12th COLOSS Conference

Proceedings

Cluj-Napoca, Romania, 10-11th September 2016

12th COLOSS Conference

TOPIC

- International meeting of COLOSS to provide an update on the network's achievements and future directions, including meetings for COLOSS Core Projects, Task Forces.
- Election of a new 3 year term Executive Committee

WHEN

9th September	Executive Committee Meeting in evening (open to EC members only)
10 & 11th September	COLOSS General Assembly and discussions (open to all COLOSS members)
9th September	Executive Committee Meeting in evening (open to EC members only)

WHERE

Life Sciences Institute
Blue and Green Amphytheater
University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca
Calea Manastur 3-5
400372 Cluj-Napoca, Romania
Link to Google Map:https://www.google.com.tr/maps/place/University+of+Agricultural+Sciences+and+Veterinary+Medicine+Cluj-Napoca/@46.7610023,23.5686129,552m/data=!3m2!1e3!4b1!4m5!3m4!1s0x47490e7c52d6022d:0xa0667527851dd42a!8m2!3d46.7609986!4d23.5708016?hl=en

REGISTRATION FEE

- 40 Euros payable on site (please bring correct cash).

POSTER SESSION

- **All poster abstracts have been accepted.**
- All participants submitting abstracts for posters are expected to present their posters during the evening apéro on 10th September (see schedule for details).
- Poster dimensions: no larger than **A0** (84.1x118.9 cm)

FUNDING

- Registration fee will cover all coffee breaks, lunches, and the social dinner on Saturday (10th September 2016).
- Due to limited financial support, participants will **NOT** be reimbursement for travel and accommodation. Further information will be provided should this reimbursement status change.

ACCOMMODATION

Most hotels are less than 15 minutes from the conference location by foot.

Please refer to hotels that are available for the conference via the EURBEE website:
http://eurbee7.usamvcluj.ro/index.php/venue

TRANSPORTATION

Cluj-Napoca, Romania can be reached via road, rail, and air.

Most visitors will arrive via the Cluj International Airport (CLJ), and take a taxi or bus to their accommodation in the city.

Please refer to the EURBEE website for travel information:
http://eurbee7.usamvcluj.ro/index.php/venue

Dear colleagues,

On behalf of the local organizing team, I would like to welcome you to the 12th COLOSS conference in Cluj, Romania.

I would like to sincerely thank all the people, who have helped to organize and conduct this meeting. In particular, it would have been impossible without the tireless efforts of Dr. Daniel Dezmirean and his local team and the kind support of the University of Agricultural Science and Veterinary Medicine Cluj Napoca.

Appreciation is also addressed to all contributors for submitting their abstracts, which I hope will stimulate rewarding discussions on honey bee health and well-being. Please be so kind and take into consideration to plan our activity until the next COLOSS conference.

Financial support is kindly granted by the Eva Crane Trust, the Ricola Foundation *Nature and Culture*; Veto Pharma and the Vinetum Foundation.

I am looking forward to fruitful discussions with all of you, and hope you will enjoy this conference.

Yours sincerely,

Peter Neumann, President COLOSS Association

COLOSS Conference - Tentative Schedule

9th SEPTEMBER 2016

Time	Session 1 – COLOSS Executive Committee Meeting 1 (for Executive Committee members only)
19:00-20:30	Meeting of the COLOSS Executive Committee

10th SEPTEMBER 2016

Time	Session 2 – COLOSS General Assembly Meeting 1
07:45-08:30	**Sign-in & coffee**
08:30-08:35	Welcome by COLOSS President Peter Neumann and Daniel Dezmirean Dean of the Faculty of Animal Science and Biotechnology
08:35-10:30	General Assembly Discussions & Executive Committee Election
10:30-11:00	**Break**, with drinks & snacks
Session 3 – COLOSS Updates	
11:00-12:30	COLOSS Core Project & Task Force updates annual achievements (3 CPs & 5 TFs; 10 mins. ea.)
12:30-14:00	**Lunch (covered) & poster set-up**
Session 4 – Concurrent Discussion Groups 1	
14:00-16:00	1. Monitoring, 2. Small Hive Beetle, 3. Vespa
16:00-16:30	**Break**
Session 5 – Concurrent Discussion Groups 2	
16:30-18:30	1. CSI Pollen, 2. B-RAP, 3. Bee Breeding
Session 6 – Posters & Social Dinner	
18:30-20:00	**Poster session** with apéro
20:00-	**Social dinner (covered)**

11th SEPTEMBER 2016

Time	Session 7 – Concurrent Discussion Groups 3
08:30-10:30	1. Varroa control, 2. APITOX, 3. Monitoring
10:30-10:45	**Break**, with drinks & snacks
Session 8 – Concurrent Discussion Groups 4	
10:45-12:45	1. B-RAP, 2. CSI Pollen, 3. Varroa Control
12:45-14:30	**Lunch (covered)**
Session 9 – Concurrent Discussion Groups 5	
14:30-16:30	1. APITOX, 2. Small Hive Beetle, 3. Bee Breeding
16:30-16:45	**Short break**
Session 9 – COLOSS General Assembly Meeting 2	
16:45-17:45	Updates from Core Projects & Task Force discussions
17:45-18:30	Final General Assembly discussions, plans & Farewell
Session 10 – Executive Committee Meeting 2 (for Executive Committee members only)	
20:00-21:00	First meeting of the 2016 COLOSS Executive Committee

ORGANIZER CONTACTS	
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Table of Contents

REPORTS OF CORE PROJECTS

COLOSS *BEEBOOK* Activity Report

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Ellis; Jamie[2]
Carreck; Norman[3]
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Insitute for Bee Health; University of Bern; Bern; Switzerland[4]

Three years after publication of the first two volumes of the COLOSS *BEEBOOK*, a manual for standard honeybee research methods, over 10'000 copies of chapters have been downloaded. This shows the high interest in the community for this tool. The chapters are increasingly cited in peer-reviewed literature, and we hope that this trend will continue and the *BEEBOOK* become established as the standard reference for research on honey bees. The most cited chapter so far is the one on *Varroa destructor*, thereby reflecting the importance of this pest in honeybee health research. The most downloaded chapter is on queen rearing, suggesting that non-researchers, especially beekeepers, also use the *BEEBOOK*. The majority of the 400 hard copies of volumes I. and II. have been sold.
The last year has been dedicated to the production of volume III. This volume focuses on methods required for hive product research. Senior authors have been been identified and recruited for all chapters and author teams have been assembled and are at work on their respective chapters. The first chapter concerning propolis has been published in the Journal of Apicultural Research and several others are close to finalization. A cover has been created for this volume. The www.coloss.org/beebook internet page will be updated as the articles become available in the Journal of Apicultural Research. An appeal to the user community was made to use the commenting tool available on the web html version of the *BEEBOOK* to foster improvement and updates.

