

COST
Domain Committee Food and Agriculture

COST Action FA0803
Start Date 21/11/2008

Prevention of honeybee Colony Losses (COLOSS)

**MONITORING
PROGRESS REPORT**

Reporting Period: from 21/11/2008 – 31/12/2009

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report prepared by the COST Office/Grant Holder***
- II. Scientific Report prepared by the Chair of the Management Committee of the Action***
- III. Previous versions of the Scientific Report; i.e., part II of past reporting periods***

The report is a “cumulative” report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

Executive summary (max.250 words):

In Europe, China and the USA, beekeepers are being regularly confronted with severe inexplicable and sudden colony losses (Euro 400 million per year, excluding pollination value), with colonies exhibiting diverse symptoms (CCD = Colony Collapse Disorder). This major pollinator decline may lead to even more serious economic and ecological consequences than already experienced (severe pollination deficits in major crops) because beekeepers and veterinary authorities are unaware of the underlying factors and cannot implement effective mitigating measures. Efforts by individual countries to reveal the drivers of colony losses are doomed due to the high number of interacting factors. An international COST network is urgently required. COLOSS will identify the factors at the individual honeybee and colony levels causing severe colony losses and investigate synergistic effects between them. This will enable the development and dissemination of emergency measures and sustainable management strategies to prevent large scale losses. For this purpose, leading scientists, beekeepers and industry from COST countries and some non-COST countries, will collaborate with complementary approaches, thereby providing the crucial R&D link for the success of this Action. This worldwide integrated approach will mitigate the detrimental impact of honeybee colony losses for beekeepers, agriculture and natural biodiversity.

Keywords: colony losses, honeybee, environment, pathogens, vitality

I. Management Report prepared by the COST Office/Grant Holder

I.A. COST Action Fact Sheet

Action FA0803 Fact Sheet

Title

Prevention of honeybee Colony Losses (COLOSS)

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Details

Draft Mou:

Mou: 221/08

Start of Action: 21/11/2008

Entry into force: 28/07/2008

End of Action: 20/11/2012

CSO approval date: 18/06/2008

Objectives

In Europe, China and the USA, beekeepers are being regularly confronted with severe inexplicable and sudden colony losses (Euro 400 million per year, excluding pollination value), with colonies exhibiting diverse symptoms (CCD Colony Collapse Disorder). This major pollinator decline may lead to even more serious economic and ecological consequences than already experienced (severe pollination deficits in major crops) because beekeepers and veterinary authorities are unaware of the underlying factors and cannot implement effective mitigating measures. Efforts by individual countries to reveal the drivers of colony losses are doomed due to the high number of interacting factors. An international COST network is urgently required. COLOSS will identify the factors at the individual honeybee and colony levels causing severe colony losses and investigate synergistic effects between them. This will enable the development and dissemination of emergency measures and sustainable management strategies to prevent large scale losses. For this purpose, leading scientists, beekeepers and industry from COST countries and some non-COST countries, will collaborate with complementary approaches, thereby providing the crucial R&D link for the success of this Action. This worldwide integrated approach will mitigate the detrimental impact of honeybee colony losses for beekeepers, agriculture and natural biodiversity. Keywords: colony losses, honeybee, environment, pathogens, vitality

Parties

Country	Date	Country	Date	Country	Date	Country	Date
Austria	03/10/2008	Belgium	28/07/2008	Bulgaria	21/08/2008	Croatia	05/09/2008
Czech Republic	25/11/2009	Denmark	16/01/2009	Finland	29/08/2008	Former Yugoslav Republic of Macedonia	14/11/2008
France	28/07/2008	Germany	28/07/2008	Greece	22/09/2008	Hungary	07/08/2008
Ireland	21/04/2009	Israel	15/05/2009	Italy	22/09/2008	Netherlands	28/07/2008
Norway	22/09/2008	Poland	30/07/2008	Portugal	05/09/2008	Serbia	20/10/2008
Slovenia	21/10/2008	Spain	07/08/2008	Sweden	10/09/2008	Switzerland	21/08/2008
Turkey	25/11/2009	United Kingdom	28/07/2008				

Total: 26

Intentions to accept the MoU

Country	Date	Country	Date	Country	Date	Country	Date
Bosnia and Herzegovina	N/A						

Total: 1

Participating Institutions from non-COST countries

China	Bee Institute of Chinese Academy of Agricultural Sciences
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Working Groups

