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While it is our goal to provide an open forum to express the various opinions and ideas for water gardening, the views expressed in the articles are the opinions of the articles' authors and not necessarily the views of Ecological Laboratories, Inc.



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## about the editor

Carolyn is the Consumer Relationship Manager of Ecological Laboratories, Inc. and liaison to koi and water garden clubs in the USA and Canada. A retired social worker and long-time hobbyist, Carolyn has authored many articles for well-known magazines on all phases of the art of pond keeping and has three times been awarded “Koi Person of the Year”. She has been a regular columnist for “Water Gardening Magazine” and “Pond & Garden Magazine”, writes the Q&A column for “MacArthur Water Gardens”, Boca Raton, FL, and is the articles editor for Mid-Atlantic Koi Club Magazine. In her spare time, she is enjoying her new Florida home and 4,000+ gallon koi pond.

## editor's letter



Fall and winter, a time to relax, go skiing, hunting, or just catch up on some reading. But first there are a few chores to make sure our pond friends have a safe dormant season (that is, for those of us with ponds in northern climes). I've collected articles to help you have the best winter ever, and a pleasant spring to which to look forward next year. This has been an exciting summer for me, settling into the new house in Florida, building a koi pond and stocking it, while not missing time from work. My koi club friends have been extremely helpful when there were difficult decisions to be made, and I am totally in their debt. I believe in “many hands working” and “two heads are better than one”. If something is important, it is worth the research to do right the first time. I believe in the experience of experts. And I wouldn't miss an opportunity to attend educational seminars or training classes if they would make me a better pond owner.

My pond is not huge, 4,000+ gallons, but the filter system is state-of-the-art. The pond is comprised of the best materials. While I may not understand every nut and bolt, I know that somebody spent a lot of time building it especially for me. I appreciate that kind of workmanship. That is the workmanship that I bring to you in the Microbe-Lift Watergardener. I'd like you to sit back and relax, learn something about pond ownership or pond care, and become better at what you enjoy. That is what I wish for you this fall.

Your editor,

Carolyn Weise



this issue's  
*featured*  
**AUTHORS**

the MICROBE-LIFT® water gardener



**MARK KRUPKA**  
Vice President and  
Technical Director of  
Int'l. Sales, Ecological  
Laboratories, Inc.

Mark received his Bachelor's Degree in Microbiology in 1975 and completed graduate work in Marine Microbiology and Bio-chemical Engineering at Rutgers University. His experience includes over 26 years performing pilot and full-scale studies to assess the treatability of organic waste streams, lagoons, ponds, and fish farms. Mark has extensive experience in the design, operation, and control of biological systems as well as the function of microbes in natural aquatic environments.

Mark has published numerous articles and technical papers on environmental microbiology, aquatic ecosystems, pond ecosystems, biological wastewater treatment processes, strain selection, bioaugmentation and bioremediation. Mark serves on the board of directors of the NAPP.



**TOM BURTON**  
Veteran Mid-Atlantic  
Koi Club Member

Tom Burton has been active on the Mid-Atlantic Koi Club Advisory Board, was '92 Koi Person of the Year, Northern Chapter VP for many years, and following training at the University of Georgia's fish-vet course, founded MAKC's Health Hot Line, now featured in the Mid-Atlantic Koi magazine. A frequent speaker on the subject of pond building, and a sought out pond building consultant, he has been well received at the International Water Lily Symposium, Longwood Gardens, the New York Botanical Gardens and Hofstra University as well as a guest speaker at Canadian events. He is the second most published author in the well-received book From the Pages of MAKC News and is renowned for his design and building of one of the most admired ponds and gardens in the country.



**BRYAN BATEMAN**  
Certified Koi  
Health Advisor

Bryan has been in the koi hobby since 1991 and is an active member of the Midwest Pond & Koi society and AKCA club rep. He has written numerous articles for noted magazines as well as given presentations at seminars and Koi Shows. He is a Certified Koi Health Advisor and AKCA Project KHV fundraising committee member. Bryan maintains active involvement with koi shows as Koi Judge and has judged internationally (Holland, 2006). He has visited the origin of koi in Niigata, Japan and he owns show quality koi in his 12,000 gallon pond in Clarendon Hills, IL. Bryan and his wife, Bay, are equally active in this hobby and well-respected by koi and goldfish fanciers everywhere. Bryan is noted for his concern for the breed standards, the care and well-being of these fish.



**BOB PASSOVOY**  
President Mid-West  
Pond & Koi Society

Bob Passovoy stumbled innocently into ponding eleven years ago when his wife decided she wanted a water lily. He now operates a 4400 gallon koi pond with 28 koi, a 550 gallon swamp with fancy goldfish, a filtration system that'll give you nightmares, and (because he left the room at the wrong time) is president of the largest water gardening club in the Midwest, namely the Midwest Pond and Koi Society, Illinois. Bob is a part-time dental surgeon and full-time water gardening family man, and a highly-respected member of the community. When not setting up shows, he is writing for club magazines and sharing his knowledge with newcomers.



**PETER PONZIO**  
Goldfish Judge

Peter has been a goldfish judge for a number of years, and led a committee which wrote the standards on judging goldfish in the U.S. and were adopted by the GFSA in 1995. In addition, Peter has been past Chairman, Membership Chair,

Treasurer, Secretary, and a contributor of articles to the GFSA. Peter's articles on goldfish have appeared in the Midwest Pond & Koi Society, Louisville Koi and Goldfish Society, the Northwest Koi & Goldfish Society, the Goldfish Report, and MAKC magazine. Peter currently writes and maintains the site [www.goldfishpages.com](http://www.goldfishpages.com).

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NAPP Director

# The AKCA Koi Health Advisor Program



by Bryan  
Bateman

## A Hands-On Approach to Better Koi Keeping

As anyone who has become involved in the Koi Hobby can attest, it is at times a rocky and frustrating road. We want to enjoy the beauty and grace of our exotic pets, but there are so many lessons to be learned along the way, and so many mistakes to be made. Why couldn't every aspiring hobbyist have some real-time resource to help with these stumbling blocks? What kind of filtration should I use? How can I design a pond that will be a safe and healthy environment? Why are my fish flashing (or fill in the blank with any number of fish maladies!)? There are certainly an abundance of hobbyists around who have been down this road, and after much trial-and-error, have pretty much figured things out. What the hobby needed was a way to team these individuals into an organization aimed at providing this much needed resource.

