

**Action FA0803: Prevention of honeybee Colony Losses (COLOSS)**

**Abstracts of the Work Shop 250509-05781 on  
Monitoring**

**Amsterdam May 25, 26.**

**Local organizer: Netherlands Centre Bee Research,  
Durk Dijkstrastr. 10 Tersoal, Netherlands**

**Meeting Location Hotel Tulip Inn Amsterdam Riverside, ALP,  
Provinciale weg 38, 1108 AB Amsterdam Zuid Oost, Netherlands**

## Evaluation and Implementation of the basic Coloss questionnaire.

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In march 2009 the first edition of the basic questionnaire was approved by the Coloss Network. The questionnaire was implemented in the Netherlands and answered by 803 beekeepers with 6323 colonies. The survey is still running, and about 1000 answered questionnaires (about 20 % of Dutch beekeepers) are expected. 708 respondents filled in some evaluation questions, directed at the understanding of the questions, resulting a 99% positive score.

404 Beekeepers (55%) suffered colony losses. In total 1349 colonies were lost (21%). 114 Beekeepers were confronted with CCD losses (253 colonies, 4%). 298 Beekeepers (37%) observed CDS (colony depopulation syndrome) losses (1059 colonies, 17%). A further analysis on a European scale might show if the CDS definition is a better indication for the character of the observed losses in the last decade compared with the CCD definition, also since the USA survey results in fact are limited to CDS too.

The implementation in the Netherlands has shown the need to develop a second edition of the basic Coloss questionnaire. The new edition will be presented at the workshop and send to coloss workgroup 1 members for discussion and approval at the conference in Montpellier. The European adaptation of the questionnaire is successful. Austria, Turkey, The Netherlands, Belgium, Spain, Italy, France (professional beekeepers), United Kingdom, Norway, Denmark, Sweden, Poland, Portugal, Hungary, Rep. of Macedonia, Germany, Israel, Croatia and Ireland have decided to implement the questionnaire. Funding for the implementation is poor in most countries. In many countries beekeeper associations have to provide fundings and sometimes take a rather undecisive or negative attitude towards it. The motivation by beekeepers to fill in questionnaires in general is rather low, with the effect that a lot of effort is needed to come to a representative result. This is a vulnerability for the monitoring results that has to be met in the future.

## Bee mortality and colony loss survey in Italy

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Bee and colony mortality have been signalled for several years in many countries, including Italy. Based on questionnaire survey from beekeepers, in the last three years colony losses in Italy were estimated around 30% but they follow a clear seasonal and spatial pattern.

At the end of 2008 the Ministry of Agriculture financed a National research project to study bee mortality and establish a national bee monitoring network (APENET). In 2009 to assess the extent and the causes of bee and colony losses in Italy two survey approaches are combined: questionnaires and large scale monitoring. Both methods have positive and negative aspects but together help us to understand this phenomenon.

The national bee monitoring network is organized in twenty sites (modules), one per region. In each module, 5 apiaries were chosen based on environmental characteristics, and on the distance from the centre of the module (about 50 km). In each apiary, 10 non-migratory colonies are visually inspected four times a year (right after winter, spring, summer and just before winter). During each inspection several parameters are noted: sanitary and nutritional

condition, number of bees and brood in each colony, and queen's age. The obtained information will be introduced in real-time in a specific web database by the person monitoring each module. APENET provides us information about: geographical and environmental condition around apiary, beekeeping management, colony condition. In addition, dead and live bees, as well as several bee hive products (brood, pollen, wax, honey), are collected during each inspection for chemical, palynological and pathological analyses. The large amount of information gathered from this bee monitoring network will be analysed to know the bee health in Italy and to understand possible action to reduce bee losses, including the efficacy of the introduced law about the suspension of seed dressing. Anyway, APENET covers the 0.05-0.1% of the Italian bee colonies so it is important to integrate these data with the data obtained from questionnaires.

