

AQUAPONICS PRODUCTS

- 16 Aquaponics System
- 17 Mini Fish Farm
- 18 Tanks/Troughs
- 20 Media
- 22 Trays/Shade Cloth
- 23 Water Conditioners/Test Kit
- 24 Induction Grow Lights





AQUAPONICS TECHNOLOGY & DESIGN WORKSHOPS

Topics that will be covered during these workshops:

UNIVERSITY OF THE VIRGIN ISLANDS AQUAPONIC SYSTEM AND UVI BASED SYSTEM AT PENTAIR AES

- System design and management
- Aeration
- Plumbing
- Pump Selection
- Components
- Construction techniques
- Operation
- Electric Cost

ENGINEERING AQUAPONICS SYSTEMS

- Engineering Aquaponics Systems
- Blower selection and sizing
- Total Dynamic Head (TDH)
- Pipe sizing and flow

FISH PRODUCTION

- Stocking rates
- Feeding, growth and survival
- Harvesting and processing
- Water quality
- Brood stock management
- Breeding
- Fry sex reversal

MARKETING AND ECONOMICS

PLANT PRODUCTION

- Seedling production
- Importance of pest identification
- Disease and insect control
- Nutrient dynamics

HANDS-ON INSTRUCTION

- PVC work
- Pump setup and plumbing
- Plant grow tray construction
- Fish handling
- Water quality testing

**Check PentairAES.com/workshops
for all workshop details including
dates, times and locations!**



AQUATIC ECO-SYSTEMS®

For more information about educational courses offered by Pentair Aquatic Eco-Systems, please email PAES.General@Pentair.com.

Web: PentairAES.com/workshops
Email: PAES.General@Pentair.com

2395 Apopka Blvd., Apopka, FL 32703

AQUAPONICS SYSTEM 800 ✓ DESIGNED HERE **NEW!**

The Pentair Aquaponics System 800 utilizes an integrated design to deliver a controlled and balanced growing environment for both fish and plants. This system* features a mix of state-of-the-art equipment and a full complement of Sweetwater® filtration and aeration equipment for an efficient, reliable and user-friendly package.

Two 400 gallon polyethylene tanks can support a maximum of 375 pounds of fish biomass at one time in the system and provide nutrients to at least 60 plants. This is a robust fish and plant production capacity within a small footprint of 10' x 17'. It is possible due to the use of a newly designed bead filtration skid system and a Sweetwater Low-Space Bioreactor to maintain optimal water quality. The bead filtration system features a pump, filter, UV sterilizer, valves and rugged Schedule 80 PVC plumbing. All specialty components and equipment are included, except standard PVC pipe (available from your local hardware store.) The filtration/pumping system ships pre-plumbed on its own pallet. To finalize assembly, follow the detailed instruction manual to connect the filtration system to all other components including tanks, using your locally-sourced PVC pipe.

With an expected feed conversion ratio of 1.5 and greater than 90% survival for fish and plants the producer could achieve 750 pounds of fish production and 650 units of leafy greens annually. That equates to 1,000 fish fillets each year for a small household!

Bead Filtration System

- Taurus™ 110 Energy Efficient Aquaculture-Duty Centrifugal Pump
- Sweetwater Bead Filter for removal of solids
- SMART UV® Sterilizer inactivates potentially-harmful micro-organisms such as bacteria and algae
- Rugged Schedule 80 PVC plumbing and true union Asahi valves
- Bypass lines to facilitate filter or lamp replacement

Sweetwater Low-Space Bioreactor

- Fully automatic, self-adjusting and continuously self-cleaning. Utilizes moving bed bioreactor technology to control ammonia and nitrite.

Plant Trays

- Two 36-inch x 36-inch plant trays supported by a powdered coated stainless steel stand

Aeration

- Sweetwater Air Diffusers provides supplemental oxygen to the fish tanks, grow trays and low-space bioreactor
- Sweetwater Linear Diaphragm Pump powers the air diffusers and airlifts

Tanks

- Circular tanks result in concentrated solids exiting through a center drain to filtration
- External standpipes set tank water level and eliminate unnecessary plumbing from remaining in fish tank

Visit PentairAES.com to check out the shopping list of items you should consider to manage and operate the system.

| MODEL | | EACH |
|--------|-----------------------|--------------|
| 440096 | AQUAPONICS SYSTEM 800 | \$ 13,900.00 |



THE MINI FISH FARM™ ✔ DESIGNED HERE

#1 in the classroom

The Mini Fish Farm™ is a complete fish raising system. It includes a quiet, oilless air pump, a state-of-the-art clarifier, a biological filter employing moving bed technology, a 5'4" Dia. x 35" H polyethylene tank that can be ordered with or without a viewing window, an operational manual and a video that gives step-by-step set-up instructions and maintenance procedures. The entire system contains only 400 gallons of water, making heating, water changes and overall size and weight minimal. All electrical components are UL-approved and power consumption is a mere 60 watts. That's under \$4 per month!

Maintenance takes less than ten minutes per day and only two 5-gallon pails of water need to be emptied and replaced. The entire system fits in a 6' x 8' area and can fit through a 36" door. Extremely safe, there is no electricity in the water, and the system is virtually leakproof. Ships Motor Freight. One-year warranty.

OPTIONAL STAND-ALONE AQUAPONICS KIT

Use this aquaponics kit with the Mini Fish Farm™ to utilize fish effluent as fertilizer, all while supplementing biofiltration with plant uptake. Eighteen lettuce, herb or other leafy plants are partially suspended in the recirculated water, providing optimal nutrient uptake and aeration of roots without the use of gravel or perlite. This unit is modeled after a commercial aquaponics unit that produces 45,000 heads of lettuce per day. It requires no additional power. Kit includes black ABS tray with removable top for root inspection and harvesting (measures 4' long x 2' wide x 6" deep), aluminum stand, 18 net pots (2") with growing cubes and all plumbing/fittings for hookup to the Mini Fish Farm™, plus a comprehensive hydroponics manual. Ships Ground. The Aquaponics Refill Kit (CK50R) includes net pots, growing cubes and cable ties.

