

151 Farms

Home of the 151 Rock Farms

Thank you for your interest in our products and mission. When purchasing one of our 151 Rock Farms you have invested in a gardening system that will provide you and your family a lifetime of food and fun that comes from understanding how plants and fish can be used to sustain us in healthy year-round crop production without the use of soil and for a fraction of the water it takes to grow plants using traditional soils cultivation methods. Plants grown in our system cannot be treated with insecticides or fungicides. To do so risks those chemicals leeching into the fish water which could become lethal to the fish. Thus, only organic treatments can be used in our systems to prevent harm to the fish or the people who could consume those plants. In short, the plants need the fish and the fish need the plants.



For more information on our 151 Rock Farms go to: [151 Rock Farms: We Bring a River to Your Roots](#)

We will now breakdown the systems modular and expandable components as follows:

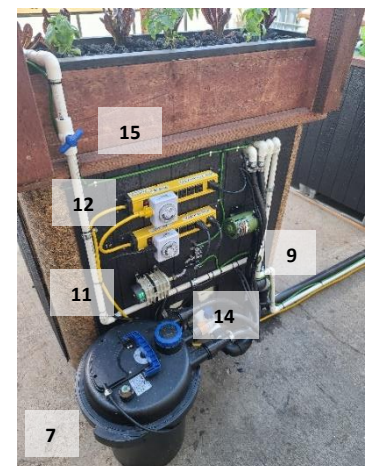
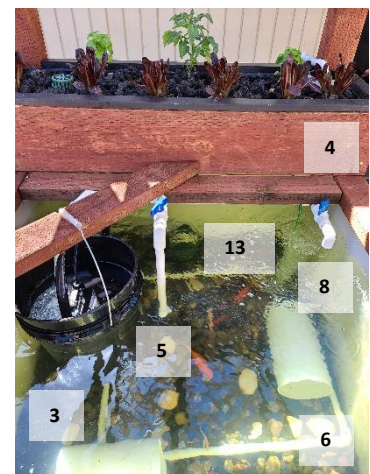
The Fish Tank

A basic 151 Rock Farm consists of a **151 Fish Tank with Gazebo & Planter (1)**. This is the 200 gallon fresh water engine that provides the nutrient rich fresh water fish that feeds our plants. Additional **Rock Tubs (2)** can be purchased (2) that expand the plant area that networks to the Fish Tank. These are sold pre-plumbed, and with inoculated rock which with the beneficial bacteria living inside that rock will convert the fish waste (nitrites) into digestible plant food (nitrates).

Within the tank can be seen the system components. First, we have the Main Pump (3) which is a ½ hp submersible pump which moves the Fish Tank water between the Planter (4) and back to the Fish Tank in a constant recirculation of water. The Main Pump is contained in a 5 gallon bucket at near the top of the water line. This is done to allow the fish solids, their poop, to drop down into the bottom of the tank and not be carried into the Plant Rock Tubs where they would accumulate unhealthy muck and sludge. **The Main Pump should never be run dry as to do so will cause it to cease working and is not a warrantable issue. There is a filter between the Main Pump and the Fish Tank water that should be cleaned daily to maintain a free flow of water to the Main Pump.** If water is not getting to the Main Pump it is in no doubt due to that filter being dirty. Under normal, 12 hour a day operation, these pumps will run for many years, as long as there is an adequate water supply going into the bucket.

The Main Pump has a Diverter Valve (5) which allows the outgoing pump flow to be reduced and it also creates a flow of water beneath the surface of the water which your fish will appreciate the current patterns. The downpipe below the valve is not glued in place. This allows the water to be occasionally redirected to change the below water flow patterns by just taking a pair of channel locks and turning the pipe.

Fish produce solids waste that we do not want to see accumulate in the Rock Tubs. The ½ pvc shown laying on the rocks (6) has perforations all along its length that will vacuum in the solids and store them in the Fish Tank Cleaner located (7) behind the Fish Tank. The Fish Tank Cleaner (FTC) Diversion Valve (8) is fed by a Transfer Pump (9) located at the rear panel. What the FTC Diversion Valve does is allows maximum vacuum suction while limiting the amount of

