



From the Chair of the Governing Council of *icipe*



Prof. Dr. Bill S. Hansson,
Chair, *icipe* Governing Council

Dear colleagues and friends of *icipe*,

This newsletter provides a snapshot of *icipe*'s accomplishments over the past four months. Highlights include progress in the implementation of the Adaptation for Ecosystem Resilience in Africa (AFERIA) project. Further, in collaboration with Kenya Biologics Limited, *icipe* has advanced the construction of a fruit fly food bait production facility.

In April, the new PhD scholars at *icipe* presented their research proposals to the Centre's scientific community. We are encouraged by their determination and creativity, and look forward to mentoring them through the exciting journey ahead. On the same note, the Centre welcomed two students from the United States of America under the Borlaug–Ruan International Internships, an initiative that *icipe* has had a close relationship with over the past two decades.

The Centre has made significant research breakthroughs on topics as diverse as the advantages of bio-larvicides in mosquito control; influence of agricultural practices on mosquito breeding; potential of fungal endophytes to control the bean stem maggot; and the promise of DNA barcoding towards rapid and accurate identification of aphids.

icipe continues to earn global accolades, including award of an honorary doctorate by Tel Aviv University (TAU) to the Centre's Director General, Dr Segenet Kelemu; publication of a Festschrift in honour of Prof. Robert Jackson, a visiting scientist at *icipe* and Professor of Animal Behaviour at the University of Canterbury, New Zealand; and the appointment of Prof. Baldwyn Torto, a principal research scientist and Head of the *icipe* Behavioural and Chemical Ecology Unit (BCEU) as a Fellow of the Entomological Society of America (ESA). In addition, *icipe*'s geo-information research on maize lethal necrosis (MLN), a disease that is threatening production of this important cereal in East Africa, gained significant recognition at the 2016 European Space Agency (ESA) Living Planet Symposium.

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The confidence invested in *icipe*'s infrastructure, expertise and leadership in R&D continues to be demonstrated. Following an evaluation and assessment of the Centre's performance conducted in early 2016, *icipe* received approval and confirmation that its designation as a Food and Agriculture Organization of the United Nations (FAO) Reference Centre for vectors and vector-borne animal diseases (including tsetse flies, animal trypanosomiasis and arthropod-transmitted viral animal pathogens) would be renewed for a further four-year period, effective 1st August 2016. In this capacity, *icipe* will continue to provide advice, capacity building, and recommendations on interventions and control measures against vectors and pathogens of African animal trypanosomiasis and arthropod-transmitted viral animal pathogens (arboviruses) to FAO and FAO members.

icipe's role as a Stockholm Convention Regional Centre (SCRC-Kenya) was formally endorsed for a further four years (2016 – 2019) by the more than 160 countries that are members of the Stockholm Convention, following the evaluation of the performance of the regional centres. In May 2015, *icipe* SCRC-Kenya participated in the 2015 Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm conventions. *icipe* SCRC-Kenya performed well, as it scored 94%, based on the 2013/2014 evaluation report that *icipe* submitted to the Stockholm Convention Secretariat in December 2014. In addition, *icipe*'s leadership in integrated vector management (IVM) has led to an agreement with the World Health Organization's Regional Office for Africa (WHO-AFRO) to jointly conduct training for practitioners from Ethiopia, Eritrea and Madagascar.

Finally, I draw your attention to the Director General's thought leadership column, which is a detailed reflection of the immense potential of insects as food, feed, part of a greener agriculture, and how *icipe* is vastly becoming a leader in this area.

Prof. Dr Bill S. Hansson,
Chair, *icipe* Governing Council

icipe by numbers (April – August 2016)

Published journal articles:



70

Farmers trained:



14,500

New push-pull farmers:



8579

Restricted projects grants signed:



7

Ongoing postgraduate scholars:



159



THOUGHT LEADERSHIP COLUMN: DIRECTOR GENERAL

icipe: Recognised leader in insects for food and feed research

A key strategy of *icipe* is to remain alert to emerging developmental challenges facing Africa, and then identify opportunities to use insect science to respond to such problems. In accordance, the Centre has established itself as a leader in the globally emerging insects for food, feed and other uses research agenda. Because of three interconnected issues, this topic has captured the imagination of the global scientific community, donors, and the general public alike.

First, the growing world population, which is now standing at around 7.4 billion, is projected to increase to 9.6 billion by 2050, pushing the demand for food up by 60%. This population surge, combined with urbanisation, climate change, diminishing land and water resources, over- and undernutrition, and persistent poverty, has created uncertainties and pressures on current food and economic systems. FAO provisional estimates of undernourishment around the world in 2015 state that one in every nine people on our planet were undernourished in 2014–2016, and that the majority of hungry people (780 million), live in the developing regions (*The State of Food Insecurity in the World 2015*). The impact is especially significant in sub-Saharan Africa (SSA), where one in every four people (23.2%) of the continent's population, are hungry (*The State of Food Insecurity in the World 2014*).

Insects can provide a solution to the undernourishment in this region, because they reproduce quickly, and are valuable sources of protein, minerals and vitamins that are essential for human development. Recent observations show that edible insects have an outstanding protein quality. Several essential amino acids, especially lysine, threonine, and methionine, which are limited in cereal- and legume-based diets, are also present in adequate quantities in edible insects. Compared to conventional sources, edible insects are rich in zinc. For instance, while 100 g of beef contains only 12.5 mg



Dr Segenet Kelemu
Director General, *icipe*

of zinc; the same amount of palm weevils contains 26.5 mg.

Second, although the poultry, fish and pig industries are the fastest growing agribusinesses in many developing countries, poor availability and high cost of feed protein additives—which include soybeans, fish oil, fishmeal, seed cakes and several other grains—hinder their full potential. Feed costs are estimated to represent 60–70% of the poultry, fish and pig production costs. In addition, it is becoming unsustainable to rely on fishmeal, soybean and cereals as protein sources in feed production, as humans also consume soybeans and cereals. Furthermore, farmland for cultivation is diminishing; and, because of overexploitation, the small pelagic forage fish from which fish meal and fish oil are derived are declining. Thus, insects represent a substitute for livestock feed, due to their protein content and amino acid profiles.

Third, there is a global quest of incorporating 'greening' measures into agricultural systems, to mitigate climate change and conserve biodiversity. Compared to other livestock, insects are more efficient in converting organic matter into protein, leading to lower greenhouse gas emissions. In addition, black soldier fly larvae, also used in composting and sanitising household and agricultural wastes, emit only a small amount of carbon dioxide and no other greenhouse gases. Insect farming thus benefits the environment and can mitigate climate change.

Despite these clear reasons, a number of challenges stand in the way of integrating insects as a sustainable component in addressing food, nutritional and feed security, and transitioning towards a 'greener' agriculture. Although a range of insect species have traditionally been part of people's diets in many countries across Africa, Asia and Latin America, they have a minimal understanding of the contribution of insects to food and nutritional security. Moreover, edible insects are often harvested in an uncontrolled manner from the wild or through semi-domesticated informal set-ups. Ultimately, this can lead to habitat destruction and even extinction of species. There is also lack of a proper institutional framework to oversee and document edible insects.