This came about in 2001 when the parent organization of the koi hobby in the U.S., the Associated Koi Clubs of America, started the Koi Health Advisor program.

The KHA program was fully funded by AKCA as an ongoing program aimed at increasing the knowledge and skills necessary to enhance the satisfaction and pleasure of koi hobbyists through better koi husbandry. Interested hobbyists who belong to any AKCA affiliated Koi Club may register for the training course, which is done via the internet. Upon successful completion of the course, which includes sections on pond design, filtration, water chemistry, nutrition, anatomy and physiology, health, KHA/Hobbyist interface, and a hands-on wet lab,

the graduates are certified as AKCA Koi Health Advisors. To date the program has graduated close to 200 KHAs. In order to maintain their certification, graduates are required to take a specified number of continuing education units as well as providing evidence of pond visits, consultations, and educational activities such as articles written or presentations given to other hobbyists on topics covered by the course.

In 2003, six members of the Midwest Pond and Koi Society (Illinois) registered for the KHA course, and all graduated. Two more members are currently taking the course and will graduate in June of 2007. This club is quite large (over 400 members), so this will give us a ratio of 50 members per KHA, which certainly eases the burden of all those anxious telephone calls! We list contact information for our KHAs in our newsletter and club website ([www.mpks.org](http://www.mpks.org)) so members may easily contact us with their problems. We also write articles for our newsletter on topics which are timely to the season of year, and we have done two wet labs for our club, providing other members with an opportunity to learn the use of a microscope, to identify common parasites, and to actually dissect a koi. These wet labs have been very well received and we will continue to offer them periodically.

From a personal standpoint, being in the KHA program has provided a great deal of satisfaction and enjoyment in helping our club members with the same sorts of problems all hobbyists encounter on the road to becoming successful koi keepers.

*Continued on page 12...*



MICROBE-LIFT®  
ROMET TC

# A Network of Independent Dealers



by Carolyn Weise

Today, you have an advanced network of dealerships in which to locate exactly the right product for whatever ails your pond. The independent dealers carry the nuts and bolts stuff that can only be found in small neighborhood nurseries and gift shops, the types of stores that know and cater to their long-time customers. You cannot find this in the big box stores.

I was looking in one of the big box stores for something, because they happened to be open late at night and I had hopes of finding exactly what I needed for a particular pond emergency. Nope. They carry standard varieties of certain items, not a huge selection, and the cheapest of what they do carry. That is not what I needed to fix my problem. My fish are important to me and when my pond has a problem it is not good enough that the store is open late at night. It matters that the right replacement parts are there for my filter, and somebody is there to assist me, rather than having to replace the entire filter with some cheap model that has been sitting on their shelf for the last three months. My pond is not a mudhole and my pump is not made of plastic. My fish are real live eating, swimming, friendly and trusting friends of mine.

I left empty-handed, knowing that in the morning, my friends at the local nursery would have what I needed. I also know that if they do not have it on hand, they will help me locate it promptly. They have a network with the other independent dealers and distributors around town. In fact, they have saved me a lot of leg-work in locating life-saving parts for my system in the past. I know I get valuable knowledge and service from my friends at the local independent Microbe-Lift dealer. They stick with me and I'm going to stick with them!

## ADVERTISEMENT

### Local Distributors—Providing Service Beyond the Sale

When in the market for pond liners, two important things to look for are the product type and availability. Many contractors turn to their local liner distributor for this information, and with good reason. Distributors can offer contractors many benefits, such as installation instructions, jobsite delivery, training and troubleshooting.

“With more than 17 years of experience, we are able to provide contractors with helpful product insight, handling and technology support,” said Rob Beausoleil, president, Aquarius Irrigation Supply of Norristown, Penn. “Contractors can come to us and receive their order same day, which saves them time, and they won't have to worry about the damage that is associated with shipment.”

There are many lining products available in the industry today, but distributors have

been providing Firestone PondGard Rubber Liner to contractors for years. Based on EPDM (ethylene propylene diene terpolymer), PondGard is a high-quality, durable, user-friendly option for landscaping professionals. Safe for plants and fish, PondGard can be used for decorative ponds, streams, waterfalls, and other water feature applications.

“We've used PondGard exclusively for the last five years because it offers superior quality and Firestone provides excellent field support,” said Clinton Elms, specialty products manager, Ewing Irrigation of Katy, Texas. “It is an ideal lining product because there are no special tools required for installation, and it is available in a variety of sizes for different project scales.”

PondGard is also highly flexible for shaping around unique pond contours and its high tensile strength and exceptional puncture resistance allow for design features such as rough-edged rocks along the banks of a pond or stream. PondGard will not crack or split in cold weather conditions down to minus 40 degrees Fahrenheit.

“No other lining product compares to PondGard, because it offers easy seaming, excellent flexibility and it is so simple to use,” said Beausoleil.

Firestone PondGard is available at your local distributor. For more information about Firestone Specialty Products, please visit our web site at [www.firestonesp.com/ml1](http://www.firestonesp.com/ml1).





PHOTOGRAPH BY CAROLYN WEISE

“...what REALLY caught my ATTENTION was his insistence in using BOGS rather

than traditional straight-sided koi PONDS, for human SAFETY.”



MICROBE-LIFT®  
BLOOM & GROW



PHOTOGRAPH BY CAROLYN WEISE

# Conventional Wisdom... or Safety?

by Carolyn Weise

When designing this, my *PIECE DE RESISTANCE*, my high-end and definitely koi-only pond, I had already experienced a couple of pre-formed ponds, a DIY 3,400-gallon pond with flat bottom in a semi-formal rectangular shape, and a glorious 6,000-gallon combined koi and water garden pond over the years. The last pond, the water garden/koi pond, was the finest by far and the most picturesque. However, there were some definite drawbacks. I had a lot of maintenance work created by surrounding plants, in-pond planted bogs, in the nature of clogged filters and skimmers. At particular times of the year it was a veritable nightmare. Now, I could look back and say that a lot had to do with my particular choice of plants... perhaps.

