Ichthyofaunal diversity of larvivorous fish species and biological control agent against Mosquito from Marathwada region, Maharashtra, India

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ABSTRACT: Present study was carried out from June 2016 to May 2018 to give a database of Larvivorous fishes and role of their use in mosquito control from Marathwada Region. The listed 06 Larvivorous fishes species reported were Cyprinadae family contribute 33 % (02 species) and family Poecilidae, Aplocheilidae, Gobiidae and Mugilidae contribute 16 % (01 species) respectively. Malaria creates serious health and economic problems around the world and specially in developing and undeveloped countries which call for integrated management strategies to control mosquito population.

Key Words: Malaria, Biological control, larvivorous fish, Mosquito.

Introduction:

Ichthyodiversity refers to variety of fish species, and ichthyological studies can be significance for the interpretation of the climatic and hydro geographical history of India. The ecological and social importance of fish biodiversity validates the significance of research aimed at assessing the social forces leading to the larvivorous fish species.

Mosquito borne diseases (Malaria) creates serious health problems around almost all tropical and subtropical countries Biological control particularly using larvivorous fish was important to malaria control programmes in the 20th century particularly in urban and peri urban area for immediate use in developed and developing countries like India.(Gratz N.G, Pal R): 1988 which call for integrated management strategies to control mosquito population. In order to reduce the intensity of Malaria transmission, malaria vector control may be implemented to protect individuals against infective mosquito bites, the use of larvivorous fish is promoted in some circumstances (Yijun Lou, XiaoQiang Zhao: 2011).

Maharashtra is the third largest state of the Indian union, both in population and geographical area, surrounded by the Arabian Sea in the west, Andra Pradesh in the south east, and Karnataka in the south, Gujarat in the north west and Madhya Pradesh in the north. The state has three district physiographical regions viz., the costal belt (Konkan), the Western Ghats and the eastern plateau. Sakhare, (2001); Hiware, (2005); Talwar and Jhingran (1991); Jayaram (1981 and 1999), Day (1878); Datta Munshi and Srivastava, (1988).

Marathwada region is one of the six divisions of Maharashtra state comprises of eight districts, viz. Aurangabad, Beed, Hingoli, Jalna, Latur, Nanded, Osmanabad and Parbhani. The location of Marathwada is on 19°20' 56.76" E longitude and 76°14' 44.62" N latitude (Google Earth, 2009) forms the part of the vast Deccan plateau of India.

The total area of Marathwada region is 64,813 km. and is bounded by Vidarbha region on the north, by Andhra Pradesh on the east and south east, Karnataka on the south and by Western Maharashtra on the west. The entire region is situated at an average height of about 300-650 m. above mean Sea level gradually sloping from west to east, and is traversed by hill ranges originated from the Sahyadri's in the east and the Satpuda's in the north. Different ranges derive their names from local sources, the northern being Ajanta-Satmala ranges and the southern the Balaghat ranges.Where the large number of hilly regions gives rise to number of hill streams which lead to the major rivers like Godavari and its tributaries which support the fish diversity and their species abundance from Marathwada region.

Material and methods:

To study the ichthyofauna of Marathwada region from June 2016 to May 2018, fish samples were collected from six sampling sites (site I, site II, site III, site IV, site V and site VI) of five districts (Aurangabad, Jalna, Parbhani, Nanded and Beed) which represent the ichthyofaunal composition of Marathwada region.

Fish samples were collected every week during the study period from the fish landing centers with the help of skilled local fishermen by various fishing crafts, gears with variable mesh size. Sampling points were distributed throughout the site to cover its whole area and location was changed for the collection of fish fauna according to the season.

Identification of fishes was done up to species level at fish landing center to get its natural colour, pattern of scales, fins, mouth pattern, identification marks like black spot, bloach on operculum, paired and unpaired fins and body parts with the help of standard literature by Datta Munshi and Srivastava, (1988); Hamilton (1822); Talwar and Jhingran, (1991); Francis Day vol I &II, (1986); Jayaram (1981); Jayaram, (1991); Jayaram, (1999); Menon (1987); Jayaram and Jeyachandra Das, (2000); Jayaram and Anuradha Sanyal, (2003); Yazdani, (1985); Menon, (1986); Jyoti and Arti Sharma (2006) and etc. According to the season, locations were changed for successive fishing operation.

Fish species which were not identified on the field (landing center) were preserved in 10 % formalin or 5cc of formalin was injected in the belly of fish with disposable syringe and packed in polythene bags. These fish samples were brought to Fishery research laboratory, Department of Zoology, Rajarshi Shahu Arts Commerce and Science College, Pathri, Phulambri, Aurangabad for further identification.