Proper research is required to gain solid understanding of appropriate insect species that can be mass-reared, including knowledge on breeding, production management, and ways to pre-empt and control diseases and environmental risks. Moreover, to succeed, mass-rearing of insects must appeal to entrepreneurs and investors across the value chain as an emerging industry. The sector also has to be supported by regulations and policy frameworks encompassing food safety and trade issues at national, regional and international levels. The initiatives should also be inclusive; for instance, by deliberately enabling the participation of women and the youth.

Since identifying insects for food and feed as a strategic research area in 2013, *icipe* is helping to address these challenges. In 2014, the Centre compiled an inventory titled "African edible insects for food and feed: inventory, diversity, commonalities and contribution to food security," which was published in the new *Journal of Insects as Food and Feed*. *icipe* also established the Insects for Food, Feed and Other Uses (INSEFF) programme, as the platform for consolidating and strengthening its activities. The Centre is implementing four



THOUGHT LEADERSHIP COLUMN: DIRECTOR GENERAL



Cricket rearing at *icipe* Duduville campus.

projects: GREEINSECT (Mass-rearing Insects for Greener Protein Supply); INSFEED (Integrating Insects in Poultry and Fish Feed in Kenya and Uganda); ILIPA (Improving Livelihoods by Increasing Livestock Production in Africa) and EntoNutri (Developing and Implementing Insect-based Products to Enhance Food and Nutritional Security in Sub-Saharan Africa).

Through the GREEINSECT initiative, which is led by the University of Copenhagen, Denmark, *icipe* is working with a consortium of public and private sector partners from Africa, Asia, Europe, and USA, to investigate ways of mass-rearing insects in small-, medium- and large-scale industries. The aim is to merge traditional and modern scientific knowledge, and provide a platform for international collaboration, bringing together South-South and North-South partnerships.

The INSFEED project, which is jointly supported by the International Development Research Centre (IDRC), Canada and the Australian Centre for International

Agricultural Research (ACIAR), aims to take a holistic approach in regard to the use of insects as feed for poultry and fish around three themes: establishing strong scientific bases; testing the technical feasibility and economical profitability, and creating favourable social and political conditions for large-scale application of the technologies.

ILIPA is a collaboration between *icipe* and Wageningen University, The Netherlands. The initiative aims to use scientific research and a participatory approach involving farmer groups, with particular focus on women and youth, to exploit the commercial potential of insects, mainly the black soldier fly, *Hermetia illucens*, in the production of affordable, high-quality protein for poultry, pig and fish industries.

The EntoNutri project, which is funded by the Federal Ministry for Economic Cooperation and Development (BMZ), Germany, is being implemented by *icipe* with the Center for Development Research (ZEF), University of Bonn and the Food

Security Center, University of Hohenheim, both in Germany in partnership with national agricultural research systems partners from Kenya and Uganda. The initiative is focusing on four insects – cricket, grasshopper, Zambezi emperor worm and shea butter caterpillar – selected on the basis of their growing popularity as food in Kenya and Uganda. Special effort is being paid towards supporting participation of women along the value chain, and assessing nutritional attributes based on the unique needs of women, girls, and infants.

In addition to these projects, *icipe* is also conducting various studies on edible insects. For instance, in a joint paper published in *PLoS ONE* journal on 13 May 2015, researchers from the Centre, the Jomo Kenyatta University of Agriculture and Technology, and United States Department of Agriculture/Agricultural Research Service (USDA/ARS) showed that the desert locust, *Schistocerca gregaria*, contains a rich composition of compounds known as sterols, which have cholesterol-lowering properties, thereby reducing the risk of heart disease. A second study by *icipe*, published in *PLoS ONE* journal on 5 January 2015, confirmed that the edible stink bug, which is known scientifically as *Encosternum delegorguei* Spinola, and in some parts of southern Africa as thongolifha, contains vital nutritional components. The study also recommended improved care in the harvesting and storage of the edible stink bugs, to safeguard their nutritional value and prevent contamination by harmful compounds.

icipe was also a key partner in organising an international conference on the use of insects as alternative sources of food for human consumption and as feed for livestock, globally, and specifically, in East Africa, held in Kenya in March 2016.

The Centre looks forward to building on its progress so far, by working with existing and potential partners to unlock the immense, yet untapped potential of insects as food, feed, and as part of a greener agriculture.



INSTITUTIONAL EVENTS

Milestone for new *icipe* PhD scholars



The new *icipe* PhD students who presented their research proposals in April 2016.

Seated from left to right: Seydou Diabate, Hellen Butungi, Akua Agyakwa, Pamela Ochungo, Olaide Olabimpe, Brenda Rasowo.

Standing from left to right: Joseph Gichuhi, Joshua Njelemba, Abdelmutalab Gesmalla, Hilaire Kpongbe, Abdullah Mkiga, Fordjour Owusu, Richard Kyalo, Duncan Cheruiyot.

Each year, the new PhD scholars at *icipe* present their research proposals to the Centre's scientific community, which enables these budding scientists to obtain useful feedback and guidance as they move forward with their studies.

On 12 April 2016, 13 PhD students presented their proposals. In the Human and Animal Health Themes two students are studying repellents of tsetse flies. Based within the Integrated Biological Control Applied Research Programme (IBCARP), funded by the European Union (EU), Joshua Mbewe Njelemba (Zambia), is investigating repellents of *Glossina fuscipes fuscipes*, the tsetse species responsible for transmission of human sleeping sickness. Olabimpe Yewande Olaide (Nigeria), is conducting semiochemical analysis of zebra repellency to tsetse flies, with sponsorship from the German Academic Exchange Service (DAAD). Hellen Butungi (Uganda), also a DAAD scholar, is studying insect-endosymbiotic *Spiroplasmas* of *Anopheles* mosquitoes.

Five of the PhD students are conducting research on integrated pest management (IPM) of fruit pests. They include two students working within the Strengthening Citrus Production Systems through the Introduction of IPM Measures for Pests and Diseases in Kenya and Tanzania (SCIPM) programme, an initiative funded by the German Federal Ministry for Economic Cooperation and Development (BMZ). They are Owusu Fordjour Aidoo (Ghana), whose research is on the bioecology of the African citrus triozid (ACT), *Trioza erytraeae*, and its associated natural enemies and Brenda Amondi Rasowo (Kenya), whose research focuses on managing huanglongbing (HLB) disease of citrus. Abdullah Mohamed Mkiga (Tanzania), aims to contribute towards the development of semiochemical based tools for the management of ACT, and Akua Konadu Antwi-Agyakwa (Ghana), is exploring the bioecology of the false codling moth, *Thaumatotibia leucotreta* and its associated natural enemies on citrus and implications for its management. Both Abdullah and Akua are DAAD scholars. Joseph Gichuhi (Kenya), is studying tephritid fruit fly endosymbionts

in relation to their associated parasitoids and entomopathogens, within the EU-funded IBCARP initiative.

Other students undertaking studies within the Plant Health Theme, with sponsorship from DAAD are Duncan Cheruiyot (Kenya), who is advancing research on *Brachiaria* and other grasses as a component of the climate smart push-pull. Seydou Diabate (Ivory Coast), who is studying plant odours with potential for a push-pull strategy to protect beans against *Megalurothrips sjostedti*, while Hilaire Kpongbe (Benin) is undertaking comprehensive pheromone and population genetics analyses of the brown spiny bugs, *Clavigralla* species, which also affect beans. Abdelmutalab Gesmalla Ahmed (Sudan), is investigating ways to improve arabica coffee quality and productivity in East Africa through the development of a risk analysis tool for major insect pests. Pamela Aor Ochungo (Kenya), is investigating the link between landscape and pollination effects for enhanced crop production.