OPTIONAL FLOATING AQUAPONICS KIT ✔ DESIGNED HERE

Use this aquaponics kit with the Mini Fish Farm™. It consists of a unique aquaponics tray that allows the growth of lettuce, herbs, flowers and other crops in the same tank as the fish. This interaction between animals and plants provides the opportunity to study and observe a more natural eco-system. The tray is designed to float within the tank, covering one half of the water's surface. It is capable of growing up to 24" plants. Special screening protects plant roots from foraging fish and the design provides proper tray height above the water. Kit includes two heavy-duty ABS plastic trays, screening, twenty-four 2" net pots, twenty-four 3 1/4" net pots, zip ties, twenty-four Rockwool cubes and complete instructions. Ships Oversize. The Aquaponics Refill Kit (CK50R) includes net pots, growing cubes and cable ties.

REPLACEMENT TANK WINDOW KITS

The **FF50W-KIT** is 1' x 2' polycarbonate window kit with an actual viewing area of 9 3/4" x 21 1/4", and the **FW22-KIT** is 2' x 2' with a viewing area of 21 3/4" x 21 3/4".



| MODEL | | SHIP WT (LBS) | EACH |
|---------------------------|---------------------------------|---------------|-------------------|
| The Mini Fish Farm | | | |
| FF50-3 | MINI FISH FARM (NO WINDOW) | 230 | \$2,911.00 |
| FF50-3W1 | MINI FISH FARM W/1' X 2' WINDOW | 230 | 3,076.00 |
| FF50-3W2 | MINI FISH FARM W/2' X 2' WINDOW | 230 | 3,127.00 |

Optional Aquaponics Kits

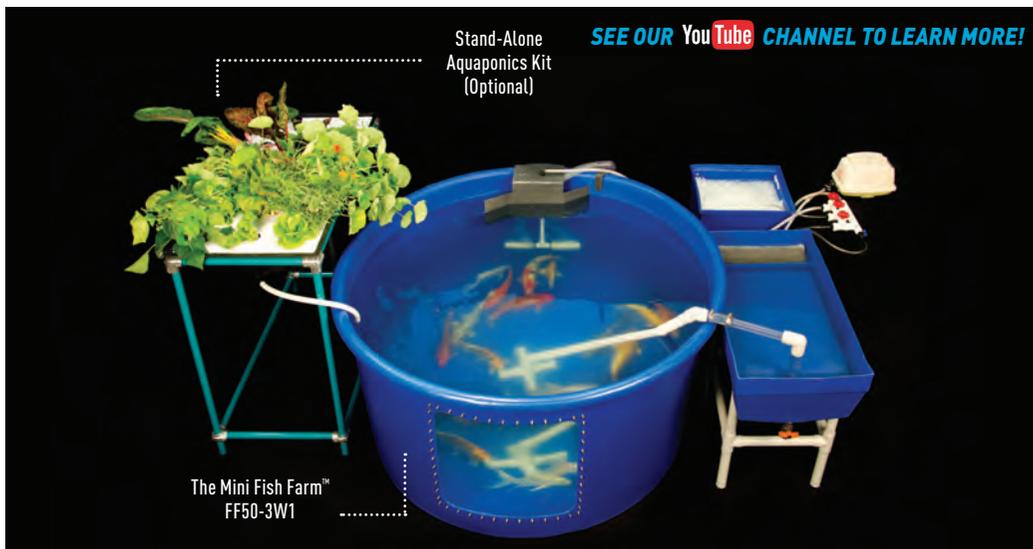
| | | | |
|---------------|----------------------------|-----|---------------|
| FF50HT | STAND ALONE AQUAPONICS KIT | 60 | 698.59 |
| CK50 | FLOATING AQUAPONICS KIT | 30 | 190.39 |
| CK50R | AQUAPONICS REFILL KIT | 0.5 | 23.49 |

Replacement Components

| | | | |
|------------------|----------------------------------|------|---------------|
| SL88 | 115V 60HZ LINEAR PISTON AIR PUMP | 23.5 | 534.39 |
| FF50W-KIT | 1' X 2' WINDOW KIT | 2.5 | 114.49 |
| FW22-KIT | 2' X 2' WINDOW KIT | 2.5 | 156.49 |
| ALR15 | 6" MEDIUM PORE DIFFUSER | 1 | 14.19 |
| ZPF2 | FILTER PAD (4 1/2" X 18") | 0.35 | 8.49 |



Optional Floating Aquaponics Kit



Mini Fish Farm with Optional Stand-Alone Aquaponics Kit

The Mini Fish Farm™ FF50-3W1

Stand-Alone Aquaponics Kit (Optional)

SEE OUR YouTube CHANNEL TO LEARN MORE!

POLYETHYLENE TANKS ▼

These polyethylene, marine blue, open top tanks are economical with long life expectancy. The smooth surface makes for easy cleaning, and their light weight allows for quick set-up and relocation. Edge lips provide wall strength and minimize deformation. Most of these tanks are nestable, which reduces shipping costs. FDA compliant; safe and non-toxic to aquatic and animal life. All tanks have ultraviolet inhibitors for outdoor use. Because they

have superior mechanical properties, high stiffness, excellent low temperature impact strength, and outstanding environmental stress crack resistance, they stand up well in tough environments. Model BP210 and models ending in -W2 have a 2'x2' polycarbonate viewing window installed (actual viewing area is 21 3/4"x21 3/4").