## Overwinter colony mortality in Austria

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In 2008 we conducted a survey on 2007/08 honeybee colony winter mortality at 8 beekeeping conventions in Austria. In 2009 we conducted a mixed media survey (online, journal, conventions) on 2008/09 colony winter losses. In both years we obtained information on more than 5% of Austrian honeybee colonies. In 2007/08 total loss was 13.3% (2,158 of 16,217 colonies, 374 beekeepers), ranging from 9.2% in Salzburg to 17.1% in Lower Austria (including Vienna). In 2008/09 (preliminary results of 454 beekeepers) total loss in Austria was 9.7%, ranging from 4.4% in Upper Austria to 22.1% in Carinthia. Losses were highest in the mountainous western regions (Salzburg, Tyrol, Vorarlberg: 16.6%) and Carinthia. In both years, beekeepers attributed their losses mainly to invertebrate pests (*Varroa destructor*), queen loss, starvation and hive management. We also asked beekeepers about their hive management and found no effect of date of last feeding and type of food fed before winter on median colony mortality ( $p > 0.05$ , Kruskal Wallis test). Furthermore, median overwinter mortality did not differ between operations that used an essential oil (thymol) and organic acids or organic acids only. We also did not find differences in overwinter mortality of small (1-50 colonies) and large (50+ colonies) operations ( $p > 0.05$ , Kruskal Wallis test). In 2008/09 we found that migratory beekeeping resulted in lower total loss (5.1%, 48 operations) than stationary beekeeping (10.7%, 380 operations,  $\chi^2 = 118.8$ ,  $p < 0.05$ ). In 2009 we conducted a mixed media survey where we obtained questionnaires online, from a beekeeping journal and at beekeeping conventions. The overwinter mortalities of individual regions did not differ between these different ways of data collection ( $p > 0.05$ , Kruskal Wallis test).

The degree of overwinter mortality of honeybee colonies in Austria in the last two years is stable and – with few regional exceptions – on a low level. We attribute the degree of mortality to well known causes, with *Varroa destructor* presumably playing a key role.

## Honey bee losses monitoring in some Italian regions

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Italy accounts for 1,000,000 honey bee colonies (Commission Regulation (EC) No 939/2007) and 75,000 beekeepers. Reports of losses from Italian beekeepers lead to two main scenarios: spring and summer losses, mostly caused by incorrect use or abuse of agrochemicals; late summer and winter losses caused by *Varroa destructor* and associated diseases. In spring 2009 the COLOSS questionnaire was applied in three regions: Veneto (northern Italy), Marche and Lazio (central Italy). 241 beekeepers were investigated for a total of 16,867 colonies active in season. The number of colonies dead in late summer and autumn was 1,083 (21%), 795 (19%) and 130 (2%); the number of colonies dead the following spring was 865 (17%), 638 (15%), and 1,748 (23%); the number of colonies too weak to be productive was 551 (11%), 385 (9%) and 234 (3%); the number of colonies lost during winter, with enough food supply was 713 (82%), 552 (86%) and 1,172 (67%); the number of colonies lost during winter, with patches of capped brood was 428 (49%), 289 (45%) and 706 (60.2%), respectively. According to the limited data available, a great difference was observed between the number of colonies dead in late summer and autumn in Veneto and Marche regions compared to that recorded in Lazio, possibly due to better weather conditions (foraging resources availability) and a more effective control of varroosis. No great variation was observed among the other parameters considered. This questionnaire even if its application has been very limited seems able to provide relevant information on colony losses. However, beekeepers need to be sensitized to an appropriate collection of information and their active participation should be improved.

### **Monitoring of honey bee colony losses in Poland during the winter of 2008/2009**

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In Poland during the winter of 2008/2009 colony losses were lower than during the previous winter (15.3% and 7%). The owners of smaller apiaries lost a higher percentage of colonies (8.6%) than owners of bigger apiaries (5.8%). The presented data are from 360 questionnaires, however only 103 were collected by me with the use of the COLOSS Basic Questionnaire. 257 questionnaires were collected by Piotr Semkiw from the Beekeeping Department in Pulawy with the use of a different form. My data were from 47 beekeepers who filled in printed questionnaires and 56 beekeepers who used the website [www.beemonitoring.org](http://www.beemonitoring.org). This year I have concentrated my efforts on gathering information through the website. The beekeepers were informed about the website during different lectures and conferences. I sent email (or fax) messages with the information about the website to 15 beekeeping associations and placed the announcement on the four most popular Internet fora for beekeepers. The beekeepers response was slight probably because of: 1) little interest - beekeepers think that it is not worth sending the data if the losses are low, 2) general limited access of Polish people to the Internet – only one out of ten people has such a possibility (the last but one place in Europe), 3) the lectures were too early (from February to the middle of April) and before the end of the long winter the beekeepers had lost interest in the project and did not bother to participate.