- WG 1 Monitoring & diagnosis
- WG 2 Pests & Pathogens
- WG 3 Environment & Beekeeping
- WG 4 Vitality & Diversity

Website

<http://coloss.org>

I.B. Management Committee member list

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Grant Holder		
Executive	Finance Officer	Legal Representative

I.C. Overview activities and expenditure

Meetings

Meeting Type	Date	Place	Paid part	Cost	Total
Kick-off	21-Nov-2008	Brussels (BE)		28	19486.98
Joint Management Comm	03-Mar-2009	Zagreb (HR)		56	47579.08
Joint Management Comm	19-May-2009	Bern (CH)		24	22376.41
Joint Management Comm	25-May-2009	Unije island (HR)		18	13323.05
Joint Management Comm	25-May-2009	Amsterdam (NL)		18	13759.04
Working Group	29-Jul-2009	Kirchhain (DE)		18	6258.37
Joint Management Comm	14-Sep-2009	Montpellier (FR)		44	41017.04
Working Group	20-Oct-2009	Guadalajara (ES)		23	6572.5
					170372.47

STSM

Beneficiary	Date	From	To	Cost	Total
Dr Joachim Rodrigues de	01-Mar-2009	Uppsala (SE)	Belfast (UK)	1150	
Dr Peter Neumann	01-May-2009	Bern (CH)	Reggio Emilia (IT)	732	
Mr Eckart Stolle	11-May-2009	06099 Halle (Saale)	84914 AVIGNON Cedex	1304	
Dr Bernhard Kraus	11-May-2009	Halle (DE)	Avignon (FR)	940	
Ms Ulrike Hartmann	02-May-2009	Bern (CH)	Reggio Emilia (IT)	2410	
Mr Michael Eyer	28-Apr-2009	3003 Bern (CH)	750 07 UPPSALA (SE)	2440	
Dr Joachim Rodrigues de	21-May-2009	Uppsala (SE)	Belfast (GB)	1600	
					10,576

Workshops

Title	Date	Place	Cost	Total
Conference and second	03-Mar-2009	Zagreb (HR)	3,000	
workshop on new molecu	19-May-2009	Bern (CH)	1,854	
workshop on monitoring	25-May-2009	Amsterdam (NL)	1,540	
Standardization of metho	25-May-2009	Unije island (HR)	3,000	
WG4 workshop Standard	29-Jul-2009	Kirchhain (DE)	2,800	
COLOSS conference and	14-Sep-2009	Montpellier (FR)	3,000	
				15,194

General Support Grants

Title	Date			Cost	Total
General	01-Jan-2009			2,000	
					2,000

Schools

Type	Date	Place	title	Cost	Total
					0

Honoraria

Title	Date	Expert		Cost	Total
					0

Grant

Grant Holder	Date			Cost	Total
					0

Dissemination

Title	Date			Cost	Total
					0

Action Total 198142.81

II. Scientific Report

II.A. Results achieved during the period November 2008 to December 2009

Working Group 1 “Monitoring and Diagnosis”

The focus of Working Group 1 is mainly on collecting comparable data on colony losses. An important achievement was made by the development of the first draft of a COLOSS questionnaire on overwintering losses 2008-09, which was presented at our COLOSS conference in Zagreb. The standardized questionnaire and results were evaluated during a workshop in Amsterdam. Six Countries were able to use the Questionnaire and six countries had already implemented their own questionnaires. This first step monitoring aims to describe the colony losses in the different countries and is ready to be use at a global level as soon as we will have funds to do it. A second version of the COLOSS Questionnaire has been developed in September 2009. Action has been taken to implement it on a global scale in 2009-10. Next to that the development of a standardized questionnaire has been started for data collection by experts on health status of colonies. This monitoring level aims to explain colony losses by correlation with different factors available. Adaptation of national monitoring projects to this process of supra national data collection with standardized tools has become a more realistic perspective for next year.

