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Studies regarding some morphological features of one-summer old catfish (*Silurus glanis* Linnaeus, 1758)

Mihaela O. Arteni

Faculty of Biology,"Alexandru Ioan Cuza" University, Iași, Romania, EU,
e-mail: oana_artenie@yahoo.com

Abstract. The present paper investigates some representative metric characters (total length, standard bodily length, head length, maximum height and bodily circumference) of wels catfish (*Silurus glanis*) during their first growing summer. Biometric analyses were performed on 70 individuals and in the end the morphological characters were statistically processed. The experimental results showed a positive correlation between all body variables investigated.
Key words: morphological characters, biometry, catfish.

Résumé. Le but de cette ouvrage est d'etudier certains caracteres metriques (la longueur totale, la longueur standarde, la longueur du tête, l'hauteur maxim et circonference du corp) du silure (*Silurus glanis*) dans le premier été d'élevage. Les analyses biometriques on été réalisés sur 70 individus y les propriétés morphologiques on été statistiquement analysés. L'explication du resultats des experiments mêt en evidence une correlation positive entre toutes les variables investigués.
Mots clés: caracteres morphologiques, biometrie, le silure.

Rezumat. Scopul acestei lucrări este investigarea unor caracteristici metrice (lungimea totală, lungimea standard, lungimea capului, înălţimea maximă şi circumferinţa corpului) la indivizii de somn (*Silurus glanis*) în vârstă de o vară. Analiza biometrică a fost realizată la 70 de indivizi, în final caracteristicile morfologice investigate fiind prelucrate statistic. Explicarea rezultatelor experimentale evidenţiază existenţa unei corelaţii positive între toate variabilele investigate.
Cuvinte cheie: caractere morfologice, biometrie, somn.

Introduction. Development of modern aquaculture and the increasing consumer demand provoke improvements in the complex breeding technologies of economically valuable fish species. *Silurus glanis*, known as the European catfish, wels and sheat fish, is the largest freshwater fish species and it is characterized by its fast growth and by a large body weight (Alp et al 2004). It has a natural distribution including the tributaries of the Caspian, Black, Aral, Aegean and Eastern Mediterranean. Because of its economic importance, *Silurus glanis* has attracted interest as a potential species for fish culture, and so a number of studies have been carried out for artificial reproduction and aquacultural purposes.

Silurus glanis is one of the species of fish with the longest life-span and largest size bred in our country, in natural basins, in monoculture and polyculture. One specific quality is the remarkable ability to adapt to different of aquatic conditions, also one of the most important attributes for fish breeding.

Currently the wels catfish is cultured in recirculating systems, substantially shortening the production cycle (from hatchling to market-size fish – 1.5 kg) to a period of 7–8 months (Ulikowski et al 1998; Linhart et al 2002; Ulikowski 2003, 2005).

Material and Method. The experimental studies were carried out on 70 one summer-old individuals of wels catfish (*Silurus glanis*). The main external corporal variables investigated were total length (L), standard body length (l), head length (c), the maximum height (H), the girth (G) and the body weight (W) (Bănărescu 1964).

All data obtained as a result of biometric studies were statistically analyzed, calculating mean, standard error, standard deviation, median, mode, range and precision coefficient variation, as well as lower and upper limits of the confidence intervals (Dragomirescu 1998; Gomoiu & Skolka 2001; Varvara et al 2001).

Results and Discussion. For one summer-old *Silurus glanis* individuals the highest values of main statistical factors (average variation, standard deviation and standard error) have been recorded for total length, standard length of body, body circumference and weight.

Table 1

Values of the main statistical indices of body variables for one summer old *Silurus glanis*

Statistical indices	*Body variables*					
	L(cm)	l(cm)	c(cm)	H (cm)	G(cm)	W(g)
Mean	19.932	17.591	3.661	2.858	7.67	47.957
Standard Error	0.248	0.202	0.083	0.086	0.155	1.948
Median	19.5	17.55	3.5	2.55	7.45	44
Mode	20.5	17.5	3.5	2.5	7.5	38
Standard Deviation	2.076	1.695	0.698	0.719	1.296	16.306
Sample Variance	4.313	2.874	0.488	0.518	1.681	265.896
Range	12.5	8.7	3.6	3.5	6.4	94
Minimum	15.4	13.8	2.2	2	5.9	28
Maximum	27.9	22.5	5.8	5.5	12.3	122
Confidence level (95%)	0.495	0.166	0.171	0.997	0.309	3.888
lower limit	19.437	17.187	3.494	2.686	7.360	44.069
Upper limit	20.428	17.995	3.828	3.030	7.979	51.845
CV%	10.419	9.637	19.088	25.180	16.908	34.001
m%	1.245	1.151	2.281	3.009	2.020	4.064

L = total length, l = standard length, c = head length, H = maximum body height, G = girth, W = weight, CV% = mean variation coefficient, m% = mean precision coefficient

The upper coefficient of average variation (34.001%) is observed in the case of weight average, the lower value being in the case of standard length of the body (9.637%). The maximum limit of the weight in this stage of development is about 122 g, the minimum is about 28 g (Table 1).

