

## Study of *Oreochromis mossambicus* growth fed with plant product (*Cicer arietinum*) under Cadmium chloride stress

**Authors:**

Gunasekaran G<sup>1</sup>,  
Rameshguru G<sup>1</sup> and  
Govindarajan B<sup>2</sup>.

**Institution:**

<sup>1</sup>Department of Zoology,  
VHNSN College,  
Virudhunagar-626001,  
Tamilnadu, India.

<sup>2</sup>Venture Institute of  
Biotechnology &  
Bioinformatics Research,  
Madurai-625004, Tamil  
Nadu, India.

**Corresponding author:**

Gunasekaran G

**ABSTRACT:**

Fish culture is one of the prominent areas among the aquaculture field, in which the aquatic organisms are rich in protein source. Length and weight of *Oreochromis mossambicus* were screened under Bengal gram feed. In the same feeding condition, the length and weight of fish was studied under undressed and stress effect of Cadmium chloride for the exposure period of 10, 20 and 30 days. The length and weight of fish was increased in Bengal gram ingredients pellet fed, when compared to the control. Thus Bengal gram plays a major role in stimulating the length and weight of *Oreochromis mossambicus*.

**Keywords:**

*Oreochromis mossambicus*, Bengal gram, Cadmium chloride.

**Web Address:**

[http://jresearchbiology.com/  
Documents/RA0123.pdf](http://jresearchbiology.com/Documents/RA0123.pdf).

**Article Citation:**

Gunasekaran G, Rameshguru G and Govindarajan B.

Study of *Oreochromis mossambicus* growth fed with plant product (Bengal gram) under Cadmium chloride stress.

Journal of research in Biology (2011) 7: 524-527

**Dates:**

**Received:** 05 Oct 2011 / **Accepted:** 09 Oct 2011 / **Published:** 15 Nov 2011

© Ficus Publishers.

This Open Access article is governed by the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which gives permission for unrestricted use, non-commercial, distribution, and reproduction in all medium, provided the original work is properly cited.

**INTRODUCTION**

Fish is easily digestible and cheaper than other animal flesh (Santhanam *et al* 1987). In India aquatic source is the most valuable and easily accessible source of protein food (Hickling, 1961). The growth and health conditions of fishes are affected by temperature, nutritional factors and pollutions. Food quality and quantity are the prime factors for the growth, health and nutrition in fishes (Sampth & Pandian 1984).The artificial diet provision to cultured fishes favours low cost but are energy rich ingredients, preferably in the form of pellets (Bryant & Matty 1981). Fishes are preferred for toxicity testing and monitoring environmental stress because of their direct relevance with human beings. Effect of environment can be noticed by a variety of morphological and functional changes that occur in fishes (Toor& gill 1974).

Cadmium (Cd) is a well known cumulative poison in animals. It is classified as the second most dangerous metal in our environment (Harris & Hohenemser 1978).Due to acute toxicity of Cd it is necessary to select a sub lethal concentration. Test animals are given stress to a particular concentration of metal at which the organism should not be subjected to mortality. Therefore a sub lethal concentration of 1.5 ppm/l was fixed to conduct and carry out (Vijayaram *et al* 1989).In this research work we discuss about relationship between the nature of artificial diet and their suppressing effect on Cadmium chloride stressed fish *Oreochromis mossambicus*.

**MATERIALS AND METHODS**

**Collection of animal and acclimation**

*Oreochromis mossambicus*were collected from the Kulloorsanthai reservoir near Virudhunagar.They were acclimatized to the laboratory condition at 29±1°C for one week in our research lab.

**Table 1. Feed Ingredients Composition (Muthulakshmi 1995)**

Ingredients	Weight (g)
Dried fish powder	42
Ground nut oil cake powder	20
Blood meal powder	5
Wheat flour	15
Mineral mix	2
Vitamins	1

**Table 2. Nutritional value of edible portion per 100g of Bengal gram Gopalan *et al* 1971**

Food	Energy calorie	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vit C (mg)	Vit A (mg)
Bengal gram	360	17.1	5.3	202	10.2	0.30	0.15	2.9	3	189

**Bengal Gram (*Cicer arietinum*)**

Bengal gram is widely appreciated as health food. It is an edible legume. It is often used as an alternate protein product with vegetarians and vegans. It offers the most practical means of eradicating protein malnutrition among vegetarian children and nursing mothers. Bengal gram has a very important role in human diet in our country.The seeds are sweet when raw and are useful in hyperdipsia, burning sensation, splenohepatomegaly inflammations and skin diseases etc. (Vaidyaratnam & Variers 1994).

**Preparation of feed**

Bengal gram was selected as an artificial feed *Oreochromis mossambicus* in the present experiment. Bengal grams are procured from the local market in Virudhunagar.60% artificial feed (Bengal gram) and 40% of **table 1** ingredients were added. In addition to this, sodium alginate was added. It does not allow the compounded feed to dissolve in water one gram of sodium alginate was used per 100g of feed.

**Experimental design**

The study period is 30 days. On 10<sup>th</sup>, 20<sup>th</sup> and 30<sup>th</sup> day the length and weight parameters of fishes were assed.The length of the fish was measured with the help of measurement tap. Weight was measured after wiping the animal with filter paper on the digital balance.

**RESULTS AND DISCUSSION**

The effect of Bengal gram plant product under normal condition on the length and weight of *Oreochromis mossambicus* was measured. The initial fed group of fish the length is about 10.1cm and weight is about 13.4g. Fishes fed with Bengal gram pellets the length averages to 10.2, 10.7 and 11.0(cm) and weights 13.7, 13.8 and 14.1(g) on 10<sup>th</sup>, 20<sup>th</sup> and 30<sup>th</sup> days (Table 3).