Specimen with doubtful identifying characters was sent to Zoological Survey of India (ZSI) Pune, regional branch (ZSI) Kolkata for identification.

Result and Discussion :

Durring the study period from June 2016 to May 2018 the listed 06 Larvivorous fishes speices are reported were Cyprinadae family contribute 33 % (02 species) *Rasbora daniconius and Esomus danricus* and family Poecilidae, Aplocheilidae, Gobiidae and Mugilidae contribute 16 % (01 species) *Poecilia reticulate, Aplocheilus panchax , Glossogobius gurius ,Rhinomugil corsula* respectively.

Species like Rasbora daniconius, Poecilia reticulate,Aplocheilus panchax and rhinomuguil corsula were reported at all sites of Marathwada region and Esomus danricus reported at Site IV,V and VI and Glossogobius giuris reported at site II,III,IV and site VI. Species like Poecilia reticulate, Aplocheilus panchax commonly use as a freshwater mosquito larva eating fishes and people kept this fishes in to their freshwater water sources. similar results were reported eight fish species from Aedes by D.H Ekanayake et al., (2007).

Pawar ravindra (2014)reported 04 species during his study period G.Chandra (2008) reported larvivorous fishes use to Mosquito control. S.Sanyal and S Ghose (2014): reported Poecilia reticulate from Bidhan sarani , west Bengal. Layla kamareddine (2012) reported 10 larvivorous fish species during his study period. C. J. Hiware(2005)reported 04 species from Marathwada region. S.C.Shinde(2009) reported two species from Harsul Dam, Aurangabad. Pawar R.T (2014) found 02 species from Majalgaon reservoir, Beed District. V.b.Sakhare and A.D Chelate (2014) reported 02 species from wan reservoir.

Table 1

Kingdom	Animalia (Linnaeus, 1758)	**Order**	Cyprinodontiformes (Berg 1940)
Phylum	Chordata (Bateson, 1885)	**Family**	Aplocheilidae (Bleeker, 1860)
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Aplocheilus* (Mcclelland, 1893)
Class	Pisces	**Species**	*panchax* (Hamilton, 1822)
Sub- Class	Actinopterygii (Ray finned fishes)	**Scientific name**	*Aplocheilus panchax* (Hamilton, 1822)
Name	Common / English:- Pichki/ Rippled tiger fish.	**New name**	
Status	Uncommon, (Yadav, 2006)		
First-Record	1822, *Esox panchax* Hamilton, *Fish.Ganges,* pp.211, 380, Pl.3, fig. 69.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**
						√
Habit	**Herbivorous**	**Carnivorous**	**Omnivorous**	**Scavengers**	**Larvivorous**	**Other**
		√			√	

Diagnostic characters	30 to 34 scales in longitudinal series eye diameter equal to interorbital width. Dorsal fin inserted above or behind posterior end of anal fin. (Jayaram, 1999).					
Fin formula	D.ii 6-7, P.14, V.6, A.iii 12-13, C.13, LL.31-34.					
Specimen L/wt	**L**- 38 **mm.**			**Wt** – 495 **m. gram.**		
Distribution	**India –**Orissa, West Bengal, Andaman Mailing north Laccadives and Western Part of India, (Kapoor, Dayal and Ponniah, (2002).					
	Abroad – Bangladesh, Pakistan, Myanmar, Indo-Malaysian Archipelago and Sri Lanka, (Kapoor, Dayal and Ponniah, (2002).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Other**
	√			√	√	

Table 2

Kingdom	Animalia (Linnaeus, 1758)	**Order**	Cyprinodontiformes (Berg 1940)
Phylum	Chordata (Bateson, 1885)	**Family**	Poecilidae
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Poecilia*(Bloch & Schneider, 1801)
Class	Pisces	**Species**	*reticulata* (Peters, 1859)
Sub- Class	Actinopterygii (Ray finned fishes)	**Scientific name**	*Poecilia reticulata* (Peters, 1859)
Name	Common / English: - Guppi/ Guppy or Rainbow fish.	**New name**	
Status	Common, (Yadav, 2006)		
First-Record	1801. *Poecilia* Bloch and Schneider, *Syst.Icth*. 2, p, 452.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**
	√	√	√	√	√	√
Habit	**Herbivorous**	**Carnivorous**	**Omnivorous**	**Scavengers**	**Larvivorous**	**Other**
		√			√	

