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University of Zadar;
Department of ecology, agronomy and aquaculture,
Zadar, Croatia

“Varroa Control TF 2018 Workshop” Proceedings



**Zadar, Croatia
27th – 28th February 2018**

INTRODUCTION

The Varroa Control Task Force started in Kiev during the 9th COLOSS Conference in 2013. From March 2017 is co-chaired by Maja Smodiš Škerl and Giovanni Formato.

Aims of the Task Force are to develop and encourage sustainable solutions for management of the ectoparasitic mite *V. destructor* studying performances of in-use treatments, developing novel strategies and diagnostic methods, exploring mechanisms of tolerance and resistance in different honey bee populations, spreading knowledge on best treatments and management practices to control the infestation etc.

Since 2013, we had 8 Workshops and today a total of 81 members from more than 20 Countries are registered in the Task Force. Six Working Groups are still running until the last meeting.

COLOSS Workshop
Varroa control Taskforce
 “ASSESSMENT OF ALTERNATIVE METHODS FOR VARROA CONTROL”

Zadar (Croatia), 27-28 February 2018



Agenda

27 February 2018	
9:00 - 9:30	Registration
9:30 - 11:00	Welcome Plenary session: <i>The Varroa control Taskforce: the current state</i> <i>The BPRACTICES project and its interactions with the Varroa Control TF</i> Giovanni Formato & Maja Smodiš Škerl
WG1	“Infestation assessments” paper - Ole Kilpinen & Marco Pietropaoli (ex-WG 1).
WG 2	Brood interruption and oxalic acid treatment - Ralph Büchler & Aleksandar Uzunov Results from brood interruption studies in Kirchhain Aleksandar Uzunov
WG 3	CSI Varroa - Fani Hatjina & Nikola Kezić Citizen Scientist Initiative for Varroa economic damage thresholds: common efforts for data collection {CSI Varroa} - Fani Hatjina
WG 4	Results of the “Formic acid-environment interactions” (paper) - Benjamin Dainat (ex-WG4) Preliminary researches regarding the effect of formic acid on varroa existed in bee brood artificially decapped - Adrian Siceanu
WG 5	Assessment of new control methods: Varromed and other perspectives - Jorge Rivera Gomis Varromed® performance during winter: preliminary results - Jorge Rivera Gomis, Marco Pietropaoli, Giovanni Formato
WG 6	Communication: the Varroa book - Victoria Soroker and Flemming Vejsnaes
Joint paper: current state	“Brood interruption”: current state - Ralph Büchler & Alex Uzunov (WG 2).
11:00 - 11:30	Coffee break

11:30 – 13:00	Each working group: separate discussions (protocols, results, strategies, etc.)
13:00 - 14:30	Lunch
14:30 – 16:30	Practical demonstrations in the apiary (note: each participant will bring her/his beekeeping suit)
	Practical demonstration provided by different WGs (e.g. queen cages & trapping frames, OA evaporators, evaluation of colony strength, icing sugar, CO ₂ counter etc...)
28 February 2018	
9:30 - 11:00	Working group discussions: protocols, results, strategies
11.00 - 11.30	Coffee breack
11:30 - 12:45	Plenary session: WG presentations on results and perspectives
WG 2	Brood interruption – R. Büchler & A. Uzunov
WG 3	CSI Varroa – F. Hatjina & N. Kezić
WG 5	Assessment of new control methods – J. Rivera Gomis
WG 6	Communication - Victoria Soroker and Flemming Vejsnaes
12:45 - 13:00	Task-force general conclusions – G. Formato & M. Smodiš Škerl
13:00 - 14:30	Lunch

Oral presentations

1. Aleksandar Uzunov: Results from brood interruption studies in Kirchhain
2. Adrian Siceanu: Preliminary researches regarding the effect of formic acid on varroa existed in bee brood artificially decapped
3. Maja Smodis Skerl and Giovanni Formato: The BRACTICES project and its interaction with the COLOSS Varroa Control TF
4. Hemma Köglberger: Visible symptoms of varroosis – what can they tell?
5. Fani Hatjina: Citizen Scientist Initiative for Varroa economic damage thresholds: common efforts for data collection {CSI Varroa}
6. Jorge Rivera Gomis, Marco Pietropaoli, Giovanni Formato: Varromed® performance during winter: preliminary results

