THE MUD FOND NITH



STORY AND PHOTOS BY **MIKE SNADEN**





The last issue of KOI Nations was very much focussed on "water" – I hope it will inspire people to strive to get more out of their hobby. For many years, people have generally been of the opinion that the best way of raising high-class Koi, was to leave them with the breeder. I think this can often be the worst option. Sure, if you can't raise Koi in a similar manner to the better breeders, then leaving them in Japan may be the best option. But, in reality, the mud pond is a very volatile environment that carries immense risk. I don't mean risk of death, but risk of all sorts... Risk of physical damage, risk of colour damage, risk of lack of growth, or just risk of not doing quite as well as you had hoped.

The mud pond can be a wonderful environment, but only in the best case scenarios. If you read the mud pond water article in the last issue, you are probably now in a spin asking yourself how you can possibly achieve the same conditions as the mud pond. The truth is; you don't have to! You see, although the mud pond may produce what you might consider the optimal results, the harsh reality is that the "usuable" part of the summer, is actually only about half of the duration that the Koi spend in the mud pond.

When are Koi put into mud ponds?

Most breeders put their Koi into the mud ponds around late April or early May (depending on age), and then harvest them in October or November (also depending on age). The older Koi are generally put out earlier, and harvested later, whereas Tosai are put out later, and harvested as Nisai a little earlier. Once the Koi are harvested in autumn, the majority of breeders will keep the Koi indoors at around 12°C, and not feed any food at all until the Koi are sent back out to the mud ponds in the following spring. As you can

Early August usually sees the start of the heavy feeding and growth period, provided of course, that the temperatures don't go too high. Temperatures of up to 27-28°C are fine, but above this, the metabolic rate of growth exceeds the Koi's desire to eat, so the Koi often become too long and thin. If the temperatures rise more than 30°C, feeding is reduced, as the lower dissolved oxygen levels result in a decline in appetite. Above 32°C, and feeding is usually suspended altogether. Young fry can tolerate higher temperatures more easily, hence the shallow fry ponds that soak up the heat. But, the larger Koi have much higher oxygen demands, and comparatively slower oxygen take up rate. Whilst these higher August temperatures may sound great, they also often lead to new-water sources drying up, and if this happens, breeders become very nervous of water becoming bad, so reduce feeding. September is usually a little cooler, with temperatures dropping off to around 22-23°C by the end of the month.

Not all plain sailing...

As you can see from the above, keeping mud ponds running well during the summer is a far from simple task. Of the five or six months that the Koi reside in these ponds, it is actually the case that only three months or so of summer are actually well utilised. But, temperatures are only one aspect of the mud pond. Given the rainy season, and frequent drought conditions, the water itself is often far from ideal, with either a pH that falls dangerously low, or pH that can sometimes climb too high, resulting in colour damage, and discoloured skin. A mud pond may perform wonderfully one year, but it may well have terrible results the next year. C'est la vie!

Soft water and a more neutral pH of 7.0-7.3 is generally

"One of the most important things of all however, is to obtain Koi with the right genetics and qualities to justify the effort."

see, essentially the Koi are being fed/grown for five or six months during summer... well, in theory at least.

You would be forgiven for thinking that once the Koi are put out into the mud pond, it's just simply a matter of filling up the auto-feeders, and watching them grow for the next five or six months. However, the reality is a far cry from this. Summer in the mud pond usually begins around mid-May, with temperatures starting to hit 23-24°C. In July, comes the rainy season, which generally lasts around two weeks or so. During this time, the Koi receive very little food, as the breeders greatly fear excessive acid rain during this period crashing the pH of the mud pond, and also worry about dissolved oxygen levels running too low. Once the rainy season is clear, the "real" summer begins.

much better for keeping Koi, as this is the environment that they have become genetically adapted to over their many generations of breeding in Japan. But, given the trials and tribulations of the mud pond, the reality is that we don't really need to match the levels of the best performing mud ponds, and the reason for this, is the consistency with which we can run our filtered ponds.