55 TO 250 GALLON TANKS

| CAPACITY (GAL) | SHAPE | INSIDE DIA. | HEIGHT | WALL THICKNESS | SHIP WT (LBS) | TANK ONLY | | TANK WITH WINDOW | |
|----------------|-------------|-----------------|--------|----------------|---------------|-----------|----------|------------------|----------|
| | | | | | | MODEL | EACH | MODEL | EACH |
| 55 | ROUND | 21" | 38" | 3/16" | 17* | TP55 | \$145.99 | — | — |
| 90 | ROUND | 39" | 20" | 3/16" | 23** | TP90 | 229.99 | — | — |
| 210 | ROUND | 48" | 30" | 3/16" | 49** | TP210 | 303.49 | BP210 | \$565.99 |
| 250 | ROUND | 60" | 22" | 3/16" | 68** | TP250 | 418.99 | — | — |
| 110 | RECTANGULAR | 55" X 31" X 18" | | 1/8" | 44** | TP110 | 261.49 | — | — |
| 130 | MORTAR BOX | 72" X 36" X 12" | | 1/8" | 39** | TP130 | 271.99 | — | — |

*Ships ground. **Ships motor freight.



410 TO 1000 GALLON TANKS

These tanks have a flat depression molded into the side near the bottom for a bulkhead fitting. Ships motor freight.

| CAPACITY (GAL) | SHAPE | INSIDE DIA. | HEIGHT | WALL THICKNESS | SHIP WT (LBS) | TANK ONLY | | TANK WITH WINDOW | |
|----------------|-------|-------------|--------|----------------|---------------|-----------|----------|------------------|----------|
| | | | | | | MODEL | EACH | MODEL | EACH |
| 410 | ROUND | 60" | 34" | 3/16" | 74 | TP440A | \$523.99 | TP440A-W2 | \$681.49 |
| 460 | ROUND | 70" | 30" | 3/16" | 78 | TP400F | 555.49 | TP400F-W2 | 712.99 |
| 650 | ROUND | 77" | 34" | 1/4" | 105 | TP655 | 660.49 | TP655-W2 | 831.79 |
| 800 | ROUND | 88" | 38" | 1/4" | 120 | TP800 | 817.99 | TP800-W2 | 975.49 |
| 830 | ROUND | 92" | 30" | 1/4" | 134 | TP830 | 849.49 | TP830-W2 | 1,007.00 |
| 1000 | ROUND | 90" | 44" | 1/4" | 148 | TP1000 | 943.99 | TP1000-W2 | 1,101.00 |



FIBERGLASS TROUGH

Rectangular troughs are used for hatching fish eggs, coral propagation, baitfish, larval rearing (use with McDonald-type hatching jars), invertebrate holding and many other culture applications. Although not as thick as our reinforced fiberglass tanks, they are still quite durable. Light blue gel coat interior. Troughs are stackable and ship via motor freight. Crating charges not included in prices when applicable. FOB Orlando.

| MODEL | CAPACITY (GAL) | L X W X H | EACH | 4+ |
|---------|----------------|-----------------|----------|----------|
| FT120L2 | 120 | 96" X 24" X 12" | \$296.89 | \$267.20 |
| FT180L2 | 180 | 96" X 36" X 12" | 513.79 | 462.41 |
| FT240L2 | 240 | 96" X 48" X 12" | 694.59 | 625.13 |
| FT320L2 | 320 | 96" X 48" X 16" | 963.59 | 867.23 |



Seeding and Planting Systems

Seed Germination

Germinating seeds can be extremely easy or extremely difficult depending on the type of plant and method used. There are several ways to do this and we will describe a few below:

1. Directly into starter cubes: This is where you use a starter cube (Hortifiber Rockwool®, coco fiber, composted pine bark, etc.) with a small hole in the center to start your seeds. You simply wet the media, drop the seeds in the hole (or widen it a bit with a pencil for larger seeds) and then place them in a tray (with or without a humidity dome, depending on your local humidity). Make sure to read up on your starter media as some media should presoak in a mildly acidic solution for better sprouting results. Some seeds will do better when placed directly out in the sun; some will do better if left in the dark for a few days then moved into the sunlight; and some will do better with a bottom heat pad placed under the tray of starter cubes. One thing to remember is that you want to get them in the same intensity of light that you will be growing them to maturity in as soon as possible. In lower light conditions, plants stretch looking for light and become thinner/weaker and more prone to breaking. Then when you move them into more intense light, they have a tendency to get leaf burn and growth slows as the plant adjusts to the stronger light. If you're trying a new variety for the first time, plant a few test cubes, put them in direct to partial sun for a few days and watch what happens. Most seeds will sprout just fine this way as long as the temperatures are in the correct range for the plant species being grown (look on the seed packet as most of the time all of the zone/planting times are listed on the packaging), but if you aren't having any luck or you see them sprout and start to get a bit burned, try one of the other methods until you see what works best for that particular seed. Just remember, the quicker you get the plant used to the final light intensity, the quicker it will grow.
2. Paper towel/plastic wrap method: Another popular way of sprouting seeds is by dampening a paper towel with water and placing it on a plate. You then place your seeds on the damp paper towel and cover the plate with plastic wrap. Place this in a dark place such as a cabinet and check it daily while also lifting the plastic wrap to exchange the air inside. As soon as you see the seed crack open, remove the seed from the plate and place the seed cracked end down into the starter cube. It will then shoot the tap root down into the starter cube and the seed will rise out of the cube and fall off of the sprout. This method works extremely well for all types of larger seeds such as beans, peas, sunflowers, cucumbers, etc. Using smaller seeds is not advisable, since it would be extremely difficult to pick them up and place them into starter cubes without hurting the sprouts.
3. Cuttings: Some plants take an extremely long time to grow from seeds, but their cuttings will readily root when cared for properly, eliminating a lot of valuable time spent by the grower. The procedure is fairly simple. First you want to make sure you sterilize your scissors, knife or whatever tool you plan to use to take the cuttings and also make sure to wash your hands well (especially if you are a smoker). Once you have sterilized the cutting tool, take your cuttings and remove all of the fruit from the plant (if there is any) along with the bottom 50% of the leaves/stems. Dip the cut end into either a rooting hormone powder or gel, then place directly into a presoaked starter cube. Some plants such as tomatoes will start to root within a day or two, while other plants such as rosemary may take as long as a month to show any signs of roots. You want to keep the cuttings in a humid environment by using a humidity dome or plastic wrap, and you want to make sure to exchange the air inside several times a day. Some plants will look pretty bad before looking better, but that is because you are stressing the plant and basically forcing it to either grow roots or die. You want the media moist, but not wet or waterlogged. You can also mist the plants to let the leaves take up water. Riding that fine line of wet/dry media tells the harder-to-root plants that they need to sprout roots. Once you have done it a few times you will be able to look at the plants and tell when they have started to root, then take the dome off until the plants get strong enough to move them to your main system. Where to germinate: Seeds can either be germinated directly in your system, on sprouting tables, in individual sprouting trays or by many other means. It really comes down to what works best for the area you have, labor involved and finances available.