Abstracts

RESULTS FROM BROOD INTERRUPTION STUDIES IN KIRCHHAIN

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The Bee institute in Kirchhain has been longtime devoted to the development of alternative (chemical-free) methods for Varroa control. A special emphasis is given to brood interruption methods, in particular to the pragmatic application of the methods such as complete brood removal, trapping frame and queen caging.

In July 2017 an experiment for assessment of alternative methods for summer Varroa control was set up as a part of the COLOSS International study for Seasonal brood interruption study 2017/2018. At the end of the main honey flow period, 28 colonies were split into four groups: I. queen caging for 25 days and treatment with Api-Bioxal®; II. queen caging for 25 days and treatment with Oxuvar®; III. Trapping frame in the sequence of 3 x 9 days and IV. Formic acid (290 ml of 60%) applied with Nassenhaider Professional evaporator as a comparison group. The colonies strength was assessed by using Liebefeld method (number of bees and brood cells) in July and September. In October the number of occupied frames with bees was estimated for each colony. In addition, the colonies' infestation level and methods efficacy were monitored by mite fall, washing bees with warm/soapy water and counting mites in the trapping frames. The final assessment of colonies strength and development is going to be done after the overwintering in March 2018.

At the beginning of the experiment (July), there was no statistically significant difference ($p > 0.05$) between the test groups concerning the number of bees and brood cells in the colonies. After the treatment period (inspections are done in late September and mid-October), we also did not find a significant difference ($p > 0.05$) between the groups concerning the mentioned parameters for colony strength. This finding indicates that the methods' application had comparable effects on colonies development. We also did not observe major differences between the groups in the number of incidents with queens' supersedure or losses.

The results of methods' efficacy, as well as other parameters of interest, will be presented and discussed in details on the Varroa Control Task Force workshop in Zadar.

Preliminary researches regarding the effect of formic acid on varroa existed in bee brood artificially decapped

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The aim of the study was to establish the effect of formic acid on varroa found inside capped brood cells, which were artificially decapped, based on the scraping method, using a decapping fork. The experiments were carried out in the autumn 2017, on honeybee colonies highly infested with varroa. The treatments were done with formic acid impregnated in special cartons (150 mm X 170 mm X 4 mm). Each colony received between 25ml and 50 ml formic acid of 60-65% concentration, the exposing time being between 15h and 36 h. The nocturnal temperatures and the evaporated quantity of formic acid were also registered during the experiments. The researches were focused on establishing the mortality level of varroa in brood and the effect of formic acid on viability of capped bee brood artificially decapped. The results will be analyzed and commented.

The BPRACTICES project and its interaction with the COLOSS Varroa Control TF

Maja Ivana Smodis Skerl¹ and Giovanni Formato²

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BPRACTICES is a project funded from the European Union's Horizon 2020 research and innovation program under Grant Agreement n° 696231, ERA-Net SusAn – European Research Area on Sustainable Animal Production Systems, that aims to develop a sustainable breeding system by implementing innovative management practices in beekeeping (Good Beekeeping Practices - GBPs). The project consortium, coordinated by the Istituto Zooprofilattico Sperimentale del Lazio e della Toscana "M. Aleandri" (Italy), includes: University of Namik Kemal (Turkey), Agricultural Institute of Slovenia (Slovenia), Centro de Investigación Apícola y Agroambiental de Marchamalo (Spain), Austrian Agency for Health and Food Safety (Austria), Mississippi State University (USA) and Istituto Zooprofilattico Sperimentale delle Venezie (Italy). Moreover the project involves: the International Federation of Beekeepers Association (Apimondia), the University of Genova (Italy), and has the valuable collaboration of the European Union Reference Laboratory for Bee Health (ANSES, France) and of the Food and Agriculture Organization of the United Nations (FAO) Technologies and practices for small agricultural producers (TECA) platform. Eight work packages aim at the following specific accomplishments: prevention and control of the main honeybee diseases adopting proper good beekeeping practices (GBP), economic evaluation of competitiveness and resilience of European beekeeping, development of an innovative traceability system approval at the apiary level of all the innovations developed within the project and dissemination of results. Innovative biomolecular techniques will be used to detect preclinical signs of honeybee diseases (e.g. PCR analyses from innovative matrices), and will be validated and standardized at international level in collaboration with the EU reference laboratory. Methods to control honeybee diseases avoiding the