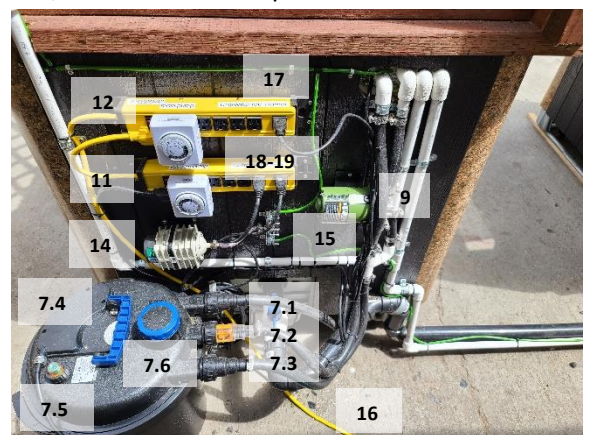


water pressure that the FTC (7) will be subjected to from the transfer pump. It also breaks up the normal water patterns in the tank when water splashes from the valve onto the water surface. This FTC Diversion Valve is best kept in the middle position. To fully close this valve could subject the FTC to water pressures that could break a seal inside the FTC unit, whereby small amounts of water could leak from the FTC tank only when the Transfer Pump is running. Should this happen it's not catastrophic to your system but it's best to be avoided since the FTC gasket(s) would then need to be replaced. The Transfer Pump is designed to run above water and does not require priming. Since these pumps are not surrounded by water they will run louder than a submersible pump. That's normal. When you hear the Transfer Pump running it acts as a reminder that you need to tend to your garden that day if you hadn't done so already.

This particular FTC is manufactured by Polar Aurora but if you go online there are a number of companies that use this common design to clean tanks and ponds. Operating instructions and parts information have been included in your sales documents and there video that shows the system in use @ [Aurora Polar Installation and Operations](#).

As you look at the image below you'll see the discharge hose (7.1) that allows you to pump out the solids from within the FTC that have been collected during the filtration process without having to disassemble the FTC. These discharges are an excellent fertilizer to be mixed into your plants that are in soil. The FTC outlet hose (7.2) returns the filtered water back to the Fish Tank. The little orange spinner in the clear housing shows the rate of water flow leaving the FTC during this process. The water inlet to the FTC (7.3) is being fed from the Transfer Pump. The UVC lamp (7.4) is housed inside the FTC and will kill off any bacterial that is passing by it. We leave this power connection to the FTC-UVC (19) plugged into the Switched Power Strip but if you wish to extend the life of your UVC lamp you could plug it into the Transfer Pump timer on the right side plug and the UVC lamp will only run when the Transfer Pump is running. The FTC Function Switch (7.6) is used to move between the normal running function of the FTC and the discharge of accumulated fish waste in the FTC. In normal mode the arrow on the function switch will be pointing to the FTC cannister. When you wish to clean it of solids you make sure the Transfer Pump is off and turn the dial to face the discharge hose (7.6). You can now press down the Function Switch and it will squeeze the sponges inside the FTC and release the stored water/solids inside the FTC to that discharge hose. If you want to further clean the sponges at this point you can override the Transfer Pump timer by moving the timer switch to the "outlet on" position. This will force new water into the FTC while you continue to pump the Function Switch until you see clear water come out. Once done turn off the power to the Transfer Pump by moving the Timer Switch to the "Timer On" position and rotate the Function Switch back to where it points at the FTC tank. **We recommend performing this cleaning function once a week.** We also recommend that the FTC cannister be removed once a year and the sponges inside be cleaned. Again, you'll want to save these annual solids recovery because they make excellent plant soils fertilizer. Lastly the FTC has a Turbidimeter (7.4) installed in a clear housing. This will tell you when the sponges need to be cleaned. In normal operations this meter will show green. When it shows yellow it means the sponges are becoming too packed with waste to do their job and dirty water is simply being returned to the Fish Tank. We prefer keeping cleaning the FTC to a regular process to avoid ever seeing the meter show yellow.

When the fish are small and the system is just beginning to be established, the Transfer Pump does not need to be run for more than an hour per day. As the fish get larger you may want to adjust the systems vacuum to run for three. or more, 30 minute cycles. The way that happens is there is a 24 hour analog timer (10) that is set to run at 30 minute irregular increments during daylight hours only. The reason for this is some of these systems will be run completely off grid on solar and wind systems. When that happens the Main Timer (12) which, when running on utility power, will be set to run for a standard 12 hour daylight cycle will power up everything, that Main Timer would be eliminated in an off grid, no batteries powered system. The only way the 151 System would get power is when there is enough sunlight and wind to power up the pumps. This would be an irregular interval power supply but it can be done to the systems satisfaction when properly engineered.