Using the standard error average and the *t* value given by α = 0.05 (95% of probability) and a *n-1* degree of freedom (where *n* represents the number of individuals taken into consideration), we calculated the confidence interval limits for all body variables analyzed. Thus, one summer-old wels catfish individuals' total body length average is situated in the 19.437-20.428 cm interval, standard length average between 17.187 and 17.995 cm, head length average between 3.494 and 3.828 cm, the height average between 2.686 and 3.03 cm, the circumference average between 7.360 and 7.979 cm, and the weight average in the interval 44.069-51.845 cm.

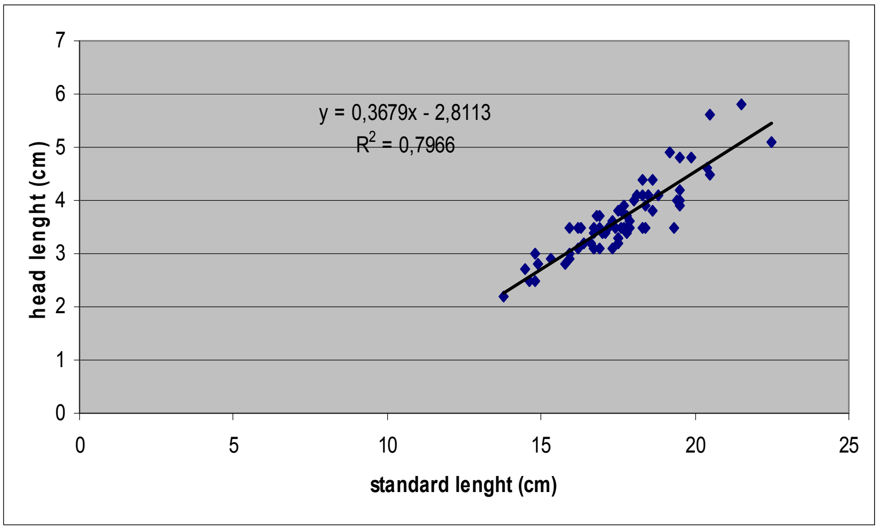

Figure 1. Graphical representation of regression - standard body length and head length for one summer-old *Silurus glanis*

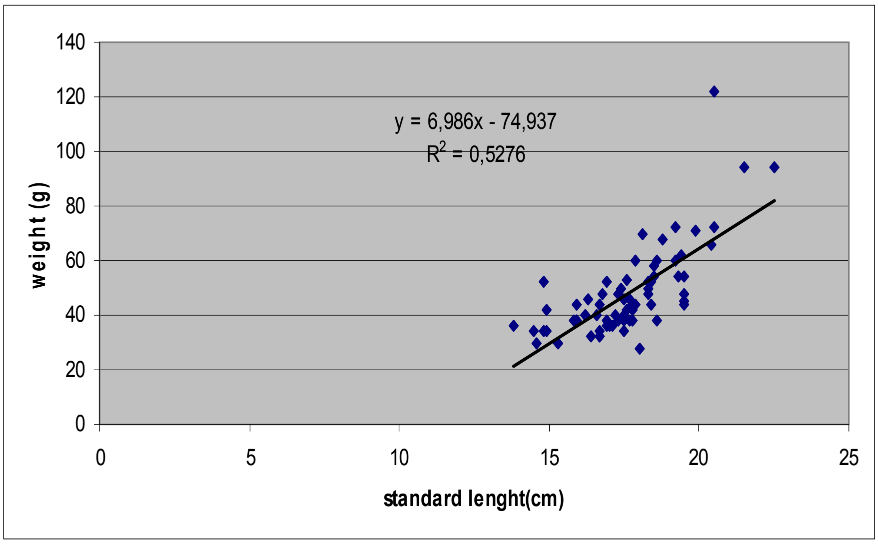

Figure 2. Graphical representation of regression - standard length and body weight for one summer-old *Silurus glanis*

The determination coefficient (R^2) shows that the values of dependent variable (the head length) are determined by an independent variable (standard length) for 79.66% of cases (Figure 1).

