

Characterization of an ecotype cichlid commonly referred to as “Wesafu” endemic to Epe-Lagoon, Nigeria

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Tilapia is a common name for more than 70 species of perch-like fishes in the family Cichlidae, native to freshwater tropical Africa (Trewavas 1983, Stiassny 1991). These fishes have been introduced into nearly every tropical and subtropical country of the world to support the development of freshwater aquaculture to an estimated world production exceeding 659,000 t/yr (FAO 1997).

The contribution of Nigeria’s tilapia aquaculture to world total output is nil, in spite of the potential and available resources. Tilapia aquaculture in the country is not attractive for several reasons including stunting, low market value, and the lack of commercially viable species. Research into the development of a commercial strain has not been conducted and this, in turn, is responsible for the lull in the tilapia aquaculture industry in the country. This has led most farmers to stock tilapia in polyculture as food for other species, such as *Clarias gariepinus*, a popular aquaculture species in the country.

The present trend in world population growth and the official population index of Nigeria suggest increases in demand well into the foreseeable future, making it imperative for Nigeria to invest in the development of tilapia aquaculture. The many attributes of this fish, which has been referred to as the aquatic chicken, may provide economic power for many farmers in the country at a sustainable level. The present population figures of the country have been put at about 120 million and suggest that food production needs to be stepped up to avert food crises in the future and also to maintain the current relative nutritional health in the nation.

There exists a strain of cichlid in a geographical location northeast of Lagos where it seems to be endemic. This so-called beefy cichlid is a highly priced fish in Lagos and grows to a size of over 1500 g in the wild. This singular attributes makes it potentially viable for culture in the country, and it lends itself to research and development of a commercial strain, including its hybrid, for commercial aquaculture in Nigeria.

This work reported here was aimed at properly identifying and characterizing an endemic strain of Epe-Lagoon fish, popularly referred to as Wesafu but often confused with other tilapia species.

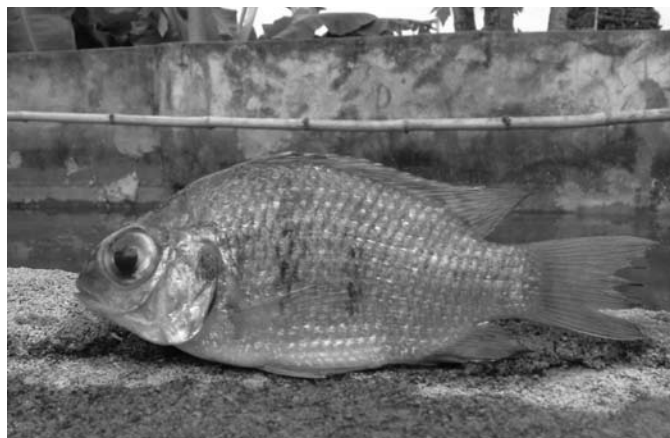


Fig. 1. Juvenile of the ecotype cichlid called Wesafu from Epe-Lagoon, Nigeria.

Collection

A total of 60 samples of Wesafu were collected over a period of eight weeks. The fish were procured at a landing site and immediately transferred to an ice pack before moving them to the university laboratory. The geographical location of the sampling site is Epe town on Longitude 4°31'N along the coastal area of Lagos Lagoon. The town lies approximately 89 km Northeast of Lagos, the economic hub of the country.

Estimation of Meristic and Morphometric Features of the Samples

In estimating the meristic and morphometric features of the sample, specimens were examined fresh on site for proper identification and subsequently chilled with ice packs for transportation. The specimens were preserved in 0.01N formalin solution pending further examination.

The measurements were taken using a graduated measuring board and vernier caliper. The number of scales along the lateral line as well as dorsal and anal fin spines and rays were counted. The body weights of the fish were measured with a top loading Mettler balance.²

Table 1. Summary of meristics and morphometric features of Wesafu from Epe Lagoon, Lagos State, Nigeria. (Data from 60 specimens.)

Parameter	Mean	Range	Variance	Std. Dev.	Std. Error
Body weight (g)	830	495-1500	4421.1	210.8	27.2
Total length (mm)	329	270-414	852.8	29.2	3.8
Std. length (mm)	271	223-340	639.1	25.3	3.3
Head length (mm)	85	60-115	109.0	10.4	1.3
Head width (mm)	112	90-138	128.3	11.3	1.5
Eye diameter (mm)	18	13-25	6.2	2.5	0.3
Body depth (mm)	44	25-64	80.0	8.7	1.1
Body width (mm)	127	100-150	119.5	10.9	1.4
Lateral line scales	28	18-35	8.3	2.9	0.4
Dorsal spines	XVI	XVI	0	0	0
Dorsal rays	12	12-13	0.2	0.1	0.1
Anal spines	III	III	0	0	0
Anal rays	10	9-11	0.3	0.6	0.6
Pelvic spines	I	I	0	0	0
Pelvic rays	5	5	0	0	0
Pectoral fin rays	12	11-13	0.2	0.5	0.5

Sampling Procedure

The specimens were kept moist in transit to the university laboratory and carefully handled to minimize risk of possible damage to the taxonomic features. Roman numerals were used to represent the number of fin spines and Arabic numerals to represent fin rays (Table 1).