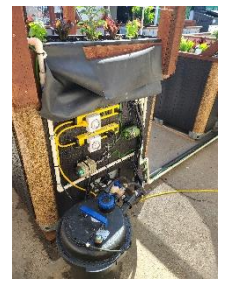
There are two Air Stones (13) located at the rear of the Fish Tank. These help to oxygenate the water for the fish and are fed from the Air Pump (14) at the rear panel of the Fish Tank. The Planter Diverter Valve (15) controls the flow of water to the bottom of planter and returns that oxygenated water, after it has run through the rock bed, back to the Fish Tank. If you understand this basic principle of operation, you will understand what makes these systems work.

The air flow to the Air Stones is controlled by the Air Flow Manifold (15). As you expand the system you will find there are additional ports to add air lines to. These pumps can be forced to overwork if the air stones are put too deeply into the water. The water pressure will not allow air to escape them. You can see if you have overburdened the system by simply raising the air stones up in the water and when you see the air bubbles start to surface you know you've found the sweet spot for the air stone depth in the water. It should be obvious, but I'll say it anyway. When there is no air line connected to the manifold port, that port valve should be left in the off position so no air escapes.

Power Connections



When connected to house power (utility) this system requires a dedicated, unswitched, grounded, 120 volt, 15 amp GFCI (outdoor) circuit to plug the Main Power Cord (16) into. Unless the system is off grid powered, the light on the top strip should always be on. The light on the lower strip will be off when the main timer (12) is off and shuts that entire power strip off during normal duty cycles. Power cord connections to the equipment is power to the air pump (17). This plug may also be plugged into the timer switched power strip below if desired to extend the life of the air pump but we prefer to keep the fish tank water well



oxygenated, and the air pumps are designed to run uninterrupted so that is how we run them. Power to the Main Pump (18), power to the FTC -UVC light (19) and timed operation power connection (11) for the Transfer Pump. During normal operations the rubber cover should be pulled down and secured over the electrical equipment and connections. Never attempt to service these components while standing in water or when energized.

The Fish

A few basic practices when taking care of your fish. One: don't overfeed them. When fish are happy and healthy, they will attack the dry fish pellets when thrown, splashed down into the water. I will throw the pellets at the far-right front corner of the tank. This gives the pellets longer to stay on the surface before the Main Pump suction would invite some of the pellets into the filter however the way the water currents work and the air stones sending bubbles to the surface tends to prevent that from happening. Do NOT over feed your fish. It's expensive and the fish will not develop that voracious appetite that comes from feeding them in small, measured amounts during daylight hours when the temperatures are up and they are at their hungriest.

Fish are smart. You'll begin to notice this. They sense your patterns and will respond. They'll let you know when they're hungry as they look to the surface of the water for food. Happy fish are active, hungry and will mate. As to the types of freshwater fish that you can grow there are plentiful choices. Many people elect to go with Tilapia as they are a warm climate fish that can be harvested at full size at around 9 months. In my bigger commercial tanks I love the KOI fish we have had for over 10 years. Koi are ornamental and can live for 200 years but they are so majestic and beautiful they do become part of your family. If you're looking to co-cultivate fish for food you'll want to go with different varieties such as Bluegill, Bass and Tilapia. Check with your local fish and wildlife rules and regulations to see if any of the species you wish to grow are not allowed.

Two: when adding water to your system it's important to know that the water being added does not contain chlorine or other chemicals that can kill your fish. Most utility water will have chlorine in it. It's a good idea to acclimate your fish to any new water being added by maintaining the temperature of the water being introduced with the current water in the tank. That can be done by simply not adding more than 25% of the fish tank water at any given time. Give the fish at least 4 yours to acclimate to the new water than you can add more water. Also consider adding a water detoxifier

such as Chloradsorb which in the 16 FL. OZ. bottle will instantly detoxify your water of ammonia, chlorine, chloramines, copper and toxic metals. You can order directly from the manufacturer @ HDLTD.COM

Three: there are many expert fish consultants you can work with when deciding when and what types of fish to add to your system. One excellent and knowledgeable resource who I trust is David @ Alpine Fishery. Tell him you have a 151 System and he'll be happy to advise you on what works well for all your fish needs based on where the system is located. David ships his fish next day air so you should not have any issues with your fish arriving in good condition. I highly recommend him for your fish tank, live and dry bait/food, sick fish treatments and he also stocks the HDL products.

