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*Debby & Dave Young's House
 April 25
 Education Starts at 4:00*

Important Notices: As of May 1st, annual dues will be \$30. If you have not already paid, your dues are past due. Please send your dues to Martha Cover ASAP so you can continue to get the newsletter. Going forward the newsletter will be distributed via e-mail only, unless requested otherwise. If you do not presently get the newsletter electronically, or if you wish to continue receiving it via snail mail, you must contact Brent VanKoevering at 780-3980 or bvankoevering@longrealty.com.

SAKA, Inc Club Officers

President	Bob Panter sakabob@yahoo.com (520) 747-7278
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Secretary	Lynn Riley (520) 825-9066
Treasurer	Dan and Martha Cover mardan79@msn.com (520) 297-4071

Committees/Points of Contact

2010 Pond Tour	Jeanmarie Schiller Tucsonpondtour@yahoo.com (520) 299-1876
31st Koi Show Co-Chairperson(s)	Bob Panter and Jeanmarie Schiller
AKCA Representative	Debby Young debbyt@akca.org (520) 682-7697

Newsletter Editor	Brent VanKoeving bvankoeving@longrealty.com (520) 780-3980
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Membership Chairperson	Faye Hall (520) 297-1253
Raffle Chairpersons	Jeanmarie Schiller crankyjean@msn.com (520) 299-1876
Education Committee	Erin Riley elriley@aol.com (520) 818-6490
Librarian	Jeanmarie Schiller crankyjean@msn.com (520) 299-1876

Editor's Note: Articles published herein are intended for the enjoyment of all and come from a variety of sources. The articles are not intended to replace veterinary advice. Pond owners, and not the club, are responsible for the health of their koi, water changes, what to do, and how to treat their pond. Reasonable effort is made to review these articles for accuracy before including them in the newsletter.

Presidents Corner

4-18-10

It's springtime and your pond is looking good. How are your koi? Just because your water looks good does not mean it is. Please take the time to test your water. Your koi will love you for it.

Koi are at the Pima County Fair. From April 15 to the 25th our Association has been at the Fair. We were invited to set up and show our koi for the public to view at no charge. This was a great opportunity for us to be seen by thousands of people here in the southwest. I thank everyone who gave their time to be at our booth to promote koi, and the Southern Arizona Koi Association, Inc. Thank you again, and thanks to all who helped in other ways to make this happen. This kind of dedication is what we are all about.

Pond Tour 2010 is next week. I hope everyone can make it. There are some great ponds on the tour. If there is anything you can help out with please do so. We would greatly appreciate it.

A big thanks to all for making the Southern Arizona Koi Association, Inc. the best in the country. You are SAKA and should be proud of it. You make a difference. Thanks again.

For the love of Koi,

Bob Panter, President SAKA, Inc.

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SAKA, Inc 10% Discount

With your SAKA, Inc Membership Card at:

Boyd Equipment Center
3625 S Country Club Road
Tucson, AZ
(520) 792-2244 or
1 (800) 844-2244

Mountain View Koi Fish & Aquatic Plants
3828 E. Keeling Road
Hereford, AZ 85615
(520) 378-3710

Oasis Tropical Fish

3865 N. Oracle
Tucson, AZ
(520) 408-9700

Patty's Water Plants

By Appt Only
E. Benson Highway, Tucson AZ
(520) 294-0748

Club Meetings

Hosting Meetings: For those wishing to host an upcoming business/education meeting, the club will reimburse the host up to \$50 (with receipts) toward food/beverage for the meeting. **We would like to see your pond!** Please contact Bob Panter if you are interested in hosting a meeting.

Club Announcements

Officer Elections are coming soon. The offices to be filled are Treasurer and President. If you are interested in running for office or being part of the nominating committee. Please contact Brent VanKoevering at 780-3980.

We also need nominations for Koi Person of the year. Please contact Bob Panter to nominate someone.

March Business Meeting Minutes

Date & Location: March 28, 2010 at Frances Case's in Tucson, AZ

Call to Order: Meeting called to order by Brent VanKoevering at 4:00 PM.

February Minutes: Motion made to accept and second the February 2010 Minutes as read.

Number of members in attendance: not taken.

Treasurer's Report: Current checking account balance: \$7661.83. \$5116.05 CD is active Rolled over to Hughes Federal Credit Union from Bank of America .

2010 Membership: 26 active members. Dues are past due so this represents members who are up to date.

AKCA: No AKCA Report

Correspondence: No correspondence.

