Fisheries and Aquaculture Journal

Goswami and Zade, Fish Aquac J 2015, 6:3
DOI: 10.4172/2150-3508.1000132

Research Article Open Access

Effect of *Daucus carota* and *Beta vulgaris* on Color of *Anabus testudineus*

Chandasudha Goswami[1]* and Zade VS[2]

[1]Department of Zoology, Govt. Institute of Science and Humanities, Amravati-444604, India
[2]Govt. Institute of Science and Humanities, VMV Road, Amravati-444604, India

Abstract

Ornamental fish keeping is one of the most popular hobbies in the world today and rapidly gaining importance for their aesthetic value as well as trade value. The knowledge of nutritional requirement in ornamental fish species is essential to improve productive development and also for color improvement. The Climbing Perch, *Anabas testudineus* (Bloch) is a highly priced air breathing, freshwater food fish species which belongs to the family Anabantidae and order Perciformes. This paper deals with effect of feed; formulated from Natural plant products viz. carrot (*Daucus carota*) and beetroot (*Beta vulgaris*) on color improvement of *Anabus testudineus*. The feed and water environment changed the color of *Ananus testudineus* by 80% during the experiment. In practice, Fishery business has enormous potential to accelerate Indian Economy by earning foreign currency as well as it may also reopen a door for young entrepreneurs to do fishery business using natural plant products as feed. Also Ornamental fish feed from natural plant product will make its culture and rearing easy and less expensive and makes this business vibrant and native fishes will get the level of demand they deserve.

Keywords: Ornamental fishes; Aesthetic value; Nutrition; Color improvement; Feed formulation

Introduction

The production and trade of ornamental fish is a profitable alternative in the aquaculture activity. Feeding habit of the fish is very difference in the form of Carnivorous, Herbivorous, Omnivorous and also there is a large diversity in their feeding patterns. Like farmed fish, some aquarium fish are surface feeders, some mid-water or bottom feeders Diets for aquatic animals can only be effective if they are formulated to contain the full array of necessary nutrients at appropriate concentrations relative to each other along with appropriate factors inducing rapid consumption on a consistent basis. Some fishes depend mostly on natural feed. Obviously it is not possible to supply their native food and the varieties that they need to survive and grow but by analyzing the requirement the food factories try to prepare the best food for aquarium fish. Also, flavor and taste, sound (vibrations in water), smell, color and buoyancy of food are also important aspects. As ornamental fishes are characterized by a wide diversity of colors and color patterns; success in the ornamental fish trade is very much dependent on the vibrant color of the fish (World Journal of Fish & Marine Sciences) [1].

In fish, correct formulations of the diet improve the nutrient digestibility, supply the metabolic needs, reducing the maintenance cost, and at the same time the water pollution. Nutrients essential to fish are the same as those required by most other animals. Foods such as meal powder, flakes, milk powder, bovine heart and liver, tubifex worms, as well as live food including *Artemia* sp., rotifers and Moina have been used extensively in ornamental fish feeding. In their natural environment fish have developed a wide variety of feeding specializations (behavioral, morphological, and physiological) to acquire essential nutrients and utilize varied food sources. In past decade the nutritional requirements of various fish species have understood and technological advances in feed manufacturing have been obtained [2].

As ornamental fishes are characterized by a wide diversity of colors and color patterns; success in the ornamental fish trade is very much dependent on the vibrant color of the fish (World Journal of Fish & Marine Sciences). Pigments are responsible for the wide spectrum of color in fishes which is an essential prerequisite for the quality as they fetch higher price in the commercial market. As fishes cannot synthesize their own coloring pigments denovo, the coloring agents which are synthesized by some plants, algae and microorganisms need to incorporated in their diet [3,4]. Various coloring agents are used in aqua industry to impart color for the muscle & skin of fishes. Thus, pigmentation is an important criterion for fishes, since their color affect commercial acceptability. One of the greatest challenges in the ornamental fish industry is to replicate the accurate natural color of the fish in the captive environment. Numerous operations that have been propagated failed to successfully market fish due to faded color. Various products have been introduced to alleviate this problem, but none has performed so effectively. Hence, in the present work an effort is made in this direction.

Materials and Methods

Study area

Study area for collection of fishes was fixed as the Southern part of Kamrup District of Assam covering the water bodies Chandubi (Highest loop containing water body), Kulsi, Beeldora etc. These were prime wetlands connected to the river Brahmaputra; hence the sample covered most of the freshwater ornamental fish species found of Assam [5,6].

