



# Comparative Breeding Strategy Of Two Different Species Of Ornamental Fish, Sword Tail (Xiphophorus helleri) & Sawdust Molly (Poecilia Sphenops) Under Captive Condition.

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**Abstract:** An experiment was conducted for 4-6 weeks in glass aquarium and tanks in the laboratory of the Forestry and Fisheries department to studies on comparative breeding technique 2 different ornamental fish species i.e. sword tail and sawdust molly .The study was started from the period of February to April 2023. Swordtail fish and saw dust was introduced in the ratio of 2:1 & 2:3 respectively. The successful breeding of swordtail was observed in March 2023, where a total of 8 fries were found in the aquarium. After the fry were found they were put in a separate tank with only bubble diffuser, to allow them to breathe easily. Fry was provided with crushed feeds, so it is easy for them to intake in their mouth. The 1<sup>st</sup> mortality of pregnant fish was observed on April 2023. A total of 38 undeveloped fry were found when it was dissected. Whereas breeding in sawdust molly was observed in April 2023, where a total of 14 fries were found in aquarium.

**Keywords:** Molly fish, Swordtail, Breeding, Dissection, Fry, etc.

## Introduction:

An aquarium is a recreational display of ornamental fish with aesthetic appeal. The term *aquarium*, coined by English naturalist Philip Henry Gosse, combines the Latin root *aqua*, meaning 'water', with the suffix *-arium*, meaning 'a place for relating to' (Khanna.S.S. 2011) Ornamental fish species are popularly known as aquarium fish (Laha and Das, 2007). Aquarium is another name for an ornamental fish tank. Aquarium tank construction is a skill that may be learned in two or three days of hands-on experience. (Mahapatra B.K., (2014). Aquarium can be made of materials like glass, concrete, wood, fiberglass acrylic sheet etc., depending on its location, cost and durability (Ngucku. B.B., (2014). Ornamental fish species are popularly known as aquarium fish (Laha and Das, 2007). Indian ornamental fish trades mostly deal with freshwater fish (90%) of which 98% are cultured and 2% are captured from wild. The remaining 10% are marine fishes of which 98% are captured and 2% culture. Majority of the Ornamental Fish Breeders in India breed exotic fishes and very few breed indigenous, marine and brackish water fish. Goldfish has the highest preference among hobbyists and hence its breeding dominates the Indian Ornamental Fish Sector. (nfd.gov.in). There are 150 variations of ornamental fish species exploitation on a commercial scale including freshwater and marine water (VSMurty 1996). India, having a large number of indigenous fishes of different ornamental attributes has great potential to earn a huge foreign exchange. West Bengal has emerged as a pioneer State in ornamental fish trade of India (Mahapatra and Lakra, 2014). Mollies are

among the most popular live bearer aquarium fish. (Divya D., (2018).The common name for *X. hellerii* (i.e. “swordtail”) is recognized worldwide and it is one of the most popular of all ornamental freshwater tropical fishes. It is widely reared in the aquarium and is considered as one of the commercially important ornamental fish after goldfish due to its aesthetic values, food habit, and reproductive traits .Molly fish are a staple of freshwater fish keeping, and have been popular among aquarists for quite a while. Due to its popularity as an ornamental fish the species has been widely translocated and introduced populations occur in at least 31 countries. Most ornamental varieties have resulted from hybridization and artificial selection of three species; i.e. *X. hellerii*, and the platys *Xiphophorus maculatus* and *Xiphophorus variatus* .Two things to take into consideration when choosing a feed are the size and composition of the feed. In a study, it is stated that *Xiphophorus helleri* at 25-30 mm total Length or age of 10-12 weeks attain sexual maturity Milton and Arthington (1983); Dawes (1991).Whereas *Poercilia sphenops* is a species of fish, of the genus poecilia, known under the common molly, to distinguish it from its congeners; it is sometimes called short-finned molly or common molly. They inhabit fresh water streams and coastal brackish and marine waters from Mexico to Colombia. The wild-type fishes are dull, silvery in colour. The molly can produce fertile hybrids with many *Porcilia* species, most importantly the sailfin molly. The male mollies generally tent to be mildly aggressive. In the home aquarium, they should be fed a high quality flake food, and variety of vegetables. Molly fish should feed once or twice a day. We use Optimum feed and Freeze dried tubifex worms. It has high nutritious food for all aquarium fish. Optimum fees ingredients are Fish meal, corn protein meal, soyabean meal, corn, cassava pellets, Fish oil, Lecithin, Symbiotic, Vitamins & minerals, Astaxanthin, Food Coloring, Antioxidants. And Tubifex Worms ingredients are crude protein, crude fat, crude fiber, ash, moisture. In Optimum feed Nutritional composition are Crude Protein is 28% (Min), Crude Fat is 3 % (Min), Crude Fiber is 4%(Max), Moisture is 10%(Max). In Tubifex Worms Nutritional composition are Crude Protein 52%(Min), Crude Fat is 12%(Min), Crude Fiber is 2%(Max), Ash is 12%(Max), Moisture is 5%(Max).The food habit of swordtail includes omnivorous in nature and feeds on both live and artificial feeds (James and Sampath, 2003). These feeds are enriched in higher protein (60-65%), moderate lipid (8-9%), and contained comparatively lower crude fiber (4-5%) (Sharma, 2020).as live feed commodity due to its availability and lower cost. From a nutritional point of view, *Tubifex* is highly potential as it contains high protein and essential fatty acids (Yanar et al., 2003; Görelşahin et al., 2018; Debnath S et al; 2022)

