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Effect of beta vulgaris as a source of carotenoid in aquarium fish *Trichopodus trichopterus*

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Abstract
Color is an important factor for determining the ornamental fish price in the world market. Use of carotenoid source beetroot (Beta vulgaris) in the powder form can be changed the skin color of three spot gourami. Beetroot are a great source of fiber, folate (vitaminB9), manganese, potassium, iron and vitamin C. Carotenoid present in Beetroot is 1.9mg/100g of the sample. Altogether 12 fish were randomly selected into 3 group into three tanks. The experimental feeds were prepared with 30% protein the basic ingredients such as GNC and maize and the natural source of carotenoid, beetroot are randomly added in experimental diet 0%, 5% and 10% for three tanks and give the feed for fishes 4% body weight for a period 60 days. In the control tank no other change was determined, but in the experimental tank colour, weight and length is different from one to another tank. In control tank color was no changed and the growth is poor in compare to other experimental tanks. The best result colour and growth was appear in 10%beetroot feed then 5% beetroot feed.

Keywords: beetroot, three spots gourami fish, carotenoid

Introduction

Pigment also play a important role in determining the colour of fish. Fish coloration is due to the presence of Chromatophore which contain pigments and are usually located in dermis. There are four main groups of pigments responsible for tissue and skin coloration in animals and plants namely melanin, purine, pyridium and carotenoid. Carotenoids are the main pigment in fish. Carotenoids belong to a family with more than 600 fat-soluble natural pigments. Fish and other animals are not able to synthesize carotenoids, thus they are depended on dietary source. After dietary intake, carotenoids can be transformed to other compounds. Due to some adverse effects of dietarieties of carotenoids pigments are used in fish diet for colour enhancement. They also occur in yeast and moulds where they carry out a protective function against damage by light and oxygen. Carotenoids, like other antioxidants, have some protective effects against certain cancers. Further, certain carotenoids are needed in the diet. It is from these carotenoids that the body creates necessary vitamins.

Types of Carotenoids

Xanthophylls

There are two main types of carotenoids, the xanthophylls and the carotenes. Xanthophylls are easily recognized by their yellow coloration, and are present in high quantities in leaves. These carotenoids are responsible for yellow leaves. Xanthophylls also give color to fruits and vegetables like papaya, squash, and peaches.

Carotenes,

Unlike xanthophylls, are carotenoids with no oxygen atoms they reflect mostly red and orange light. Carotenes are responsible for the color of everything from carrots to sweet potatoes to cantaloupe.

Examples of Carotenoids

Beta-Carotene: Beta-carotene is a specific carotenoid found plants and fruits. It has a red-orange coloration when isolated. Beta-carotene is found in carrots, pumpkins, sweet potatoes, and even leafy greens like spinach and kale.

Lutein: Lutein is a xanthophyll, found in leafy green plants. Lutein is a yellow colored pigment. It bestows yellow color to egg yolks, and yellow carrots.

Carotenoid content in vegetable samples

Table 1

Vegetable Carotenoid Content	mg/100g of the sample
Carrot	18.3
Spinach	5.6
Red capsicum	2.4
Beetroot	1.9
Broccoli	1.3

Material and Methods

Experimental fish - Three spot gourami (Trichopodus Trichopterus) Characteristics feature of three spot gourami:

Fig 1

Kingdom: Animalia
Phylum: Chordata

Class: Actinopterygii
Order: Anabantiformes
Family: Osphronemidae
Genus: Trichopodus
Species: T. trichopterus
Binomial Name: Trichopodus trichopterus

The three spot gourami (Trichopodus trichopterus), also known as the opaline gourami, blue gourami, three spot gourami gets its vernacular name from the two spots along each side of its body in line together with the eye being considered as the third spot. known as "hair fin gourami" The three spot gourami is an omnivore and requires both algae-based and meaty foods, tubifex worms, and brine shrimp provide these fish with the proper nutrition Differentiating between the male and female three spot gourami is by the dorsal fin. In the male, the dorsal fin is long and pointed and the anal fin is pointed, while the female's are shorter and rounded

Carotenoid source- Beet root (Beta vulgaris)
I choose beetroot as a source of carotenoid because it easily available in monsoon season and its color is good. Beetroot (Beta vulgaris) is a root vegetable also known as red beet, table beet garden beet. Packed with essential nutrients, beetroot are a great source of fiber, folate (vitamin B9) manganese, potassium, iron and vitamin C. while 3/4 cup (100grams) of raw beet boasts the following nutrients.

Table 2

Calories	**43**
Water	88%
Protein	1.6grm
Crabs	9.6grm
Sugar	6.8grm
Fiber	2.8grm
Fat	0.2grm

Firstly I collected gourami fish from Adhar tal market Jabalpur, and measure their weight and length.

Table 3

Tank	**A**	**B**	**C**
Number of three spot gourami	4	4	4
Weight	*2g Approximately*	*2gApproximately*	*2gApproximately*
Length	*4.5 cm*	*4.5cm*	*4.5 cm*

60 days experiment was carried out to elucidate the effect of beetroot (Beta vulgaris) feed on growth

Preparation of experimental diet
The experimental feeds were prepared with basic ingredients such as maize and GNC and the natural source of Carotenoid beetroot were collected, air dried in the dark room to prevent denature of carotenoids. Proximate analysis was performed using Pearson square method. Based on this analysis, one practical diet was formulated containing 30% protein. Vitamin and mineral mixes were then added by continuous mixing.
Percentage composition of various ingredients in experimental diet/100g

Table 4

Diet	**GNC**	**Maize**	**Vitamin & mineral**	**Beetroot**
Experimental feed Tank A	42.87g	55.12g	2g	0g
Experimental feed Tank B	40.4g	52.1g	2g	5.5g
Experimental feed Tank C	38.29g	49.21g	2g	10.5g

Detail of experiment
The average length and weight of individual fish was recorded before transferring them into experimental aquarium tank Trichopodus trichopterus fish were randomly selected and transferred to individual tank. Tank A was considered as control in which feed devoid of Beta vulgaris was given. Tank B and Tank C was supplied feed with the rate of 4%of the bio mass twice a day, morning (10:00am) and evening (5:00pm).

Results
Result after 30 days experiment
According to the results obtained from the experiment, it was observed that the gourami fish responded to coloration effected by the use of pigment source. Measure length and weight of experimental tank approximately 30 days after feeding beet feed. So the fish in the tank that gave more beetroot feed got less weight and the tank which gave less beetroot got more weight. The tank in which the beet feed was not given at this time did not show much difference in the weight of the fish in that tank.

Table 5

Tanks	**Control Tank A**	**Experimental Tank B**	**Experimental Tank C**
Length	5.2cm	5.2cm	5.2cm
Weight	3.7g	3.6g	2.77g
Color	No change	No change	Little change

Result after 60 days
After 60 days, I found that the growth was more in the fish of the tank, in which the percentage of beetroot was mare and color was also found more in these fish.

Table 6

Tanks	**Control Tank A**	**Experimental Tank B**	**Experimental Tank C**
Length	6cm	6cm	6.4cm
Weight	4.07g	4.38g	4.75g
Color	No change	Light pink color	Reddish color

Fig 2

Conclusion

Tank c which showed more color because it had more beetroot percentage and tank b in which beetroot was less, then it got less color and in which there was no beetroot there was no change in color.

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