2010 Show and Auction Committee: No Show Committee report. Jeanmarie Shiller gave the Pond Tour Committee report. Tickets were made available for purchase at the meeting. 12 ponds will be on tour, 6 Saturday and 6 Sunday, May 1&2. Amado Territory Inn is a bonus pond each day. There will be media coverage in the AZ Daily Star.

Old Business: Jeanmarie brought items from the library, most of which were checked out. Motion made and approved to increase the potluck meeting budget to \$100 for the Hereford meeting. Faye Hall indicated the monies could come from her budget as she has received a donation of magazines for new members. See through koi tank was briefly discussed, then shelved until Bob Panter is present for the discussion.

New Business: SAKA will have a tank at the Japanese Speech Contest Saturday, April 24 at Pima Community College. Noel Shaw and Jeanmarie Schiller are taking the lead. SAKA was asked to exhibit at the Pima County Fair from April 15-25. Bob Panter is heading up that effort to determine if it is feasible and if so, will run with it.

Adjournment: The meeting adjourned at 5:00 PM.

Educational Talk: Dave Johnson spoke about spawning and breeding in your back yard and brought several of his home grown fish for all to see.

Debbie Shaw for
Lynn Riley
Secretary

Did You Know... SAKA has a LIBRARY? It's TRUE!

SAKA's library collection is full of great books, videos and magazines about Koi and Ponds. All are available to borrow by members in good standing at no cost.

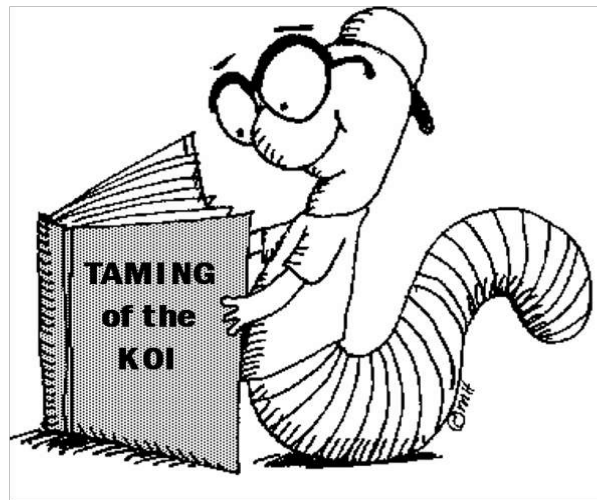
The Library Collection is listed on our website. All you have to do is request a title 1 day before a club meeting and come to the meeting to pick it up.

Then, return it at the next meeting.

It's that EASY!

**To request a title
by phone:
299-1876**

**by email:
crankyjean@msn.com**



Southern Arizona Koi Association's

Parade of Ponds

A self-guided tour of 12 beautiful ponds around the Tucson area.

MORE INFO:

www.sakoa.org

tucsonpondtour@yahoo.com

(520) 628-0381

APR 1 & 2, 2010
9am-5pm each day

Tickets
\$5 per person
child under 12
free with paid
adult

ON SALE APRIL 1ST

TICKETS AVAILABLE AT: Magic Gardens Nursery, Mesquite Valley Growers, Harlow's, Tucson Botanical Gardens, Green Things, Pond Plants & More, Rillito Nursery, Sheldon's Nursery, Civano Nursery, Tohono Chul Park and Mountain View Koi (in Hereford, AZ)

POND TOUR TICKETS WILL GO ON SALE APRIL 1ST AND ARE AVAILABLE AT THE THESE FINE GARDEN CENTERS:

- (Southeast): Civano Nursery 5301 E Houghton Rd. 546-9200
- (East): Mesquite Valley Growers 8005 E. Speedway Blvd. 721-8600
Magic Gardens Nursery 7909 E. 22nd St. 885-7466
- (Central): Harlow's Gardens 5620 E. Pima St. 886-5475
Tucson Botanical Gardens 2150 N. Alvernon Wy. 326-9686
Green Things Nursery 3235 E. Allen Rd. 299-9471
- (Northeast): Sheldon's Nursery 4999 N. Sabino Canyon Rd. 529-0609
- (Northwest): Ponds, Plants and More 2060 W. Ruthrauff Rd. 292-6774
Rillito Nursery & Garden Center 6303 N. La Cholla Blvd. 575-0995
Tohono Chul Park 7366 N. Paseo del Norte 742-6455
- (Hereford, AZ) Mountain View Koi & Nursery 3828 E. Keeling Rd. (520) 378-3710

