"Mississippi State University - Grass Carp in Mississippi Farm Ponds"

WEED CONTROL

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Controlling and eliminating aquatic weeds from farm ponds in Mississippi are often confusing and frustrating tasks. There are three basic weed control approaches, and a combination of two or more of these often is required for success. The selection of a weed control program depends on local conditions in the pond, as well as the needs, desires, and capabilities of the pond owner or manager.

The three approaches include mechanical/environmental control, chemical control, and biological control. Mechanical control involves physical removal or harvesting of the troublesome weeds. Mechanical control is often more difficult in water than on land (using a hoe in the garden is an example of mechanical weed control). A good example of environmental control is a winter drawdown, where water levels are dropped, exposing weeds in shallow areas to drying and lethal winter temperatures.

Chemical weed control is often unsuccessful, and re-treatment may be needed, adding significantly to costs incurred by the pond owner. Chemical weed control can become expensive, and the selection of a chemical depends on the weed species involved. Additionally, chemical weed control is short-lived, since most aquatic herbicides do not persist more than a few months.

An alternative to mechanical or chemical weed control is biological control, which involves use of an animal or other living organism to control the weeds. Many rural residents are familiar with the biological control of weeds and other plants provided by farm animals such as sheep and goats. Biological control has many advantages over other weed control means. It takes much less human work effort than most mechanical control means, and does not require use of expensive and sometimes hazardous aquatic herbicides. Additionally, use of animals provides longer term control than do other means, since the animals usually have a life-span of several years.

ORIGIN and BIOLOGY OF GRASS CARP

The grass carp, also known as the white amur (Ctenopharyn-godon idella), is a Chinese carp imported into this country as a means of achieving biological aquatic weed control. It is native to southeast Asia, and was brought into the United States in the early 1960's as an experimental aquatic weed control method. Since that time, use of grass carp has become commonplace. Because of concerns about the potential impacts on the environment and native fish populations, several states restrict or prohibit their uses. While some states prohibit the stocking of grass carp altogether, others will allow the use of a sterile

carp known as a "triploid". Triploid grass carp have an extra set of chromosomes and thus, are sterile, eliminating any possibility they may reproduce if they escape into the wild. Stocking of grass carp in ey escape into the wild. Stocking of grass carp in Mississippi is currently not restricted by law. Either normal (diploid) or triploid carp may be used; but it is recommended that pond owners stock the triploid carp when available.

The grass carp is a member of the Cyprinid family, which includes goldfish,"common carp, and many of our native minnow and shiner species. It should not be confused with other nonnative carp, such as the bighead carp, silver carp,"black carp, or mud carp. These other carp are not good biological control agents for aquatic weeds because they feed on different components of the pond ecosystem.

Feeding Habits

Until they are about 2 inches long, grass carp feed almost exclusively on microscopic animals called zooplankton. They become dedicated vegetarians, however, after they reach a length of about 4 inches. The amount of vegetation"they will consume depends upon several environmental conditions, such as water temperature, water chemistry, and the kinds of plants available. Consumption rates also vary with fish size. For example, until they reach weights of about 6 pounds, grass carp may eat 100 percent of their body weight in vegetation per day. (This is equivalent to a 150-pound human eating 150 pounds of food per day.) As they grow larger, consumption decreases; up to about 13 pounds, they will eat 75 percent of their body weight per day, and above 13 pounds, they slow down to about 25 percent of body weight per day.

Grass carp prefer soft, low fiber aquatic weeds such as duckweed and various underwater plants. If the more desired species of plants are not available, they will feed on plants above the water surface; and in cases where no aquatic food is available, they have been observed feeding on overhanging brush and tree branches. It is this voracious appetite for plants that makes the grass carp useful in controlling aquatic weeds.

Stocking

The number of grass carp required to control weed problems varies, depending on the degree of weed infestation, kind of weed, size of pond or lake, and size of fish stocked. A number of different approaches have been used to determine the appropriate number of carp to stock, and all are successful. The most precise method is to determine the weight of aquatic vegetation in the pond, and then, knowing the consumption rates of the fish, stock the appropriate number to consume however, and pond owners must use other means to"determine how many carp to stock.

