Effect of Substrate on Egg Hatchability and Survival of Carp Seeds

[1.2]Helmin Dupamana, [2]Ade Muharam, [2]Juliana

[1]helmin_s1bdperairan2013@mahasiswa.ung.ac.id
[2]Department of Aquaculture, Faculty of Fishery and Marine Sciences
Universitas Negeri Gorontalo

Abstract

This study aims to determine the effect of different substrates on egg hatchability and survival of carp (*Cyprinus carpio*) seeds. This research is an experiment with 4 treatments and 3 replications. The treatment of addition of substrate is A (Fibers), B (Hydrilla), C (Raffia String), D (Control) Treatment. The design used is a Completely Randomized Design (CRD) using Analysis of Variance (ANOVA). Furthermore, further tests are carried out using the Least Significant Difference Test (LSD). The results obtained indicate that each treatment has a very significant effect. The highest hatchability was found in the palm substrate treatment of 87.66%, followed by the treatment of the raffia substrate 78.42%, then the control treatment with the percentage of hatching power was 64.78% and the lowest was in the hydrilla substrate treatment with the hatchability percentage of 57.51%. While the highest survival rate of tilapia fish was found in the treatment of palm oil substrate by 73.67%, and the survival rate with the lowest percentage was in the treatment of hydrilla sp. Substrate.

Keywords: carp; seed; substrate; hatchability; survival rate.

Introduction

Carp (Cyprinus carpio) is one of the freshwater fisheries commodities that is currently the mainstay in the fisheries sub sector. This fish in the market has a high economic value and a large amount of demand, especially for some local markets in Indonesia. Carp or also known as common carp is a worldwide fish. This certainly makes an opportunity for the development of goldfish farming (Suseno, 2000).

Carp spawning can occur throughout the year and does not depend on the season. Goldfish in their natural habitat often spawn at the beginning of the rainy season, because of the stimulation of the aroma of dry, flooded soil. Spawning occurs at night until the end of dawn. Before spawning, goldfish parents actively search for lush places, such as aquatic plants or grasses that cover the surface of the water (Susanto, 2007).

The availability of seeds in sufficient quality and quantity is an absolute factor that greatly determines the success of goldfish farming activities. To get good quality seeds in sufficient quantities and continuously must be controlled by hatching that is by conducting artificial spawning (induced breeding) followed by artificial fertilization (artificial fertilization). Spawning fish can be accelerated by manipulating existing conditions, for example by providing stimulation using the pituitary gland or ovaprim hormone injected into the body of the fish (Horvarth, 1980).

The success of fish spawning is strongly influenced by several factors including parent handling, spawning technology, especially in egg incubation and larval handling. The way that can be done to improve the success of the spawning process, especially in the process of hatching eggs is by providing a substrate for laying eggs. Goldfish are classified as phytophils which are fish that need vegetation (plants) to attach eggs (Adhesive).

Substrate is a place to lay eggs when spawning fish and not attached to the spawning container. Substrates that can be used in the spawning process are numerous, for example water hyacinth, hydrilla, palm fiber, and other aquatic plants, this can increase the hatchability of eggs when hatching eggs.

Fish spawning that is usually applied by farmers only uses one type of substrate and sometimes does not use substrate in the spawning process and this is one factor decreasing the hatching rate of eggs. This problem can be overcome by increasing the hatching of eggs by using the best substrate, which can affect the increasing degree of hatching of carp eggs.

This paper aims to determine the effect of using different substrates on egg hatchability and survival of carp (*Cyprinus carpio*) seeds.

Research Methodology

This research was conducted in March to April 2017 in the Laboratory of the Faculty of Fisheries and Marine Sciences, Gorontalo State University.

The study was conducted experimentally using a completely randomized design (CRD) with four treatments and three replications. The treatments in

this study are as follows: Treatment A = using a palm substrate; Treatment B = using hydrilla substrate; C = treatment using raffia string substrate; D = no substrate (control) treatment

Preparation of the parent by preparing three male goldfish and one mature female gonad with the characteristics: For the female goldfish, the stomach is rounded soft, the genintal papilla is reddish in color, the anal canal is widened, and protrudes. clear color will come out. Whereas for male goldfish, the male is usually characterized by a slender body, the surface of the back and pectoral fins is rather rough. anal canal, and sometimes the skin changes in the head (Djarijah 2001).