Update on the COLOSS monitoring group over 2015-2016

Alison Gray
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The monitoring group is a core project of COLOSS, using a standardised questionnaire to collect information on colony losses each year from many different countries. The group continues to expand. This year monitoring data have been received from a new survey in Wales, and both Turkey and Belgium, which have contributed in the past, provided data once again and on an expanded basis. Russia, Egypt and England did not send data this year.

In late July we produced our now established annual press release of preliminary results for colony loss over winter. Data was received in time for this from 29 countries, indicating an estimated 11.9% overall winter loss rate (compared to 17.4% for winter 2014-15 and 9% the previous winter) based on 18,693 respondents and 399,603 colonies wintered. The higher losses were mostly in Western and Northern Europe as well as some regions in Eastern Europe.

The press release has been followed up this year with the submission of a short paper giving summary data for winter mortality and losses due to unresolvable queen problems after winter for each participating country. It is planned to do this annually, to publish first results quickly. This will be followed up by more in-depth analysis and model fitting using significant variables associated with risk of loss. An article presenting a multi-year study is also in draft at the time of writing, to show patterns of loss over the years and also geographically. This will show how spatial patterns of loss change from year to year, as does the overall rate of loss. Further model fitting will follow.

Most of the countries in the monitoring group are in the northern hemisphere, hence the focus has been on winter losses rather than summer or annual losses. However, a few countries are not, and to try to produce some results comparable to those in the USA and elsewhere, a set of optional extra questions was developed and added to the winter loss questionnaire to collect information in order to estimate summer and annual losses. These were used in a pilot study by a few countries in the group as part of the 2015 questionnaire. Some results of analysis were presented at the February 2016 monitoring group workshop. The reception of these questions by beekeepers was mixed. Scotland has used these questions again in the 2016 survey, though shortened to exclude the original examples given on how to answer the questions. The group generally felt that trying to collect this information was difficult.

An important goal for the monitoring group is to maintain high scientific standards of sampling and data collection at the same time as welcoming new countries to participate in monitoring. Providing support for new countries engaging with the group is a way to achieve this. The group remains committed to publishing high quality papers and extending the analysis to gain deeper insights into risk factors for loss. There is also potential within current survey mechanisms for carrying out short or smaller-scale supplementary surveys on specific topics on which it is felt that having more information would be useful.

B-Rap (Bridging bee Research And beekeeping Practice)

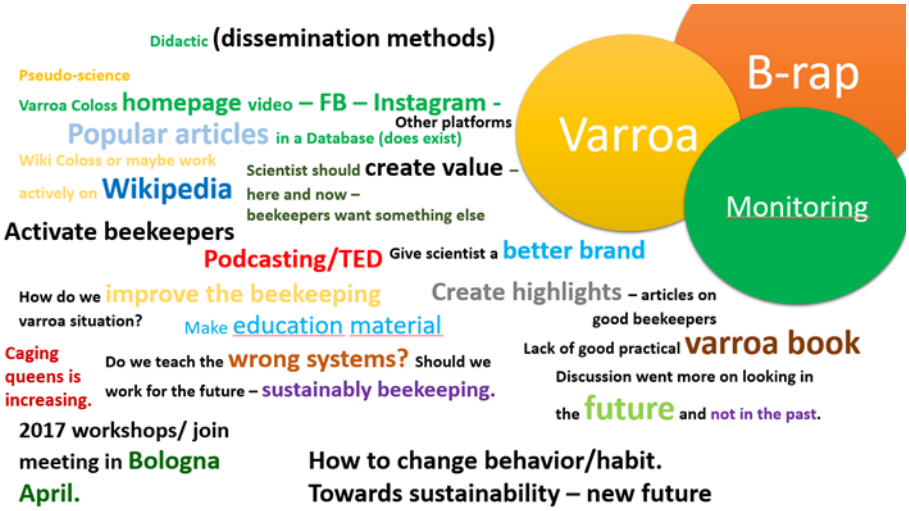
Flemming Vejsnæs, Denmark and Preben Kristiansen, Sweden

The B-rap group was founded in Murcia (Spain) 2014 during the Coloss meeting there. It was realized that there is a demand on focusing on the reaching out with the scientific messages for beekeepers. The question is: Is there a need for reaching the beekeepers and giving better dissemination? The group has been slow starting, having a short meeting in Bologna 2015 creating ideas. In 2015 the first real kick off meeting was held in Copenhagen, Denmark, with 14 participants. The second meeting was in Thessaloniki, Greece, 2015 with 14 participants. Here the group found its way of working, where we try to be as productive as possible, finishing our project as must as possibly . Normann L. Carreck represended the B-rap group as one of the main speakers at the Apimondia congress in Korea 2016: COLOSS B-RAP: Bridging bee Research And beekeeping Practice. We have presented the group at the annual meeting of the German speaking beekeeper advisors in Celle, Germany. We are happy to welcome two of them in our group. We have b-rap on the agenda of that meeting every year. We got very good input/response at the B-RAP “workshop/meeting” with about 50 beekeepers at the Beecome conference in Malmö, Sweden. We agreed to arrange more workshops with beekeepers, presenting our work and ideas and to get suggestions and ideas from the beekeepers. Lots of ideas and inspiration came from the audience. At the varroa task force meeting on Unije, a communication group was founded and decided to cooperate with the b-rap group. That happened with a joint meeting of the varroa taskforce and the b-rap group at the annual meeting at Cluj in Romania 2016. At the joint meeting there were some very intense discussions on the need of educational material, like an international practical varroa book. There was no real conclusion, other than that we will continue working with this subject. As a result of this we motivated the monitoring group, who do have the results for the different ways of varroa treatment in different countries, to make an overview. See also the report from the varroa taskforce group. On the other workshop, we had 2 hours of very good and productive discussion creating ideas, which can be seen in the below graphic. Our impression during the COLOSS meeting, is that more or less all groups, now do talk and consider dissemination as an important part of the different working groups.
At the moment the group is working with:
1. Questionnaire to analyze the structure of beekeeping training/education in all COLOSS countries. Aim: Make an overview article. We have produced a preliminary list of contact persons for each country.
2. Questionnaire targeting members of COLOSS and other relevant persons. The aim is to “ask” how scientists, advisors put priority on dissemination: How often, how, and which needs for improving?
3. A guideline on how to evaluate the quality of websites with information on beekeeping. A very long and interesting discussion on this issue resulted in a slight change of the task, so we decided to produce a recommendation list for minimum demands for websites.
4. We had an initial discussion about producing a questionnaire for a survey on how we can improve dissemination of information to the beekeepers. We will use the monitoring group to distribute this questionnaire.

Among others we have also discussed that we would like to:
A. Make a popular article about COLOSS for local beekeepers magazines.
B. We intend to write chapters on dissemination in the COLOSSBEEBOOK, e.g. presenting good examples of beekeepers (lighthouses).