But the plant material was not the only problem. The pond was 6' deep with a bottom drain, no rocks in the bottom of the pond. The bogs were a different story and they were inside the pond. They were filled 1/3 with sand and covered with a thick layer of smooth stone. This created a big anaerobic zone and an invitation to become septic. Sure, it held taller plants in the wind and none ever blew down, but at what cost to the pond system? After all, this is an imitation, however nice looking, of nature and not really a natural landscape. I also had a very awkward time with some plants which grew quite aggressively in such a situation, like Lotus and Thalia. [So, if you plan to install something like this, please do it at the far end and raised above the level of your pond. It would be better if the bog were not *INSIDE* the pond with the fish.]

The next issue was predators, raccoons in particular, which found these in-pond bogs just a perfect place to corral fish. I have been told fish aren't really on a raccoon's diet (whether I believe that or not is another story) and they do not eat plants, but their two-year-old mentality and mischievous nature will have them wreaking havoc in areas where there are no proper obstructions placed in their wading path. That is a construction issue, so plan ahead by placing boulders, trees, and other barriers that allow your fish to escape. The same man who told me this reasoned that when you remove something from the pond (plants) you have to replace it with something else. He believes plants are the most important filtration for any pond because they remove all nutrients and trace minerals that can in time build up to toxic levels. I believe this, along with Microbe-Lift bacteria, can work for any pond if the planning is done right.

Now, what *REALLY* caught my attention was his insistence in using bogs rather than traditional straight-sided koi ponds, for human safety. I was, at the time, in the process of building (and nearly completed) my koi-specific pond, in the new Florida home. This man told me about a 68 year old man that drowned in his koi pond, with the conventional straight, 5' deep sides, which over time had become slime coated as it will in any normally-evolving pond, and this pond had flagstone coping around it. I gasped! This is the design of my new pond, almost to a "T". The man had fallen into the pond, a friend of his was there, 73 years old, and had held onto him for a long time until

he could no longer do so, and the man drowned... in his own koi pond, because there was no way to climb out. I am going to be 63 this year and have already experienced something like that in the earlier days of ponding, with the flat-bottomed pond, where I was unable to hoist myself out until I nearly froze.

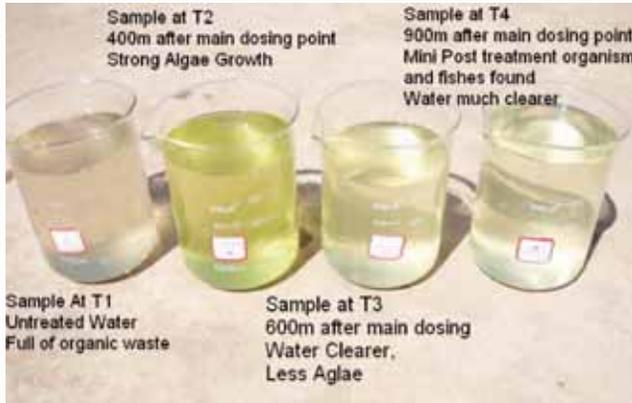
Finally, in desperation, I dragged myself over the jagged rocks, choosing to cut and bleed rather than freeze and die alone in my pond. That must have been over ten years ago. What have I learned? It is a fine thing to prevent someone from falling into the pond, but what about building a feature into the pond that will enable the poor person from getting back *OUT* if and when such a thing happens? The fish may just have to deal with a little obstruction in their pond, may bump their noses on a ladder, or it may not look as wonderful and clean-lined as it was supposed to (as convention dictates), but I guess it needs to be considered for the safety of humans and not just the fish. More than likely I am not old enough to build a koi pond yet. I should have waited another fifty or so years ... 🍀



PHOTOGRAPH BY CAROLYN WEISE

# To Xiba and Beyond -

Technology That Is Up to Even the Largest of Tasks for Cleaning Up Water



by Mark Krupka

There was a lot of technology developed for the space programs that eventually filtered their way down to mainstream consumer products. These include liquid crystal displays (LCD's), and many technologies for medicine, etc. It is not unusual to have technology make its way from large well funded government projects or industrial R&D programs to the consumer. It is a little more unusual to have technology make its way from a small company selling into consumer applications that find their way into large government projects, but, recently, this has been the case with the unique water treatment technology from one small biotechnology company.

In the fall of 2004, Ecological Laboratories was approached by Oakwell Engineering in Singapore regarding a very important program to improve the water quality of rivers in China that exhibited a high degree of pollution. While Ecological's products have been used widely and successfully to provide excellent quality of water in ponds, large and small, treating a river is obviously another matter altogether.

The first consideration in treating a river is that the water is flowing and not contained as it is in a pond or lake. To overcome this, we applied some biokinetic (mathematical) models to the river that took into account volume, flow, and degree of pollution. These helped determine the total bacterial mass that would be required to treat the water in the hydraulic retention (contact) time, which dictates how long the bacteria have to break down the pollutants as the water passes by.

Applying this model told us how much bacterial mass we needed. Based on this, we calculated how much biological media we would need to support this level of biomass. In essence we were putting together a biological filter for the river, very similar to the biological filters used in your pond. I had recommended a plastic media but this proved to be beyond the budget for the trial so the Environmental Engineering Dept. at the University of Kunming, the group conducting the field work, came up with an alternative that was a little less expensive – PVC pipe with holes drilled in it at regular intervals with brushes inserted into the pipes. The media tubes were inserted into the bottom of the riverbed at regular spacing for a 500 meter (about 1,650 ft.) stretch of the river.

The bacteria (MICROBE-LIFT PL/HC) were introduced from a boat in the river and water samples taken regularly at four sample points to monitor the progress. (Fig. 1) These were 500 meters above the site where the bacteria were introduced; the site where the bacteria were added; 300 meters down river from the



MICROBE-LIFT® BEING ADDED TO RIVER  
BY GRADUATE STUDENTS FROM  
ENVIRONMENTAL ENGINEERING DEPT.  
OF UNIVERSITY OF KUNMING

FIGURE 1 -  
XIBA RIVER TRIAL  
WATER SAMPLE ON 25TH  
OF FEBRUARY 2005

“The results were **DRAMATIC**.  
Within 30 days, odors which had  
**PLAGUED** many of the *residents*  
living in **CLOSE** proximity to  
the **RIVER** were *gone*.”