application of chemical treatments and guaranteeing quality and safety of hive products will be studied and tested at the apiary level, in collaboration with APIMONDIA and the other project partners. COLOSS Varroa Control TF finds an interesting synergy with BPRACTICES collaborating in field trials and diffusion of results.

Visible symptoms of varroosis – what can they tell?

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In the surveillance study of the project “Future of honey bees” colonies in ca. 190 apiaries all over Austria were visually checked by bee inspectors for symptoms of varroosis and other bee diseases. The colonies were visited in summer and autumn 2015 and in spring 2016. Varroosis was diagnosed in 5 % (summer and autumn visit) and 1.5 % resp. (spring visit) of the colonies. The symptoms of varroosis reported by the bee inspectors were mostly “varroa mite on a bee” and “deformed wings” and less often “varroa mite embedded in a cell capping”. The varroa infestation rate of the bees in summer and autumn-samples determined by the washing method was significantly higher in colonies with varroosis-symptoms than in colonies without symptoms ($p < 0.001$). Moreover the varroa infestation rate in colonies with two or three observed symptoms was significantly higher than in colonies with just one or no varroosis symptom ($p < 0.001$). Thus, it can be concluded that visible symptoms of varroosis give relevant clues on the varroa load of a colony. The project “Future of honey bees” (www.zukunft-biene.at) was funded by the Austrian Federal Ministry of Sustainability and Tourism (former: Federal Ministry of Agriculture, Forestry, Environment and Water Management), Biene Österreich, the Austrian federal provinces and own resources of the Austrian Agency for Health and Food Safety and the University of Graz (DaFNE Proj. 100972, www.dafne.at).

Citizen Scientist Initiative for Varroa economic damage thresholds: common efforts for data collection {CSI Varroa}

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SCI Varroa aims to collect as much data as possible, from as many colonies as possible, from treated and untreated colonies, with a uniform and standardized method, for at least 2 full years, from at least 2 apiaries per region and several regions per country. Participants could be professionals or amateur beekeepers and/or experts, therefore it is a CSI project. For each Country there will be a coordinator, therefore we will ask for volunteers. Country coordinators will have to promote this activity in any way they think it is relevant and best for their region, and at the same time they will

have the responsibility of data collection (frequency of recording, data entry in the data base, correction of mistakes, answering questions, etc). A methodology note will be sent to all country coordinators and a Google excel file will be used for data recording. An alternative to the online data form, will also be used. The survey will start in early spring 2018 and it will be terminated in early spring of 2020.

Varromed® performance during winter: preliminary results

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Varroa destructor is one of the main threats to the European honeybee *Apis mellifera*. The number of suitable products for the treatment is quite limited and frequently their efficacy is related to environmental conditions or to the amount of brood in the hives.

Here we present a preliminary study on the efficacy and toxicity of Varromed®, an organic (formic and oxalic) acids based product, authorised in the European Union in 2017. The protocol adopted was developed according to indications of COLOSS VARROA TASK FORCE – WG 5 – “Assessment of new control methods”, that is based on the EMA guidelines (EMA/CVMP/EWP/459883/2008).

The field trial was conducted in Central Italy, from January 29th to February 14th, in absence of brood, adopting the winter protocol.