For more information, visit http://www.icipe.org/capacity_building



INSTITUTIONAL EVENTS

Training for improved beekeeping and pollination services

icipe is implementing a project aimed at providing alternative livelihoods for food and income security among communities targeted by the International Fund for Agricultural Development (IFAD) country programmes, in four Indian Ocean island nations (Mauritius, Seychelles, Comoros and Madagascar), and in Zanzibar (United Republic of Tanzania). The goal is to introduce improved beekeeping technologies and pollination services, to assist rural and largely poor communities increase the productivity and resilience of their farming systems and natural resources.

Over the past several months, *icipe* and collaborators have been conducting the relevant trainings for key stakeholders in these regions. These sessions have received significant coverage in the media of beneficiary nations and regions. The reports highlight the important role of the *icipe*-IFAD activities in alignment to the respective local objectives, especially in regard to the revival



Dr Eliud Muli (*icipe*) (extreme left), during a training session for beekeepers involved in the *icipe*-IFAD project aimed at providing alternative livelihoods for food and income security.

of the beekeeping sector. For more information, visit: <http://www.icipe.org/media-coverage/local-media/regional-media/trainings-improved-beekeeping-technologies-and-pollinati-1>

icipe and WHO-AFRO IVM training agreement

In June 2016, *icipe* and the World Health Organization Regional Office for Africa (WHO-AFRO) signed an agreement to jointly conduct an integrated vector management (IVM) training course at the Centre, scheduled for 10 – 23 July 2016, targeting a total of 20 participants drawn from Ethiopia, Eritrea and Madagascar. The three countries have been exploring the application of mosquito control methods without the use of DDT, an insecticide that has well-documented negative health and environmental impacts. The collaboration between *icipe* and WHO-AFRO is part of an ongoing partnership also involving the United Nations Environment Programme (UNEP), the Global Environment Facility (GEF) and the Stockholm Convention on Persistent Organic Pollutants (SC-POPs). Active engagement of the different



Integrated vector management approaches can control malaria-transmitting mosquitoes; for instance, through the application of biopesticides to shallow waters, such as in this irrigated rice field.

stakeholders through this strategic partnership is among the activities being implemented by *icipe*'s IVM project, which is funded by the Biovision Foundation for Ecological Development, coordinated by Prof. Clifford Mutero. The overall goal is to strengthen regional and national capacity for

implementation of IVM towards sustainable control of malaria and elimination of the disease in various African countries.



INSTITUTIONAL EVENTS

icipe's designation as an FAO Reference Centre extended

The designation of *icipe* as a Food and Agriculture Organisation of the United Nations (FAO) Reference Centre for vectors and vector-borne animal diseases has been renewed for a further four years, running from 1 August 2016 to 31 July 2020. *icipe*'s initial designation commenced on 1 August 2012 for a period of four years, ending on 31 July 2016. FAO Reference Centres are institutions selected by the Director General of the organisation to provide specific, independent technical or scientific advice on issues related to its mandate. The centres are chosen on the basis of their high level scientific expertise, commitment to capacity building, and provision of services. Selected institutions must also have demonstrated ability to contribute to capacity building in their areas of expertise. *icipe* was designated as a Reference Centre of FAO after a



icipe Duduville campus, Nairobi.

thorough evaluation of its mandate, main activities and competencies in vector-borne animal diseases. The extension is based on the degree of progress and compliance, as

well as quality contributions that *icipe* has made to assist FAO in its mission of providing authoritative advice to its Members, and in particular the developing countries.

ITAACC meeting held

The 7th Steering Committee Meeting of the Innovation Transfer into Agriculture – Adaptation to Climate Change (ITAACC), was held at the *icipe* Duduville Campus from 26 – 28 April 2016. ITAACC supports various innovation transfer projects designed in collaboration with international agricultural research centres and implemented in conjunction with various partners, including the private sector and non-governmental organisations. The Steering Committee Meeting, which is held two times a year, was hosted by *icipe*, with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. The forum brought together representatives from partnering institutions, including: the World Agroforestry Centre (ICRAF); International Livestock Research Institute (ILRI); Africa Rice; the BMZ special initiative One World – No Hunger, which is being implemented by GIZ-SEWoH; International Centre for Agricultural Research in Dry Areas



Bait production facility that is being constructed at the new home of Kenya Biologics Ltd at Makuyu-Kambiti, Kenya

(ICARDA); and International Institute of Tropical Agriculture (IITA). Among the issues discussed is the ITAACC pilot project involving the construction of a production facility towards the commercialisation of a protein-based food bait for the management of fruit flies, a joint initiative between *icipe* and Kenya Biologics Limited (KBL). Significant progress has been made towards

completion of the facility, and *icipe* and KBL have been developing and testing the efficacy of different waste brewer's yeast to come up with a formula of the product to be produced. The next ITAACC Steering Committee Meeting will be held in Bad Honnef, Germany, in October 2016, which will also showcase pilot projects to donors and other interested partners.



INSTITUTIONAL EVENTS

Borlaug–Ruan International interns at *icipe*

In mid-June, two students from the United States of America, Holly Enowski and Isaac (Rico) Mirti, arrived at *icipe* under the auspices of the Borlaug–Ruan International Internships.

An initiative of the Iowa-based World Food Prize (WFP) Foundation that was founded by the late Nobel Laureate Norman Borlaug, the Borlaug–Ruan International Internship Programme is unique in its goal of inspiring young people to embark on careers in science, agriculture, and global development. The initiative achieves this objective by providing talented American students with a chance to undertake original research, through eight-week-long internships in leading research centres in Africa, Asia, Latin America, and the Middle East, where they work alongside world-renowned scientists and policymakers.

The WFP Foundation and *icipe* have had a close relationship since 1995 when *icipe*'s second Director General, Dr Hans Herren, won the World Food Prize for his pioneering work on biological pest control.

During their time at *icipe*, Holly and Isaac will be hosted by Prof. Zeyaur Khan and Dr Charles Midega, within the push–pull integrated pest management technology programme. (For further information visit: <http://push-pull.net/>).



Holly Enowski and Isaac Mirti when they paid a courtesy call to the *icipe* Director General, Dr Segenet Kelemu, during the start of their Borlaug–Ruan International Internships.

Holly is a freshman at the University of Missouri where she is majoring in Science/Agriculture Journalism. Her goal at *icipe* is to gain hands-on experience in food security matters, and to combine her passion for agriculture, communications, and helping others.

Isaac, from Gainesville, Florida, will join the University of Florida in the fall of 2016, where he aims to double major in Economics and Computer Science, with a minor in Arabic. Through the internship at *icipe*, his aim is to gain research experience and to apply what he learned in high school in regard to solutions for food security.

AFERIA project commences

icipe and partners have made considerable progress in the implementation of the Adaptation for Ecosystem Resilience in Africa (AFERIA) project, an initiative launched by *icipe* and the Ministry for Foreign Affairs of Finland in March 2016, to support the ability of smallholder farmers living around fragile mountain ecosystems in eastern Africa to adapt to the impacts of climate variability and change through research-based interventions. AFERIA, a two-year project, will disseminate research findings developed through the Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa (CHIESA, <http://chiesa.icipe.org/>), which was implemented by *icipe*, the Ministry for Foreign Affairs of Finland and various partners, from 2011–2015. AFERIA is being implemented in Murang'a county and Taita Hills in Kenya; Jimma Hills, Ethiopia; and around the Mount Kilimanjaro region in Tanzania.