C. Work on an evaluation form that can be handed out to participants of talks, meetings and courses to get feedback on that.
D. We would like to invite a main speaker for further meetings on the subject: The good presentation.
E. Radio COLOSS. Idea to make webinars when we have COLOSS workshops. We could make online discussions.
F. We need to involve sociologist and extension experts in our group.

In the nearest future we have produced a contact person list for each member state country. We need this for our questionnaires for analyzing the different aspect of each country. This so that we do not mail all our members of Coloss with the same questions. We expect that our contact person either will answer our mails, or forward our questionnaire to relevant persons.
The group is now finding its way of working and we will soon produce a member and mailing list.
Next workshop is not planed at the moment, but we want to connect our next workshop with other COLOSS workshops.
Flemming Vejsnæs 21.10.2016



REPORTS OF TASK FORCES

Varroa Control Task Force - accomplishments and future directions

The Varroa Control Task Force (TF) of COLOSS currently includes 78 members from more than 20 countries. It is composed by*Varroa destructor* researchers, bee health inspectors, and extension specialists.

Varroa Control members focus on developing and encouraging sustainable solutions for management of the ectoparasitic mite *V. destructor*, one of the most devastating threats to honey bees. Pivotal to the philosophy of the group is the adoption of Integrated Pest Management schemes.

The Varroa Control TF is co-ordinated by Ales Gregorc (Agricultural Institute of Slovenia) and Giovanni Formato (IZS del Lazio e della Toscana, Italy).

General discussion:
In Cluj-Napoca some general activities of the Task Force have been shared in collaboration with the B-RAP group. The discussion was focused especially on the dissemination and on new instruments that should be adopted to improve it. For example: a new booklet on varroa and varroa control ("the safe strategy"), monitoring methods, biology, viruses, etc.; adoption of a Varroa "Smartbox" (with posters + kit AFB/EFB/varroa); leaflets; videos; "Varroa weather"; Varroa training with tests on treatments and varroa infestation assessment; adoption of maps with contacts of local coordinators for beekeepers; meetings with practical demonstrations for beekeepers and technicians; online sharing of files and pictures; etc.
Moreover, the concept of "*Scientist beekeepers*" was discussed, and how beekeepers could help researchers with specific tools like:

1. *monitoring questionnaires* (online or on paper) for beekeepers to get information related to varroa management methods (e.g. what techniques or treatments are adopted or what negative effect, e.g. in terms of queen mortality, was recorded);
2. *simplified protocols* to be applied in different areas by beekeepers, focusing limited goals of interest of WGs. In this case, videos and images or a training of participants (e.g. mail/phone) could be activated, even with the help of local coordinators.

Concerning the Varroa resistant colonies, Varroa Control TF could collaborate to identify and evaluate resistant colonies (>5 years untreated colonies for varroa), in collaboration with the Sustainable bee breeding group.
Finally, it was defined to realize a *Varroa Control TF Workshop*, organized by Antonio Nanetti in Bologna, next April 2017.

Specific Working Groups discussion
Varroa Control Task Force (TF) is organized in 6 different Working Groups. Their accomplishments and future directionswere discussedas follows:

Working Group 1 – WG1: Infestation assessments (Leaders: Marco Pietropaoli and Ole Kilpinen)

3. Goal of WG1 is to compare currently used methods to assess the infestation levels of the colony (e.g. the soapy solution, powdered sugar, and natural mite fall methods).

Accomplishments: WG1 has involved a total of 10 researchers, coming from 7 different countries, with two different protocols (available at: LINK) in order to compare the icing sugar method (checking its accuracy with a soapy solution wash of the sample) and the natural mite fall with the colonies varroa infestation levels. A shared file to collect all the data obtained by the different field trials was published on the COLOSS Varroa Task Force webpage. Restricted access was provided to participants.A google document accessible to this LINK has been created and shared with the interested WG participants to collect all the references available in the literature and the results of the activities concerning the varroa infestation assessment.

Future directions: before the next Varroa Control TF meeting in Bologna (Spring 2017) a statistical and modelling analyses on the results will be carried out, in collaboration with statisticians indicated by some members of the Task Force (Ralph Buechler, Victoria Soroker and Vincent Dietemann).
A trial with a new CO_2 counter will be implemented to obtain data from this disposal.

Working Group 2 - WG2: Brood interruption (Leaders: Ralph Buechler and Antonio Nanetti)
Goal of WG2 is to compare *V. destructor* control methods using total removal of brood or temporary caging of queens combined with oxalic acid treatment.

Accomplishments: The definitive protocol has been published on COLOSS website at this LINK.

Ralph Buechler in this WG2 is giving a great impulse for a general change of view concerning the treatment system concept. He suggests a strong improvement in beekeeping techniques like brood interruption during season and strict application of infestation thresholds, reducing winter treatment with high environmental impact chemicals.

Members collaborating to the protocols have already been recruited and already started the field trials. An excel file with the database needed to collect data from the trials was set up. A laboratory for residual analysis (oxalic acid, amitraz, total acidity) is under identification.

Future directions: the excel file with the database needed to collect data from the trials will be shared soon to the field trials participants. During the next TF meeting 2017 in Bologna will be presented the preliminary results of the field trials.

Working Group 3 - WG3. Damage thresholds (proposed Leader: Fani Hatjina).
Goal of the WG3 is to determine the range of damage threshold levels across Europe, and to link these to environmental factors.

Accomplishments: this WG was temporary arrested during 2014 and 2015 because of not availability of leaders.

Future directions: It was proposed to change the title of WG 3 from “Damage thresholds” to "Damaged Varroa levels across Europe". The aim and the activities of this group will be discussed and defined during the workshop in Bologna, Spring 2017.

Working Group 4 - WG4: Formic acid management (Leaders: Benjamin Dainat and Giovanni Formato)
Goal of the WG4 isto better understand the influence of intra-colony and environmental parameters on efficiency of formic acid treatments for *V. destructor* control, with the final aim

to improve treatment application and to provide baseline data for a "Varroa-weather" prediction tool to determine the best moment for treatment.

Accomplishments: short-term and long term protocols were adopted in field experiment of 2014 and 2015.A total of 4 members participated to the long-term protocol and 6 members participated to the short-term protocol. Results were all collected by Vincent Dietemann that is performing the statistical analysis.
Moreover, in the workshop of Unije it was set up the 2016 protocols. Detailed protocols are all available at:http://www.coloss.org/taskforces/varroacontrol

Future directions: results will be presented at the next Varroa Control TF Workshop in Bologna (April 2017).

Working Group 5 – WG5: Assessment of new control methods (Leader: Maja Ivana Smodis Skerl)
Goal of WG5 is totest new frontiers (e.g. new products, like Aluen cap) to control *Varroa destructor*, considering the beekeepers' priorities and realizing comparative studies.
This Working Group has recently been formed, in the Varroa Control Task Force Workshop held in Unije (Croatia) on 19th and 20th of May 2016.

