

PHENOTYPICAL PERFORMANCES AT 5 *CYPRINUS CARPIO* LINES RESULTING FROM LAUSITZ VARIETY GENITORS SELECTED ON DNA FINGERPRINTING AT 45 AND 145 DAYS

PERFORMANȚE FENOTIPICE LA 5 LINII DE *CYPRINUS CARPIO* OBȚINUTE DIN PĂRINȚI VARIETATEA LAUSITZ SELECȚIONAȚI PE BAZA AMPRENTII ADN LA VÂRSTA DE 45 ȘI 145 ZILE

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*The paper presents some phenotypical performances of five offsprings families who belong to five lines created in *Cyprinus carpio* population, Lausitz variety, at Arinis fishery complex, Maramures county. We observed the total body length (from top of nose to tail's end), the tail base length (from top of nose to tail's base), maximum height, body weight. The data were statistical analyzed using the average and dispersal indices and the differences were tested using Student test. There are significant differences at all the observed traits, between the offsprings obtained from the parental couples matched after DNA fingerprinting using PCR-RAPD technique and migration on polyacrylamide gel. There is also observed a homogeneity between the families offsprings, as well as a variability quite big between the families, which allows a good intra- and interlinear selection, useful for the lines consolidation. The performance values are shown at the ages of 45-47 days and 145-147 days, on 100 offsprings per family, randomly captured for the representability of the extraction population.*

Key words: *Cyprinus carpio*, total body length (from top of nose to tail's end), tail base length (from top of nose to tail's base), maximum height, body weight.

Introduction

This paper represents a sequence from a CEEX research, module I, Biotech 45/2005, which studies the genetic variability for the strains creation in carp populations (*Cyprinus carpio*) from the north-western part of Transylvania, using genetic markers and associated biotechnologies for the genestock sustainable

preservation. The experiment took place at Arinis fishery complex, Maramures county.

Materials and Methods

The biological material used in the families phenotypical performances evaluation was represented by 100 offsprings per Lausitz couple of genitors. We observed the offsprings of five parental couples. The parental pairs matching was made after DNA fingerprinting of each reproduction individual, based on the fish fins and scales collected samples. The genetic fingerprinting of each individual from the selection nucleus was made using PCR-RAPD technique and migration on polyacrylamide gel. The eclosion of the offsprings of each family took place different and the fish were growth divided on vivariums, having the same water, food and density conditions because the differences between them should be attributed only to the genetic causes. We weighed and measured all the individuals at 45-47 days and at 145-147 days, and the data were statistical interpreted, showing the average and disperal indices. The differenced between families and their statistical signification was made using Student test.

There were observed more traits, but in this paper we present only total body length (from top of nose to tail's end), tail base length (from top of nose to tail's base), maximum height, body weight.

Results and Discussions

Table 1

Average and variability measure of body length trait at 45-47 days
(in centimeters) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		3.92±0.06	3.96±0.06	4.31±0.05	4.50±0.05	4.90±0.05
s		0.57	0.63	0.52	0.49	0.50
V%		14.54	15.90	12.06	10.88	10.20
Fam. I	Diff.		-0.04	-0.39	-0.58	-0.98
	Signification		ns	**	***	***
Fam. II	Diff.			-0.35	-0.54	0.94
	Signification			**	***	***
Fam. III	Diff.				-0.19	-0.56
	Signification				*	***
Fam. IV	Diff.					-0.40
	Signification					**

Table 2

Average and variability measure of body length trait at 145-147 days
(in centimeters) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		10.63±0.16	10.02±0.17	11.04±0.18	10.90±0.16	11.85±0.15
s		1.63	1.74	1.80	1.63	1.51
V%		15.33	17.36	16.30	14.95	12.75
Fam. I	Diff.		0.61	-0.41	-0.27	-1.21
	Signification		*	*	ns	***
Fam. II	Diff.			-1.02	-0.88	-0.77
	Signification			***	*	*
Fam. III	Diff.				0.14	-0.81
	Signification				ns	*
Fam. IV	Diff.					-0.95
	Signification					**