Taking eggs from the female parent spawning results by means of "Stripping" that is removing the female goldfish eggs by sorting the stomach of the female parent while holding her head and tail. Sorting is done slowly from the chest towards the genital hole until the eggs come out.

Preparation of the container by preparing an aquarium container that is clean and filled with as much as 4 liters of water / container and given an aerator with one point in each aquarium. Aerator will stir water in the aquarium for 48 hours after the substrate is inserted.

Before the substrate is used, each substrate is washed clean and then dried by drying (raffia and palm fiber), for Hydrilla sp substrate is rinsed with water until clean from mud. After the substrate is ready for use, each substrate is arranged according to the size of the akurium, which is placed at the bottom of the pond so that the eggs can be spread precisely on each type of substrate.

Palm fiber substrate and raffia substrate are clamped with bamboo blades and tied with raffia straps and placed right at the bottom of the aquarium. Palm fiber and raffia substrate are neatly arranged to meet the base of the akurium so that the eggs can be spread directly on the substrate Hydrilla sp substrate is arranged neatly to fill the aquarium so that in the process of spreading eggs, the scattered eggs can stick to the substrate and not fall directly to the bottom of the aquarium without sticking to the substrate.

The fish used for this study were goldfish obtained from Lake Limboto. Parent fish that will be used in a ratio of 3:1, eggs used in the hatching process are 10,766 Grains, and after hatching, 2,400 birds are taken for the survival rate observation process.

Eggs are obtained through the process of fertilization by taking goldfish brooders and stripping the female goldfish to take eggs. After sequencing the female parent is then sequenced by the male parent to collect sperm (sperm is taken out using a needleless injection, Murtejo (2008) states that every 1 ml of normal sperm can be diluted with 4 ml of NaCl. The egg is mixed with sperm which has been added with physiological solution and shaken or stirred using chicken feathers so that the sperm spread so that the egg can be fertilized evenly. Eggs that have been fertilized with sperm are spread in egg hatching containers that have been given a substrate first.

The eggs will hatch within 42 hours after fertilization. Eggs that have been hatched are left attached to the substrate. The substrate will be removed on the media if the larvae are not attached to the substrate or have spread at the bottom of the aquarium. Feeding on larvae is done when the larvae are three days old. The feed given is egg yolk in the smallest possible way (Adlibithum).

The parameters observed include the degree of hatching, survival and water quality. The degree of hatching is the number of eggs that hatch in percent. The calculation is done two days after hatching using the hatching formula as used by Fajrin (2012).

Survival during seed maintenance. How to count is the number of seeds that live 100 times multiplied by the total number of seeds when calculating the percentage of hatching (Fajrin, 2012).

The data obtained includes the results of the calculation of the Hatching Rate Precentage and Survival Rate calculated using a one-way analysis of variance (ANOVA) by performing the F test of the complete randomized design method (CRD) then the subsequent analysis is carried out the Least Significant Difference (LSD) test.

Results and Discussion

Hatchabilty rate

Egg hatchability is the ratio of the number of eggs that hatched at the end of the observation with the number of eggs at the beginning of the observation. Hatching of eggs is observed for three days using a substrate, after the fourth day the substrate is removed from the hatching container then a calculation is performed.

The hatchability of carp eggs (*Cyprinus carpio*) varies, the highest hatchability was 87.66% in the palm fiber substrate treatment and the lowest was 57.51% in the hydrilla substrate treatment. Egg hatchability can be seen in Figure 1.

