<u>DISCLAIMER:</u> Below are things I ran across while researching before building my new pond. I take no credit for the ideas, nor any of the responsibility. But maybe there is something here that you are looking for or will help you.

<u>Barley Straw</u>

In still waters such as lakes, ponds and reservoirs, the minimum quantity of straw needed to control algae is about 10g straw m-2 of water surface. However, when a water body with a history of severe algal problems is first treated, a higher dose is preferable (25 g m-2) and quantities up to 100 g m-2 have been used. Once the algal problem has been controlled, and further additions of straw are being made to prevent a recurrence of the problem, the dose can be reduced. In small garden ponds where only a few grams of straw are needed, the straw can be put into a net bag, nylon stocking or simply tied into a bundle with string. This can be attached to an anchor made of a stone or brick and dropped into the pond. However, as the straw becomes waterlogged, the net will gradually sink to the bottom. In this position, it will not work as effectively as it does near the surface and it is advisable to include some form of float in the net. Floats can be made of corks, polystyrene or small plastic bottles with well-fitting screw tops. Once the straw has rotted, the net, complete with float and anchor can be removed and used again. In small ponds where only a single net of straw is required, this should be placed in the center of the pond. However, if there is an incoming flow of water, either as a stream or fountain, the straw net should be placed where there is a continuous flow of water over and through the straw. This will help to keep the straw oxygenated and spread the chemical throughout the pond.

Method for estimating amount of straw required.

1. Estimate the surface area of the lake 1.5ha (15,000 m2)
2. Decide on the dose rate of straw required. This will range from 1 lb per 500 sq feet in a clear lake with little algae or mud to 5 lb per 500 sq feet in a heavily infested lake with muddy water 2.5 lb per 500 sq feet
3. To obtain the number of bales to be purchased, divide the total weight of straw by the weight of bales (small rectangular bales normally weigh about 20kg).
4. Decide on the weight of straw to be placed in each net. (Bear in mind that the smaller the quantity in each net, the more nets there are and so the better the distribution of the chemical. Nets should normally contain between 1kg (in small lakes) to 40kg (in very large lakes).
5. Calculate the number of nets, which will have to be constructed.
6. Decide on the most appropriate placement of the nets of straw in the lake so that each one is approximately 35m from its neighbor.

WHEN TO APPLY STRAW

Although straw can be applied at any time of year, it is much more effective if applied before algal growth takes place. This is because the anti-algal agents released by the straw are more effective in preventing algal growth than in killing algae already present. Therefore, straw is best applied in the autumn, winter or very early spring when the water temperature is low. The straw will usually become active within one month and will continue to inhibit algal

growth for about 6 months. However, rapid algal growth can take place once the straw has rotted away and so further applications should be made each 6 months.

1. Straw should be supported by floats so that it does not sink to more than one meter below the surface, even when waterlogged.
2. If the straw starts to smell then it is not working and should be removed. This is caused by too much straw in too little water.

CONTROLLING ALGAE

If you have tested your pond water for Nitrates and find them low or zero and your pond plants are growing very slowly or yellowish instead of green, then try using Potassium Nitrate (K2NH4) instead of Potassium Chloride or Potassium Sulphate. This will add both potassium and nitrogen to the water. Algae will thrive if there is any available phosphorus in the water but the nitrogen and potassium levels are low. Higher plants will grow better and use up the available phosphorus much more efficiently when there are sufficient amounts of nitrogen and potassium available. Once the higher plants use up all the available phosphorus, the algae can no longer grow. As long as there are small amounts of both nitrogen and potassium in the pond water, the higher plants will stay green and healthy and continue to use up any available phosphorus. It is the phosphorus in the water that allows the green algae bloom. To add both potassium and nitrogen as nitrate to my pond, I use a granulated tree stump remover, which is almost 100% potassium nitrate with a little talc to keep the granules from sticking together. I use 1 tablespoon of granules per 1000 gallons of water. Caution; do not add the granules directly to the pond or the fish may try to eat them. I pre-mix 1 tablespoon of granules with one gallon of warm water since potassium nitrate dissolves slowly in cool water. I then use a paper towel to strain out the talc, which will not dissolve. Pour the solution from one container to another through the paper towel to remove the talc. Talc is a harmless rock powder but looks bad in a pond because it is white.

