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Proceedings of CoLoss Varroa taskforce workshop: 'Assessment of alternative methods for Varroa control'

Edited by:

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Council for Agricultural Research and Economics, CREA-API - Honey bee and Silkworm Research Unit



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Topics

The workshop is intended to provide the opportunity for a discussion on the joint experiments made by the Varroa Taskforce in the past seasons. Preliminary discussion on results was made in Cluj-Napoca, but not all the trials were yet completed at that time.

The workshop includes both working group gatherings and plenary discussions. The representatives of the six workgroups the Taskforce is split into will give an outline of the acquired results and of still pending issues deserving further development. New protocols may be produced also, within the separate workgroup discussion sessions.

Besides, a joint meeting with the B-RAP group is planned in order to discuss ways to communicate the Varroa control measures and in particular the outcomes of Varroa task force to beekeeping community.

Therefore, aim of this workshop is to set a point on the past two-year activity and to start planning future joint actions.

Organization contacts

The workshop will be held at:

[CREA-API](#) (Honey bee and Silkworm Research Unit of National Council for Agric. Research and Economics)

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Abstracts

Patricia Aldea Sánchez - First steps of the Latin American Bee Research Society (SoLatInA)

Universidad Mayor, Facultad de Cs. Silvoagropecuarias, Escuela de Medicina Veterinaria CEAPIMAYOR

Several years ago, there has been increasing evidence of a significant decline in the populations of bee species around the world, which has affected not only agricultural activities that dependent on pollination, but also apiculture and meliponiculture related industries.

Fortunately, bee research in Latin America has increased in recent years, making important contributions to the understanding of the characteristics, diversity, and causes that affect the populations of the species of bees inhabiting this region. However, until now, these scientific achievements have been the result of the efforts of research groups working independently rather than the product of cooperative work among the different groups of Latin American countries. Due to the necessity of organizing the growing number of Latin American researchers interested in bee-related topics, through the initiative of researchers from the republic of Uruguay, a proposal was made to create a regional scientific network of bee research.

With the objectives of establishing a Society of Researchers to strengthen the scientific capacities of the researchers and the institutions they represent, as well as contribute to the knowledge, health and conservation of the bees, a meeting was held with researchers at the Experimental Station "La Estanzuela" INIA, Colonia del Sacramento, Uruguay on November 24th and 25th, 2016. The meeting was attended by more than 50 researchers from Argentina, Brazil, Chile, Colombia, Costa Rica, Peru, Uruguay, Mexico, the United States and Austria.

At the end of the meeting, those present signed the founding act of the Latin American Bee Research Society (SoLatInA). Dr. Karina Antúnez (Uruguay) and Dr. Martín Porrini (Argentina) were elected as general coordinators. The following researchers were selected as delegates from each country: Dr. Sandra Fuselli, Dr. Marina Basualdo (Argentina), Dr. Rodrigo Velarde (Bolivia), Dr. Lionel Segui Gonçalves (Brazil), Dr. Patricia Aldea (Chile), Dr. Alexandra Torres (Colombia), Dr. Rafael Calderón (Costa Rica), Dr. Adriana Correa and Dr. José María Tapia (Mexico), Dr. Eleazar Pérez (Peru), and Dr. Ciro Invernizzi (Uruguay). Drs. Peter Neumann (Switzerland), Karl Crailsheim (Austria), Ernesto Guzmán Novoa (Mexico/Canada) and Miguel Corona (Mexico/USA) were appointed as collaborators and articulators with other societies.

All Latin American researchers whose topic of investigation involves bee research, are invited to join this new Society. This network will undoubtedly expand rapidly and it will facilitate horizontal cooperation between different research groups, promoting and consolidating the exchange of knowledge, experiences and technologies.

If you want more information, please contact to Dr. Santiago Plischuk to the email solatina2017@gmail.com. Or you can visit our Facebook: Sociedad Latinoamericana de Investigación en Abejas; or twitter [@SoLatInA2017](https://twitter.com/SoLatInA2017).

The biodiversity of bees in Latin America is too big. Here we have productive bees: apiculture (africanized bees and not africanized bees), meliponiculture and wild bees.

SoLatina should be representative in all Latin American countries, so, we want integrate more countries and more people inside them.

We want to thank to all our sponsors since without them it would not have been possible to carry out this meeting nor the creation of Latin American Bee Research Society.