Working Group 2 “Pests and pathogens”

A relevant outcome was the organisation of two work shops. One of the work shops was specific to the endoparasitic fungus *Nosema* and resulted in two standards for this pathogen. First steps were taken into standardization of non-molecular methods in pathology one for experimental infections (hoarding cage experiments) and one for sampling and diagnosis of Nosemosis. The other work shop was broader and explored the opportunities and limitations of new molecular tools for pathology but also for our entire Action. One important result was the idea of an online BEE BOOK. The scope of this effort is quite broad, in that it does not just simply cover experimental approaches, but also advice and guidelines for data analysis, reporting, publishing, etc. The envisaged product will be dynamic, an online BOOK containing procedures, recipes, primer sequences, guidelines etc. on all factors related to research on honeybee health and the loss of colonies. There are two key components to this standardization effort: A) To provide practical procedures and online guidelines for direct use by scientists; B) To provide criteria for improvements, additions/deletions etc., so that the BOOK will become dynamic, self-correcting and self-improving according to new developments without losing data compatibility. Thus, we will take full advantage of web 2.0, much like Wikipedia, but not quite so open.

Working Group 3 “Environment and Beekeeping”

At two meetings the problems of standardisation of methods regarding the determination of the definition of a “healthy bee” were performed. Experiments with a standardized method of artificial larvae rearing were performed in two laboratories to develop a model of investigating bees that were absolutely free of influence from temporary hive conditions and the performance of the adult bees was tested. A workshop is in preparation to discuss this and other methods helping to define standards of bees. In cooperation with Working Group 1 surveys were conducted to evaluate winter losses in 2 countries in successive two years and *to compare methods*.

Working Group 4 “Vitality and diversity”

The outcome of the first year of activity concerning honey bee and vitality issues has been the set up of an experiment to reveal interactions between the genetic origin of the bees,

and the environment and pathogens. Seventeen partner institutions across Europe participate in this experiment that includes 670 colonies. Standard methods to assess colony vitality within the experiment were discussed in detail and different methods were demonstrated and assessed during two specific workshops (see annex for workshop proceedings), resulting in common protocol that will be followed by all participants. The common experiment will offer the opportunity to adapt and validate the methods in the respective local conditions of each participant, thereby providing reference points and thresholds for different climatic conditions. Several early stage researchers are actively participating in the joint experiment and in specialized sub-working groups focusing on international breeding recommendations and on methods used to characterize European honey bee populations. Members from acceding, candidate, and potential candidate countries are actively involved in the working group, either in the common experiment, or running a parallel experiment using the same methods. Furthermore, networking activity with a member from China concerning honey bee subspecies discrimination, biodiversity and breeding is ongoing.

Efforts made and success achieved in involving early-stage researchers, in particular with respect to networking activities and Training Schools

Due to the limited funding no Training School could be granted. Nevertheless, we have a high proportion of both ESR and female participants (ESR 64, Females 57, both ESR and Female 28). However, our networking activities appear to be quite successful as evidenced by the increasing number of countries and individual members of the COLOSS network (177 people from 42 countries at 11.01.2010).

Impact of European Neighbourhood Policy (ENP) and other non-COST participants' involvement

Our Action has good contacts to Argentina, Australia, Canada, Chile, Egypt, Ethiopia, Jordan, Kyrgyzstan, Libya, Mexico, New Zealand, Peru, Russia, South Africa, Sudan and USA. In some of these countries, colleagues are considering to join our Action officially (see above). U.S. involvement has benefited scientists in Europe and North America. In some instances, new collaborations between scientists on both continents have begun. These collaborations help avoid experimental duplication and allow research synergisms between international laboratories. Furthermore, COLOSS members from the U.S., China, Kyrgyzstan, Chile and Europe are working to standardize methods for determining colonies losses so that there can be harmonization of data.

STSMs (in addition, justification should be provided if less than 4 STSMs were carried out during the year)

Due to the limited funding and the urgent need for work shops, only one STSM could be granted.

Synergetic activities (e.g. other Actions and Domains, Framework Programme activities, ESF, EUREKA, etc.).

Other COST Actions: A factor not taken into account in our Action, but investigated in the framework of the COST Action FA0701 is the presence and role of endosymbionts associated with arthropods. A preliminary survey amongst our members indicated considerable interest in Action FA0701. Therefore, we have suggested a honeybee symposium at the next meeting of FA0701 in summer 2010 in Germany to foster interactions between scientists from the two COST Actions in a synergetic manner. Requests for potential funding of this joint meeting have been sent to the COST office.

Framework Programme activities: members of our Action are part of BEE DOC (Bees in Europe and the Decline Of honeybee Colonies, FP7-KBBE-2009-3) and STEP (Status and Trends in European Pollinators, FP7-ENV-2009-1), which will both start in 2010.

