Cooperative Extension Program

Preparing and Stocking Golden Shiner Fry Ponds

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Tank spawning and hatching of golden shiners creates new opportunities and challenges for golden shiner producers. Compared to the egg-transfer method, many fewer pounds of broodfish are required and relatively few mats are needed. Also, rearing ponds can be fertilized and prepared without concern for incubating eggs, providing a greater and more consistent food supply for fry.

Mats collected from brood ponds during prime spawning season have anywhere from 2,000 to 250,000 eggs, with a median of around 40,000 eggs per mat. With the egg-transfer method, less than 40 percent of these eggs hatch; the rest are lost to fungus, low dissolved oxygen and predators or are damaged in transit. In contrast, tank hatching rates are 80 to 95 percent, so tank-hatching the same mats would result in two to five times better survival of eggs to fry.

Stocking fry instead of eggs also means that ponds can be filled and fertilized at the appropriate times prior to fry stocking, resulting in greater production of natural foods and better fry survival. In the traditional egg-transfer method, ponds are emptied and then quickly filled with clean well water so that egg hatch will be better. Once fry hatch, there is little for them to eat if the pond does not develop a zooplankton bloom on its own.

In addition, as Dylox (trichlorfon) has been approved for use in baitfish production ponds in Arkansas, "old" water can now be treated and reused for fry. This concept is similar to "no-till" in agriculture, where seeds are planted in the stubble of the previous crop. Without treatment, predaceous cyclopoid copepods present in ponds with established plankton blooms will kill newly stocked fry. Getting rid of predaceous copepods is critically important to the success of the fry stocking method when stocking "old" water ponds. With treatment to eliminate copepods, use of "old" water can result in significant water conservation.

Stocking fry instead of transferring eggs, while providing many benefits, requires fish farmers to learn and adopt a different set of pond management practices. Pond preparation for golden shiner fry is similar to that used for hybrid striped bass fry. However, as with anything new, there will be a learning curve for golden shiner producers who try this new

method. Producers are cautioned to start slowly and try tank hatching and fry stocking on an experimental basis with a small portion of their crop until they become confident of the new techniques.

This fact sheet provides current knowledge on methods for preparing and stocking golden shiner fry ponds. However, this information is based on limited research, and it is to be expected that the practices outlined in this fact sheet will change as additional information becomes available.

Fry Pond Preparation

It is critically important to stock fry the correct number of days after beginning to fill a pond with water. Proper timing of fry stocking after the start of filling can make or break a crop. Fertilizers stimulate production of natural foods for fry. Rotifers and other microscopic animals are important first foods for golden shiner fry. The warmer the water temperature, the faster the growth in the population of these tiny animals and the sooner a pond should be stocked. The following chart (Table 1) shows the best time to stock fish in a pond for optimum food supply for the newly-hatched fry. If fry are stocked late, not only is the food supply diminished but numbers of insect predators increase greatly.

Table 1. Chart of Peak Rotifer Abundance Based on Water Temperature

Tempera-ture °F	Tempera-ture °C	Days to Peak Rotifers	Days to Best Stock-ing Time
59	15	21.0	17
61	16	19.4	16
63	17	17.8	15
64	18	16.1	14
66	19	14.5	13
68	20	12.9	11
70	21	11.3	10
72	22	9.7	9
73	23	8.0	7
75	24	6.4	5-6
77	25	4.8	4-5
79	26	3.2	2-3
81	27	1.6	1

The peak bloom in rotifer production is based on the average daily water temperature during the first three days after a pond begins to fill. The best time to stock fry would be prior to the peak in rotifer abundance. Daily water temperatures used in developing the chart were the average of readings taken at 8 a.m. and 3 p.m.

(Adapted from Li, Y., S. Jin and J. Qin. 1996. Strategies for development of rotifers as larval fish food in ponds. Journal of the World Aquaculture Society 27:178-186).

Fertilize ponds at the time of initial filling with 100 pounds per acre of cottonseed meal or rice bran and 1 to 2 gallons per acre of liquid fertilizer. Thereafter, apply 25 pounds per acre of organic fertilizer and 1 to 2 gallons per acre of liquid fertilizer weekly until the pond develops a good bloom, as indicated by a Secchi disk reading of 12 to 18 inches.

"Old" water ponds with established blooms can be fertilized with an organic fertilizer to restart a zooplankton bloom. Fertilize initially with 100 pounds per acre of cottonseed meal. Apply 1 to 2 gallons per acre of liquid fertilizer if the bloom thins to a Secchi disk reading of more than 24 inches.

For newly-constructed ponds, at filling, apply 250 pounds per acre of cottonseed meal or rice bran and 16 to 32 pounds per acre of powdered water-soluble fertilizer (e.g., 12-52-4) or 2 to 4 gallons per acre of liquid fertilizer (e.g., 11-37-0).

Avoid excessive application of organic fertilizer when preparing ponds during cold or cool weather (typically March and April). Decomposition is slow in cold water, and the excess organic matter will accumulate. Once the water warms, the accumulated organic fertilizer and feed will rot, leading to septic pond bottoms (without oxygen) and reduced survival of fish. During harvest, seine crews may complain about the smell and fish will die in the sump from the poor water quality.