Accomplishments: contacts have been undertaken with producers of Aluen cup to organize field trials in EU.

Future directions: during the Conference, the activities that will be realized are:

- define a protocol to test Aluen cap (oxalic acid + glycerol);
- compare protocols and results previously obtained by Swiss bee research Institute, Julien Vallon and researchers from Argentina;
- ask to Varroa TF members to collaborate by mail and make a participant list
- define a protocol to test thermoterapy (in collaboration with Preben Kristiansen and Jorge Rivera Gomis).

Working Group 6 – WG6: Communication (Leaders: Victoria Soroker and Flemming Vejsnaes)
Goal of WG6 is to guarantee a strong communication concerning the output of the Varroa Control Task Force towards the beekeepers (by training, guidelines and books), and the B-RAP COLOSS project leaders. Moreover, WG 6 should give feedbacks from beekeepers to the WGs leaders of the Varroa Control Task Force, suggesting them new studies/ideas/corrections for future activities.
This Working Group has recently been formed, in the Varroa Control Task Force Workshop held in Unije (Croatia) on 19th and 20th of May 2016.

APITOX Task Force

Noa Simon Delso

Venue: Life Sciences Institute – University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania
Start: Saturday, 10th September 13:30
End: Sunday, 11th September around 17:00

Aim of the meeting:
● to update the COLOSS members about the annual achievement of the APITOX Task Force
during the Session 3 on 10th September,
● to show and discuss the results of the three studies carried out in 2016 during the Session 7 on
11th September (open session),
● to define the next steps to finalize the three studies carried out in 2016 and to plan the next
studies for 2017 and meeting.
Present:
Members Non members (only in the Open Session)
Fani Hatjina,
Fabio Sgolastra,
Aulo Manino,
Marco Porporato,
Daniela Laurino,
Tomasz Kiljanek,
Lukas Jeker,
Geoffrey Williams
Norman Carreck,
Raffaele Dall'Olio,
Liudmyla Yazlovytska,
Galina Savchuk
Excused (members): Apinel P, Fourrier J, Simon-Delso N, Medrzicky P, Crailsheim K, Gregorc A,
Giffard H, Molitor C, Hernández-López J, Malagnini V, Renzi T, Tosi S, van Praag J, Dermine M
PROGRAM
Saturday 10/09/2016
11:00 – 12:30
Brief introduction about the APITOX Task Force (website, statutes, number of members) and about
the annual activities carried out by APITOX TF (about 10-12 min)
Sunday 11/09/2016
08:30 – 10:00 Session 7 (Open session):
Welcome, introduction and adoption of the agenda and of the aim of the meeting
Presentation of the results obtained in the recent studies carried out at international level by APITOX TF:
● Field trials on trial – Evaluation of the information of honey bee field test for pesticide risk

assessment

- Lab vs Field – HPG development
- Chronic toxicity

During the discussion followed the presentations, the participants made valuable comments on how to proceed or where to pay attention, as for example to improve the template used by risk assessors for evaluating the field studies.

14:30 – 16:30 Session 9 (Session only for APITOX members):

Discussion about the next steps in order to finalize the three studies:

- Field evaluation: Preparation of a template with recommendations for Risk Assessors, draft the paper;
- Lab vs Field-HPG development: Complete data analysis, draft the paper;
- Chronic toxicity: Collect the data from different Labs, data analysis, draft the paper

Summary and state of the art of the new toxicity testing methods requested in the EFSA GD

Definition of the next steps to undertake in 2017: programming common experiments aimed to elaborate test methods. In particular:

- Comparing three methods to assess HPG development;
- Performing accumulative toxicity test using the data from chronic toxicity study carried out in 2016

Proposal for the next meeting: Spring 2017 in Bologna. Exact dates will be determined later.

17:00 End of the meeting

Some summary results of C.S.I. Pollen from 2014-2015

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Many beekeepers, 475 and 591 in 2014 and 2015 respectively, from 24 and 27 countries participated in this study period. They determined the number of colours and submitted data from in total 17917 pollen samples. It appeared that the majority of the beekeepers keep their bees in rural sites: arable land-, grassland regions and in villages. Not all samplings resulted in the required amount of 20 gram per hive. In 2014, 69% and in 2015 65% of pollen samples reached this. The results presented here are calculated with the data of the samples that had the required amount. Overall, the average number of abundant pollen colours (minimum of 20 pellets of the same colour per sample) was 4.55 (seasonal variation 3.86 to 5.03) and 4.42 (3.30 to 5.14) in 2014 and 2015 respectively. The rare colours were 1.5 and 2.99 and the very rare were very rare indeed. Looking at the number of total and abundant colours reveals a similar seasonal pattern in all participating countries. Although the land use is rather different, again similar patterns in total and abundant number of colours can be found. The statistical analysis on regional and seasonal differences and on land on land use of the data are not yet completed. Nevertheless, the preliminary findings indicate that the pattern of pollen diversity expressed in different colours is about the same from North to South and from East to West in Europe. This shows the strong inherent characteristic of the pollen collection strategy of *Apis mellifera*. Our study raised the beekeeper's awareness of the pollen influx. CSI pollen 2.0 continues in several countries and side projects like mapping of land use and virus detection in pollen are planned or are currently running.

On the C.S.I. Pollen project and its continuation in 2016

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The COLOSS C.S.I. Pollen project, begun by Jozef van der Steen and Robert Brodschneider, started as a pilot study in 2013 in the Netherlands, Austria and Switzerland, with the aim of studying pollen diversity available to honey bees across Europe and beyond. A citizen science approach involving individual beekeepers was chosen to allow wide-scale data collection in many countries. Participating beekeepers collect pollen samples from three non-migratory colonies in one apiary, on up to nine pre-determined sampling occasions across the season (April to September), and return data via an online questionnaire. Data records numbers of abundant, rare and very rare pollen colours collected in each colony, as well as environmental information. A standardised protocol is followed for comparability of results between beekeepers and countries. Additionally, in some countries a second level of the project involves palynological analysis for determination of exact plant origin of the collected pollen.

Further countries were recruited to participate, via the COLOSS network, and the main two-year project ran over spring/summer in 2014 and 2015, involving over 20 countries each year, co-ordinated from Austria. Annual workshops were held for the organisers at national level. It was decided at the workshop in February 2016 to continue pollen collection in some countries. This was for various reasons: some countries had started only in 2015, or were able to expand participation in the project in 2015, poor weather in some countries had led to limited data collection in 2015, and others were also highly motivated to continue. Eventually 10 national co-ordinators and 12 countries committed to participate in 2016, with Alison Gray acting as international co-ordinator for this year.
The same protocol has continued, with a new additional question asking whether or not participants found any mixed colour pollen pellets in any of the samples from their three participating colonies. Those who did were encouraged to freeze such pellets for later analysis. A further project is likely to develop in order to examine these.