Hortifiber Rockwool® is a registered trademark of Thermofiber, Inc.

TECH TALK 124

Compost Tea

Compost tea is exactly what it sounds like—a liquid extract prepared by steeping compost in water. Sounds delicious, right? Don't worry, it's for your plants. Just spray it on and watch them grow healthier and less susceptible to disease. Compost tea can be used on trees, shrubs, houseplants, vegetables, flowers and lawns. It can also help with seed germination and starting new plants.

Compost tea has been shown to be a source of beneficial microorganisms that protect plants and provide better nutrient availability to the plants while also improving soil condition. Several types of compost teas can be made, and they vary in the method of preparation and in the ways they are used. Examples include anaerobic compost teas, aerobic compost tea, compost leachate, manure tea and Bokashi tea, among others.

One of the most popular of the compost teas is aerobic compost tea (no, it has nothing to do with jumping jacks). Aerobic compost tea is made by using an air pump or blower to supply your mixture with oxygen while brewing. The process enhances the production of beneficial bacteria, protozoa, fungi and other microbes. You can even add food and/or other additives to further encourage the growth of microorganisms in the tea. For example, add molasses for bacteria growth; kelp and humic acid for fungi; and peat moss and hay for protozoa.

Brewing aerobic compost tea is easy. Many commercial compost tea brewers are available, but if you take pride in your DIY ethic you can easily build your own brewer. All you need is a bucket, an air pump or blower, an air hose with check valve and a diffuser. Simply wrap the compost in cheesecloth or place it in a mesh bag (avoid fine mesh—it may keep some beneficial fungi from the tea). Fill a bucket with clean water and drop the bag in [one part compost to four parts water]. Then throw in your choice of additives. Aerate the liquid for several hours.

While it brews, make sure you provide enough aeration to maintain dissolved oxygen (D.O.) content around 6 ppm. This will support the growth of aerobic microorganisms that enhance plant growth. Aerate the extract between 12 and 48 hours, depending on the type of microbes that are desired. A period of around 12 hours will favor the growth of fungi, while a 24-hour period of aeration will favor the

growth of bacteria. Longer periods (36–48 hours) will favor the growth of protozoa and other microorganisms.

After aerating, pour the liquid through a strainer or cheesecloth to filter. Then dilute the concentrated tea with clean water at a ratio of 1 to 10 before dispensing in sprayers or spray bottles. One gallon of your diluted mixture will cover 800 ft² of planted area. For best results, apply the tea to plants and soil once every week. The whole plant and surrounding soil may be thoroughly wetted. Tea may be stored up to two weeks in a closed container before applying to plants.

To consistently make great compost tea, consider the following:

- Aerate or chemically treat clean water to remove chlorine or chloramines from water prior to adding compost.
- Keep the brewer between 70 and 75°F while brewing tea.
- The pH should be near neutral (6.5 to 7.5).
- Maintain the D.O. concentration around 6 ppm throughout the brewing cycle.

Using these methods, you can routinely make tea with high numbers of beneficial bacteria, fungi, protozoa and nematodes, time after time. The result will ensure healthier plants and better growth.

Sources of additional information on compost tea:

The National Sustainable Agriculture Information Service (ATTRA)
website: <http://www.attra.org/attra-pub/compost-tea-notes.html>

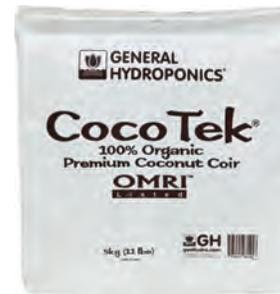
The Compost Tea Brewing Manual, 5th Ed., 2005. Dr. Elaine Ingham, Soil Foodweb Inc., Corvallis, Oregon 97333.

COCOTEK®

This organic growing medium consists of three different types of compressed coco coir. A high-quality, low-sodium, environmentally friendly alternative to sphagnum peat moss. When hydrated with water, CocoTek rapidly expands, saving time and effort. Use by itself or mix with expanded clay pellets, perlite or topsoil.

| MODEL | | EACH |
|--------------|-----------------|----------------|
| CB310 | COIR BALE, 5 KG | \$11.59 |

CocoTek® is a registered trademark of HGCI, Inc.