### **A spatial data and time series analysis of pesticide application in relation to honeybee colony losses**

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Recently we have started a research project to test the hypothesis that imidacloprid, (and other insecticides), is/are one of the determinants for the present colony losses in the Netherlands. To test this hypothesis we will explore two statistical methods (1) changing patterns over time (time series analysis) and (2) changing patterns over space (spatial analysis, geostatistics). Both approaches can be followed within the Netherlands because NCB has been able to collect bee decline data on a bee keepers level on the one hand, and detailed information on spatial patterns of imidacloprid is available on the other hand. As for the latter we will explore imidacloprid measurements in surface waters and emission data of imidacloprid, recalculated for different agricultural applications and allocated on a fine grid over the Netherlands. Maps for emission to surface waters and emission through the air (evaporation) will be designed. The factor 'time' will be introduced as follows. We will explore changes in bee-decline maps over time (2003 through 2009) in relation to allowance of imidacloprid for agricultural practices in specific years (if imidacloprid is allowed in mazes from year x onwards, we might see a change in bee decline in years after x in those mazes regions). In this stage also the role of climate extremes will be incorporated into the analysis. Apart from these two statistical angles we are planning to analyse imidacloprid concentrations within individual bees along imidacloprid concentration gradients. Along these three lines of research we hope to accept or reject the role of pesticides.

## **Colony Losses in Turkey and The New Structure of Turkish Beekeeping**

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Turkey has an important role in Beekeeping Industry. It has approximately 4 millions colonies and 150.000 family live with only beekeeping inputs. There are 3 million migratory beekeeping colony(75% of total honey bee colonies). Turkish Beekeepers go to 3 different geographic location every year and transport their colonies 2000 km. Major Honey Bee Diseases: AFB, EFB, Varroasis, Nosemosis. Pesticides (Imidaclopride??), Starvation, Incorrect Application for treatment of Honey bee diseases, New pests and pathogens (viral infections and *N. ceranae*), Old queen, The quality of comb foundation and Climatic changes  
Colony losses in 2007: 8-10%, in 2008: 1.8%, in 2009: 0.7% (up to now) respectively. They also produce 85% of pine honey production of the world. Turkey has 81 cities and in 76 of them Turkish Beekeepers Association was founded in 2003. All City Beekeepers Associations are managed by Turkish Central Beekeeper's Association. Since 2003, Turkish Agriculture Ministry has given some responsibilities to the Central Turkish Beekeepers Association. Every beekeeper who has at least 50 colonies has to register to their city's Beekeepers Assoc. Being a member of a Beekeepers Assoc. Give the beekeepers some advantages. By this way, we obtain huge level of motivation to be answered questionnaires or pick up samples from beekeepers. Each member has an ID number for beekeeping and lots of plaque which is equal with their colony number. Turkish Central Beekeepers Assoc.+ Turkish Agriculture Ministry+ Hacettepe University have worked together since 2003. %92 of beekeepers are registered for now. All beekeepers have plaques contains barcode number for each colonies. Begin to use barcode system gives a big opportunity to follow colonies and honeys from hive to honey jar. Our new aim is entegration of the Honey Bee Health Monitoring System to this registration system.

## **CNDA survey program, in France**

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A survey was completed to estimate colony losses during winter 2007/2008 and most of the French regions were assessed. 168 professional beekeepers (more than 150 hives) were randomly selected out of 782 beekeeping farms. Therefore, this survey includes 1358 apiaries and 62400 colonies. A questionnaire was sent to beekeepers. An average of 29.3% (IC<sub>95%</sub> = [26% - 32%]) of losses was recorded, ranging from 21 to 62% (out of data from La Réunion Island).

