

Aquatic Plant Solutions!



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Aquatic Plant Introduction

There is a wide array of aquatic plants. There are many species and varieties that are beautiful, add to your ponds function and aesthetics, and serve a purpose to your pond or lake. We like to call these desirable aquatic plants. Then there are the many that quickly take over your pond, can potentially hurt your ponds ecosystem, are an eye sore, and don't serve much purpose to your pond or lake. These are known as undesirable aquatic plants and are what we are referring to when we discuss aquatic plant problems.

Often times, it is not difficult to distinguish between desired and undesired aquatic plants. However, as with many things, the difference can be determined by balance and personal taste. Aquatic plants are essential to a healthy pond ecosystem. They can serve as a food source for organisms in your pond, hiding places for fish and insects, nutrient sinks (using up available nutrients), and also provide oxygen. Aquatic plants can also enhance the aesthetics of your pond and create a beautiful, peaceful area.

Non invasive, native plants are much more desirable than non native, invasive varieties. Non native plant species out compete native species for nutrients because the native species are in better balance with the entire system. The non native species that overtake a pond are rapid growers and do not have the organisms to keep them in check because they are not native to the area. Native plants can also grow rapidly if not monitored and held in check. Therefore, the key is balance and preventing one specific aquatic plant from overtaking your entire pond. A nice mix of species will provide a healthy pond ecosystem and also a beautiful setting.

Cause: Nutrients

Aquatic plants, whether desirable or undesirable, can quickly take over a pond or lake that has too many nutrients available. Nutrients are the main cause for excessive aquatic plant growth. Only a small amount of nutrients added to a pond can cause a lot of problems with aquatic plant growth.

Nutrients can be added to your pond in a number of ways, such as, leaves, grass clippings, wildlife waste, and runoff from lawns, cattle pastures, and farm fields all add a large amount of nutrients to your water. Once they reach the pond, they are available for plant growth.

It is important to look at the source of your ponds nutrients and try to get a handle on that while you are working on the immediate problem with aquatic plants. The treatments that are discussed on this page can be costly as well as labor intensive and strenuous. If you do not take any steps toward correcting the nutrient problem in your pond, these treatments will have to be an ongoing task. You will just be treating the symptoms of the problem, which are the weeds, and not doing anything for the problem, which is excessive nutrients.

In the Nutrient Solutions page, you will see some detailed information on ways to prevent nutrients from entering your pond and getting rid of the nutrients already there. It is very important to limit the amount of nutrients that are entering your pond; otherwise, the aquatic weed problem will be there every year.

Floating Aquatic Plants

As the name implies, these are plants that are free floating at the surface or have leaves that float. They typically have some sort of root system that hangs below the plant and filters the water for nutrients. Two common undesirable or nuisance floating aquatic plants (not including algae which is discussed individually in the Algae Solutions page) are Duckweed and Watermeal. These two species of aquatic plants can cover a pond and create a very unappealing pond or lake. They also block out sunlight from reaching the rest of the water column which limits growth of other aquatic plants and can limit the amount of oxygen available for your fish. Some more desirable floating aquatic plants, in moderation, are Water Lily (Lily Pads), Watersheild, and Spatterdock. These plants are considered more desirable because they enhance the aesthetics of a pond and create nice flowers. However, they can overrun a pond and become undesirable if not controlled.

Duckweed (*Lemna minor*) is a small, green, round or oval aquatic plant that floats at the surface with a root that hangs below. Duckweed is transferred or spread by humans and wildlife (ducks, geese, turtles, etc.). It can quickly spread and cover an entire pond, blocking sunlight for other plants and causing an unappealing pond. Common treatments are with a diquat (contact herbicide) which turns duckweed brown on contact or fluridone (non contact herbicide) which turns the duckweed white. Grass Carp will also eat duckweed.



Watermeal (*Wolffia* spp.) is smaller than duckweed and looks like small green seeds with no roots that hang below. Watermeal will feel gritty between your hands and fingers. Watermeal can be spread by humans and wildlife into new areas. It can also spread quickly and cover an entire pond blocking sunlight and causing an unappealing pond. Common treatments are with a diquat (contact herbicide) which turns duckweed brown on contact or fluridone (non contact herbicide) which turns the duckweed white. However, watermeal can be more difficult to treat than duckweed.



