

Guidelines for Ebb & Flow System

WATERING

Refer to Grodan's **WATER** guide, the Gro-SMART video on watering on grodan101.com, and search our Website for more detailed information on watering and maintaining the correct pH and nutrient levels in the reservoir.

In Ebb and Flow systems, the block or container is completely saturated. So flooding too much too often will produce lazy plants that will not root well into stone wool. Reduce the watering especially when just starting the system. However, if using a medium that does not hold a lot of moisture, such as expanded clay pellets, then frequent watering will be necessary.

FLUSHING

Ebb and Flow systems use capillary movement to deliver nutrients directionally, from the bottom up. Unfortunately, this causes build up of salts (leftover nutrients) in stone wool and most other media. It is important to flush these salts out at least once a week. Flush by simply top watering using the same nutrient solution as is in the tank. Never use plain water - it will shock the plant.

PUMP AND RESERVOIR SIZE

Before purchasing, discuss your options with the professionals at a local hydroponic store to help determine the best size for you. To find an authorized Grodan supplier near you, use the store locator section on grodan101.com. Keep in mind that the size of the pump required will depend on the height and width of your tray. Reservoir size will depend on the number of plants to grow, and how large you intend for them to grow.

To determine the size of reservoir needed, choose one that is 4 times the water volume of your tray, or to be more precise, calculate as follows:

1. Measure length (L) and width (W) of the top grow tray.
2. Measure height of container or GRO-BLOCK and divide by 2 = A.
3. $L \times W \times A = \text{Cubic inches.}$
4. $4 \times ((\text{number of cubic inches}/1000) \times 4.329) = \text{number of gallons.}$
5. If in metric: $4 \times ((L \times W \times (H/2) \text{ cm})/1000) = \text{number of liters.}$

Algae - is it a Problem?

The green, slimy stuff that grows on top of stone wool is algae. It may be unsightly, but it is not a detriment to your plants. There is a high percentage of air space in stone wool which provides plenty of oxygen to roots, even if the stone wool is covered in algae. However, excessive amounts of algae can attract fungus gnats. For this reason, it is a good idea to cover the top of the blocks or containers.

There are various block covers available at your retailer. Plastic, reusable covers can effectively minimize algae growth and algae-related pest problems, but they are just one of several options available.

For a more hands-on approach, watch the GRO-SMART video instructions on transplanting posted on our Website.

Your local store:



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TRANSPLANT

Rooting and Transplanting




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The Next Step

After starting the seeds or cuttings in a Grodan starter (as shown in Grodan's **START** guide) the seedlings can be transplanted into another Grodan product or any other growing media such as water, peat mixes, coco or even soil.

Choosing the right GRO-BLOCK size

Choose the size of GRO-BLOCK like you would a plant container. If you would normally use a 4" pot, then choose a 4" GRO-BLOCK. If 6", then use the Hugo - and so forth.

BASIC STEPS

1. Wet the growing medium before transplanting. If using Grodan, condition the stone wool according to steps listed in Grodan's **WATER** guide. To avoid shock to the seedling, soak the medium with the same concentration of plant food that the seedling (mid-strength) was already receiving.
2. If seedling is in a 1.5" Grodan starter, plug it into the round hole of a GRO-BLOCK. If the starter doesn't fit, enlarge the hole using a sharp knife, then transplant.
3. If using a MINI-BLOCK, remove the plastic wrapping before transplanting into the GRO-BLOCK; or leave the wrapping on and simply place it on top of the larger GRO-BLOCK.
4. The plant is now ready for fast root growth. It is crucial to curb the watering during the rooting-in phase. Refer to our **WATER** guide for more details.

You can also transplant into loose Grodan, such as GROW-CUBES, GROW-CHUNKS or granulate. Just fill a small container that has good drainage with the loose Grodan.

Transplanting into soil and other media

- Before transplanting, soak the growing media well - and choose a plant food that is made for that specific media.
- If transplanting into coco, soil, etc., make sure to cover any exposed wool. Keep the media surrounding the wool moist, so that outside area does not pull any moisture away from the wool.
- After transplanting the seedling, water it using a watering can and gradually increase the food strength as the plant grows.
- Adequate drainage is essential when using rockwool in a container or in a tray, so make sure that water drains away.