Feeding Koi

Reprinted from
akca.org

Feeding and growth rate

The feeding pattern, and thus the growth rate, of koi depends on many factors, such as water temperature, water quality, stocking density and genetic background. Koi feed most actively at temperatures in excess of 15c(59F), thus sexually immature fish can grow rapidly during the summer months when the temperature is warmer. Once koi are mature, their growth rate slows considerably; in sexually mature fish, most of the food eaten is utilized in producing eggs or sperm in preparation for breeding. However, unlike many other vertebrates, fish continue to grow throughout their lives and it is easy for pampered koi to reproduce and continue to grow because of their artificially high feeding rates. The cycle of rapid growth in summer and retarded growth in winter produces rings on the fish's scales (much like the growth rings of a tree) and a koi's age can be determined by counting these rings. Some koi-keepers, however, who heat their pools in the winter, continue to feed their koi throughout the year. If a koi has continued to feed during winter its rings will not be clearly defined and it will therefore be difficult to age.

Water quality affects the rate of growth because koi lose their appetites and may even stop eating if their environment is poor. Poor water quality can also affect the fish's metabolism, thus hindering digestion of food.

The stocking density of the pond can also have marked effects on koi growth rate. In a lightly stocked pond, koi will become sexually mature while still of a relatively small size (25-30cm/10-12in) and once mature, growth is retarded. Although koi in a densely stocked pond will mature at a much larger size (50-60cm/20-24in), competition for food will slow the growth rate, food will be more scarce and the 'battle' for it can stress some koi. You will have to decide on optimum stocking levels for your own koi pond bearing this in mind. In fact, these considerations are really most important for koi farmers.

The genetic background, too, influences the size to which koi will grow; as the children of tall parents tend to be tall, and short parents produce small children, so the same is true of koi. This is obviously a simplified view of gene action, however, because of the significant role the environment plays in influencing size.

Water temperature affects fish more than any other single factor. Fish are ectothermic - their body temperature fluctuates in accordance with the temperature of their environment, usually remaining 10C higher. As the temperature drops, the ability of the koi to digest and assimilate food decreases. In the winter months, therefore, at temperatures below 10C(50F), it is a good idea to feed cereal diets that the koi can digest quickly and easily and that do not stay in the gut too long. High-protein diets linger in the gut and can cause severe problems; the bacteria found in the fish's gut, which play a role in breaking down some less readily digestible substances, such as cellulose, may become pathogenic if food is retained in the gut too long. As the water temperature rises,

however, the koi need protein for growth, repair of damaged tissue and injuries, and for reproduction. In the summer, koi will benefit from a high-protein diet containing 35 to 40 percent of fishmeal-based protein.

Nutritional content of food

Food contains various elements, such as proteins, fats, carbohydrates, vitamins and minerals, which are essential for all animals to maintain healthy bodies, grow and reproduce. Here we explain what these elements are and why they are important components of food.

Proteins are made up of amino acids. Thirteen essential amino acids should be included in any fish diet, although there are about 20 found in natural proteins. An adequate diet contains sufficient quantities of both essential and nonessential amino acids to allow the koi to grow, repair damaged tissue and produce either eggs or sperm. Deficiency of protein or any of the essential amino acids causes koi to grow more slowly and, if this dietary problem continues, can result in a deformation of the spine. (Spine deformities may have a number of other causes, such as disease, however).

Fats provide a source of energy to koi; their important role is in providing fatty acids, such as triglyceride and phospholipids; vital components of membranes surrounding all cell walls. Koi can make almost all of the fatty acids they need with the exceptions of linoleic and linolenic acids, which are essential and must be provided in the food. Linolenic acids are required for growth.

All fats are made up in a similar way to proteins, but of fatty acids, rather than amino acids, bonded together with glycerol. If essential fatty acids are omitted from the diet, symptoms of fin erosion and heart and liver problems may result. Fats have a low melting point and are thus more easily digested by koi. They are found in fish, soya and corn oils and in high concentrations of wheatgerm. Fatty acids become rancid on exposure to air - a chemical process known as oxidation. In koi, the liver is the chief organ for storing fats and if stale food is fed to them it can result in disease and death. Unfortunately, rancid food has no outward appearance of having 'gone bad'. It is, therefore, worth buying smaller packs of food, rather than a large quantity which is utilized slowly, and never keep food from one year to the next.

