

reversing a trend

In this final part of the gH series, Mike Snaden extols the virtues of reverse osmosis.

This is the third part in the series that focuses on water for growing koi, and the aim of this is to explain how I have managed to create my own soft water. This can be a costly exercise, but one that I feel to be well worth pursuing.

Please note that Reverse Osmosis water contains no minerals, and hence is very unstable. It is dangerous to use R/O water without mixing it with mains water.

water wastage

A R/O plant is a unit containing a semi-permeable membrane, which effectively rejects minerals and metals, leaving distilled (virtually pure H₂O) water as the end product. The rejected minerals are disposed of as 'effluent' through a waste pipe. I consider my R/O plant to be an invaluable asset nowadays, but in their usual guise, they are very

environmentally unfriendly, simply because of the quantities of water wasted. This is where mine differs greatly, as I will explain.

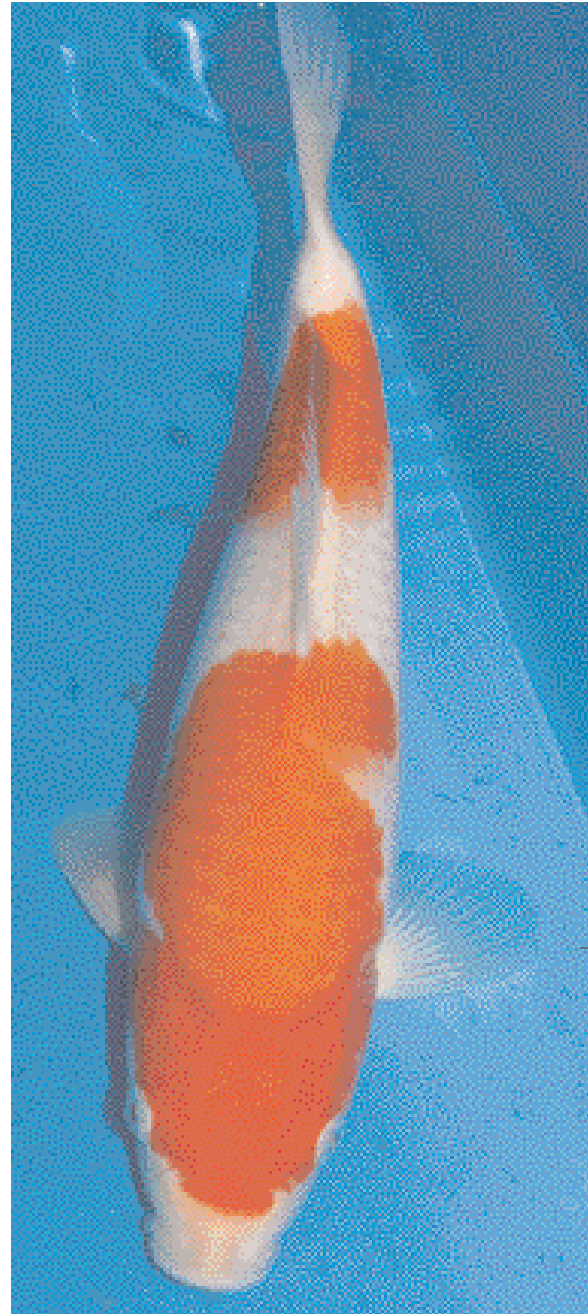
re-cycled water

Conventional R/O plants waste about 85% of the water that is put into them, and hence only give about 15% of good water. There are three problems with this. Firstly, it isn't feasible to obtain a large quantity of good water. Secondly, they waste large amounts of water, which is simply put down the drain. Finally, even in the event of an R/O plant being able to produce a reasonable amount of good water, it will require so much import water,

I consider hard water to be the 'bottleneck' of koi growth, or limiting factor

that most domestic water supplies simply won't supply water fast enough.

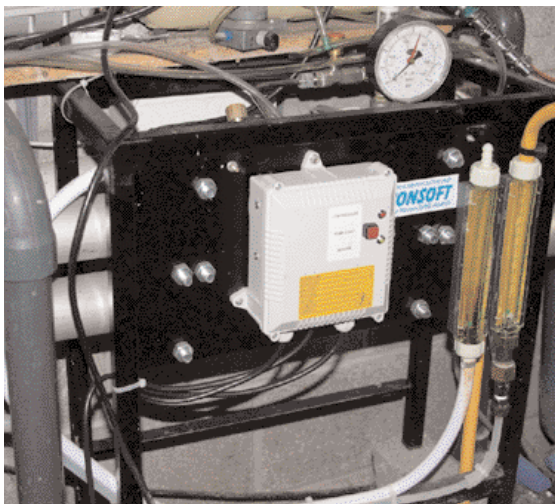
This is to my mind unacceptable ecologically, and not cost effective. So, after months of research, and negotiating with a local water softener supplier, we managed to come up with a solution in the form of a unique plant that actually recycled its wastewater by passing it through a second membrane, and then by also re-circulating a proportion of it all over again.