II.B. Dissemination of results

- *Action related Publications and Reports (list)*

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- *Conferences, Workshops and Training Schools (list and programme)*

Proceedings of the COLOSS workshop "Monitoring", May 24-26, 2009, Amsterdam, Netherlands

Proceedings of the COLOSS workshop "Standardization of methods II. Vitality testing", May 25-28, 2009, Unije, Croatia

Proceedings of the COLOSS workshop "Standardization of methods II. Vitality testing", July 28-August 1, 2009, Kirchhain, Germany

Proceedings of the 4th COLOSS Conference, March 3-4, 2009, Zagreb, Croatia

Proceedings of the 5th COLOSS Conference, September 14-15, Montpellier, France

Proceedings of the COLOSS workshop, May 18-21, 2009, "New Molecular Tools", Bern, Switzerland

- **Web site (description)**

Action goals and overview are given as well as information on participants and activities. A WikiCOLOSS is currently planned for the BEE BOOK.

- **Scientific and Technical Cooperation**

Scientific institutions: EFSA (Bee Mortality and Bee Surveillance in Europe CFP/EFSA/AMU/ 2008/02), Pollinator initiative of the WELLCOME trust (UK)

FP7 research programmes: FP7-KBBE-2009-3: BEE DOC (Bees in Europe and the Decline Of honeybee Colonies); FP7-ENV-2009-1: STEP (Status and Trends in European Pollinators)

Potential users: regular and frequent cooperation and exchange with beekeepers' and bee breeders' associations across COLOSS countries (for details please see dissemination table below)

- **Transfer of results**

List briefly cooperation and contacts established with the

Commission: COLOSS members were inaugural associates of the BEE INTERSERVICE GROUP for the EU Commission, Health and Consumer Protection, Directorate D Animal health and welfare

Normalisation and standardisation bodies: COLOSS members are in close contact with both OIE and EFSA

Industry and operators: one SME (Andermatt) and a large company (Bayer) are COLOSS members to provide close links to the industry; COLOSS members also belong to the Steering Committee of the Pollinator SETAC (Society of Environmental Toxicology and Chemistry) Pellston Conference (USA)

Dissemination plan to end users:

Several COLOSS members are from national beekeeper associations or national extension services, which naturally facilitates transfer of new results and knowledge in member state countries. Moreover, we have the following detailed dissemination plan:

Who? Target audience	What?	How?
1) COLOSS (FA0803)	a) General information at public COLOSS website in all languages of countries signing the MoU, b) Action specific information at WikiCOLOSS and newsletters, conferences, workshops, seminars, training schools, blogs	a) Active participation of Action members, b) Update of public web site, c) Update of WikiCOLOSS ("crowdsourcing" principle),
2) beekeepers, veterinarians	See 1a) and a) Popular articles, case study reports, guidelines (e.g. disease control, diagnosis) and manuals in local beekeeping and veterinary journals in the language of the member country, b) Awareness training, symposia and talks at local meetings	See 1a,b) and a) oral and written publications, b) Close collaboration with APIMONDIA and IBRA (the largest global organisations in apiculture and bee science)
3) beekeepers` and veterinarians` associations	See 1a, 2) and a) specific seminars with representatives of all country associations and a local COLOSS member	See 1a,b, 2)
4) other researchers and research frameworks	See 1a, 2) and a) articles in peer reviewed international journals, b) talks, posters, abstracts in conference proceedings at COLOSS, national and international conferences, c) open access to COLOSS training schools, seminars and conferences (primarily aiming at early career scientists)	See 1a,b, 2)
5) Industry	See 1a, 2, 4) and a) R&D meetings at local and EU authorities and ministries	See 1a,b, 2)
6) Veterinary authorities	See 1a, 2, 4) and a) Local guidelines and manuals, b) OIE manuals	See 1a,b, 2)
7) Government and European policy makers;	See 1a, 2, 4, 5, 6) and a) suggestions for guidelines and laws (e.g. trade regulations) b) annual bee breakfasts	See 1a,b, 2)
8) General public	See 1a) and a) Newspaper Articles, b) Broadcasts, c) contribution to movies, d) interviews (national and international)	See 1a,b, 2)

- *Contacts in the ERA*
None.