Carbohydrates also form a source of energy for koi but fish metabolize them less readily than omnivorous birds or mammals. Too much carbohydrate is very bad for koi health, resulting in either degeneration of the liver or an excessive storage of these substances as glycogen, leading ultimately to heart failure.

Vitamins are essential for the normal metabolism and growth of koi, and requirements of some are increased during spawning. Vitamins are complex-structured substances, needed in only small amounts in the diet, but deficiencies can cause clinical disorders.

Vitamins are divided into two categories: fat soluble and water soluble. Fat-soluble vitamins are found in a variety of forms, all of which are metabolized slowly and can be stored in the body fat. An excess of fat-soluble vitamins can lead to a condition known as hypervitaminosis, which, depending on the vitamin, can lead to clinical disorders. Water-soluble vitamins are easily absorbed and are not usually excreted.

All essential vitamins are supplied in more than adequate quantities in proprietary koi foods and it would be unusual for the hobbyist to meet clinical symptoms associated with deficiency.

Minerals, too, aid basic metabolic functions, as well as performing their own duties, which include building skeletal structures, osmoregulation, building of nerves, and maintaining the efficiency of gaseous exchange in the blood system. Little is known about mineral deficiencies in fish, probably because most minerals are absorbed from the surrounding water. Normally 12 percent of the diet is made up of minerals, being contained in fish food in the form of ash.

Nutritional requirement of koi

The type of food you give your koi and the quantity you offer them will vary according to their size. The majority of proprietary koi foods have a cereal base with different ingredients added either to enhance colour or aid digestion. Choose a food size that is small enough to be eaten by the smallest fish in the pond, otherwise they may die of starvation. If you keep very small koi with larger ones, offer a mixture of large and small foodstuffs, but always make sure that young fish are adequately fed. Most koi food comes in two forms: floating and sinking. Koi are bottom-feeding fish and are, therefore, better suited to sinking food. This is made by compressing the meal through a die at high pressure. The meal is held together with fats and, again, takes a long time to be dissolved by cold water. The disadvantage with relying on this type of food is that you will be deprived of seeing your koi feeding. Fortunately, koi will take food from the surface - indeed, you can even tame your koi to feed from your hand - and special expanded (hollow) foods have been formulated for this purpose. These are steam cooked to create an outer shell, which protects the food particle from saturation for a while. (Once the pond water has dissolved the shell, the food will sink.) Another advantage with floating food is that it is easy to see when the koi have eaten enough. Take care when feeding sinking types - uneaten food can easily pass unobserved, particularly in murky water.

Provide just enough food so that after five minutes it has all been eaten. On koi farms in summer, smaller koi (i.e. below 15-20 cm/6-8in in length) are fed five percent of their body weight per day, where-as large mature koi (i.e. over 20cm/8in long) are only fed two percent. The nutritional value of koi food is calculated by weight and not by volume. Normally, 1kg(2.21b) of fish food will increase koi growth by 500gm or even 700gm in favourable conditions. In the winter, provide wheatgerm based diets on a maintenance basis, in order to keep the body functions ticking over, since it is too cold for the koi to grow. Wheatgerm is also a good source of Vitamin E.

Feeding to enhance colour Koi are highly valued for their colour and certain additives can be included in the diet to maintain and enhance the fish's natural coloration. Carotene affects the red pigmentation, but if used at too high a concentration, even the white pigment on the koi will turn pink. Spirulina platensis also enhances and fixes the red pigment, but does not turn the white to pink to the same extent. It is a type of algae found and cultured in Mexico and eaten by the people, since it contains a high level of protein. Initially, it was fed to koi on account of its nutritional value and not because of its colour-enhancing characteristics. Now that these have been established, it is fed to koi for only one month each year, usually during September, but can be given at any time, even during colder periods, at temperatures of 10c, but no lower. Some koi farmers feed it for the month before the fish go to market to bring out the best colours in the koi.

Good coloration is not only enhanced by good feeding, however. Healthy fish tend to have much brighter colours than diseased ones. To bring out the colour in koi, particularly the white, you must provide good living conditions. Strong red and yellow pigments develop well in waters rich in green phytoplankton (single-celled plants). Because koi are difficult to see in green water, it helps to feed a diet that will enhance the red pigmentation. Black pigment is enriched in hard water with a pH level of 7.5-8.5. Remember, however, that changing the pH and hardness of the water can affect the toxicity of ammonia and nitrite.