The determination coefficient used for the regression between standard length and body weight showed that the values for the two variables determine each other in 52.76% of cases (Figure 2).

A positive correlation has been recorded for standard length versus total body length (r = 0.9); this correlation appears valid for 81.04% of cases (Figure 3).

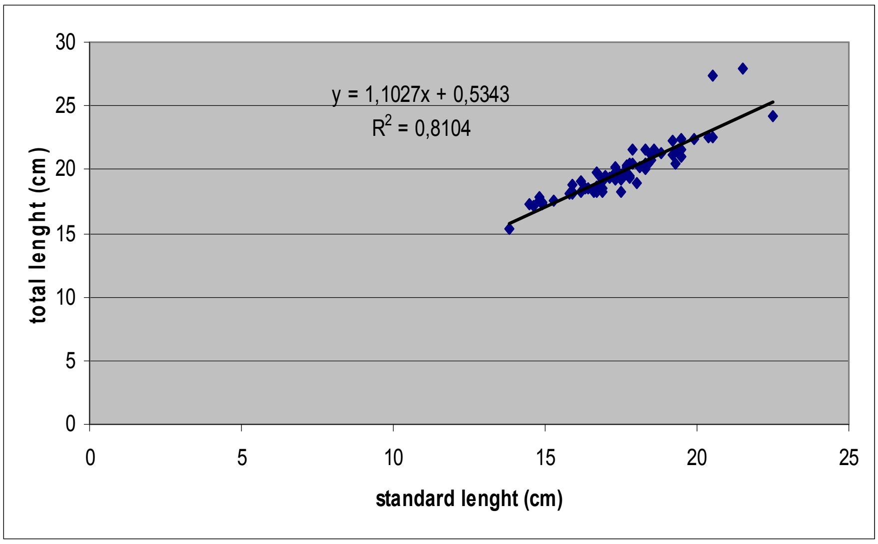

Figure 3. Graphical representation of regression - standard length and total body length for one summer-old *Silurus glanis*

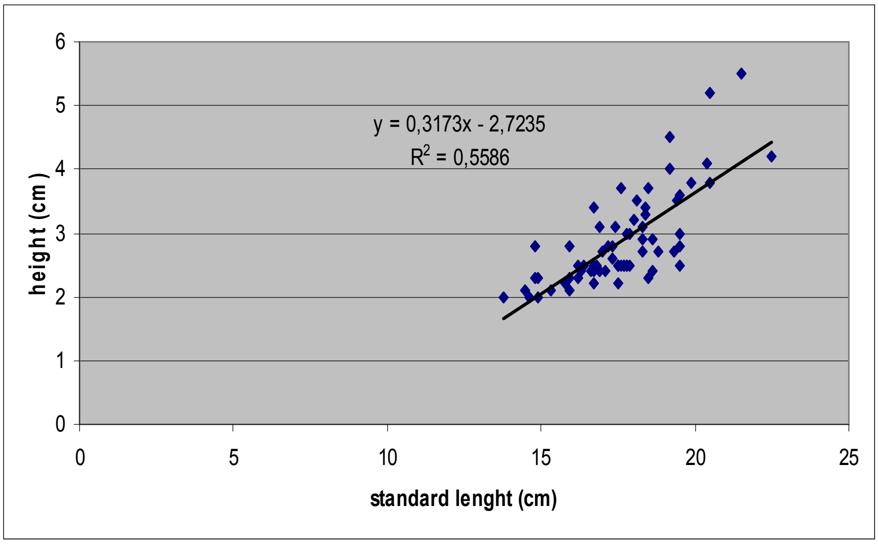

Figure 4. Graphical representation of regression - standard length and body height for one summer-old *Silurus glanis*

For one summer-old wels catfish individuals a p value of 0.747 has been established between standard length and body height.

Due to the values of the determination factor, this type of relation appears valid in only 55.86% of the cases (Figure 4).

The determination factor between total length and girth evidence that the two variables determine each other in 79.95% of the cases (Figure 5).

The height and girth determine each other in 65.21% of cases (Figure 6).

A positive correlation has also been observed between girth and body weight (r = 0.822); this type of relation is true for 67.64% of cases (Figure 7).

