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Research Article

Impact of agrimin and fishmin on the aspects of body length - weight (growth), gonadal somatic index of the fish species *Hypophthalmichthys molitrix, Cyprinus carpio* and *Ctenopharyngodon idella*

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Abstract

The present study is aimed at investigating the effect of selective Supplementary feeds like Agrimin and Fishmin on body length, weight and gonadal somatic index of the cultivable fish species like *Hypophthalmichthys molitrix, Cyprinus carpio,* and *Ctenopharyngodon idella.* The fishes selected for the study were divided into two groups viz. control group and experimental group .The control group of fishes were fed with control feed such as Groundnut cake, rice bran. The experimental group of fishes was further divided into two groups. The first group of experimental fish was fed with (CF+Agrimin) control feed mixed with Agrimin. The second group of experimental fish was fed with (CF+fishimin) control feed mixed with fishmin. Henceforth the feed i.e., control feed+Agrimin, control feed+Fishmin, supplied to the two groups of experimental fishes is called as supplementary feed. The two groups of experimental fish were fed twice a day at 10 a.m. and 5 p.m. The exposure period selected for the study is 30 days. Further, it may concluded that selected fish species fed with supplementary feeds supplemented by many of nutrients and minerals, resulted in significant increase in length and weight The same effect is observed in Ovary weight and Gonadal Somatic Index.

Keywords: Agrimin, Fishimin, supplementary feed, Gonadal Somatic Index.

Introduction

Growth of organism means a change in length or weight or both with increasing age. Growth is generally an increase in size due to conversion of the food matter into the building matter in the body by the process of nutrition. The rate of growth varied to a large extent among fishes as these are cold blooded (Poikilotherms). It varies from species to species. It may vary for the same fish in different localities or for the same individual at different seasons (temperature etc). Also, different parts of the body or even different organs have different rates of growth. Except for the males of piecilids (which have determinate growth), Fishes continue to grow, practically throughout their life (in determinate growth). However, in extreme old age their growth is extremely slow. Growth of fish is dependent on population density also. Higher densities tend to slow down growth, and low densities tend to hasten it (Srivastava, 1999).Food is one of the important factors promoting growth and enriching the biochemical composition of fishes. Growth attained by fish is naturally derived from the food consumed. The seasonal and diurnal abundance of different food organisms may influence the movements and migrations of fishes. Hence it is essential to have an understanding of the relation between the fishes and food organisms for prediction and exploitation of fish populations. The importance of knowledge of food and feeding habits of fish in understanding its biology has been well established. It helps in finding the distribution of a fish population which is highly

essential for successful management of any fishery (Rao and Durga Prasad, 2002). Herbivorous fishes have low assimilation efficiency and high net growth efficiency. Gross growth efficiency is higher in carnivores when compared to herbivores .This is due to the low assimilation efficiency of the herbivores. (Patterson Edward et al., 1996). Food has components which may or may not have energy value. Water, minerals, vitamins, fiber etc. have little energy value. Proteins, carbohydrates and fats are the main sources of energy. Fat has more than two times the calories of either protein or the carbohydrate. Carbohydrate is a redundant component of the fish diet if protein and fat are readily available. On an average, the requirements of carps (percent of diet) are as follows (Sreevastava, 1999).

Nutritional requirement of carp.

S.No	Stage	Protein	Fat	Carbohydrate
1	Fingerling	45%	6%	26%
2	Adult	40%	20%	10%

It may be noted that the requirements vary with species, stage of growth (Fry, Fingerling, Adult) temperature, metabolic state (Caloric need satisfied or not) and nature of available food (high - energy or low energy). Carnivorous fishes have higher growth efficiency (29%) than herbivore fishes have (20%). Study on the natural growth of fishes is a basic necessity for assessing the cultural possibilities of the fishes. Under natural conditions, the growth of a fish is in part dependent on the population density (Lecren. 1965, Backiel & Lecren, 1978). Generally a direct relationship exists between food abundance and growth rate. Although the fish were able to utilize the various dietary carbohydrates, the efficiency of their utilization was significantly affected with the nature / complexity of carbohydrate fed. Maximum growth and best conversion efficiencies and increased nutrient - retention occurred in fish fed the sucrose diet (Erfanullah, 1995). Higher stocking density may cause crowding effects and reduction of growth rate. In many fishes, fish culture practices, where the fishes are confined in a restricted space, size - dominance in feeding, is often of considerable significance (Weatherly, 1978). Growth in fishes has been found to be affected by a variety of factors such as water, temperature, levels of dissolved oxygen and ammonia, salinity and photo period. Such factors interact with each other to influence growth rates. Growth in fishes is also dependent on other factors such as the degree of competition. The amount and quality of food ingested and the age and state of maturity of the fish (Biondevi, 1993). Dietary minerals influence the growth and survival of many fish species. Since the minerals absorbed from water do not always need the total metabolic requirements of fish, their supplementation through diets results in growth promotion. Diet is an important source of salts that not only satisfies the need of body for growth, but also osmoregulation in fresh water fish. Hence provision of adequate amount of salt through feed would spare energy used in osmoregulation and reduce stress, there by leaving more energy for growth (Nandeesha *et al*., 2000).Weight of fish is a function of its length. Conditions of fish is expressed by the ratio of length to the weight of the fish at any given moment. The fish is set to have a better health condition when this ratio is high. Mathematically the condition of fish is expressed by the Fultons formula as follows (Sreevasthava, 1999).

$$Q = \frac{wx100}{L^3}$$

Where
Q is the coefficient of condition
W is weight of fish and l is length.

The coefficient of condition or factor is an expression of the condition in which the individual fish is , or has been during a certain period. This value is useful in explaining 1) differences among individuals of the same length 2) differences arising from seasonal changes in relation to the age and sex of fish 3) Differences between condition of the individuals of same species in different waters and so on. The length, weight, relationship in some other fish species was also studied by workers like pandey (1995) and sarkar *et al*., (1997) in *Hypophthalmichthys molitrix* and *Ctenopharyngodon idella*. Singh et al., (1998) in *Cyprinus carpio*, Mohan and Sarwat (2000) in *Cyprinus carpio* and Mohan and Jhajhria (2001)

with major carps. Further the weight length relation of rohu significantly varies in different reservoirs (Pantulu *et al*., 1967). Providing the fish with a nutritional diet indicates better nutritional efficiency of diet and implies that the specimens tend to put more weight and body length. In this study length weight relationships were used to evaluate the effects of artificial diets on the relative heaviness and health condition of the fishes (Najib-ur-Rahaman, 1986). But studies involving the growth patterns of fishes fed with better supplementary feeds are far and few. Therefore an attempt is made in this investigation to study the growth in terms of body length and weight in supplementary feeds like Agrimin and Fishmin.

Materials and Methods

General Experimental Conditions

For the present study, the following experimental ponds and tubs were used at the Government fish farm, at Nandyal, Kurnool District (Andhra Pradesh). The breeders were fed with shellar rice bran and ground nut oil cake regularly at the rate of 2% body weight of the fish.

1. **Stocking / Breeders pond**

The shape of the pond is rectangle of size 100'x30'x4'. Each pond is provided with inlet, outlet and overflow pipe. The bottom of pond is katcha to enable the breeders, to grow well and for buffer action. Every 48 week the stagnant water is replaced with fresh water through exchange method.

2. **Breeding tubs**

4 cement breeding tubs of size 15'x10'x4' were used for breeding of major carps. Each pond is provided with an inlet of 2" GI pipe and 2" outlet is provided at the bottom for bailing out water. Prior to, the water is released into the pond up to the over flow pipe, care is taken to maintain the water level with continuous water flow.

3. **Hatching tub**

The hatching tub is echo-hatchery type and movable. The tub is made up of zinc sheet and is cylindrical in shape. The tub height is 2.10' and dia of 3.2'. There are two chambers inside the tub since there is a round mesh of 1.80' height and 30 cm dia. There is one outlet in this tub to drain out the spawn after hatching. There is one semicircular chamber ½" pipe with nozzle to circulate water flow and to wash the eggs with freshwater continuously. The nylon cloth is inserted over the second chamber to arrest the over flow of eggs into the second chamber.

4. Nursery cum rearing pond

These ponds are built with brick and cement and the shape of nursery pond is rectangle, having the size of 50'x15'x4'. Each nursery is provided with an inlet, outlet and overflow pipe. The bottom and side walls of the nursery are plastered with cement to make them smooth. The inlet is connected to the pipeline to draw water. The inlet is provided with 3 inch gate valve to regulate the flow of water.

Determination of rate of hatchlings:

After the hatching of eggs, the hatchlings are collected from the hatch tub and shifted into a 50 ml beaker, containing fresh oxygenated water. The hatchlings are counted with help of petridish one by one. Thus the total number of hatchlings can be calculated. While counting, bad hatchlings (dead ones) and good hatchlings (live ones) are separated. The rate of hatchlings is calculated with the help of number of good and bad hatchlings by using the following formula.

No. of hatchlings = Total Number of hatchlings - Number of bad hatchlings.

And the percentage of hatchlings is calculated by using the following formula.

$$\text{Percentage of hatchlings} = \frac{\text{No.of good hatchlings}}{\text{No of bad hatchings}} \times 100$$

Determination of body length and weight

Natural growth in terms of length and weight in different supplementary feeds like Agrimin and Fishmin is measured separately. Growth in terms of

length and weight was recorded and calculated by using the following formula

$$\text{Total length gain TLG (\%)} = \frac{L-L_0}{L_0} \times 100$$

Where L_0 = Initial length of fish
L = Final length of fish.

$$\text{Wet Weight gain WWG (5)} = \frac{w-w_0}{w_0} \times 100$$

Where

w_0 = Initial wet weight of fish
w = Final wet weight of fish.

Results and Discussion

Indian Major Carps is considered as fast growing fish. Its highest growth performance after 3months is between 10-13.75 cm (Chakrabarthy, 1998). Length and Weight are attributes of growth that can be easily measured. In the present study growth and weight have been studied in different supplementary feeds, Agrimin and Fishmin. This major carp *C.catla* recorded higher rate of growth in terms of length and weight with Agrimin than with Fishmin followed by *C.idella* and *C.carpio*. Khan (1972) observed positive correlation between growth rate and nutritional values of ecosystem. The higher growth rate of fish species in Agrimin compared with Fishmin could be attributed to its high mineral conditions and presence of Methionine and L.lycine, Mono- HCl in its composition. The same effect is observed in Ovary weight and Gonadal Somatic Index. In Supplementary feeds fish species not only gain growth in terms of length but also in weight. These findings on growth are supported by the earlier studies where Mitra, 1942 observed higher rate of growth in Rohu in highly nutritive ponds in Orissa. According to Alikunhi1957 in well stocked ponds *Rohu* may attain 34-40 cm body length in a period of one year. Hora and Pillay (1962) observed that *Rohu* attained 35-45 cm body length with the weight of 670-900 gm in one year. Taking the above findings into consideration, it may be concluded that the fast growing fish species not only obtained higher growth rate in normal waters but their growth rate further increased when they were fed with supplementary feeds. The present investigation has revealed a significant raise in the growth rates of all selected fish species. Further similar patterns in growth with better food conditions in fishes (Rao and Durga Prasad 2002) are in precise agreement with the findings of the present study. The growth efficiency of the Agrimin and Fishmin fed fishes has substantially increased. This may be explained as suggested by other investigators (Nandeesha et al., 2000, Manjulatha 2003) also. Dietary minerals influence the growth and survival of many fish species. Since the materials absorbed from water do not always meet the total metabolic requirements of fish, their supplementation through diets results in growth promotion. Diet is an important source of salts. It not only satisfies the needs of body for growth but also osmo regulation in fresh water fish. Hence provision of adequate amount of salt through supplementary feeds would spare energy used in osmoregulation and reduce stress, thereby leaving more energy for growth as observed in Agrimin than Fishmin in the present study. Moreover the more accumulation of carbohydrates in the form of glucose and glycogen, protein and fat contents maintain of high energy charge. As shown in the previous chapters an increase in the rate of metabolism results in an increase in growth performance. Further, it may concluded that selected fish species fed with supplementary feeds supplemented by many of nutrients and minerals, resulted in significant increase in length and weight and ultimately reflected in the profound growth rate.

Table: 1 Effect of Agrimin & Fishmin on the rate of Hatchlings & Body length Of Fry in *H.molitrix, C.carpio, C.idella*
(Values expressed as mm for Body length)

Name of the Feed	Name of the parameter					
	Rate of Hatchlings			Body Length of Fry		
	Cyprinus carpio	*Hypophthalmichthys molitrix*	*Ctenopharyngodon idella*	*Cyprinus carpio*	*Hypophthalmichthys molitrix*	*Ctenopharyngodon idella*
Control Feed AV SD PC t	1.108 ±0.026	0.489 ±0.024	1.00 ±0.005	30.0 ±1.07	33.0 ±4.19	34.5 ±1.26
Control Feed + Agrimin AV SD PC t	1.644 ±0.26 48.37	1.327 ±0.024 171.37	1.848 ±0.78 84.8	31.6 ±3.14 4.24	31.4 ±1.07 4.66	35.46 ±3.45 2.78
Control feed + fishmin AV SD PC t	1.25 ±0.025 12.81	0.77 ±0.008 57.46	1.43 ±0.036 43.00	31.12 ±2.46 5.69	32.0 ±0.69 6.66	35.02 ±0.86 1.50

Each value is the mean ±SD of 7 samples
AV – Average,
SD – Standard Deviation,
PC – Percentage change over the control ;
* – P<0.001, N.S. – Not significant

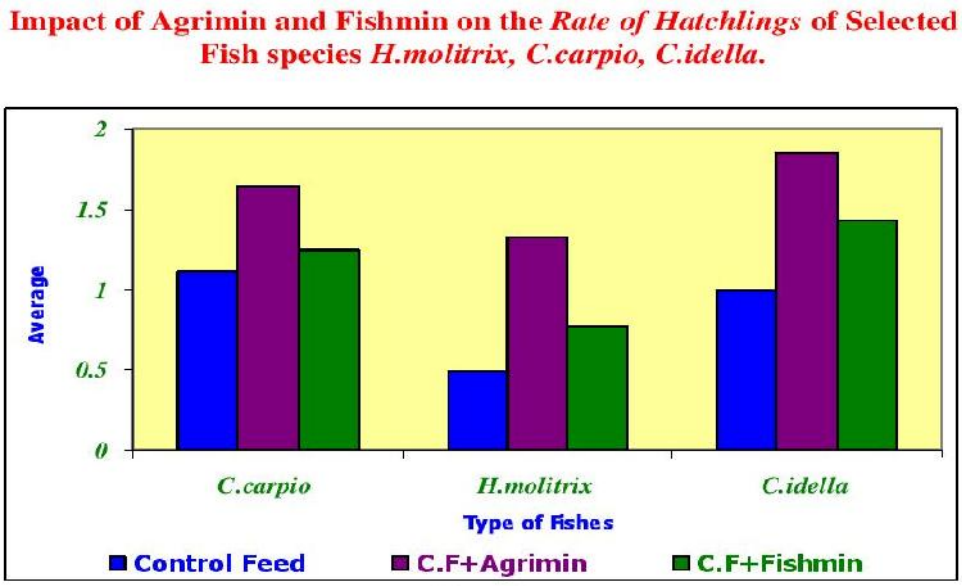

Fig: 1 Impact on Hatchling

Impact of Agrimin and Fishmin on the *Body Length of Fry* of Selected Fish species *H.molitrix, C.carpio, C.idella.*

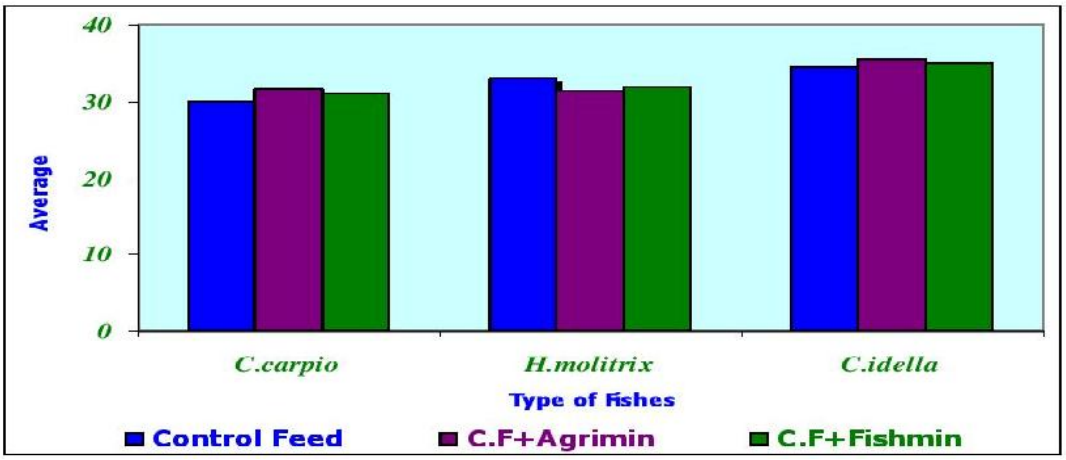

Fig: 2 Impact on the body length of fry

Table: 2 Effect of Agrimin & Fishmin on Body Length and Body Weight in various *H.molitrix, C.carpio, C.idella* (Values expressed as mm for length and gm for weight.)

Name of the Feed	**Name of the parameter**					
	Body Length			**Body Weight**		
	Cyprinus carpio	*Hypophthalmichthys molitrix*	*Ctenopharyngodon idella*	*Cyprinus carpio*	*Hypophthalmichthys molitrix*	*Ctenopharyngodon idella*
Control Feed AV SD PC T	543.9 ±1.09	496 ±2.42	670 ±7.14	2393 ±3.17	10875 ±17.16	2902 ±3.16
Control Feed + Agrimin AV SD PC T	585 ±4.18 7.52 *	790 ±2.36 59.27 *	795 ±1.46 18.65 *	2703 ±2.22 12.95 *	14373 ±4.06 32.16 *	3145 ±3.86 8.37 *
Control feed + fishmin AV SD PC T	573 ±0.99 5.35 *	690 ±1.29 39.11 *	690 ±1.29 2.9 *	2443 ±14.19 2.08 *	12470 ±15.66 14.66 *	3070 ±2.24 5.78 *

Each value is the mean ±SD of 7 samples
AV – Average,
SD – Standard Deviation,
PC – Percentage change over the control
* – P<0.001,
N.S. – Not significant

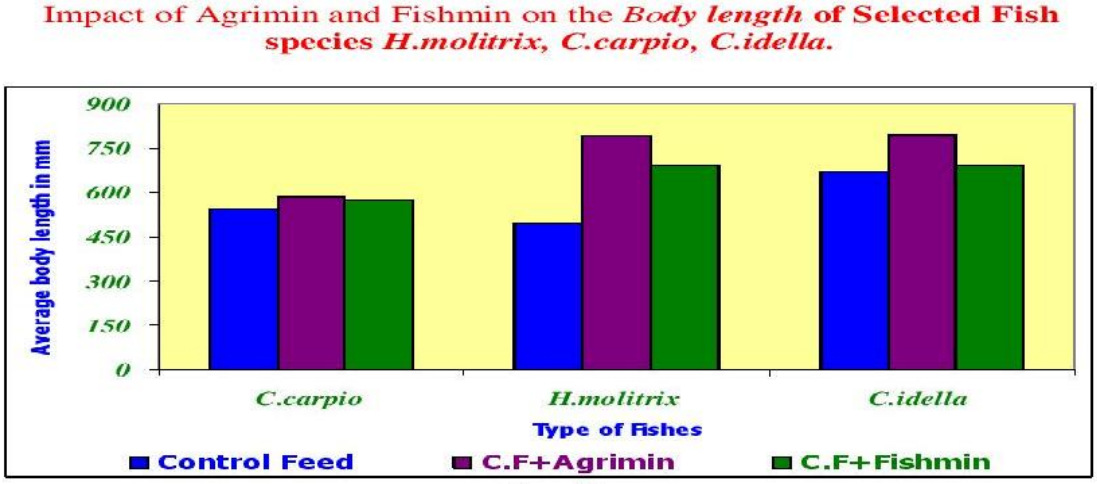

Fig: 3 Impact on Body length

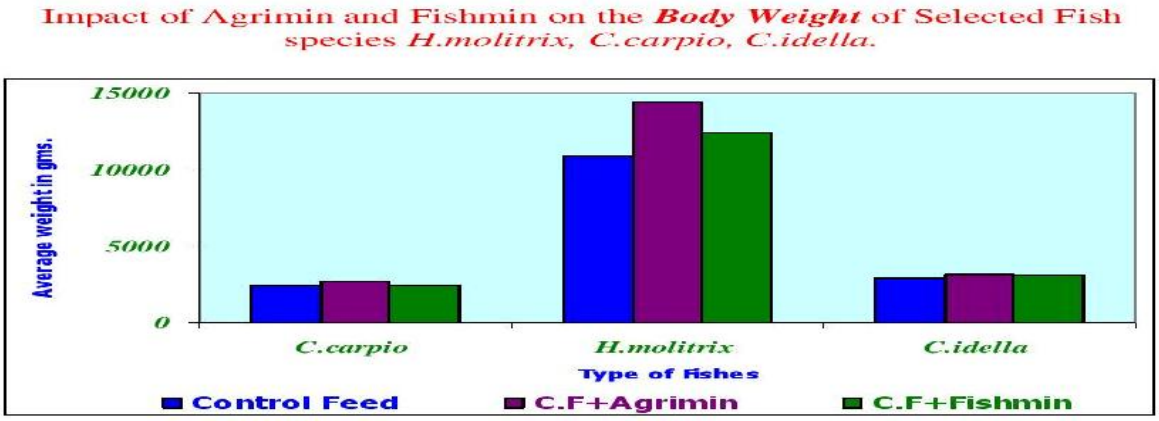

Fig: 4 Impact on Body weight

Table: 3 Effect of Agrimin & Fishmin on Ovary weight in *H.molitrix, C.carpio, C.idella* (Value expressed as gms)

Name of the Feed	**Name of the parameter**		
	Ovary Weight		
	Cyprinus carpio	*Hypophthalmichthys molitrix*	*Ctenopharyngodon idella*
Control Feed AV SD PC t	525 ±0.69	249 ±3.69	291 ±2.14
Control Feed + Agrimin AV SD PC t	6.27 ±0.32 19.34	305.1 ±4.77 46.66	320 ±6.19 9.96

Control feed + fishmin			
AV	543.9	267.1	314
SD	±1.09	±3.82	±1.36
PC	3.6	27.23	7.90
t			

Each value is the mean±SD of 7 samples
AV – Average,
SD – Standard Deviation,
PC – Percentage change over the control ;
* – P<0.001,
N.S. – Not significant

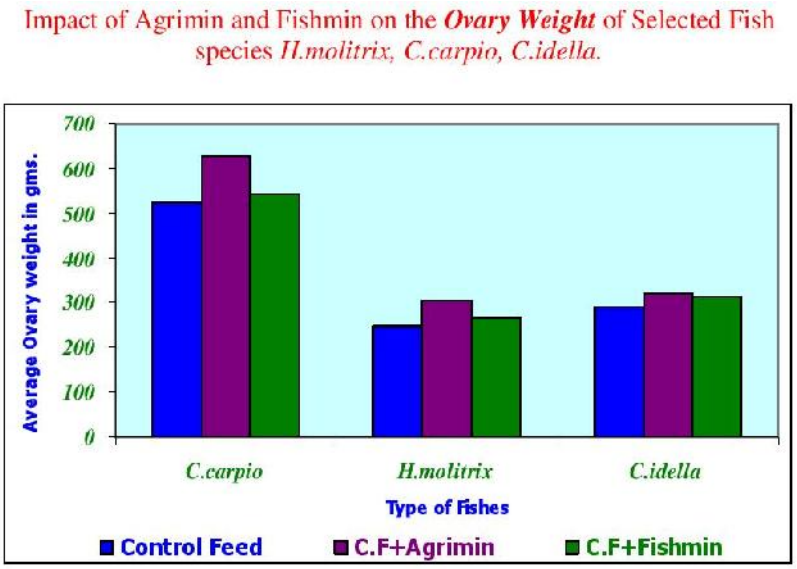

Fig: 5 Impact on ovary weight

Table: 4 Effect of Agrimin & Fishmin on Gonadal Somatic Index in *H.molitrix, C.carpio, C.idella*

Name of the Feed	**Name of the parameter**		
	Gonadal Somatic Index		
	Cyprinus carpio	*Hypophtha lmichthys molitrix*	*Ctenopha ryngodon idella*
Control Feed			
AV	21.92	18.84	10.08
SD	±1.24	±2.16	±0.39
PC			
t			

Control Feed + Agrimin			
AV	22.19	20.96	10.14
SD	±1.67	±0.88	±0.25
PC	1.23	11.25	0.59
t			
Control feed + fishmin			
AV	22.24	20.92	10.25
SD	±3.14	±0.62	±0.79
PC	1.45	11.04	1.68
t			

Each value is the mean ±SD of 7 samples
AV – Average,
SD – Standard Deviation,
PC – Percentage change over the control ;
* – P<0.001, N.S. – Not significant

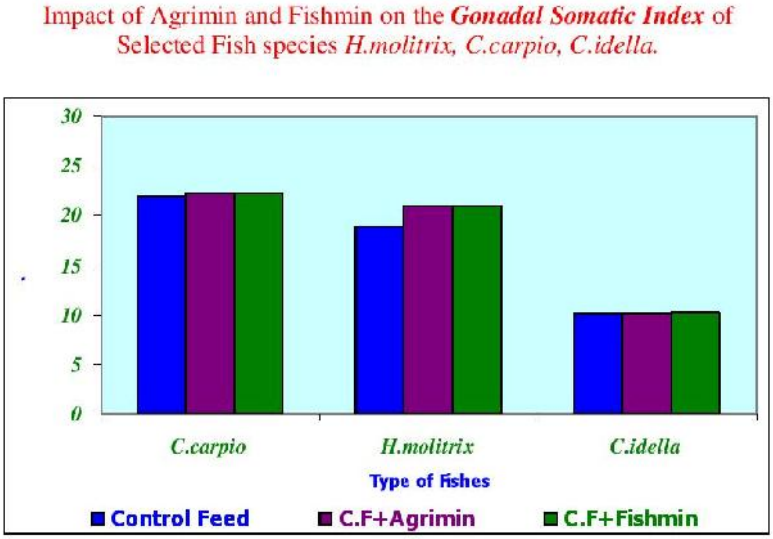

Fig: 6 Impact on Gonadal Somatic Index

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