Sample collection

Samples were collected at random intervals by bag nets, scoop nets, cast nets or by hand picking. For feeding and experiment few fishes were

***Corresponding author:** Chandasudha Goswami, Research Scholar, Dept. of Zoology, Govt. Institute of Science and Humanities, Amravati-444604, India, Tel: +919922961064; E-mail: goswami.chandasudha@gmail.com

Received February 16, 2015; **Accepted** May 26, 2015; **Published** May 30, 2015

Citation: Goswami C, Zade VS (2015) Effect of *Daucus carota* and *Beta vulgaris* on Color of *Anabus testudineus*. Fish Aquac J 6: 132. doi:10.4172/2150-3508.1000132

taken for the experiments and were cultured for a stipulated period of 6 months [7]. The experiments were carried out in aquariums, cement tanks and buckets.

Experimental setup

The experimental setup consisted of 3 aquariums, 2 cement tanks and 3 buckets. Aquariums and buckets were used for rearing of fishes whereas cement tanks were used as reserves and also for acclimatization [8].

Water collection and maintenance of quality in rearing tank

Water used here was not from eutrophicated pond, but it was normal clean well/tap water. Water was being changed in aquariums and buckets in every 2 days to maintain a hygienic condition. Tanks were just used as reserves and water was changed in 7 to 10 days [9].

Rearing

The tanks were covered with metallic net to prevent the escape of fish. The 1/4th surface area of the tanks were covered with *Azolla* to provide shelter and shadow to the fishes. Bacteria accumulated in the inner sides of the tanks were removed mechanically at regular interval. Faeces, waste particles of food and dead bodies of fish were siphoned or collected with small net at regular interval. Some *Anabus testudineus* were treated in clear water aquaria. They were fed one time/day with meal.

Diet

For the present investigation, the feed was prepared in the form of dry pellets [10]. The experimental diet contains the *Daucus carota* (carrot) and *Beta vulgaris* (beetroot) as basic ingredients (sometimes mixed with a portion of rice grain/meal powder). Carrot and beetroots were farmed and also purchased from the local market. The prepared foods were provided one time daily to the experimental fishes. Three aquariums: control, positive control (commercial feed added), and experimental tank were design. During the experiment the fishes were fed with prepared feed at a constant rate a time a day. And the experiment was continued for a period of 6 months though coloration we got on 3 months. After that till the end of 6 months there was a very slight variation in color with the same feed [11].

Coloration Judgment

Test panels of persons randomly recruited judged color. The treatments were not revealed to the individuals who will be asked to rank the fish according to intensity of color. Color ranking were scored by a score of 1-4 (one being the lowest) for each treatment groups [12].

Result and Discussion

Results

Effect of formulated feed on Coloration: During Coloration Judgment color ranking were scored by a score of 1-4 (one being the lowest) for each treatment groups. From Table 1 we got to know about the effect of formulated food on 4 different random species. The result shows highest coloration on *Anabus testudineus* (Koi). Koi fishes are black in color in eutrophilated or polluted ponds. When it is brought and cultured in clean water its color changes from dark to white tone gradually. Again, after *feeding Daucus carota* (carrot) and *Beta vulgaris* (beetroot), color changes gradually giving the fish a orange look in fins and heads and the color continues till it cultured in aquarium with clean water with formulated diet.

Fish species	Feed	Colour rank (out of 5)
Anabus testudineus	1. Daucus carota (carrot) 2.Beta vulgaris (Beet root) 3.Rice Meal Power	4
Puntius sp.		2.8
Channa sp.		2.5
Botia Sp .		1

Table 1: Color ranking score 1-4 (one being the lowest) for each treatment groups out of 5.

✓ In first month of culture fish turns to white shade from black shade.

✓ Upto 3rd month fish gradually develop in color in one of the dorsal and caudal fin.

✓ In 4th month coloration change widens to all fins (orange in dorsal & caudal fins) and above the head we got red color.

✓ After that the color improvement shows very slow pattern but retaining color continues.

✓ 5th and 6th month shows slight brightening in colors.