Ralph Büchler, Alexandar Uzunov - Coloss Roadmap towards sustainable Varroa control

Landesbetrieb Landwirtschaft Hessen Bee Institute, Kirchhain, Germany

[No text yet]

Rodrigo Díaz, Naomi Durán, Patricia Henríquez, Patricia Aldea Sánchez - Comparison of the effectiveness and sensitivity of the sugar shake method to detect phoretic varroa mites versus the gold standard method of soapy water washing

*RD: Universidad Mayor, Facultad de Cs. Silvoagropecuarias, Escuela de Medicina Veterinaria CEAPIMAYOR;
ND, PH, PAS: Centro para el Emprendimiento Apícola de la Universidad Mayor*

INTRODUCTION. The Varroa mite infestation levels can be assessed at an apiary using different methods. In Chile, the most common are the soapy solution (soapy water washing method) and the icing sugar (sugar shake method). Both methods have been shown to be effective. The last few years Chilean beekeepers began using the sugar shake method instead of the soapy water method because it doesn't kill honeybees. However, it is unclear whether the effectiveness and sensitivity of the sugar shake method is like to the soapy water washing method to detect phoretic mites in adult bees or if the infestation level (low, medium or high) has an influence over the effectiveness and sensitivity of this method to detect mites.

OBJECTIVES. The aim of this study was: i) to determine the effectiveness and sensitivity of the sugar shake method to remove phoretic mites compared to the standard method "soapy water washing"; ii) to compare the effectiveness and sensitivity of the sugar shake method to remove phoretic mites when the infestation levels in adult bees were low, medium or high.

METHODOLOGY. To reach our objectives, 99 samples were collected during the summer of 2016 in apiaries from the central zone of Chile. To determine the infestation level with this test, the sugar shake test was done directly in the apiary as the COLOSS protocol recommended. Later, the bee samples were analyzed in the laboratory to determine the final infestation level using the soapy test. All data was recorded and sorted into three groups of samples: low infestation level (LIL) with less than 3% of mites; medium infestation level (MIL) with 3,01% to 5% of mites; and, high infestation level (HIL) with more than 5,01%. Each group had 33 total samples. Finally, the effectiveness and sensitivity of the sugar shake test was calculated.

RESULTS. The average infestation level obtained with the sugar shake method was 4.16% and with the soapy water method was 5.24% in adult bees. In addition, we also found that the effectiveness of the sugar method for removing mites in all samples was of 76.71% and the total sensitivity was of 94.95% (to detect at least one mite in the sample), compared to the soapy water washing.

The ANOVA test showed a significant difference between the infestation level obtained when the sugar or soapy method was used ($F(2, 98) = 46.387$ with $p < 0.0001$). The results show that when the infestation level was lower the sugar method had less effectiveness (73.8%) and sensitivity (84.85%). This was not the same case for the effectiveness in the group with MIL (76.2%) and HIL (79.8%); in both cases, the sensitivity was of 100%. Due to the great variability of the data in the samples between groups to determine the infestation level between both methods, the T-Student test of unpaired samples was performed. All the comparisons were significant statistically.

CONCLUSIONS. In general, the effectiveness of the sugar shake method to remove phoretic mites is less than the soapy water washing but the difference of sensitivity is not significant. However, the mite infestation level is an important factor which affects the effectiveness and sensitivity of this method. Thus, when the infestation level was low (less than 3%), the sugar shake had less effectiveness and sensitivity than the soapy test. When the sample had more than 3.01% of mites, the sensitivity was the same as for the soapy test and the effectiveness was better but not as good as the soapy test ($p < 0.05$).

Summarizing, the sugar method can adversely affect the decision of a beekeeper whether to apply treatment or not.

We want to thank our sponsors (Universidad Mayor and O'Higgins Region Government) since without them it would not have been possible to carry out this study.

Claudia Garrido - Using oxalic acid as critical treatment in registration trials

BeeSafe, Leverkusen, Germany

For the registration of varroa treatments, the guideline provides a so-called critical treatment to evaluate the efficacy of the tested product. The critical treatment has to be done at the end of the test treatment and has to be from a different chemical group than the test treatment.

With the availability of oxalic acid treatments in summer after queen caging, a new and powerful critical treatment is available.

Fani Hatjina, Nikola Kezic, Cecilia Costa - Varroa damage thresholds : possibilities of data collection

FH: Division of Apiculture, Inst. of Animal Science, Chalkidiki, Greece; NK: Faculty of Agriculture, University of Zagreb, Croatia; CC: Council for Agricultural Research and Economics, CREA-API - Honey bee and Silkworm Research Unit, Bologna, Italy

Are varroa damage threshold different in different regions or under different environmental conditions? Which are these threshold? Are we able to give beekeepers an advice to avoid economic damages? The idea behind the formation of this group was to gather the already existed data (from previous COLOSS experiments such as the COLOSS GEI experiment, EPILOBEE project, APINET project, etc) or from other sources. These data should also be related to the season, region, environmental drivers. Furthermore, a common experiment could be performed to determine these threshold in a more standard way. The detailed protocol of such an experiment needs to be discussed, but first the main points of interest and types of data collected have to be determined.