We used 6 colonies in total, equally divided in two homogenous groups: one treated with Varromed® and another one was left untreated (control). The toxicity of the treatment was quantified by visual estimation (Delaplane et al. 2013), once before the application and once at the end of the mite fall due to Varromed® treatment (7 days) and counting the number of dead bees in the under basket cages. The presence of the queen before and after the treatment was also checked.

Mites were counted every 2-3 days during the treatment period and after a follow-up treatment based on a combined administration of Amitraz and Fluvalinate. The count of residual mites lasted 7 days.

The preliminary study showed an acaricide efficacy of $93,5\% \pm 5,5\%$ of Varromed® and a natural mite fall of $8,3\% \pm 4,8\%$. No statistically significant differences were observed during the treatment in the number of bees dead into the under basket cages and after the treatment in the amount of adult bees. No queen mortality was recorded.

Meeting summary Varroa Control Task force ACTIVITIES

Hereby we report the activities carried out in each working group and the future plans for each group.

WG 1. Varroa infestation assessments (Leader: Ole Kilpinen)

Aim of the working group 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).

The WG 1 performed the field trials in 10 apiaries with 6 researchers in 2015/2016. The results, already discussed during the Varroa TF meeting in Bologna, will be collected in a manuscript and the WG will publish them on COLOSS website and/or on international journal. Into the same paper, as agreed during the Conference, a small review of available methods to evaluate Varroa infestation will be added in collaboration with the BPRACTICES project. Moreover, the same review will be added to the COLOSS Varroa Book (see WG 6).

During the Conference no new protocols were suggested. Considering that aspect, WG 1 will be closed as soon as the results of the 2015/2016 field trials will be published on the COLOSS website and/or on an international journal.

WG 2. Brood interruption (Leader: Ralph B uchler and Malgorzata Bienkowska)

Aim of the working group is to compare Varroa control methods using total removal of brood or temporary caging of queens combined with oxalic acid treatment.

Some trials of the WG 2 have been carried out during 2016 and the results have been collected in a shared file. At the spring workshop in Bologna in April 2017 the participants decided to repeat the trials in 2017/18. Both seasons will be evaluated together in spring 2018. The plan is to get the results published by the end of 2018. If further trials will be performed in 2017/2018 has to be decided during the taskforce spring meeting in 2018. All updates will be shared by email with participants and results will be available on COLOSS website.

An analytical core-group is consisted: Janez Pre ern, Marin Kova i , Aleksandar Uzunov. Aleksandar is the coordinator of the paper and he will contact all members of core-group.

The goal is to have all data prepared by 15th of March to write a paper by September 2018 for the COLOSS Congress in Eurbee 2018. The results are very important for other studies (e.g. BPRACTICES), to identify the best method to be suggested to the beekeepers. There is also a need for adaptation of the methods to local conditions.

Some ideas: to evaluate the impact of brood interruption on hives with viruses prevalence and population; mortality of the mites; to evaluate the duration of the queen being caged (18 or 25+ days).

In the future there will be collaborations with EurBeST-project and a Book on integrated Varroa control.

WG 3. Varroa Economic damage thresholds (Leaders: Fani Hatjina and Nikola Kezi , Janja Filipi)

Aim of the working group is to determine the range of economic damage threshold levels across Europe, and possibly link it to the environmental actors.

As suggested by WG 3 leaders, the new name of the working group will be: **CSI Varroa**, as the group will seek a help of beekeepers in building a data base.

For this reason, a detailed protocol has been defined and discussed among the members of the group and will be sent to all COLOSS members during the next months to find interested Citizen Scientists (researchers/beekeepers). A Google document has also been prepared and is ready to be shared, containing the information/ data that have to be collected as well as the names of each country representative. The protocol and all WG 3 updates will be available on COLOSS website soon.

WG 4. Formic acid management (Leaders: Benjamin Dainat and Marco Pietropaoli)

Aim of the working group is to better understand the influence of intra-colony and environmental parameters on efficiency of formic acid treatments for Varroa control.

The preliminary results of the statistical analysis of the field trials carried out during last two years have been discussed. All the outputs of the analysis with a first backbone for the publication will be sent to participants to get their feedback. After this, writing up will be initiated.