This Kohaku measured 33cm in May at the time of taking this pic. It is now 41.5cm, as of July 11th

high running costs

The result is an R/O plant that gives 70% good water, with only 30% rejected - far more environmentally friendly! The only downside is the booster pump, which consumes around 750W of electricity. Despite such running costs, I feel that this is all more than justified, even given the original £2,500 outlay for the plant, and softener. This plant is intended to give 600 gallons per day, but in reality, gives 800 gallons. When mixed with my desired quantity of mains water, a total of about 1,100 gallons of water is available if needed. ►



Standard R/O plants waste about 85% of the water put into them

Soft water is one of the contributing factors in this Kohaku growing to 79cm at just four years of age at Momotaro Koi Farm



cheaper alternative

Don't despair however, as there is now a cheaper way, in the form of the Kent RO650 plant. This unit is designed to give 650US gallons per day. In reality (given varied mains water pressures, and temperatures), this unit would probably give somewhere in the region of 300 to 400UK gallons per day, but for a mere £1,000. The downside of this unit is it's waste water level, which is relatively low by single membrane

In my mind, it is possible to win Baby Champion, Young Champion, Adult Champion, and perhaps even Grand Champion with the same koi over a number of years!

standards, but still much higher than mine. On the positive side, this unit doesn't need feeding with softened water, and doesn't use a pump, hence no high running costs.

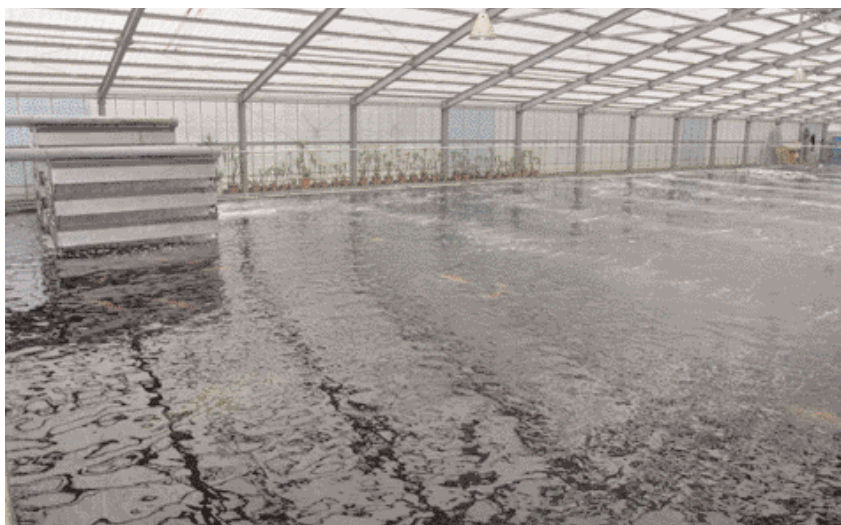
growth spurt

Let's take a look at my 4,400gallon pond, and the results I have had with it up until the end of May 2003. Water TDS is approx 100ppm, KH is just over 2dH, temperature is 23.7°C. In late December 2002, 110 koi arrived at sizes of 15cm to 27cm. They are fed six times daily with an auto feeder, and bottom drains are flushed daily. The koi of 15cm averaged a growth to 25cm, and the koi of 26 to 27cm, generally grew to around 40cm.

I am very happy with the growth rates of the above koi, but the only downside of running such soft water



is that one or two koi have developed secondary hi. Since April this year and the addition of showered filtration, the koi have generally grown at a rate of one centimetre per week.



Everyone dreams of growing koi like they do in Japan, yet for some reason, people resign themselves to thinking that such growth can never be achieved in the UK. Make your dreams become reality!

Soft water isn't the answer to everything, so here is a brief summary of factors that I feel play an important role (in addition to basic koi keeping practice) in growing koi to Jumbo sizes, with optimum improvement in beauty.

Temperature

Soft water with as low as possible TDS levels
Many small feeds as opposed to a few big feeds
Koi from big parent stock and with good history of growth
Plenty of aeration, and high oxygen levels,
Low nitrates
Good water circulation to keep the koi active
Good pond depth



Despite very heavy stocking, Ian's 6,500 gallon pond in Bristol is running a TDS level of just 80ppm. The growth rates are staggering, and this is without any weakening of the colour quality.

convincing argument

I have a customer who came here a month ago and announced that last summer he had bought an R/O plant. The interesting thing is, he has two ponds. Both are heated and maintained in the same manner. The ponds have been run in the same way with the exception of one factor - the R/O plant has been used on only one of the ponds. When he came here, here said that he had noticed the following:-

- i) The koi in the R/O pond became more energetic.
- ii) They started to grow noticeably after about a month.

He also said that he has now been running the system for about eight months, and the koi in the R/O pond have grown significantly, whereas the koi in the other pond do not appear to have grown at all. His final verdict was: "I am absolutely convinced!"

