

OIE Collaborating Centres Reports Activities

Activities in 2021

This report has been submitted : 2022-01-19 16:29:11

Title of collaborating centre:	Bee Health in Africa
Address of Collaborating Centre:	International Centre of Insect Physiology and Ecology, Kasarani, Off-Thika Road, P.O Box 30772-00100, Nairobi KENYA
Tel.:	+254-20 863 20 00
Fax:	+254-20 8632001/2
E-mail address:	sekesi@icipe.org
Website:	www.icipe.org
Name of Director of Institute (Responsible Official):	Dr. Segenet Kelemu, CEO and Director General
Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Dr. Sunday Ekesi, Director of Research and Partnerships
Name of writer:	Dr. Michael Lattorff

ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
surveillance of <i>Aethina tumida</i> (small hive beetle, SHB), notifiable bee pest, in three counties of Kenya (Kilifi, Kitui, Nairobi)	estimate infestation level of colonies
modelling of climatic factors influencing the activity of propolis	<ul style="list-style-type: none"> - propolis is a plant-derived bee product protecting bee colonies from microorganisms. - modelling impact of climatic factors on phytochemical composition and biological activity (antimicrobial and antioxidant)
species distribution modelling for a wild bee species	<ul style="list-style-type: none"> - modelling distribution of <i>Ceratina moehrenhaupti</i> - projecting distribution into the future utilizing climate change models
assessment of wild bee species diversity and factors influencing it	<ul style="list-style-type: none"> - assessment of species diversity along tropical elevation gradients in temporal context - modelling factors impacting species diversity, amongst them climatic factors
Training, capacity building	
Title of activity	Scope
training in meliponiculture	Meliponiculture training (Topics: Module 1- Species diversity, Module 2- Hive types, Module 3- Nesting colonies, Module 4- Meliponary management, Module 5- Bee plants), Tanzania, Zanzibar, both islands, 27 ToT (9 F, 18 M), 100 Farmers (26 F, 74 M)
training in meliponiculture	Meliponiculture training (Topics: Module 1- Species diversity, Module 2- Hive types, Module 3- Nesting colonies, Module 4- Meliponary management, Module 5- Bee plants), DR Congo, 15 ToT (6 F, 9 M)
training in beekeeping	training in best management practices and bee health, Comoros, all three islands, 97 farmers (11 F, 86 M)
training in beekeeping	training for livestock production officers in best management practices and bee health, Kenya, West Pokot, 15 ToT (5 F, 10 M)

training in beekeeping	training in best management practices and bee health, Tanzania, Zanzibar, both islands, 37 farmers (11 F, 26 M)
training in entrepreneurship and life skills development	Training of Trainers in entrepreneurship and life skills development, Ethiopia, 3 regions, 1076 ToT (312 F, 764 M)
training in entrepreneurship and life skills development	Village level training of youth partners in entrepreneurship and life skills development, Ethiopia, 3 regions, 26228 farmers (16786 F, 9442 M)
training in beekeeping	training in best management practices and bee health, Ethiopia, 3 regions, 464 ToT (93 F, 371 M)
training in beekeeping	training in best management practices and bee health, Ethiopia, 3 regions, 22983 farmers (14939 F, 8044 M)
training in Internal Control System for organic certification of bee products	Fundamentals of Internal Control System for organic certification of the production and processing of honey and beeswax, Ethiopia, Amhara region, 46 ToT (7 F, 39 M)
training in beekeeping	training in best management practices and bee health, Ethiopia, Amhara region, 150 farmers (150 F, 0 M)
training in digital finance tools	Practical training in application of digital finance tools in E-Birr Wallet, Ethiopia, Oromia region, 505 farmers (298 F, 207 M)
training in product diversification and value addition to hive products	Practical training of YESH project youth partners in product diversification and value addition to hive products, Ethiopia, Amhara region, 324 farmers
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
test of a trapping method for <i>Aethina tumida</i> (small hive beetle, SHB), notifiable bee pest, using modified procedure of Schäfer et al. 2007	<p>- test method of placing traps on top of combs instead of bottom boards, as modified bottom boards are rarely used in sub-Saharan Africa</p> <p>- test failed as less beetles were caught and no relationship to total infestation could be established</p> <p>- published in J Apic Res.</p>

analysis of pesticide residues in pollen sorted for botanical origin	<ul style="list-style-type: none"> - establish a protocol that allows to test for pesticide residues in bee-collected pollen of specific botanical origin - bee-collected pollen pre-sorted according to colour and verified using microscopical analysis (palynology) - establish and adopt protocol for small input amounts (< 3 g) and analyse pesticide residues - manuscript under review
establish protocol for laboratory rearing of small hive beetles (SHB)	- establish laboratory rearing for SHB to study reproductive physiology under controlled conditions to establish characters predisposing SHB as invasive species

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
N/A	N/A	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
N/A	N/A	<input type="checkbox"/> Surveillance and control of animal diseases <input checked="" type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
N/A	N/A	<input type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input checked="" type="checkbox"/> Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines

ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations

3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
RL: EU Reference Laboratory for Bee Health	Sophia Antipolis, France	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	<p>- collaborative research on small hive beetles</p> <p>- Capacity building for icipe on bacterial brood diseases of bees (american foul brood)</p>
oth. org.: Institute for Bee Health, Vetsuisse Faculty, University of Bern	Bern, Switzerland	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	- collaborative research on small hive beetles
oth. org.: Apicultural Research Institute (ARI), Kenya Agricultural and Livestock Research Organization (KALRO)	Marigat, Kenya	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	- collaborative research on apiculture incl. bee health
oth. org.: Social Insect Research Group (SIRG), Dept Entomology and Zoology, University of Pretoria	Pretoria, South Africa	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	- collaborative research on pollinators incl. bee health
oth. org.: Dept. Tropical Ecology, University of Würzburg	Würzburg, Germany	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	- research on managed and wild pollinators and drivers for their decline

4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

No

ToR: To place expert consultants at the disposal of the OIE.

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

No

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

Yes

a) Technical visits: 7

b) Seminars: 118

c) Hands-on training courses: 51562

d) Internships (>1 month): 5

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
c	applied beekeeping and bee health	Comoros	97
c	applied beekeeping and bee health	Kenya	15
c	applied beekeeping and bee health	Tanzania	37
d	diagnosis of bee diseases, especially viruses	Kenya	1
c	Training of Trainers in entrepreneurship and life skills development	Ethiopia	1076
c	Village level training of youth partners in entrepreneurship and life skills development	Ethiopia	26228
c	Training of Trainers in beekeeping skills development	Ethiopia	464
c	Village level training of youth partners in beekeeping skills development	Ethiopia	22983

c	Practical training of YESH project youth partners in product diversification and value addition to hive products	Ethiopia	324
c	Fundamentals of Internal Control System for organic certification of the production and processing of honey and beeswax	Ethiopia	46
c	Entrepreneurship and beekeeping technical skills development training of project partner women	Ethiopia	150
c	Meliponiculture training	Tanzania	127
c	Meliponiculture training	DR Congo	15
b	Zanzibar National Beekeeping workshop	Tanzania	85
b	Mauritius National beekeeping workshop	Mauritius	33
d	Foraging behaviour and pollination efficiency between four Afro tropical stingless bees and open pollination on blueberry (<i>Vaccinium corymbosum</i>) var. stella blue.	Kenya	1
d	Productivity and quality of strawberries pollinated by stingless bees in Nairobi county, Kenya.	Kenya	1
d	Meliponiculture	Belgium	1
d	Efficient pollination of watermelon by stingless bees and honey bees in greenhouse.	Kenya	1
a	Hive type comparison in arid and semi arid lands at Apicultural Research Institute (ARI) of Kenya Agricultural and Livestock Research Organization (KALRO)	Kenya	7

ToR: To organise and participate in scientific meetings and other activities on behalf of the OIE

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

No

ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 18

Adan M, Abdel-Rahman EM, Gachoki S, Muriithi BW, Lattorff HMG, Landmann T, Mohamed SA, Tonnang HEZ, Dubois T 2021. Use of earth observation satellite data to guide the implementation of integrated pest and pollinator management (IPPM) technologies in an avocado production system. *Remote Sensing Applications: Society and Environment* 23: 100566.

Dicks LV, Breeze TD, Ngo HT, Senapathi D, An J, Aizen M, Basu P, Buchori D, Galetto L, Garibaldi L, Gemmill-Herren B, Howlett B, Imperatriz-Fonseca V, Johnson S, Kovács-Hostyánszki A, Kwon YJ, Lattorff HMG, Lungharwo T, Seymour C, Vanbergen A, Potts SG 2021. A global-scale expert assessment of drivers and risks associated with pollinator decline. *Nature Ecology & Evolution* 5: 1453–1461.

Dogantzis KA, Tiwari T, Conflitti IA, Day A, Patch HM, Muli EM, Garney L, Whitfield CW, Stolle E, Alqarni AS, Allsopp MH, Zayed A 2021. Thrive out of Asia and the adaptive radiation of the Western honeybee. *Science Advances* 7, eabj2151.

Dzekashu FF, Yusuf AA, Pirk CWW, Steffan-Dewenter I, Lattorff HMG, Peters MK 2021. Floral turnover and climate drive seasonal bee diversity along a tropical elevation gradient. *Ecosphere* (accepted).

Krausa K, Hager FA, Kirchner WH. 2021. Guarding Vibrations—*Axestotrigona ferruginea* Produces Vibrations When Encountering Non-Nestmates. *Insects*. 12, 395.

Mokaya HO, Nkoba K, Ndunda RM, Vereecken NJ. 2021. Characterization of honeys produced by sympatric species of Afrotropical stingless bees (Hymenoptera, Meliponini). *Food Chemistry* 366, 130597.

Muturi MNK, Bargul JL, Lattorff HMG 2021. Influence of the type of pollen diet on the survival, body weight, and immune response of the African honeybee, *Apis mellifera scutellata*. *Journal of Apicultural Science* (accepted).

