Program:

IDEEAS

Type of the programme:

Exploratory Research Project

Project code:

ID_852

Title of the project:

Characterization of the genetic potential at *Apis mellifera carpatica* honeybee using molecular techniques for its biodiversity conservation

Contract:

390/2007

Project duration:

2007-2010 (36 months)

Project director:

Prof.eng. Liviu Al. Mărghitaş, PhD

Project's abstract:

The motivation of proposed aim is first of all the conservation of *Apis* biodiversity, applying high performance biotechnologies. The maintenance of diversity is necessary for different reasons. The importance of this action cames from the fact that the genoms secventiation at apis species was reasised. For testing the biodiversity, the first step is identification of local races and populations. Races appreciation based on morphological characteristics must be analyzed in relation with the study of genotype-environment interactions. The effect of hereditary base for phenotypical response is not always easy to analyse. This study wants to be the first one in molecular and morphometrical characterization of *Apis mellifera carpatica* Foti, for recognize of this one on european and worldwide plan and for this introduction in *Apis* species genetical stock. The local ecotipes identification can be realized after a scientifical description of those using last generation molecular techniques and methods, and this permits the comparation of obtained data with those of other races, populations and varieties. The research team has experience in this domain due to its involve in other grants with similar topic and due to its collaboration with other specialists in this field.

Objectives and activities:

Year	Objectives	Associate Activities	Achievement %
2007	1.Scientific study of intraspecific diversity of Apis mellifera carpatica bees from Transylvania area	1. Workshop organization , International Conference participation 2.Existing data collecting about the intraspecific diversity from Transylvanian areal regarding the race Apis mellifera carpatica 3.Source identification and imported race proportion	100% 100% 100%
	2.Collecting and conservation of biologic material (*Apis mellifera carpatica*) from Transilvania and establishment of work protocols	1.Randomized selection of areal for sample collecting based on the beehive number and important meliferous areal 2.Bee sample collecting from 12 countys of Transylvania from stationary apiaries 3.Protocol identification for preservation of biologically material	100% 100% 100%
2008	1.Morphometric measurement determinations at *Apis mellifera carpatica*	1.Equipment acquisition and materials for measurement and computer programs for data interpretation 2.Morphometric measurement in Apis mellifera carpatica by informatic biometry 3.Data interpretation in correlation with specificity of race and international bibliographic referencies 4.Biometric comparative study of local ecotypes	100% 100% 100% 100%
	2.Molecular markers identification, used in analysis methods testing of genetic variability of the bees	1.Specific marker identification, utilized in molecular analysis 2.Aquisition of materials for molecular analysis 3.Genes and locuses establishment which can provide precise information of differentiations in analyzed race	100% 100% 100%
	3.Molecular marker's testing and choosing of working method	1.Practical applications and identification of optimal working method 2.Testing of markers by molecular analysis techniques 3. Microsatelites variability analysis	100% 100% 100%
2009	1.Research upon genetic variability in bees	1.Identification of certain common genetic characteristics in studied population and establishing the correlations between them 2.Identification of the locuses from genes in Apis mellifera carpatica race 3.Molecular fingerprint study in Apis mellifera carpatica 4.Statistical interpretation of results and establishing of dispersion in population of certain characters of the race and studied varieties	100% 100% 100% 100%
	2. Correlation between morphometric characteristics and the studied race genofond	1.Genetic and phenotypic correlations evidentiation, in relation with selection upon productive performances of studied populations 2.Selection criteria nominalization, taking into account biodiversity maintenance and races genetic characteristics	100% 100%
	3.Heterogeneity study of studied populations and hybridation degree	1.Heterogenity analysis in studied populations 2.Foreign gene flux identification by quantifying mDNA analysis with specific markers 3.Mapping of distribution for different genotypes in studied population	100% 100% 100%
2010	1.Development of a breeding technology of Apis mellifera carpatica race, that should preserve local biodiversity	1.Conflict identification between biodiversity conservation, development of apicol sector and economic activity expansion on local scale 2.Durable development manual elaboration of beekeeping for biodiversity maintenance	In finalization
	2.Dissemination of informations	1.International collaboration, European programems in partnership 2.Elaboration of symposium volume, ISI research papers in Journals as: Apidologie, Journal of Insect Biotechnology, thematic workshop, round tables, other publications	In finalization