Diagnostic characters	Teeth spatuliform and movable. Dorsal fin inserted in front of anal fin. (Jayaram, 1999).					
Fin formula	D.ii 5, P.ii 11, V.i 5, A.ii 7, C.19, LL.27-28.					
Specimen L/wt	**L**- 35 **mm.**			**Wt** – 300 **m. gram.**		
Distribution	**India** –Throughout India, (Jayaram, 1999).					
	Abroad – Tropical America, (Jayaram, 1999).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Other**
	√			√	√	

Table 3

Kingdom	Animalia (Linnaeus, 1758)	**Order**	Cypriniformes
Phylum	Chordata (Bateson, 1885)	**Family**	Cyprinidae (Minnows & Carp)
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Esomus* (Hamilton, 1822)
Class	Pisces	**Species**	*danricus* (Hamilton, 1822)
Sub- Class	Actinopterygii (Ray finned fishes)	**Scientific name**	*Esomus danricus* (Hamilton, 1822)
Name	Common / English:- dabri /Flying Barb.	**New name**	
Status	LR-lc (Lower risk least concern) (IUCN).		
First-Record	1822. *Cyprinus* (Danio) *danrica* Hamilton Buchanan, *Fish Ganges*: 325, 390, pl.16, fig-88.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**
				√	√	√
Habit	**Herbivorous**	**Carnivorous**	**Omnivorous**	**Scavengers**	**Larvivorous**	**Other**
		√			√	

Diagnostic characters	Maxillary pair very long extending up to anal fin, (Jayaram, 1981).					
Fin formula	D.8-9(2/6-7)); P.11; V. 8; A.9 (3/6); C.20; L.I. 30-34; L.tr 8(5/3), Barbles two pair, (Datta Munshi and Srivastava, 1988).					
Specimen L/wt	**L**- 65 **mm.**			**Wt** – 03 **gm.**		
Distribution	**India-** Freshwater rivers, ponds, lakes, channels, paddy fields and even ditches of this region (Throughout India),(Datta Munshi and Srivastava, 1988).					
	Abroad – Pakistan, Myanmar, Bangladesh, Nepal, Sri lanka, Malaysia, Archipelago and Siam, (Datta Munshi and Srivastava, 1988).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Other**
				√	√	

Table 4

Kingdom	Animalia (Linnaeus, 1758)	**Order**	Cypriniformes
Phylum	Chordata (Bateson, 1885)	**Family**	Cyprinidae (Minnows & carp)
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Rasbora* (Weber & de Beaufort, 1916)
Class	Pisces	**Species**	*daniconius* (Hamilton, 1822)
Sub- Class	Actinopterygii (Ray finned fishes)	**Scientific name**	*Rasbora daniconius* (Hamilton, 1822)
Name	Common / English: - Angulla, Kaneri/ Slender Barb.	**New name :-**	
Status	Common, (Yadav, 2005).		
First-Record	1822. *Cyprinus daniconius* Hamilton Buchanan, Fish *Ganges*: 327, pl.15, Fig: - 89.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**
	√	√	√	√	√	√
Habit	**Herbivorous**	**Carnivorous**	**Omnivorous**	**Scavengers**	**Larvivorous**	**Other**

	√					
Diagnostic characters	Lateral line with 32 to 34 scales. A black lateral stripe along center of body presents, (Jayaram, 1999).					
Fin formula	D. 9 (3/7); P.15; V.9; A.7 (2/5); C.19; L.I. 31-34; L.tr 4 1/2/4 ½/5, vert 18/14, (Days, vol I 1986).					
Specimen L/wt	**L**- 67 **mm.**			**Wt** – 2.8 **gm.**		
Distribution	**India: -** Throughout India, (Kapoor, Dayal and Ponniah, 2002).					
	Abroad – Nepal, Pakistan and Sri Lanka, (Kapoor, Dayal and Ponniah, 2002).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Other**
	√			√		√

Table 5

Kingdom	Animalia (Linnaeus, 1758)	**Order**	Mugiliformes
Phylum	Chordata (Bateson, 1885)	**Family**	Mugilidae (Mullets)
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Rhinomugil* (De.Vis, 1883)
Class	Pisces	**Species**	*corsula* (Hamilton, 1822)
Sub- Class	Actinopterygii (Ray finned fishes)	**Scientific name**	*Rhinomugil corsula* (Hamilton, 1822)
Name	Common / English: - Vardoli/ Flathead mullet.	**New name :-**	
Status	Rare, Menon, (2004).		
First-Record	1822. *Mugil corsula* Hamilton, *Fish Ganges*: pp.221, 381, pl. 9, fig 97.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**
	√	√	√	√	√	√