I use Hydrogen Peroxide to control string algae, I use 1 pint per 1000 gallons, and I think that is the common standard. I use it only once or twice a season.

A very cheap potash solution can be made from muriate of potash (potassium chloride - KCl), which is available at any garden supply. Add 50 grams of muriate of potash to 500 ml of water to create a 6% potash solution at a cost of about ten cents. During the winter continue to add your potash solution once a month or so as long as your pond isn't frozen over. During the winter you will probably have some filament type of algae grow on the sides of the pond as the various nutrient processes continue at reduced pace. The filament algae will tie up phosphorous at least temporarily (until the fish eat it) but that will suffice since fish do not excrete much phosphorous in the winter. In the spring get the hyacinths in the pond as early as frost allows and boost the potash again at that time.

Filamentous algae [string algae, blanket weed, silkweed are all common names] and can be removed with a bottlebrush or a toilet brush, just twist the brush around as you pull it over the algae.

Algae Bloom

* Do not use any of the algaecides that are available commercially. Most of them severely decrease the oxygen level in the pond and that will kill the fish.

- If you must get rid of your green water use a mechanical filter. I use a large black pot that a plant has come in--10" or bigger. I put 2 inches of foam rubber in the bottom of the pot and suspend it over the surface of the water. I usually use a lawn chair or upturned 5-gallon bucket. Next I run a hose from the pump over the top of the pot so the water runs through the foam rubber. I hold it down with a brick. This makeshift filter looks awful and must be cleaned every 2 hours or so, but it will clear up your pond in a day or two.

My Pond Has Turned to Green Pea Soup

Excess fertilizer will turn the pond green. Stagger your fertilization schedule if necessary. Change 25% of your water weekly until pond clears.

FOOD

■ A good food to re-start on would be Cheerios or Wheat Germ based diets.

■ Feed sparingly and be sure to notice the weather forecast. A good diet for the year would be the Misty Mountain Diet.

■ We also give them things like watermelon, orange slices, and duckweed every few days

■ Broccoli and asparagus brightens yellow and orange. Citrus seems to enhance the scale patterns, but I have not enough proof for that.

■ Salt water Krill seems to enhance all of them.

■ An excellent diet to end the year with, or even better; to begin the year with, would be the medicated feeds containing either Romet (ormetoprim Sulfa) or Terramycin (Oxytetracycline) or even the proprietary foods from some retailers containing Oxolinic Acid. Starting and ending the season with these feeds has the benefit of ensuring that the fish neither sleep, nor emerge from sleep with bacterial infections.

■ In wintertime, the best time to stop feeding is when temperatures in the water drop below fifty five.

■ They are particularly fond of crushed Cheerios and previously frozen (thawed) peas.

■ In cooler temperatures, when water temperatures are between 42 degrees F and 70 degrees F, fish require a high carbohydrate/reduced protein diet. In warmer waters, above 65 degrees F, protein metabolism is very high. Therefore, your fish require a highly digestible, high protein diet. Proteins are required for tissue formation. This means that fish require the proper amount

of proteins and carbohydrates along with fats, minerals, nutrients and vitamins.

GENERAL

FIGURING POND SIZE

You need to have the surface area of your pond to figure out how many plants you need. Ponds can be really oddball shapes but the best way is to break the shape down to some basic geometric shapes.
Rectangle or Square: Length x Width
Circular: 1/2 diameter x 1/2 diameter x 3.14
Oval: 1/2 length x 1/2 width x 3.14

AMOUNT OF FISH

1 to 2 inches of fish for every 5 gallons of water is sufficient.