Livefoods

Koi will relish a variety of livefoods, including cockles, worms and prawns. Earthworms can be fed to the fish all year round and, like prawns and cockles, are high in protein and soon become a favourite treat - a sure way to gain the affection of your koi. Tadpoles from frogs are another great treat in spring and, in summer, silkworm pupae, imported from Japan, are an excellent source of protein. Feed these pupae only as an occasional treat, however, as they have been shown to cause a diabetes-like disease in koi. Chironomid larva and mosquito larva are a popular diet for small fish, though not easily available. Daphnia ('water fleas'), plentiful in earth ponds, are one of the first foods for koi fry but tend to be too small for adult koi. Maggots are not recommended as they can carry harmful bacteria from the decaying flesh. Do not rely on livefoods to form the staple diet for koi, however, but offer them as a supplement to the regular diet. If koi are fed on these titbits alone, there is a risk that nutritional diseases will set in as the result of a lack of vitamins or amino acids.

Other foods

Koi will accept many foods thrown to them in their pond, but many of these are of little or no nutritional value and may even harm the fish. Brown bread is acceptable, but white bread contains a mild form of bleach, which does the koi no good at all. Do not offer beans, peas or corn, since koi are unable to digest the hard outer casing of these foods. Koi will take lettuce leaves and may also eat duckweed and other plants around their pond (with the exception of blanketweed, which is too coarse for them to pull off the sides).

Water Testing For Your Pond

Reprinted from The Valley of the Sun Koi Club Newsletter

Tests! "We don't need tests!" the cry of the beleaguered pond owner who has problems enough dealing with algae, malfunctioning filters and pumps, pond leaks and sooner or later sick fish. Monitoring water quality in a koi pond is often viewed with the same degree of enthusiasm as preparing a tax return. Who subjects oneself to another bunch of problems? Well, if your tax return is not prepared, your tax problems will not just go away, and if you don't test your pond water, your water quality problems will not just go away.

Unlike paying taxes, testing our ponds is entirely voluntary, so let's consider three good reasons for volunteering. First, knowledge is power. Second, prevention is easier than cure. Third, learning can be fun. The reasons for not testing - too time consuming, too confusing, too expensive and just not necessary - don't stand up in light of the facts, as we shall see. Another consideration is that we generally have koi ponds for two basic reasons - the beauty of the water environment and the pleasure of having koi. Water testing goes to the heart of both these issues - keeping the pond attractive for our enjoyment and keeping the water healthy for the fish. The latter is the most important reason to test. As hardy as koi are, long term exposure to poor water quality will cause stress and disease. Unfortunately, we can not rely on our unaided senses to determine water quality - clear water is not an indication of good water quality from a fish's perspective. Millions of years of evolution have resulted in fish that are superbly adapted to their environment. An attempt to create and maintain an artificial pond environment for even domesticated fish is complicated by the fact that fish are essentially "bags of water living in water" with only a semipermeable membrane to maintain internal integrity.

Terrestrial animals, as ourselves, can be considered "bags of water living in air" with enhanced barriers that, relative to fish, effectively separate and protect us from our environment. We can tolerate pollution and environmental changes much better than fish can because our bodies do not interact with the environment as intimately as do fish bodies. Fish are truly a part of their environment and are strongly and directly affected by its condition.

Because koi are so adapted to and affected by their environment, it is important that natural, healthy conditions be maintained in a pond to ensure healthy, happy, colorful fish. Fish disease issues invariably involve water quality. Poor quality stresses the fish, which in turn causes their immune system to go down, which in turn makes the fish susceptible to disease pathogens. In order to know if there is good water quality, it only makes sense to test it periodically rather than wait for disease symptoms to appear.

"A pond is basically a toilet". Fish waste must not be allowed to accumulate in a pond, which usually means a biological filter must be operating properly. Fish waste and other organic debris are the first step of the nitrogen cycle, a series of events that produces some of the compounds we test for - ammonia, nitrite and nitrate. Algae may colonize and detoxify a pond with high levels of nitrogen compounds, but algae's presence changes water quality for two other things we should test for - pH and dissolved oxygen. The last naturally occurring factors we routinely check are temperature and water hardness.

1.1.1.1 When to Test

Individual, one-time tests are only important if the test results indicate a toxic or dangerous condition, such as high ammonia, where corrective action has to be taken immediately. The greatest benefit of testing, however, is obtained when results are plotted on graph paper over a period of several testings, so that trends or directions can be noted early. By knowing the direction your pond's water quality is taking, you can take corrective action before the problem gets out of hand.