The beekeepers estimated the mortality rates of colony during the winter 2005-2006 and 2006-2007 being 16.8% and 17.3 % respectively. Some regions (North-East of France) were more affected than others.

Dead colonies represented 50% of the losses, when queenless and diseased colonies were 14% and 8% respectively. The rest (28%) was weak colonies unable to survive.

Preliminary results for possible causes show that availability of food, strength of the colonies and varroa pressure could explain partly the losses

### ***Content of the survey***

The survey is composed of 2 parts and the base unit is the apiary.

• Part I provides information on "the preparation of bee colony wintering and the environment of the apiary":

- location of the apiary, - number of colonies removed before winter,
- availability of pollen and nectar, - type and quantity of feeding provided by the beekeeper,
- assessment of the last harvest, - estimation of varroa infestation and varroa treatments,
- estimation of strength of the colony, - breeding queens.

• Part II focuses on colony losses during winter and on "spring visits" of bee colonies:

- number of dead colonies,
- number of queenless colonies,
- number of diseased colonies and types of diseases,
- number of weak colonies without actually cause identified.

### ***Selection of the target population***

- From the list of professional beekeepers acceding to the network CNDA.
- Stratification by region.
- Poll rate covered 20% in each region with a minimum of 5 farms.

### ***Forecast non-responses to the survey***

- Creating a random list of "titular" and "substitute" (rate survey conducted by 40%). Drawing list conducted among 782 farms.
- Replacement of titular who have not responded by substitutes in order of entry on the list.

### ***AFSSA case studies:***

Is it important to mention that AFSSA run relevant experiments and surveys on case studies every year from 2002 with different aims as to show the multi-exposure of honeybees to low

doses of pesticides and the presence of various diseases in colonies; to study the beekeeping practices (inadequate varroa treatments) versus pesticide residues; to evaluate CBPV load by Real-Time PCR; or to assess the pathological context during the winter 2007-2008 on 35 apiaries (1649 colonies) displaying severe winter losses (68%) in various parts of France.

These data highlight the need for improved molecular detection tools to ensure accurate sensitivity and specificity.

### **Varroa tolerant honeybee program**

The stock of varroa surviving colonies is maintained at INRA laboratory in Avignon (Y Le Conte). The colony survival is checked and the stock is used to find out the causes of the tolerance.

### **About the datacollection 2009**

Using the CNDA survey program which is nowadays running for 2 years, we will be able to obtain data of about 20% of professional beekeepers (150 and more colonies) for all France. We will use the results of our survey of winter 2008/2009, which will be ready for next summer.

For the non-professional beekeepers (less than 150 colonies) we have to contact different beekeepers unions, propose them to work with CNDA for the COLOSS beemonitoring. For this point, we have to work on the method with the union to obtain data which represent a good spread geographically of those 2 beekeeper operation scale (0-50 and 51-150 colonies). We have to decide if we send an email to those beekeepers or we use another survey mode. The CNDA team will use the phone.

### **Monitoring colony losses in Ireland, 2009/2010**

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Beekeeping is primarily practiced as a hobby in Ireland and approximately 2000 beekeepers manage 20 000 colonies. Many bee diseases such as AFB, EFB and *Nosema apis* are endemic. *Nosema ceranae* was identified for the first time during 2008, while positive samples for IAPV have not been identified. To date, no formal assessment of colony losses being incurred by beekeepers has been documented, thus during 2009/2010, we are hoping to coordinate the dissemination of the COLOSS working group 1 questionnaire. Through close collaboration between the University of Limerick and the Federation of Irish beekeepers, it is hoped that the individual secretaries of the 46 different associations' will assist in the distribution of the survey. Areas where this method is not feasible, mail and email will be used to disseminate the questionnaire. Registered and non-registered members will be encouraged to complete the questionnaire as it will provide more reliable data. Results from this survey will be processed and submitted to a common databank.