Photo by Ken Rust.

Fragrant Water Lilies (*Nymphaea odorata*) are a great example of beauty in moderation. Lily pads can greatly enhance the beauty of a pond or water garden with the green pads and the flowers, but they can also quickly overtake a pond if not monitored. They can be held in check by simply pulling the pads out. They have rounded leaves about 6-12" with a cleft or cut to the center. The underside is a purplish red color. A white, fragrant flower is also produced.



Photo by Ken Rust.

Water Hyacinth (*Eichhornia crassipes*) is an invasive plant species that originated from Brazil. It can quickly spread and take over an entire pond; therefore, it is often classified as undesirable. It is characterized

by the prominent purple flower. The upper petal of the flower has a yellow spot surrounded by purple. If this species is in your pond, it is important to keep it from spreading too rapidly with treatment or pulling the plants out.



Photo courtesy of The Lake Doctors, Inc.

Watersheid (*Brasenia schreberi*) has floating lobed leaves similar to the Fragrant Water Lily, but without the cleft and the leaves are much smaller, typically only about 4" long and 3" wide. The stem and undersides of the leaves are purple and are covered with a thick, gelatinous coating. This can be a desired species depending on personal taste and if it has not overrun the pond.



Photo courtesy of The Lake Doctors, Inc.

Spatterdock (*Nuphar polysepala*) is another rooted plant with floating leaves and flowers. Yellow, ball shaped flowers bloom during the summer months. The leaves are large (12") and can be round or heart shaped with rib down the center and a cleft. It is a great species for fish and wildlife because it serves as a food source and habitat.



Photo courtesy of The Lake Doctors, Inc.

Submerged Aquatic Plants

There is a plethora of submerged aquatic plant species. Some may be more prevalent in certain areas than others. Submerged aquatic vegetation are plants that are completely under the water and typically have a root system in the bottom sediment. They require the water for physical support of the plant structure.

The difference between desirable submerged aquatic plants and undesirable varieties is personal taste (how the plants look) and balance. A beautiful plant that takes over the entire pond can quickly turn from one that is pleasant to one that needs to be killed off. Keeping plant species in check and in balance will create a beautiful pond setting. Below are some common submerged aquatic plants and some information about them. This section of the page is an ongoing process, so check back for more additions.

Muskgrass (*Chara* spp.) is actually a form of erect algae. It is a great plant for ponds with excessive nutrients because it uses up a large amount of nutrients and provides food and hiding for fish and other organisms. It can look like several other aquatic plants, but a way to tell it apart is to break the thin straw-like stem. Since it is a single celled stem, if you break it, the entire stem will turn flaccid. Other plants will just break or bend, not turn flaccid. Also has a strong garlic smell to it. As with many plants, it is good in moderation. The pond above is a bit over grown.



Photo by Ken Rust.

Pondweed (*Potamogeton*) is a thin leafed aquatic plant that is native to many areas. This plant can serve as a food source and hiding place for organisms in your pond and produce oxygen. Since it is native, it is not as invasive as non native plants, but it must be kept in moderation. This picture is of young pondweed before it puts out its surface leaves. Some consider pondweed as a floating plant due to these surface leaves.



Photo by Ken Rust.

Eurasian Watermilfoil (*Myriophyllum spicatum*) is not native to the US and is an extremely invasive species. There are strict regulations for boats in lakes that contain eurasian watermilfoil because small pieces that break off can stick to boats and trailers and then re-root in other bodies of water. The leaves are feather-

like and are limp when out of water. The leaves are arranged in circles of 3 to 5 around a long, spaghetti stem. The plants can grow over 10' tall. The tops of the stems often are reddish in color.



Bladderwort (*Utricularia purpurea*) is an aquatic plant that can live in ponds with limited nutrients available. It is actually a carnivorous plant. It can look like an unorganized mess in your pond, but it eventually comes together to form the "starfish" shape and then shoots up the yellow flowers. Black bladders hang below that open and catch small organisms like zooplankton. Bladderwort can be a pain if it takes over your pond and since it isn't as dependent on nutrients in the pond, it can spread rapidly.



Photo by Ken Rust.

Hydrilla (*Hydrilla verticillata*) is an undesirable aquatic plant with long, branching stems. Hydrilla often fragments and form large floating mats. It produces tiny white flowers in early fall. It can be differentiated from Elodea or Egeria with its sharp toothed leaf margins. Hydrilla feels brittle to the touch. Hydrilla can grow in shallow or deep water and can quickly spread throughout a body of water.



Photo courtesy of The Lake Doctors, Inc.

Common Waterweed (*Egeria densa*) is branched and has a long, narrow stem with dense leaves found in whorls of 4. The leaves can be oblong or linear and are very fine toothed. It produces flowers that are white with yellow anthers. As with many aquatic weeds, it needs to be controlled to prevent overtaking your pond.



Photo courtesy of The Lake Doctors, Inc.

Elodea (*Elodea canadensis*) is commonly confused for hydrilla or egeria, but is much smaller in size. The leaves are bright green, in whorls of 3, and elliptic to oblong. Small white flowers are produced from mid summer to fall. Needs to be kept in check to limit spreading.



Photo courtesy of The Lake Doctors, Inc.

Coontail (*Ceratophyllum demersum*) is a submersed aquatic plant, but does not have any root structure. The feathery, fan shaped leaves are arranged in whorls with small teeth and resembles a raccoon tail. Coontail can grow very tall (15') and occur in deep water areas. Controlling the spread of coontail can be difficult since it is free floating.

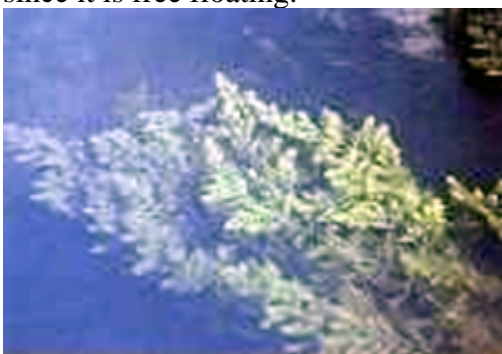


Photo courtesy of The Lake Doctors, Inc.

Emergent Aquatic Vegetation

Emergent aquatic plants grow in shallow areas, usually along the banks of ponds or lakes, or in shallow marshy areas. Some may not be considered aquatic vegetation, but can survive in wet soils for an extended period of time. Emergent plants, unlike submerged vegetation, are rigid and can stand on their own, without support from the water.

These again, can be desirable or undesirable depending on balance and what you like to see. Often times, emergent vegetation can be very beneficial as a nutrient buffer. They can block or at least slow down nutrients that are entering the pond due to runoff. Emergent vegetation also serves to stabilize the shoreline and reduce erosion. Deep rooted vegetation keeps the shoreline intact. Desirable varieties also provide wildlife food and habitat. Below are some common submerged aquatic plants and some information about them. This section of the page is an ongoing process, so check back for more additions.

Pickerel Rush (*Pontederia cordata*) is a plant that is often sold in watergarden stores that sell aquatic plants. It produces a nice purple flower and is great for the banks of ponds and watergardens. It will use up and block some of the runoff nutrients entering the pond and look good doing it.



Photo by Ken Rust.

Cattails (*Typha* spp.) are probably the most recognizable plant in and around water. The tall stalks or stems with long, green leaves are very recognizable and the 6-8" brown cylindrical spike produces seeds for reproduction. Cattails can spread quickly if not controlled. Cattails serve as cover for wildlife and also as a food source for aquatic rodents, such as Muskrats.



Photo courtesy of The Lake Doctors, Inc.

Arrowhead (*Syngonium* spp.) is named after the "arrowhead" shaped leaves. There are several species within the arrowhead family. The white flowers are in whorls of 3 with a yellow center. Arrowhead is a good plant to use up nutrients, but need to be kept in check to prevent over population.



Photo courtesy of The Lake Doctors, Inc.