Analyzing the average and dispersal indices of total body length trait, on the offsprings belonging to five Lausitz families, at the age of 45-47 days we observed that family V realizes an average of 4.90 cm. The difference between this family and the other four is very significant statistical. The smallest values were registered by the family I, with an average of 3.93 cm. The variation coefficients are comprised between 10.2 % at family V and 15.90 % at family II. At 145-147 days, family V has an average of 11.85 cm, being statistical significant superior in correlation with family I, significant different in correlation with the families II, III and distinct significant in correlation with family IV. We observed that all the families realize at this age values bigger than 10 cm regarding the total body length trait (tables 1,2).

Analyzing the length from top of nose to tail's end, at the two ages, on the five families we observed the maintaining of some very significant differences in favour of the family V, at 45-47 days, who realizes an average of 4.10 cm in correlation with family I, who has an average of 3.20 cm. At the age of 145-147 days, the smallest value is realized by family II, with an average of 9 cm, inferior with 2 cm in correlation with family V. At this age, excepting the differences between families I, II, III and IV, which are meaningless, the other ones are very significant statistical. The variation coefficient has values between 14.54 % at family V and 20.10 % at family I (tables 3, 4).

Table 3

Average and variability measure of body length without tail trait at 45-47 days
(in centimeters) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		3.20±0.05	3.25±0.06	3.90±0.05	3.90±0.04	4.10±0.05
s		0.53	0.63	0.52	0.40	0.45
V%		16.56	19.38	13.33	10.25	10.97
Fam. I	Diff.		-0.05	-0.70	-0.70	-0.90
	Signification		ns	***	***	***
Fam. II	Diff.			-0.65	-0.65	0.85
	Signification			***	***	***
Fam. III	Diff.				0.00	-0.20
	Signification				ns	*
Fam. IV	Diff.					-0.20
	Signification					*

Table 4

Average and variability measure of body length without tail trait at 145-147 days
(in centimeters) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		9.10±0.18	9.00±0.17	10,01±0,17	9.90±0.17	11.00±0.16
s		1.83	1.72	1.69	1.70	1.60
V%		20.10	19.11	16.88	17.17	14.54
Fam. I	Diff.		0.10	-0.91	-0.80	-1.90
	Signification		ns	***	***	***
Fam. II	Diff.			-1.01	-0.90	-2.00
	Signification			***	***	***
Fam. III	Diff.				0.11	-0.99
	Signification				ns	***
Fam. IV	Diff.					-1.10
	Signification					***

The maximum height at 45-47 days is registered at the individuals from family V, with an average of 1.90 cm and the lowest value, of 1.30 cm, at family IV. We observed a very good homogeneity at this trait, at all the families and a very low variability between the families. The differences between the families are maintaining at the age of 145-147 days, excepting those between the families I and

II, II and III, being statistical insignificant. Family V has an average of 2.94 cm, and family II of 2.39 cm (tables 5, 6).

Table 5

Average and variability measure of maximum height trait at 45-47 days
(in centimeters) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		1.51±0.01	1.37±0.01	1.42±0.01	1.30±0.01	1.90±0.01
s		0.12	0.13	0.11	0.11	0.10
V%		7.94	9.48	7.74	8.46	5.26
Fam. I	Diff.		0.14	0.09	0.21	-0.39
	Signification		***	*	***	***
Fam. II	Diff.			-0.05	0.07	-0.53
	Signification			*	*	***
Fam. III	Diff.				-0.12	-0.48
	Signification				***	***
Fam. IV	Diff.					0.60
	Signification					***

Table 6

Average and variability measure of maximum height trait at 145-147 days
(in centimeters)– difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		2.41±0.03	2.39±0.02	2.48±0.03	2.83±0.04	2.94±0.03
s		0.25	0.22	0.29	0.35	0.30
V%		10.37	9.20	11.69	12.32	10.20
Fam. I	Diff.		0.02	-0.07	-0.42	-0.53
	Signification		ns	*	***	***
Fam. II	Diff.			-0.09	-0.44	-0.55
	Signification			ns	**	**
Fam. III	Diff.				-0.35	-0.46
	Signification				**	**
Fam. IV	Diff.					-0.11
	Signification					*