The Rock Tubs

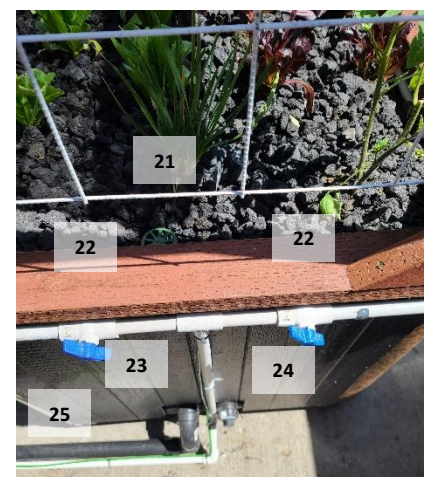
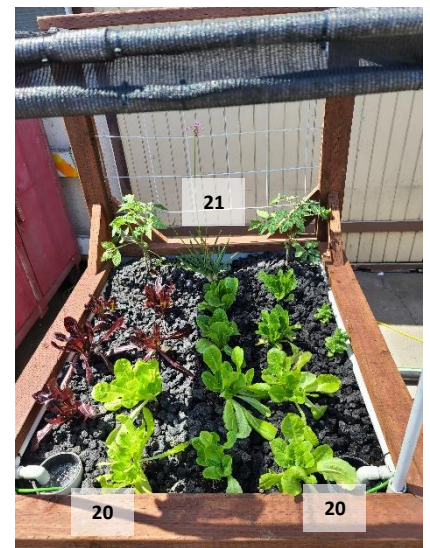
The 151 Rock Farm Systems are designed to be modular. That means when you buy a single Fish Tank it can be used as a stand-alone unit with a small planter bed. Keeping in mind this is the basic starter system for plants and fish you can't overwhelm the system by not having the correct number of fish to the number and size of plants that you intend on growing. 151 stands for 1 pound of fish to 5 gallons of water to 1 sq-ft of media. This is a rough approximation of what the system will need to stay in balance. It's pretty easy to see when the system is running optimally. You have happy fish and happy plants!

As you harvest plants you need to replace them, start thinking about reducing the number of fish in your system or cut back on their feeding a bit if you just took a significant number of plants out of the system. You need enough plants in the system to help with the removal of their uptake of nitrates. These are pretty flexible requirements and unless you let one side go drastically different than the other you'll find your system to be quite resilient to the changes that they see as both your plants and fish grow over time.

They have been operated in our facility as a completely functioning system that when disconnected from the fish tank, can be shipped to the final location and reconnected so the beauty that exist between our plants and our fish can be shared by many. Each of our 200-gallon Fish Tanks can accommodate up to 10 Rock Tubs. Setting the Fish Tank in the middle of 5 on each side is a dramatic effect but having the Fish Tank on one side or the other is fine as well.

The top-down view shows the two fresh water (20) Supply Columns with accompanying Air Stones. The fresh fish water must travel down to the bottom of the Rock Tub where it enters the rock bed and works its way back to the Return Column (21) where the water, from near the top of the rocks and at the opposite end of the Rock Tub from where the water comes in, will make its way back to the Fish Tank. As this is a constant flow of oxygenated water over rocks we call it **"Bringing a River to Your Roots"** as this replicates what plants located next to river beds would experience in nature. Clearly some of the most lush and dense growth on the planet.

The water flow to the Rock Tub(s) is controlled by two (22) valves that serve the Supply Columns. By looking down into the Return Column you can see the water swirling down the Return Column as it makes its way back to the Fish Tank via the Return (23) Bulkhead Piping. The supply fish water must make its way to the farthest Planter Tub in the system. It only has to do this once. After that each successive Planter Tub is connected via the Lower Rock Tub Connection (24). Top water supply connections are not necessary when the Lower Rock Tub Connection



has been used in these rows. Air Stones and air supply (25) must still be installed in the successive Rock Tub Supply Columns so as to oxygenate the incoming water at each Planter Tub.