Task Force RNSBB – update

Update on current RNSBB projects

- **Varroa Sensitive Hygiene / Suppressed Mite Reproduction: protocol and experiment**

- Discussion on results of common experiment for screening of VSH-SMR in European colonies
- Ideas for improvement of the developed protocol for screening of VSH (non reproduction of *V. destructor).* Aim of the protocol is to assess presence of the trait in European honey bee colonies and to better understand this phenomenon

- **Book for Sustainable bee breeding**

- This is intended to be a popular version of the chapters of Bee Book related to breeding; during the meeting we confirmed allocation of main authors, we made a final agreement on contents and set up a time schedule. The book will be organized in two parts, with part covering general aspects and part two providing detailed protocols for breeders. The author list has been finalized and no further changes in authorships / contents are possible. The book will be published by IBRA, and the editorial board includes Norman Carreck, Ralph Buechler, Cecilia Costa and Marina Meixner.
- **PART 1**
- **Chapter 1-2: Bee evolution and current situation and history in Europe.**
- **Chapter 3: Honey bees and genotype – environment interactions.**
- **Chapter 4: Breeders viewpoints and considerations.**
- **Chapter 5: Conservation efforts across Europe.**
- **PART 2**

Chapter 6: Selection and propagation of honey bees
6.1: Performance testing of bee colonies
6.1.1 Preconditions and general recommendations
6.1.2 Test criteria
6.1.3 Data collection and evaluation
6.2: Propagation of queens and drones
6.2.1 Queen biology and rearing
6.2.2 Drone biology and rearing
6.2.3 Health of queens and drones
6.3: Mating of honey bees
6.3.1 Mating biology
6.3.2 Mating stations
6.3.3 Instrumental insemination
6.4 Breeding locally adapted bees in the new world

- **Next meeting**

- Krakow, Feb., 2017
- Local organisers Bienenkowska, Panasiuk, Tofilski

Small hive beetle Task Force

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The small hive beetle Task Force (=SHB TF) of COLOSS is composed of >40 researchers, bee health experts, and extension specialists workers from >20 countries. Our members develop, standardize and promote diagnostic and sustainable control methods for this pest as well as conduct research aiming towards a better understanding of SHB basic biology. The specific aims of our SHB TF will be achieved by organizing workshops to design common experiments as well as training schools on specific subjects and reciprocal research visits (Short term Scientific Missions). We will also share ongoing research and databases electronically in order to coordinate and speed research efforts. The TF consists of the following Working Groups (WG):
WG 1. SHB Diagnosis and Monitoring: Development of novel and enhancement / standardization of current diagnostic methods (molecular diagnostic, diagnostic strips, etc.);
WG 2. SHB Prevention and Control: Development of novel and enhancement / standardization of current prevention and control methods (traps, sanitation, etc.). This group will also focus on developing genomic sequences useful for RNA interference or other gene-based controls.
WG 3. SHB Biology: Hypothesis-driven experiments and descriptive studies to enhance our knowledge of basic SHB biology.

Since the establishment of this new TF last year, small hive beetles (SHBs) have been found in Brazil and the Philippines. The TF has established a mailing list to provide literature updates, incl. grey literature and theses.

For next year, a workshop in Wageningen (The Netherlands) and a training school in the US are planned.

Velutina Task Force

Daniela Laurino

On 10th of September, during the meeting of the Velutina TF, the following issues were discussed and various resolutions were taken:

- ✓ It was decided to organize the Velutina TF in two Section (European and Oriental researchers), since the presence of the oriental researchers is fundamental and it is to be pursued.
- ✓ Activities for the next year: Secure the involvement of all participants of the TF (only few of them are in the countries where *V. velutina* is already present); before the start of the next season, circulate the existing information materials (translating it in the different national languages) and provide additional material to inform the beekeeping. To achieve these goals, it would be appropriate to have a cooperation with BEEBOOK and B-RAP.
- ✓ Study the impact on honeybees colonies (and also on bumblebees, wild bees and other species), the controls methods, (nest finding and destruction, mass trapping, mating disruption), the population dynamic, the biology, the distribution, the anatomy, the morphometric differentiation and the molecular differentiation.
- ✓ Implement a joint search on the standardization of research and control methods.
- ✓ Organize a new meeting in late spring in a place where could be possible see the insects such as Italy, France, Spain, or Portugal, possibly to coincide with some other COLOSS meeting of COLOSS in order to optimize travel costs.

ABSTRACTS FOR POSTER PRESENTATIONS

Survey about the usage of Varroa destructor treatments with thymol in Austria

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In some countries, concerns about the efficacy of thymol as treatment against *Varroa destructor* have been expressed and beginning resistance has been hypothesized by some beekeepers and scientists. On the other hand, no severe winter losses were reported in correlation to previous thymol treatments. To get an impression about the extent of potential problems, an online survey among users was performed. Beekeepers participating in the Austrian COLOSS winter colony loss survey which use thymol products were in July 2016 invited to answer seven questions about their experiences. Up to now, 55 beekeepers answered the questionnaire. Most participants use thymol in the period July to September, corresponding to the usual period of late summer treatments. The operating experience with this active substance was very heterogeneous: a third of the beekeepers used thymol products for 1-3 years, while 27% had experience for more than ten years. Only a small portion of the participants reported they ever experienced problems after thymol treatments (16%), without clear correlation to timing of the treatment, product used or experience with the substance. However, it seems that beekeepers performing two treatments with thymol experience less problems than those doing only one. For the first time, users of thymol products were asked if they cover the thymol tablets during the treatment: 47% of the participants indicated to do so. According to the recorded data, this does not influence the success of the varroa treatment with thymol. A great majority (76%) of the participants expressed to control the efficacy of the treatments. This survey does not confirm general problems with thymol as agent for *Varroa destructor* treatments. However, it gives first hints to approach upcoming issues with thymol treatments. It seems that under Austrian conditions two separate treatments with thymol could be more appropriate to reduce mite infestation in late summer. Further research is necessary to clarify the influence of local climatic conditions, infestation pressure and other factors. Direct contact with beekeepers could help to tackle management problems during the treatment.