The first thing we must bear in mind when comparing our own filtered ponds to mud ponds, is the "stability factor". This counts for a great deal, and in practise means that we don't have to push things to the limit. I think the phrase, "slow and steady wins the race" pretty much sums things up here. A mud pond will probably achieve its wondrous results with an actual three months of "useable" sum-



I sold this Koi to a customer when she was Nisai. He then grew her to Gosai (five years old) at 81cm. As you can see, she is in pristine condition, and will easily grow to 86cm this coming summer, and hopefully 90cm next summer. This has been achieved by paying wonderful attention to good and soft water quality. Even if she was grown in a breeder's mud pond it would be quite unlikely for her to have done as well as this, as the breeder has far less control over the pond's environment.



mer, whereas in our concrete ponds, we have a full five or six month's timeframe in which to achieve the same results. This makes things comparatively easy, and as such, we don't really need to strive so hard to get "magic water". Instead, we can err on the side of caution and still achieve as good a result. But, it's better than that, because we can watch the Koi every day and control things day by day and hence ensure a good result every year, rather than the mud pond's apparent pot luck.

So, let's tackle each of the mud ponds summer scenarios one by one, so that it makes more sense...

Temperature in the mud pond

As you can see from the photo of the rear of the mud pond auto feeder... the mud pond temperatures are all over the place during summer. In our own heated environment, we don't need a great deal of heat. My opinion is that a temperature of 23°C from May through to October will easily match the mud pond, provided that the water chemistry is good. We don't need highs of 28°C at all, as these temperatures in a filtered pond often have a negative effect against the colour Teri and shine. 23°C is a very forgiving temperature - it is easy to raise a Koi reasonably quickly, whilst keeping the colour in optimum condition. If you are really confident in your water quality, and temperature/light balance, then you can push the temperature to 24°C, but there really is no need to go any higher. The latter part of August, and into September are the best months of summer, as the Koi will generally dispose of their eggs during this period, and hence, will then eat greatly. If you have ever wondered why the skin of some of your female Koi has turned a little yellow during August... the reason is egg disposal. Once this process has taken place, the skin will brighten up to its former glory, and the Koi will start to consume masses of food. Make the most of this period with increased feeding.

The importance of light and temperature

One of the most important aspects of raising Koi with optimum colour condition is the relationship between light and temperature. A koi needs light in order for its colour to look beautiful. Too little light will lead to the colour becoming too pale and uneven. Too much light will lead to the colour becoming too red, and



eventually breaking up. It is important to find the right balance between keeping the colour attractive and keeping it soft and glossy to ensure that it lasts well so that the Koi becomes a beautiful Jumbo Koi. Too much light will finish the Koi too early, and you will find yourself moving it to a "good home" long before it has become anywhere near Jumbo. If your pond catches a lot of direct sun, try to shade it a little from afternoon sun. Morning sun comes with lower ambient temperatures, and is safer for the Koi. Afternoon sun tends to elevate water temperatures very easily, and is more intense.

The effects of pH and kH

As proved in the last issue of KOI Nations, mud pond water isn't just soft, it's incredibly soft! To run such water hardness levels in a filtered pond is virtually impossible, and this is primarily because of pond and filter loadings. The biological loading can actually be used to our advantage to some degree. I'm sure that some readers will have noticed that if your pond receives little food, the pH tends to run at slightly elevated levels. This is because of lower levels of acid by-products that are created due to the lighter feeding. Heavy feeding produces more acid by-products, and hence, a lower pH. We can play on this a little if we try not to load a pond too lightly.

KH levels have a sliding scale effect on pH levels. Ultimately, if a pond has an infinitely high KH level, this will naturally (assuming no algal blooms) run at a ph of 8.4. A low KH level will allow the pH to run at much lower levels. Typically, a reasonably well-stocked and fed pond with a KH of 2 ~ 3dH will run at a pH of somewhere between 7.2 order to be able to run a pH of somewhere between 7.2 and 7.5, the results will prove very rewarding. Please note though, that although a well-loaded pond can help you run more stable pH levels, if you overstock the pond, the colour condition of your Koi will suffer as a result. Don't overdo it!

Total dissolved solids

Conductivity or total dissolved solids (TDS) is another parameter that can't generally be run as low in a filtered pond, as it does in the mud pond. The reason for this is the necessity to run a safe KH level. It stands to reason, that a mud pond with a TDS of say 30ppm can't contain any significant level of ions of any kind, let alone significant levels of KH ions. That said, I think that if your pond runs a TDS of 100ppm, or less than 150ppm, then provided your pH isn't too high, you can expect pretty good results. It must be born in mind though, that the differential between your new water, and your pond water should be maintained as low as possible. Just because your new water comes in at a TDS of 100ppm, doesn't necessarily mean that the water in the pond will be equally good. A pond TDS of 300 (hence differential of 200) is terrible. But, a pond TDS of 130 (differential of 30ppm) is pretty good going. The differential is an indication of the amount of waste byproducts in the water. These waste by-products include the hormones that are said to restrict growth.