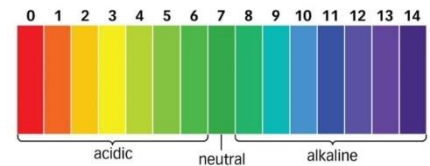
Questions and Answers

Q: What kind of rock is being used and does it matter to the system?

A: We use black lava rock because its porous and allows the beneficial bacteria to colonize so they can convert the high nitrite fish water into nitrate rich plant food. Basically, the beneficial bacteria live on the nitrites and poop out the nitrates. That's another reason these systems need to work in synchronicity. So yes black lava rock is essential to the successful operation of these systems but we also like to experiment with adding other rock media into these Planter Tubs because the constant flow of water over these rocks will, over time, release stored mineral deposits in them. But the primary rock media is always black lava rock and if you consider that Hawaii and the thick lush foliage that is grown on those islands is directly attributable to these black lava rock deposits, who are we to argue with nature?

Q: Are there any plants that don't grow well in a rock farm?

A: Yes. Fresh water fish tend to like higher pH factor environments in the 8-10 alkaline range where as plants tend to like lower pH factor environments that are in the 5-6 acidic range. We have found that most of the plants we grow in rock have accommodated ranges in the 6.5-7.0 pH region quite nicely. pH can be adjusted up or down in the fish tank to meet these levels. However, if you watch your plants and how they react to the water being supplied them you can gauge how well that particular plant is responding.



We also have a design that relies on a Dual Root Zone. What this does is puts the plants in a bed of soil, or other media, ABOVE the Rock Tub. The zones are separated by a coco coir barrier that prevents the top zone media from getting into the lower zone Planter Tub. This works particularly well for the hops, hemp, avocado and citrus plants we've grown as we add micronutrients to the top zone without introducing them to the lower Rock Tub zone.

The other thing to consider is that most of a flowering plants vegetative needs are met in the nutrient rich fish water they're receiving while flowering plants might need additional Iron in an Iron Chelate form as that is the most common mineral with Calcium and Potassium following, that is found to be in short supply in an aquaponics system. But before you do ANYTHING make sure that pH is between 6.5 and 7.0 because if it is too high the flowering plants may be having a hard time uptaking ANY of the available minerals that is in the system. Oftentimes just fixing pH issues will help recover the plants. After you've done that, I would recommend a foliar spray a couple times of week of Super Thrive which can be found at any store that has a lawn and garden section. Our plants LOVE it, it causes no harm to our fish and we've seen some amazing results with it as it helps encourage the natural building blocks that plants normally make themselves under optimum conditions.

Q: How come you don't see the water in the Planter Tubs?

A: The water is kept an average of 1" below the rock's surface. This prevents evaporative losses and build up of algae which is a common problem when these surfaces are wet and exposed to the sun.

Q: Can you explain how the water savings are achieved?

A: The water is always recirculating between the plants and the fish. That water is in the root zone. The plants roots will only uptake whatever water the plant needs for that particular stage of growth. Even in the best designed drip systems, when irrigation water hits that soil a large percentage of the water is going to travel outside the root zone. That's water that is lost to the aquifer or to evaporation. In our system each and every root has the ability to uptake the available water and that water is continuously circulating in a closed loop. Unless there is a catastrophic systems failure and all the water were to be discharged to the aquifer that water is only going to need to be replaced from some evaporative losses but mainly from plant uptake of that water. And if there were a catastrophic failure and that water were to travel into the aquifer it's not like there is anything other than fish water that will contribute to the aquifer.

There are no added nutrients, pesticides, fungicides, heavy metals or toxins from that water that would be flowing into the aquifer.

Q: Does this system require permits to install?

A: That will vary by location. These are not fixed structure systems in that they can be picked up and moved at anytime. They usually don't rely on added circuits to supply them. If in doubt you should check with your local building department.

Q: Can these systems be ran off of rainwater?

A: Yes. In some locations we have used tarps to capture the rain and route it into our Planter Tubs where it ends up back at the Fish Tank. Once at the tank we install overflow pipes that take any water the closed loop system does not need and sends it to storage tanks for future use. Since the rain never hits the ground and piping is already in place to route the water back to the Fish Tanks it's a natural way to claim water that in some localities is identified as government property because should it have hit the ground it would have contributed to the aquifers. We capture that water before it hits the ground, but like the previous question, it's best to identify your local and state agencies written policies on how captured rainwater can be treated.