### **Monitoring of honeybee colony losses in Norway**

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Honeybee colony losses have been surveyed annually since 1980 by the Norwegian Beekeepers Association. A questionnaire embedded in the September issue of the monthly beekeepers journal includes among other topics questions about the number of colonies wintered and the number colonies in spring. The data from this questionnaire have shown that on average 8.9% of the colonies are lost annually. Only 10-20% of the members of the Beekeepers Association return the filled out questionnaire so we do not know how representative it is. The rate of winter losses is also known by us almost one year after. Further, because beekeepers remain anonymous we are not able to follow the same respondent from one year to another. However, the last problem will be solved for the 2009 questionnaire when the questionnaire 1-3 agreed upon within COLOSS will be available at the home page of the Norwegian Beekeepers Association. Hopefully one third of the beekeepers will answer these questionnaires. As in many other countries we have established monitoring apiaries. 40 beekeepers widely distributed throughout the country now report their honeybee colony losses in spring. Bee samples are taken for analyses of Nosema and different honeybee viruses.

### **Implementation of the questionnaire for the extension service**

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The basic definitions for bee monitoring with questionnaire has to be clear.

The monitoring can be divided in 4 levels. Level 1: Is the quantification of the mortality. Level 2 and 3: Are respectively the comparison of the situation in the different regions and countries and the identification of the causative factors. Level 4: Is the development of a system for predicting potential honeybee colony losses.

If the mortality quantification (level 1) shows any signs of increased mortality, then it is relevant to move to the second level of bee monitoring. The level 2 questionnaire is a simple data questionnaire setup used either on the internet or as interviews of representative numbers of beekeepers.

This talk is about the implementation of level 1 in Sweden and Denmark and the preparation and development of the level 2.

It is important to discuss different methods for estimating the actual no. of colonies in counties. Different methods in Denmark turns out to give big variations in the result. Should it be the aim of working group 1 to uniform the methods of calculating no. of colonies in the different countries?

In Denmark we have implemented the level 1 questionnaire this spring. We have only used internet based questionnaire using the internet based interview program from [www.trictrac.dk](http://www.trictrac.dk). This program is very easy to handle. The questionnaire was presented on the [www.biavl.dk](http://www.biavl.dk). We also sent invitation to approximately 500 beekeepers.

The Swedish questionnaire started 2 weeks later then the Danish questionnaire. Preben Kristiansen, Swedish Beekeepers Association made minor corrections. In the Danish one it was mandatory that the beekeeper had to supply the questionnaire with name, address, zip code and e-mail. In the Swedish one it was not mandatory with name and address.

In Sweden 5.5% of the beekeepers preferred to be anonymous. Please note that the Swedish questionnaire only is preliminary, since it was not closed prior to these meeting.

On the other hand we added few additional questions about varroa treatment and we used a more simple evaluation method.

When using the questionnaire template – translated to different languages – there is a need for a unique labelling of each question, so that it is easy to collect all data in a central database.

The results from the Danish/Swedish questionnaire can be seen below.

Sweden**	Denmark*		
Production colonies in 2008	11,23	16,74	
Colonies wintered in 2008	1	2,76	21,51
Colonies lost during fall 2008	0,36	0,34	
Colonies lost during winter 2008/09	1,73	1,61	
Colonies alive spring 2009	10,73	19,24	
Colonies to weak to become production colonies	0,66	1,35	
No. of beekeepers in these examinations	412	422	
No. of colonies in these examinations	5.257	9.056	

\* Final results

\*\* Preliminary results. Questionnaire still ongoing for 1 week. Preben Kristiansen, Swedish Beekeepers Association

Using an internet interview in Denmark is representative for the distribution of beekeepers in Denmark with regard to hobby, part-time and professional beekeepers.

A very interesting result from these examinations is that beekeepers tend to make a wintering insurance – since they winter approximately 20 % more colonies then they are using during the summer. For Denmark this was also the case in 2006.

The working group also have to uniform the way of calculating the winter losses. An example is given showing 3 different values for losses can be calculated from the level 1 template.

Loss 1 = ((Alive in spring – Wintered) / Wintered) = 10,3 %;

Loss 2 = (Alive in spring – (Loss during winter + loss in fall))/ Wintered = 9,0 %

Loss 3 = (Alive in spring – Loss during winter)/ Wintered = 7,5 %

The average winter losses are low (acceptable) – but 35 % of the beekeepers do still have losses that are higher then 10 %.

