

EBB & FLOOD



basic steps to successful growing



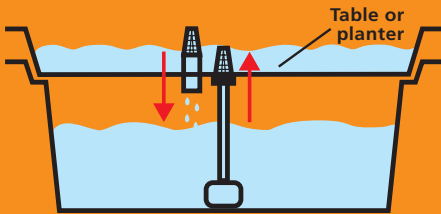
WHAT IS EBB & FLOOD/EBB & FLOW?

EBB & FLOOD IS THE HYDROPONIC SYSTEM THAT GIVES YOU MOST CONTROL OVER THE ROOT ENVIRONMENT.

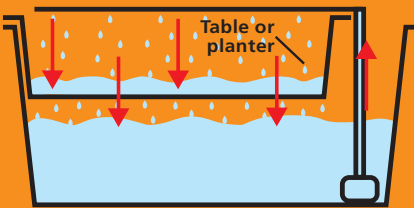
WHAT IS AN EBB & FLOOD SYSTEM?

Ebb & Flood systems come in many forms but they are all versions of one or other of these two operations.

BASIC EBB & FLOOD AND MOST EBB & FLOOD TABLES



DELUXE EBB & FLOOD AND FLO-GRO



THE THEORY

Ebb and Flood is so successful because it gives great opportunity to vary the watering (and hence nutrition) cycle. Unlike most other hydroponic systems the roots of your plants are not, in most cases, immediately visible so it is most important to understand what is happening so the correct decision on operating the system is made.

In Ebb and Flood the growing medium is periodically flooded. During this process any residue of the previous flood will be redissolved in the nutrient solution so that the nutrient solution remaining in the medium after the drain (ebb) does not become stale, precipitated or over concentrated (if you try growing a plant in any ordinary pot this is the reason why performance is so often disappointing).

Also, because all the free draining moisture is removed from the root area on the ebb, vast amounts of air which of course contains essential oxygen is drawn in around the roots. This invigorates the roots and encourages their best performance in terms of growth, water uptake and nutrient uptake.

WHY USE EBB & FLOOD/EBB & FLOW?

EBB & FLOOD GIVES GREAT RESULTS AND IT LOOKS GOOD AS WELL.

WHY USE EBB & FLOOD?

The simple answer to this is because Ebb & Flood gives the same increased yield you can expect from any hydroponic system but is more foolproof and what's more your plants can be displayed to perfection. Your plants not only perform well but they look good too.

ARE MY PLANTS READY?

It's one of the great advantages of Ebb & Flood that almost any plant can be transferred at any time. Also it is possible to germinate seeds directly in a Ebb & Flood system so no transplanting is ever necessary. Don't waste your time with unhealthy plants. To get really good results always start off with a healthy pest free plant.

THIS IS WHAT YOU WANT



THIS IS WHAT YOU GET

Ebb & Flood systems give great displays of decorative plants such as the banana shown above. Ideal for the greenhouse or conservatory we look forward to picking our banana's in the summer.

Remember:- The key to any successful hydroponically grown plant is to have a healthy plant at the time of transplant.

The picture above shows Nutriculture's 'WORLD RECORD' for the longest tomato plant grown in a Ebb & Flood system alongside a range of decorative plants.

The tomato plant is listed in the Guinness Book Of World Records at 65ft (19.8 meters) but it eventually reached a total length of 92ft (28 meters).

It just shows you can grow decorative and fast cropping plants side by side.

PLANTING OUT IN EBB & FLOOD

DON'T MAKE UP A HYDROPONIC SOLUTION BEFORE YOU TRANSPLANT. IT'S ALWAYS BETTER TO RUN THE FIRST DAY OR SO ON WATER ONLY. IT ENCOURAGES ROOTING.

A. USING CLAY PEBBLES FILLING THE TABLE/PLANTER

Obtain sufficient clay pebbles (Nutriculture recommends **Buzzz** clay pebbles) to fill the table or planter. Although it is commonly done it is not necessary to wash the pebbles of dust prior to use.

Place a inch or so (2.5cm) of pebbles on the base of the table/planter. Before setting out your plants in their final position gently ease out the roots from the propagation block so they can quickly penetrate through the pebbles. With strongly root bound plants some considerable force may be required to pull the roots apart. Wash away loose unnecessary compost.

Now place the plants in their final positions and fill table/planter with pebbles and finish so as to effect a pleasing look.



B. USING CLAY PEBBLES, **grodan** CUBES OR OTHER MEDIUM IN LARGE POTS OR BUCKETS

This method uses a smaller quantity of growing medium overall.