The activities over the past several months include a cooperation planning meeting held with the KiLi project, an initiative of the University of Wurzburg and University of Bayreuth, Germany; and the Department of Geosciences and Geography of the University of Helsinki, Finland. The KiLi project is overseeing community nurseries and tree planting in cooperation with the Lutheran Church around the Mount Kilimanjaro region, and is considering incorporating the AFERIA project interventions into its activities. In addition, four kick-off seminars were held in the targeted sites, bringing together



Participants of the AFERIA planning meetings in Moshi, Tanzania, who included agricultural extension officers and representatives from *icipe* and Pangani Basin Water Board.

senior scientists of the lead partner institutions, local researchers, agricultural extension officers, government officials, and farmers' representatives. Participants were introduced to the AFERIA project, key findings from the CHIESA project were highlighted, while the activities expected to be implemented were described, discussed and recommendations made. Project planning workshops, attended by lead scientists and representatives from the partner organisations, were also held in the four target areas to discuss work plans and activities. For more information on AFERIA, visit:

<http://www.icipe.org/news/new-initiative-climate-change-adaptation>



RECOGNITIONS

International Ellis Island Medal of Honor awarded to Prof. Dr. Bill Hansson, Chair, *icipe* Governing Council

In a festive ceremony on 7 May 2016, Prof. Dr Bill S. Hansson received the International Ellis Island Medal of Honor on Ellis Island, in New York. Ellis Island Medals of Honor, which were established in 1986 by the National Ethnic Coalition of Organizations (NECO), are officially recognised by the US Senate and House of Representatives, and each year, the recipients are listed in the Congressional Records. Prof. Hansson, **Max Planck Institute for Chemical Ecology director and vice president of the Max Planck Society**, was honored in New York for his contributions to international scientific cooperation and as a global leader in neuroscience research.

After the former president Peter Gruss and Nobel Prize winner Bert Sakmann, Bill Hansson is the third representative of the Max Planck Society to receive this award and international honour.

Prof. Hansson was born in Jonstorp, in the south of Sweden, and studied biology at the University of Lund. After his PhD in ecology and a postdoctoral stay in the United States, he became Professor for Chemical Ecology, first in Lund and, beginning in 2001, at the Swedish University



Prof. Dr Bill S. Hansson, Max Planck Institute for Chemical Ecology Jena director and vice president of the Max Planck Society; Chair, *icipe* Governing Council. Photo: NECO

of Agricultural Sciences (SLU) in Alnarp. In 2006, he was appointed Director at the Max Planck Institute for Chemical Ecology in Jena, Germany, and Scientific Member of the Max Planck Society. Head of the Department of Evolutionary Neuroethology, Bill Hansson focuses on neurophysiological

and behavioural aspects of interactions between insects and their host plants. His main research interest is insect olfaction: How do insects detect odours, how is semiochemical information processed in the insect brain, and how does olfaction affect insect behaviour? Bill Hansson is Honorary Professor at Friedrich Schiller University in Jena and a Fellow of several national and international science academies, such as the Royal Swedish Academy of Sciences and the Royal Entomological Society. He has also received several distinguished awards for his research. Since June 2014, he is the first vice-president of the Max Planck Society who is not German. As vice-president, he is responsible for the 27 institutes in the Section of Biology and Medicine, including the new Max Planck Florida Institute for Neuroscience in the United States. One of his main tasks is internationalisation in the Max Planck Society. Until today, researchers in the Society have established more than 40 partner groups and 16 Max Planck Centres worldwide. In this context, Hansson plays an important role as ambassador for international scientific cooperation. **In 2006 he joined the *icipe* Governing Council as a member, before becoming its Chair in 2014.**

icipe MLN research recognised

In May 2016, *icipe*'s research on the use of satellite data to map the severity of maize lethal necrosis (MLN) in Kenya earned significant recognition at the 2016 European Space Agency Living Planet Symposium held in Prague, Czech Republic. MLN is a disease that affects maize, primarily in East Africa, reducing the yield of the crop and posing significant food security challenges for many households that depend on this cereal as their primary staple food. A paper titled: "Mapping maize lethal necrosis severity in Kenya using multi-spectral high to moderate resolution satellite imagery", presented by Richard Kyalo et al., was selected as the most innovative out of more than 1500 oral paper presentations made at the Symposium. Richard is a PhD candidate in the *icipe* Geo-Information Unit.



Richard Kyalo (left), *icipe* Geo-Information Unit, and Michael Thiel, Remote Sensing Department, University of Wuerzburg, inspecting MLN affected maize fields in Bomet, Rift Valley Province, Kenya.

The paper presented findings of the research, which show the possibility of using time-series and multi-sensor satellite data (with permissible spatial resolutions) to monitor the spatial distribution of MLN disease infestation rates in small-scale farms in western Kenya. Satellite data on

MLN severity could complement field efforts and lead to more synoptic and wide-area information on where intervention efforts need to be prioritised. Information data feeds (such as droughts and soil fertility), decision-making in regard to farmers' risks, and food security can be improved if MLN severity maps are combined with other crop productivity constraints. This research is funded through a small grant from the Advisory Service on Agricultural Research for Development (BEAF), run by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The Remote Sensing Department of the University of Wuerzburg, in cooperation with the German Aerospace Centre (DLR), was the German collaborator in this research.



RECOGNITIONS

icipe Director General honoured

On 31 May 2016, *icipe* Director General, Dr Segenet Kelemu, received an honorary doctorate from Tel Aviv University (TAU), Israel's largest and most comprehensive institution of higher learning, and one of the top 100 universities internationally. Dr Kelemu was among five individuals from across the globe who received the distinguished award, which has over the past 50 years been conferred by TAU to remarkable figures in recognition of their professional and philanthropic contributions to society. Dr Kelemu was honoured for her pioneering role for women scientists in Africa; her leadership in the fight for providing new solutions for ecologically responsible food crop production, especially by local, small-scale farmers in Africa; her commitment in directing the major effort, through international collaboration, for the transformation of African agriculture into self-sustainability that will meet the goals of feeding the people; her international acclaim as recipient of prestigious awards (such as the UNESCO Award for Women in Science in 2014), and her serving on advisory boards of key international institutions; and her support in the establishment of the Manna Center Program in Food Safety and Security of Tel Aviv University. The *icipe* Director General joins a distinguished list of TAU



Left to right: Prof. Yaron Oz, Rector of Tel Aviv University and Prof. Joseph Klafter, President of the University, presenting Dr Segenet Kelemu with her honorary doctorate.