Phenolic Profile and Biomedical properties of honeycomb waste

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Beekeeping is considered as a highly valued agro-industrial across the world. Beehive products include honey, pollen, propolis, royal jelly and venom have been studied and applied for food and pharmaceutical industries. However, utilizing of waste from beekeeping industry particularly used-honeycomb has not been studied. In our experiment, used-honeycomb was extracted by maceration technique and purified at low temperature to obtain a concentrated active bee-honeycomb extract (BHE). Chemical analysis showed that BHE containing silk proteins and moderate concentration of phenolic and flavonoid derivatives compounds, contributing to their antimicrobial and antioxidant properties. Experimental results confirmed that BHE had good antibacterial and anti-Herpes virus properties. This is the first report of biomedical properties of BHE that could be used as an alternative source for antioxidant and antimicrobial agents for future medical application. Keywords: honeycomb extract, antibacterial activity, antiviral agent, antioxidant, honey bee

Primary cell lines isolated from honeybees Apis mellifera carnica

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Majority of studies regarding the impact of different chemicals and pathogens were performed on bees/ bee families. The studies are carried out under unstandardized conditions therefore the results obtained are difficult to compare. We aim to establish a permanent honeybee cell lines for standardized in vitro testing of the effects of xenobiotics and pathogens, which would enable learning and understanding the mechanisms present in vivo. The first step was the preparation of primary cell lines. Here we describe methods that are effective for maintaining various honeybee cells in in vitro conditions. The preparation of cells from different honeybee Apis mellifera carnica developmental stages and the optimization of growth conditions and media for different cell types, including supplements were standardized. Multiple bee cell cultures were produced using bee eggs, larvae, pupae, queen bee ovaries, brains and hypopharyngeal glands as a starting material. Only cells from eggs and pupae were used for further tests. Supplemented L-15 media was found to support long-term growth of eggs while modified WH2 media was established for long-term cultivation of pupae cells. The cells were successfully cultured for up to 6 months and the bee origin of the cells was confirmed using PCR specific primers. Multiple cell phenotypes were observed including free-floating small suspension cells, neuron-like monolayers and cells with multiple nuclei. Cells obtained from pupae were successfully cryopreserved. After thawing their viability was estimated and was always higher than 85 %. For this purpose trypan blue and propidium iodide were used, the latter being more appropriate.

Losses of honey bee colonies in Austria and the Czech Republic during the 2015/16 winter

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In Austria we have established the monitoring of honey bee colony losses during winter since 2007/2008. In the Czech Republic, winter losses of honey bee colonies were investigated for the third time this year. In both countries, data are collected online, per mail and the surveys are advertised in a beekeeping journal and at several beekeeper meetings. Both surveys resulted in a response of more than 3% of the estimated number of national honey bee colonies. In both countries, winter loss rate was much lower compared to 2014/15. Colony loss rate of 1289 beekeepers wintering 23418 honey bee colonies in fall 2015 in Austria was 8.1% (95% confidence interval: 7.4-8.8). In the Czech Republic, it was 6.4% (95% CI: 5.8-7.1) based on 968 beekeeping operations wintering 17350 colonies. In both countries, queen problems were included in mortality figures and contributed 3.6 and 2.2 percentage points to losses in Austria and Czech Republic, respectively. We found differences in colony loss rates between regions in both countries, ranging from 5.1 to 11.5% in Austria, and from 3.5 to 9.8% in the Czech Republic, respectively. After a winter with very high losses, both countries experienced very low loss rates of honey bee colonies during the winter of 2015/16. On our poster we will discuss the influence of several risk factors that can be easily observed by beekeepers on winter mortality of honey bee colonies.

Colony losses in Ukraine – the second year of survey

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Ukraine has joined the COLOSS international study in 2015. During our second survey, we collected the data after the winter 2015-2016 online, by email, mail and by means of a paper-pencil questionnaire. In general, we processed the results of a survey of more 400 beekeepers of which 399 questionnaires were valid. The beekeepers from 18 regions of Ukraine took part in the survey with the largest part from Chernivtsi region. Before the winter 2015-2016, they kept together 13850 colonies, of which 1368 were lost after the winter. Thus, general colony losses were 9.9 %, which is 1.5 times lower than last year. 15.1% of colonies that wintered were weak but queenright in spring 2016. The mortality of bee colonies in the winter 2015-2016 was 6.3%, which is more than twice lower in comparison with the results after the winter 2014-2015 (13.4%). Having analyzed the signs of death we found out that a large part of dead families had many dead bees in or in front of the hive (22.3 %), while 18.8 % of the colonies did not have dead bees in the hive. 13.7% of the colonies died for unknown reasons, and 11.7 % – in the result of natural hazards. Losses due to queen problems were much higher after the winter 2015-2016 (3.6 %) in comparison with the previous winter (1.6 %). *Varroa* mite is widespread in Ukraine. However, 12.3% of respondents indicated living on the territories free from the parasite mostly in the Carpathian mountainous areas (74.0 %). 64.4% of respondents monitored their colonies for *Varroa*, and 82.46% have treated their colonies. On the whole, the loss rates after the winter 2015-2016 vary considerably within Ukraine. The loss rates on the biggest part of the surveyed territory of Ukraine do not differ from the mean of the COLOSS international study. Whereas the higher relative risk was registered for Volyn, Kirovograd and Kharkiv regions. Chernivtsi and Zaporizhzhya regions are found to have a lower relative risk.

Preservation of Honey Bee (Apis mellifera L.) Semen

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Preservation of honey bee (*Apis mellifera* Linnaeus) sperm, coupled with instrumental insemination, is an effective strategy to protect the species and their genetic diversity. Our overall objective is to develop a method of drone semen preservation; therefore, two experiments were conducted. Hypothesis #1 was that cryopreservation (-196˚C) of drone semen is more effective for long-term storage than at 16˚C. After 1 year of storage, frozen sperm viability was higher than at 16˚C, showing that cryopreservation is necessary to conserve semen. However, the cryoprotectant used for drone sperm freezing, dimethyl sulfoxide, can harm the queen's fertility after instrumental insemination. Hypothesis #2 was that centrifugation of cryopreserved semen to remove DMSO prior to insemination improves queen fertility. Our results indicate that centrifuging semen does not affect sperm viability. We cannot yet confirm that centrifugation improves queen health after insemination due to variable results after instrumental insemination.

Comparison of three formic acid products to control Varroa destructor: Nassenheider Professional®, MAQS® and Varterminator®

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The Summer acaricide treatment against Varroa destructor should be able to drastically reduce the infestation at the minimum to avoid colony collapse of the colonies during winter. In summer 2015, we verified in one apiary in Central Italy the acaricide efficacy and the toxicity on honey bee colonies of the formic acid evaporator Nassenheider Professional® compared with two new gel formulations formic acid based: MAQS® and Varterminator®. Acaricide efficacy was evaluated counting the number of mites killed by the treatments, while toxicity on honey bee colonies was evaluated by the estimation of the amount of bees and brood in each colony adopting the Liebefeld method. The mean acaricide efficacy of 290ml of formic acid 60% used with Nassenheider Professional® evaporator in Dadant-blatt beehives was 72.7%±12.5%; MAQS® efficacy was of 49.7%±14.3% and Varterminator® efficacy was of 78.2%±19.1%. No statistically significant reduction of adult bee population or brood has been recorded after all the treatments. The products showed absent or quite low queen mortality: Nassenheider Professional® 0% (0 on 8); MAQS® 12.5% (1 on 8) and Varterminator® 12.5% (1 on 8).