If the table/planter is not going to be packed tightly with pots or buckets it is necessary to obtain a completely non transparent cover for the table/planter so that light is excluded from the nutrient solution. If using a cover mark the position of the pots on the cover and cut out spaces for each pot.

Place cover in position and place the pots through so that they rest on the bottom of the table. It is common to lay an inch or so (2.5cm) of pebbles in the bottom of the table prior to placing pots this encourages draining from the bottom of each pot.

An alternative to a pot/bucket is the **grodan** 'HUGO' block which is used exactly like you would use a pot/bucket. Removing the plastic sleeve is optional depending on how you use it.

'HUGO BLOCK' - L 6" (150mm), W 6" (150mm), H 6" (150mm)



PLANTING OUT IN EBB & FLOOD

REMEMBER: ALMOST ANY PLANT WILL GO INTO A EBB & FLOOD SYSTEM PROVIDING IT IS HEALTHY FROM THE START.

C. USING ROCKWOOL EG **grodan**® OR OTHER MOISTURE RETENTIVE MEDIUM

This method is normally limited to short term crop plants. Transplants will already be in the rockwool block.

Obtain a completely non transparent cover for the table and mark on the position of plants on the cover. Cut out spaces but retain cut outs.

Fix cover in position. Remove outer plastic wrapping (if any) from the rockwool (**grodan**) cube and place cube through cut outs so cubes rest on base of table.

Cut a hole in the centre of the retained "cut-outs" and fit them gently round the stem of the transplant. This will prevent light getting to the root system.

Remove the plastic sleeve from around the **grodan** cube before transplanting. This allows an unlimited supply of oxygen to get to your plant roots.



D. SOWING SEEDS DIRECTLY

Fill the table with clay pebbles. Obtain a fine grade pebble for the top 1/2" (1.5cm) if using small seed. Obtain a completely non transparent cover for the table (a polythene sheet will do nicely).

Scatter seeds onto the pebbles, wet the pebbles (and seeds) either using a watering can or by flooding the table, place cover over the table.

Each day raise the cover to check if seeds have germinated. As soon as they show remove the cover. Do not allow seedlings to dry out. It may be necessary to water with a watering can. Later when the seedlings have developed they can be grown on just as in method A (Page 3).



HOW MANY FLOODS?

YOU NEED TO DECIDE HOW OFTEN TO FLOOD YOUR SYSTEM AND WHEN IT SHOULD BE FLOODED.
BELOW IS A GUIDE THAT HIGHLIGHTS THE IMPORTANT POINTS YOU NEED TO LOOK OUT FOR.

To get the best of your Ebb and Flood you need to choose how often to flood the system and when the floods should be made. *Certain obvious factors affecting your decision making are given below.*

- a. Young plants need fewer 'ON' periods than older plants because they use less water.
- b. Hydrophobic plants need fewer 'ON' periods than hydrophilic plants.
- c. During cold or dull conditions fewer 'ON' periods are required. Accordingly more 'ON' periods are needed in summer than in autumn or spring.
- d. 'ON' periods should be slightly gathered towards the hottest part of the day. Do not make 'ON' periods longer but shorten the 'OFF' periods.
- e. Expanded clay pebbles need more 'ON' periods than stonewool medium. Other mediums may require more or fewer 'ON' periods depending on their water retaining qualities.
- f. Plants under stress, on whatever count, need fewer 'ON' periods. Just one per day or every other day may be sufficient in severe cases.

HOW MANY FLOODS TO START?

- a. **Using clay pebbles filling the table.** Here a considerable amount of nutrient solution is held in the clay pebbles so at first only 1 or 2 floods per day is all that is required.
- b. **Using clay pebbles, *grodan* cubes or other medium in large pots or buckets.** When using clay pebbles or other free draining medium the smaller volume used allows more floods. Try 2 or 3 to start.
- c. **Using Rockwool or other moisture retentive medium.** This is a difficult one. Use 1 flood at first. But be ready to go up in number as soon as roots emerge from the block (see later).
- d. **Raising seedlings.** At first one flood is enough.

WHEN SHOULD THE FLOODS BE?

Easy, at the start of the day and in the middle of the day.

AS YOUR PLANTS DEVELOP

In all cases as plants grow they use more water providing an opportunity and indeed a need to flood more frequently.

Space additional floods more or less evenly throughout the day but slightly grouping floods to the hottest part of the day and leaving at least 1 hour between the last flood and the end of the day time.

The perfect number of floods? Probably there's no such thing but if it exists it's the number of floods which maximise your water usage since water usage is directly related to rate of growth. If you

under flood, your plants cannot get enough water and water consumption is reduced. If you over flood, your plant's roots become inactive because oxygen is driven out by the water and water consumption is reduced.