Habit	Herbivorous	Carnivorous	Omnivorous	Scavengers	Larvivorous	Other
		√			√	
Diagnostic characters	Mouth inferior, snout projecting beyond mouth; L.tr. 15; eyes are small and elevated above inter- orbital area; first dorsal originates posterior to the base of ventrals; opercle with a spine, Datta Munshi and Srivastava, (1988).					
Fin formula	D. 4 1/8; P.15; V.1/5; A.2/8-9); C.15. L.r. 49-52.L.tr.14-15, Datta Munshi and Srivastava, (1988).					
Specimen L/wt	**L**- 194 **mm.**			**Wt** – 65 **gm.**		
Distribution	**India:** - Ganga and Cauvery river system, Kapoor, Dayal and Ponniah, 2002).					
	Abroad – Pakistan, Bangladesh Nepal and Myanmar, Kapoor, Dayal and Ponniah, (2002).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Othessr**
				√		

Table 6

Kingdom	Animalia (Linnacus, 1758)	**Order**	Perciformes (perch-likes)
Phylum	Chordata (Bateson, 1885)	**Family**	Gobiidae (Gobies)
Sub-Phylum	Vertebrata (Cuvier, 1812)	**Genus**	*Glossogobius* (Hamilton, 1822)
Class	Pisces	**Species**	*giuris* (Hamilton, 1822)
Sub- Class	Acantoptergii (Ray finned fishes)	**Scientific name**	*Glossogobius giuris* (Hamilton, 1822)
Name	Common / English:- Jalbudla/ Tank Goby.	**New name**	
Status	LR-nt (lower risk near threatened) (Yadav 2006)		
First-Record	1822. *Gobius giuris* Hamilton Buchanan. *Fish Ganges* pp.51, 366, pl.33 Fig. 15.		

Area of Collection	**Site I**	**Site II**	**Site III**	**Site IV**	**Site V**	**Site VI**

		√	√	√		√
Habit	**Herbivorous**	**Carnivorous**	**Omnivorous**	**Scavengers**	**Larvivorous**	**Other**
		√				
Diagnostic characters	Lips thick,Jaws with villiform teeth in several rows,outer and inner one enlarged,unevenly,widely set, two dorsal fins, separated by a short interspace ; first dorsal insertrd above half or three- forth of pectoral fin with six rays and second with six to ten rays,scales ctenoid on body and cycloid on head, (Jayaram, 1981).					
Fin formula	D 6/1/9/, P.20, V. 1/5 A.1/8., C. 17, L.I. 33-36, L.tr. 9-12, (Datta Munshi and Srivastava, 1988)					
Specimen L/wt	**L**- 175 **mm.**			**Wt** – 52 **gm.**		
Distribution	**India**- Freshwater of India, U.P, Utaranchal, Delhi, M.P, Bihar, Rajasthan, Assam, Bengal, Gujrat, Karnataka (Mysore) Maharashtra, Pulicat take east coast, Goa and Andaman Island, (Gupta and Gupta, 2006).					
	Abroad – Pakistan, Bangladesh, Sri-Lanka Myanmar, Nepal East And South Coast of Africa, Mauritus, Siam, China, Japan, Phillipines, Australia, (Gupta and Gupta, (2006).					
Categories	**Commercial fish**	**Nutritive fish**	**Medicinal fish**	**Food fish**	**Ornamental fish**	**Other**
				√		

TABLE 7

DISTRIBUTION PATTERN OF LARVIVOROUS FISH SPECIES FROM MARATHWADA REGION

Name of Fish	Site I	Site II	Site III	Site IV	Site V	Site VI
Rasbora daniconius	√	√	√	√	√	√
Esomus danricus	-----	-----	-----	√	√	√
Poecilia reticulate	√	√	√	√	√	√
Aplocheilus panchax	√	√	√	√	√	√
Glossogobius giuris	-----	√	√	√	-----	√
Rhinomugil Corsula	√	√	√	√	√	√

Ref: Gupta and Gupta (2006), Prasad and Rao (1999) Dutta Munshi and Srivastava (1998) Jayaram (1999) Khedkar (2005) Hiware (2005) Salve *et.,al* (2006) Ahirrao and Mane(2000) Elivira and Almodovari (2001) Rao *et al* (1999) Balasundaram *et al.*,(2006), Biju Kumar (2000), Chandra *et al.*,(2008).Menon (1999).

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