◀ COCOGRO® COIR FIBER BRICK

This premium coir fiber has a low salt content and no chemical treatment. Its doublesleeved ¾" long fibers provide an optimal air to water ratio and reduced dust, which means stronger root development. Cocogro® fiber is aged at least 18 months, so it has longer usability. And it has excellent drainage properties. 100% recyclable. Expands to approximately ⅓ cu. ft. of media.

| MODEL | | EACH |
|--------------|--------------------------------|---------------|
| COCOB | COCOGRO COIR FIBER BRICK, 650G | \$4.39 |

Cocogro® is a registered trademark of American Agritech, LLC.

PERLITE

Coarse perlite (siliceous rock) is one of the best hydroponic media commonly used. It has high water-holding capacity and fertilizer retention. It has neutral pH, is sterile and weed-free. Ideal for tray systems, bag systems and deep nutrient trough systems. Sold in four cubic foot bags.

| MODEL | | EACH |
|-------------|-----------------|----------------|
| PR40 | PERLITE, 20 LBS | \$17.99 |



◀ GOLD LABEL HYDROCORN®

This lightweight clay aggregate is an excellent growing medium for any hydroponic system. Clay aggregates are heated at high temperatures, creating an inner pore structure and ceramic shell that holds moisture for roots and helps minimize the buildup of salts and nutrients. The aggregate wicks the water/nutrient solution upward, pebble by pebble, releasing it to the plant roots as needed. The uneven shape is an ideal surface for roots and beneficial bacteria. Pebbles range from 8–16 mm.

Clay aggregate is chemically inert, odorless, will not degrade and has a neutral pH of 7.0. It's easily washed, completely reusable and will last indefinitely. Excellent in systems with potted plants and in ebb and flow system trays. It readily accepts transplanted seedlings started in oasis cubes, Hortifiber Rockwool® or other planting media.

| MODEL | | EACH |
|-------------|-------------------------|----------------|
| CA4A | HYDROCORN, 36-LITER BOX | \$40.39 |

Gold Label Hydrocorn® is a registered trademark of Jongkind B.V. Bestoten Vennootschap

SMALL PROPAGATION CUBES

These Hortifiber Rockwool® small cubes are ideal for starting seedlings and cuttings and fit nicely into 2" net pots, seedling trays or directly into a growing media. Cubes have a small hole in the center for seed placement.

| MODEL | L | W | H | CUBES/SLAB | EACH |
|-------|-----|-----|-----|------------|--------------|
| PC112 | 1½" | 1½" | 1½" | 98 | \$12.59/SLAB |



PROPAGATION MINI BLOCKS

These Hortifiber Rockwool® small blocks are ideal for both seed and cutting propagation. They are designed to be transplanted directly to other media and not intended to be used with larger Rockwool blocks.

| MODEL | L | W | H | CUBES/SLAB | EACH |
|-------|-----|-----|-----|------------|--------------|
| RMB1 | 1½" | 1½" | 1½" | 15 | \$3.59/STRIP |



NET POTS

These plastic net pots have slits in the sides and bottom to allow root development and promote oxygen transfer. Ideal for ebb and flow systems and NFT systems, pots can be used for starting seedlings and propagation. The 2" size is ideal for use with Hortifiber Rockwool® and oasis cubes or Hydroton to start seedlings which will then be transplanted to the growing system. Plants are left in the net pot when transferred, which avoids transplant shock. Larger size net pots are perfect for use with Hydroton media.

These pots are excellent for classroom science projects and experiments, as the root system is visible when lifted out of the nutrient solution.

| MODEL | EACH |
|--------------------------------------|--------|
| NP12NL 2" H X 2" DIA., 25/PK, NO LIP | \$3.19 |



BL306



MEDIUM PROPAGATION CUBES

Start seeds and root cuttings right with OASIS® Horticultures®, 1" Medium Thin Cut! Because cubes are pH neutral and extremely porous, they are multi-purpose and work especially well in hydroponics systems. OASIS Horticultures are designed to drain off excess water from the base of the germinating seed or cutting while maintaining a proper air/water balance. 2 sheets at 276 cubes/sheet.

| MODEL | L | W | H | CUBES/SLAB | EACH |
|--------|----|----|------|------------|---------|
| OH0300 | 1" | 1" | 1-½" | 276 | \$25.19 |

Oasis® Horticultures® are registered trademarks of Smithers-Oasis Company.



PROPAGATION BLOCKS

Once seedlings have developed in the Hortifiber Rockwool® propagation cubes, the entire cube can then be transferred to these propagation blocks. Propagation blocks have a hole in the center that will accept the 1½" propagation cubes. Larger quantities and sizes available.

| MODEL | L | W | H | CUBES/SLAB | EACH |
|-------|----|----|-----|------------|--------------|
| PB3 | 3" | 3" | 2½" | 8 | \$6.39/STRIP |
| PB4 | 4" | 4" | 2½" | 6 | 6.49/STRIP |



BUCKET LID

Perfect for customized hydroponic systems, these sturdy Bucket Lids fit any standard 5-gallon bucket.

| MODEL | EACH |
|-----------|--------|
| BL306 6" | \$3.69 |
| BL310 10" | 4.19 |

22 AQUAPONICS

Trays and Shade Cloth

PROPAGATION TRAYS

Great, sturdy additions to any hydrogarden. Trays have raised interior channels for superior drainage. The basin of the Eazy Drain Reservoir also features a gradual slope and can be modified with bulkhead fittings for simple hose connection and reservoir change-outs. Made of durable, UV-resistant plastic. Ships motor freight.