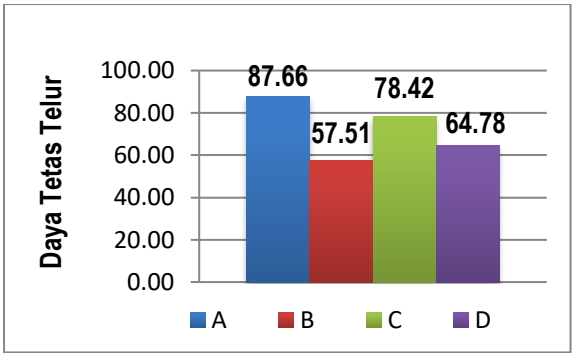

Figure 1. Hatchability of carp (*Cyprinus carpio*)

Treatment A with palm fibres substrate has the highest percentage of hatchability among treatments B, C, and D. These results indicate that the palm fibre substrate is a good substrate for hatching goldfish eggs. Eggs that are fertilized are eggs that attach perfectly to the very fine natural fibers.

In the container with palm fibres, the water does not change color or become turbid or smelly. Water quality remains in good condition so that it does not affect embryonic development. This is in line with Widiyati's opinion in Tommy et al. (2013) that fertilized eggs will develop and hatch normally if supported by good environmental conditions. According to Sutisna (1995), in spawning ponds, egg hatching ponds and larval rearing, water brightness must be considered because it is very influential on egg fertilization, and larval life.

Raffia string substrate treatment has hatchability after palm fibres substrate treatment. The low percentage of hatching on the raffia string because it is not natural and has slippery textured so that the eggs fall to the bottom and die. According to Wahyuningsih (2012) the low hatchability of eggs on raffia string substrate is allegedly because not all eggs that have been issued by the parent fish can hatch into larvae. Raffia string substrate material can bind dirt and contain chemicals from a group of polyamides from nylon, polyolefin, polyester. The chemicals contained in the raffia can inhibit the development of the embryo during egg incubation. Control or no substrate treatment is a treatment with hatchability percentage after palm fiber substrate and raffia string treatment.

Hydrilla substrate treatment has the lowest hatching percentage. This is because at the time of research hydrilla plants experienced decay because it did not get enough sunlight to live, while the study was conducted in a room that had little sunlight. According to Handoko (2008), *Hydrilla verticillata* is very dependent on light to photosynthesize.

According to Widiyati in Tommy et al. (2013), the low degree of hatching on Hydrilla sp substrate due to this plant can die and rot and affect water quality, so that eggs are attacked by pathogens and cannot hatch. Microorganisms such as bacteria and aquatic fungi, as well as the treatment of egg transfer can cause egg viability to decrease thereby reducing the degree of hatching and abnormalities of newly hatched larvae (Effendi, 2002).

According to Akhmat (2001), differences in the substrate as a place for egg incubation can affect the physiological development of offspring. According to Affandi and Tang referred to by Zairin (2005), hatching of eggs is influenced by internal factors such as hormone work and egg yolk feed volume and external factors such as temperature, dissolved oxygen and light intensity, but there are other factors including the percentage of fertilization of fertilized eggs, and pathogens . According to Tommy (2013), fertilization factor is largely determined by how many eggs can be produced by sperm, the more eggs fertilized by sperm the higher the hatchability and vice versa. Besides environmental factors also affect hatchability, such as water quality, lack of oxygen and acidic. However, both factors are considered the same because the environmental conditions in the hatchery container are the same, for example the results of water quality measurements have the same value and are included in good criteria. The distinguishing factor is the use of different substrates.

Survival rate

Basically, the larvae hatched on different substrate have different survival rate. Larvae hatched on palm fibers have the highest survival rate compared to other types of substrates (Edwar, 2016).

The results showed a different survival for each treatment. The difference can be seen in Figure 2.

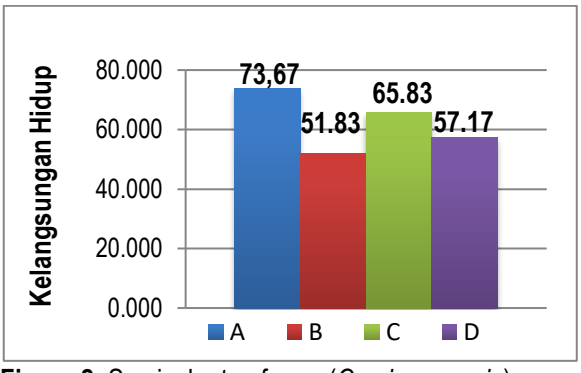

Figure 2. Survival rate of carp (*Cyprinus carpio*)

Observation of survival rate is carried out for 14 days after hatching eggs, during observation on day 4 carp seeds are fed with egg yolk dissolved in water and then filtered so that the feed is easy to eat. Feeding is given on the fourth day because after hatching the

larvae have egg yolk sacs as food reserves that can last until the third day. The feed size used in the seed stage is adjusted to the fish's mouth opening.

