

YOU Can Guard Against KHV!



As there is no cure for KHV, we all need to prevent it getting into our ponds.

First, you need to know something about the 'enemy' you are dealing with:

<http://koiorganisationinternational.org/blog-entry/khv-facts-spike-cover>

Then, you need to know a simple way to prevent getting KHV in your pond:

The solution is Quarantine (“Q”)!

No matter where you buy your Koi, no matter what club member gives you a Koi – no matter HOW you get a new Koi, you need to quarantine. EVEN IF the Koi have already been quarantined, or in someone’s home pond for years, **YOU need to Q again to make sure KHV doesn’t get into your pond.** End of discussion, no options at all. Just do it.

We know that KHV is very temperature dependent, and that a major stress can cause KHV to go from latent to active. We use these facts to create a simple and effective quarantine system.

The technique:

The new Koi will have been stressed from shipping. **You will need to put them into an aerated tank and maintain them there for 21 days, keeping the water temperature between 70 and 80. If the water temp goes below 70 or above 80, start counting 21 days again.** That’s it! If the Koi have active or latent KHV, you may find the disease.

What you will need:

- A tank to hold the new fish
- A net for the tank, and some way to hold the net down
- Air for the tank
- Ultimate/ClorAm-X
- A water thermometer
- Possibly – some aquarium heaters with thermostatic control
- 3 weeks/21 days

Below is a primer on every step in the process. Everyone can do this!

Tanks

The number fish that need to be quarantined at the same time will determine how large the tank needs to be. Perhaps the easiest option is a tank that folds up for storage, and that can be quickly set up whenever needed, such as the tanks sold by Pearls of Paradise and used for most Koi shows.

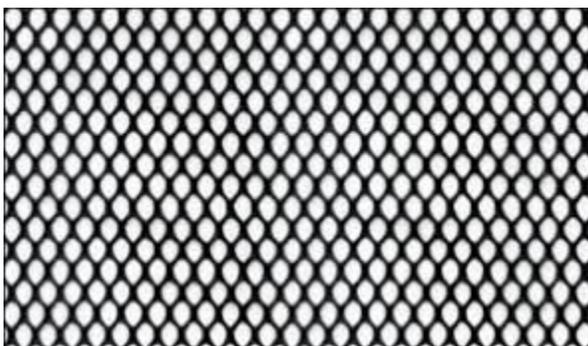


Standard Pears of Paradise Show Tank



Hard Sided Tank from Farm Store

The tank pictured on the left is made of water-proof, heavy-duty fabric. It breaks down into small pieces for storage. The tank has hooks to hold a round net, which is sold with the tank. The tank on the right can be found in various sizes at farm supply stores and is sold as a Stock Watering Tank. A piece of heavy duty netting is required. To hold the netting, you will need some hand clamps (available at big box home-improvement stores such as Lowe's or Home Depot for \$.99 each). Or, insert some round-head screws, from the outside towards the inside of the hard tank, along the top rim, and you can connect the netting to the screw heads.



Heavy Duty Tank Netting



\$.99 Hand Clamp



Fancy Hand Clamp \$5

If you will be getting new Koi for your pond on a regular basis, you will want to invest in one of these tanks. Remember that Koi jump when being moved from a larger volume of water to a smaller volume of water – and they are Olympic level athletes! The easiest way to prevent Koi from dying is to make sure the netting is well-secured to the tank such and is drum-tight. Koi will jump, and if there's a 2" hole, a very large fish will find a way to squeeze through it...

If you belong to a club, you may be able to borrow a show-tank for free if the club isn't using it. Many clubs hold Koi shows, and replace their tanks on a rotating schedule. Check club newsletter for sale tanks, as you can often get one for a small fraction of the price of a new one, and patch kits are cheap and easily applied if a tank leaks. ALWAYS rinse a borrowed tank with a hose before filling it – if there's mildew, mold or algae, then then the tank will have to be swabbed with bleach – see the Cleaning the Tank section near the end.

Set the tank up IN THE SHADE. A tank in full-sun will likely cause the water temperature to exceed the 80 degree limit for the Q, and cause sun-burn to the Koi.

Show tanks that have been used can be a bit of a challenge to set up – the secret is to dampen a towel with a tiny bit of food-grade oil, and run the towel over the tubing before inserting it into the fabric pockets on the tank. The barest hint of an oil-film on the tubes will really help them slide into place easily, but you don't want them so slippery that you can't hold them/connect them. Having a 2nd person to guide the top tubing into position as one person inserts the end also helps.