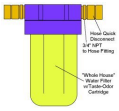
INSTALLING A LINER

Completely unfold the pond liner on the lawn. Caution; do not leave the liner on the lawn more than a few minutes, especially on a hot day, otherwise the grass could be killed. Fold the liner equally from the outside in from all four sides. Carry the liner into the center of the hole and start unfolding outwards. Make sure the liner is centered in the hole so when completely unfolded all edges extend around the rim.
Place stones on the liner perimeter to position liner. As the pond fills with water remove the stones so the liner settles into place. The rising water will help minimize creases. While the pond is filling take the smaller folds and wrinkles and pull together as pleats. Now the pond can be planted. Planting areas for marginal plants can be built into shelves. Line the planting areas with fabric underliner to help hold soil. As the water filled we carefully smoothed and folded the liner, to create flat shelves for our plants.

FILLING THE POND

First, we used a stopwatch and timed how long it took to fill a 1-gallon bottle with water. Then we put the hose in the hole and began timing. When filled, we could divide how long it took to fill the gallon bottle by how long it took to fill the pond and this would equal the total gallons in our pond. This figure is extremely important when stocking or treating your pond. As soon as I had a few inches of water in the pond, I tested the pump and plumbing system.

PLANT SHELVES
Use concrete blocks that have been thoroughly painted with cheap latex enamel paint and a couple of 2x6 boards to add shelves. And you can get real cheap paint by buying the returns at the paint store. The color doesn't matter, as they will all be a uniform green after a few months. But you might talk them into adding a squirt of a dark tint so the blocks don't stand out at first. I paint the blocks with 2 coats of paint. I think wrapping the block in a scrap piece of 45mil EPDM liner would improve the situation. One could actually glue the liner back on itself. Do this after painting with latex paint. You should end up with a plant shelve support that is black and soft to the fish.

DECLORINATOR

They don't REMOVE the chloramines/chlorine/ammonia. What that means is that every time you add water and add this stuff, you are asking the gods to present you with a nice algae bloom. It starts with a "whole house" filter. It's like those you may have under your sink but is has 3/4-inch fittings, not 1/4 inch. To those openings, attach brass or plastic fittings that go from hose to pipe. Your plumbing dealer can help find the fittings. I use brass fittings because I also attached "quick disconnect" fittings. When you make up all your connections, use Teflon paste, not Teflon tape. The cartridge you use will be a "taste/odor" cartridge. They come in 2 different types. One has a wire mesh around it and you can see the charcoal in the filter, the other uses a membrane. It is the second one you want. I replace 2 to 4 inches of water from my 12x22 and 6x8 ponds every week during the summer and I only replace the cartridge twice a year.

Getting fish out of the water when it is cold outside
Sometimes fish have some sort of disease and treating the entire pond is almost impossible, but treating a few sick fish is economically feasible. Pour warm water into one end of the pond. The fish will come toward the warm water and right into the net you have conveniently placed there.

Recycling
when you change some of the water in your pond, use that water for the rest of your garden. You can't find a richer source of organic nutrition. You can recycle up to 5% of your water weekly if you like, thereby helping the planet and saving on your water bill.

IDEAS

- They have misters hooked up to there sprinkler system to spray the "fog" you see.

RETAINING WALL

Helen Nash's "The Complete Pond Builder" has one of the best selections of edging options with drawings on how to build them.

OTHER CHEMICALS

Baking Soda- I usually add 1/3 cup per 30 new gallons every 2 weeks in my 100-gallon tank. I started out only to maintain pH, not knowing all the other good things. Your dose could vary depending on fish load and how much you feed. Don't worry. As water additives go, baking soda is relatively risk-free.

Gin clear water is temporarily achieved by a partial water change. Hardening the water with Calcium carbonate (powdered or crushed Oyster shell) will *also* clarify the water. Use a pound of powdered oyster shell per thousand gallons deposited in the filter media unless the water is already Hard, e.g. 120+ ppm Hardness).

Potassium is another important chemical your pond may need. Purchase muriate of potash, and add a tablespoon per 1,000 gallons each month during the summer and you will see lush green growth in your water hyacinths and other water plants. There is also evidence that potassium helps fish growth as well.

SALT

Parasite control in the spring and fall can be intercepted with routine use of Salt. I recommend that salt be applied as you quit feeding in the fall; and, if it's removed by winter water changes or additions, then you would also re-apply the salt to 0.3% in the springtime as you resume feeding. I do not recommend

using salt all year round, as resistance has been shown in Flukes and Trichodina.

To apply the Salt: Remove submerged plants. Perform a fifty percent water change, and clean the pond as well as reasonably possible without causing undue delay in treatment. Apply non-iodized table salt for larger systems, dosing one pound per hundred gallons of water every 12 hours for three treatments (3 pounds per hundred gallons). As a side note, you would add the salt all at once in the case of epidemic mortality.

A 0.3% salt solution or roughly 3lbs. per hundred gallons is good for the pond. It slows algae growth and helps build the slime coat on fish. And at these levels when added slowly over several days will not harm plants. However it requires a rate of 4-5 lbs. per 100 gallons to treat parasites and requires that you add it much faster to be effective. I think there are better solutions than salt. After you've treated your fish for the fungus, if you want to add salt as a maintenance item, the best way is to buy one of those pool chlorine tablet floaters, fill it with rock salt (NEVER USE IODIZED AS THIS IS FATAL TO FISH AND PLANTS) and let it dissolve gradually.

Others who value their live plants, or who prefer a simpler regimen will use several treatments of Potassium permanganate followed by substantial (30-40%) water changes. They get the antibacterial, antifungal and antiparasitic effects, as well as the benefit of oxidation of organic debris, which is then removed by both filter, and water changes. Potassium permanganate is very safe in colder water as dissolved oxygen is universally high, but in case of trouble, where the fish may be laboring at the surface, you should always bear in mind that Potassium can be instantly neutralized by Dechlorinator.

Salt Table
0.1% salt = 0.8 pounds of salt per 100 gallons. Use this rate to relieve stress, help fish fight off disease & stimulate slime coat. I have found this rate not to hurt plants over a 2-3 week period if water changes are then used to remove it after that time
period. (They can be gradual water changes ~ 20%).
0.2% salt = 2nd day add another 0.8 lbs. per 100 gallons and you'll be up to 0.2%. I recommend removing all floaters and submerged plants if you decide to get into the medicinal levels.
0.3% salt = 3rd day add another 0.8 lbs. per 100 gallons and you'll be up to 0.3%. All potted plants should be removed. At this rate it's suppose to be able to kill some parasites and diseases.
Some handy conversions,

For Coarse Salt:
2 cups = 1 pound
2 tablespoons = 1 ounce
For Granulated Salt:
1.5 cups = 1 pound
1.5 tablespoons = 1 ounce.
200 to 500 ppm is recommended an indefinite treatment to ease osmoregulation and relieve stress in fish, without harming plants:

200 ppm = 2-2/3 ounce = 5-1/4 tablespoons per 100 gallons
200 ppm = 1-2/3 pound = 3-1/3 cup per 1000 gallons
500 ppm = 6-2/3 ounce = 13-1/4 tablespoons per 100 gallons.
500 ppm = 4.2 pounds = 8-1/3 cups per 1000 gallons.
USDA recommends 200 to 500 ppm as an indefinite (permanent) salinity. It relieves osmotic stress and prevents nitrite toxicity. This level does not directly treat diseases or parasites, but it may allow fish to more easily fight off and prevent them.
As you can see, the precise level isn't important, and these levels are far below those that affect plants.