GH levels in a mud pond

GH... looking back at the last issue, you can see that mud pond GH levels are negligible. Over here in the UK, many people have run very low levels of GH, with no ill effects.

"In reality, the mud pond is a very volatile environment that carries immense risk."

and 7.5. But, if you removed the Koi from the pond, the pH would rise from this level, and on a sunny day can rise very high, very easily. If you maintain a healthy stocking level, and feed the Koi well, you will find that a pond with lower KH levels of say 2 ~ 3dH will have less of a pH swing, and this is because the acids being produced by the Koi and filters are being produced prolifically enough to keep the pH from rising. Imagine it as say 100 KH ions being present in I cubic meter of water. If the acid ions are plentiful, these 100 ions will become exhausted at a given rate. But, if the same volume of water contained 1000 KH ions, then that's 10 times as many ions, and as such can neutralise acid ions a lot quicker. So, running a lower KH will enable you to run a lower pH, but if doing so, you need to make certain that this lower KH level is maintained very consistently from day to day. If you don't maintain the levels, they will become slowly depleted, until the point that a pH crash occurs.

If you are careful, and manipulate your KH levels in

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In Japan, the top Koi experts (Miyazaki, Takigawa et al) recommend keeping GH levels below 500 pm. In a pond with a high TDS differential, you will also find that the GH level in the pond will be higher than that of the new water, and this is because the Koi food contains more than enough calcium and magnesium, with the excess waste becoming dissolved into the water and hence elevating the GH level.

Clays... should they be added?

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I have never managed to figure out why some people insist on using clay additives. In the event of a pond with poor or incomplete filtration, there is some logic to using clays, as they have high quantities of zeolite present, which will mop up impurities in the water. But, if you are using clays, you must be certain to run a continuous influx of good new water in order to keep TDS and GH levels down, as otherwise, GH in particular will increase in time from the use of the clay. The long and short of it... if you have good filtration, avoid using clays. If you have prehistoric pond,



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As beautiful and serene as it may look; the mud pond is very much in the hands of Mother Nature. When the mud pond water is good, it's very good! But, when nature dictates, it can also become a very dangerous environment. Once the Koi are put in here, it is very difficult to see how they are doing. Of the five or six months that the Koi will reside here, only about half of that period is working the way we think it should be.

LEFT: Breeders keep careful track of water temperature and condition, and vary the feeding accordingly. If you look closely, you can the water temperature and feed operation duration (in seconds) each time they are altered according to temperature, etc. As you can see, the amount of food fed during the summer season varies immensely!

RIGHT: As you will have read in the last issue, mud pond TDS levels are very low, and as such, are very much devoid of minerals. In reality however, we don't have to match such incredibly low levels, as we can make much better use of six months of summer than a mud pond can, due to the degree of stability we can run at.





have grown at Yume Koi

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This Kohaku is one that we from 26cm as Nisai, to now stocked. Not only has the also remains a very good



This Koi arrived in the UK at 56cm as Nisai. She is now 81cm! Though this sounds impressive, this isn't nearly as much as an achievement as growing a Go-Sanke at the same rate... But nonetheless, to grow a Go-Sanke at this rate is very much possible, if you get your pond and water right

with a very slow turnover, and small filter, then perhaps clays may benefit you a little, provided you keep the GH levels diluted by adding good new water.

Reverse Osmosis...

This is a wonderful method of diluting mains water hardness levels in order to make a blend of good soft water. I have written about this for many years now, and given the length of this particular subject, please either get yourself the relevant back issues of KOI Nations, or download the articles from the Yume Koi website. If you have hard water which prohibits you from running water parameters that are described in this article, then RO could very well be the best route for you to go.

