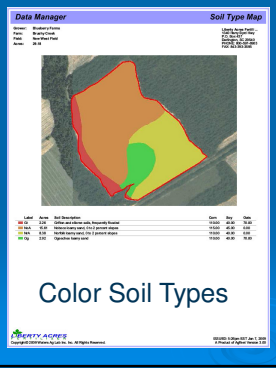


Areal with GPS Boundary

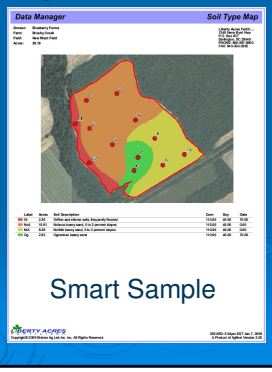


Overlay Soil Types

Soil Sample

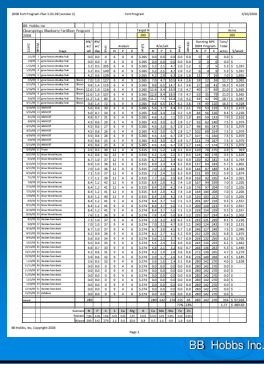


Color Soil Types



Smart Sample

Fertigation Basics



- Have a plan to follow
- But be ready to modify it by:
  - Visual observations
  - Tissue samples

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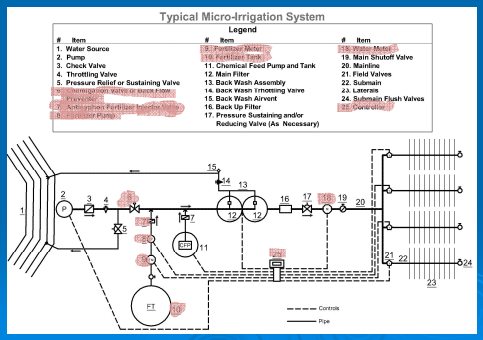
Fertigation Success Is Not Automatic

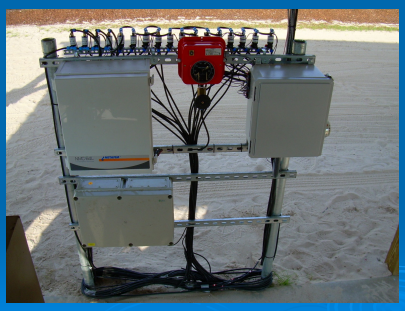
- There is really no recipe
- Hard work and close attention to the crop is required.
- There is always a lot of learning to do with each new soil and crop.
- Proper water management is a must fir

Typical Micro-Irrigation System



Drip Irrigation Systems

Fertigation Controller



Automatic Diesel Engine

Automatic Diesel Engine

Safety Interlocks and BFPs

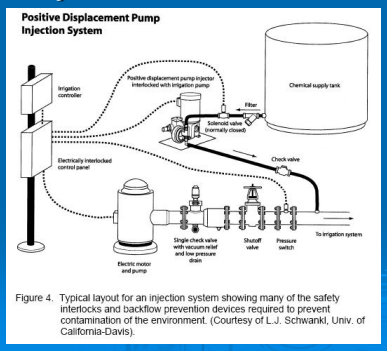


Figure 4. Typical layout for an injection system showing many of the safety interlocks and backflow prevention devices required to prevent contamination of the environment. (Courtesy of L.J. Schwankl, Univ. of California-Davis).

Chemigation Valve, NC Valve & Fert Meter

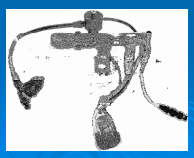
FERTILIZER INJECTORS

- 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



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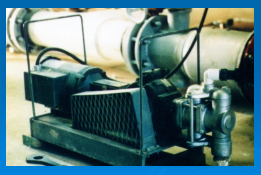
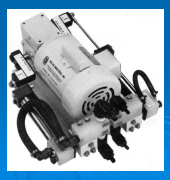
Electric Positive Displacement Pumps

- Large Volume
- Easy to maintain
- Maintenance required





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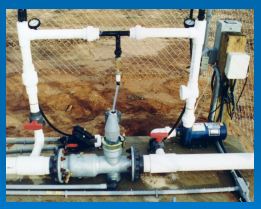
Venturi Fertilizer Pumps



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

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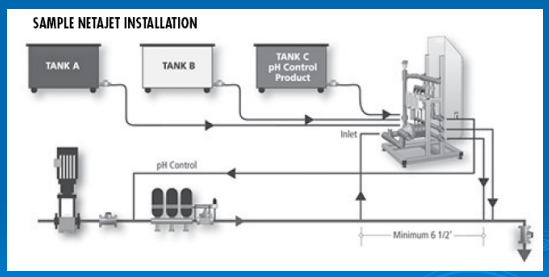
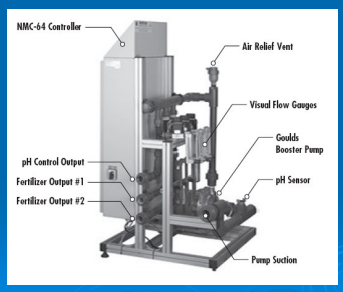
pH Control System



pH control system



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.

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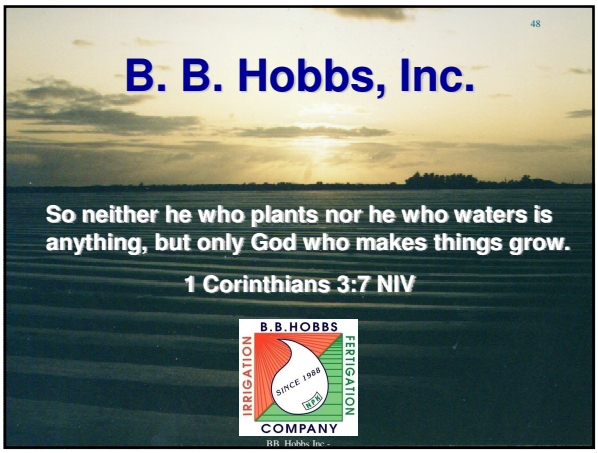
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So neither he who plants nor he who waters is anything, but only God who makes things grow.
1 Corinthians 3:7 NIV
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