Carp genetics and breeding in Hungary

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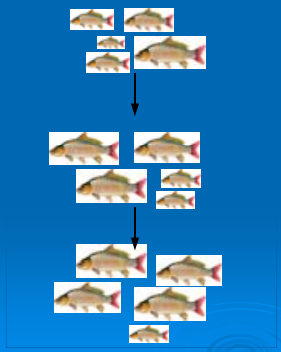
Starting of carp culture in Hungary

- The first „modern" carp farm (pond system) was built at the end of the 19-th century – Simontornya – and an extensive pond building followed it, until the 1960-ies.
- The first stocks have been introduced from **Germany, Bohemia and Galicia**

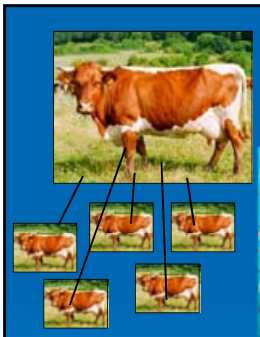
The farms improved their stocks by phenotypic mass selection.
It could be done even with only natural spawning (Bercsenyi, 2007)



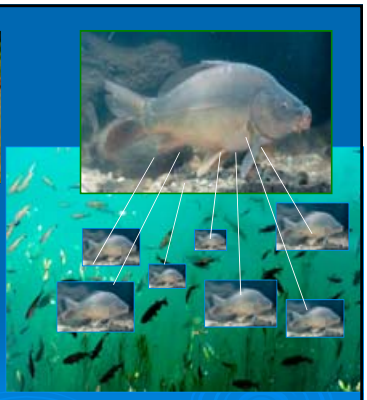
$V_G = V_A + V_D + V_I$

A - additive
D - dominant
I - interactive

By the end of the fifties about 10-15 „landraces" existed



5 pcs of progenies



5 millions of progenies

The efficiency of a genetic program highly depends on the availability of artificial propagation methods.
Hungarian researchers contributed substantially to that (Woynarovich 1958).

Hungarian achievements in relation to carp genetics and breeding

- Gynogenesis
- Sterile fish by triploids
- Sex reversal
- Interspecific androgenesis
- Transgenetic carp
- Maintenance of live gene banks

Historical background

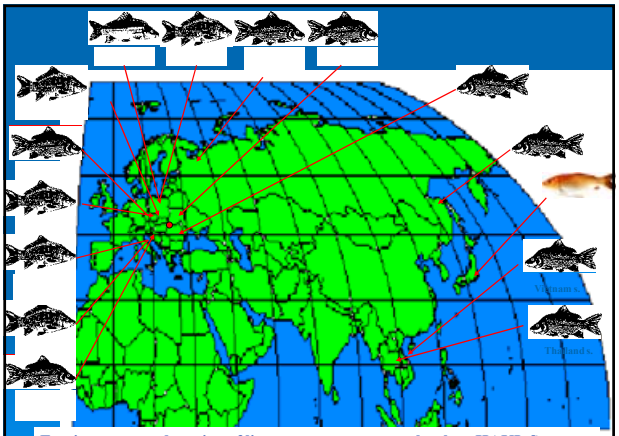
- Establisment of the live gene bank: 1962
- Original objectives:
  - maintaining, completing and preserving the strains of common carp;
  - production of hybrids with enhanced productivity
  - gene exchange

Dr. János Bakos, the "father of the gene bank"

Hungarian and foreign carp strains

Hungarian strains	Foreign strains
Bikal mirror carp	Amur wild carp
Dinnyés mirror carp	Czech scaly carp
Felsősomogy mirror carp	Czech mirror carp
Gödi mirror carp	Fresinet scaly carp
Hortobágy mirror carp	German mirror carp
Nagyatád mirror carp	Nasic mirror carp
Palkonya mirror carp	Polish linear carp
Sumony mirror carp	Polish mirror carp
Szarvas mirror carp	Poljana scaly carp
Szarvas red mirror carp	Poljana mirror carp
Szeged mirror carp	Ropsha scaly carp
Tata scaly carp	Ukrainian scaly carp
Tisza wild	Vietnam scaly carp
Szarvas 22 mirror carp	
Szarvas P33 scaly carp	
Szarvas P31 scaly carp	
Szarvas P34 scaly carp	
Szarvas 215 mirror carp	