The basis template for the level 2 questionnaire will be presented. From former meetings we have this template: *Basic beekeeper information, Losses, Beekeeping practice, Apiary, Food supplies, Queen information, The colonies, Pest (Varroa, Other diseases, CCD, Visible examination for different pest/disease), Bee poisoning, Outside disturbance.*

We have now got several very good questionnaires from other countries (Sweden, Germany, UK, Austria, France.....) that we now are able to finish the template for the level 2 questionnaire. Each participant of these meetings has to evaluate the existing level 2 questionnaire at these meetings and try to add/comment with additional questions.

After this we do an additional evaluation of the new questionnaire and perform an internet evaluation afterwards. Hopefully the questionnaire will be finished to the meeting in Montpellier.

### **The German Monitoring Project DEBIMO**

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During the last 4 years of the project, comprehensive examinations about overwintering losses with ca. 120 bee-keepers at 1.200 bee colonies were realised comprising the collection of more than 100.000 single data and around 5.200 statistically analysable data sets on individual colonies. This is the first and unique world-wide long-term monitoring project with reliable data.

Among others, the following factors were recorded: location and operating data of the apiary (including nuclei production, migration, Varroa control, colony strength in harvest and spring, honey harvest, residues in bee bread, Varroa infestation in harvest, infestation by bee viruses, infestation by Nosema and amoebae. During the past 4 years, winter losses of apiaries monitored varied between 8 and 16% with sometimes considerable regional variations, thus clearly figuring below the loss ration calculated on the basis of interviews.

There is a significant correlation between the winter losses and the Varroa and virus infestations in harvest. An effective Varroa control is the pre-condition to facilitate the assessment of eventual sub-lethal damages by other factors.

For the analysis of residues in bee bread a sensitive „multi-method“ for more than 250 active substances was established. During the analysis of 215 bee bread samples from 2005 to 2007, more than 55 active substances were identified, mostly only traces of them were found. In most of the samples several active substances could be proved, among them mainly fungicides, acaricides from Varroa control, and herbicides. Clothianidin was not found, and Imidacloprid only in one sample near the detection limit. On the basis of these data, a direct damage on bees cannot be expected. For the verification of eventual sub-lethal respectively long-term effects a suitable test set-up is going to be developed within the project.

### **Healthy Bees - a ten year plan**

#### **Honey bee monitoring and surveys in England and Wales**

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In April 2009 the Department for the Environment and Rural Affairs (Defra) published a document called Healthy Bees. This is a 10 Year Plan for beekeeping in England. The plan was formulated after consultation between Defra and all the key stakeholders, including the British Beekeepers Association, the Bee Farmers Association and the Food and Environment Research Agency (Fera) National Bee Unit. The plan focuses on 5 key areas; effective communication between stakeholders, effective bio security, good standards of beekeeping, keeping Impacts from pests and disease and other hazards to the lowest possible levels and sound science and evidence being used to underpin policy and its implementation. To

initiate the programme an extra £2.4M will be invested in the NBU over the next two years (£2M from Defra and approximately £400,000 from the Welsh Assembly Government). Part of this extra investment will be used to collect baseline information on pest and disease levels in honey bees throughout England and Wales. A statistically based apiary and colony survey is to be carried out over the next two years, collecting samples from up to 25000 colonies in 5000 apiary sites. These samples will be analysed for a whole range of honey bee pests and diseases using molecular diagnostics. The evidence gathered and a robust analysis of the risks will be used to direct the future bee health plan in England and Wales. In addition to this the NBU has launched an extensive bee husbandry survey to obtain information on current honey bee husbandry practices. The information from this survey is being gathered by means of a questionnaire, available both on-line via BeeBase or hard copies circulated to beekeepers through the bee health inspection service at association meetings and training events. It is intended to gather this data regularly and use it monitor trends in UK beekeeping and to assist with beekeeper training. This will be the most comprehensive survey of beekeeping practices ever completed in the UK. There is no direct funding available to feed into the CoLoss project, however, the work of the group will be publicised via articles in UK beekeeping journals and press. Beekeepers will be encouraged to take part in the CoLoss Basic questionnaire. Information collected on the current status of bees and beekeeping in England and Wales through the bee health programme will be reported back to the CoLoss working group.