Bog Moss (*Mayaca fluviatilis*) is typically found in wetlands or wet areas around ponds in creeping mats. It is a small, dark green, branched plant with leaves spirally arranged on the stem. Small pick flowers are produced with 3 petals. It can serve to block runoff nutrients from entering the water.



Photo courtesy of The Lake Doctors, Inc.

Water Primrose (*Ludwigia* spp.) can be emergent or submersed plants, depending on the species. It produces stems that grow horizontally with roots that are wiry. Leaves are produced and alternate along the stems. Erect stems occur during the flowering stage and most typically bloom from April to September, depending on species and location. Water primroses are typically considered desirable aquatic plants.



Photo courtesy of The Lake Doctors, Inc.

Spikerushes (*Eleocharis* spp.) cover a wide range of species. Most grow in moist soil or shallow ponds, marshes, and wetlands. The stems are topped by a terminal spike. Spikerushes can cover many acres and

serve as cover for certain wildlife. Certain species of spikerushes are used as a food source for birds and animals, as well as for human consumption.



Photo courtesy of The Lake Doctors, Inc.

Physical/Mechanical Treatments

Physical and mechanical treatments can often be the simplest and very effective, but also are time consuming and can require a lot of physical effort. This can be done with a rake or shovel or your bare hands. This technique works well near the shoreline and in shallow areas and works great at removing the weeds. This is also a good maintenance technique. You can selectively remove individual plants to keep them from overrunning your pond. Desired species can be held in check with selective harvesting before they become an undesirable species.

There is also harvesting equipment available that can remove more weeds in less time and is also more effective in slightly deeper water where hand removal is difficult, still only effective in the 6' range. This method is also much less selective than hand removal. This equipment varies in size and scale. Some is available for individual use in small ponds, other are large barges that harvest the plants with cutters, conveyors, and a large platform to store them.

Either way you physically or mechanically remove the plants, you must make sure to remove all the plant fragments from the pond. Many of the aquatic plant species can re-root and grow from small segments. Therefore, cutting, but leaving fragments behind, will lead to more growth in the future and the plants can spread into a larger area of the pond. It is also important to remove the plants away from the pond far enough to prevent them from washing in or getting blown back in. Physically removing the plants is a great way to remove large amounts of nutrients as well, which will improve overall pond health in the future.

Chemical Treatments

There are several chemical treatment options available for aquatic plant problems. Some treat certain aquatic plants better than other treatments, and since there are many types of aquatic plants, it is a good idea to talk with a local lake management professional to get some assistance in identifying the type of aquatic plant problem and develop a plan for the best solution to that problem. Typically, liquid treatments are more effective in shallow applications of 5 to 6' or less and granular applications are better in deep water. Granular applications can also be used in spot treatment. Some common chemical treatment methods are copper products, diquat herbicides, and fluridone herbicides.

Copper - Copper is usually the first answer most people get when they bring up the subject of algae and control. Copper is toxic to certain species of fish within the minnow family as well as salmonids depending

on the dosage and water chemistry. Water with high hardness and alkalinity buffers copper from being toxic, but also limits its effectiveness. The most common form of commercially available copper is granular copper sulfate. Its effectiveness and cost as a broad spectrum controller of planktonic and filamentous algae has led to its high usage. Liquid chelated copper products are used to control a broad range of algae including planktonic, filamentous, and bottom attached types of algae. Cutrine-Plus® is an example with application rates from 0.6 to 1.2 gallons per acre-foot of water treated. Consistent usage of some copper products can lead to bioaccumulation within the sediments and this approach is on the radar of some regulatory agencies, so a varied approach is probably the most sensible path to take.

Diquat Herbicide - Diquat is a liquid, contact herbicide that is sprayed on the vegetation. This is a very powerful and fast acting form of aquatic weed and algae control. The treated vegetation will quickly die and turn brown from this treatment. A common diquat herbicide brand is Reward® and is great for floating aquatic vegetation. It is safe to use, according to the label, for algae and floating aquatic vegetation control in natural ponds, but there are restrictions concerning fish harvesting. A lake management professional will be able to assist with information and application of this product.