Hungarian races and strains of live common carp gene bank at HAKI, Szarvas



Foreign races and strains of live common carp gene bank at HAKI, Szarvas

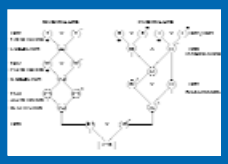
Dr. Bakos* applied a formula for ranking the races based on five properties as:

- Weight gain in the year of table size (g)
- Survival (%)
- Feed conversion (kg/kg)
- Fat content (%)
- Carcass (% of edible parts)

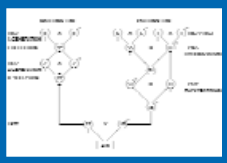
*Bakos,J. 1965. Comparative performance test of carp land races in Szarvas. **Halászat 10, 3** (in Hung.)

Three high quality hybrids have been produced in HAKI using the strains in the live common carp gene bank

Breeding schemes of Szarvas hybrids



Szarvas 215



Szarvas P31

Szarvas P34

Objectives of live gene bank today

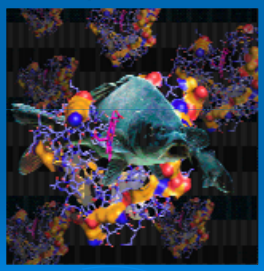
Overall objective:

gene bank is maintaned;

Immediate objectives:

- gene bank is studied;
- gene fond is used for rehabitation purposes;
- gene fond is used for gene exchange.

EUROCARP 5th Project Meeting Bodo-Tromso, October 6-7, 2008



EUROCARP project
Month 1-36.

Example for rehabilitation function: Resettlement of Croatian strains

- Nasice mirror carp
- Poljana mirror carp
- Poljana scaly carp

Lost in recent war in former Yugoslavia, but preserved in live gene bank of HAKI

The Croatian carp strains have settled succesfully at their original farm environment. How do they relate to the todays local varieties?

Lessons 1

- The breeding program of common carp was succesfull in Hungary and resulted in:
  - Live gene bank of common carp
  - Methodology of maintaining live genebanks
  - Three top productive hybrids for different conditions of fish farms and natural waters
  - National Breeding Program of carp

Lessons 2

- National Breeding Program
  - Methodology of Progeny Performance Testing
  - Methodology of licencing and controlling fish farms and hatcheries
  - Methodology of fish seed distribution

Lessons 3

- Close cooperation between stakeholders
  - National Association of Fish Producers (HOSz)
  - National Research Institute for Fisheries (HAKI)
  - National Institute for Agricultural Quality Control (OMMI)

Ponds for gene banking and breding works at HAKI

Recent history of carp breeding program

- 1st phase: 1963 – 1988
  - The beginnings
- 2nd phase: 1989 – 1992
  - „Falling a part"
- 3rd phase: 1993 – 2006
  - The Animal Breeding Act
- 4th phase: 2007 –
  - The present situation

4th phase from 2007 – (present situation)

Present number of strains:

- Total number of strains:	30
- New	5
- Earlier approved:	25
- Total number of strain owners:	18
- Domesticated scaly strains:	5
- Domesticated mirror strains:	14
- Original wild strains:	3
- Hybrids:	3
- Domesticated with elongated body shape:	5

SUMMARY

Parameters	1st phase	3rd phase	4th phase	
			new	registered
Centralised propagation	no	yes	no	
1st year testing	no	yes	yes	no
2nd year testing	yes	yes	yes	no
3rd year testing	no	no	no	yes
Constant testing farms	no	yes	no	
Standard control	yes	no	no	
Certificate of origin	no	yes	yes	
Only better strain approved	yes	no	no	
Subsidy for test farms	yes	yes	no	
Reimbursement	no	no/yes	50 %	
Hatchery control	no	yes	yes	
Quality supply	no	yes	yes	
Publishing the results	no	yes	no	

Thank you for your attention!