Ponds with existing plankton blooms may have high populations of predaceous copepods that can eat fry. Copepods can literally wipe out all fry in a pond. For this reason, ponds are treated with Dylox (80 percent active ingredient) at 0.25 ppm active ingredient. This is equal to 0.8 pound per acre-foot. Treating a pond with an average depth of 3 feet costs about $20 per acre. Other names for Dylox (trichlorfon) are Dipterex and Masoten; however, these other formulations are not legal, and Dylox is legal for nonfood fish use only. The chemical kills only crustacean zooplankters so rotifer populations rise sharply after treatment due to reduced competition and reduced predation. Dylox breaks down quickly in warm water and becomes essentially ineffective at water temperatures above 85°F. Fry can be stocked the day after Dylox is applied. Check a water sample from treated ponds before stocking, to make sure that the Dylox killed the copepods.

In cases where old water will be pumped into an empty pond prior to stocking fry, a filter with a 100 to

150 micron mesh can be used to mechanically remove the large, predatory adult copepods. If a filter is not available, water can be pumped from ponds with existing crops of golden shiners, as the fish will have eaten most of the adult copepods. However, if Asian tapeworms are present in the "donor" pond, transfer of any copepods will infect the new pond. If the donor pond is fertilized in advance to produce a rotifer bloom, fry should be stocked into the new pond immediately – within several days. The filter will not remove all the copepod nauplii, and the survivors will quickly grow to adult size, capable of feeding on fry, within one to two weeks. Predation by copepods is probably not a problem unless a pond has more than 50 cyclopoid copepods per liter.

Controlling aquatic insects is critical to good survival of hatchery-reared fry, as relatively few fry are stocked per pond as compared to the egg-transfer method. Baytex (Fenthion) is a restricted use pesticide approved for larval dragonfly control on baitfish farms in Arkansas. The label gives a rate of 0.1 ppm active ingredient, or 3 liquid ounces per acre-foot. At $190 per gallon, for a pond 3 feet deep, one treatment would cost only about $13 per acre. Ponds should be treated a day or two before stocking fry. Unfortunately, Baytex apparently kills zooplankton as well as insect predators, and using Baytex will reduce levels of this food source for fry. Baytex is moderately toxic to fish, and the 96-hour LC50 levels (the concentration that will kill one-half of the fish within 96 hours) are 1.1 ppm for carp, 2.4 ppm for fatheads and 3.4 ppm for goldfish.

Bloom Quality

It is critically important to check the bloom quality in a pond before stocking fry. Even ponds that have been filled and fertilized as recommended can have little or no food for fry. A sample of pond water should be collected and observed under a microscope. Place the water in a depression slide or a Sedgewick-Rafter cell and observe pond life at 40X and 100X magnification. The relative abundance of food items (rotifers) and unsuitable foods (bluegreen algae) should be noted. Bloom evaluation is best learned by "hands on" experience.

Ponds should also be checked for copepods. A simple way to check for large zooplankters in a pond is to dip a sample of water in a mason jar or other clear container, and hold it up to the light. If present, large zooplankters are visible as tiny specks darting about in the water. Similarly, a pie tin fry checker can be used to look for large zooplankters. This method checks for the presence of larger zooplankton, that may or may not be predaceous on the fry. However, if large zooplankters of any kind are present, it means that the bloom is old enough to host predaceous copepods.

Do not rely on looking at a few drops of water under the microscope to check for the presence of copepods, as it is easy to miss dangerous levels of these organisms. In fishponds, predaceous copepods normally range in abundance from 0 to 500 per liter. At a concentration of 500 per liter, they can kill virtually all fry within 24 hours. Yet at a concentration of 500 per liter, if the zooplankton in the pond water are not concentrated with a plankton net, there is a 50:50 chance that no predaceous copepods will show up in a single, 1 ml sample.

Stocking Fry

Stocking rates for fry vary from 0.5 to 1 million per acre. It is possible to go higher if stunted juveniles (peewees) are required. To avoid cannibalism, fry stocked together in a single pond should be within several days of age and of similar size. Fry are placed in plastic bags with oxygen and taken to the pond. Stocking is best done in the cool of the early morning. Float bags in the pond until the temperature of the water in the bag is within a few degrees of the pond temperature. Ideally, bags should be tempered to pond water temperatures while in a vat filled with pond water before leaving the hatchery. This will save the stocking crew from having to monitor bag and pond temperatures so closely. However, every pond differs in water chemistry, so it is still important to temper fry when stocking each pond.

Caring for Fry

Fry should be fed slightly more than they can eat of a formulated feed two or more times each day. A typical rate is 5 to 10 pounds per acre per day, divided between two or three daily feedings. Fry stocked during cold weather (March and April) are fed at 2 to 5 pounds per acre per day. A fine meal is best for the first few weeks. Fish can then be switched to a crumbled feed, then to pellets as soon as possible.

Check fry abundance along the pond edges during the first week or two by using a "pie tin on a stick" fry checker. The light background of the pie tin makes it easier to see the fry. Fry should remain plentiful after stocking. After one and a half to two weeks, fry move

away from pond edges into open water, and "disappear" for several weeks until they begin to come up for floating feeds at three to four weeks of age.

Dense plankton blooms are not beneficial in fry ponds. Often "heavy" or "thick" blooms, with Secchi disk visibility of 8 inches or less, are composed of only one kind of algae – often a bluegreen algae – which is a poor food for fry. Also, a bloom that is predominantly one type of algae is more likely to "crash," leading to low oxygen or even the release of toxins, in the case of some bluegreen algae.

For more information and assistance in developing a tank spawning, hatching and fry stocking program, contact the UAPB Aquaculture/Fisheries Center Extension specialists at the Lonoke County Extension Service office at (501) 676-3124.

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