Ron Korkidi, Shimon Barel, Yosef Kamer, Victoria Soroker - Oxalic acid and queen replacement as a tool for Varroa management

Agricultural Research Organization The Volcani Center, Rishon LeZion, Israel

The Varroa managed in Israel is based on Amitraz loaded sticks while mite infestation evaluation is based on smoking with Taktic that also contains Amitraz. This situation poses a problem that may in future prevent timely detection of resistance development. As there is a need to develop a new approach for Varroa management we are investigating the possibility to cope with the mite, by development of an IPM approach. Within the Varroa task force we are evaluating methods to use oxalic acid treatment. Following last year success in Varroa treatment by oxalic acid trickling following queen caging we focused on attempt to optimize this treatment fitting it into general beekeeping practice. This year we tested the possibility to time it with queen replacement. We also tested additional method of oxalic acid treatment using vapors of oxalic acid water solution. The experiment was conducted at two sites on 16 colonies at each site. Locally accepted recommended Amitraz treatment was used as control. The efficacy of the treatment was tested by monitoring Varroa fall and evaluation colony strength after winter. The experimental set up and treatments efficacy, will be discussed.

Hemma Köglberger, Katharina Etter, Josef Mayr, Rudolf Moosbeckhofer - Variable efficacy of Apitraz-treatment against *Varroa destructor* [Poster]

Austrian Agency for Health and Food Safety, Vienna, Austria

„Apitraz 500 mg bee-hive strips for honeybees” (active substance: Amitraz) is listed since 19.1.2016 as a veterinary medicinal product in Austria. The indication is restricted to treatment of external parasitosis caused by *Varroa destructor* sensitive to Amitraz. The national listing simplified purchasing an Amitraz-based product compared to former import procedures according to legal necessities. Besides Apitraz only remedies based on organic acids or essential oils are listed in Austria for varroa control. As the strips can be easily manipulated, this product could be an interesting alternative for beekeepers who prefer simple handling of varroa treatments.

The directions for use inform about possible resistance of *Varroa destructor* against the active substance Amitraz in the chapters „Contraindications” and „Warning Notices”. But unfortunately there is no further information given on the prevalence or geographical distribution of resistant varroa mites in Austria or Europe.

We tested the product in a field trial (15 colonies) in autumn 2016, followed by a control treatment with “Dany’s Bienenwohl” (active substance: oxalic acid) in the broodless stage of colonies. The relative efficacy of the Apitraz treatment ranged from 48 to 99 %. The median was 90%, so in half of the colonies the treatment was highly effective, suggesting that the varroa mites were sensitive to Amitraz. On the other hand in one third of the colonies the efficacy was under 80 %, which led to excessive numbers of remaining varroa mites in the colonies.

Whether this insufficient efficacy in part of the colonies was caused by resistant mites or a faulty batch of strips remains unclear. Based on our findings the use of Apitraz is not advisable unless resistance tests had been carried out prior to application, as it is recommended on the label of the package as well as in the directions for use. This procedure is impracticable and makes the product unsuitable for the average beekeeper.

Björn Lagerman - Beescanning - a new method to monitor Varroa

Fribi HB, Lindesberg, Sweden

BeeScanning will provide beekeepers with a Varroa monitoring tool in their phone and breeders and researchers with data to find resistant bees.

Analysing pictures of bees on broodframes may detect infestation less than 1-3%. Preliminary results suggests there is a correlation between the three examined methods. BeeScanning 1 V = Alcohol Shake 10 V = Fluvalinate 13 V.

An extended survey is planned for 2017. A database for handling data is created and will provide foundation for the development of image analysing software as well as the data for selection. Image analysing will use neural networks and deep learning to train the software. This will provide the capabilities of the app to analyse and deliver beekeepers relevant results.

A team with experts, companies and institutions in the field of beekeeping and computer vision from Swedish Beekeeping organisations and Swedish University of Agricultural Sciences in Uppsala, KTH Royal Institute of Technology in Stockholm and Cornell University in Ithaca New York is formed to assess the method and collaborate on possible paths.

Rosa María Licón - Hyperthermia revisited. An option as part of integrated therapy against varroosis?

No affiliation, Gex, France

Heat treatment against varroosis has been used since the 70s, based on the observation that Varroa mites are more sensitive to temperature increases above the normal nest temperature than are the bees and their brood. Several studies on this topic were made mostly in the 80s, and although heat was found to be effective in killing Varroa from the brood, it was considered time-consuming and not an answer for commercial beekeeping. It is to note that most of those experiments were made in the time when the decline of the honey bee populations was not as severe as now, chemical products were cheap and simple to use and problems of resistance were not yet evidenced. Although not many experiments with hyperthermia have been made lately (reflected in the fact that there are none or hardly any peer-reviewed publications on the topic), at least a dozen of heat-devices exist in the market for the treatment of the whole colony and/or the brood.

A common method is to treat just the brood, once the adult bees have been removed. The brood frames are put in the heating device for about 2 h at 42-44 C. Treating the whole hive requires about one hour longer than treating only the brood, since the bees will regulate the temperature downwards by fanning. Once the temperature is stabilized, the standard 2 h treatment can start. Some of the problems observed after treatment are deformities in adult bees that develop from old pupae. Also, while heat treatment kills all the mites in the brood, many remain alive on the bees.

The effectiveness of the technique in reducing the mite populations in one heat treatment is likely to be between 50% and 80%. The method is therefore insufficient on its own to eliminate the totality of the parasitic load. Since this method is not fully effective, it may still be interesting as part of an integrated management plan.

Many questions would need to be addressed, such as the effect of heat on the viruses vectored by Varroa and on other common bee pathogens; possible induction of heat-shock proteins in the bees and the mites, etc.

Given the fact that no other method has proven fully effective either, would it be time to reassess the risk-benefits of hyperthermia, alone or combined with essential oils or other products?

Antonio Nanetti - Back to some basic knowledge on oxalic acid

Council for Agricultural Research and Economics, CREA-API - Honey bee and Silkworm Research Unit, Bologna, Italy

Oxalic acid is one of the strongest organic acids. It has also a notable chelating property for Calcium ions present in a solution. In an attempt to understand the mode of action of this varroacide, acidic and neutral solutions containing oxalates were administered to the mites. By this, we demonstrated that oxalic acid acts by the low pH of its solutions. Therefore, the concentration of the solution is crucial for a successful treatment.

When used by trickling, oxalic acid is normally dissolved in sugar syrup. A comparisons between high and low sugar concentration under relatively dry environmental conditions showed that sugar concentration is important also. Low pH makes the bees reject therapeutic oxalic acid concentrations, which excludes a role of sugar in a supposedly systemic mode of action. Indeed, investigations on pharmacodynamics showed that the mites get externally contaminated by the oxalic acid. The importance of sugar is defined by its hygroscopic property instead, which makes it possible to imagine the use of alternative hygroscopic agents.

Bees receiving oxalic acid by trickling are exposed to a short term contamination of about 10 micrograms/bee. In summer, thanks to a quick kinetics, this contamination decreases to undetectable levels in matter of few days.

Antonio Nanetti, Gianluigi Bressan, Salvatore Barone, Chiara Gardinazzi, Enrico D'Addio, Gianluca Obaldi, Alba Giorgio, Riccardo Redoglia, Stefano Cremasco, Viviana Ruta, Paola Marcello, Ariella Massidda, Giampaolo Cantoni, Giulio Loglio, Bruno Damiani, Sandro Fe - A citizen science experience on the formic acid-based acaricide "Varterminator"

AN: Council for Agricultural Research and Economics, CREA-API - Honey bee and Silkworm Research Unit, Bologna, Italy

The formulation Varterminator was registered in Italy in the year 2015. The product contains 360g of formic acid and it shows as a jelly pad enclosed in a sheet of non-woven fabric. The treatment consists of two doses that must be administered ten days apart.

Information from the manufacturer reporting 94% efficacy and suitable temperature range of 15-35°C prompted high expectations in the beekeeping community.

The product was tested in Italy in a citizen science context in summer 2015 with product provided by the manufacturer. Most of the participants to the trial were veterinarians, being others agronomists and beekeepers. The trial covered Northern and Central regions and Sardinia. The treatments were made according to the label in the period from mid-July to early-September.

The efficacy averaged 66.4% and was highly variable (N=56, min= 9.9%, MAX=100%). No correlation with treatment period, temperatures or latitude could be detected. At post treatment check, 88% of the colonies showed damage to the brood, whereas 14% of the queens were lost. In many cases, the gel wrapping allowed the product to leak onto the combs.

These results triggered a pharmacovigilance notification to Health Ministry.

The trial proved that the problematic use of formic acid in warm countries was not solved by the use of a jelly excipient.

Fruitful was the citizen science approach. With limited individual efforts from a well-coordinated group of non-scientists, it allowed to perform a comprehensive trial producing meaningful scientific results.

Marco Pietropaoli, Jorge Rivera Gomis, Viviana Belardo, Giovanni Formato - Results of autumn formic acid treatments carried out in Central Italy according to COLOSS protocols 2016-2017

IZSLT, Rome, Italy

In Autumn 2016 a field trial was carried out in Central Italy on 14 hives to test the acaricide efficacy and the toxicity for the honey bees of a new registered formic acid based product named Varterminator. Tests were performed both in colonies provided with brood and broodless.

Varterminator application is a 20 days-long treatment, that caused a significant reduction in the numbers of adult honey bees in the two (with and without brood) treated groups respect to the control group, associated with a stop of the egg laying of the queen at the end of the treatment. The acaricide efficacy obtained with Varterminator treatment in presence of brood was $93,20\% \pm 3,00\%$, while in broodless colonies resulted in $90,10\% \pm 7,60\%$ efficacy. Natural mite mortality in the control group was $32,80\% \pm 5,40\%$. All queens survived to the formic acid treatment.

Jorge Rivera Gomis, Marco Pietropaoli, Viviana Belardo, Antonella Cersini, Valeria Antognetti, Giovanni Formato - Comparison of the performances of two different cages (Cassian and Var Control®) used for the autumn brood interruption in Central Italy

IZSLT, Rome, Italy

Varroa destructor is the major European honeybee pest since it has spread almost all over the world. A beekeeping technique to increase the efficacy of acaricide treatments with oxalic acid is caging the honey bee queen. We evaluated the performances of two different types of queen cages: Bigabbia Cassian and Var Control®, applied in autumn in Central Italy. The Bigabbia Cassian cage is built with two queen excluders able to segregate the queen on a comb of the super, allowing the queen to lay eggs only on that comb. The Var Control cage is a plastic cage that prevents at all the queen deposition.

We tested performances of the two cages measuring: the queen mortality during caging, re-acceptance of the queens by the worker bees after the queen caging, the time the queens needed to lay new eggs after they were freed, the acaricide efficacy of the cages alone and in combination with Apibioxal® (oxalic acid).

At the end of the caging period, it was quantified the amount of adult honeybees and viruses.

The Bigabbia Cassian and Var Control cages used in autumn did not show differences in queens' mortality (0%) and queens' re-acceptance (100%). The time needed to lay new eggs after caging was the same in both groups (1 day). At the end of the caging period, the amount of adult honey bees in the Bigabbia Cassian group was statistically lower than the uncaged group (control) (-46,4%). Acaricide efficacy of caging the queen was: 69,6%±12,9% for Bigabbia Cassian (including the counts of the mites trapped in the frame), 54,4%±12,0% for Var Control® and 49,1%±11,8% in the untreated group. After applying Apibioxal®, efficacy boosted to 97,7%±2,8% in the Bigabbia Cassian group and to 98,0%±1,9% in the Var Control group.

Interesting results were observed in the different levels of viruses recorded in the three groups.

Jorge Rivera Gomis, Marco Pietropaoli, Giovanni Formato - Varromed: A new research opportunity

IZSLT, Rome, Italy

Since 90s, the parasitic mite *Varroa destructor* has become the major threat to honey bees worldwide. The control of this pest can be assessed thanks to several products but mite resistance and low acaricide efficacy can compromise honeybee colony survival.

On 6 October 2016 the Committee for Medicinal Products for Veterinary Use (CVMP) adopted a positive opinion, recommending the granting of a marketing authorization for the veterinary medicinal product VarroMed, a bee-hive dispersion intended for the treatment of *Varroa*-mite infestation in honey bee colonies.

That product consists of a mixture of two widely used active principles (Formic Acid and Oxalic Acid). The combination of these two organic acids could be effective both against foretic and reproductive stages of *varroa* mite.

Hereby, a new research opportunity for the COLOSS *Varroa* TF can be found, in order to assess the efficacy and toxicity parameters of this new product, in order to help beekeepers to integrate it in their treatment routines.

Pasquale Rombolà, Paola Scaramozzino, Giovanni Formato - Development of a practical model to choose the best treatment against *Varroa destructor*

IZSLT, Rome, Italy

Climate conditions are variables of basic importance to guarantee the proper efficacy of most of the treatments against *Varroa destructor*.

Beekeepers are frequently exposed to mistakes in choosing the right timing and products application with the subsequent risk to obtain a poor varroa control.

We developed a simple model able to indicate to beekeepers the best varroacide treatment to apply according to the temperature's range of the Municipality where their apiary is located. We included in the model 6 different products (based on thymol, formic acid and fluvalinate active principles) according to their label indications. We referred to worldclim temperatures for max and min averages (raster interpolation at the global level of data calculated over a period of 30 years) and set-up a regional map (Latium, Central Italy) where for every month and municipality it was possible to show the best treatment to apply.

The model is so far showing promising results and could contribute to a better identification of the proper treatment to apply against *Varroa destructor*.

Alexandar Uzunov - Dissemination on location

Landesbetrieb Landwirtschaft Hessen Bee Institute, Kirchhain, Germany

[No text yet]

Aleksandar Uzunov, Ralph Büchler, Antonio Nanetti - Seasonal brood interruption study 2016/2017 – Preliminary results and experience

AU, RB: Landesbetrieb Landwirtschaft Hessen Bee Institute, Kirchhain, Germany; AN: Council for Agricultural Research and Economics, Honey Bee and Silkworm Research Unit, Bologna, Italy

[No text yet]

Alexandar Uzunov, Ralph Büchler - International study on regional adapted Varroa infestation threshold values - Concept, results and plans

Landesbetrieb Landwirtschaft Hessen Bee Institute, Kirchhain, Germany

[No text yet]

Andrea Varesio - Apisfero & BeeVS

Apisfero A.P.S., Turin, Italy.

Presentation of Apisfero A.P.S. goal and mission. Presentation of BeeVS (Bee Varroa Scanner) an instrument enabling automatic varroa counting on the beehive tray. Presentation of the user experience (enabling good practices) and performances from the image recognition point of view. Brainstorming on future collaboration proposal.

Flemming Vejsnæs, Victoria Soroker - Outline for the Coloss varroa book – a practical user guide

FV: Danish Beekeepers Association, Denmark; VS: Zrifin Apiary, Institute of Plant Protection, Agricultural Research Organization, The Volcani Center, Israel.

The aim of the WG6 and B-rap is to transfer information to beekeepers. Norman Carreck did outline in his presentation in Cluj, that there is a need of such a book on the market and that IBRA would probably support this project.

We suggest to prepare a practical book for beekeepers focused on Varroa control methods. The general idea is as follows:

The book will start by presenting the history of the Varroa problem world-wide. The difficulties of Varroa control will be presented along with the essence of sustainable Varroa management, specifying advantages of this approach. After a summary of methods listed in the literature, chapters devoted to proven methods will follow. Each chapter will describe in details with schemes and photos of the specific method. At the end of each chapter pros and cons of each method will be presented. Eg. use of organic acids one by one; different essential oils; bee population manipulations such as , brood removal, queen caging and more..... A separate chapter will be devoted to breeding for varroa resistance. Different bees' traits that promote some Varroa resistance will be described. Current status on breeding for Varroa resistance will be presented.

Methods popular in different countries will be discussed along with a need to adjust the treatment to local conditions and legislations.

The final chapter will be devoted to integrated management approach (IVM), presenting a few best combinations of techniques.

As addition to a book, it would be relevant to have a books homepage, with video instructions and regular updates on new achievement. Suggestion for a name: www.colossvarroa.org .

The idea is to make it as practical as possible and we need lot of contributors. We suggest that working groups will make chapters based on the outcome of their common activities.

On the long-term the book should consist of 2 parts – book and homepage (instruction videos).

The idea is to offer different countries to make a translation.

Suggestion for chapters is listed below:

1. Introduction
2. History Varroa invasion, when, where, what, how does it harm? Varroa-Virus interaction – how does it effects colony health? Why it so difficult to control Varroa? Is it important to control Varroa?
3. Varroa monitoring: Why is it important to know how many Varroa do you have in a colony?
4. How do you check for Varroa? What the numbers tell you?

What is Sustainable Varroa treatment – why is it important?

5. Dronebrood removal
6. Formic acid – all relevant methods are described. Pros and cons
7. Lactic acid - all relevant methods are described. Pros and cons
8. Oxalic acid - all relevant methods are described. Pros and cons
9. Essential? oils - all relevant methods are described. Pros and cons

10. Creating brood free colonies due to varroa treatment.
 11. Producing nucs are important varroa treatment.
 12. Breeding bees for Varroa resistance
 13. What is used in different countries – data or even article from the monitoring group from the winterloss questionnaire.
 14. Visiting different beekeepers in different countries, having success with sustainably varroa treatment. (We chose countries that are very different. Like no need to have Denmark and Sweden in at the same time.
 15. Integrated Varroa management
 16. Strange/weird/alternative methods. Discuss other methods that are doubtful. Could be small cell size, pseudoscorpions etc. Explain what is true and what is false?
- Appendix: often asked questions and answers about the Varroa and its control
- Doing this book, we need an editor group and the more writing, the better.

Programme

The participants are kindly requested to contribute with a registration fee of 30 Euros.

CoLoss Varroa Taskforce	
Workshop: "ASSESSMENT OF ALTERNATIVE METHODS FOR VARROA CONTROL"	
CREA-API, Bologna (Italy), 21-22 March 2017	
Agenda	
21 March 2017	
9:00 - 9:30	Registration
9:30 - 9:45	Welcome, organisational matters
9:45 - 10:30	Updates from TF and WG coordinators (5 min each)
10:30 - 11:00	Coffee break
11:00 - 13:00	Presentations by participants (10 min each)
<i>Treatment concept</i>	P. Rombolà <i>et al.</i> : <i>Development of a practical model to choose the best treatment against V. destructor</i>
	A. Uzunov, R. Büchler: <i>International study on regional adapted Varroa infestation threshold values - Concept, results and plans</i>
<i>Varroa monitoring</i>	A. Varesio: <i>Apisfero & BeeVS</i>
	B. Lagerman: <i>Beescanning - a new method to monitor Varroa</i>
<i>Formic acid</i>	M. Pietropaoli <i>et al.</i> : <i>Results of autumn FA treatments carried out in Central Italy according to COLOSS protocols 2016-2017</i>
	A. Nanetti <i>et al.</i> : <i>A citizen science experience on the FA-based acaricide "Varterminator"</i>
<i>Oxalic acid & caging</i>	A. Uzunov <i>et al.</i> : <i>Seasonal brood interruption study 2016/2017 – Preliminary results and experience</i>
	R. Korkidi <i>et al.</i> : <i>OA and queen replacement as a tool for Varroa management</i>
	J. Rivera Gomis <i>et al.</i> : <i>Comparison of the performances of two cages (Cassian and Var Control®) used for the autumn brood interruption in Central Italy</i>
	C. Garrido: <i>Using oxalic acid as critical treatment in registration trials</i>
<i>Thermal treatment</i>	A. Nanetti: <i>Back to some basic knowledge on oxalic acid</i>
	R.M. Licón: <i>Hyperthermia revisited. An option as part of integrated therapy against varroosis?</i>
13:00 - 14:30	Lunch
14:30 – 15:00	Videoconference on thermotherapy
15:00 - 16:00	Working group discussions on recent results
16:00 - 16:30	Coffee break
16:30 - 18:00	Working group discussions on recent results (continued)
At 20:00	Social dinner offered by Chemicals Laif