## MATERIALS AND METHOD:

### Study the breeding technique of Sword tail & Common Molly Fish:

Aquarium fishes are broadly divided into two categories: Egg layers and live bearers. The egg layers lay eggs, but the live bearers do not lay eggs but instead give birth to live young. Mollies are among the most popular live bearer aquarium fish. (Divya D., (2018).It is reported that *X.helleri* attains sexual maturity at 25-30mm (1-1.2 inch) TL or 10-12 weeks of age (Milton and Arthington 1983; Dawes 1991). The recommended sex ratio is 2F:1M OR 4F:1M. Once the sperm is inserted into the female fish and fertilizes its eggs and the rest is stored in the oviduct walls for later use (Siddiky and Mondal 2016). A single copulation can provide viable sperm for fertilization for up to two years, with a female giving birth to from five to nine consecutive broods from a single mating event . Take a Healthy Breeding Pair to breed swordtail fish i.e. a healthy male and female pair.

### Identification of sex in swordtail molly

For breeding the most important thing you kept in mind is differentiation in male and female swordtail and knows its characteristic.

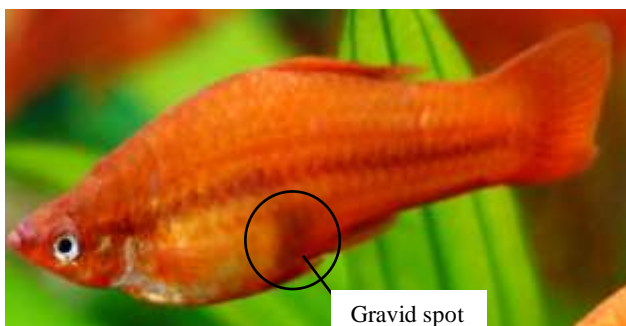


Figure1: Mature female swordtail molly



Figure 2: Mature male swordtail molly

Male molly fish tend to be much smaller than female mollies, have a specialized anal fin called a gonopodium. Males have larger fins and are more torpedo shaped than females. For reproductive purposes female mollies have bulkier proportions than males. She will have a bulging and dark spot appearance in belly region while she is pregnant. Her anal fins are triangular and she has shorter fins. (Durgude Archana, 2020).

### Embryonic Development

According to (Milton and Arthington 1983), reports of embryonic development vary from 26 to 63 days (Table). They demonstrated that temperature is the major factor in the rate of development while photoperiod plays a minor role. The gestation time of a molly is approximately 40 to 70 days.

Embryonic Stages (Days)	Duration(Days)	Description
Early Development	1-12	2 Embryo less than 1.5 mm, seen as a pale strip on the surface of the ovum
Early-eyed Embryo	13-16	Some retinal pigment, no body pigments
Intermediate-eyed Embryo	17-24	Distinct neck strap of receding extra embryonic membranes
Mature Embryo	25-26	Neck strap absent, preparturition stage with fully developed fins

### Table: Classification of embryo stages during Embryonic Development

(Milton and Arthington (1983) the number of fry a female fish can give birth to numbers of fry depending up the sizes of the fishes. A large pregnant fish can give birth up to 100 fry, whereas a small pregnant fish can give birth up 65- 80 fry (Divya, 2018). Changes in the type and quality of feed, feeding rate, ammonia and dissolved oxygen levels, disease, and age of broodstock are all factors that can affect fry production. The average swordtail fish lifespan is around three to five years.