#### **NATIONAL SURVEY OF BEE HEALTH IN SPAIN:**

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Due to the increasing number in denounces about bee losses with depopulation in Spain, research project is being developed by the Apicultural Centre (CAR) of Marchamalo, the Veterinary Faculty of Madrid (UCM) and Chemistry Faculty of Valladolid in order to study the pathological and toxicological agents that could be related with bee depopulation. Beekeeping associations and veterinary services were contacted to ask for their participation in the study. The epidemiological design for the survey (95% confidence) was made according to the number of hives (2,700,000) and beekeepers (45,000) in Spain and also with the prevalence of depopulation (estimated in 40% due to the absence of official data). All regions were included in the study and it was made throughout 2006 and 2007, sampling in spring and autumn both years.

The hives were randomly selected and all samplings (total of 4) were made on the same sentinel colony, properly identified. Each hive sample included a questionnaire, adult bees, brood, honey and pollen.

Questionnaire included questions about personal, zootechnical and sanitary data. We have received a total of 1957 samples from the most of the regions of Spain. Analyses performed to the moment include pathogens (*Varroa* and its haplotypes, *Nosema* spp., *Acarapis woodi*, AFB, EFB and Chalkbrood) and pesticides (multi-residue analysis)

#### **Survey for CCD and colony losses in Israel**

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The number of bee hives in Israel is estimated at approximately 100,000; these are operated by 450 beekeepers and generate annual honey production of about 3,200 metric tons valued at 12 million USD. In addition they carry out 60,000 cycles of pollination services to different crops, which produce an additional income of 250 million USD. Distribution of operation size varies from small operations (up to 100 hives) managed by the majority of beekeepers (64%); medium size operations (100-500 hives) managed by about 25% of the beekeepers; and larger operations (over 500 hives) managed by 11% of the beekeepers. Apiary migration is common in pursue of the wild or crop blossom and bee wintering sites. The common bee lines are *Apis mellifera ligustica*, *Apis mellifera caucasica* and *Buckfast*.

Due to the 25% colony loss in Israel during 2007 a national project aimed at assessing the causes of these losses was launched. The target of the project is to characterize the distribution and extent of the losses, and to evaluate the correlation of loss with pesticide use, presence of bee pathogens, pests, and management practices. One of the main project approaches is an implementation of a general, detailed questionnaire survey. The questionnaire survey was conducted using mail, phone, and electronic-mail and was distributed among the leading registered beekeepers (large operations). About 100 hives in ten sites are being monitored and sampled for presence of pathogens and pests throughout the year: in the fall after requeening the hives; at the end of winter before super augmentation; and during the summer after the honey harvest. Site locations are mapped together with adjacent crops and fauna.

The questionnaire was responded to by the majority of the leading beekeepers. Out of the responding beekeepers, 38% indicated some losses (over 20%) and 9% indicated severe losses (above 40%). The survey indicated that workers disappeared in 14% of the lost hives yet the cause for the losses remains unknown according to the majority of the responding beekeepers. The heaviest losses were observed in small to medium size operations.

## **COLONY LOSSES IN REPUBLIC OF MACEDONIA**

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The Macedonian beekeeping sector includes approximately 10.000 beekeepers possessing approximately 75.000 honeybee colonies. The annual honey production is about 1.200 metric tones.

Neither Macedonian veterinarian service nor other institution in the country does not produce any kind of data regarding the beekeeping sector and eventually colony losses rate by year. For that reason, since last COST meeting in Brussels, the questionnaire for assessment of the last winter season (2007/2008) colony losses rate within the Macedonian beekeepers was designed and distributed through associations to beekeepers. In total 193 fulfilled questioners were received back from beekeepers, representing 2% of the total number of the beekeepers in Macedonia. They were located in 12 different regions (cities) across the

country. The total number of the colonies of the assessed beekeepers was 11.912 which account for 16% of the total population of honey bee colonies in the country.