No new activities or protocols were suggested so, after the publication of the results the WG will be closed.

WG 5. Assessment of new control methods (Leaders: Maja Smodiš Škerl and Jorge RiveraGomis)

Aim of the working group is to test the acaricide efficacy and toxicity on honey bees of newly registered products in different climatic conditions.

Different protocols to evaluate performances of VarroMed have been set up and spread by email will be sent to COLOSS members to find researchers interested in performing the trial. The protocol will also be available on the COLOSS website.

WG 6. Communication (Leaders: Victoria Soroker and Flemming Vejsnaes)

The goal of the working group is to disseminate the current and developing methods for Varroa control to the beekeepers thus facilitating sustainable Varroa control according to local conditions, available tools and operation structure.

To achieve this goal, on the workshop in Bologna 2017, we had started a discussion regarding the production of a book for beekeepers on Varroa and methods of its control. The project is planned to be conducted in cooperation with the members of B-RAP group.

The scope is to give the “state of the art” information regarding management practices targeting *V. destructor*. The book will address the main methods and challenges of Varroa management considering climatic conditions, as well as local operation. Targets are beekeepers, students, honeybee extension as well as any researcher interested in design sustainable practices for bee parasites.

The general subjects to be included in the book were discussed, the Editorial board has been defined (Victoria Soroker, Norman Carreck, Flemming Vejsnæs, Sjeff van Steen, Maja Smodiš Škerl, Marco Pietropaoli, Fani Hatjina), A tentative list of content has been formed, most contributors (within Varroa task force of COLOSS network) have been identified, a potential publisher is IBRA, a proposal for the book for a potential publisher should be done in March- April 2018. Once the proposal is accepted, editorial board will provide instructions and template for the writers. A review will be done by the editorial board. It should be decided to publish each chapter online on the dedicated web page and to translate the book into different languages by COLOSS members and other experts.

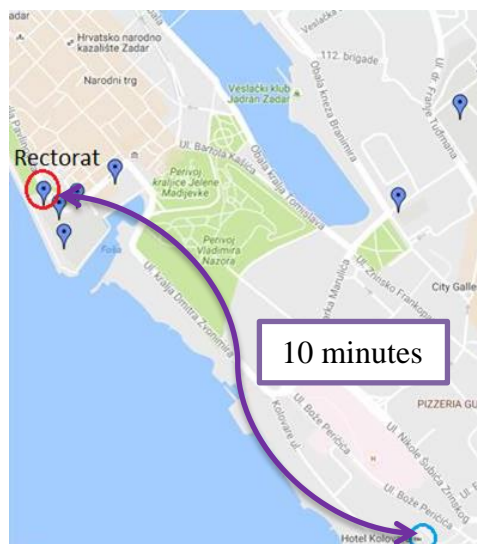
A plan is to publish the Varroa Book in mid-2019. The domain name: www.varroa.info has been acquired as a potential homepage name.

List of registered participants

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Workshop location:

The Workshop will be held in main building of University of Zadar (Street: Mihovila Pavlinovica bb; Zadar).



About Zadar

Zadar is a city of exceptional history and rich cultural heritage. Situated in the heart of the Adriatic, Zadar is the urban center of northern Dalmatia as administrative, economic, cultural and political center of the region with 75,000 inhabitants. The coast is particularly indented, the islands and the untouched nature allures many boaters to this regions. The archipelago counts 24 bigger and about 300 smaller islets and rocks, 3 nature parks - Telašćica, Velebit and Vransko jezero and 5 national parks - Paklenica, Plitvice lakes, Kornati Islands, Krka and Sjeverni Velebit classifying Zadar and its surroundings at the very top of the Croatian tourist offer. Zadar is a city monument, surrounded by historical ramparts, a treasury of the archaeological and monumental riches of ancient and medieval times, Renaissance and many contemporary architectural achievements such as the first sea organs in the world.

ORGANIZER CONTACTS	
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