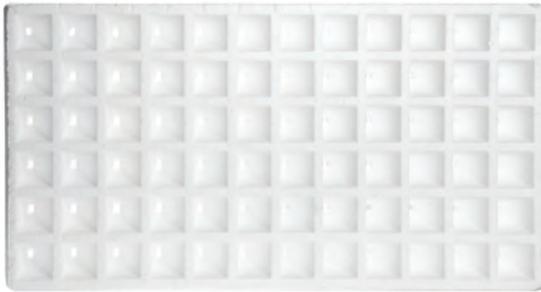
| MODEL | | L X W X D | EACH |
|---------------|----------------------|----------------|----------------|
| WPT200 | PROPAGATION TRAY | 22" X 22" X 7" | \$52.49 |
| WPT210 | PROPAGATION TRAY | 44" X 24" X 7" | 78.79 |
| WPT220 | PROPAGATION TRAY | 36" X 36" X 7" | 157.49 |
| WPT230 | PROPAGATION TRAY | 48" X 48" X 7" | 150.19 |
| WPT240 | PROPAGATION TRAY | 72" X 36" X 7" | 194.29 |
| WPT250 | PROPAGATION TRAY | 96" X 48" X 7" | 280.39 |
| WPT221 | PROPAGATION TRAY LID | 36" X 36" X 7" | 104.99 |
| WPT231 | PROPAGATION TRAY LID | 48" X 48" X 7" | 141.79 |



WPT220



WPT221



← SPEEDLING TRANSPLANT TRAYS

Keep your plants' roots safe from damage, pests and diseases during transplant. These polystyrene trays are reusable and drastically reduce transplant shock. The angled sides of the cells encourage roots to grow downward, rather than spiraling as they would in a square cell. This allows plants to begin growing immediately after transplant. Plants and soil are easily removed, completely intact.

Trays are 26 5/8" L x 13 3/8" W. Ship weight 1.5 lbs.

| MODEL | | EACH |
|----------------|------------------------------------|----------------|
| TR128A | 128 CELLS @ 1.5 SQ. IN., 2.5" DEEP | \$10.49 |
| TR200A | 200 CELLS @ 1 SQ. IN., 3" DEEP | 13.29 |
| TR242HC | 242 CELLS @ 1 SQ. IN., 2.5" DEEP | 8.59 |
| TR72A | 72 CELLS @ 1.75 SQ. IN., 2.5" DEEP | 13.59 |

SHADE CLOTH

Our premium shade cloth is the knitted type, which will last over 15 years in the tropical sun. This cloth is useful for shading tanks to reduce algae, prevent sun damage to fish and reduce water temperature. It is also useful for predator control, visibility screening and, of course, shading plants. Made of UV-resistant plastic. Sold in 10' L increments or full 300' rolls only.

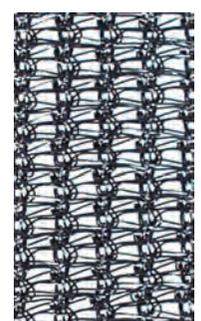
| MODEL | SHADE | LENGTH | WIDTH | SHIP WT (LBS) | EACH |
|--------------|-------|--------|-------|---------------|-----------------|
| SC30 | 30% | 10' | 12' | 2.8 | \$37.79 |
| SC30R | 30% | 300' | 12' | 83 | 755.99 |
| SC50 | 50% | 10' | 12' | 2.8 | 44.09 |
| SC50R | 50% | 300' | 12' | 83 | 995.39 |
| SC70 | 70% | 10' | 12' | 4.6 | 56.69 |
| SC70R | 70% | 300' | 12' | 138 | 1,328.00 |



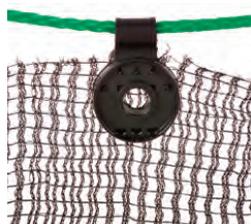
30% SHADING



50% SHADING



70% SHADING



← NETTING & SHADECLOTH POLYCLIPS

These unique fasteners are ideal for attaching predator netting and shade cloth to support rope and wires. Constructed of tough polypropylene, they can be used over and over again. Simply snap over the edge of the material and attach to 3/8" support wire. Recommended spacing is one polyclip per 2' (depending on load).

| MODEL | | EACH |
|--------------|-------|---------------|
| PC1 | EACH | \$0.65 |
| PC125 | 25-PK | 14.59 |

PROLINE® SUPER SALT CONCENTRATE

Contains everything but the salt—save on shipping!

This synthetic salt mixture contains all the necessary elements and buffers (except sodium chloride) required to make up to 4,400 gallons of synthetic seawater. Each phosphate- and nitrate-free batch is individually tested to generate consistency and high quality. Because sodium chloride is a major component of most synthetic sea salt mixtures, it is also responsible for a large amount of the weight. This concentrated mixture contains everything but the sodium chloride.

ProLine Super Salt Concentrate is packaged in a semiliquid form and sold in resealable buckets. One bucket mixes with 80 lbs of noniodized, high-purity sodium chloride to make 400 gallons (1,514 liters) of salt water. Pallet quantities available.

| MODEL | | SHIP WT (LBS) | EACH | 4+ |
|---------------|----------------|---------------|----------------|----------------|
| 239500 | 400 GALLON MIX | 63 | \$79.29 | \$71.36 |



#10 WHITE CALCIUM CARBONATE DUST

Due to the nitrification process that occurs in the biofilter of a healthy aquaponics system, pH of the system tends to steadily decrease over time as the nitrifying bacteria create acid. Regularly adding calcium carbonate increases pH, and adds beneficial nutrients for plant uptake as well.

| MODEL | | EACH |
|-----------|-----------|----------------|
| MD | 50 LB BAG | \$52.49 |

MICROBE-LIFT® PH INCREASE AND PH DECREASE NEW!