ORP levels in mud ponds

ORP is a subject that is forever being debated. I have long been of the belief that ORP levels in mud ponds run very low, and this is where part of the magic lies. If you read the last article on mud pond water, you will see that it transpired that ORP levels are incredibly low - my belief is that the anti-oxidant nature of the negative-ORP mud is what keeps the ORP low by fighting against the high ORP of the new water. Of course, ORP levels are indicative of the cleanliness of the system, but I think that it is better to chase TDS differentials, and let the ORP be what it will be. Deliberately elevated ORP levels, I think, is the reason why so many Koi in hobbyists ponds have Beni that becomes too hard and thin. This is all just my theory though... there is no proof... yet!

Can you have too much oxygen?

For some reason, many people feel that they are doing their Koi great favours by adding heavy aeration to the pond thinking it is absolutely necessary in order to reach the maximum saturation level, when in reality, perhaps half of the amount of aeration will still keep the O2 levels at saturation point. This can lead to detrimental effects on the Koi. To understand this, we need to consider the fact that we tend to look at oxygen levels solely as in mg/l. If we look at this as a hypothetical situation, and have a desire to achieve 10mg/l of O2, it actually has little meaning, as at a water temperature of say 23°C, this would be unachievable unless the water was supersaturated, and hence, dangerous. At 10°C however, the saturation point would be about 12mg/l. It is far more beneficial to look at O₂ levels as a percentage of saturation, as it is easier to run the system at its optimum performance, and maximum safety. Excessive amounts of aeration in a Koi pond is very seldom an issue, but there seems to be some circumstantial evidence now in customer's ponds, where deeper ponds with excessive aeration often fall prey to problems such as swimbladder failure, or signs of what appears to be early signs of gas bubble disease. If you have a pond of more than 6ft (1.8m) deep that is heavily aerated, you may have experienced such problems as the Koi looking as though they have a very thick (almost skinlike) layer of mucous on their heads, and fins that look

stressed. If this is the case, check your oxygen levels, and try reducing the aeration levels. If you find that the mucous clears after a week or two, you have found the cause of the problem!

It is fair to say, that maximised O2 levels make the Koi much more active, and hungrier. This is also another reason for not heating the pond to too high a temperature. Above 25°C, the O2 level starts dropping below 8mg/l, which although the metabolic growth rate of the Koi is higher, the lower oxygen levels dictate that the Koi doesn't have enough energy or appetite to consume enough food in order to maintain a good body shape whilst growing. Small fry however, can take up oxygen more easily than larger Koi, and this is one of the reasons that fry ponds in Japan are shallower, hence soaking up more sun, and running at higher temperatures. Nisai and older Koi however, will eat far less as the temperatures start exceeding 30°C, and at temperatures of over 32°C, breeders will usually stop feeding altogether... another reason why we can actually outperform mud ponds if we can make a good environment of our own ponds. My own thoughts on aeration are that if we strive to achieve a little less than 100% saturation, then there is very little risk of becoming oversaturated at any point in time. I personally run my own ponds between 90-95%, as I feel that this is safe, and with any luck, the Koi will last longer when they find their way to new owners' ponds.

Winter pond temperatures

Many people seem to insist on running elevated temperatures during the winter months, so that they can keep feeding the Koi. In reality however, this is often pretty pointless, as unless you heat to 18°C or more, the Koi won't grow anyway. If you heat more than this, then you won't have enough ambient light to maintain the colour. Winter should really be utilised as a period to get the Koi into peak condition. This is the reason that most breeders tend to overwinter Koi at around 12°C. At this temperature, the colour will become very beautiful, and Sumi will develop a good shine, whilst the Koi's metabolic rate becomes very low, so there is no need to feed the Koi, as they won't lose much weight during the winter months anyway. Also, Koi that have been wintered tend to eat more heavily during the summer months anyway, so tend to very quickly put their weight back on, and grow faster. Tosai are something of a different matter however, as pushing them on through the winter builds their frames up more, creating good foundations for future development.

To summarise this article... this isn't rocket science. Raising Koi to become wonderful Jumbo Koi is actually surprisingly easy. Adopting the methods stated above is much easier than it seems. One of the most important things of all however, is to obtain Koi with the right genetics and qualities to justify the effort. If you can't afford such Koi, try to compromise on pattern rather than the quality. And remember, you can't make a silk purse out of a sow's ear!

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This Sanke arrived in the UK at 56cm when Nisai. She is now 79cm as Yonsai thanks to her owner's keeping skills. This has been achieved with "summer-only" growing.