Photo: Michal Roche – Ben Ami

honorees that includes: former President of the United States, Bill Clinton; German Chancellor, Angela Merkel; former British Prime Minister, Tony Blair; former Israeli President and Prime Minister, Shimon Peres; Elie Wiesel, an American Romanian-born Nobel Laureate; Alan Dershowitz, an American lawyer, jurist and author; Amos Oz, an Israeli writer, novelist, journalist

and intellectual; Umberto Eco, an Italian novelist, literary critic, philosopher; Zubin Mehta, an Indian conductor of Western classical music; Ronnie Chan, a Hong Kong entrepreneur; and Maurice Lévy a Moroccan French businessman. For further information, please visit <http://www.icipe.org/news/icipe-director-general-honoured>

A Festschrift in honour of Professor Robert R. Jackson

In May 2016, Professor Robert R. Jackson, a visiting scientist at *icipe* and Professor of Animal Behaviour at the University of Canterbury, New Zealand, was honoured in a Festschrift (a collection of writings celebrating the accomplishments of a scholar) published recently by *the New Zealand Journal of Zoology*. Written by some of his many colleagues and friends, the Festschrift celebrates Prof. Jackson's productive and successful career in arachnology (the scientific study of spiders and related animals), inspired by his fascination with spiders from a very early age. The articles in the Festschrift reflect the numerous ways in which Prof. Jackson's insights have influenced the work of arachnologists around the world, featuring behavioural studies as well as descriptions



Prof. Robert Jackson looking for spiders in Nairobi.

Photo: Fiona Cross

of spiders from New Zealand and further afield. Prof. Jackson's research at *icipe*, based at the Thomas Odhiambo Campus on the shores of Lake Victoria in western Kenya, began in 1994, and has been supported by

the Royal Society of New Zealand and the National Geographic Society. For more information, visit, <http://www.icipe.org/news/festschrift-honour-professor-robert-r-jackson>



RECOGNITIONS

icipe's Prof. Baldwin Torto appointed ESA Fellow

Prof. Baldwin Torto, Principal Scientist and Head of the *icipe* Behavioural and Chemical Ecology Unit (BCEU), is among 10 new Fellows elected by the Governing Board of the Entomological Society of America (ESA)* in 2016. Election as an ESA Fellow acknowledges outstanding contributions to entomology in one or more of the following: research, teaching, extension, or administration.

He is internationally recognised for his research on the chemical ecology of disease vectors and crop pests, and in his own words, his aim is "to understand the chemical signals mediating their behaviour so as to develop environmentally-sound control methods against these insects and arthropods that harm us and our livestock, and threaten our food security and livelihoods."

Prof. Torto notes: "I am fortunate to have been mentored over the years by some of the best minds in the field of chemical ecology including: Prof. Ahmed Hassanali (former *icipe* Head of the Behavioural and Chemical Ecology Unit); Prof. John Pickett and Prof. Lester Wadhams (Rothamsted Research, UK); Prof. James H. Tumlinson (Pennsylvania State University, State College, USA) and the late Prof. Peter E.A. Teal (USDA/ARS-CMAVE, Gainesville, Florida, USA).

At *icipe*, Prof. Torto's research has been supported by: Google.org; National Institutes of Health (NIH), USA; United States Department of Agriculture (USDA); Swedish International Development Cooperation Agency (Sida); Swiss Agency for Development and Cooperation (SDC); Department for International Development (DFID), UK; German Federal Ministry for Economic Cooperation and Development (BMZ); International Fund for Agricultural Development (IFAD); the European Union (EU), Wellcome Trust, UK; Bill and Melinda Gates Foundation in partnership with the National Science Foundation (BMGF/NSF); Biovision Foundation for Ecological Development; and the German Academic Exchange Service (DAAD).



Prof. Baldwin Torto, Principal Scientist and Head of the *icipe* Behavioural and Chemical Ecology Unit (BCEU), is one of the 10 new Fellows elected by the Governing Board of the Entomological Society of America (ESA) in 2016.

Born in Accra, Ghana, on August 17, 1955, Prof. Baldwin Torto obtained a BSc in chemistry and biochemistry (1979) and an MSc (1982) from the University of Ghana under the tutelage of Prof. Ivan Addae-Mensah. He then joined the *icipe* African Regional Postgraduate Programme in Insect Science (ARPPIS) programme on a German Academic Exchange Service (DAAD) scholarship.

After a two-year postdoctoral (1989–1991) in the laboratories of Prof. Michael Bentley and Prof. Barbara Cole at the University of Maine, Orono, USA, Prof. Torto returned to *icipe*, where, for 10 years, he researched the chemical ecology of the desert locust and various crop pests, rising to the position of Senior Scientist. In 2000, he was a Rothamsted International Fellow at Rothamsted Research, United Kingdom. Between 2001–2006 he was a visiting scientist at the USDA/ARS-Centre for Medical, Agriculture, and Veterinary Entomology, Gainesville, Florida, before returning to *icipe* in 2007.

Prof. Torto has mentored nine postdoctoral fellows and 36 graduate students (10 MSc and 26 PhD), and more than 50 undergraduate interns, many of whom have received prestigious awards across the globe. He has served the ESA as a judge of students' presentations, in the

organisation of symposia, and in promoting the ESA agenda in Africa. He is a Fellow of the African Academy of Sciences, and he has also been a councillor of the International Society of Chemical Ecology and a member of the American Chemical Society. He is also a member of the editorial boards of *Journal of Chemical Ecology*, *Pest Management Science*, and the *International Journal of Tropical Insect Science*. Prof. Torto is a recipient of the distinguished *icipe*-ARPPIS Silver Jubilee Alumni Award for Best Achiever in Scientific Research and Innovation. He has delivered several plenary and keynote presentations at national and international conferences. He has published 104 peer-reviewed scientific papers, as well as three patents and six book chapters.

*The Entomological Society of America is the largest organisation in the world serving the professional and scientific needs of entomologists and people in related disciplines. The new ESA Fellows will be recognised during the International Congress of Entomology, which will be held from 25–30 September 2016 in Orlando, Florida, USA. **For more information, including a complete list of the 2016 ESA Fellows: visit <http://www.entsoc.org>.**

For more information on the *icipe* Behavioural and Chemical Ecology Unit, visit: <http://www.icipe.org/research/research-support-units/behavioural-and-chemical-ecology>



RESEARCH HIGHLIGHTS

Biolarvicides and malaria control

icipe recently published the results of a study conducted in Tolay, southwestern Ethiopia, to explore the ability of three biolarvicides: neem, chinaberry, and *Bacillus thuringiensis israelensis (Bti)*, to kill the larvae of *Anopheles arabiensis*, the mosquito vector of malaria, in comparison to the conventionally used insecticides. The research, funded by Biovision Foundation for Ecological Development, showed the biolarvicides to be effective against the larvae and pupae of *An. arabiensis*. In contrast, a high level of mosquito resistance to pyrethroid insecticides and DDT was confirmed. Therefore, the researchers conclude that using an integrated vector management (IVM) approach that includes the application of neem, chinaberry, and *Bti* can potentially help to manage mosquito resistance to synthetic insecticides and reduce overall reliance on such compounds



Applying an *icipe*-developed biolarvicide to kill larvae of *Anopheles* mosquitoes in a rice field.

to control malaria. Publication link: <http://www.sciencedirect.com/science/article/pii/S2221169116304191>

Vector-borne diseases and intensification of agriculture

Recent findings by *icipe*, due to be published in a forthcoming issue of the Centre's *International Journal of Tropical Insect Science*, have demonstrated the significant role of larval habitat conditions in determining the distribution patterns of mosquitoes. The study, conducted in a malaria and arbovirus endemic region in western Kenya, showed that some agricultural practices, such as the use of fertiliser in agriculture, could potentially increase suitability of mosquito breeding habitats; and therefore, aid in the transmission of diseases vectored by *Aedes*.