Transplanting into hydroponic systems

Some people prefer to use advanced techniques that make hydroponics more exciting. The two systems below are a great choice for short term crops with small root mass, such as herbs and lettuce.

AEROPONICS

Method where nutrient solution is sprayed directly onto the plant's roots. This system will require the following:

1. An air pump or compressor pushes the nutrients up the tubing.
2. The nutrient solution is held in a reservoir tank.
3. A timer regulates frequency and duration of nutrient delivery.
4. A mister sprays the nutrients onto the plant's roots.
5. The seedling in your Grodan plug goes directly into the system, some times you may use a small net basket to hold plug.
6. The nutrients are returned from the tray into the reservoir so it is a closed system with no waste.

NFT (NUTRIENT FILM TECHNIQUE)

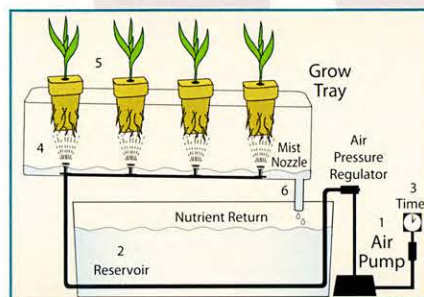
This method entails nutrients flowing over the roots inside a channel usually made of pvc pipes. This system will require the following:

1. A pump pushes nutrient solution up.
2. The nutrient solution is held in a reservoir tank.
3. The plants are held in a tray/tube.
4. Grodan starter in net basket.
5. The nutrient is continually flowing over the roots and then returning into the reservoir. So it is also a closed system with no waste.

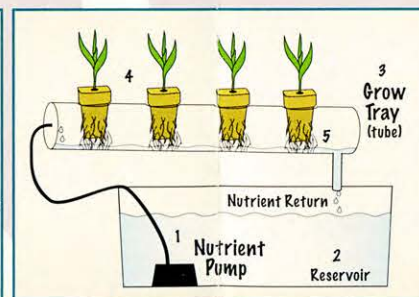
EBB & FLOW (ALSO CALLED EBB & FLOOD)

For growing even larger plants, this technique involves a tray being flooded periodically with nutrient solution from a reservoir. This system will require the following:

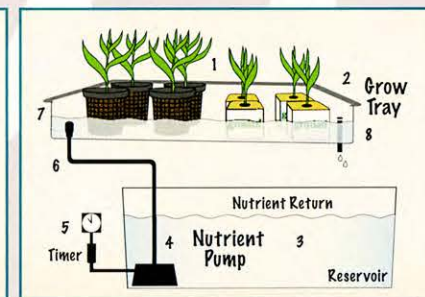
1. Choose plants that are either in a container or in a GRO-BLOCKS. If in a container, make sure there is a good drain layer at the bottom of container, such as some expanded clay pellets.
2. A tray that will allow flooding up to half of the block or container. Keeping the tray clean and free of leaves and debris will minimize insect and disease infestations.
3. A reservoir that holds the nutrients. It needs to be at least four times the size of the volume needed to completely soak the plants. For top irrigation one can use a much smaller tank. See Grodan's **GROW** guide to learn how to convert an ebb & flow table to top irrigation.
4. A pump that will lift the nutrient solution to the tray and quickly flood it to half way up the growing media.
5. A timer set for frequency of flooding. Set cycle time at 15 minutes for each flooding. This is how long it will take to fill and empty the tray. See Grodan's **WATER** guide for additional recommendations.
6. Connect 1/2" tubing to the pump and up through a hole in the tray.
7. Connect the tube to a fitting that will fill the tray with solution.
8. An overflow fitting that sits above the fill fitting, positioned about half the height of a plant container or block, so that is the point when the solution drains back into the tank.



Aeroponics



NFT (Nutrient Film Technique)



Ebb & Flow (also called Ebb & Flood)