Obtained results:

Published articles:

1. Liviu Al. Mărghitaş, Daniel Dezmirean, Orsolya Teleky, Emilia Furdui, Adela Moise, Laura Stan, Cristina Mihai, Aurelia Pece, Cristian Coroian, 2009, *Biodiversity testing of Transylvanian honeybee populations using mtDNA Markers*, Bulletin USAMV-CN, 66 (1-2), 402-406, ISSN 1843-5262.
2. Mărghitas L. Al., Paniti-Teleky Orsolya, Dezmirean D., Mărgăoan Rodica, Bojan Cristina, Coroian C., Laslo Laura, Moise Adela, 2008, *Morphometric differences between honey bees (Apis mellifera carpatica) populations from Transylvanian area*, Lucrări ştiinţifice zootehnie şi biotehnologii, Timişoara, vol. 41 (2) 309-315.
3. Liviu Al. Mărghitaş, Stefan Fuchs, Orsolya Paniti-Teleky, Dezmirean Daniel, Alexandru S. Bărădău, Rodica Mărgăoan, Laura Laslo, Coroian Cristian, Adela Moise, Morphometrical study regarding ecotypes variability of *Apis mellifera carnica carpatica* bees from Transylvania – Romania, reference number 09105NC, sept 2009, Journal of Apicultural Research.
4. Liviu Al. Mărghitaş, Daniel Dezmirean, Emilia Furdui, Laura Stan, Cristian Coroian, Genetic diversity of Apis mellifera from Transylvania (Romania) based on mtDNA sequences, Apidologie, reference number m100047, apr 2010.

Finalized PhD thesis:

1. Genetic variability of Apis mellifera carpatica honeybees from Transylvania, Eng. Orsolya Reka Teleky Paniti, PhD

Obtained results point out:

Heterogenity analysis of honeybee population from 35 villages from Transylvania based upon morphometric measurements and genetic analysis of diversity using mDNA method
Establishment of hibridation drgree of studied populations
Teritorial distribution of bee families according to genetic purity

Reasearch team of the project:

Nr.crt.	Name	Position	Period
1.	Liviu Al.Mărghitaş	Director of project	2007-2010
2.	Daniel Dezmirean	Experienced researcher	2007-2010
3.	Adela Moise	Postdoc researcher	2007-2009
4.	Cristian Coroian	Postdoc researcher	2007-2010
5.	Teleky Orsolya	PhD student	2007-2009
6.	Cristina Bojan	PhD Student	2007-2009
7.	Laura Stan	Postdoc Researcher	2009-2010
8.	Olimpia Morar	Postdoc Researcher	2009-2010

Implication degree of young researchers:

Nr.crt.	Name	2007		2008			2009			2010	
		O1	O2	O1	O2	O3	O1	O2	O3	O1	O2
1.	Adela Moise	X	X	X	X	X	X	X			
2.	Cristian Coroian	X	X	X	X	X	X	X	X	X	X
3.	Orsolya Teleky	X	X	X	X	X	X	X			
4.	Cristina Bojan	X	X	X	X	X	X	X			
5.	Laura Stan								X	X	X
6.	Olimpia Morar								X	X	X

Project budget:

Nr. crt.	Budget chapter	2007 Value	2008 Value	2009 Value	2010 Value	Total value
1.	Direct expenses (max.60% from total value of the contract)	28372	166650	133464	146869	475355
2.	Indirect expenses	13767	46167	27084	37890	124908
3.	Mobilities (ensuring the participation in documenting stages abroad)	905	7879	0	7500	16284
4.	Logistic for project management (research infrastructure, materials, disemination)	39556	55804	20011	57841	173212
5.	**TOTAL**	**82666**	**276500**	**180559**	**250100**	**789759**