The body weight, a very important trait and an index used in the establishment of the growth speed and environment adaptation indicates at 45-47

days the very significant statistical superiority of family V, who realizes an average of 12.40 cm. At 145-147 days all the individuals from different families have more than 32 grams. The obvious superiority of family V is maintaining at this age, when the realized average is 50.30 grams (tables 7, 8).

Table 7

Average and variability measure of body weight trait at 45-47 days (in grams) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		10.73±0.42	9.16±0.39	11.30±0.32	10.91±0.32	12.40±0.30
s		2.19	2.91	2.15	1.20	1.01
V%		20.41	31.76	19.02	10.98	8.14
Fam. I	Diff.		1.57	-0.57	-0.18	-1.67
	Signification		***	***	ns	***
Fam. II	Diff.			-2.14	-1.75	-3.24
	Signification			***	***	***
Fam. III	Diff.				0.39	-1.10
	Signification				**	***
Fam. IV	Diff.					1.49
	Signification					***

Table 8

Average and variability measure of body weight trait at 145-147 days (in grams) – difference and signification

Specification		Family				
		I	II	III	IV	V
n		100	100	100	100	100
x ± sx		32.54±0.49	34.50±0.53	40.15±0.61	40.10±0.73	50.30±0.69
s		4.90	5.32	6.11	7.31	6.90
V%		15.05	15.42	15.21	18.22	13.71
Fam. I	Diff.		-1.96	-7.61	-7.56	-17.56
	Signification		ns	***	***	***
Fam. II	Diff.			-5.65	-5.60	-15.80
	Signification			***	***	***
Fam. III	Diff.				0.05	-10.15
	Signification				ns	***
Fam. IV	Diff.					-10.20
	Signification					***

Conclusions

1. We observed a good homogeneity within the families and a large variability between the families for the analyzed traits of the five Lausitz carp families offsprings.

2. The individual performances analysis allows a familial selection combined with an individual selection in obtaining the carp lines.

3. The study of carp offsprings variability at 45-47 days and 145-147 days gives the possibility to work, in summer, with smaller retaining percent and bigger intensities for obtaining high selection effects.

Bibliography

1. **Oroian, T.E.** (2007)- Principii in ameliorarea pestilor, Editura Risoprint, Cluj-Napoca, ISBN 978-973-751-424-0.

2. **Oroian, T.E. si col.** (2007)- Selectia asistata de markeri la crap, Edit. Risoprint, Cluj-Napoca, ISBN 978-973-751-373-1.

3. **Oroian, T.E. si col.** (2006)- Phenotipic variability in two summers old *Cyprinus carpio* population from North-Western Transylvania, *Lucrari stiintifice Zootehnie si Biotehnologii*, Timisoara, vol. 39 (2), pg. 37-42.

4. **Oroian, T.E. si col.** (2006)- Phenotipic variability in three summers old *Cyprinus carpio* population from North-Western Transylvania, *Lucrari stiintifice Zootehnie si Biotehnologii*, Timisoara, vol. 39 (2), pg. 31-36.

5. **Oroian, T., Vlaic, A., Simona Pascalau, Oroian, R.G., Dronca, D., Cighi, V., Viorica Cosier** (2006)- Description d'un noyan elargi de selection dans une population de carpe (*Cyprinus carpio*) du Nord-Ouest de la Transylvanie, *Buletin USAMV, seria Zootehnie si Biotehnologii*, Cluj-Napoca, vol. 62, pg. 189-194.

6. **Oroian, T., Cosma, Al., Oroian, R.G., Ramona Cosma** (2006)- Station mobile de couvasion pour les poissons, *Buletin USAMV, seria Zootehnie si Biotehnologii*, Cluj-Napoca, vol. 62, pg. 195-200.