Muturi MNK, Papach A, Lattorff HMG, Neumann P 2021. A scientific note on in-hive positioning determines small hive beetle trap efficacy. *Journal of Apicultural Research* (accepted).

Nganso B, Torto B. 2021. The effects of crude propolis, its volatiles and ethanolic extracts on the ecto-parasitic mite, *Varroa destructor* and health of the African savannah honey bee, *Apis mellifera scutellata*. *Parasitology* 148, 696-702.

Ochungo P, Veldtman R, Abdel-Rahman E, Muli E, Nganga J, Tonnang HEZ, Landmann T 2021. Fragmented landscapes affect honeybee colony strength at diverse spatial scales in agro-ecological landscapes in Kenya. *Ecological Applications* 32, e02483.

Ochungo, P, Veldtman R, Kinyanjui R, Abdel-Rahman E, Muli E, Muturi MNK, Lattorff HMG, Landmann T 2021. Pollen diversity and protein content in differently degraded semi-arid landscapes in Kenya. *Journal of Apicultural Research* 60, 828-841.

Okello EN, Amugune NO, Mukiyama TK, Lattorff HMG 2021. Abundance and Community Composition of Flower Visiting Insects of Avocado (*Persea americana*) in the East African Region. *International Journal of Tropical Insect Science* 41: 2821–2827.

Okwaro LA, Muli E, Runo SM, Lattorff HMG 2021. Coexistence of honeybees with distinct mitochondrial haplotypes and hybridized nuclear genomes on the Comoros Islands. *The Science of Nature* 108, 17.

Omuse ER, Niassy S, Kiatoko N, Lattorff HMG, Wagacha JM, Dubois T 2021. A fungal-based pesticide does not harm pollination service provided by the African stingless bee *Meliponula ferruginea* on cucumber *Cucumis sativus*. *Apidologie* (accepted).

Omuse ER, Niassy S, Wagacha JM, Ong'amo G, Lattorff HMG, Nkoba K, Mohamed SA, Sevgan S, Dubois T 2021. Susceptibility of the Honey Bee *Apis mellifera* and the African Stingless Bee *Meliponula ferruginea* (Hymenoptera: Apidae) to the Entomopathogenic Fungi *Metarhizium anisopliae* and *Beauveria bassiana*. *Journal of Economic Entomology* (accepted)

Sagwe RN, Peters M, Dubois T, Steffan-Dewenter I, Lattorff HMG 2021. Pollinator supplementation mitigates pollination deficits in smallholder avocado (*Persea americana* Mill.) production systems in Kenya. *Basic & Applied Ecology* 56: 392-400.

Tola YH, Waweru JW, Ndungu NN, Nkoba K, Slippers B, Paredes JC. 2021. Loss and Gain of Gut Bacterial Phylotype

Symbionts in Afrotropical Stingless Bee Species (Apidae: Meliponinae). *Microorganisms* 9, 2420.

Toukem NK, Mohamed SA, Yusuf AA, Lattorff HMG, Copeland RS, Dubois T 2021. Interactions between integrated pest management, pollinator introduction, and landscape context on avocado *Persea americana* productivity. *Entomologia Generalis* (accepted).

b) International conferences: 10

Inauguration symposium of the African Section of the International Union for the Study of Social Insects (IUSSI), 25.11.2021, virtual

1. Ndungu N et al. Nest architecture as a tool for species discrimination of *Hypotrigona* species (Hymenoptera: Apidae: Meliponini)
2. Krausa, K. Foraging and Recruitment Communication of African Stingless Bees
3. Lattorff HMG, Dzekashu FF. Bees and Pollen – a relationship more than pollination alone

Tropentag, 15.-17.09.2021, Hohenheim + virtual, Germany

1. Dubois T et al. Integrated pest and pollinator management (IPPM) as a novel tool to merge ecosystem services: lessons learnt from avocado in Kenya

SETAC Africa 10th Biennial Conference, 20.-22.09.2021, virtual

1. Sagwe RN et al. Pollinator Supplementation Mitigates Pollination Deficits in Smallholder Avocado (*Persea americana* Mill.) Production Systems in Kenya
2. Omuse ER et al. Assessment of the Impact of Biopesticides on the Western Honey Bee *Apis mellifera* and African Stingless Bee *Meliponula ferruginea* Using Laboratory and Semi-Field Approaches
3. Koech SJ et al. Flowering Seasons Affect Diversity, Quality and Levels of Pesticide Residue Contamination on Honeybee-Collected Pollen
4. Wesonga ZM et al. Impact of Acute Oral Exposure to Paraquat and Glyphosate on the African Honey Bee, *Apis mellifera* Lepeleiter
5. Nkoba K et al. Effective pollination of greenhouse *Galia musk melon* (*Cucumis melo* L. Var. *reticulatus* Ser.) by Afro tropical stingless bee species

Early Career Biogeographers Conference (ECBC), 22.-24.10.2021, virtual

1. Dzekashu et al. Seasonality in bee communities varies with elevation on East African mountain slopes.

c) National conferences: 0

d) Other

(Provide website address or link to appropriate information): 0

9. Additional comments regarding your report:

N/A