The general rule of thumb in farm ponds is to stock enough grass carp to control the weeds in one to two seasons, but not so many that they completely eradicate all vegetation in a short period of time. The best approach is to consider the carp as a weed "maintenance" tool, rather than an eradication tool. This usually results in less environmental disturbance of the pond, and the carp are not subject to starvation

due to complete loss of vegetation. Additionally, recent research indicates that complete eradication of weeds from a pond may not be desirable, since vegetation harbors many tiny organisms that contribute to the productivity in the pond. Fishermen have long known that weed beds and other vegetative "structure" can be highly desirable, since they provide shade"and cover for sport fish. The problem occurs when weed growth passes the "fine line" between desirable and undesirable amounts.

This rule of thumb does not apply to commercial aquaculture ponds, however. In these kinds of ponds, more rapid control of aquatic weeds is usually needed, and higher stocking rates are required. Long-term impacts of high densities of grass carp are not a concern, since fish farmers can remove excess carp when they harvest other fish in the pond. Commercial fish producers can often sell the carp for other uses after they have achieved the weed control needed in the aquaculture situation.

For most farm pond situations where weeds have already become a problem, 5"to 10 grass carp per surface acre will achieve desired weed control, without resulting in crowded conditions of the fish. In severely weed-choked cases, higher rates of 15 to 20 grass carp per acre may be necessary to attain control. In such cases, it is sometimes more effective to treat the pond with herbicide first, and then stock moderate numbers of grass carp. You can get assistance in"diagnosing the situation by contacting an Extension fisheries specialist or your county Extension agent, or a fisheries biologist from state or federal agencies.

In new ponds where grass carp are stocked as a weed preventive measure, three to five fish per acre usually does the job. In new ponds fingerling grass carp may be successfully stocked anytime before the bass are stocked. Once bass are established, however, larger grass carp will be required to ensure that the bass do not eat them. In ponds where bass populations are present, a minimum carp size of 8 inches is required to ensure their safety from bass predation."Although this size fish cost more, it is a cost-effective stocking technique, since predation losses are minimized.

Sources

Grass carp can be purchased from many sources, instate and out of state. When possible, pond owners should stock certified triploid carp. Such fish have been tested individually to confirm that they possess an additional set of chromosomes and are, therefore, sterile. A list of hatcheries licensed to sell game fish and grass carp is available from your county Extension agent, the Mississippi Department of Agriculture, or Mississippi Department of Wildlife, Fisheries and Parks.

Other Considerations

Grass carp are a viable and economical means of controlling the growth and spread of certain aquatic weeds. It is critical that problem weeds be properly identified as a preferred food for grass carp, or they may not provide acceptable control. When stocked at low to moderate rates, grass carp will not muddy a pond as do their cousins, the common carp. They typically will not disturb the nests of other fish (bass and bream), and they are not predatory, so there is no concern about their eating

desirable sport fish.

Once carp reach 20 to 30 pounds, their effectiveness as a weed control agent is diminished, since their food consumption is reduced and they are not growing as rapidly as do the smaller fish. Thus, periodic restocking (5- to 7-year rotation) may be required for permanent weed control. This, however, still represents a substantial cost savings over the use of chemicals, in many situations.

Large grass carp are powerful fish and can be dangerous if you try to catch them with a seine or a net. They are strong jumpers and will jump over a seine if cornered. In these situations, they can become "flying torpedoes" and can cause injury to humans. For this reason, remove grass carp by hook and line, or by shooting with arrows, spears, etc. In general, once grass carp have reached large sizes, remove them if and when they are caught (by fisherman).

Although grass carp sometimes take on off-flavors from their diets of aquatic plants, their flesh is firm and they do not have excessive intramuscular bones. Many consider them to be excellent table fare!

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