The researchers found greater proportions of *Aedes aegypti* mosquito larvae in ammonium and phosphate rich habitats. The study also revealed that *Anopheles* mosquitoes not only breed in high temperatures as expected, but also in shaded habitats, which could be associated with increased irrigation agriculture. On the other hand, *Culex* mosquitoes were more indiscriminate in their choice of breeding sites. These



icipe researchers collecting mosquito larvae.

results highlight the need to align control of vector-borne diseases with increasing intensification of agriculture. This study was funded by research cooperation between the Swedish International Development Cooperation Agency (SIDA); International Development Research Centre (IDRC),

Canada, in partnership with the Canadian Centre for DNA Barcoding (CCDB), Canada; and Training Health Researchers into Vocational Excellence (THRiVE) in East Africa, a consortium supported by The Wellcome Trust, UK.



RESEARCH HIGHLIGHTS

Fungal endophytes for the management of the bean stem maggot

The common bean, *Phaseolus vulgaris* L., is important in Africa, as it serves as a source of calories, protein, oil and micronutrients, for households that cannot afford meat. However, its production is affected by the bean stem maggot (BSM), *Ophiomyia* spp. Farmers use chemical control and traditional approaches to control the pest; however, these strategies are inefficient, due to the complex behaviour of BSM.

In a recent study, *icipe* builds on its extensive research on the use of entomopathogenic fungi (EPF) to manage crop insect pests, to explore the potential of fungal endophytes to control BSM. The researchers found most fungal isolates from *icipe* germplasm capable of colonising different bean plant parts (root, stem, and leaves). They observed that the application of the fungal isolates on bean plants reduced the ability of the pest to feed and lay eggs, which in turn affected



the emergence of pupae and development into adults.

A fungal isolate known as ICIPE 20, developed by the Centre from *Metarhizium anisopliae*, a fungus that grows naturally in the soil, was most effective in interfering with BSM life cycle. Another isolate of *M. anisopliae*, ICIPE 78, also led to a significant reduction in the number of BSM pupae and adults. The study demonstrates that fungal endophytes can be considered as tools for the management of BSM in East Africa. The research was funded by the Centre's

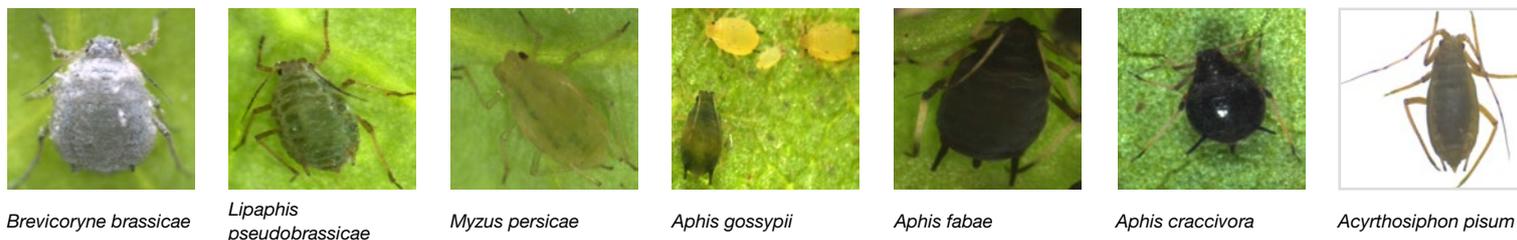
Innovative Seed Research Grants, which are funded through *icipe* core funding, provided by: Aid for Africa, USA; Federal Ministry for Economic Cooperation and Development (BMZ), Germany; Ministry of Higher Education, Science and Technology, Kenya; Swiss Agency for Development and Cooperation (SDC), Switzerland; Swedish International Development Cooperation Agency (Sida) and UK Aid, Government of the United Kingdom. Publication link: <http://link.springer.com/article/10.1007/s10340-015-0725-4>

DNA barcoding and aphid identification

Aphids, also known as plant lice, are among the most economically important pests in the world. In addition to transmitting plant viruses, these sap-sucking insects are capable of causing severe crop losses. They also excrete honeydew that favours the growth of sooty mould, which reduces the quality of vegetables and fruits; and hence, their market value. To effectively manage aphids and develop relevant quarantine systems, it is critical to have methods for rapid and accurate identification at the species level. Even though morphological taxonomy (the description of their size, shape and structure), has had tremendous

impact on species-level identifications, the presence of different forms, the tendency of the insects to physically change appearance and immature stages, are among the many challenges that stand in the way of accurate identification of aphids. In addition, because of the small size of the insects, the presence of cryptic species (two or more species that are indistinguishable), and damaged specimens, there is need for alternative identification strategies. A recently published study by *icipe* showed that DNA barcoding can provide rapid accurate identification of aphid species, which could support effective pest management programmes and enhance

plant quarantine systems. The research was funded by UK Aid, Government of the United Kingdom, and through *icipe* core funding, provided by: Aid for Africa, USA; Federal Ministry for Economic Cooperation and Development (BMZ), Germany; Ministry of Higher Education, Science and Technology, Kenya; Swiss Agency for Development and Cooperation (SDC), Switzerland and the Swedish International Development Cooperation Agency (Sida). Publication link: <http://www.ncbi.nlm.nih.gov/pubmed/26490301>



Different aphid species collected in the study.



RESEARCH HIGHLIGHTS

Research findings on organic agriculture in Kenya

Organic agriculture holds great potential in Kenya towards increasing food security, nutritional needs and incomes of many households, while protecting the environment.

Over the past several decades, there have been various efforts to adopt organic farming in the country involving farmers, national and international research institutes, non-governmental organisations, and agricultural development agencies. However, the lack of reliable data; for instance, in regard to the environmental impact, economic benefits and comparative studies of organic versus conventional agriculture, hinder the full impact of such efforts.

Since 2007, seven national and international organisations have been conducting research, expected to extend over a period of 10 to 20 years, to compare the performance of organic agriculture and conventional agriculture in Kenya.

In addition to *icipe*, the other organisations are: Kenya Institute of Organic Farming (KIOF); Kenya Organic Agriculture Network (KOAN); Kenya Agricultural Livestock and Research Organization (KALRO); Kenyatta University; Research Institute of Organic Agriculture (FiBL), Switzerland; and the Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture (TSBF-CIAT).

The studies are funded by: the Swiss Agency for Development Cooperation (SDC); Biovision Foundation for Ecological Development; LED Liechtenstein Development Service; and Coop Sustainability Fund, Switzerland.



Workshops participants, including journalists, during a visit to a trial site where organic farming has led to a thriving maize crop.

The trials involve crop rotations with maize, vegetables and potato, enabling the researchers to monitor the effects of organic agriculture on crop yield, organic matter, soil properties, the health of the crops, biodiversity, quality of the products (for instance, nutrient contents and pesticide residue levels) and the profitability of organic farming.