Normally, tests for ammonia, nitrite, nitrate, pH and temperature should be made once every week or two. Tests should be made more frequently during periods of change in the pond, such as spring warming, new filter installation, major pond cleaning or repair. At such times daily testings for certain items may be necessary, for example pH test during cement work and ammonia and nitrite tests for new filters. During stable periods such as mild summers, testing may be cut back to once every three weeks, and during periods of midwinter inactivity, testing can be eliminated.

Test Kits

Home kits all work the same way - there is a small container for a measured sample of pond water, a chemical to add to the sample that will cause the water to turn a certain color, a color chart to compare the result to and instructions to tell you if things are OK or not. Some kits use drops and some use tablets - drops are faster but tablets are easier to measure. Test kits come in either "Master Packs" which contain several basic tests or a single test pack. Refills are usually available and most of the chemicals have expiration dates after which they don't work properly. The basic tests are usually ammonia, nitrite, nitrate and pH.

The following is a discussion on the specific factors tested in a Koi pond. You do not need this information in order to properly test your pond, as the commercial test kits are simple and easy to understand. Read this only if you care to understand the factors behind the test results. Don't worry about the technical measurements, because the color charts in the test kits really make things very simple. There's no reason to convert mg/liter to oz/gallon because only the ratio matters and you don't even need that to read the color chart. What is important to realize, however, is the interrelationship between pH and various factors in the pond. Also, results may vary depending on the time of day and how long the water sample was stored before being tested.

Ammonia

is introduced by the fish waste and decomposing organic debris, is the most toxic nitrogen compound. It is present in two forms in the pond - free and ionized. Free ammonia is the most toxic and will cause death in very low concentrations. Problems associated with non-lethal elevated levels of ammonia include gill disease, dropsy and finrot. The higher the pH and the temperature, and the lower the salinity or hardness, the greater the ratio of free ammonia to the ionized form. Thus, the higher the pH and or the temperature, the more toxic the ammonia. Test kits measure the total ammonia (free plus ionized). With a properly functioning biological filter, the ammonia level is usually zero in the pond and should be under .1ppm (mg/l). Nitrosomonas bacteria in the filter oxidize ammonia into nitrite, our next compound. If the level of ammonia is elevated, you should immediately add ammonia remover such as Tetra Aquasafe, Kordon AmQuel or make partial water changes. You should also add nitrifying bacteria to your filter and stop feeding your fish until the situation is corrected.

Nitrite

is less toxic than ammonia, but still very toxic as it inhibits the ability of the blood to carry oxygen. Nitrite is oxidized into nitrate by Nitrobacter bacteria living in the filter, but some of the commercially prepared bacteria compounds for ponds are rather skimpy in the amount of Nitrobacter present because it is relatively expensive. Thus your pond may experience a nitrite spike as your filter is being conditioned until the Nitrobacter colony reaches sufficient size to deal with all the nitrite. If the nitrite level is elevated according to your test results, you should make a partial water change and add bacteria high in Nitrobacter, such as Aqua 5

Nitrate

is the end product of the nitrifying phase of the nitrogen cycle. It is much less toxic for koi than either ammonia or nitrite. It is however, a nitrogen compound that is the food and the fertilizer for algae. In nature, nitrate is absorbed by water

plants and is reduced into free nitrogen by anaerobic bacteria living in the bottom silt. Hydrogen sulfide and methane gas are given off as a by-product of the anaerobic filtration. An oxygenated, clean pond will not have any anaerobic bacteria present, so nitrate will accumulate in the pond. An algaecide is often used to control algae that would be attracted to the nitrate. Partial water changes of 1/10th per week will flush out the accumulating nitrate. If the nitrate level is over 20 mg/l, you should make water changes immediately or add Aqua 5 Dry, which contains bacteria that remove nitrate without producing hydrogen sulfide and methane gas.