Since April this year and the addition of showered filtration, the koi have generally grown at a rate of one centimetre per week

I consider most of the above factors to have an effect a bit like credit scoring. Each will give a percentage of the maximum benefit in relation to growth and development. But, with hard water, each of the others listed above will have a much lower effect. I consider hard water to be the 'bottleneck' of koi growth, or limiting factor.

case study

Ian Graham of Bristol, has a Bakki Showered pond, and now runs the same kind of R/O as I do. His pond is 6,500 gallons, and runs a TDS of 80ppm, and KH of just over 2dH. The pH runs at just over 7.4, with a temperature of between 24 and 25°C.

Ian's pond is extremely heavily stocked, and yet despite this, he is obtaining incredible growth rates. It has been just seven weeks since Ian added four new tosai to his pond. In these seven weeks, his Momotaro Kohaku has grown from 33 to 41.5cm, his Momotaro Showa (arrived here in December 2002 at 18cm), has grown from 26cm to 37cm, and his two Takeda Sanke have grown from 29 and 31cm, to 37 and 40cm respectively. That's a growth rate of over one centimetre per week, whilst retaining superb colour quality!

Ian found the whole R/O idea extremely daunting at first, but now says: "It's much easier than I thought

it would be." I must also add, that these koi have grown at this incredible rate without becoming a single ounce overweight!

low TDS means leaner koi

One interesting observation I have made with this whole 'water hardness' practice, is that in two identical ponds, run in exactly the same manner, except for different TDS readings, in a pond with high TDS readings, the koi become obese very quickly, whereas koi in a low TDS pond grow much faster, without becoming obese. It is also interesting to note that if you place an 'overweight' koi that has been kept in a high TDS pond, into a low TDS pond, it will very quickly shed some weight, and stretch out in length. Hence, by carefully controlling the water in your pond, you can control every aspect of your koi's growth, body shape, and colour development. This basically means that with an R/O plant, you can condition your koi for a show, and once the show is out of the way, you can then lower your TDS ►

I purchased this Kohaku in November 2002, and it arrived in December at 27cm. By the end of April, I had grown it to 39cm (at the time of photo) for the customer that bought it. This Koi was actually sold at 31cm for £350. It is fair to say that now that it is over 40cm, it has become a 'cheap' koi. But, had it not grown, it would have remained relatively 'expensive'

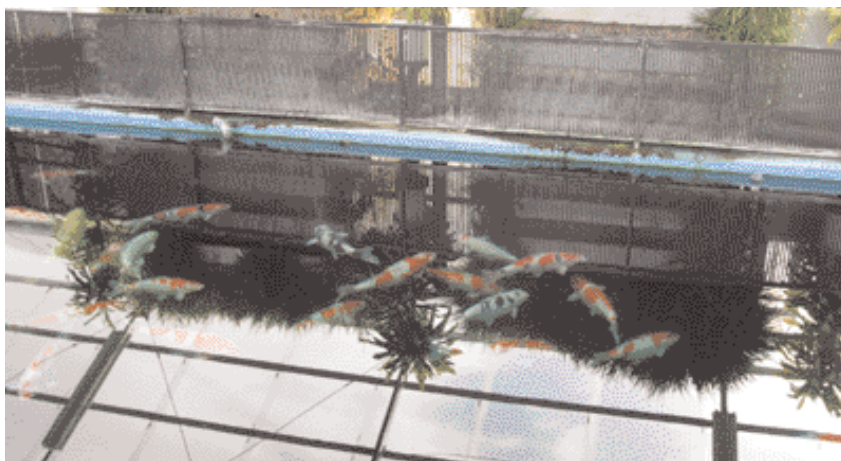
and grow your koi bigger and then compete with the same koi, but in the larger size groups next year! In my mind, it is possible to win Baby Champion, Young Champion, Adult Champion, and perhaps even Grand Champion with the same koi over a number of years! Wouldn't that be a wonderful achievement?

growth potential

You may wonder why I feel so strongly about the subject of soft water, but my reasons are simple. People in England generally accept that they can't grow koi like they do in Japan. Some people even go as far as saying that they don't care whether they can grow big koi or not. But, if you knew you were capable of growing koi beyond 80cm, would you try? One of my customers visited Momotaro Koi Farm with me in April, and bought an expensive Jumbo tosai Sanke. Mr Maeda said to him: "If you leave this koi here, and grow it big, it will become a cheap koi. But, if you take it home and don't succeed in growing it, then it will be an expensive koi!" I must agree, in that it is pointless buying expensive koi with huge potential for size, if you don't try to make the koi achieve its potential.

the future's big

Let's look back to Colin's pond in Swansea, which contains 7,500 gallons (mentioned in the April 2003 article). Colin is running his pond on



Japanese hobbyist, Mr Mori, can grow Tosai in his own ponds, to over 70cm by the time they are three years old

the 'low TDS theory', and adds absolutely no form of water additives, or clays. Lasts year's Tosai are now up to 55cm. All of his koi are growing alarmingly fast, and he has achieved his own personal goal in growing a koi to over 70cm. This koi was bought at three years old at 50cm, and is a male Wakabayashi Kohaku. It is now five years old. I am absolutely confident that Colin will easily grow some of last year's tosai to over 80cm within the next three years. But, he is now facing stiff competition from this side of the border! 鯉