Safely Raises/Lowers pH Levels

pH Increase - Includes 2 pH increasers for gentle effectiveness and 3 electrolytes to help maintain osmotic balance.

pH Decrease - Includes 2 pH decreaseers for gentle effectiveness and 3 electrolytes to help maintain osmotic balance. Contains phosphoric acid.

- Formulated in deionized water
- Contains a slime coat ingredient for skin protection and stress reduction in pond fish
- Contains a chelating agent to enhance water quality
- Not harmful to fish or plants

| MODEL | | | EACH |
|---------------|--------------------------|---------|----------------|
| 890024 | MICROBE-LIFT PH INCREASE | 1 QUART | \$13.99 |
| 890025 | MICROBE-LIFT PH INCREASE | 1 GAL | 44.59 |
| 890026 | MICROBE-LIFT PH DECREASE | 1 QUART | 13.99 |
| 890027 | MICROBE-LIFT PH DECREASE | 1 GAL | 44.59 |

Microbe-Lift® is a registered trademark of Ecological Laboratories, Inc.



AQUAPONICS TEST KIT NEW!

Designed for small to midsize systems, this test kit has everything you will need to monitor water quality for both the aquaculture and hydroponics segments of your system. Kit includes labware, accessories and reagents to repeat tests for each factor approximately 50 times, a detailed instruction manual and quick reference card in a foam-lined carrying case. Test chemistries and comparators are compatible with fresh, brackish, or salt water systems. Ship weight 9 lbs.

| MODEL | | EACH |
|-----------------|---------------------|-----------------|
| LM3637 | AQUAPONICS TEST KIT | \$298.99 |
| LM3637RP | REAGENT REFILL KIT | 138.99 |



| TEST | RANGE |
|------------------------|---------------|
| AMMONIA | 0.0-2.0 ppm |
| NITRITE | 0.05-0.8 ppm |
| NITRATE | 0.25-10.0 ppm |
| PH | 5.0-10.0 |
| IRON, FERROUS & FERRIC | 0.5-10.0 ppm |
| ALKALINITY | 0-200 ppm |
| DISSOLVED OXYGEN | 0-10 ppm |

INDUCTION GROW LIGHTS

Energy saving, full spectrum lighting ideal for aquaponics!

Pentair Aquatic Eco-Systems' line of induction grow lights, an emerging technology that is replacing metal halide and high pressure sodium lighting in aquaponics. Induction lighting offers many benefits to crop production including a broad spectrum, greater canopy penetration and lower operating temperatures.

- Consumes up to 70% less power than traditional HID lamps
- One lamp from vegetative thru flowering reduces plant stress
- PAR rated spectrums: 90% UV – 95% Carotenoid – 80% R/FR/IR
- 98% specular reflectance for greater canopy penetration
- Low operating temperatures reduce cooling costs
- Longer lamp life (100,000 hour rated)
- 10 year lamp and driver warranty

40W PONTOON ACCESSORY

Designed to work as an enhancement accessory to the induction lamps' broad spectrum phosphor blend. They are a low wattage addition to our induction lamps' spectrums and should be considered when the gardener is seeking optimized quality, yield and reduced time to harvest.

- Flowering enhancement accessory
- Comes fully assembled No Tools Required for Easy Installation
- 5 Year Warranty

LIGHTING CONVERSION REFERENCE

| |
|--|
| PNR-100-PAR (100W) REPLACES 200W METAL HALIDE OR HP SODIUM LIGHTS |
| PNR-200-PAR (200W) REPLACES 400W METAL HALIDE OR HP SODIUM LIGHTS |
| PNR-400-PAR (420W) REPLACES 1,000W METAL HALIDE OR 750W HP SODIUM LIGHTS |



GROW LIGHT



40W PONTOON ACCESSORY



420W GROW LIGHT WITH PONTOON ACCESSORY

| MODEL | | VOLTS | HZ | WATTS | COVERAGE AREA | | DIMENSIONS | | | SHIP WT (LBS) | EACH |
|--------------------|-----------------------|---------|-------|-------|---------------|-----|------------|------|-----|---------------|-----------------|
| | | | | | L | W | L | W | H | | |
| PNR-100-PAR | 100W GROW LIGHT | 120-277 | 50/60 | 100 | 24" | 24" | 19" | 14½" | 6¾" | 8 | \$503.99 |
| PNR-200-PAR | 200W GROW LIGHT | 120-277 | 50/60 | 200 | 36" | 36" | 26½" | 14½" | 6¾" | 11 | 640.49 |
| PNR-400-PAR | 420W GROW LIGHT | 120-277 | 50/60 | 420 | 48" | 48" | 41" | 14½" | 6¾" | 15 | 834.79 |
| PNR-400-PON | 40W PONTOON ACCESSORY | 120-277 | 50/60 | 40 | — | — | 40" | 20" | 5½" | 4 | 782.29 |

TECH TALK 130

Hydroponics vs Aquaponics

Hydroponics refers to using a nutrient solution to grow plants in a recirculating (closed) system. Open nutrient systems were used in the past but not much anymore. Two different ways hydroponic systems work are:

- Aggregate, which uses a solid medium (sand, Hortifiber Rockwool®, gravel, perlite, vermiculite, peat moss, coconut husks, etc.) for support of plant roots.
- Liquid, which uses no supporting medium for plant roots.

Aquaponics refers to growing a fish (or any aquatic animal) and plant crop together in a recirculating system. So aquaponics is really the marriage of aquaculture and hydroponics, aggregate or liquid, in a closed system.