pH

indicates the ratio of hydrogen ions to hydroxyl ions on a logarithmic scale from 0 (pure acid) to 14 (pure alkaline). Pure water is 7.0, meaning that there is an equal balance of hydrogen ions and hydroxyl ions. Most tap water in the southwest is between 7.4 and 7.6, which is perfect for koi, as they do best in water 7.2 to 8.0. Koi can actually tolerate a wide range of pH, from 6.5 to 9.0, but they cannot tolerate a rapid change - more than .2 per hour. (Note the logarithmic scale means that there are 10 times as many hydroxyl ions at 8.0 as at 7.0). As mentioned above, pH affects the free ammonia/ionized ammonia ratio, with a higher pH resulting in a greater concentration of the more toxic free ammonia. To make things more complicated, algae and other water plants can drastically change a pond's pH from night to day, due to a change in the amount of dissolved carbon dioxide present in the water. We're concerned about rapid pH shifts not only because of the ammonia ratio, but also because the fish are trying to keep their blood pH even during these shifts, thereby causing stress. Carbon dioxide mixes with water to form mild carbonic acid; therefore, more carbon dioxide means a lower pH, and less carbon dioxide means a higher pH. A bloom of algae will take up a lot of carbon dioxide during daylight for photosynthesis and emit a lot of carbon dioxide at night during respiration. Buffers such as bicarbonate ions help maintain the amount of carbon dioxide and therefore the pH remains even in the pond, but if there's too much algae for the available carbon dioxide, it will be obtained from the bicarbonate ions in the water, thus reducing the buffering agent and increasing the risk of rapid pH changes. Finally, even though koi can tolerate extremes of pH there are diseases directly caused by the stress. Acidosis is a reaction of fish to acidic conditions, in which they act highly agitated, with a lot of jumping. A rapid lowering of pH will cause quick death, while a slow lowering below tolerance levels will cause few behavioral changes until the inevitable death. In alkalosis, a reaction to conditions that are too alkaline, the gills and fins are destroyed; otherwise the symptoms are similar to acidosis. Continued high pH can be caused by improperly cured or sealed concrete ponds or mortar work. New concrete ponds should be sealed with penetrating water based or epoxy compounds, which not only provide a water seal, but also bond with the lime to eliminate pH problems. Cement based water seals don't do anything to control pH. For temporarily raising or lowering pH, you should use sodium bicarbonate or sodium monophosphate respectively. If fish are in the pond be sure to alter pH gradually - no more than a 0.2 change per hour. If an algae bloom is causing the pH shifts or extremes, you have to first determine if your filter is working properly, in which case it's safe to kill the algae (while monitoring dissolved oxygen levels). If an improperly operating filter is the cause of the algae bloom, you have to first ensure safe levels of ammonia and nitrite before it is safe to control the algae. Remember, go slow in fixing the problem that probably took a long time to develop. Finally, if algae are present, take an early morning and a late afternoon reading before taking corrective action.

Temperature

is often viewed by pond owners as a guide to feeding, more than as a health issue for koi. Temperature should be monitored for both daily and seasonal extremes. Temperature affects dissolved oxygen levels, respiration, metabolic rate, pH balance, free ammonia/ionized ammonia ratio and osmoregulation. Koi can tolerate a broad range of temperatures, from ponds that are iced over; to water up to 90F, better than they can tolerate sudden shifts in temperature. If you have a shallow pond (less than 2 feet) in full sun along with cool summer nights, the pond temperature may be changing by more than four degrees an hour, causing stress to the fish. Greater splashing of the water and shading may control the problem. If your pond is subject to stressful temperature changes, a 0.1% solution of sea salt containing calcium, potassium, sodium and trace elements will reduce the stress as it aids the koi's osmoregulation. As with pH, do not drastically alter a pond's temperature. Fish can tolerate a low to a high temperature change better than a high to low change.

Water Hardness

consists of two elements, permanent or general hardness and temporary or carbonate/bicarbonate hardness. Koi do better in hard water because of the relation of salt within their bodies to the dissolved salts in the pond. In soft water, the difference in salt concentrations means the koi have to work harder, through the process of osmoregulation, to prevent the salts within their bodies from diffusing out through their gill membranes. Harder water allows the koi to ease up on osmoregulation and therefore reduce stress. As mentioned above, bicarbonate ions buffer the water, reducing pH shifts, another cause of stress in koi. Koi do well in carbonate hardness of 150-300 mg/liter or 9-18 degrees dH. In most koi ponds the water is too soft due to the fact that there is no natural mud bottom that leaches minerals into the water. Marine salt and sodium bicarbonate increases hardness and will also cause pH to go up. A permanent salt solution of 0.1% is

beneficial to koi, and works out to eight pounds per 1,000 gallons. Check your pH if you add salt, and do not use table salt. Salt will not evaporate out and needs to be replaced only if water is drained from the pond.