Discussion

Fishes cannot synthesis the carotenoid denovo). As per Sinha and Asimi [13] Pigmentation is one of the quality attributes of the fish for consumer acceptability. Carotinoids are responsible for pigmentation of muscle in food fish, and skin colour in ornamental fish. As fish is not capable of synthesizing carotenoids de novo there is a need to incorporate carotenoids in the diet of cultured species. Since synthetic carotenoids are known to have deteriorating effects on the environment, there is a great demand for inclusion of natural carotenoids in aqua feed to achieve bright coloration in fish. Carotenoids are absorbed in animal diets, sometimes transformed into other carotenoids, and incorporated into various tissues. In earlier days Ali and Salim [14] also established that fish do not possess the ability to synthesize carotenoids. Hence the carotenoid pigmentation of fish results depends upon the supplementary feed contains the carotenoid amount. The micro algae *Chlorella vulgaris* has become a potent pigment source which imparts yellow/blue hues [15]. Here in our study we tried *Daucus carota* (carrot) and *Beta vulgaris* (beetroot) instead of *Chlorella vulgaris* or other carotenoids to make a different wayout with low cost easily available natural products.

Conclusion

Pigmentation is an important criterion for fishes, since their color affect commercial acceptability. One of the greatest challenges in the ornamental fish industry is to replicate the accurate natural color of the fish in the captive environment. Numerous operations that have been propagated failed to successfully market fish due to faded color. Various products have been introduced to alleviate this problem, but none has performed so effectively. Hence, in the present work an effort was made in this direction using Carrot and beetroot as source of carotenoids to impart color on few randomly selected species. Here *Anabas testudineus* shows greatest improvement in color by 80%.

Acknowledgements

I want to extend deep sense of gratitude to Dr K. M. Kulkarni sir for his support and guidance. Also we want to offer thanks to Mr. Amol Nale, Mr. Jujusman, Dr. Dinesh Dabhadkar, Dr. Vaibhao Thakare, Ved Patki, Akanksha Mahajan and all supportive people we get on the way for providing us colloquial knowledge and information about the river, fish and feed.

References

1. Rainboth WJ (1996) Fishes of the Cambodian Mekong: FAO Species Identification Field Guide for Fishery Purposes. FAO, Rome.

2. Wang TY, Tzeng CS,Shen SC (1999) Conservation and phytogeography of Taiwan paradise fish: *Macropodusoper cularis* Linnaeus. Acta Zool Taiwan.
3. Kottelat M (2001) Fishes of Laos: WHT Publications Ltd, Colombo.
4. Tan HH, Lim KKP (2004) Inland fishes from the Anambas and Natuna Islands, South China Sea, with description of a new species of *Betta*(Teleostoi: Osphronemidae): Raffles Bull. Zool. Suppl, 11: 107-115.
5. Iwata *A,* Ohnishi N, Kiguchi Y (2003) Habitat use of fishes and fishing activity in plain area of southern Laos: Asian Afr. AreaStud. 3: 51-86.
6. Sarkar UK, Deepak PK, Kapoor D, Negl RS, Paul SK, et al. (2005) Captive breeding of Climbing Perch, *Anabus testudineus* (Bloch, 1792) with Wova-FH for conversation and aquaculture: Aquacult. Res 36: 941-945.
7. Mustafa Md G, Alam Md J, Islam Md M (2010) Effects of some artificial diets on feed utilisation and growth of the fry of Climbing Perch, *Anabas testudineus* (Bloch, 1972): Department of Fisheries, University of Dhaka, Bangladesh.
8. Graham JB (1997) Air-breathing fishes: Evolution, Diversity and Adaptation. Academic Press, London, UK.
9. Petiyagoda R (1991) Freshwater fishes of Sri Lanka: The Wildlife Heritage of Sri Lanka, 362.
10. Sterba G (1983) The Aquarium Fish Encyclopaedia: The MIT Process. Cambridge, Massachusetts, 605.
11. Sakurai A, Sakamato Y, Mori F (1993) Aquarium Fish of the World: The Comprehensive Guide to 650 Species. Chronicle Books. San Francisco: 288.
12. Liem KF (1987) Functional design of the air ventilation apparatus and overland excursions by Teleosts.Fieldiana: Zoology 37: 1-29.
13. Davenport J, Matin AKMA (2006) Terrestrial locomotion in the Climbing Perch, *A. testudineus* (Bloch) (Anabantidea, Pisces): Journal of Fish Biology 37: 175-184.
14. Joseph B, Sujath S, Shalin JJ, Palavesam A (2011) Influence of Four ornamental flowers on the growth and colouration of orange sword tail Chicilidae fish *(Xiphophorus hellerei*, Heckel, 1940): Int J Biol Med Res 2: 621-626
15. Meyers SP (1994) Developments in world aquaculture, feed formulation and role of carotenoids. Pure applied Chem 66: 1069-1076.