22 March 2017	
9:00 - 10:30	Working group discussions on future research
10:30 - 11:00	Coffee break and welcome to B-RAP members
11:00 - 13:00	Varroa taskforce – B-RAP joint meeting: Here, we will discuss the subjects of common interest between WG6 of Varroa Taskforce and B-RAP group, and the possibility of further cooperation (continuation of Cluj-Napoca meeting)
	R. Büchler, A. Uzunov: <i>Coloss Roadmap towards sustainable Varroa control</i>
	A. Uzunov: <i>Dissemination on location</i>
	F. Vejsnæs, V. Soroker: <i>Outline for the Coloss varroa book – a practical user guide</i>
	General discussion and how to continue

Workshop summary

Election of a new co-chair for the Varroa Control TF

A new co-chair of the Varroa Control TF was elected: Maja Ivana Smodis Skerl.

Detailed results of the elections: 17 votes for Maja, 5 votes for Nikola, 4 invalid votes.

New leadership in the Working Groups

A new organization in the leadership of the 6 Working Groups was approved:

WG 1: Infestation assessments - leaders: Ole Kilpinen

WG 2: Brood interruption - leaders: Ralph Buechler and Antonio Nanetti

WG 3: Damage thresholds/Damaged varroa level - leaders: Fani Hatjina and Nikola Kezic

WG 4: Formic acid management - leaders: Benjamin Dainat and Marco Pietropaoli

WG 5: Assessment of new control methods - leaders: Maja Ivana Smodis Skerl and Jorge Rivera Gomis

WG 6: Communication - leaders: Victoria Soroker and Flemming Vejsnaes

Approved decisions on future activities

WG 1: Infestation assessments

Ole will define a new co-chair, will ask to WG 1 members if new protocols will be proposed. Eventually, Ole will decide if WG1 will cease.

Last activity: to publish the results on COLOSS website and/or on international journal.

WG 2: Brood interruption

Modify the «results file» setup by Antonio and Alex, according to the revisions discussed.

To collect results from all the field trials carried out on the «results file».

Analyse the data of the different field-trials.

To publish the results.

Improve the protocol and repeat the experiment in 2017/2018.

WG 3: Economical thresholds for varroa damages

As the group is re-orientating its activities and after the fruitful discussion that took place among the participants we can summarise the important points for the future work in the following:

- We all agreed that we talk about two different threshold: the biological one and the economic one. The difference should be made clear.
- The threshold are quite different from each-other. Also, we usually refer to the biological threshold meaning at what level varroa infestation will result in the collapse of the colony, while the economic threshold is the one showing the level of infestation at which the colony does not have damaging effects (so no economic damage) although is without treatment.
- The question is when and how we are going to access this threshold. An idea is to monitor colonies with only 1 varroa treatment (winter or summer) for 1 year to see the development of the colony according to the infestation levels.
- Viruses, however, is one more variable to be taken in to account on evaluating the economic thresholds for varroa damages. At this point WG3 will call 'Survivors' and 'Virus' Task Forces for a collaboration.

Concerning our future plans, we agreed to the following:

-We need to get information from all past and current projects on threshold of varroa infestations showing damages to honey bee colonies. These projects could be COLOSS-GEI experiment, EPILOBEE, APENET, SMART BEES, etc. The collection of this data might take long time and a meta-analysis will be needed. There was also a suggestion from Roberto to use a general lineal model (GLM) system for the analysis.

-After SMART BEES project (Ralph and Alex) shares with us the protocol of monitoring the infestation level, we can invite COLOSS colleagues to participate in a survey in a similar way and fill in the gaps of the geographical areas that are not represented in the SMART BEES survey. Our aim would be to contact as many beekeepers as possible, to collect as much data as possible but in a similar way (times of monitoring infestation levels, measuring adult and brood at least three - four times per year, to ensure monitoring the dynamics of the mites and the colonies and to ensure that we can measure also the overwintering ability of the colonies).

WG 4: Formic acid

It seems that the trend to use formic acid in EU is increasing. Varroa-Weather as a decisional tool to help the beekeeper to know when to optimally treat Varroa is as well increasingly used (Denmark, Germany, Austria, one similar system in development in Italy).

To define with the WG4 members the protocol for the year 2017. Improve the protocol from 2016 and repeat it in 2017.

To send this protocol to all the Varroa Control TF members asking for participation in 2017 field trials.

In the future (2018): The WG 4 members have been asked to think the protocols they like to propose. This will define if WG4 will cease or not.

WG 5: Assessment of control methods

Aluen CAP: no protocols or field trials to suggest to Varroa Control TF members.

Varromed: protocols or field trials will be suggested to Varroa Control TF members. The protocols will be carried out with field trials as soon as the product will be available on trade.

Thermotherapy: is an old method, it works with most of the devices available on the market and it is interesting for the small scale beekeepers. No protocols will be suggested for now on this matter.

WG 6: Communication

Approval of the Varroa roadmap presented by Ralph.

COLOSS Varroa Book: It seems a good initiative to compact all the Varroa control TF on a shared goal.

Chapters should be discussed with the Varroa control TF members, involving at the beginning at least the leaders of the WGs (in specific meetings or Skype conferences). Victoria and Flemming will prepare a draft for book proposal. The draft will be circulated between task force and B-Rap members with the comments and it will be presented at annual Coloss meeting where it is suggested to have a special session. A preliminary editor group of Victoria and Flemming, supported by Ralph and Magnus (decided on the B-rap group meeting)

Some funding can be right now available by Smartbees and B-practices EU project that agree to collaborate with WG6 "Communication". We will search the market for other funding as well. Contact will be taken to Norman Carreck and Ibra.

Well done and attractive videos and leaflets should be set-up and published on the web. Even considering material that is already existing on the web.

Following suggestions come by the B-rap meeting: This will be discussed among the WG6 and WGs of the TF by mail.

List of participants

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Travel and local information



Bologna is the largest city (and the capital) of the Emilia-Romagna Region in Northern Italy. This city is the home to the oldest university in the world, University of Bologna, founded in 1088. Bologna hosts thousands of students who enrich the social and cultural life of the city. Famous for its towers and lengthy porticoes, Bologna has a well-preserved historical centre (one of the largest in Italy) thanks to a careful restoration and conservation policy which began at the end of the 1970s, on the heels of serious damage done by the urban demolition at the end of the 19th century as well as that caused by wars.

This city is an important cultural and artistic centre, its importance in terms of landmarks can be attributed to a varied mixture of monuments and architectural examples (medieval towers, antique buildings, churches, the layout of its historical centre) as well as works of art which are the result of a first class architectural and artistic history.

Bologna is also an important transportation crossroad for the roads and trains of Northern Italy, where many important mechanical, electronic and nutritional industries have their headquarters. Bologna is home to numerous prestigious cultural, economic and political institutions as well as one of the most impressive trade fair districts in Europe.

Accommodation

Bologna offers plenty of different solutions for your accommodation. You may check the one that best suits you on your preferred booking search engine.

However, for your convenience a short list of hotels is provided herewith:

- hotels in the centre: [Hotel Cristallo](#), [Hotel University](#), [Hotel Paradise](#), [Hotel Cavour](#), [Nuovo Hotel del Porto](#), [Hotel University](#).
- hotels close to [CREA-API](#): [Hotel Arcoveggio](#), [HC3 Hotel](#), [City Hotel](#), [Hotel Corticella](#).

You may also explore other possibilities, like [B&Bs](#) and [Forestries](#).

Travelling to and inside Bologna

The [Bologna Airport "Guglielmo Marconi"](#) is easily connected to the major International destinations. From the Arrivals exit, you may take the [Aerobus shuttle](#), that leaves every 11 minutes and connects to downtown Bologna and Central railway station in 20-25 minutes for 6 Euros. Taxi is obviously a more expensive option.

If you are traveling by train, Bologna is well connected with fast trains (FRECCIE) to the main Italian cities. You may check your connections here: <http://www.trenitalia.com/tcom-en>.

If you are coming by car, exit the motorway at Bologna and take the bypass (tangenziale). Get off the bypass at exit 6 (Castelmaggiore). Follow signs for the city centre and turn left at the traffic light of Via di Saliceto.

Within Bologna, public transportation is generally rather convenient and cheap. You may install on your smartphone the application Moovit, that assists you real-time when travelling on busses or local trains. Tickets are sold in the shops or, in most busses, also on-board. In the last case you need change, though. Once stamped, the ticket is valid for 75 minutes within the city. Within that time, you are allowed to change bus without buying a new ticket. Citypass is less expensive ticketing if you travel on bus 10 times.

CREA-API is well served by the bus line 27, direction Corticella. Leave the bus at the stop "Caserme rosse", which is 11 stops away from city centre (Via Rizzoli). Walk back 50 metres and turn left: CREA-API is the first building on your right.



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