Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(6): 559-561

Received: 14-08-2020
Accepted: 20-09-2020

**Hitesh Parmar**
Assistant Professor, Department of Aquaculture, College of Fisheries Science, JAU, Veraval, Gujarat, India

**Sajidkhan Yusufzai**
Associate Professor and Head, Department of Aquaculture, College of Fisheries Science, JAU, Veraval, Gujarat, India

**Prakash Parmar**
Assistant Professor, Department of Aquaculture, College of Fisheries Science, JAU, Veraval, Gujarat, India

**Viral Bajaniya**
Assistant Professor, Department of FRM, College of Fisheries Science, JAU, Veraval, Gujarat, India

**Vanraj Chavda**
Assistant Professor, Department of FRM, College of Fisheries Science, JAU, Veraval, Gujarat, India

**Corresponding Author:**
**Hitesh Parmar**
Assistant Professor, Department of Aquaculture, College of Fisheries Science, JAU, Veraval, Gujarat, India

# Efficacy of Shatavari supplemented diet on growth performance of genetically improved farmed tilapia (GIFT) fry

**Hitesh Parmar, Sajidkhan Yusufzai, Prakash Parmar, Viral Bajaniya and Vanraj Chavda**

**Abstract**
The global adoption of Genetically Modified Farmed Tilapia as a substitute for all kinds of wild-caught fish has driven demand higher every year. *Asparagus racemosus*, commonly called Shatavari has antioxidant activity, anti-abortifacient activity, Antioxytoxic, hypoglycemic, hypertensive activity, anticoagulant activity, antiviral activity, anticancer. The objective of this research was to evaluate the effect of Shatavari on growth performance of Genetically Improved Farmed Tilapia (GIFT), fry. The mean initial and final length of GIFT fry fed with different levels (0.5, 1, 2, 5 %) of Shatavari were ranged between 2.1 ± 0.10 and 7.35 ± 0.19 cm and the average initial and final weight ranged between 1.64 ± 0.013 and 7.29 ± 0.031 gm respectively. The fish fed with Shatavari at a concentration of 10 gm/kg of feed showed an enhanced specific growth rate when compared with that of the control fish. It was recorded 0.074 ± 0.002, 0.087 ± 0.030, 0.098 ± 0.050, 0.092 ± 0.09 and 0.094 ± 0.10 in treatment ST0, ST1, ST2, ST3 and ST4 respectively. These results indicated that the addition Shatavari to fish feed at the rate of 10 g/kg of diet could enhance the growth of GIFT fry.

**Keywords:** Shatavari, gift, growth, fry, supplementation

## Introduction
For getting high production from freshwater fish, farmers stock the seed at high density. This, however, leads to disease outbreaks in adversities, antibiotics are used as control measures. One of the most recent technological developments in tilapia culture is the production of genetically improved farmed tilapia (GIFT) through a selective breeding project [1]. Excess use of various antibiotics, hormones and other synthetic drugs to control diseases and improve fish growth in aquaculture is the reason behind the emergence of drug resistant bacteria and production of toxic substances harmful to the environment and human health and suppress immunity in the host. Because of the side effects to consumer's health, the use of antibiotics is banned. India has often been referred to as the "Medicinal Garden of the World'' owing to its rich medicinal plant biodiversity. Shatavari (*A. racemosus*) root traditionally is used as lactogenic folk medicine in man and animals. *A. racemosus* supplementation is beneficial, and it could serve as potential management tool to improve reproductive performance in crossbred dairy cows [3]. The application of medicinal plants as natural and innocuous compounds has potential in aquaculture as an alternative to antibiotics and immunoprophylactics. Adding 1.5% Shatavari as a growth promoter to the fish diet can promote growth, improve body composition, reduce cost of production and increase in profitability in Carp culture [8]. Many researches have been conducted to study the effect of herbs such as Tulsi, Neem, Turmeric, Ginger, Garlic on fish growth. Shatavari is also one of the potential herbs which are used as a one of the poultry feed ingredients. Thus the present investigation was carried out to study the efficacy of Shatavari on growth performance and feed utilization in Genetically Improved Farmed Tilapia, *Oreochromis niloticus* fry.

## Materials and Methods
The experimental set-up consisted of 15 plastic tanks, each tank of 50 l capacity. Shatavari (*Asparagus racemosus*) was used as a feed supplement. The tanks were washed with potassium permanganate solution (4 ppm) thoroughly and cleaned with fresh water where one hundred and fifty (150) fishes were distributed with three replicate. Each plastic tank containing 30 L chlorine containing 30 L chlorine free water was stocked with 10 fishes.