PAGODA IN KUNMING, CHINA

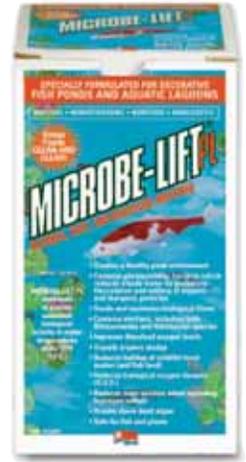
application point; and, 800 meters down river from the application point.

The results were dramatic. Within 30 days, odors which had plagued many of the residents living in close proximity to the river were gone. After 60 days, all key parameters monitored (BOD, COD, Total Nitrogen, Total Suspended Solids, etc.) reflected significantly lower pollution levels. Finally, after 90 days, higher life forms and aquatic life e.g. fish, that had not been observed in the river for years, returned. Dr. Hu, the Professor from the University of Kunming overseeing the study concluded that the bacterial addition program had eliminated any and all toxicity from the water.

What we were able to conclude was that the bacteria attached to the media giving us the amount of biomass needed to remove the pollutants from the water as it passed through the filter. In addition, the media acted as mini-bacterial incubators, releasing bacteria to the water that continued to remove pollutants as the water progressed downriver. As the water progressed downriver, observable differences in water quality were noted. Once the pollutants are removed, the bacteria die off due to lack of a food source.

A paper was published on this work by Dr. Hu and his graduate students, which can be found on our website for the technically inclined. I was also invited to give a lecture to the Environmental Engineering class to explain how we came up with the program and how the model worked. Based on the success at Xiba River, Ecological was awarded a project to clean up a large retention pond in Malaysia where we not only cleaned up the water but also reduced bottom sludge from 600 mm (24 in.) to less than 50 mm (2 in.) in six months. Ecological was also recently awarded another contract for a river cleanup in China, which will start mid-summer 2007. (It's a good thing I like Kung Pao Chicken.)

So the next time you go to add MICROBE-LIFT PL to your pond, remember you are using that same technology used to clean up the Xiba River. 🌿



MICROBE-LIFT® PL

## ADVERTISEMENT

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**GreenClean** Granular Algaecide works on contact to control algae in water gardens, ornamental ponds, fountains, and waterfalls. GreenClean begins fighting algae blooms immediately, releasing vital oxygen as it biodegrades. Use GreenClean as a curative or a spot treatment – ideal for water features containing aquatic life and plants.

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# Treating Fish & Not Killing Filters?

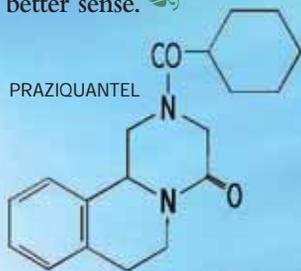
By Carolyn Weise

Are your fish flashing? Are they opening up wounds from rubbing themselves against rocks and filters in the pond? Are they gasping at the surface, even though there is plenty of aeration and you have several waterfalls? Do you know how to anesthetize a fish with oil of cloves and then use a microscope to identify parasites, if your fish are infected? I always advocate for a positive diagnosis before you treat because adding chemicals to the water can be very stressful to the fish. If you've added salt at the proper dosage and the fish are still acting as though they have "fleas", maybe it's time to look deeper for the problem.

I've had fish that swam erratically, jumped (did you know it isn't really a "happy" thing when fish jump?) and flashed even though I provided a thoroughly clean pond, great filter and all the accoutrements for a happy koi pond. I thought perhaps they had nutritional deficiencies affecting their minds, so I switched to a much better koi food (Legacy). Then I spent a lot of money on independent laboratory tests to find out my water does not contain lead, arsenic, copper, zinc, or anything of a toxic level to injure the fish. A very expensive electrician inspected all my outdoor outlets and the surrounding environment and pronounced my fish safe from electric shock. There were no low voltage mishaps near my pond and we'd had no electrical (lightning) storms lately.

This left me one choice: get the net, catch the fish, anesthetize and scrape body and gills. When the diagnosis of flukes was determined, I had to rule out Potassium Permanganate- too dangerous, expensive, and would kill my filter bacteria. The same with almost every other treatment hobbyists were using for flukes.

HOWEVER, Praziquantel is safe, gentle and will not harm the fish or filter. Most pond owners have known about this medicine but not used it because of prohibitive costs in the past. It was not that easy to obtain either. But it will clear the surface and internal flukes and worms from fish without damaging the filter, something that made it a "treatment of choice" for all fish, including Discus, Koi and Goldfish. It is harmless to the fry when treating the pond and won't hurt plants. Wow! Just add the powder to water and within a few hours the fish will be parasite free, eliminating intestinal worms, tapeworms and gill flukes. Repeat dosing is usually recommended when treating flukes and worms, but with Praziquantel, one dose is usually sufficient. PRAZIQUANTEL- better for your pond, filter, plants and fish- It just makes better sense. 🌱



<b>Systematic (IUPAC) name</b>	
2-(Cyclohexylcarbonyl)-1,2,3,6,7,11b-hexahydro-4H-pyrazino(2,1-alpha)isoquinolin-4-one	
<b>Identifiers</b>	
CAS number	55268-74-1
ATC code	P02BA01
PubChem	4891
DrugBank	EXPT02728
<b>Chemical data</b>	
Formula	C <sub>19</sub> H <sub>24</sub> N <sub>2</sub> O <sub>2</sub>
Mol. mass	312.411
<b>Pharmacokinetic data</b>	
Bioavailability	relatively small
Metabolism	hepatic
Half life	0.8 to 1.5 hours (Main Metabolites 4 to 5 hours)
Excretion	mainly in urine
<b>Therapeutic considerations</b>	
Pregnancy cat.	Only when clearly needed (lack of sufficient data in humans)
Legal status	Rx-only, designed as indispensable drug by WHO
Routes	oral

...Continued from page 6

The KHA website provides access to the opinions and knowledge of other KHAs around the country as well as the expert advice of veterinarians who have offered their services to the program. Many times advice can be given in a telephone consultation, but pond visits are frequently needed to actually observe the whole picture. An example of this was a call we received from a local hotel. They had a koi pond in their lobby, and were experiencing significant koi losses. They weren't doing any type of water testing. Upon arriving at the hotel, one of the first things we noticed was that the koi pond was doubling as a good luck "throw a few coins in the fountain" pond! We performed the normal water quality tests (ammonia, nitrite, nitrate, pH, and alkalinity/hardness, and all were in the normal range. We scraped several koi and found no parasites. The cost of metal test kits is quite high, but we narrowed it down to the coins and advised that following a 100% water change, that they hang signs around the pond saying "Please do not throw coins into the koi pond - they are dangerous to the koi's health". They did this, and the last time we spoke with them, the koi were doing nicely. Koi Health Advisors are not to accept money for their services however, but we didn't feel guilty accepting the free dinner the hotel offered us as a thank you gesture!

