Meeting report:

1st European Workshop on testing procedure for monitoring and managing insecticide resistance in invasive mosquitoes

Organised by: WHO, IRD, WIN
Report prepared by: Lauren Carrington, Consultant, NTD/VEM

From 18th – 22nd November, 19 participants from 15 countries joined the 1st European workshop on for insecticide resistance testing and management in invasive mosquitoes. On the first day, participants were welcomed by IRD's MIVEGEC Director, Dr. Frederic Simard, and the workshop organiser and leader, Dr. Vincent Corbel, who provided an overview of the workshop and logistics. Dr. Lauren Carrington, representing the WHO/NTD/VEM unit, presented opening remarks in the global importance of monitoring insecticide resistance, as new mosquito vectors were expanding their geographical footprint within Europe.

The aim of the workshop was to strengthen capacity of European countries at risk of mosquito-borne diseases to conduct appropriate surveillance of insecticide resistance, and monitoring and evaluation of control activities. This included building sufficient participant knowledge in both theoretical and practical aspects, to be able to make informed, effective decisions for vector control activities and insecticide resistance monitoring and management.

Participants listened to a range of key note lectures, on topics including:

- *Ecology, distribution of public health impact of invasive mosquitoes in Europe* (Dr. Vincent Robert)
- *New and existing methods for the control of invasive mosquitoes in Europe* (Dr. David Roiz)
- *Spread of insecticide resistance in Aedes mosquitoes and operational consequences* (Dr. Beniamino Caputo)
- *Mechanisms of insecticide resistance in Aedes: detection methods and geographical relevance* (Dr. David Wheetman)
- *Insecticide resistance management strategies applicable to Aedes mosquitoes* (Dr. Fabrice Chandre)
- *WHO testing procedure for monitoring insecticide resistance in mosquitoes* (Dr. Joao Pinto)
- *Experimental design and data analysis of bioassays* (Dr. Pie Muller)

In the afternoon, participants were given a tour of Vectopole, IRD's insectary facility consisting of BSL-1, -2, and -3 laboratories where experiments ranging from insecticide resistance assays to infectious vector competence assays are undertaken as part of IRD's research portfolio. This was followed by detailed introductions to the three bioassays that were the focus of the workshop: the WHO larval bioassay, the WHO filter paper test, and the WHO-adapted CDC bottle assay. These presentations were made by those IRD staff who were running the practical session with the participants the rest of the week: Bethsabee Scheid, Stephane Duchon, Marie Rossignol and Celine Montazeau. To end the first day, the IRD hosts a three-course dinner for all participants at a restaurant in the centre of the city, which was enjoyed by all attendees.

The middle three days of the week were dedicated to all participants spending time in the laboratory for practical exercises. Participants were divided into four groups of five people; each group spent one day focused on each assay, with collection and recording of results taking place the following day (as per standard assay procedures). The teams watched the staff demonstrate the assays first, and then performed each of

the assays, before actively performing the procedure themselves. The trainers engaged actively with all participants, and encouraged questions at all times. Many of the participants varied in their level of experiences, from PhD students to principal investigators. As several participants had previous experience with at least one of the assays, participants themselves were able to provide another dimension to the group learning, by sharing their own experiences and asking for help with technical challenges they had experienced in the past. Dr. Lauren Carrington spent time with each group to allow opportunities for participants to interact and ask questions about WHO/NTD/VEM operations. A series of photographs of the practical components of the workshop were taken and are available on the VEM unit drive.

On the final day of the workshop, after collection of the results from the last practicals, Dr. Vincent Corbel provided a 2-hr plenary seminar, highlighting the importance of unambiguous data collection and systematic data base management, providing practical examples of how to perform appropriate data analysis for insecticide resistance assays, and introducing data sharing platforms available for insecticide resistance monitoring. In the afternoon, the participants broke up into their groups again to undertake a multiple-choice questionnaire, allowing the participants to demonstrate their newly acquired knowledge. All groups did very well in the exam – scores ranged between 90 and 95%, (from 20 questions) and time had to be used to separate the 'winning' team. A light-hearted feedback session followed, allowing for clarification of the minor inaccuracies. Final discussions between the participants, trainers, and programme leaders encouraged continued networking between hosts and participants, and the inclusion of participants in future communications.

Participants received a USB flash drive containing all workshop materials (data recording sheets, templates for databases, slide presentations, etc), and an attestation of participation in the course. With the collaboration of the WIN network, all participants will receive deliveries to their home institutions of 1) a CDC bottle assay kit (from the CDC in USA), and 2) the WHO filter paper bioassay kit (from VCRU in Malaysia), to support them in their future work on insecticide resistance monitoring.

Feedback forms were received from participants to assist organisers in understanding what the participants thought of the programme, and how improvements could be made in the future. All feedback received was positive, with 100% of the 19 participants stating they found the workshop "very useful", and that the workshop organization was "excellent", and that the teachers were "excellent". 95% of participants reported that they their overall impression of the workshop, the laboratory activities, and the resources (presentations, materials) were "excellent". 84% of the participants said they would be "very likely" to use the techniques learned in the workshop in their own institution.

The workshop was officially closed on Friday afternoon, with many students expressing sincere thanks to organisers for the opportunity to participate in the event.