Fluridone Herbicide - Fluridone is a liquid, non contact herbicide that is slower process than the diquat herbicide, but does not have the same restrictions for water usage afterwards. Fluridone herbicide is sold under the product name of Sonar® and manufactured by Avast® and typically takes 30 to 90 days to effectively work. The herbicide is absorbed into the plants and symptoms develop within 1 to 2 weeks. Affected plants will lose their green pigment and turn white. This can be a more selective method of treatment depending on application levels.

Biological Treatments

Organisms can be used to help control and prevent aquatic weed growth in ponds. Biological treatments may not work as fast as chemical treatments, but can be effective and a long term solution to problems. This method works better in smaller scale applications and it is important to contact a lake management professional before introducing organisms into your pond because you could see negative effects from this. Some common biological treatments are other plant species, plant eating fish, and bacteria.

Aquatic Plants - Often times introducing more desired species of plants can assist in helping rid the pond of a nuisance species. Native plants are usually a good bet because they have more checks and balances with the local environment. This can be difficult because invasive species are often present because they can successfully out compete desirable plants. This method works better when the invasive plants are removed.

Plant Eating Fish - Introducing plant eating fish, or herbivores, can assist in limiting plant growth. Grass Carp are being used to help control aquatic vegetation. They are bred to be sterile so they will not reproduce in the pond and will eat vegetation in the pond. Grass Carp do not like all forms of vegetation and there are various restrictions on their use, so consult a local professional or regulatory agency. They also do not eat algae, contrary to popular belief, so they can shift your pond from aquatic plants to algae growth.

Bacteria - Bacteria and fungi can be used to help control aquatic plant growth. Certain varieties of bacteria and fungi live on various aquatic plants and can be used to selectively control aquatic vegetation. The attacked aquatic plants will die from the introduction of the bacteria and fungi and the more desirable plants will be unharmed.

Pond Environment Treatments

Altering the pond environment can be an effective solution to aquatic plant problems. Changing the habitat the aquatic plants grow in can be detrimental to their health and cause reduced numbers or even elimination of a certain plant species. This can be done changing the water level, flushing the water, shading, changing the water pattern, and dredging.



Photo by Ken Rust.

Pond overflow and drain makes water level fluctuations and flushing possible.

Water Level - Altering the water levels in a pond can have a negative affect on aquatic plant health because many species grow best in certain water level conditions. If water levels are raised, sunlight may not be able to fully penetrate the water column and submerged vegetation will die due to the lack of sunlight.

Conversely, if the water levels are dropped, the sunlight and air can dry out areas along the edges that are now not covered by water. Without water contact the plants will die off and the sunlight will burn off the remaining vegetation. In my own experiences at a trout farm, ponds were periodically drained and cleaned; however, filamentous algae would still cling to rocks, aerators, and cages. A few days in the sun without water would burn the algae off and the pond would be new once filled again. Altering the water level can be a large project and some ponds that have a drain installed and constant water supply make this much easier.

Flushing - Flushing the water can have two benefits. First, flushing out the nutrient filled water with nutrient free water will lower the overall nutrient content in the water and help reduce the existing plant growth and help prevent future growth. Flushing can also be used to remove floating aquatic plants such as duckweed and watermeal. Again, in my own experiences, a small pond that was covered with duckweed was overfilled. The water level was raised a couple feet above normal level by covering the overflow. The overflow was then removed and much of the duckweed was washed into the marshy overflow area and out of the pond. This can also be a very intensive and large undertaking. A large clean water supply and overflow to the pond makes this process much easier.

Shading - Since the aquatic plants require sunlight for the photosynthesis process, limiting the amount of sunlight that reaches the water can decrease the amount of aquatic plant growth. This can be done with trees and shrubs naturally, or done through artificial shading. Another personal experience at the above mentioned trout farm had a side benefit for the aquatic plant problems. Several raceway ponds were shaded with a shade cloth to limit predation of fish by Great Blue Herons and King Fishers and also to help keep the water cool during the hot summer months, since Rainbow Trout require cold water to grow. A side benefit was the reduced aquatic and terrestrial plant growth. The water did not receive as much sunlight penetration and the aquatic weeds did not grow as fast or dense in these areas. The grasses around the pond also grew slower, which was not a problem for those unlucky enough to be selected for pond mowing.