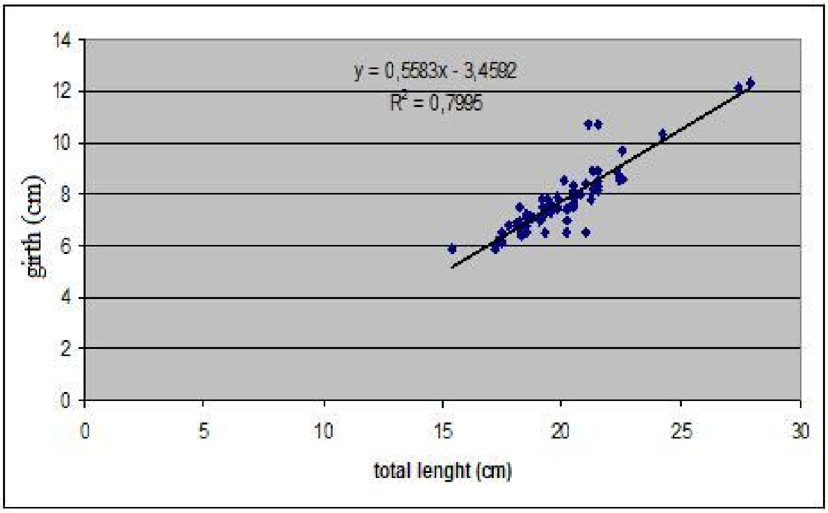

Figure 5. Graphical representation of regression - standard length and girth for one summer-old *Silurus glanis*

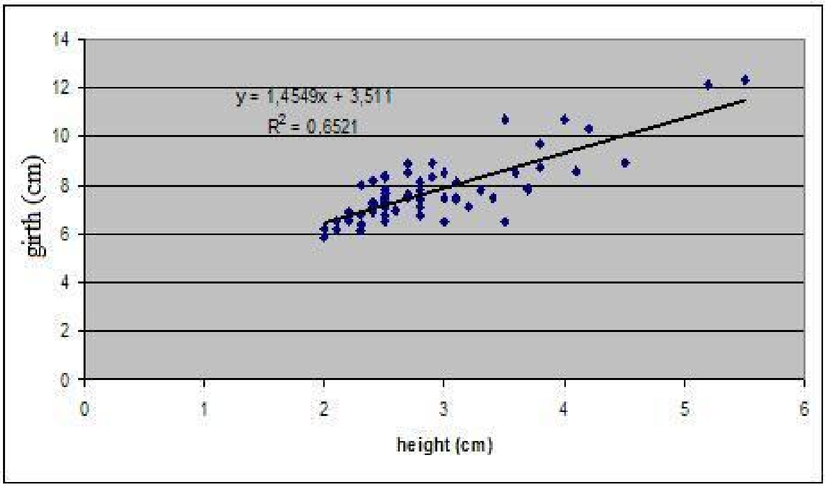

Figure 6. Graphical representation of regression - height and girth for one summer-old *Silurus glanis*

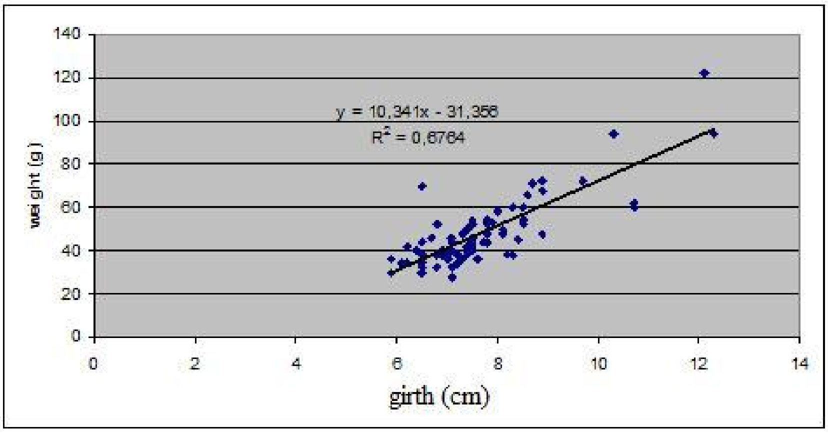

Figure 7. Graphical representation of regression - girth and body weight for one summer-old *Silurus glanis*

Conclusions

- For one summer-old *Silurus glanis* individuals all the body couples of variables recorded positive correlations (*t calculated* was each time higher than *t critic*);
- Strong correlations has been recorded between standard length and total body length (r = 0.9) and between girth and body weight (r = 0.822).

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Author:
Mihaela Oana Arteni, Faculty of Biology, "Alexandru Ioan Cuza" University, Carol I Bvd, No 20A, Iași 700505, Romania, EU, e-mail: oana_artenie@yahoo.com
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