Appendices:

1. Workshop description and agenda
2. List of participants
3. Summary of participant feedback

THE WORLD HEALTH ORGANIZATION (WHO-HQ)

THE REGIONAL OFFICE FOR THE EUROPEAN REGION (EURO)

&

THE INSTITUT DE RECHERCHE POUR LE DEVELOPPEMENT (IRD)

&

THE WORLDWIDE INSECTICIDE RESISTANCE NETWORK (WIN)

Organized

THE 1st EUROPEAN WORKSHOP ON TESTING PROCEDURES FOR MONITORING AND MANAGING INSECTICIDE RESISTANCE IN INVASIVE MOSQUITOES

18 – 22 NOVEMBER 2019

Convened by :

The Institut de Recherche pour le Développement (IRD)
911 Avenue Agropolis, Montpellier
FRANCE

1. Context

With increasing travel and trade, several invasive *Aedes* mosquitoes (*Ae. albopictus, Ae. japonicus, Ae. aegypti*) have been recently introduced in European countries, where they represent a major nuisance and an actual health threat due to the capacity to transmit exotic arboviruses [1, 2]. *Aedes albopictus* have already been responsible for Chikungunya outbreaks in Italy [3] and autochthonous cases of dengue and chikungunya in southern France [4]. Moreover, *Culex pipiens* is also widespread in Europe, where it represents the main vector of West Nile Virus. Preventing diseases caused by currently recognized or novel mosquito-borne viruses continues to depend largely on controlling vector populations. In Europe, larvicides are largely used to reduce mosquito abundance, while spraying of pyrethroid insecticides in and around autochthonous arbovirus cases is the only measure recommended to stop transmission. Evidence of reduced susceptibility to insecticides has been recently reported in *Cx. pipiens* and *Ae. albopictus* populations from Italy [5, 6], Greece [7], and Spain [8], but no regular resistance monitoring is carried out at national level which makes prioritization for vector control difficult.

In view of the spread of insecticide resistance in invasive mosquitoes in Europe and the lack of expertise and capacity to conduct routine resistance monitoring at national level, the WHO and IRD through the WIN initiative (https://win-network.ird.fr/) will jointly organize the 1st workshop on testing procedures for monitoring and managing insecticide resistance at IRD, Montpellier, France. The scope is to build a regional information base on mosquito vectors susceptibility to insecticides on which rational resistance management policy and locally effective vector control can be based in the member states.

2. Objectives

The workshop aims to strengthen the capacity of European countries at risk of mosquito transmitted diseases to conduct appropriate monitoring and surveillance of insecticide resistance. **The workshop will provide participants with necessary knowledge and practical skills to conduct basic resistance tests following standardized WHO methodologies and reporting/analysis system.** The output of the meeting is to provide participants with sufficient expertise and knowledge to conduct insecticide resistance tests needed to support decision making for vector control and good management practices.

3. Content

The workshop will consist of a certain number of lectures on vector biology, control and insecticide resistance and technical presentations on WHO procedures for testing insecticide products; a visit to the Vectopole, a WHO collaborating platform for testing public health insecticides; demonstrations of the calculation and preparation of insecticide materials (papers, stock solutions, bottle coating, etc); use of the WHO test kits, larval bioassays and bottle assay tests and; data analysis and depository. An evaluation will be implemented at the end of the training to assess the knowledge acquired by participants (theoretical and practical). Scoring will be based on the three following categories (A = knowledge acquired, B = knowledge being acquired, C = unearned knowledge).

4. Programme

Please refer to Annex 1.

5. Duration

The workshop will last for 1 week from 18-22 November 2019.

6. Targeted audience

Permanent institutions or health programs of the Government who are committed to carry on with the tests regularly. The idea is to ensure that participants will have the capacity to build and sustain resistance monitoring activities in their respective countries. A selection committee will be in charge of evaluating the pertinence of the applications.

7. Registration

If you are interested in participating to the training, register at https://forms.gle/secKh4n26WyXhSJu6, before October 20, 2019.

8. Other information

Travel, accommodation and local meeting costs will be arranged and covered by the workshop organizers. Candidates must provide i) an Health insurance certificate and ii) a Liability insurance certificate in order to participate in this event.

9. References

1. Medlock JM, Hansford KM, Versteirt V, Cull B, Kampen H, Fontenille D, Hendrickx G, Zeller H, Van Bortel W, Schaffner F: **An entomological review of invasive mosquitoes in Europe**. *Bull Entomol Res* 2015, **105**(6):637-663.
2. Tomasello D, Schlagenhauf P: **Chikungunya and dengue autochthonous cases in Europe, 2007-2012**. *Travel Med Infect Dis* 2013, **11**(5):274-284.
3. Rezza G, Nicoletti L, Angelini R, Romi R, Finarelli AC, Panning M, Cordioli P, Fortuna C, Boros S, Magurano F *et al*: **Infection with chikungunya virus in Italy: an outbreak in a temperate region**. *Lancet* 2007, **370**(9602):1840-1846.
4. Succo T, Leparc-Goffart I, Ferre JB, Roiz D, Broche B, Maquart M, Noel H, Catelinois O, Entezam F, Caire D *et al*: **Autochthonous dengue outbreak in Nimes, South of France, July to September 2015**. *Euro Surveill* 2016, **21**(21).
5. Pichler V, Malandruccolo C, Serini P, Bellini R, Severini F, Toma L, Di Luca M, Montarsi F, Ballardini M, Manica M *et al*: **Phenotypic and genotypic pyrethroid resistance of Aedes albopictus, with focus on the 2017 chikungunya outbreak in Italy**. *Pest Manag Sci* 2019.
6. Kasai S, Caputo B, Tsunoda T, Cuong TC, Maekawa Y, Lam-Phua SG, Pichler V, Itokawa K, Murota K, Komagata O *et al*: **First detection of a Vssc allele V1016G conferring a high level of insecticide resistance in Aedes albopictus collected from Europe (Italy) and Asia (Vietnam), 2016: a new emerging threat to controlling arboviral diseases**. *Euro Surveill* 2019, **24**(5).
7. Fotakis EA, Chaskopoulou A, Grigoraki L, Tsiamantas A, Kounadi S, Georgiou L, Vontas J: **Analysis of population structure and insecticide resistance in mosquitoes of the genus Culex, Anopheles and Aedes from different environments of Greece with a history of mosquito borne disease transmission**. *Acta Trop* 2017, **174**:29-37.
8. Bengoa M, Eritja R, Delacour S, Miranda MA, Sureda A, Lucientes J: **First Data on Resistance to Pyrethroids in Wild Populations of Aedes albopictus from Spain**. *J Am Mosq Control Assoc* 2017, **33**(3):246-249.