Evaluation of Oxalic Acid treatments against the Mite Varroa destructor in Algeria

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The *Varroa destructor* varroasis is a very serious parasite of honeybee *Apis mellifera*. The objective of this study was to evaluate the effectiveness of *Varroa* treatment using organic acid (oxalic acid) in Algeria identifying its side effects on bee colonies. Treatment was conducted in one apiary consisting 30 colonies kept in Langstroth hives kind. Oxalic acid dripped directly on bees 5ml of this solution of oxalic acid per lane occupied by a syringe. Three doses were tested: 4.2, 3.2 and 2.1% oxalic acid is 100, 75 and 50 g of oxalic acid dehydrate in one litter of sugar syrup (1water to1 surge) concentration.
The percentage of average efficiency obtained for the first dose was 81%, 72.19% for the second dose, and 65% for third one, while the dose of 100 g oxalic acid causes a weakening of honey bee colonies. The experiments revealed that clear variation in the treatment efficiency among colonies that this might be related to brood presence therefore in order to assure the treatment efficiency oxalic acid should be part of a bigger strategy of *Varroa* treatment.

European honeybees surviving Varroa destructor display elevated brood recapping

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The ectoparasitic mite Varroa destructor is a major pest of global apiculture with untreated colonies generally failing within 2-3 years. However, several populations of European honeybee have been surviving V. Destructor infestations for >10 years without treatment. Here, we investigated such a mite-surviving population in the Oslo region of Norway. The goal of the study was to verify the population's survivability and identify possible mechanisms. We provided surviving and sympatric susceptible colonies with freshly capped brood from susceptible donor colonies known to be highly infested with mites. Just prior to bee emergence samples of cells were dissected off each frame and mite fecundity was captured. We tested for several behavioural mechanisms including hygienic brood removal, grooming and hygienic cell recapping. The average fecundity of foundress mites was ~30% lower in surviving colonies. It was observed that surviving colonies did not remove brood or groom adult individuals at a greater rate than susceptible colonies, but the recapping behaviour was much more prominent being 0-17% of cells in susceptible colonies and 24-64% in surviving colonies. Here, we provide evidence of a possible mechanism that bees have evolved to combat a highly invasive brood parasite.

Composition of haemocytes depending on the breed of honey bee (Apis mellifera L.)

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In the last decades, bees of different breeds have been actively imported to the territory of Bukovina.These include Caucasian, Italian, Ukrainian steppe and Central Russian breeds. The Carpathian breed is endemic to the Chernivtsi region. Therefore, there is a problem with uncontrolled hybridization of bee breeds. It is not clear how the different breeds and hybrids are able to adapt to various stressful environmental factors including infectious diseases. Since cell-mediated immunity is provided by the cells of haemolymph, we studied the composition of haemocytes in *Apis mellifera* L. cultivated in the Chernivtsi region. We have studied 4 bee families. The breed was determined by the cubital index. For 90% of bees from the families 1 and 2 this index was corresponded to the standard for the Carpathian breed. In contrast, the family 3 appeared highly hybridised with only 63% of the bees being the Carpathian breed. 77% of bees from the family 4 met the characteristics of the Carpathian breed. Apparently, families 1, 3 and 4 originated by hybridization with the Caucasus and Ukrainian steppe breeds, while family 2 is a hybrid with the Ukrainian steppe breed. The following types of cells were identified in the haemolymph of worker bees: prohaemocytes, oval and spindle-shaped plasmatocytes, permeabilizedcells, granulocytes. Transitional forms of cells were also found. In worker bees of all studied families, permeable cellular granulocytes were the least abundant, whereas oval plasmatocytes were the most numerous haemocytes.The fraction of prohaemocytes in families 1, 2 and 3 ranges from 20.3 to 22.0%, and is lowest in family 4 (12,9±2,9). A number of oval plasmatocytes, the bees families No. 2 and 3 below in comparison with bees of families 1 and 4.The content of spindle-shaped plasmatocytes was most variable: the lowest and highest values were found in worker bees of families 2 (6,2%) and No 4 (24.2%), respectively. No significant differences between individuals of the studied families have been found in the content of permeable cells and granulocytes. The highest content of transitional forms was demonstrated in the haemolymph of bees from the families 2 and 3. In family 4, these forms of haemocytes do not occur in all individuals. Thus, we have not identified clear differences in the cellular composition of haemolymph depending on the breed of the honey bee.

Neonicotinoids and extreme sex ratios of solitary bees (Osmia cornuta and Osmia bicornis)?

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Neonicotinoid pesticides resulted in a male biased offspring sex ratio in laboratory experiments with wild solitary bees,*Osmia bicornis*, but field data are lacking so far. Here, we therefore conducted fully-crossed semi-field experiments with *O. Bicornis* and *O. Cornuta* to further test the impact of neonicotinoids on sex ratios of wild bees. In spring 2015, 720 males and 960 females of *O. Bicornis* and 100 males and 200 females of *O. Cornuta* were held in separated flight cages for each species (*O. Bicornis*: 24; *O. cornuta*: 20 in total) on an oilseed rape field treated and non-treated (=controls) with the neonicotinoid clothianidin (seed coated; 0.56 ng/g pollen) for 16 (*O. bicornis*) and 21 (*O. cornuta*) days respectively. The cages were equipped with trap nests, so that the females could reproduce. Subsequently, nests where incubated at 2°C for 5 months to enable hibernation. In spring 2016, the cocoons were transferred to RT to investigate hatching sequence and sex ratio of adults as well as overall overwintering mortality. A total of 150 male and 8 female *O. Bicornis* and 394 male and 6 female *O. Cornuta* emerged, respectively, thereby clearly showing an extremely male-biased sex ratio for both species (94.94 % *O. Bicornis* and 98.5 % *O. cornuta*). However, there were no significant differences between the neonicotinoid and control groups, neither in sex ratios (Chi-squared test: *O. bicornis*: $x2 = 1.06$, $df = 1$, $P = 0.31$; *O. cornuta*: $x2 = 0.78$, $df = 1$, $P = 0.38$) nor overwintering mortality (*O. bicornis*: Chi-squared test: $x2 = 0.01$, $df = 1$, $P = 0.94$.; *O. cornuta*: Chi-squared test: $x2 = 0$, $df = 1$, $P = 1$). Our data cannot explain the underlying mechanisms for the observed extreme sex ratios. Nevertheless, such alarming sex ratios require more attention to foster the conservation of wild solitary bees.

