Hydroponics

NUTRIENT FILM TECHNIQUE (NFT)
Elements of Hydroponic Systems

- Water Delivery System
- Nutrient Injection System
- Media – Something to hold the roots
- Irrigation Catchment

Nutrient Film Technique (NFT)

- The water is pumped from a main tank and distributed
- Continuous flow of nutrient solution to roots
- The water gravity drains back to the tank
- Continuously recycled nutrient solution

http://www.simplyhydro.com/images/content/nft.gif
Nutrient Film Technique (NFT) – Water Delivery System

- Holding Tank with aeration and heating or cooling – control root zone temp
- Automatic Fill/ Float Valve
- Pump
- Filters and Clean outs
- Distribution Lines
- Emitters (6 gph is good) with small hoses
- Tray to hold plants
- Frame to hold trays – angled for flow
- Drain pipes
- Flows back to your Tank

http://www.hydroworld.co.za/index_hbtn_files/78.jpg
Example NFT System
Cooling, Heating and Aeration
Float Valve – for constant tank fill


External Pump or Submersible Pump

Screen or Disk Filters

http://i.ebayimg.com/00/s/NjAwWDYwMA==/z/U-gAAAMXQhpdrRnp8p/$T2eC16N.lzoE9s5nd91D8rnpBoKjtl
~~60_35.JPG

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Distribution Lines, 6gph Emitter

Growing Trays
Trays Spaced 16” apart on center, alternating hole positions
Seedling grown for 15 - 25 days before being put on the system.
Drain Pipes
Nutrient Film Technique (NFT) – Fertilizer Delivery System

- Stock Tanks
- Nutrient Solutions
- Acid or Base for pH Adjustment
- Injection or Dosing System
- Controller
- Monitoring probes for EC and pH

http://www.hidhut.com/images/minifertigator.jpg
Three Stock Tanks (Acid is behind in the picture)
Fertilizer: Tank 1 - everything without nitrogen

Lettuce Formula

Magnesium Sulfate
Fertilizer: Tank 2 – Calcium Nitrate & Potassium Nitrate

Calcium Nitrate

Potassium Nitrate
Small Pump to Mix the Concentrated Nutrient Solution Tanks
What can you use to adjust pH?

- Diluted Sulfuric Acid - Battery Acid – lower pH
- pH Down - Phosphoric Acid – lower pH
- PH Up - Potassium Hydroxide & Potassium Carbonate – raise pH
- Potassium Phosphate – raise pH
Peristaltic Pump Dispenser – Injects Stock Solution

http://californiawarewashinglaundryservice.com/resources/_wsb_508x348_OPP.jpg
Peristaltic Triple Pump

- Two Pumps for fertilizer
- Third Pump injects acid or base

Controller

- If you don’t have an automatic Controller, then you are the controller.
- Directs Dosing when pH or EC of out of range
Temperature, pH, EC Probes

http://agrowtek.com/images/content/GC-Pro_Hydro_main.jpg

http://www.hannainst.com/images/imgHI_1285-5_lg.jpg
Nutrient Film Technique – Media - Desirable and essential characteristics

- Holds the Roots
- Doesn’t brake apart and clog the system
- Sterile – clean and sanitary
- Neutral – doesn’t give or take nutrients or change pH
Nutrient Film Technique - Media Options

- Rockwool
- Sure to Grow
- Oasis
- Expanded clay pellets in baskets
- Gravel in Baskets
- Anything big enough to not clog the system and inert
Rockwool
Sure to Grow
What Can You Grow?

- Lettuce
- Sweet Basil
- Thai Basil
- Water Cress
- Other Salad Greens, Mustards
- Spinach – under short day – sporadic, more difficult
- Others

http://www.florescentetea.com/mm5/graphics/Articles/Watercress.jpg
Variety Selection: Lettuce

**Summer**
- Tip Burn resistant – non-central head forming varieties
- Full Sized Varieties – mini’s seem to tip burn more often
  - Oak Leaf
  - Great Green Rapids
  - Lollo
  - Summer Crisp – Teide and Muir
  - Salanova Incised
  - Salanova Sweet Crisp

**Winter**
- Low light performance
- Compact, but fast growing
  - Lollo
  - Romaine
  - Summer Crisp
  - Multileaf
  - Butterhead
  - Salanova Sweet Crip
Winter and Summer Lettuce Varieties

**In a Nutshell:**
- Central head forming varieties are more likely to tip burn than loose leaf varieties.
- Full sized varieties are less likely to tip burn and Mini or Baby varieties.
- Fast growing Great Green Rapids and Oakleaf get lanky in the winter under low light.

- Varieties that tip burn or bolt the least under high temperature and long day conditions and have good production are recommended for the **summer**.

- Varieties that bulk up well with good yields and compact, non-floppy form are recommended for the **winter**.
Winter, Fall, Spring (Seed Dates: Aug 1 to Mar 15)
Varieties for best yield and quality in low light situations

Best
- Green Lollo Livigna
- Green Multileaf Multy
- Red Summercrisp Teide*
- Red Summercrisp Cherokee
- Green Summercrisp Nevada
- Romaine Coastal Star
- Romaine Green Forest

Good
- Red Lollo Revolution (doesn't bulk up the best at times)
Summer (Seed Dates: Mar 15 - Aug 1)

Varieties for long days and high temperatures

Best
- Great Green Rapids Tropicana*
- Great Green Rapids Two Star
- Great Green Rapids Green Star
- Red Oakleaf Roxai*
- Red Oakleaf Oscarde
- Green Oakleaf Panisse*

Good
- Red Summcrisp Teide (some tipburn at times)
- Red Summcrisp Cherokee (some tipburn at times)
- Green Lollo Livigna
- Red Lollo Revolution (some tipburn at times)
- Romaine Coastal Star* (some tipburn at times)
- Romaine Green Forest (some tipburn at times)
Oakleaf
Romaine and Summer Crisp

- Romaine – Costal Star, Green Forest
- Summer Crisp – Cherokee, Nevada
Sweet Basil
Thai Basil
Thanks for coming!