Between 28 and 30 June 2016, the research partners presented their findings from the first six years of their studies. The results show similar yields in organic farming systems as in conventional farming systems, in both commercial and small scale settings. Although production costs of organic farming were higher, the profitability of such systems (without premium) was similar to, and in some cases higher than conventional farming. The results also show that when practised in an optimum manner, organic farming significantly improved soil fertility, more than conventional systems.

icipe and IRD sign MoU

icipe and the Institut de recherche pour le développement (IRD), France, have signed a Memorandum of Understanding (MoU), towards continued collaborative research on a programme entitled: “Biodiversity, chemical ecology and functioning of monocotyledonous noctuid stemborers in East Africa”. Under the MoU, an IRD team composed of Dr Bruno Le Ru and Dr Paul Calatayud will continue to work with *icipe*, and will be fully integrated into the Centre’s research programmes.

In East Africa, yield losses in maize due to stemborer infestation is estimated at 12–50% of the total production, depending on the pest species, region, maize variety, cropping pattern, and soil fertility level. Moreover, global warming and climate change are expected to have significant consequences on the abundance of stemborers, with serious impact on cereal crop production; and therefore, food security in the region. The IRD–*icipe* studies are intended to generate integrated pest management strategies of stemborers, to



Dr David Williamson, Representative of IRD in eastern Africa, and Dr Segenet Kelemu, Director General, *icipe*, sign a research agreement between the IRD and *icipe*.

mitigate these adverse effects. The IRD team will also contribute to other *icipe*’s initiatives; for instance, the Adaptation for Ecosystem Resilience in Africa (AFERIA) project.



RESEARCH HIGHLIGHTS

Tiny microbe turns tropical butterfly into male killer



African Queen butterfly. Photo: Dino J. Martins

Scientists from Kenya and the United Kingdom have helped to identify a male-killing microbe in a common East African butterfly called the African Queen (also known as the African Monarch) that leads to the death of all sons when a mother butterfly is infected. The findings were published in August in the Royal Society journal *Proceedings of the Royal Society B*.

In most of Africa, this microbe, called *Spiroplasma*, infects African Queen butterflies, but has no effect on their offspring. However, in a narrow zone around Nairobi, Kenya, where two subspecies of butterfly live and breed, the scientists noted that the microbe infection caused all their sons to die. In fact, the male eggs never hatch and are often consumed by their hungry sisters.

Dr Jeremy Herren, a Visiting Scientist at *icipe*, was part of the team that made the discovery. He contributed knowledge on the *Spiroplasma* bacteria, through a grant from the Wellcome Trust Sir Henry Wellcome Postdoctoral Fellowships.

The group of scientists also included Dr David Smith and Dr Ian Gordon who have worked on this butterfly species for many years in East Africa, working with Professor Richard French-Constant of the University

of Exeter, Professor Walter Traut from the University of Lübeck, Steve Collins of the African Butterfly Research Institute (ABRI), Kennedy Saitoti, a student affiliated with the National Museums of Kenya, Piera Ireri of Kenyatta University and Dr Dino J. Martins who chairs the Insect Committee of Nature Kenya and is the current Executive Director of the Mpala Research Centre.

Dr Herren notes: "This study demonstrates the complexity of interactions between insects and maternally-inherited bacteria that manipulate their reproduction. Many researchers believe these bacteria might be useful as a strategy to control insects that transmit diseases and destroy crops; and therefore, it is very important that we better understand how they affect their hosts." For further information, visit: <http://www.icipe.org/news/tiny-microbe-turns-tropical-butterfly-male-killer>

icipe research featured on BBC

In July 2016, *icipe's* research towards increasing agricultural productivity in Africa was featured on BBC World News, *Horizons* programme, in an episode titled 'Healthy Harvests' (Link: <http://www.bbc.com/specialfeatures/horizonsbusiness/seriesix/healthy-harvests/?vid=p0400hrw>).

The episode highlighted *icipe's* accomplishments over the past several decades in using fungi-derived biopesticides to tackle fruit flies in Africa. In so doing, the Centre has contributed towards realising the potential of fruit cultivation across the continent, as a way of improving the incomes and nutritional security of many people and protecting the environment.

The development and dissemination of biopesticides is part of *icipe's* integrated pest management (IPM) package for fruit flies, which also includes baiting and male annihilation techniques, biological control with parasitoids, cultural control through

field sanitation, minimal use of pesticide in localised bait stations of spot spray, and proper post-harvest treatment to provide and assure quarantine security.

The IPM packages have been developed by *icipe* in collaboration with partners from Africa, Asia, Europe, and USA. The Centre's fruit fly IPM activities commenced close to two decades ago, their basis laid through support from the International Fund for Agricultural Development (IFAD). Since then, funding has been obtained from: the German Federal Ministry for Economic Cooperation and Development (BEAF), implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); Biovision Foundation for Ecological Development, Switzerland; Food and Agriculture Organization (FAO) of the United Nations; International Atomic Energy Agency (IAEA), Austria; Department



A range of fungal-based biopesticides developed by *icipe* in partnership with Real IPM Ltd.

for International Development (DFID), UK Government; United States Agency for International Development (USAID); United States Department of Agriculture, Foreign Agricultural Service (USDA-FAS) in coordination with USDA Animal and Plant Health Inspection Service (USDA-APHIS); and European Union (EU). For further information, visit: <http://www.icipe.org/research/plant-health/fruit-fly-ipm>



RESEARCH HIGHLIGHTS

New odour-baited, solar-powered mosquito trap offers hope for combating malaria

A newly-developed, solar-powered mosquito trapping system (SMoT), which is baited with a synthetic odour blend that mimics human odour, has led to a 70% decline in the populations of *Anopheles* mosquitoes, the most significant malaria-transmitting species, in Rusinga Island, western Kenya. In addition, households using SMoTs have recorded malaria infection rates that are 30% lower than those for non-beneficiaries of the technology.

The technology was developed by *icipe* and Wageningen University, The Netherlands, and implemented in partnership with the Swiss Tropical Public Health Institute, Switzerland, and the Rusinga Island community. It was tested in a project known as SolarMal between 2012 and 2015, with more than 4200 households on the Island benefitting from the SMoTs.

The researchers report the findings from their trials in a paper published in *The Lancet*, a leading scientific journal, on 10 August 2016.

Dr Daniel Masiga, SolarMal lead researcher at *icipe* noted: "In Africa, malaria control depends on the use of long lasting insecticide treated nets (LLINs), and disease management using approved drugs. However, mosquito vectors are increasingly becoming resistant to insecticides, and also adapting to feeding outside, which reduces the effectiveness of nets. Therefore, new, complementary approaches are urgently needed, if efforts to eliminate malaria by 2030 are to succeed. The goal of SolarMal is to reduce the number of mosquitoes to a level where malaria transmission becomes insignificant."

"Our objective was to investigate whether malaria-transmitting mosquitoes can be captured and destroyed using traps to minimise malaria infections," explains Prof. Willem Takken of Wageningen University,



Fitting of a solar-powered mosquito trapping system (SMoT) in a homestead on Rusinga Island, western Kenya.

The Netherlands and the SolarMal project leader. "Ultimately, we want to contribute towards total eradication of malaria in an environmentally-friendly and sustainable manner. As we are using a natural lure, namely human odour, there is no negative impact on the environment and it is improbable that the mosquitoes will become 'resistant' to being captured. After all, the mosquitoes need their attraction to the lure in order to be able to survive."

Mrs Jane Okong'o, Chair, Rusinga Island Community Advisory Board, adds: "We are grateful to have partnered with the researchers in the implementation of the SolarMal project, and to have contributed to its success. In addition to the reduction of malaria cases, we have noted a myriad of other benefits from the project."