Eggs hatched on the palm substrate have the highest survival rate of 73.67%, this shows that the palm fibers are a good substrate used in the hatchery process. Palm fiber substrate has a very good influence on fish survival, similar to the results obtained by Edwar (2016). The most fertilized egg is thought to be an egg that attaches to the palm fiber substrate.

Treatment B with hydrilla substrate has a low survival percentage of only up to 51.83%, this is due to the quality of larvae produced from hatching is not good because the eggs are damaged and decayed. According to Edwar (2016), eggs that are hatched in containers or on substrates with good water quality influence the increase in survival rate of larvae. Hydrilla damage affects water quality in the form of changes in the color of the water to become turbid and its brightness decreases. According to Sutisna (1995), water brightness has a direct effect on seed respiration.

References

Akhmat T.M. 2001. Poliploidisasi Ikan Mas (Cyprinus Carpio L.). *Jurnal Biosain* Vol. 1 No. 1, 2001: 117

Djarijah A.S. 2001. Pembenihan Ikan Mas. Jakarta

Edwar. 2016. Pengaruh penggunaan substrat yang berbeda terhadap daya tetas telur dan sintasan hidup larva ikan lele sangkuriang *(Clarias* sp*)*. *Jurnal Imiah Perikanan dan Kelautan* Vol. 4 No.1: 7 - 15

Fajrin CN. 2012. Penambahan Ekstrak Tauge Dalam Pakan Untuk Meningkatkan Keberhasilan Pemijahan Ikan Mas Koki (Carassius auratus). *Jurnal Perikanan dan Kelautan*. Vol 3. No 3. Fakultas Perikanan dan Ilmu Kelautan. UNPAD.

Handoko P. 2008. Pengaruh Spektrum Cahaya Tampak Terhadap Laju Fotosintesis Tanaman Air Hydrilla Verticillata. *Jurnal Biologi*. Vol. 15:1. Prodi Pendidikan Biologi FKIP Universitas Nusantara PGRI Kediri

Hikmat K. 2002. *Mas Siikan Panjang Umur*. Agromedia. Jakarta.

Horvart L. and A. Pateri, 1980. The Effect of Oxygen Conten of Water on The Ovulation of Carps. *Aquaculture Hungarica* (Szarvas), Vol. 11: 15-18.

Susanto. 2007. Budidaya Ikan di Pekarangan. Jakarta: Penebar Swadaya.

Suseno D. 2000. Pengelolaan Usaha Pembenihan Ikan Mas. Jakarta: Penebar Swadaya.

Murtejo H.E. 2008. Effektivitas Egg Stimulant dalam Pakan terhadap Pematangan Gonad dan Produktifitas Ikan Red Fin Shark (Epalzeorhynchos frenatum). *Skripsi*. Institut Pertanian Bogor, Bogor.

Tommy P.M., D Bakti dan Nurmantias. 2013. Pembenihan Ikan Mas Koki (*Cararasius auratus*) dengan Menggunakan Berbagai Subtrat. *Jurnal Fakultas Pertanian*. Universitas Sumatera Utara. Program Studi Manajemen Sumber Daya Perairan Universitas Sumatera Utara.

Wahyuningsih S. 2012. Pengaruh Jenis Substrat Penempel Telur Terhadap Tingkat Keberhasilan Pemijahan Ikan Komet (Carassius auratus). *Jurnal Perikanan Unram*, Volume 1, No. 1. Universitas Mataram.

Zairin JR. 2005. Pemijahan Ikan Tawes Dengan Sistem Imbas Menggunakan Ikan Mas Sebagai Pemicu. *Jurnal Akuakultur Indonesia*. Vol 4. No (2). Jurusan Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor.