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Soya Milk Using for Herbivorous Fishes Larvae Raring

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Abstract: In ponds (3 ha) with brackish water, larvae of silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*H. nobilis*) were grown in monoculture. There were stocked silver carp larvae - 2 million pieces, bighead carp - 0.5 million pieces. Soy milk was prepared daily (15 kg of beans/pond/day + 140 l of water in each pond) and applied to the pond for 30 days. The yield from the first pond was 900,000 fry of the silver carp with a total biomass of 4104 kg, from the second - 210,000 bighead carp with a total biomass of 1070 kg (yield 45% and 42%, respectively).

Keywords: aquaculture, silver carp, bighead carp, soybean milk, fish growth, fish biomass, post embryonal larvae, Uzbekistan.

Introduction

Fish farming is one of the fastest growing areas of the global economy in recent years. In the last decade, it has been one of the largest manufacturers and suppliers of animal proteins in human nutrition. Total global aquaculture production reached 82.1 million tons per year, of which 51.3 million tons came from freshwater aquaculture (FAO, 2020). The importance of aquaculture as a fish producer is increasing in continental regions.

Technological approaches to pond polyculture of cyprinids were developed for ponds fed with fresh water (Sbornik…, 1988; Kamilov et al., 2003). In this case, fish farm ponds are tied to a river or irrigation system (Kamilov, 2003). In Uzbekistan, land resources with such conditions are very limited. At the same time, there is an extensive network of drainage channels with brackish water (Kamilov et al. Lands capable of organizing the filling of ponds with such water is a real resource for pond fish farming, provided that cultivated fish and other necessary aquatic organisms survive and grow in such conditions The limiting factor of fish farming is the development of natural food base organisms.In addition to the ability to grow in brackish water, it is important to determine the ability to fertilize brackish water for the development of natural food base organisms.Soy milk is a new type of pond fertilizer, the basic use of which has been developed for freshwater fish farming in China (Aquaculture… , 2018) The purpose of this work is to determine the possibility of fertilizing water with soy milk for the growth of the food supply and, as a result, the growth of larvae of herbivorous fish in the conditions of drainage water of the flat zone of the republic.

Material and Method

The work was carried out in 2019 in a pond fish farm on the banks of the Central Golodnostepsky collector in the Syrdarya region of Uzbekistan. In the spring of that year, 2 ponds were dug and prepared at the fish farm: No. 2 (with an area of 3 ha) and No. 4 (3 ha) with water supplied from the drainage water collector by pumps.

A week before stocking, slaked lime (300 kg/ha) and overripe manure (5 t/ha) were added to the ponds throughout the bed. Along the perimeter of the pond, a ditch 10 m wide was dug from the supply sluice to the discharge sluice, with a depth of 20 cm at the top of the pond to 70 cm at the bottom. A mill gas filter No. 12 was installed at the supply lock. The pond began to be filled 4 days before the arrival of the larvae, only the ditch was filled to a depth of 40-60 cm near the lower monk, where mats (3* 1.5 m) were installed every 4-6 m) from reeds, tying them to poles stuck in the bottom.

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On June 5, 2 million prelarvae of bighead carp were brought into pond No. 2 and 500 thousand prelarvae of bighead carp were brought into pond No. 4 in monoculture; both species hatched on 3 June. Water continued to be supplied, on June 10 the entire bottom was covered with water.

The introduction of soy milk was carried out daily, starting 2 days before stocking the pond with larvae. The soybeans soaked in the evening were left until the morning, at 6-7 o'clock in the morning they were thoroughly ground in a blender with the addition of water (the ratio of swollen beans and water by volume was approximately equal), resulting in a liquid with the consistency of milk ("soy milk"). ”), which was sprinkled on the surface of the water. For the whole month, 15 kg of beans were used daily for each pond, in the first half, 100-140 liters of water were used to prepare soy milk. By the end of the month, 70-80 liters of water were used, i.e. soy milk was thicker in consistency. In the first half of July, both ponds were completely fished.

Hydrochemical analysis was carried out by conventional methods (Alekin et al., 1973).

Control fishing was carried out every 10 days. The body weight of fish was measured in a random sample of 25 individuals with an accuracy of 0.1 g.

Results

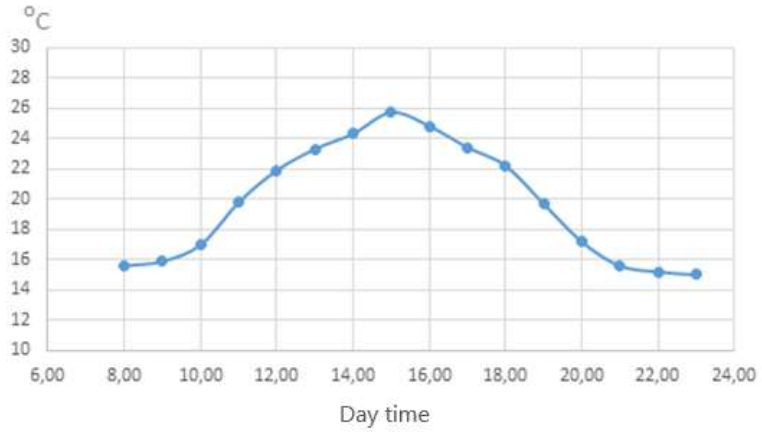
Hydrochemical regime of ponds

The water in the pond warmed up well: on June 10 at 8-00 the water temperature in both ponds was 15.8 °C, at 16-00 - 25.6 °C, at 20-00 - 17 °C; On July 10, the temperature was noticeably higher during the day: 25.2 °C, 26.8 °C, 31.5 °C, respectively. It should be noted that such a good heating of the water was carried out precisely due to the creation of fish-breeding ditches along the perimeter of the pond. Such a simple technique allows you to significantly optimize the rearing of cyprinids with any fertilizer used.

The hydrogen index during the month varied from 6.9 to 8.1.

During the day, the whole month, the temperature increased by the second half of the day (Fig. 1), and the pH increased at night (Fig. 2). Both indicators were within the normal range, one can even consider it to the optimum for carp polyculture. The mineralization of water in the pond varied 2.6 - 3.5o/oo, i.e. was salty.

The content of dissolved oxygen throughout the month varied during the day from 3.5 to 5.9 mg/l.



Pic. 1. Daily dynamics of water temperature in pond No. 2, Central Golodnostepsky collector, Syrdarya region, Uzbekistan, 14.06.2019

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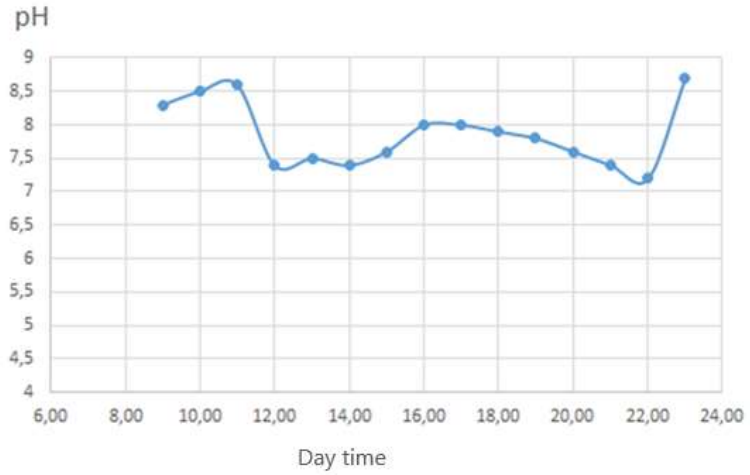

Pic. 2. Daily dynamics of the hydrogen potential in pond No. 2, Central Golodnostepsky collector, Syrdarya region, Uzbekistan, 14.06.2019

Fish behavior and growth

In white and bighead carps, we tried to find out whether soy milk is only a fertilizer, or also supplementary feeding for these species. The development of natural food base organisms in these two ponds was richer than in the canals; soy milk is a fertilizer that stimulates the development of hydrobionts in the pond.

Starting from the second week, when it became possible to see shoals of silver carp in the water from the shore (Fig. 3), each time when soy milk was introduced, it was seen that large shoals of both species, when fish farmers appeared on the shore with cans of soy milk, quickly gathered in flocks that actively swam near the shore. Immediately after the introduction of soy milk into the pond, white clouds of milk (slurry) formed in the water. Several large flocks of silver carp threw themselves into these clouds of suspension. This was especially evident in the cloud that washed ashore. It was evident that the silver carps actively swam under the layer of suspension, swam in it, swimming through it many times, already from the stage of fry, the unique feature of silver carps to jump out of the water was clearly manifested.

That and for both species of silver carp, the participation of soy milk in the diet of fish was noted.

Pic. 3. On the left, a flock of silver carps immediately before adding soy milk to the pond, on the right, an actively feeding flock of silver carps in a cloud of soy milk 15-20 minutes after the introduction.

The control catch carried out on July 1 showed that juveniles of silver carp reached 1.0 - 2.1 (on average 1.49) g of the total weight of fish, bighead carp 1.1 - 2.0 (1.61) g. that in the normative regime of the former planned economy, fry of both species reach an average individual weight of 1 g at the age of one month. That. in our experience, the growth of experimental herds began to somewhat exceed the normative one by a month.

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Moreover, we are talking not only about the growth of body size, but also about the transition of larvae into fry (and this is a real metamorphosis, larvae are not at all similar to fry in body structure).

Fry output

On June 11-12, 4104 kg of white silver carp fry were caught from pond No. 2, the fry reached an average of 4.56 g, calculations showed that about 900 thousand pieces were caught, the yield was 45%. On the same days, 1070 kg of fry of bighead carp were caught from pond No. 4, the fry reached an average of 5.1 g, the estimated amount caught was 210 thousand pieces, the yield was 42%. Already by this age, the growth of experimental fish of both species significantly exceeded the normative growth for the conditions of a planned economy (almost 2 times the experimental fish are larger).

Thus, when using soy milk in ponds with brackish water for silver carp and bighead carp, the standard indicators of the former planned economy (25 g) were met in terms of survival, but in terms of fish size, the growth in the experiments far outstripped the standard growth.

According to our observations, soy milk for silver carp and bighead carp shows a complex effect. It is a good rich water fertilizer for the growth of natural food base organisms. At the same time, fish willingly and repeatedly swim through a cloud of soy milk in flocks, and for silver carps this is an indicator of nutrition. Already by the end of the first month of life (by the beginning of the juvenile period), a significant difference in nutrition appears between the two species of silver carp: the silver carp switches mainly to feeding on phytoplankton, and the bighead carp specializes in feeding on zooplankton. The difference with carp (benthophage) and grass carp (which, having become a fry, passes to feed on higher aquatic vegetation) appears even more. Обсуждение

Silver carp and bighead carp are among the 5 most cultivated fish species in the world, referring to the so-called. "filter-feeding fish". Occupying the initial links of food chains, these species are beneficial from an environmental point of view; they are grown in the so-called. extensive and semi-intensive conditions, tk. they grow due to the development of organisms of the natural food base, which is stimulated by the application of fertilizers. The normative indicators for the conditions of the republic are the following: the density of planting of ungrown larvae in fry ponds in monoculture - 1-2 million pieces / ha, obtaining a grown larvae (up to a sample of 20-30 mg) - in 15-20 days (yield 40-50%); further, fry ponds are fished, and fish of different species are planted in polyculture. In Uzbekistan, in advanced fish farms, during the month of June, ungrown larvae of various species in a monoculture are grown to fry with a sample of 0.3-1 g.

In Uzbekistan, there is no experience of using soy milk in fish farming and growing larvae in drainage water. Our experiments have shown that (a) on drainage water (salinity up to 3.5 o/oo), using a set of measures that stimulate the development of the natural food base of plankton, it is possible to successfully grow larvae to fry, which makes it possible to create nursery ponds throughout the drainage area. system of the republic; (b) soy milk may be a very promising new food source for cyprinid fish larvae in earthen ponds. The results obtained by us on the survival of larvae are in good agreement with the norms of pond polyculture for the VII zone of fish farming (yield 41-45%), and individuals had a much faster growth (fry on average 4.56 g for silver carp and 5.1 g for bighead carp). compared with the normative 0.3-1 g).

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