

Vines & Rushes Hydroponic Farm Operations

Ebb & Flow System (E&F)

- 6.4 pH
- 600-700 uS/cm
- Water Schedule: 4 Times/Day
 - 12AM , 6AM , 12PM , 6PM
- Light Schedule: 24/7

Nutrient Film Technique System (NFT)

- 6.0 pH
- 850-950 uS/cm
- Water Schedule: 120 Times/Day
 - 1 min. ON, 10 mins. OFF
- Light Schedule: 24/7

Grow Medium: Rockwool

- Must be heavily wetted with pH corrected solution (in the basin) before planting occurs.
 - This allows for even rehydration in the E&F system.
- The Rockwool sheet should be placed in the 1210 tray and one seed should be placed in each Rockwool cube. Place the humidity cover atop the tray once planted.
 - The humidity cover is to be removed once seedlings emerge.
- After germination, cubes should be separated and moved to the NFT system

Reservoir pH Adjustment

- Ideal pH for plant growth rests between 5.5-6.5 pH.
 - Nutrient Solution will lower the pH slightly, so ALWAYS adjust pH after adding the nutrient solution.
- Phosphoric acid (GH pH Down) will serve to lower the pH of the tap further.
 - The expected initial dosage is 1-2ml pH Down/gallon of water in fresh reservoir.
 - Though add incrementally and check pH after mixing in each addition.

If pH is behaving strangely, consult CARBONATE issues.

Nutrient Solution (NS)

Components:

- **Solution A**
 - 8-15-36 (NPK)

- **Solution B**
 - Epsom Salt (Magnesium Sulfate)
 - Calcium Nitrate (15.5-0-0)

Calcium Nitrate MUST be fully dissolved before adding other components! Otherwise, components may chemically bond, preventing uptake of nutrients.

Reservoir Filling

Initial Fill

- The NFT system (105 gal.) will require:
 - 110 grams 8-15-36
 - 62 grams Epsom Salt
 - 110 grams 15.5-0-0
 - 300 mL pH Down

- The E&F system (40 gal.) will require:
 - 45 grams 8-15-36
 - 26 grams Epsom Salt
 - 45 grams 15.5-0-0
 - 100 mL pH Down

Resources:**Nutrient/EC Adjustment:**

<https://youtu.be/IUFWnaTabyw>

<https://university.upstartfarmers.com/blog/mixing-hydroponic-nutrients>

Lettuce growing:

<https://rgjhydroponics.weebly.com/plant-growing-data.html>

<https://hortamericas.com/wp-content/uploads/2018/04/e-gro-Nutritional-Factsheet-Lettuce.pdf>

System Information:

http://www.homehydrosystems.com/hydroponic-systems/nft_systems.html

<https://www.gchydro.com/pdf/GreenCoast%20Hydroponics-IS-HYD-0201-Hydroponics%20Systems%20Q&A.pdf>

<https://www.intechopen.com/books/urban-horticulture-necessity-of-the-future/nutrients-for-hydroponic-systems-in-fruit-crops>

Automation:

<https://atlas-scientific.com/files/electrically-isolated-ezo-carrier-board.pdf>

HYDROPONIC MAINTENANCE SCHEDULE

EBB & FLOW SYSTEM

'Once Every 3 Days Maintenance'

1. Stir basin with spoon (to prevent nutrient drop-out) and check EC and pH
 - a. EC = 600-700 $\mu\text{S}/\text{cm}$. If not, refer to Correction Table
 - b. pH = 6.2-6.5. If not, refer to Correction Table
2. Top water off to 40 gal.
 - a. After top-off water reaches 40 gal. (basin should be turned over)
3. Verify that timer mode is **AUTO**
4. Inspect seedlings for any disease or oddity

'Weekly Maintenance'

1. Wet 90 block of Rockwool in basin and place in slotted tray
2. Plant each with one seed
3. Place humidity cover on tray

'Monthly Maintenance'

1. Pump the contents of the basin to flex collection or drain (before 12:00pm or 6:00pm)
2. Refill 35 gal. with ground water
3. In 5 gallon bucket, mix the following (**completely dissolving each before the next**):
 - a. 18 grams 8-15-36
 - b. 10 grams Epsom Salt
 - c. 18 grams 15.5-0-0
 - d. 100 mL pH Down
4. Add this solution to the basin and stir well.
5. Check pH and EC to ensure proper turnover.

HYDROPONIC MAINTENANCE SCHEDULE

NFT SYSTEM

‘Once Every 3 Days Maintenance’

1. Stir basin with spoon (to prevent nutrient drop-out) and check EC and pH
 - a. EC = 850-950 $\mu\text{S}/\text{cm}$. If not, refer to Correction Table
 - b. pH = 5.9-6.2. If not, refer to Correction Table
2. Top water off to 105 gal. (also mixing basin with hose pressure)
 - c. After top-off water reaches 105 gal. (basin should be turned over)
3. Inspect seedlings for any disease or oddity

‘Weekly Maintenance’

1. Turn off ALL fill valves on mature layer, let drain briefly.
2. Trough by trough, harvest one layer of mature lettuce, keeping rockwool plugs intact.
 - a. **Be mindful of remaining water in troughs when removing! Use bucket under drain end when harvesting/replanting.**
 - b. Remove rootmass from each trough.
 - c. Replant each available slot with mature seedling and return trough to system.
3. Turn on ALL fill valves on returned layer.

‘Monthly Maintenance’

1. **Perform this step quickly:** UNPLUG pump from Cycle Timer, OPEN hose spigot, CLOSE blue line valve, and pump the contents of the basin to flex collection or drain.
 - a. Once the water reaches the level of the pump, begin filling with hardwater.
 - i. This serial dilution will allow for complete drain of NS.
 - ii. Perform this step for 5-10 minutes.
 - iii. CLOSE hose spigot.
 - iv. Fill to ~95 gallons.
2. Add 300 mL of pH down and PLUG pump back into cycle timer, reinitiating watering of plants.
3. In two 5 gallon buckets, mix the following:
 - a. **Solution A**
 - i. **95 grams 8-15-36**
 - b. **Solution B**
 - i. **54 grams Epsom Salt**
 - ii. **110 grams 15.5-0-0**
4. Add solutions to the basin and stir well.
5. Check pH and EC to ensure proper turnover.

Correction Table(s)

For all additions, add/stir/re-check after 15 mins.

Ebb & Flow System

NS additions use solution: 12g 8-15-36 / 7g Epsom / 12g 15.0-0-0 in **2 L dilute**

pH	pH Addition	EC ($\mu\text{S}/\text{cm}$)	NS Addition
<5.5	30 mL + pH up	<510	1.0 L +
5.5 - 5.8	30 mL pH up	510 - 540	1.0 L
5.9 - 6.1	20 mL pH up	540 - 570	0.70 L
6.2 - 6.5	Optimal	570 - 600	0.35 L
6.6 - 6.8	20 mL pH down	600-700	Optimal
6.9 - 7.0	30 mL pH down	>700	DILUTE
>7.0	30 mL + pH down		

NFT System

NS additions use solution(s) A and B in each 5 liters of water

A - 1 kg 8-15-36 AND 0.284 kg Epsom Salt

B - 1 kg 15.5-0-0 AND 0.284 kg Epsom Salt

pH	pH Addition	EC ($\mu\text{S}/\text{cm}$)	NS Addition
<5.5	50 mL + pH up	<760	120 mL A & B each
5.6 - 5.8	50 mL pH up	760 - 790	90 mL A & B each
5.9 - 6.2	Optimal	790 - 820	60 mL A & B each
6.3 - 6.5	50 mL pH down	820 - 850	30 mL A & B each
6.6 - 6.8	80 mL pH down	850 - 1000	Optimal
6.9 - 7.0	110 mL pH down	>1000	DILUTE
>7.0	110 mL + pH down		