From the analyzed questionnaires, we can conclude that the average colonies losses during the winter 2007/2008 was 20%. The main 3 reasons for these losses were: lack of food (28%), undefined reason (22%), *Nosema* observation (13%) etc. Related to the mentioned reasons the most "vulnerable" period are early spring (30%), winter (24%) and late autumn (18%).

The initial morpho-metrical analyses show existence and introgression of two races, such as: *Apis mellifera macedonica* and *Apis mellifera carnica*. At the moment, the groups of national and international experts are working on molecular determination of the honey bee population in Republic of Macedonia. The results will be published soon.

### **Biodiversity monitoring in Europe, upscaling and downscaling between species and regions.**

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\* summarized by Romée van der Zee. The abstract of dr. Jongman may be replaced by one of his own hand in the future.

EBONE is an EU FP7 project. The key challenge of the EBONE project is the development of a cost effective system of biodiversity data collection at regional, national and European levels. The need for the project is to develop a system for a coherent system for data collection that can be used for international comparable assessments.

The OECD reports on the economies of countries and international markets as well as on world developments. This can be done because financial and economic approaches and definitions in different parts of the world are comparable. This is not the case for biodiversity. All reporting and all assessments on biodiversity are hampered by the fact that the data used and the way they are collected and analysed is different for all countries and NGOs. Conclusions can therefore not be generalised as is done for other fields such as economics and health. This project initiates common approaches and harmonisation of data from both field observations and earth observations. It will assess the existing approaches on their validity and their applicability starting with Europe, but expanding to other regions of the world.

The official objective of the project is (1) The provision of a sound scientific basis for the production of statistical estimates of stock and change of key indicators that can then be interpreted by policy makers responding to EU Directives regarding threatened ecosystems and species (2) The development of a system for estimating past change but also for forecasting and testing policy options and designing mitigating management strategies for threatened ecosystems and species.

Moreover, we think it essential to link the scientific basis of the project to a sound institutional framework. This ensures continuity and long term collaboration between partners in the project. This network is open for other partners as well.

The end product should therefore be „a biodiversity observation network that is spatially and topically prioritized and a structure for an institutional framework allowing European and monitoring and a possible extension world wide including projections on trends based on reliable data and indicators”.

This is elaborated in the following working objectives:

Working objectives
1) Elaboration of a monitoring concept including common indicators for biodiversity
2) Stratification of Europe and other regions involved for monitoring purposes
3) Development and testing of standard field–site observations and database management
4) Intercalibrate field data with earth observation data
5) Development of a cost effective framework for European and world-wide biodiversity monitoring including suggestions for an institutional setting.

We will link databases, which have currently remained isolated in order to increase their overall effectiveness. Quantitative comparisons will be made using matrices e.g. of remote sensed categories and their relationship with in situ habitat data.

Regarding honeybee monitoring we are interested in:

- Is it possible to identify a pollinator index?
- What should it include: honey bees, wild bees, bumble bees, butterflies etc.
- What is the regional diversity to be included?
- What does it indicate: agrobiodiversity, food security, biodiversity?

Presently available for honingbee honeybee monitoring are u.a. data on climate and geomorphology. The environmental stratification of Europe contains 84 explicit classes, 1 km resolution and 3 aggregation levels and is easy adaptable to user's needs.

## **Colony losses in Germany**

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Since 1998 in the German countries Rheinland-Pfalz and Nordrhein-Westfalen and since 2003 additionally in all other countries the amount of colony losses had been surveyed. Questionnaires had been sent to all beekeepers by letter post and magazines. Each year more than two thousand, some years more than six thousand beekeepers answered. Losses fluctuated between 11% (2009) and 29% (2003).

There had been different losses in different regions. An influence of the altitude and the microclimate at the apiaries could be shown. Losses were lowest on sunny places and highest on shady apiaries. The lower the altitudes the higher the losses had been. After harvest the time of beginning feeding had a distinct influence of the colony health. The same correlation could be shown for the time of beginning varroa treatment. No influence could be proved for fields of rape or maize in the surrounding.