Hydroponics and aquaponics offer these advantages over traditional farming: high productivity for the space used, conservative water usage, low environmental impact and the ability to grow plants out of season. The primary disadvantage to both is the high startup cost involved.

Common Aquatic Species Used in Aquaponics

Tilapia sp.

There is little documentation through research as to which aquatic species work best in aquaponic systems. Tilapia have the most results as they are very hardy and adaptable to poor water quality, temperature and poor handling by farmers. They also have a large market value and have developed a niche as a good-tasting white fish. The most common tilapia used are Nile tilapia (*Oreochromis niloticus*), Mozambique tilapia (*Oreochromis mossambicus*), blue tilapia (*Tilapia aureus*) or some crossbred variety of a wide number of tilapia species. They are ideal for our system here in Florida, as we have a longer warm season here than many US states, and their ideal water temperature is in the range of 75–90°F. There are a number of hatcheries in our geographic area that can supply us with fresh, affordable fingerlings. For colder temperatures, the blue tilapia has shown a wider tolerance than the other species of tilapia and will continue feeding in the 60s. However, once the water temperature starts to dip into the 50s and lower for a significant period of time, the fish will not survive for very long. If you live in a cooler climate and do not have the capability to heat the water, then perhaps tilapia is not the ideal species for you. Again, this will all go back to market demand and your own cost analysis.

Koi

Koi are ornamental varieties of the common carp (*Cyprinus carpio*) and have a large market in the United States as a decorative water feature or small pond fish for many homes and businesses. They are cultured in many states and can tolerate a wide range of temperatures and water quality parameters similar to tilapia. However, their ranges are most ideal in between 60–75°F. Similar to the tilapia, once temperatures drop below their ideal range, they will stop feeding and can eventually die. Below 50°F, they will cease feeding and their immune system will begin to shut down, so they too can suffer mortality after prolonged periods of time in those temperatures. Fortunately, in Florida we don't experience too many days with an average temperature below 50°F.

Other Common Aquaponics Species

Ictalurus punctatus is North America's most common catfish and is easily procured through the web of aquaculture hatchery suppliers in the country. It is popular in aquaculture due to its rapid growth and wide temperature tolerance of 68–85°F.

Hybrid-striped bass (*Morone saxatilis* and *Morone chrysops* cross) do well in a wide range of environmental conditions, including a temperature range of 40–90°F, but grow best in between 75 and 80°F.

Barramundi (*Lates calcarifer*) is already a fish of large commercial importance throughout the world, especially in the Indo-Pacific area. It has proven to be useful in aquaculture and aquaponic systems since its temperature ranges are similar to that of tilapia.

Jade perch (*Scortum barcoo*) is being considered more and more for aquaponic systems due to its wide tolerance for temperature fluctuations, 50–95°F. It is originally found in Australia and, like tilapia, is omnivorous.

Crappie and other sunfishes exist in almost every single US state, making access easy to farmers. Their temperature ranges are ideally between 58–68°F, but they have been located in waters much cooler and warmer than that.

Malaysian prawn (*Macrobrachium rosenbergii*) is a freshwater shrimp native to the Indo-Pacific area and is a common aquaculture food species. Temperature ranges for this shrimp are ideally between 68–80°F. One thing to note is that shrimp don't typically occupy the same space in the water column that a school of fish will occupy. They are found on the riverbed in nature as detritivores, but in an aquaculture system, their surface area can be increased with the addition of high surface area structures within the tanks or ponds.

NOTE:

It is important to understand that while these are the most commonly used aquatic species used in aquaponics, there is only limited documented information regarding their performance and production data. Should you choose to use a species outside of this list, we recommend that you contact your local aquaculture extension agent or a hatchery/farm operator to discuss the feasibility. As with any other aspect of this operation, you need to determine your market and what would work best for you. If your ambient temperature is within 68–78°F on average throughout the growing season, perhaps you should stick with a species best suited to that temperature to minimize system shock and avoid possible loss of crop. It is true that the warmer the temperature, the more the fish will eat and the more nutrients they will excrete. However, high temperatures can also inhibit the growth and nutrient uptake of the plants, so it is important to try to find a happy medium for all of your water quality parameters.



TECH TALK 134

Pest Management

Vigilance is the key to successful pest management. Make sure to inspect plants and crops on a regular basis to ensure that an outbreak does not occur. You should look for holes, speckling, browning and other damage from the bottom of the stem to the tip of the leaves and all sides of any fruit. Inspections should be increased around high-threat areas such as doors, vents and lights. Yellow sticky cards can also be hung throughout the greenhouse to help in identification of any insects. Records should be kept in order to keep track of past infestations as well as how successful prior treatments were. This will allow you to trend the occurrence of certain problems and can therefore predict future outbreaks.

The easiest way to manage pests in your greenhouse is to keep them out. While double door systems, screens around ventilation ducts and plastic sheeting to cover greenhouses help in keeping pests out, they will not keep all insects at bay. Cleaning should be performed on each plot in between plantings. Footbaths and hand sinks will also assist in deterring transfer of pests from one area to another.

If a mild infestation has occurred and it is contained in one area, a solution of water and liquid dishwashing soap can be used to dislodge insects from your plants. When a large infestation occurs, biological controls can be used to eliminate the pest population. This means that beneficial insects (parasitic wasps, ladybugs, predator mites, etc.) are released into the greenhouse to destroy the pests. Biological control requires a lot of time dedicated to monitoring and releasing predators, as well as knowledge of pest identification and biology. Environmental factors and any previous insecticide or pesticide use also need to be taken into account.

If pesticides need to be used, make sure you are using the correct pesticide for the application and following the labeled instructions. Spraying pesticides in the early evening is the best practice, since this method allows adequate time for the area to ventilate before people will be returning to the greenhouse.