The breeding cycle in mollies usually remains for approximately 3 to 6 weeks (20 to 40 days). Before the fry are born a dark triangle shaped patch around the anal vent known as 'gravid spot' showed the gravid condition of fish which becomes larger and darker as it matures as was also observed in the present study (Swain *et al.*, 2010). The gestation period for gravid female molly fish is between 28-35 days and their fry can swim after birth. A matured female molly fish can produce around 20-60 fry/broodstock. Their movement tends to become slow and they start hiding under the plants of an aquarium. After 35-45 days, the fry hatch. Once a female is fully formed it can produce up to 30-70 young ones per female, though you may not get them all to survive (Ayyapan, 2018). The young ones need to be separated from the adults or they will get eaten. One option is to put pregnant mollies in a breeder's box before they give birth, the young ones are free to leave the box through small holes but the adults stay trapped. Mollies take 12-16 weeks to mature.

### RESULT AND DISCUSSION:

The fish was brought from market from 27<sup>th</sup> February 2023 after completing the fabrication process where the ratio of the female and male taken was 3:1. The successful breeding of swordtail molly was observed in 23 March 2023, where a total of 8 fries was found in the aquarium. The fry was < 0.5 cm in length. After the fry were found they were put in a separate tank with only bubble diffuser, to allow them to breathe easily. Fry was provided with crushed feeds, so it is easy for them to intake in their mouth. The 1<sup>st</sup> mortality of pregnant fish was observed on 10 April 2023. A total of 38 undeveloped fry were found when it was dissected.

A similar study was done by Siddiky and Mondal (2016) for 3 to 4 weeks in a glass aquarium and tanks to study on Breeding technique of goldfish (*Carassius auratus*), molly (*Poecilia sphenops*), guppy (*Poecilia reticulata*), (Sudha, 2012).

Similar studies were done by Naik (2020) on three different species of molly, Black, White and Sailfin *Poecilia* species originating from Central and North- Eastern South America, required for the experiments were obtained from ornamental fish traders of Ratnagiri and Mumbai during the months from April 2016 to March 2017. Another experiment was conducted for 3 to 4 weeks in glass aquarium tanks to study the Breeding technique of molly (*Poecilia sphenops*) by Divya (2018). Molly starts breeding at the age of 4 months. The sex ratio was taken slightly differently in jars of three sets that are 1 female 2 male, 1 female, and 2 males and 2 females with one

male. The molly can produce fertile hybrids with many *Poecilia* species, most importantly the sailfin molly. The male mollies generally tend to be mildly aggressive. I take a mix of molly fish species (gold dust molly, platinum molly, and common molly) in my aquarium and 12 numbers of species. 4 are male and 6 are female species. My molly fish average length is 4- 5 cm.

### Discussion

There are a few different kinds, but it mostly works for mollies like this. They are born alive and sink to the bottom at first. Floating breeding units with a grid allow the kinds to fall through. One teaspoon per gallon is sufficient. Giving the babies fry flake food, lettuce, soft inside of cucumbers and small bites of egg yolk at first will aid in their growth. Divya.D,(2018). Study on breeding behavior in ornamental fish, *poecilia sphenops*.

### Aquarium Formula =

$L \times W \times D = \text{cubic feet}$

Cubic feet  $\times 7.47 = \text{Gallons.}$

$1.42 \times 1.50 \times 0.98 \times 7.47 = 15.59$  equal to **59 litres**(Water).

(1 Gallon = 3.785 litres.)

Where, L= length (1.42 ft), W= width (0.98 ft), D= depth (1.50 ft).

$$\text{Specific growth rate (SGR\%/day)} = \frac{\ln W_t - \ln W_i}{T} \times 100$$

Where,  $W_t$  = mean final weight,  $W_i$  = mean initial weight and  $T$  = total experimental days.

Brood survival rate 100%

Male female ratio = 4:6

### CONCLUSION:

Livebearer breeding is simple because they release fry immediately, but the fry may need to be raised in a separate environment to avoid cannibalism from their parents. Both the ornamental fishes are belonging to same family i.e. *Poeciliidae*, life span of both fishes i.e. sawdust & sword tail fish are 3-5 years. Number of fry are also more or less same in both the species.

But with this comparative study, we are able to conclude that as compared to swordtail fish, survivability of common fish was 100%. Still both have same breeding cycle. Sawdust or common molly are genetically more improved as compared to sword tail.

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