Total length was taken from the tip of the snout to the termination of the caudal fin (Table 1). Head length was taken from the tip of the snout to the posterior end of the operculum and the eye diameter was measured as the distance across the eye socket. Body depth was taken to be the distance from the ventral region and the base of the dorsal fin. Table 2 presents the meristic and morphometric characteristics of 60 *Tilapia guineensis*.

Discussion of Results

Tilapia are highly palatable foodfish that lend themselves well to the aquaculture industry in most poor nations of the world. The ease of propagation and the characteristics, planktivorous feeding habits and use of organic waste products for growth led to the development of tilapia as aquaculture species in many parts of the world. However, this is not the case in Nigeria, where these species are only hunted and are hardly ever found in culture systems. The world economy makes it imperative for the country to quickly develop a viable and sustainable aquaculture; Wesafu might just be the fish that can allow that to occur.

Previously, Wesafu was commonly assumed to be *T. guineensis*, a species that is also found in Epe Lagoon; how-

ever, the consistently larger size of Wesafu and its deep body tend to separate it from the well known *T. guineensis*. Could it then be a variant of *T. guineensis*?

The present study is an attempt to identify the fish and do comparative studies of Wesafu and *Tilapia guineensis*. A series of experiments will culminate in the characterization, domestication and hybridization of the fish in an attempt to stimulate Wesafu aquaculture in the country.

The body weight range of Wesafu (495-1500 g) is a large variation from the 11- 352 g for *T. guineensis*, for which Wesafu is being mistaken. The same trend was also observed with respect to length (Tables 1 and 2). Other obvious differences in mean values were observed with respect to head length and eye diameter, with Wesafu once again having the highest values. However, *Tilapia guineensis* seems to have a larger mean body depth (Tables 1 and 2). The mean lateral line numbers were the same at 28. This was also true for dorsal and anal spines (XVI and III), respectively. There are, however, differences in the mean number of dorsal and anal fin rays between the two fishes.

Discussion and Conclusion

It has been shown that there is a relationship between some meristic characteristics and the environmental condition to which eggs and larvae are exposed (Taning 1944). Taning (1944) also showed that the number of rays in the pectoral and the dorsal fins increase with temperature.

Individuals cannot be separated by their meristic characters but only populations by their differences in mean numbers. It is common to use two or more characteristics in combination for discriminatory functions (Fisher

Table 1. Summary of meristics and morphometric features of *Tilapia guineensis*. (Data from 60 specimens.)

Parameter	Mean	Range	Variance	Std. Dev.	Std. Error
Body weight (g)	92.0	11-352	636.7	73.3	10.1
Total length (mm)	152	76-225	215.3	46.4	6.7
Std. length (mm)	122	60-205	139.9	37.4	5.1
Head length (mm)	36	18-60	11.7	10.8	4.5
Eye diameter (mm)	9	4-15	0.8	2.7	0.4
Body depth (mm)	54	28-90	24.8	15.7	2.2
Lateral line scales	28	26-30	0.6	0.8	0.1
Dorsal spines	XVI	XIV-XVI	0.3	0.5	0.1
Dorsal rays	10	9-10	0.2	0.5	0.8
Anal spines	III	III	0	0	0
Anal rays	11	10-13	1.1	1.0	0.1
Pectoral length (mm)	49	18-79	76.3	27.6	3.8
Pelvic length (mm)	39	17-70	14.4	12	1.6

1935); it would, therefore, be safe to assume meristic and morphometric variation, based on the variable characters of Wesafu and *T. guineensis*.

Radiation of cichlids was recently noticed in the great Lakes of Africa (Greenwood 1991), with unique modes of speciation. Sexual selection has been shown to play a crucial role in the large genetic divergence that makes cichlids endemic in the African Great Lakes, (Sturmbauer and Mayer 1992). Although radiation is not pronounced in Wesafu, it has a distinct and peculiar radiation that is well recognized by the local fishermen, apart from the large size of the individual fish that are landed.

While speciation cannot be determined by meristic characteristics alone, the unique size of the fish can not be neglected; such speciation is one reason for genetic divergence in Lake Malawi, where species evolve through three major selection forces: primary, secondary and the third radiation (Danley and Kocher 2001, Anseeuw *et al.* 1999).

In conclusion, Wesafu deserves further investigation for the many potential benefits it holds for tilapia aquaculture in Nigeria. Research in the development of hybrids of Wesafu with other tilapia species to improve the aquaculture value of those other common species is also warranted. For the management of fisheries, as well as for biodiversity conservation, it is crucial to ascertain the distinct characteristics of Wesafu using other tools such as genetic makeup, geometric morphometric analysis and life-history characteristics.

Notes

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²Mettler balance model PE 1600

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