The mission of the KHA program is to educate motivated volunteer hobbyists regarding proper koi husbandry and recognition and management of koi and pond problems. These volunteers, in turn, have the mission of helping others in the Koi hobby by assisting them in making health and pond system assessments and evaluating options for improvements, and promoting membership in AKCA clubs. The KHA program is not intended to supplant veterinary medicine in the diagnosis and treatment of koi, but KHAs are available to assist hobbyists in locating a veterinarian if such help is needed. The best way to contact a KHA is to contact one of the AKCA clubs in your area. This can be done by going to the AKCA website ([www.AKCA.org](http://www.AKCA.org)) and finding the list of affiliated koi clubs, most of which have their own websites or contact information available on-line. If you are a hobbyist (dealers and business people involved in the koi hobby can now take the course, but cannot be certified) and would like to learn more about the KHA program, more information can be gotten by going to the AKCA website at [AKCA.org](http://AKCA.org), and clicking on KHA program. 🌱



MICROBE-LIFT® THERAPEUTIC SALT FOR QUARANTINE TANKS

# Winter and

# Algae

some facts

by Carolyn Weise

The Pea Soup variety, or phytoplankton (algae) bloom, is generally a spring occurrence when there are an abundance of nutrients in the water. It is a temporary bloom and should die off of its own accord, if allowed to run its course. A UV light will hurry the process. This is the only type of algae that is affected by a UV light. This consists of billions of single-celled plants that reproduce at an alarming rate, so that when using an algacide it requires repeated applications. The plants reproduce so quickly that any that have been killed will rapidly be replaced. It is also normal to see this type of algae bloom in a new pond. New ponds and spring ponds have one thing in common: lack of bacteria to remove nitrogenous waste. They generally will have fish to produce an excess of nutrients at a time when there are minimal microbes, so the algae takes up these nutrients before they can reach toxic levels. In this way, the algae are a beneficial plant, even if not invited.

**Floating-type algae** can be found in clean water as slimy masses of filamentous algae which float as scum on the surface. It denotes that the pond is eutrophic (rich in nutrients).

In spring these filamentous algae grow under water but when there is

*“It is estimated that algae produce about 73 to 87 percent of the net global production of oxygen - which is available to humans and other terrestrial animals for respiration”.*

[http://en.wikipedia.org/wiki/Cellular\\_respiration](http://en.wikipedia.org/wiki/Cellular_respiration).

enough sunlight, and the temperatures are not too low (which would occur in shallow ponds or in ponds with heaters), can cause the growth of these plants to break. In sunlight, these plants produce a lot of oxygen. The oxygen is trapped in little bubbles between the tangles of the algae. It is these bubbles which make them rise to the surface and become visible as slimy green masses. They reproduce sexually, by forming a union with each filament that happens to touch or overlap another, sometime between mid-May and mid-June, releasing spores which sink to the bottom of

the pond to germinate the following spring. This type of algae can be controlled by using MICROBE-LIFT/TAC, sprinkled directly onto the floating masses, with no toxicity to the water. Due to its reproduction methods, however, it will not likely be eradicated in one season.

**String Algae**, non-floating variety-(one species of Spirogyra). It is also called Blanket-weed. Filamentous algae are algae cells that form long visible chains, threads, or filaments. Filamentous algae starts growing along the bottom in shallow water or attached to structures in the water (like rocks or other aquatic plants).

## PREVENTION

It can be brought in by water plants so pull off any stringy algae you see on new plants before introducing them into your pond. Avoid overstocking with fish, which produce nutrient-rich waste. Net the pond in autumn to prevent leaves (nutrient source) from falling into the water. Remove any soil from the pond before filling, and only immerse plants in containers of aquatic planting medium. And use Barley Straw Pellets (or Barley Straw Concentrated Extract) to sequester more of these nutrients. To control this type, remove as much by hand before using algacide to minimize the organic waste being added to

the pond by the dead algae plants. Always add additional aeration and check for ammonia levels prior to application when using an algacide.

## SUMMARY

Cold temperatures do not kill algae. It drives it into dormancy since there is less ambient temperature and there are fewer nutrients in the water during the winter months. Salt will not kill algae. There are many types of algae to be found in your pond. They do not all respond to the same preventive or control methods. 🌱



MICROBE-LIFT®  
ALGAWAY 5.4



# Winterizing 101

by Bob Passovoy

For those of us in the hobby cursed with an aggressively temperate climate (best defined as hot as Hades in the summer and cold as a well-digger's-er-lunch in the winter), the need to protect the fragile and artificial environment of our ponds in cold weather is a major and recurring concern. We need to be aware of several issues, all centered around water quality and the needs of our fish. Briefly, these are: **Pollutants, Temperature, Metabolism and pH.**

The goal is to try to maintain the same optimum conditions in the winter that we strive for with more ease during the ponding season. For those of us with unlimited money, the solution is simple. Build our house out around our pond, effectively moving the whole shebang indoors. Problem solved. Water stays at 75 degrees year round, filters stay active and if you dig the pond deep enough, you can go scuba diving with your fish any time you want. (Do not laugh. One of our local club members has done exactly that.) For the rest of us, we find ourselves up against a formidable opponent every year. Ma Nature does not like us or our works, even when we try to help her. We are forced to defend our small patches of artificial wilderness with all the wiliness at our disposal.