ANNEX 1 – Programme

THE 1st EUROPEAN WORKSHOP ON TESTING PROCEDURES FOR MONITORING AND MANAGING INSECTICIDE RESISTANCE IN INVASIVE MOSQUITOES

18-22 November 2019

IRD, 911 Avenue Agropolis, 34394 Montpellier, France

Contact persons:

Dr. Raman Velayudhan, Coordinator, WHO-NTD, VelayudhanR@who.int

Dr. Vincent Corbel, Research professor, IRD-WIN, vincent.corbel@ird.fr

Ms. Claire Durot, WIN Project manager, Claire.durot@ird.fr / winprojectoffice@ird.fr

Participants; 20 max

Lunch served between 12.30-14.00 in room 151

Morning and afternoon coffee breaks (served at different time) in room 151

Day 1: 18 November 2019

Time	Agenda	Responsible
08.00-08.50	Registration at IRD, Centre Occitanie (Amphithéâtre des plantes)	IRD-WIN (Ms. Claire Durot)
08.50-09.00	Opening session Opening remarks	Dr. Fréderic Simard (IRD), Director of MIVEGEC unit, France Dr. Lauren Carrington (WHO-NTD), Technical officer, Switzerland
09.00-09.10	Objectives of workshop programme and expectations	Dr. Vincent Corbel (IRD), Research professor, Montpellier, France
09.10-09.30	Key note lecture on "Ecology, distribution and public health impact of invasive mosquitoes in Europe"	Dr. Vincent Robert (IRD), Research professor, Montpellier, France
09.30-09.50	Key note on "New and existing methods for the control of invasive mosquitoes in Europe"	Dr. David Roiz (IRD), Research Fellow, Montpellier, France
09.50-10.10	Key note lecture on "Spread of insecticide resistance in *Aedes* mosquitoes and operational consequences"	Dr. Beniamino Caputo (Sapienza University), Roma, Italy
10.10-10.30	Key note lecture on "Mechanisms of insecticide resistance in *Aedes*: detection methods and geographical relevance"	Dr. David Weetman (LSTM), Reader, Liverpool, UK
10.30-10.50	Morning coffee-break (Amphithéâtre des plantes)	
10.50-11.10	Key note lecture on "Insecticide resistance management strategies applicable to *Aedes* mosquitoes"	Dr. Fabrice Chandre (IRD), Research professor, Montpellier, France
11.10-11.30	Key note lecture on "WHO testing procedures for monitoring insecticide resistance in mosquitoes"	Dr. João Pinto (IHMT),Professor, Lisbon, Portugal

11.30-11.50	Key note lecture on "Experimental design and data analysis of bioassays"	Dr. Pie Müller (Swiss Tropical Institute), Professor, Switzerland
11.50-12.10	Overall summary and discussion	Dr. Lauren Carrington (WHO NTD) / Dr. Vincent Corbel (IRD)
12.10-12.30	Group photo	
12.30-14.00	Lunch (Room 151)	
14.00-15.00	Visit to the testing facilities (Vectopole)	Ms. Bethsabée Scheid
15.00-15.45	WHO larval bioassays – Introduction, methods and application	Mr. Stéphane Duchon
15.45-16.30	WHO filter paper test – Introduction, methods and application	Ms. Marie Rossignol
16.30-17.00	Afternoon coffee break (Room 151)	
17.00-17.45	Bottle assays – Introduction, methods and application	Ms. Céline Montazeau
17.45-18.15	Discussion and creation of working groups	Dr. Vincent Corbel / Dr. Fabrice Chandre
18.30	Transport to La Brasserie du Théâtre	
19.00	Diner at La Brasserie du Théâtre (Montpellier city center)	

Day 2: 19 November 2019

Time	Group session (by group of 5)	Responsible
09.00-12.00	G1: Preparation of stock solutions and demonstration on how to conduct larval bioassays	Mr. Stéphane Duchon
09.00-12.00	G2: Demonstration on how to conduct Bottle assays and conduct Bottle assays	Ms. Marie Rossignol
09.00-12.00	G3: Demonstration on how to conduct WHO filter paper test and conduct filter paper test	Ms. Bethsabée Scheid
09.00-12.00	G4: Preparation of stock solutions and conduct impregnation of Bottles	Ms. Céline Montazeau
12.00-13.00	Lunch (Room 151)	
13.00-16.00	G1: Conduct larval bioassays	Mr. Stéphane Duchon
13.00-16.00	G2: Preparation of stock solutions and conduct impregnation of Bottles	Ms. Marie Rossignol
13.00-16.00	G3: Preparation of stock solutions and conduct impregnation of WHO filter paper test	Ms. Bethsabée Scheid
13.00-16.00	G4: Demonstration on how to conduct Bottle assays and conduct Bottle assays	Ms. Céline Montazeau
16.00-16.30	Afternoon coffee-break (Room 151)	
16.30-17.00	Discussion (Room 151)	
17.15	Transport to hotel	

Day 3: 20 November 2019

Time	Group session (by group of 5)	Responsible
09.00-12.00	G1: Preparation of stock solutions and conduct impregnation of Bottles	Mr. Stéphane Duchon
09.00-12.00	G2: Preparation of stock solutions and demonstration on how to conduct larval bioassays	Ms. Marie Rossignol
09.00-12.00	G3: Demonstration on how to conduct Bottle assays and conduct Bottle assays	Ms. Bethsabée Scheid
09.00-12.00	G4: Demonstration on how to conduct WHO filter paper test and conduct filter paper test	Ms. Céline Montazeau
12.00-13.00	Lunch (Room 151)	
13.00-16.00	G1: Demonstration on how to conduct Bottle assays and conduct Bottle assays	Mr. Stéphane Duchon
13.00-16.00	G2 : Conduct larval bioassays	Ms. Marie Rossignol
13.00-16.00	G3 : Preparation of stock solutions and conduct coating for Bottle assays	Ms. Bethsabée Scheid
13.00-16.00	G4 : Preparation of stock solutions and conduct impregnation of WHO filter paper test	Ms. Céline Montazeau
16.00-16.15	Afternoon coffee-break (Room 151)	
16.15-17.30	G1: Recording test results (larval test)	Mr. Stéphane Duchon
16.15-17.30	G2: Recording test results (bottle assays)	Ms. Marie Rossignol
16.15-17.30	G3: Recording test results (filter papers)	Ms. Bethsabée Scheid
16.15-17.30	G4: Recording test results (bottle assays)	Ms. Céline Montazeau
17.30-18.00	Discussion (Room 151)	
18.15	Transport to hotel	

Day 4: 21 November 2019

Time	Group session (by group of 5)	Responsible
09.00-12.00	G1: Demonstration on how to conduct WHO filter paper test and conduct filter paper test	Mr. Stéphane Duchon
09.00-12.00	G2: Preparation of stock solutions and conduct impregnation of WHO filter paper test	Ms. Marie Rossignol
09.00-12.00	G3: Preparation of stock solutions and demonstration on how to conduct larval bioassays	Ms. Bethsabée Scheid
09.00-12.00	G4: Preparation of stock solutions and demonstration on how to conduct larval bioassays	Ms. Céline Montazeau
12.00-13.00	Lunch (Room 151)	
13.00-16.00	G1: Preparation of stock solutions and conduct impregnation of WHO filter paper test	Mr. Stéphane Duchon
13.00-16.00	G2 : Demonstration on how to conduct WHO filter paper test and conduct filter paper test	Ms. Marie Rossignol
13.00-16.00	G3 : Conduct larval bioassays	Ms. Bethsabée Scheid
13.00-16.00	G4 : Conduct larval bioassays	Ms. Céline Montazeau
16.00-16.15	Afternoon coffee-break (Room 151)	
16.15-17.30	G1: Recording test results (bottle assays)	Mr. Stéphane Duchon
16.15-17.30	G2: Recording test results (larval test)	Ms. Marie Rossignol
16.15-17.30	G3: Recording test results (bottle assays)	Ms. Bethsabée Scheid
16.15-17.30	G4: Recording test results (filter papers)	Ms. Céline Montazeau
17.30-18.00	Discussion	
18.15	Transport to hotel	

Day 5: 22 November 2019

Time	Agenda	Responsible
09.00-10.30	G1: Recording test results (filter papers)	Mr. Stéphane Duchon
09.00-10.30	G2: Recording test results (filter papers)	Ms. Marie Rossignol
09.00-10.30	G3: Recording test results (larval test)	Ms. Bethsabée Scheid
09.00-10.30	G4: Recording test results (larval test)	Ms. Céline Montazeau
10.30-11.00	Coffee-break (Room 151)	
11.00-12.30	Data analysis, depository and management (Room 151)	All group
12.30-14.00	Lunch (Room 151)	
14.00-15.00	MCQ exam (Room 151)	All group
15.00-15.30	Afternoon coffee-break (Room 151)	
15.30-16.00	Results of exam and graduation ceremony	Dr. Vincent Corbel / Dr. Fabrice Chandre/ Dr. Lauren Carrington
16.00-16.30	Closing ceremony	Dr. Fréderic Simard
16.45	Transport to hotel	

1st EUROPEAN WORKSHOP ON TESTING PROCEDURES FOR MONITORING AND MANAGING INSECTICIDE RESISTANCE IN INVASIVE MOSQUITOES

Montpellier, November 18-22, 2019

List of Participants

	Last name	First Name	Institution	Email
1	ABOULFADL	Souhail	Institut National d'Hygiène, Rabat, Morocco	Aboulfadlsl@gmail.com
2	ABOULKACEM	Amal	Public Health Laboratory, Meknes, Morocco	amalaboulkacem@yahoo.fr
3	BALASKA	Sofia	Agricultural Pharmacology Lab, Agricultural University of Athens, Greece	blsophia94@gmail.com
4	BENBEKTA	Sihem	Institut Pasteur d'Algérie (Algers)	arnsisi@yahoo.fr
5	CAPUTO	Beniamino	Sapienza University, Rome, Italy	Beniamino.caputouniroma1.it
6	DADA	Nsa	Faculty of Science and Technology, Norwegian University of Life Sciences, Ås, Norway	nsa.dada@nmbu.no
7	DRAGO	Andrea	Entostudio, Ponte San Nicolò, Italy	drago@entostudio.com
8	ELHAMER	Omar	National centre for Disease Control, Tripoli, Libya	oelahmer@yahoo.co.uk
9	FALCUTA	Elena	"Cantacuzino" National Medico-Military Institute for R&D, Bucharest, Romania	efalcuta@yahoo.com
10	JANI	Vjola	Institute of Public Health, Tirana, Albania	janiviola99@hotmail.com
11	KADRIAJ	Përparim	Institute of Public Health, Tirana, Albania	pkadriaj@yahoo.com
12	KAVRAN	Mihaela	Faculty of Agriculture, Novi Sad, Serbia	mihaela.kavran@polj.edu.rs
13	LARGHI	Adeline	EID Méditerranée, Montpellier, France	adeline.larghi@outlook.com
14	LEVY	Arie	Israeli Ministry of Health, Medical entomology labratory, Jerusalem, Israël	ariklevy.88@gmail.com

15	LOPES	Filipe	Instituto de Higiene e Medicina Tropical, Lisbon, Portugal	filipe.lopes@ihmt.unl.pt
16	MARTINOU	Angeliki	Laboratory of Vector Ecology and Applied Entomology, Joint Services Health Unit, British Forces, Cyprus	af.martinou@gmail.com
17	MIKOV	Ognyan	National Centre of Infectious and Parasitic Diseases, Sofia, Bulgaria	mikov@ncipd.org
18	MOHAMED	Ahmed	Research institute of medical entomology, Cairo, Egypt	abodooh@msn.com
19	OSORIO	Hugo	National Institute of Health,Aguas de Moura, Portugal	hugo.osorio@insa.min-saude.pt
20	SETIER-RIO	Marie-Laure	EID Méditerranée, Montpellier, France	mlsetierrio@eid-med.org

1st EUROPEAN WORKSHOP ON TESTING PROCEDURES FOR MONITORING AND MANAGING INSECTICIDE RESISTANCE IN INVASIVE MOSQUITOES

Montpellier, November 18-22, 2019

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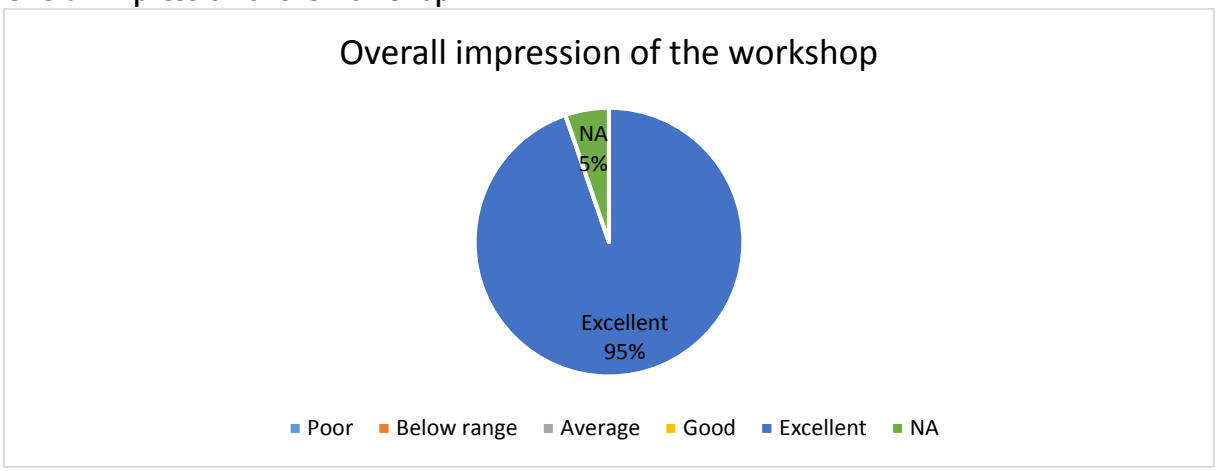
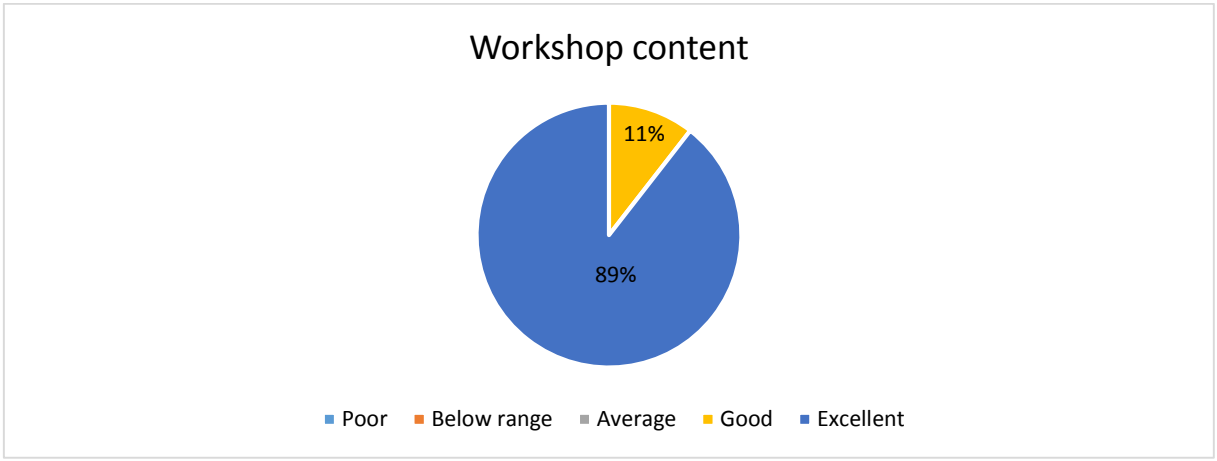
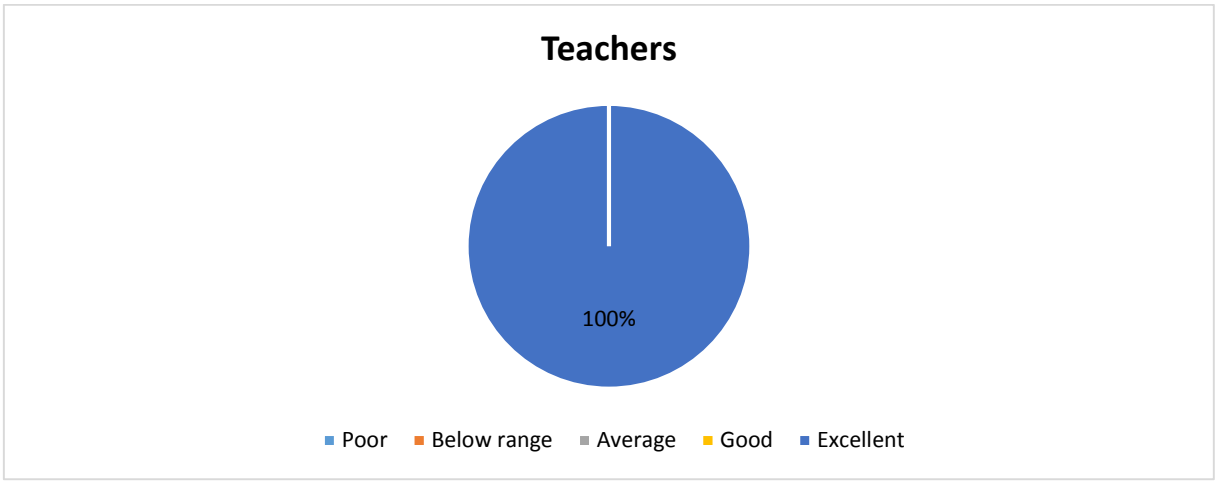
Workshop evaluation (19 responses)

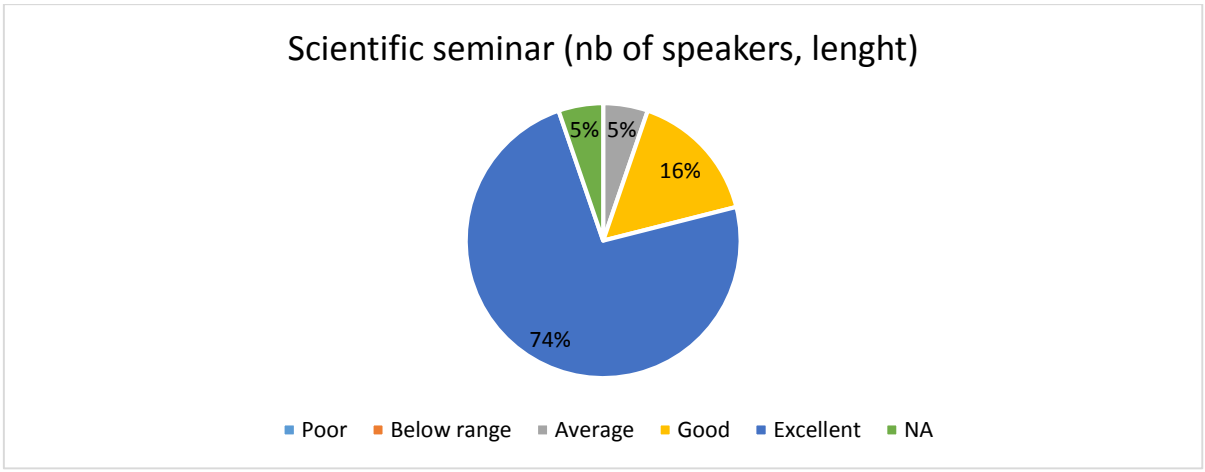
Overall impression of the workshop:

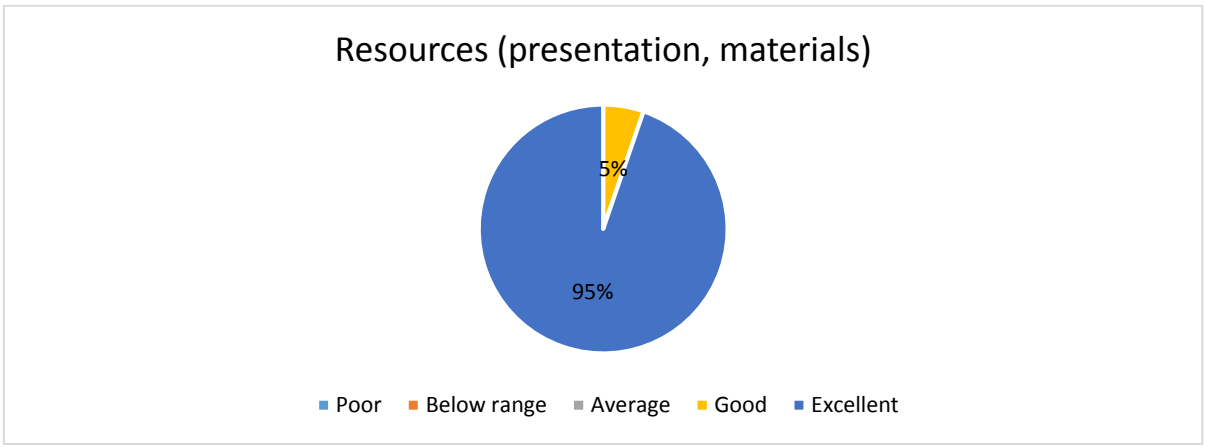


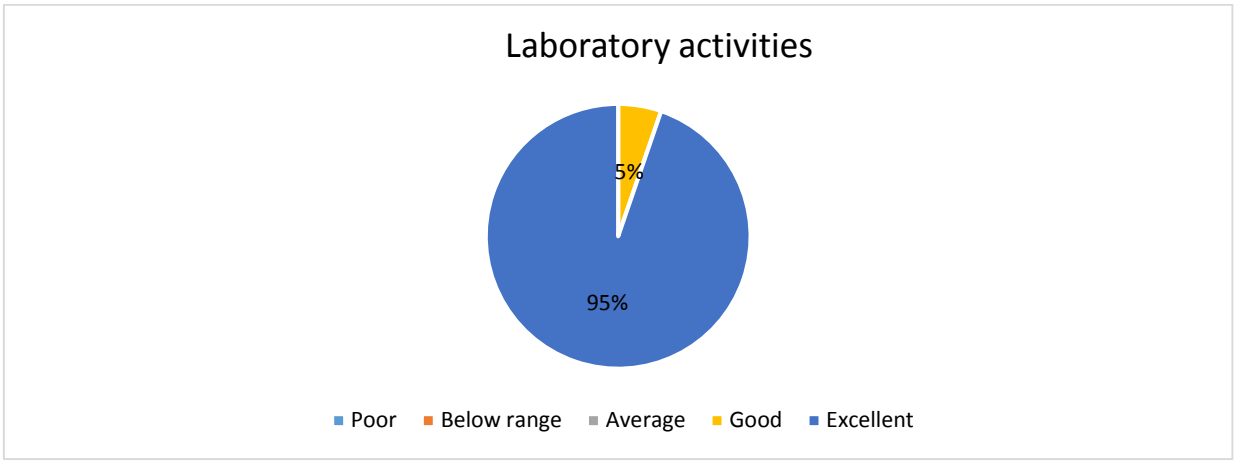
Please indicate your impressions of the items listed below:

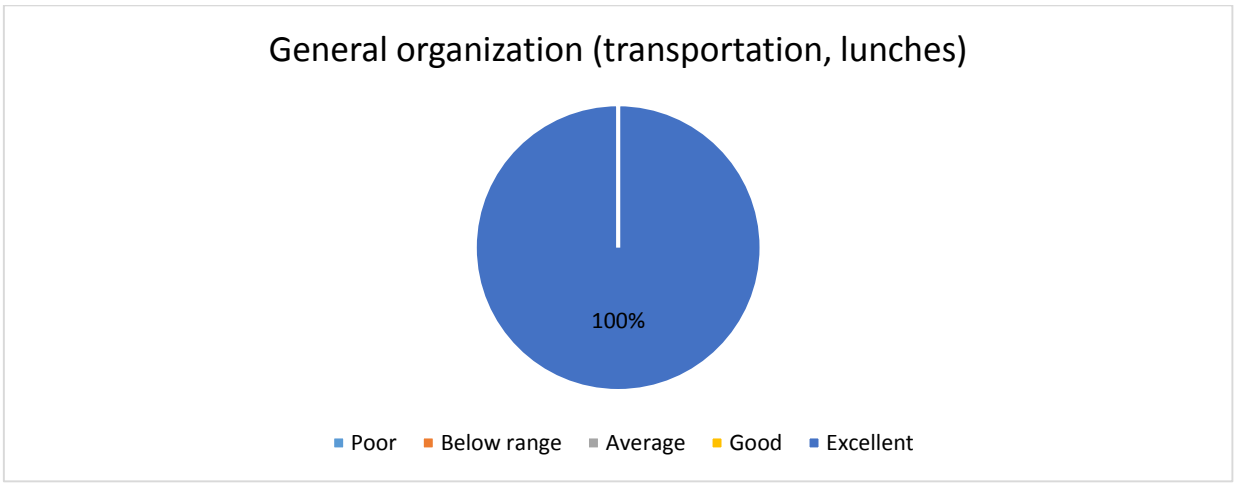


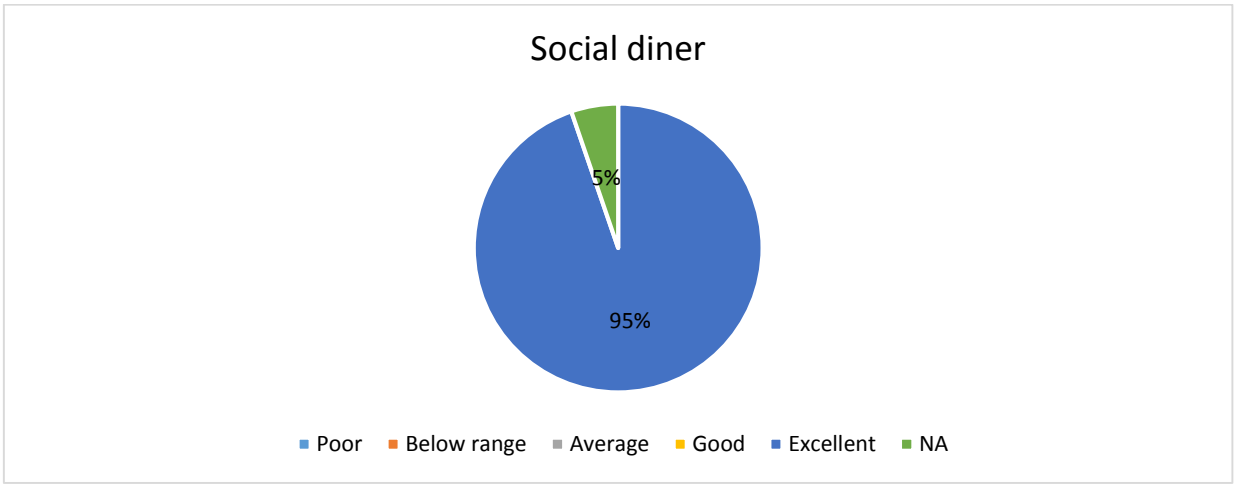

Teachers
100%
Poor
Below range
Average
Good
Excellent

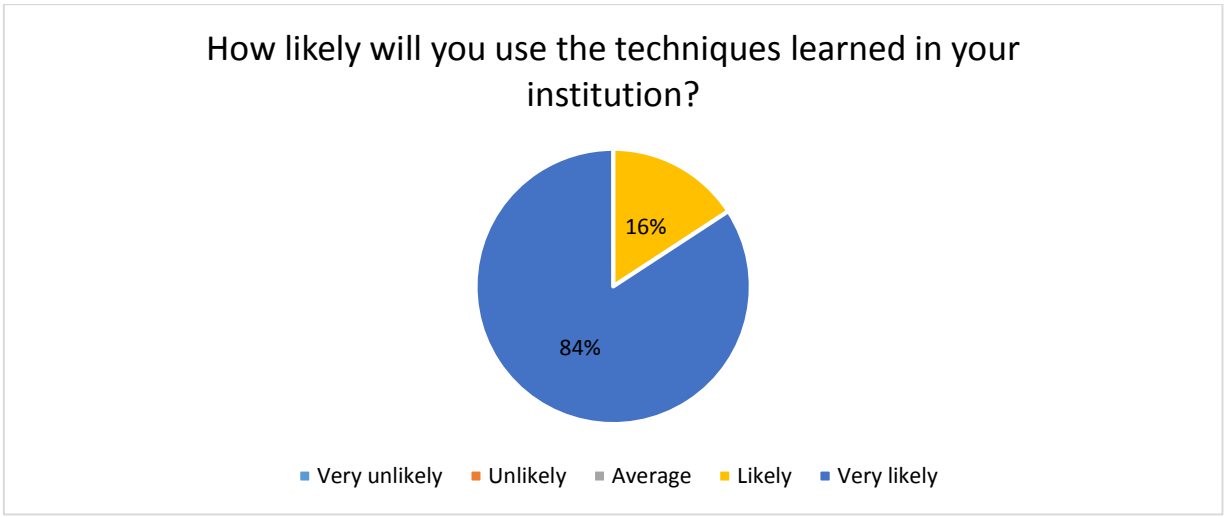

Scientific seminar (nb of speakers, lenght)
5%
5%
16%
74%
Poor
Below range
Average
Good
Excellent
NA


Resources (presentation, materials)
5%
95%
Poor
Below range
Average
Good
Excellent


Laboratory activities
5%
95%
Poor
Below range
Average
Good
Excellent


General organization (transportation, lunches)
100%
Poor
Below range
Average
Good
Excellent


Social diner
5%
95%
Poor
Below range
Average
Good
Excellent
NA



Please specify which techniques:

37% of the trainee declared that they will use the larval bioassays, 37 % the WHO tube assays, and 32% the Bottle assays in their respective institution.

Please identify what you consider to be the strengths of the workshop:

**** Hands-on laboratory experiments

*** Valuable discussions with the teachers

*** Excellent organization

*** High skilled teachers

** Workshop resources and presentations

* Sophisticate laboratory equipment

Please identify area(s) where you think the workshop could be improved:

Regarding the content of the workshop:

- Focus the scientific seminar presentations on Insecticide Resistance
- Reduce the practical demonstration
- Introduce molecular assays and biochemical assays
- More hands on for data analysis

Regarding the organization:

- Sticking to the schedule
- Lunches