To the effect of cadmium chloride stress condition the fish length and weight was slightly decreased. The control fed group length averages to 10.0, 10.3 and 10.5(cm) and weight is about 13.6, 13.7 and 13.8(g) on 10<sup>th</sup>, 20<sup>th</sup> and 30<sup>th</sup> days.Fish fed with Bengal gram pellets the length averages to 10.1, 10.5 and 10.8(cm) and weight is about 13.7, 13.9 and 13.9(g) on 10<sup>th</sup>, 20<sup>th</sup> and 30<sup>th</sup> days (**Table 4**).



**Table 3**Effect of Bengal gram on length and weight of *Oreochromis mossambicus* under normal condition.

Days	Sample	Fish length (Cm)	Fish weight (g)
0	Initial	10.1±0.02	13.5±0.12
10	Control	10.0±0.04	13.4±0.21
10	Bengal gram	10.2±0.08	13.7±0.07
20	Control	10.1±0.02	13.6±0.02
20	Bengal gram	10.7±0.05	13.8±0.01
30	Control	10.3±0.10	13.8±0.03
30	Bengal gram	11.0±0.14	14.1±0.07

Each value is the average (X±SE) of three observations.

In the present study, the length and weight of fish was increased significantly in unstressed conditions, but only slight increase was studied under Cadmium choride stress effect. Robert *et al* 1981 reported the effect of dietary protein, increased the length and weight of fishes. Arevalo *et al* 1948 highlighted the similar observation by increasing the protein and lipid feed quantity, triggered the linear dimension or length and weight of the fishes, but cadmium chloride stress have showed slight decrease in the length and weight of fish. Similar observation was obtained by Medda 1993.

It was concluded that the Bengal gram feed increases the length and weight of fish. The plant products had inducing effect on the length and weight of *Oreochromis mossambicus*. Therefore the Bengal gram seed pellet was confirmed to be an intensive product in stimulating the length and weight in *Oreochromis mossambicus*, which will enhances the economic value of the edible fish. *O. mossambicus* shows better improvisation in almost all the length and weight in unstressed as well as Cadmium chloride stress condition. In the 10<sup>th</sup>, 20<sup>th</sup> and 30<sup>th</sup> day exposure period, the length and weight of fish was increased in Bengal gram

**Table 4**Effect of Bengal gram on length and weight of *Oreochromis mossambicus* under Cadmium chloride (1.5 ppm/l) stress condition.

Days	Samples	Fish length (cm)	Fish weight (g)
0	Initial	10.1±0.02	13.5±0.09
10	Control	10.0±0.12	13.6±0.13
10	Bengal gram	10.1±0.21	13.7±0.15
20	Control	10.3±0.22	13.7±0.17
20	Bengal gram	10.5±0.21	13.9±0.27
30	Control	10.5±0.09	13.8±0.21
30	Bengal gram	10.8±0.12	13.9±0.07

Each value is the average (X±SE) of three observations.

ingredients pellet fed, when compared to the control. Therefore we conclude that plant product Bengal gram was confirmed to be on an intensive product in stimulating the length and weight in *O. mossambicus*.

#### BIBLIOGRAPHY

**Arevalo A. 1948.** Study of the variation in the chemical composition of the *Trachurus trachurus* L. Bolm. Inst. Cap. Oceanoger. 8:13.

**Bryant PL and Matty AJ. 1981.** Adaptation of carp, *Cyprinus carpio* larvae to artificial diets. Optimum feeding rate and adaptation age for commercial diets. Aquaculture 23:275-286.

**Gopalan C. 1971.** Nutritive value of Indian foods. Indian Council of Medical Research Publication. 60-114.

**Harris RC and Hohenemser C. 1978.** Mercury measuring and managing the risk. Environ., 20:25-36.

**Hickling CF. 1961.** Tropical inland fisheries orient longman publication, London.

**Medda C. 1993.** Seasonal variation of length and weight groups of muscle protein and lipid in the minor carp, *Puntius sophore*. J. Ecobiol., 5(3):177-180.

**Robert A, Winfree and Robert R. Stickney. 1981.** Effects of dietary protein and energy on growth, feed conversion efficiency and body composition of *Tilapia aurea*. J. Nutrition 111 (6):1001-1012.

**Sampath K and pandian TJ. 1984.** Interactions of feeding frequency and density on food utilization in air breathing murrel, *Channa striatus*. Indian Acad. Sci., 93:445-453.

**Santhanam R, Sukumaran N and Natarajan PA. 1987.** Manual of fresh water aquaculture. Oxford and FBH publishing co PVT Ltd, New Delhi-2.

**Toor HS and Gill HS. 1974.** Distribution of fisheries in relation to hydrobiological conditions of Budha Nalha-a tributary of river Sutlej. J. Ecol. 1:55-62.

**Vaidyaratnam PS, Varies. 1994.** Indian medicinal plants, a compendium of 500 species. Orient Longman Publication. 2-3:70-73 and 129-131.

**Vijayram K, Geraldine P, Varadarajan TS and Longanathan P. 1989.** Haematological responses of an air-breathing fish *Anabas testudineus* to Cadmium. J. Ecobiol., 1(1):15-19.

Submit your articles online at [Ficuspublishers.com](http://Ficuspublishers.com)

Advantages

- Easy online submission
- Complete Peer review
- Affordable Charges
- Quick processing
- Extensive indexing
- Open Access and Quick spreading
- You retains your copyright

[submit@ficuspublishers.com](mailto:submit@ficuspublishers.com)

[www.ficuspublishers.com/submit.aspx](http://www.ficuspublishers.com/submit.aspx)

**FicusPublishers**