Water used for the entire experiment was sourced from bore-well (ground water source). Aeration was provided through the aerators. The aeration pipe in each tank was provided with an air stone and a plastic regulator to control the air pressure uniformly in the entire tank. The experimental diet was formulated with 30% protein level using locally available ingredients such as fish meal, wheat bran, tapioca powder, sunflower oil, vitamin and mineral mixture and different level of Shatavari (0.5, 1, 2, 5%) powder were used for the preparation of experimental feed by using feed formulation.

## Results

### Mean length (cm) of GIFT fry fed with different levels of Shatavari during study period

The average initial and final length was ranged between 2.1 ± 0.10 and 7.35 ± 0.19 cm respectively among all the treatments. The mean length was calculated for each tank at each fortnight interval. The initial mean weight recorded were 2.1 ± 0.10, 2.1 ± 0.19, 2.2 ± 0.14, 2.1 ± 0.11 and 2.3 ± 0.20 in treatment ST0, ST1, ST2, ST3 and ST4 respectively (Table. 1). At the end of experiment, the final mean weight recorded were 5.58 ± 0.15, 6.20 ± 0.15, 7.14 ± 0.10, 7.18 ± 0.12 and 7.35 ± 0.19 cm in treatment ST0, ST1, ST2, ST3 and ST4 respectively. In ST2 treatment when GIFT fed with 1 % Shatavari supplements, it supported the growth as length was increased with compared to other treatments.

**Table 1:** Mean length (cm) of gift fry fed with different levels of Shatavari during study period between 0 to 60 days (mean ± SE)

| Treatments | Days | | | | |
|---|---|---|---|---|---|
| | 0 | 15 | 30 | 45 | 60 |
| ST0 | 2.1 ± 0.10 | 2.52 ± 0.14 | 3.74 ± 0.16 | 5.10 ± 0.20 | 5.58 ± 0.15 |
| ST1 | 2.1 ± 0.19 | 2.59 ± 0.11 | 4.89 ± 0.28 | 5.87 ± 0.14 | 6.20 ± 0.15 |
| ST2 | 2.2 ± 0.14 | 2.78 ± 0.22 | 5.29 ± 0.21 | 6.33 ± 0.18 | 7.14 ± 0.10 |
| ST3 | 2.1 ± 0.11 | 2.78 ± 0.21 | 5.12 ± 0.19 | 6.19 ± 0.21 | 7.18 ± 0.12 |
| ST4 | 2.3 ± 0.20 | 2.89 ± 0.16 | 5.22 ± 0.22 | 6.49 ± 0.14 | 7.35 ± 0.19 |

### Mean weight (g) of GIFT fry fed with different levels of Shatavari during study period

The average initial and final weight ranged between 1.64 ± 0.013 and 7.29 ± 0.031 gm respectively among all the treatments. The mean weight was calculated for each tank at each fortnight interval. The initial mean weight recorded were 1.64 ± 0.013, 1.67 ± 0.020, 1.67 ± 0.011, 1.65 ± 0.012 and 1.64 ± 0.010 in treatment ST0, ST1, ST2, ST3 and ST4 respectively (Table. 2). At the end of experiment, the final mean weight (g) recorded were 6.23 ± 0.029, 6.30 ± 0.010, 7.17 ± 0.020, 7.41 ± 0.040 and 7.30 ± 0.022 in treatment ST0, ST1, ST2, ST3 and ST4 respectively. The highest final mean weight (g) was observed in ST2 and lowest in ST0 treatments.

**Table 2:** Mean weight (g) of GIFT fry fed with different levels of Shatavari during study period between 0 to 60 days (Mean ± SE)

| Treatments | Days | | | | |
|---|---|---|---|---|---|
| | 0 | 15 | 30 | 45 | 60 |
| ST0 | 1.64 ± 0.013 | 2.39 ± 0.010 | 3.81 ± 0.019 | 4.95 ± 0.03 | 6.10 ± 0.029 |
| ST1 | 1.67 ± 0.020 | 2.72 ± 0.011 | 4.76 ± 0.039 | 5.69 ± 0.028 | 6.90 ± 0.010 |
| ST2 | 1.67 ± 0.011 | 2.81 ± 0.020 | 5.12 ± 0.034 | 5.93 ± 0.030 | 7.56 ± 0.020 |
| ST3 | 1.65 ± 0.012 | 2.45 ± 0.030 | 4.58 ± 0.021 | 5.88 ± 0.025 | 7.22 ± 0.040 |
| ST4 | 1.64 ± 0.010 | 2.37 ± 0.014 | 4.89 ± 0.013 | 5.98 ± 0.016 | 7.29 ± 0.031 |

### Specific Growth Rate (%/day) of GIFT fry fed with different levels of Shatavari during study period

After the 60 day dietary treatment, the weights of the individual fish from each experimental group were measured to calculate the specific growth rate (SGR). The fish fed with Shatavari at a concentration of 10 gm/kg of feed showed an enhanced specific growth rate when compared with that of the control fish. It was recorded 0.074 ± 0.002, 0.087 ± 0.030, 0.098 ± 0.050, 0.092 ± 0.09 and 0.094 ± 0.10 in treatment ST0, ST1, ST2, ST3 and ST4 respectively. The highest specific growth rate was observed in ST2 (0.098 ± 0.050) and lowest in ST0 (0.074 ± 0.002) (Fig.1). The statistical analysis revealed the significant (P<0.05) difference in specific growth rate among the treatments. Treatment ST2 showed significantly higher SGR compared to other treatments.

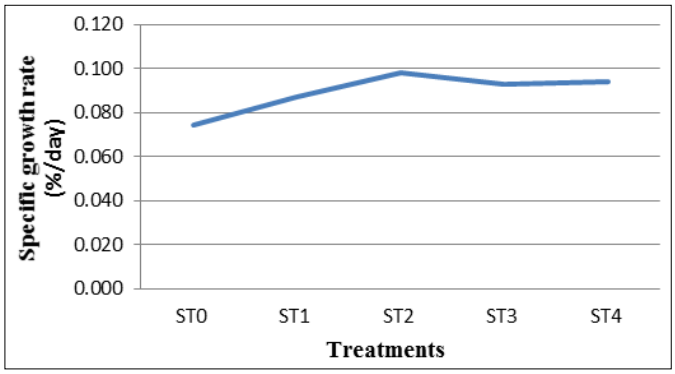


**Fig 1:** SGR of GIFT fry fed with Shatavari supplemented diet

### Mean weight gain of Shatavari fed GIFT in different treatments during study period

The final percentage mean weight gain obtained in present experiment were 271.11 ± 0.11, 313.26 ± 0.30, 352.17 ± 0.41, 337.13 ± 1.08 and 344.18 ± 1.11 in treatment ST0, ST1, ST2, ST3 and ST4 respectively (Fig.2).

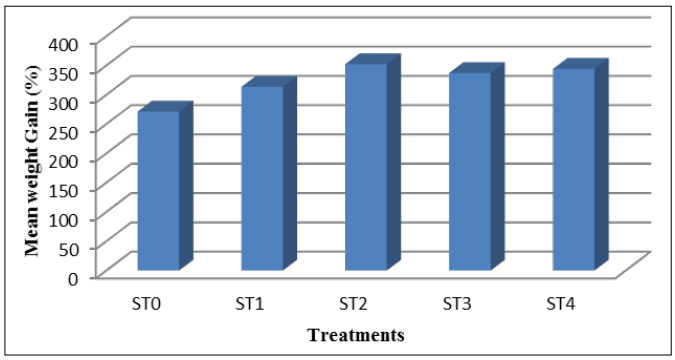


**Fig 2:** Mean weight gain GIFT fry fed with Shatavari supplemented diet

The highest final mean weight gain (%) was observed in ST2 and lowest in ST0 treatments. The statistical analysis revealed the significant difference (P<0.05) in total mean weight gain (%) between the treatment. The maximum significant difference of mean weight gain (%) was observed in ST2 compared to other treatments. The treatments ST0, ST3 and ST4 did not show significant difference at the end of experiment.

## Discussion

The plant, *A. racemosus* has been reported to have medicinal values, various therapeutic uses and aphrodisiac effects in

mammals. There is no much work carried out to find out the effect of Shatavari as feed supplemented on growth performance of GIFT. Herbal plants were broadly used as animal feed additives, having galactogogue properties like Shatavari (*Asparagus racemosus*), Jivanti (*Leptadenia reticulata*) (Bakshi *et al.*, 2004) [2]. In this investigation the mean initial and final length of GIFT fry fed with concentration of Shatavari at 2% supplementation were obtained range between 2.1 ± 0.10 and 7.35 ± 0.19 cm and the average initial and final weight ranged between 1.64 ± 0.013 and 7.29 ± 0.031 gm respectively [4-6]. Oral administration of *A. racemosus* roots at a dose of 200 mg/kg body weight showed pronounced anabolic effects such as significant weight gains in the body of rat [7].

## Conclusion

The results derived from this study signify that the Shatavari might be used as supplementary to better growth of GIFT strain of tilapia. The result indicated that supplementation of Shatavari root powder at 1 % of GIFT diet enhances growth performance. This will be worth and useful for application in fish aquaculture.

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