Dissolved oxygen

is usually only a warm weather concern, as it is associated with water temperature and algae. However, the larger the fish, the greater the oxygen demand - low levels will stress and kill your biggest koi. Ponds that have been safe for many years become unsafe as your fish grow larger. The colder the water, the greater its capacity to hold dissolved oxygen. Algae takes up oxygen at night, and an algae bloom can cause suffocation in large fish and inhibit the oxidation process of nitrifying bacteria. Also, dying algae and decaying organic material takes up oxygen. Testing for dissolved oxygen allows you to determine if your pond has the maximum amount of oxygen for the temperature of the water. Splashing the water into small droplets with a fountain or waterfall is best for aeration, although venturi valves on underwater jets and air compressors also do a good job of oxygenation.

Chlorine and Chloramine

should be tested for if your water supply is from any source other than your own well. Chlorine will burn off by itself in a day or so, but chloramine must be broken down and removed chemically. Check with your local water agency to determine whether they add chlorine or chloramine. These chemicals damage the gills and liver and even in low concentrations can cause stress that ultimately leads to disease. Also, frequently overlooked is the fact that they are added to the water supply to kill bacteria. The beneficial, nitrifying bacteria in your biological filter can be killed off by chlorine and chloramine in concentrations that do no obvious damage to your fish. Good products on the market to eliminate chlorine and chloramine include Tetra Aquasafe, Kordon AmQuel and Aqua 5 chlora Gone.

Copper

should be tested for if water supplied to the pond is via copper pipes or if coins are thrown in the pond. Copper, in its toxic form will leach into soft water more readily than into hard water. It damages skin and gills and can cause sudden death that is very hard to trace. It also kills the nitrifying bacteria in your filter, which results in an ongoing algae problem. Copper is used in several pond treatments and should be monitored if you are using any such treatments. Concentrations above 0.015 mg/liter are dangerous to fish, and even lower levels can kill the beneficial bacteria in a biological filter.

In conclusion, testing gives you the information you need to ensure the best possible conditions for your fish, as well as the information needed to maintain water clarity. It only takes a few minutes a week, and is about the best investment of pond maintenance time you can make.

Kawarigoi Korner



Important Notice: Going forward the newsletter will be distributed via e-mail only, unless requested otherwise.

If you do not presently get the newsletter electronically, or if you wish to continue receiving it via snail mail, you must contact Brent VanKoevinger at 780-3980 or bvankoevinger@longrealty.com.

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For those that are interested in water lilies, you should open the below link to discover parts of the most complete water lily collection in the world, and it is located right here in Texas at San Angelo. Ken Landon has spent his life seeking water lily specimens from throughout the world and accumulating them in his collection, Ken also creates his own varieties by crossing various lilies in his laboratories.

The collection on display is just a small amount of his total collection, which is too numerous to display for the public. The display is located at the San Angelo, Texas city park and is free to the public. Lilies are displayed in a series of large concrete ponds at the park. This is worth seeing. I saw the display a few years ago and was completely impressed with the collection. You can visit the lily display anytime, it is not limited to any time of the year. It is probably most beautiful during late spring and summer when the lilies are in full bloom. If you can find your way to San Angelo, Texas, visit this display at the city park.

<http://www.internationalwaterlilycollection.com/>

If you have suggestions for the newsletter or items to be included in Karawagoi Corner or the Calendar, Please contact Brent VanKoevinger at 520.780.3980 or bvankoevinger@longrealty.com.

Upcoming SAKA Education and Business Meetings

Date	Location
April 25, 2010	Host: Dave and Debby Young
May 23, 2010	Host: Kevin Black
June 27, 2010	Host: Karen Wilson
July 25, 2010	Host: Mountain View Koi
August 22, 2010	Host: Rick Schuck
September 26, 2010	Host: Bob and Darleen Panter
October 24, 2010	Host: Open
November	No Meeting See you at the Show
December	Host: Open

Shows, Pond Tours and Seminars

Event	Dates/Location/Links
Japanese Speech Contest	April 24, 2010 Noon-5PM Pima Community College, Northwest Campus 7600 N Shannon, Tucson, Arizona http://www.saaje.org/page4contest.html
Annual SAKA Pond Tour	May 1st & 2nd 9-5 each day http://www.sakoia.org/

**Tucson Water Gardeners
Annual Plant Sale**

from 8am to 1 pm
SW corner of Reid Park at 22 St.



**31st Annual SAKA, Inc.
Koi Show and Auction**

TBD



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<http://www.sakoi.org>
 Annual Membership

Dues are \$30.00 per family from March 1 to February 28 or 29 of the next year.

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E-mail _____

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of Koi _____

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Would you like to host a meeting?

Would you like to serve on a committee?

_____ If yes which one?

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