**Pollutants:** Our worst enemy. While colder temperatures slow down the ammonia production of our fish and send our filter bacteria into dormancy, it is important to remember that there are other processes in our ponds that have the potential to severely degrade the water quality under cold conditions and threaten the health of our fish. The enemy is sludge, the collection of broken down organic crud that lodges between and behind all those beautiful big rocks around the sides of your pond and beneath that natural-looking thick layer of

river rock and gravel on the bottom. (Those of you out there with bare-liner bottomed ponds can ignore this next bit. I'm a little biased here, and the proprietors of a certain pond construction style will probably go ballistic.) Ponds are living things. A good portion of a pond's ability to convert nitrite to nitrate lives in its oxygen-poor areas; behind and under rocks and in areas where water movement is slow. The bacteria grow, divide, work and die, and the dead bacterial biomass accumulates in the dark areas we do not see. These are also areas where debris tends to settle, become trapped and break down, also adding to the load of organic materials that will accumulate over a normal season. As the water cools down and we turn down (or off) our filters and pumps, the bacterial populations in these areas change, shifting to anaerobic species. The result is the continued breakdown of organics, but with no easy way of getting rid of the result, a heady mixture of dissolved proteins and the toxic gas hydrogen sulfide.

While the process can be partially dealt with by keeping the water moving and ice-free, it will not solve the dissolved organics problem, with its negative impact on water quality. The easiest and simplest solution is cleanliness. Clean the pond out each fall, preferably while the water and air are still warm and the fish are at their peak of health. Get your koi into a temporary holding area, drain out and save as much of your water as you can, and use the rest to rinse and sump out as much of the season's crud and goo as you can. Bare-liner ponds tend to be mostly self-cleaning, so a pump in the bottom of the pond drained down to a foot deep can provide all the pressure you need to get behind the rocks. A hose water rinse and pump-out, refill, dechlor, and you're done. Folks with gravel bottoms

have a much harder job, but it is doubly important that they do it. Proponents of gravel-bottom pond construction assert that their ponds do not accumulate sludge, but also offer to come and clean out these ponds on a twice-yearly basis. I sense a conflict here...

There is a temptation to pressure-wash the sides of a pond during this exercise, and I'm not a fan of this. The algae adhering to the walls and rocks is actually beneficial, providing a minor amount of filtration and also cushioning on the rocks. It is also a non-toxic winter food source. Insisting on a sterile, stripped pond wall every year is a great way to have "new-pond syndrome" in perpetuity. Get the sludge out, but be gentle!

**Temperature:** Koi are cold-water fish, and will tolerate temperatures down to about 38 degrees without too much trouble. What they can't tolerate is sudden changes in their environment at those temperatures. Events such as the sudden entry of a load of snow dumped through an inadequately-supported weather cover, the sudden freeze-over during an unexpected cold snap (and the subsequent frantic hammering of the ponder on the ice in an attempt to break through), or the gradual build-up of noxious pollutants from a deferred, incomplete or forgotten cleanout can kill them outright, or stress them enough to cause fatalities in the spring when the parasites awaken before their immune systems.

The most obvious (and most expensive) means of dealing with this problem, aside from bringing the pond indoors, is to heat the pond. Many experienced koi-keepers do this, and there are several pond-heater designs available that work well. The cost in natural gas,

propane or electricity to run them is significant, however, and there are other ways to deal with the problem.

Many ponders set up indoor facilities for their fish and shut their outdoor ponds down for the winter, disconnecting their pumps and draining their pipe runs to prevent expansion damage. It is a system that works well for smaller fish and smaller ponds, but when your fish mature, it becomes progressively more difficult to provide acceptable water quality in the tight conditions that temporary indoor vats impose. Leaving the fish in the pond year-round presents other challenges. In climate zones with mild winters, a floating heater can be sufficient to keep enough of the pond's surface ice-free to get them through. The problem with these devices is that, for the most part, they are designed to keep horse troughs open enough to allow livestock to drink. They get overmatched in ponds. They also tend to corrode and short out, presenting another risk to the fish. High-flow airstones near the water's surface are also possible, but can be overwhelmed by a really cold spell.

The system we use, and which I wholeheartedly support, is to cover the pond. How you do it is up to you, but remember to take your local weather conditions into account. If your winters reliably present you with two feet of snow and subzero temperatures with winds approaching hurricane force, PVC pipe and a plastic tarp are not going to cut it. Our solution to Chicago winters was (and is) a \$700 "hoop-house" kit purchased from a local landscaping supply business. A minor amount of modification created a structure that easily supports three feet of accumulated snow and, more important, keeps the wind off. We shove a small \$15 electric radiator under the greenhouse-grade plastic and watch our perennials around the pond thrive. We have been ice-free for eight years.

**Metabolism:** This principle involves the whole pond, not just the fish. We tend to lose sight of two facts as we glide through the summer months: first, that our ponds are closed systems, and in the absence of a constant source of fresh water from "upstream" depend on a complex infrastructure to maintain water quality and fish health, and second, that everything in the pond environment is

poikilothermic. This means that every living thing is dependent on the temperature of the water and will only function

“...try to MAINTAIN the same optimum conditions in the winter...”

in temperature zones it is designed for. Koi digestive systems slow down and become incapable of digesting complex foods at about 50 degrees F. Their immune systems shut down at about 40. Thankfully, most parasites stop being active at or about 45. Unfortunately, so do our pond's filtration-support bacteria. It is essential to remember that while our fish may still be active and appear hungry as the water temperatures drop, the efficiency of our bioconverters is also dropping, right along with the temperature, and we need to be cutting back on the feeding. The Ponder's Adage "A hungry fish is a healthy fish" was never more true than in the fall.

**pH:** Thought you were done with all that water testing, didn't you? Not so fast, buckaroo! There's still a little bit of water cleaning going on in the pond, even in the depths of winter. Ammonia is still being generated by the fish, algae is still growing, bacteria are still working, and consumable minerals (mostly carbonates) are still being used up. Alkalinity, the buffering capacity of your pond, (its ability to maintain a constant pH) is under constant, if slower, attack. Water changes are your friend here, pulling out about 5% of your pond's volume from the deepest part of the pond and gradually replacing it with fresh (dechlorinated) will keep your alkalinity up and will help get rid of some of the dissolved organics too. Your pH will stay stable and your fish will thank you by being there in the spring.

Look under that cover every day, test your water frequently, and dream of warmer times and climes.

Inhabitants of San Diego can disregard this article in its entirety. Try not to laugh too hard as you do. 🌿



# Little Giant®

## WATERMARK™ BY LITTLE GIANT

WaterMark™ by Little Giant is a complete line of water gardening and Koi pond products that offer innovative technology to help simplify installation and reduce pond maintenance. From innovative biological filtration products to efficient pumps and durable liners, dramatic lighting to basic plumbing fixtures, WaterMark is the most innovative line of professional-quality water garden components you can buy. The line-up features vortex pumps, pond skimmers, biological waterfall filtration units with BioVort™ technology, energy saving programmable LED lighting and a complete line of fish food, water treatment and pond cleaning products. Read on — there's always something new from Little Giant, because they're never done creating innovative solutions for the home or garden.



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As the autumn approaches, the days get shorter and the nights colder, and people begin to plan winter maintenance for their ponds. For people who raise goldfish, several important decisions have to be made in the autumn, including: whether or not to winter fish outdoors; whether they will continue to run their filters; whether they will heat their ponds or provide an outside cover; and decisions regarding fish to leave outdoors or bring inside. This article will address these issues, and try to provide some guidance on how/what to do. There is really no “correct” answer when it comes to wintering your fish, but some planning will help you in making your decision.

If you decide to winter some or all of your fish outdoors, you will need to decide whether to run your filters throughout the winter. There are two schools of thought involved in keeping filters running. One school of thought advocates shutting down your pond filtration to avoid potential freezes, the loss of water stratification which may lead to colder temperatures throughout the pond, and the fact that filters do not operate at anything near peak efficiency during the winter months. All these points are valid, and a strong case can be made to turn off the filter systems during the winter. If you decide not to run your filters, be sure to thoroughly drain the filter lines and filters to prevent freezing; inadvertent freezing can damage both the lines and/or filters.

The second school of thought on filtration in the winter advocates a water current to prevent the pond water from freezing over. People who leave their filters running during the winter usually turn-off any waterfall features that they have, and tend to divert the water return away from the surface of the water, to a place of greater depth. These people realize that the biological activity of the filter will be reduced significantly, but may start-up earlier in the spring-time. Whether you choose to shut down your filters or keep them running, it's a good idea to provide a thorough cleaning of the pond to remove leaves, debris or detritus before the winter sets in. MICROBE-LIFT provides an autumn preparation product that helps break down organic material in the pond before the winter sets-in, and I use it in addition to

manually cleaning the pond.

Once a decision has been reached to filter or not, a decision as to heating the pond can be made. There are two types of heating systems generally used: one which provides enough heat to keep the pond from freezing over, and another which provides an ambient temperature throughout the winter. The first type of heater is an electrical device; the second is usually a natural-gas type unit. Both units will consume additional power, and the gas-fired units which maintain a steady temperature can add significant cost to your winter heating bills, especially if the pond is large.

Most people who heat their ponds also provide some sort of outside cover for the pond. This cover is generally clear plastic on a metal frame and can be purchased off-the-shelf or can be custom made. The additional cost for a cover is generally paid-back in lower heating bills. As a friend of mine once remarked “why heat the pond if you’re losing heat to the open air,” which was good advice indeed.

The next question to be addressed is whether or not to leave fish outdoors for the winter. Most single-tail goldfish, as well as fantails can over-winter even in a pond that is unheated, provided that there is an area of the pond that does not freeze solid. Of course, their chances of surviving the winter unaffected will increase if you provide a heater, cover, and filtration. Double-tail varieties such as Telescopes, Orandas and Ryukins can probably survive the winter in an unheated, uncovered pond that has an area that does not freeze solid, but there is no guarantee that they will survive in this type of environment.

# Over-Wintering Goldfish

Dorsal-less fish and eye-fish should not be over-wintered in a pond that is unheated and uncovered.

Heating and covering a pond provide greater odds that your fish will over-winter without any damage. If you plan on heating the pond, a minimum temperature of approximately fifty degrees is good; you can of course, keep the temperature steady year-round, but goldfish, like koi, do better when they fast for a period of a few months.

Feeding is another issue that will require thought and planning. Most people stop feeding their fish when the temperature falls below fifty-five degrees Fahrenheit, and start feeding when the temperature reaches sixty degrees. As with koi, goldfish should be fed a lower protein diet as the temperature decreases, and should gradually be fed a higher protein diet as the temperature increases. A good nutritious food in summer is important in preparing the fish's health for winter dormancy.

If you make a plan and adhere to it, your chances of having your fish over-winter in the pond will improve, and their health coming into the spring season will not be an issue. 🐟



# What does it Cost To Build a Proper Koi Pond?

By Tom Burton

I've often been asked how much it costs to build a pond and I've learned that there are as many answers as there are questioners. Each pond is unique so there is no good fix on costs. However, there are some things that are necessary and common to any proper koi pond and we can certainly address those and then allude to potential additional costs based on the desires and imagination of the builder.

## EXCAVATION

If a professional is hired with a backhoe, expect to pay \$400 to \$600 for a day's work. If you dig it yourself or with free labor, no sweat (well, maybe some), it's free.

## EPDM RUBBER LINER

The 45 mil thick liner is most commonly used because it's light enough to be handled and put in place by you and a few good friends. The cost is from about 50 cents per square foot up to a dollar. Calculate length plus two sides of the hole plus overage outside, times width plus two sides of the hole plus overage outside. Be sure and leave yourself plenty outside and don't cut any excess until you're absolutely sure it's excess. What you plan to do around the edge of the pond will determine how much overage is needed. A good size for a koi pond is around 23 feet long by 12 feet wide (not too wide - you're going to have to catch fish someday) by 3 feet (minimum) deep and let's leave ourselves 3 feet overage all around. So for this sized pond we need a liner 25' by 35' or 875 square feet, times \$.50 = \$437.50. The water volume of a pond this size is about 6500

gallons. Then when we add in the water in the filter systems, we end up with about 7000 gallons. This is about right and don't be afraid of water volume. It's just as easy to keep 7000 as it is 3000. To determine exactly how much water you've got, use a meter when you initially fill the pond. You must know this so if you ever have to treat the pond for parasites or whatever, you can administer the correct dosage.

## BOTTOM DRAINS

These are ready to connect to four inch pipe and have an anti-vortex dome supported by a single center pedestal. The cost is from \$99 to \$140 each depending upon where you buy. This type of drain is designed to work on the principal of water gravity feeding to the filter system. What that means is that the water in the pond and in the filter chambers is at the same level. Since water will always seek its own level, any reduction on either side will have an identical effect in the other. When we pump from the filter system back to the pond, water from the pond automatically tries to get to the filter system at the same rate. That's the gravity flow principal.

## SKIMMER

This can be a swimming pool power skimmer installed just like you would in a liner swimming pool or, one of the small units that mounts on 1" or 2" PVC pipe through the liner to a pump. Either type should have its own dedicated pump but the water from that pump can be routed anywhere;

waterfall, stream, returns (through bulkhead fittings in the walls of the pond), filter (even one that requires pressure such as one of the bead variety), etc. etc. The swimming pool type costs about \$100 and the other about \$40.

## FILTER SYSTEMS:

*Note - this is plural.*

The best way to go is two bottom drains gravity feeding two separate filter systems. This will require a pump for each. There are many, many systems now offered for sale and their level of effectiveness/

*“... there are SOME things that are necessary and COMMON to any proper KOI pond.”*

efficiency runs from nil to perfect with everything in between. It's composed of three cone-bottomed chambers with purges for each, and sells for about \$1200. So for two we've got \$2400.

*Note: Bead filters operate under pressure and are most efficient as the last phase of a filter system (after the pump). Gravity feeding to a settlement phase then a mechanical phase (the actual filtration/extraction process) prior to the bead filter is usually best as this will help avoid clogging.*

## PUMPS

Again, there are many on the market, all will move water, but for a koi pond, we want one that will move about 2500 to 3000 gallons per hour, is made for use outside

the pond and can stand the weather, and doesn't use too much electricity. So we look for a low Amp and quiet variety. One that is extensively used in the koi hobby because of its low operational cost is a good name 1/8th or 1/6th HP form. The cost is \$350 to \$400.

## PVC PIPE

We use 4" for the drains, and 1" or 2" for most of the rest (purge lines from the filter containers can use 3" drain pipe grade PVC). The 2" is recommended because the flow is greater and the pump doesn't have to work so hard. Standard lengths of rigid PVC comes 20 feet long and can be found at your local plumbing supply house. In Schedule 40 (the white stuff - Schedule 80 is the heavy duty gray stuff) the 4" runs about \$30 while the 1" is about \$8 and the 2" is about \$11 a length. You might want to use some flexible PVC in some (or even all) applications. A 100' roll of 1" is about \$150 while 2" is \$230. Quantities less than a full roll will cost slightly more per foot. Be sure and use the glue made for flexible though.

## VALVES

Knife (gate) valves (the ones with the "T" handle sticking out the top with a blade sort of like a guilotine) are used to open or close pipes (on or off) only. There should be a 4" one in each drain line just before the filter system in order to isolate the system from the pond for periodic cleaning. These valves are also used on purge lines on each section of the filter system to dump the crud from the bottom of the containers. Ball valves are used to control the flow rate and there should be one after each pump. Four inch knife valves cost about \$75. The purges will normally be 3" at \$19, while 2" are \$13. Ball valves in 1" go for about \$11, while the 2" are about \$14.

## ULTRA VIOLET STERILIZER

UV's are used in the koi hobby to get rid of single celled algae that make the water look green. Many factors come into play in choosing the right unit for a given pond; amount of sunlight on the pond, volume of water, fish load, maturity of the biological processing station, etc., etc. However, this device is often the only thing standing between green water and clear water. Cost ranges from \$260 for a 40 watt UV to \$800+ for a 160 watt unit (four 40 watt bulbs in sequence). The pump supplying the appropriate volume of water for the UV could be any one of the three already addressed or an entirely separate one. Flow rate through the UV is very important so in order to get within the most effective flow range for the size unit, a bypass off of a main line is a good way to go using a "Y" with a ball valve for control and a flow meter to know just what we're doing. Most manufacturers suggest replacing the bulbs after six months use (the UV is typically used only in the summer) and costs about \$65 for a 40 watt bulb.



DIANA AND TOM  
ENJOYING THEIR POND

## FLOW METERS

Knowing how much water each pump is moving tells us how well the system is operating. If for some reason the flow from a pump is reduced, it helps us isolate the problem so we can correct it faster. They cost about \$50 and should be placed a couple of feet down the pipe from the ball valve on the output side of each pump. Just follow the installation instructions that come with it.

## AIR PUMPS (HIGH BLOWERS) AND AIR STONES

High oxygen levels are essential to fish life AND the good guy bacteria that live in the biological processing station and consume the

toxic ammonia and nitrite that can kill fish if not controlled by these natural (nitrifying) organisms. So we use air pumps supplying air through diffusers (air stones) to the filters and, by some koi keepers, directly to the pond to ensure the healthiest environment possible. The pump costs about \$350, each six inch diffuser runs about \$7, with a manifold from which we can run eight air lines about \$20 and 100 feet of air line tubing about \$13. 🌿

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a) Brand new b) 1-5 years c) Over 5 years (circle one)
2. Do you currently maintain a pond or water garden?  Yes  No
3. Would you like to receive the monthly MICROBE-LIFT e-newsletter, which you may unsubscribe at any time?  Yes, please  No, thank you
4. What size is/was your largest pond or water garden?  
Length \_\_\_\_\_ Width \_\_\_\_\_ Depth \_\_\_\_\_ Gallons \_\_\_\_\_
5. In which of the following are you primarily interested? (check all that apply)  
 Plants  Landscaping  
 Fish  Equipment for your pond  
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 Water features  Education about your hobby

6. Which of the following water garden oriented magazines do you read regularly?

- |  |  |
|--|--|
| <input type="checkbox"/> Water Gardening       | <input type="checkbox"/> Pond Boss                 |
| <input type="checkbox"/> Aquascapes Lifestyles | <input type="checkbox"/> Koi USA                   |
| <input type="checkbox"/> Ponds Magazine        | <input type="checkbox"/> Mid-Atlantic Koi Magazine |
| <input type="checkbox"/> Other: _____          |  |

7. Where did you get this issue of The Microbe-Lift Watergardener magazine?  
\_\_\_\_\_

8. Which of the following is most true of your purchase of this issue of The Microbe-Lift Watergardener magazine?

(Please select only one of the following)

- |   |  |
|---|--|
| <input type="checkbox"/> My Microbe-Lift dealer offered it to me        | <input type="checkbox"/> Saw it advertised online. |
| <input type="checkbox"/> A friend told me to look for it                | <input type="checkbox"/> Just happened upon it     |
| <input type="checkbox"/> My (koi or water garden) club talked about it. |  |

Name \_\_\_\_\_ \*Email \_\_\_\_\_

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