Q: What happens to the water in the Planter Tubs when the Main Pump shuts off for the day?

A: That water will simply stop flowing and stage inside the Planter Tubs until the start of the new day and oxygenated water begins to flow again.

Q: When moving these systems what is required?

A: When we ship them they have already been ran as a system for at least 10 days to establish the rock has been inoculated with beneficial bacteria, the plants have sufficiently rooted, the fish are active/eating and there are no leaks.

The Fish Tank water level will ship at approximately 25% of the normal tank levels. The fish are fine in that environment for up to 24 hours. If they are going to be traveling longer than that we recommend that a small generator or inverter be used to power just the air pump so we can oxygenate the water during travel. As long as the fish are fed and there is oxygen in the water, they can survive at lowered water levels for days and even weeks but it's not a good idea to do so as it creates stress on the fish and they may not survive.

To move the Fish Tank just drop the water levels down again to the 25% level or relocate the fish and empty it entirely. There is a main valve behind the Fish Tank that when closed will keep the water in the Fish Tank and allow you to cut the connecting pipes and transport the systems.

Q: I see valves on the bottom of the Fish Tank and Planter Tubs. What are they used for?

A: In the event that you would like to remove all the water from the tubs you can do so by opening these valves. Under normal operating procedures it should never be necessary to do so.

Q: Do you offer financing or quantity discounts?

A: We can discount larger order systems. We currently do not offer financing.

Q: Does your company do the installations?

A: No. We can train any contractor who is familiar with irrigation and plumbing systems on how to do this and we will gladly assist with any design/build questions or advice.

Q: Are there sites we can visit to see other 151 Rock Farm systems that have been installed?

A: Yes, we offer tours to the public at our 151 Farm located here in San Diego. Here you can see numerous plants and styles of these systems on display. Please call or text 619.954.4447 for more information.

Installation

The tank(s) must be installed in a location that provides adequate sunlight and ventilation to the plants. Make sure that wherever you install the equipment the ground has adequate compaction and stability to prevent settling of the tanks. All tanks and tubs must each be installed level and when grouped with multiple Plant Tub **must be level in relationship to each other.** This is because the system design requires that as the farthest Plant Tub is fed water from the Fish Tank each successive Plant Tub will be filled and that water goes then on to the next tub and the next tub until the water is finally returned to the Fish Tank and process repeats itself. Remember this first and foremost. Water seeks level. When the system is installed with multiple Planter Tubs that water level will always be looking for the water level you have established at the first and last Planter Tubs. Run a line or a laser level between all the Planter Tubs and keep them level between them and your system will perform marvelously.

If you have a project that you would like to install Planter Tubs at different elevations than the Fish Tank, for example in a mountain trellising style, that's fine as long as you group the Planter Tubs at the same level between them and return the water to the Fish Tank at a lower elevation. The Main Pump in the Fish Tank can always pump up to the Plant Tubs. For our purposes we just need that Main Pump to be below any grouped Planter Tubs.

Terms

Upon signed mutual acceptance of a written order, we require a 50% nonrefundable deposit with the balance due upon the system being scheduled for pickup.

Warranty

Under normal operating procedures we warranty these systems to be free from defect for one year from the date of sale. Warranties do not apply to improper installations or damage that may occur from handling, transportation or setting of the systems. Warranties on the Main Pumps do not apply if the pump was ran without water. If a pump is agreed to be covered under warranty that warranty will only apply to the original pump, not any pump that would replace it. Warranties are non-transferable and do not cover labor, loss of product or shipping costs.

Specifications

151 Fish Tank with Gazebo:	200 gallons 48"(l) x 40"(w) x 79" (h)
Full weight with 180 water:	2,600 lbs (approximate)
Full weight when shipping (70 gal of water):	1,700 lbs (approximate)
Full wattage when everything is running:	904 watts (7.53 amps)
Wattage without the Transfer Pump running:	660 watts (5.5 amps) <i>This will be your normal system load.</i>

151 Planter Tub:	200 gallons 48"(l) x 40"(w) x 79" (h)
Full weight when shipping:	1,400 lbs (approximate)
Power requirements:	None
On board water:	25 gallons (approximate)

For more information, please contact your Authorized 151 Farmers Dealer
visit us @ 151Farmers.org and join our [151 Farmers Facebook Page](#)



Introducing

151 Rock Farming

'We Bring the River to Your Roots'