Gene expression in worker honeybees (Apis mellifera carnica) exposed to neonicotinoid thiametoxam and Varroa mites (Varroa destructor)

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Intensive agriculture depends heavily on the use of pesticides. There is a limited information available about the effects of pesticides on infected bees. The ingestion of certain chemicals significantly alters the gut microflora and could affect bee development, several metabolic pathways, weakens the bee's immune defense mechanisms. In spite of laws and regulations, Slovenia has lost 100.000 bee families in the period of 2007-2009. Europe and America also face the disturbing phenomenon of disappearance of bee families termed Colony collapse disorder (CCD), the cause of which is presumed to be the suppression of their immune system as a consequence of prolonged exposure to chemicals. In this study, the effects of neonicotinoid thiametoxam on honeybees *Apis mellifera carnica* previously infested by *Varroa destructor* mites were analyzed at the molecular level. One week before the experiments were undertaken four honeybee colonies without a queen were established. Just before the start of the experiments unsealed honeybee broods originating from the same honeybee colony to reduce genotypic variability were introduced. Two groups of *Varroa* mite infested brood were exposed to mites for 10 days. Afterwards all colonies were fed with 100 g protein cake, provided daily for the bees. One infested and one non infested colony received protein cake with thiametoxam (10mg/kg). After 10 days exposure to thiametoxam, samples of adult worker honeybees were collected. Total RNA was extracted from 12 bees/group and complementary DNA (cDNA) was synthesized. Expression of 8 detoxification, 2 developmental, 17 immune related and 5 apoptosis related genes were analyzed by real-time PCR**.**

Three years' investigation of honey bee winter colony losses in Poland based on stratified randomised sampling – preliminary analysis

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2016 was the third year of investigations into honey bee colony losses based on stratified randomised sampling and with the use of the internationally standardized COLOSS questionnaire. The participants in the survey (1552 beekeepers) were randomly selected in 2014 and each next year about 100 to 300 beekeepers were selected to replace those who had died, had given up beekeeping or whose addresses proved to be no longer correct or valid. In total we received 720 filled in questionnaires in 2014, 734 in 2015 and 596 in 2016 (by the middle of July). The overall colony loss was high during the winter of 2014/15 (16.9 % of colonies lost) and much lower during the other two winters, that is 8.2 % in 2013/14 and 11.0% in 2015/16. Each year the loss rates varied considerably between regions but this was best expressed in the year when the overall losses were high. Although the spatial pattern of loss rates differed each year, a certain trend was visible: in neighboring regions of the central part of Poland the loss rates were of similar value, whereas in the peripheral regions more considerable differences were observed. This could have been caused by climatic conditions. 221 beekeepers sent us filled in questionnaires for all three years. 99 of them had higher than average losses each year and most of the 99 experienced extremely heavy losses. 15 beekeepers had below average losses each year and in their case almost all had very low losses.

Essential oils against Paenibacillus larvae

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American foulbrood as a dangerous infection, is compulsory notifiable (Act of the Slovak National Council No 39/2007 Coll. on veterinary care) and one of the most common disease of bees worldwide. In the world of the American foulbrood is radically solves some countries, but some countries also use the antibiotics and sulfonamides in the prevention and treatment of this devastating disease of bees. Using these products is a risk of residues in honey and risk for consumers. Plant essential oils of sage (*Salvia officinalis*), anise (*Pimpinella anisum*), oregano (*Origanum vulgare*), caraway (*Carum carvi*), thyme (*Thymus vulgaris*), rosemary (*Rosmarinum officinalis*), clove (*Syzygium aromaticum*), camomile (*Chamomilla recutita*) and fennel (*Foeniculum vulgare*) were used for the testing of the inhibitory activity against *P. larvae*. Essential oils at amounts of 5 µl and 10 µl were applied to sterile discs on MYPGP agar; inhibition zone diameters were measured after 24-h incubation at 37 °C. Two strains of *P. Larvae* were used for this study: CCM 4488, a strain from the Czech collection of micro-organisms and a Slovak field strain which was isolated from infected bee combs and characterized on the basis of biochemical properties. The strongest inhibitory activity against both *P. Larvae* strains was noted in case of the essential oils from oregano, thyme and clove; essential oils from camomile, rosemary and fennel showed no or weak antibacterial activity. Medium strong inhibition activity was recorded in case of previously untested essential oil from *Carum carvi*. There was a difference in sensitivity of both tested strains to essential oils.

Dietary carbohydrates affect catalase activity in honey bees

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In summer, honey bees often do not obtain sufficient amounts of food in nature and require additional feeding. However, the physiological and biochemical consequences of the feeding still remain poorly understood. Especially little is known about the possible effects of feeding on the activity of antioxidative enzymes, e.g., catalase (CAT), which is responsible for the scavenging of hydrogen peroxide and, therefore, is involved in the cell protection against different kinds of stress. The aim of our study was to evaluate the effect of summer feeding with solutions of different carbohydrates on the activity of CAT in foraging bees. The experimental colonies received additional feeding with a 30% sucrose solution during two months. Afterwards, these colonies were fed for 4 days with different carbohydrate solutions: the first group was fed with a 30% glucose solution, the second group with a 30% fructose solution, the third group received no feeding, while the fourth group (control) received a 30% sucrose solution. After this, all experimental colonies received 30% sucrose solution again. The activity of CAT was measured (i) before the beginning of different carbohydrate diets, (ii) after the end of different carbohydrate diets, and (iii) at the 8th day after the colonies were returned on the 30% sucrose solution. The enzyme activity was determined in tissues of the abdomen, head and thorax from foraging bees. It was found that after the termination of carbohydrate feeding the CAT activity significantly decreased in all body parts examined in comparison with the control group. Herein, the activity of CAT dropped most in the experimental group, which received additional fructose feeding, and least in the group without supplemental feeding. Moreover, the strongest decrease of CAT activity was detected in the abdominal tissues in all experimental groups. Decrease of CAT activity in the tissues of the thorax and head depended on the type of diet. CAT activity returned to its previous level within a week after termination of the monocarbohydrate diet and return to the feeding with 30% sucrose solution. Thus, our data indicate that consumption of different carbohydrates and subsequent changes in metabolism may affect the redox balance in different tissues of honey bee.

Participants

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Costa	Cecilia	Italy
Crailsheim	Karl	Austria
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Garrido	**Claudia**	**Germany**
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Gregorc	**Ales**	**USA, SLO**
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Kovacic		
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Manino	**Aulo**	**Italy**
Meixner	**Marina**	**Germany**
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Mutinelli	**Franco**	**Italy**
Nanetti	**Antonio**	**Italy**
Neumann	**Peter**	**Switzerland**
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Odoux	**Jean-François**	**France**
Panasiuk	**Beata**	**Polska**
Papoutsis	**Laettitia**	**Greece**
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Seltzer	**Rya**	**Israel**
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Soroker	**Victoria**	**Israel**
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Tymochko	**Lesia**	**Ukraine**
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Vejsnaes	**Flemming**	**Denmark**
Williams	**Geoffrey**	**Switzerland**
Yanez	**Orlando**	**Peru**
Yazlovytska	**Liudmyla**	**Ukraine**

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