Water Patterns - Altering the water patterns can have an effect on aquatic plant growth. Many of the undesirable aquatic plants that overtake a pond thrive in shallow, stagnant water. By changing the stagnant

water into a moving, riverine environment, those same aquatic plants struggle to grow and survive. This process can be difficult and is best done with the addition of equipment. Kasco's Water Circulator was designed for this purpose. It creates directional flow and a riverine environment out of a stagnant pond. By adding a Water Circulator, you can successfully limit the amount of aquatic plants because they cannot thrive in moving water areas.

Dredging - Dredging is physically digging or removing sediment from the pond to make the pond deeper and remove organic, nutrient rich sediment from the pond, as well as the plants that are growing in that sediment. This can be a very intensive and expensive project because of the heavy equipment involved and the removal of the sediment, but is very successful. Dredging makes the pond deeper, thus increasing the water column. Deeper water has a more difficult at supporting plant life because not as much sunlight can reach the bottom. Dredging also removes much of the nutrients in the pond and the plants that are living in those sediments, thus renewing your pond or making it younger (see Backyard Ponds & Lakes). It is extremely important to remove the sediment far away from the pond so the water and nutrients to run back in or get washed in with a large rainfall.

Benefits of Aeration

Aeration is an integral part of your entire pond ecosystem and is also a tool to effectively manage aquatic plant growth. The most important benefit of supplemental aeration in your pond is buffering against aquatic plant die off. Aeration can also help with limiting the amount of plants that grow by limiting sunlight penetration and the breakdown of nutrients.

As discussed previously on the page, there are many types of aquatic plants that can be a nuisance to you and your pond. There are several effective ways of treating these problems, whether it is biological, physical, changing the pond environment, or chemical treatments. Chemical treatments are very popular because they require less effort than physical removal of the plants, work faster than most biological treatments, and are not as large of a project as changing the pond environment. The chemicals will kill off the aquatic plants and be fairly effective in doing so.

When the plants start to die off is when aeration is needed. The dead plant material will begin to be decomposed by bacteria on the bottom. The decomposition process can occur aerobically (with oxygen) or anaerobically (without oxygen). As long as there is oxygen available, it will take place aerobically. This is good because aerobic decomposition is faster and creates less harmful byproducts of the process. However, the process uses up a lot of the available dissolved oxygen in the water, much faster than can be naturally added in most cases. Once the oxygen is depleted, decomposition switches to anaerobic and without oxygen fish and other aquatic organisms die.

Having supplemental aeration in a pond before, during, and after will help mix the water column, and with some chemicals, increase their effectiveness. After the treatment, the added oxygen will allow for aerobic decomposition to take place and provide enough dissolved oxygen for your fish to survive during the process.

Surface agitation caused by an aeration device is also important in the battle with aquatic plants. Creating water movement and waves helps eliminate stagnant water areas where aquatic plants thrive. The agitation also helps refract some of the incoming sunlight, limiting the amount available for the plants.

Aeration and agitation is also very important in what it takes out of the pond. As discussed, during the aerobic decomposition process, oxygen is used. A byproduct of this process is carbon dioxide, which is a key component to plant growth and is used during photosynthesis. The surface agitation caused by aeration

breaks up the water by splashing. This provides amply surface area of the water droplets to "vent" the carbon dioxide. Carbon dioxide levels in the water can be much higher than the air, therefore, when the water is exposed to the air, the carbon dioxide will leave the high concentration area of the water to the lower concentration area, air. Some nutrients in the water are also volatile and can be vented when the water is exposed to the air.

Kasco Marine offers several options for adding oxygen to the pond, creating water agitation, and water movement. Kasco's Pond Aerator models are great for adding oxygen when no display pattern is needed. These units splash the water creating great agitation while adding oxygen. The Aerating Fountain models add oxygen and aeration, while providing a beautiful display in your pond. Kasco's Water Circulators can turn your stagnant pond into more of a riverine environment which can limit the growth of some aquatic plants.



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