Make sure the drain plug is screwed in tightly, and position the drain plug in the direction that makes it easiest to do water changes or drain the tank. If possible, the drain should be facing downhill, so you can just open the plug, and the water will drain away from the tank. Inserting the drain plug on the inside of the tank will help to seal it with water pressure.

Even if your tank has net hooks, hand clamps between the hooks are often used at shows on tanks that house large and powerful Koi. The net HAS to keep them in - Koi will not last long if they jump

out of the tank... 

Set up the tank several days in advance of getting the Koi, so that the water temperature is ~75. If needed, inexpensive water heaters can be obtained from Wal-Mart or a local aquarium store. The models shown here vary in wattage, but all were all under \$20 each, some as low as \$8.



What's important is that they have a thermostat to control the temp. Keep them set at 75, as they are not super-accurate. You can use several smaller ones, as needed, rather than one big one. They are available in different heating capacities from about 50 watts to 300 watts each. The ones with suction cups will stick well to the walls of the tank, but just laying them on the bottom is fine. They are all submersible. **NOTE: make SURE the heater(s) stay submersed when you do water changes,**

or they will burn a hole through the tank. Ask me how I learned this...



If the ambient temp is above 80, you will need to set the tank up in a garage, basement or other location that is cooler. Cooling a tank down with ice and keeping it within a 10 degree temperature range for 3 weeks is possible – but not practical. It's much easier to heat water than to cool it...

Get a decent water thermometer (pool supply stores are perfect for this!), leave it in the water and check it several times a day! **Remember – Q is only useful when you are able to hold the temperature between 70 and 80!**



Standard Pool Thermometer

Reporting Thermometer – pricey, but fun!

Oxygen

Next, you will want to set up an air system. Use an air pump with air stone. Ideally, use 2 pumps, each with their own stone, and plug each pump into a different circuit. Remember – one of the few things that can kill all the Koi even faster than KHV is lack of oxygen. A Q tank does not have a lot of spare oxygen capacity, so if a pump goes out, depending on the Koi load, the fish may have less than an hour to live. If a system is critical – like oxygen – then it pays to have a backup. The University of Alberta learned the hard way about plugging the backup air pump into a different circuit:

<http://koiorganisationinternational.org/blog-entry/plan-equipment-failures-dont-wire-both-pumps-same-circuit>

Air pumps are available in many sizes, but most aquarium air pumps will not pump to the depth of a Q tank. Measure the depth of water in your tank (P of P tanks have 30" tall sides, and regardless of diameter, they are usually filled with 24" of water. There are 17 gallons per inch of water in a 6 foot tank – so filled to 24" is about ~400 gallons, which is a great size to use for a Q tank!). Make sure your pump will work at that depth. My favorite air pumps are from Medo (Japan), but there are certainly excellent pumps available that are cheaper, and some can even be ordered from big boxes such as WalMart. You may need to cover the pump with a plastic bin if it's not 'outdoor' rated, but make sure that the pump has enough air flow not to overheat and stop working! You may also want to raise it off the ground in case of a heavy rain, as none of these pumps will work when flooded. If you invest in a good pump, you can use it as backup for your pond when you are not using it for the Q tank.



Medo pump ~\$225



PondMaster from WalMart ~\$110

Plug the pump into a GFCI – Ground Fault Circuit Interrupter – outlet. If you only have a standard outlet nearby, use a GFCI extension cord for the air pump. What's that old adage? – the one about water and electricity don't mix? **While your Koi may survive an electrical short, you may not – don't risk it!**



GFCI Outlet



GFCI Extension Cord

Buying a good air stone is important! Ideally, your stone/diffuser will have tiny pores which create a much higher volume of air. My favorite are the Sweetwater Diffusers from Pentair:

<https://pentairaes.com/sweetwater-air-diffusers.html>



Once you have your pump and stone/diffuser – take them to a hardware or home improvement store and find the right connectors, fittings and air tubing. Think of the parts as an adult-sized construction



toy, and play with the parts until you get them connected.

Because there is so little pressure with an air pump, compared to a water pump, the fittings do not need to be glued, and the tubing can be much longer with very little loss of volume. That said, check that there are no leaks, and check the connectors and tubing *every day* to assure it's not coming apart. Use braided tubing where possible to avoid kinks in longer runs – **Remember, if the air stops for ANY reason, like kinked tubing, the Koi will die.** Also check to be sure water is not condensing in the tube and preventing or restricting the flow of air.



Standard Air tubing



Air tubing connectors



Braided NO-KINK air tubing

Dealing with Ammonia and Chlorine

So – we all know that when Koi breath, pee and poop, they produce Ammonia. If you're on city water (rather than a well), your water may contain Chlorine or Chloramines. You will need to be able to control both ammonia and chlorine while the Koi are in Q. You deal with this every day when you keep Koi – usually with a filter system on your Koi pond. But there's an easier way! Use the system developed for Koi shows – control Ammonia (and chlorine) with Ultimate or ClorAm-X.

In order for a filter to work, it has to 'started' with a full-grown colony of helpful bacteria. You won't even be able to get a new filter 'started' on a Q tank during the 3 short weeks the Koi are in there. **So skip the filter, and just add Ultimate or ClorAm-X every day.** Because the chems bind ammonia/chlorine on contact, as soon as a Koi produces an ammonia molecule, it is bound up by a molecule of the chemical into a form that is non-harmful to the Koi. The chems don't remove the ammonia/chlorine, but they change the ammonia/chlorine so that it can't hurt the Koi. Using a

chemical means there is less ambient ammonia/chlorine in the water than if you use a filter, because it takes time for the water pump to circulate all the water through the filter! So why don't we do this in our ponds? Cost! The chems are expensive in the long run, and while easily affordable for a few weeks for a small q-tank, if you're going to keep Koi for years in a larger pond, you'll want a filter. You may use ClorAm-X or Ultimate interchangeably, so long as you dose to assure zero ammonia/chlorine.



ClorAm-X is one of two ingredients in Ultimate. The other ingredient in Ultimate replaces slime coat where it is missing (and does not clog the gills – but it does close the portal of entry to pathogens that would enter in the area the slime coat is missing). At shows, we usually do the first chemical dose with Ultimate, then switch to ClorAm-X for 2 reasons. First, because ClorAm-X can be produced in powdered form, it is cheaper than Ultimate, which only comes in a liquid (because of the slime-coat replacing component). Secondly, in some water chemistries, Ultimate can cause the water to become cloudy. It's still perfectly healthy for the fish, but it's hard to see the Koi, and thus undesirable at a Koi show.

You can NEVER overdose with Ultimate – Koi can live in PURE Ultimate! How do we know this? Years ago, when Ultimate first came out, 50 small Koi were put in a tank of pure Ultimate, fed every day, and left for a month. At the end of the month, all the Koi were alive and thriving! I am told that the patent on the molecules recently expired, and now everyone can copy Ultimate and ClorAm-X. Note that ONLY ClorAm-X and Ultimate have been tested to be safe – and if another product is not chemically IDENTICAL, it may harm or kill the Koi if overdosed, or may not work correctly at the same dose rate... If you can't personally verify "chemically identical," it's just safer to use ClorAm-X or Ultimate.

How much chem do you need to use? Well – it depends... More Koi and larger Koi will produce more ammonia that has to be neutralized. Read the label – but the standard dose for powdered ClorAm-X is 4.3 oz by weight (121 grams) to neutralize 1 part per million of chlorine OR ammonia in 1000 gallons. 1/2 cup (use a real measuring cup for baking!) of powdered ClorAm-X will treat 2 ppm (Ammono or Chlorine) in 1000 gallons. Thus, 1/2 cup will neutralize more than 4ppm in a show tank filled with ~400 gallons of water. I would start with that dose, then check with an ammonia test kit after 12 hours, and again at 24 hours. As long as there was zero ammonia after 24 hours, then I would just add another 1/2 cup of ClorAm-X per day, and know the Koi are safe! Ideally, you check to be SURE there is no ammonia with the test kit - every day.



Water Changes

Philosophically, you don't actually have to do water changes, assuming your water has enough KH (buffer) to keep the pH of the tank from crashing. Even in a tank, every living thing – the Koi, the algae – every microscopic organism - is consuming carbonates every minute of every day, so pH is always going down, albeit slowly. Keeping the KH at about 100 will prevent pH crashes. 1 pound of baking soda (by weight) will raise the KH by 72 ppm in 1000 gallons (or ~180 ppm in 400 gallons). So if your KH tests at less than 100, use baking soda in addition to the ClorAm-X or Ultimate.

If you don't do any water changes, the water will probably get murky, and as long as you have decent source water, a water change at least once a week is desirable. **BUT – make sure you do not increase the water temp by more than 5 degrees or decrease it by more than 2 degrees within a 24 hour period**, in order to avoid stressing the Koi. If you're using cold, deep well water, you may want to simply change 10% of the tank water each day, rather than doing one big water change every week, in order to avoid temperature shock to the Koi. **Remember – Q for KHV is based on being able to keep the water temp between 70 and 80 for 3 weeks!** It's pretty easy to mess that up with water changes if you don't pay attention to the water temps!

Assuring you find KHV, if it's there



In order for KHV to 'break' if it's not already active, a large stressor is required. No stressor or group of stressors has been proven to always cause KHV to break but for Koi, there are few stressors worse than being captured, stuffed in a small bag in a box, and jostled around for a few hours before being released into completely different water. Even when done very carefully by competent handlers, shipping is very stressful to the Koi, and thus an excellent way to try to get latent carriers to break with the disease..

To assure new Koi are KHV free, once they have been stressed, all you have to do is to place them securely (that means a net with clamps!) in an aerated tank (air stones and air pumps), heated to 70-80 degrees (heaters) for 21 days (3 weeks). You may feed them, just test for ammonia to be sure you're adding enough Ultimate/ClorAm-X so that the test kit always reads ZERO ammonia.

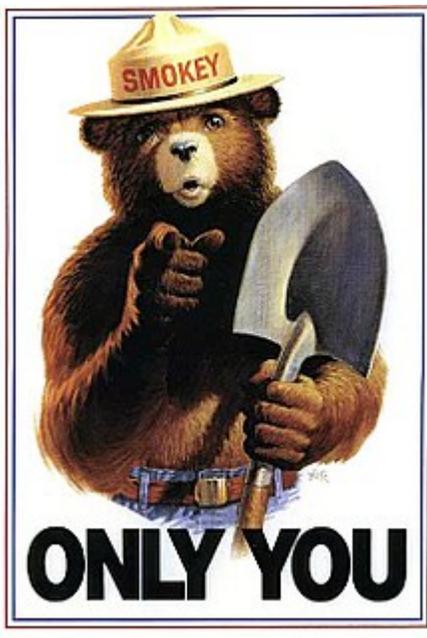
If you find KHV

Some Koi are naturally immune to KHV, but about 80% of those exposed will die. If KHV is found in your Q tank, any surviving Koi are now carriers. You can decide to try and keep the survivors/carriers, but if you introduce any other Koi to the carriers, they will likely die. Most Koi keepers choose to euthanize KHV fish. An overdose of MS-222, 2-Phenoxyethanol or other anesthetic is the best way to euthanize Koi. Leave them in the anesthetic 30 minutes after their gills stop moving, to assure they are deceased before you bury them (they make excellent fertilizer for roses or flower beds!).

Cleaning the tank

After using a tank, regardless if you find KHV, you will want to sanitize it before putting it away so that it is ready to be used for the next occasion (or returned to the owner, if borrowed). To sanitize the tank, use bleach! Drain the tank down to an inch of water on the bottom, and add several cups of plain, household bleach. Swab every millimeter of the tank down with the bleach solution using a cheap disposable mop or rag. Drain the bleach water (be careful of plants or other animals that could come in contact with the bleach!), and rinse the tank thoroughly with a hose. Allow the tank to dry completely before storing it.

Conclusions



Koi Dealers are expected to take reasonable precautions to insure that the fish they sell do not have (active) KHV disease but it's financially impractical for dealers to do what's necessary to ensure that no fish they sell is a carrier. **Therefore – it's UP TO YOU to prevent KHV from getting in your pond! To prevent KHV, QUARANTINE!**

Further Information

To learn how to diagnose KHV, along with parasites, bacteria or fungus – take some courses! You can take any K.O.I. course at any time, in any order! You do NOT have to be a member (although there are so many member-perks, you will hopefully also *want* to be a member). If your club is a K.O.I. Member Club, courses are available at half-price for a group of students. Courses are available in all aspects of Koi keeping, including Water Quality, Construction, Diagnosis & Treatment, Nutrition, Filtration, Anatomy, Physiology and even an On-Line lab! There is a 100% money-back, no-quibble, guarantee for all courses. If you like a course, and want to take the full set of 9 courses to become a Certified Koi Keeper, we will apply the money you've already spent to the package deal! If you have any questions, email with our Student Coordinator, Mary Nielsen - hulali8@icloud.com. If you want to learn more about any course:

<http://koiorganisationinternational.org/courses>

If you are interested in learning more about building a filter for a Q tank, there are 2 excellent ebooks in the K.O.I. store:

<http://koiorganisationinternational.org/product/quarantine-nuts-bolts>

<http://koiorganisationinternational.org/product/good-quarantine-system>

OR – you can buy all 25 ebooks for a package-deal of only \$30:

<http://koiorganisationinternational.org/product/ebooks-package-special-deal-all-25>

By: Karen Pattist
Contact: pattist@snet.net