If you set the perfect number of floods your water consumption is maximised and your results are spectacular.

Conclusion. The keen Ebb & Flood grower always records the amount of water needed to top-up his system each day. This is his best guide to number of floods.

ADVANCED SYSTEMS

Ebb and Flood systems are usually very tolerant of the operation but especially if using a water retentive medium it is very difficult to set a flood time using an ordinary segmental timer which does not drown the plant.

The answer is to use a **Timing Modifying Unit** which allows the signal from an ordinary segmental

(15min) timer switch to be modified to run for a few minutes (usually 1-10 mins).

Using a TMU very short floods are possible. During these floods only the bottom of the root is flooded and the solution quickly drains away. Using this instrument it is possible to have more but shorter flood and drain periods in any day.

MAINTAINING THE EBB & FLOOD SYSTEM

FOLLOW THE INSTRUCTIONS ON YOUR HYDROPONIC NUTRIENTS. THESE INSTRUCTIONS WILL TELL YOU WHEN TO USE HIGHER OR LOWER LEVELS OF NUTRIENT OR IF IT IS APPROPRIATE TO CHANGE TO LEAF PROMOTING OR FLOWER PROMOTING NUTRIENT FORMULATIONS.

A. USING SOFT WATER

1. Determine the pH of the nutrient/water mix in your collection tank using an approved test kit eg: Nutriculture liquid pH test.
2. Determine the pH you wish to run your Ebb and Flood system. Most authorities recommended between pH 5.8 and 6.5.
3. If the pH of the solution is in the correct range do nothing.
4. If the pH of the solution is above the correct range add phosphoric acid (pH down).
5. If the pH is below the correct range add potassium hydroxide (pH up)

B. USING HARD WATER - ie: water which causes your kettle or boiler to "fur" up.

1. Determine the pH of the water (BEFORE ANY NUTRIENT IS ADDED) in the collection tank.
2. Determine the pH you wish to run your Ebb & Flood system. Most authorities recommended between pH 5.8 and 6.5.
3. The pH of hard water is always higher than soft water so you need to add phosphoric acid (pH down) to reduce pH to about 7.0.
4. Add hydroponic nutrients to the water and begin circulation.
5. After an hour or so recheck pH and add more phosphoric acid (pH down) if necessary to adjust pH to chosen level.

SAFETY FIRST

Phosphoric acid is strongly acidic and Potassium hydroxide is strongly alkaline. Always follow the safety instructions on the container. NEVER EVER mix phosphoric acid with potassium hydroxide. You should never need both materials on the same site.

USEFUL TIPS

Phosphoric acid and potassium hydroxide are very dense chemicals which do not mix readily with water. To improve mixing so as to get the best results from your pH test kit add phosphoric acid or potassium hydroxide very sparingly to a glass of warm water stirring vigorously before adding it to the nutrient solution. Once in the solution stir vigorously again, or allow ample circulation of the nutrient (say over 1 hour) before retesting pH.

It is very easy to overdose with either chemical. It is not critical for your plants that the pH should always be in the determined range, while overdosing is always very harmful so go easy and use either chemical very sparingly. Be satisfied to adjust pH to your chosen level over several days.

Take a note of the amount of phosphoric acid used to adjust your first tank of nutrient solution it will make it much easier when you need to do it again at solution changes.

Avoid large changes in either pH or nutrient strength and do not let the solution level in your tank drop significantly. On larger systems an automatic top-up device can be fitted to prevent this happening.

If you are monitoring your solution strength using a conductivity meter always top-up the tank with

water to it's maximum level about 1 hour before testing for nutrient strength. This will ensure an accurate reading.

Never fill your tank above the base of your table.

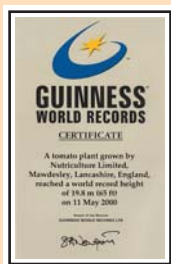


If you are using the "top-up" method of nutrition (dose rates will be given on your nutrient pack) it is especially convenient to make-up a large container of nutrient solution so you can draw off just sufficient to top-up the tank on a regular basis, say every day or so.

Check and adjust the pH of the solution as necessary. In soft water areas very little adjustment (if any) will be needed but in hard water areas (and especially if using **grodan**) there will be a tendency for the pH to rise gradually after you have previously adjusted it down to the correct level. Do not be alarmed by this. Do not be tempted to add extra acid. As necessary simply adjust pH down to preferred level.



CONTACT YOUR STOCKIST FOR MORE GROWING GUIDES
"99% OF ALL HYDROPONIC QUESTIONS ARE ANSWERED IN THESE GUIDES"



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