Because the SMoTs are solar based, they

have become a source of green energy for the Rusinga Island community, leading to a reduction in the negative impacts of kerosene use, such as upper respiratory tract infections and kerosene-related accidents.

Children are able to study at home during the evenings, because of the availability of lighting from the SMoTs. The technology has also elicited a saving culture, with approximately 100 women groups involved in saving towards sustaining the maintenance of the SMoTs.

The SolarMal project was funded through the Food for Thought campaign of the Wageningen University Foundation. Publication link: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)30445-7/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)30445-7/abstract)



icipe IN THE MEDIA [\[More info: http://www.icipe.org/media-coverage/media-clippings\]](http://www.icipe.org/media-coverage/media-clippings)



icipe Director General interview http://www.icipe.org/sites/default/files/Segenet_interview_amharic.pdf



Bees and Silkworms Spin Gold for Ethiopia's Rural Youth <http://www.ipsnews.net/2016/05/bees-and-silkworms-spin-gold-for-ethiopia-rural-youth/>



Project to help 'mountain growers' adapt to climate change rolled out in Murang'a <http://www.mediamaxnetwork.co.ke/features/224418/project-to-help-mountain-growers-adopt-to-climate-change-rolled-out-in-muranga/>



Ameenah Gurib-Fakim PhD Scholarship Programme for African Researchers launches in Mauritius <http://www.biznisafrika.co.za/ameenah-gurib-fakim-phd-scholarship-programme-for-african-researchers-launches-in-mauritius/>



Kakamega farmers seeking value addition for medicinal herbs <http://www.coastweek.com/3920-West-Kenya-farmers-see-value-addition-on-medicinal-herbs.htm>



Waarom je zeker de lokale honing moet proeven in Ethiopië <http://weekend.knack.be/lifestyle/radar/waarom-je-zeker-de-lokale-honing-moet-proeven-in-ethiopië/article-normal-704945.html>



<http://www.globes.co.il/news/article.aspx?did=1001131789%20>



Bugs can help tackle food insecurity <http://augustafreepress.com/bugs-can-help-tackle-food-insecurity/>



12 New Members Appointed to the United Nations University Council <http://www.hongkongherald.com/index.php/sid/243641631>

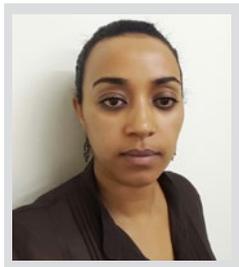


APPOINTMENTS



Workneh Ayalew Kebede, Project Coordinator, Young Entrepreneurs in Silk and Honey project

Workneh joins *icipe* after having served the Ethiopian Agricultural Transformation Agency (ATA) as Director of the Livestock Value Chains, on secondment from the International Livestock Research Institute (ILRI). Prior to this, Workneh worked for eight years in Papua New Guinea as the Deputy Director General (Research) of the country's National Agricultural Research Institute, and as Livestock Research and Development Coordinator and Principal Livestock Scientist. Previously, he held positions in the ILRI, Ethiopia office, FARM-Africa, and Alemaya University, Ethiopia.



Meron Belay Alene, Gender Specialist, Young Entrepreneurs in Silk and Honey project

As YESH's gender specialist, Meron is responsible for collecting and compiling data and information on the economic and social value of women's participation in beekeeping and silkworm farming, raising awareness among partners and staff, and assessing the situation of women before, during and after the project implementation period. Prior to joining *icipe*, Meron was the Participation and Inclusion Manager at Pact Inc. She also served as Gender and Capacity Building Advisor at Save the Children International in Ethiopia. Meron holds an MSc in Development Studies from University College Dublin, Ireland, and an MA in Human Rights from University of Nottingham, United Kingdom.



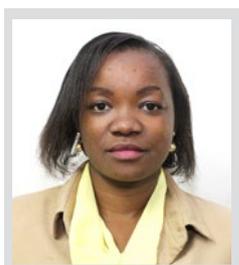
Bedaso Taye, Impact Assessment and Monitoring & Evaluation Specialist, Young Entrepreneurs in Silk and Honey project

Bedaso will develop and implement M&E frameworks, conduct baseline as well as monitoring surveys, and organise evaluation and impact assessment studies for the project. Previously, Bedaso was a lecturer at Mada Walabu University, Oromia Region, Ethiopia, where he taught courses and headed the Economics Department. He has also held positions in the Sasakawa Global 2000 initiative in Ethiopia as Monitoring, Evaluation, Learning and Sharing Program Officer and at the Ethiopian Agricultural Transformation Agency (ATA) as Monitoring, Learning and Evaluation advisor to the Ministry of Agriculture (MoA). Bedaso Taye received his first degree in Economics from Arba Minch University in 2007 and an MSc degree in Resource and Environmental Economics from Addis Ababa University in 2010. He has also undertaken several high level trainings in M&E and impact assessment, and participatory planning, monitoring and evaluation.



Esayas Mulatu Morka, Business Development Manager, Young Entrepreneurs in Silk and Honey project

Prior to joining *icipe*, Esayas worked for the International Maize and Wheat Improvement Center (CIMMYT-Ethiopia) where he served as Agribusiness Development Officer working to facilitate technology adoption. Before CIMMYT, he had worked for the Ethiopian Agricultural Transformation Agency as Senior Technical Expert for Output Marketing. Prior to this, he was with GIZ as Livelihood Advisor and Small & Medium Enterprise Development Officer, and with Mercy Corps as Value Chain & Financial Services Officer for about six years. Esayas holds an MBA from Sikkim Manipal University, India; a Postgraduate Diploma in Rural Development from Weitz Centre for Sustainable Development, Israel; and a BSc degree in Industrial Engineering from Bahir Dar University, Ethiopia. His expertise includes agribusiness development, value chain analysis, business model development, enterprise development, and facilitation of private sector engagement in agribusiness.



Jerusa Omukoko
Communications Assistant



Felix Matheri Mumbi
Research Technician



Edgar Kipkururi Mutai
Electrical Engineer



James Zakayo Lelesara
Security Coordinator

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Core donors

- Aid for Africa, USA
- Federal Ministry for Economic Cooperation and Development (BMZ), Germany
- Ministry of Higher Education, Science and Technology, Kenya
- Swiss Agency for Development and Cooperation (SDC), Switzerland
- Swedish International Development Cooperation Agency (Sida)
- UK Aid, Government of the United Kingdom

Restricted project donors

- ACDI/VOCA Agribusiness Systems International (ASI) Kenya
- African Union
- African Women in Agricultural Research and Development (AWARD)
- AIRD (French Inter-institution Agency for Research and Development)
- Australian Centre for International Agricultural Research (ACIAR)
- Biotechnology and Biological Sciences Research Council, UK, through Rothamsted Research, UK
- Biovision Africa Trust
- Biovision Foundation for Ecological Development, Switzerland
- Canadian Government through International Development Research Centre (IDRC)
- CIRAD – Agricultural Research for Development, France
- Consortium for National Health Research (CNHR), Kenya
- Cultivate Africa's Future (CultiAF) through International Development Research Centre (IDRC)/Australian Centre for International Agricultural Research (ACIAR)
- European Union
- Food and Agriculture Organization of the United Nations (FAO)
- German Academic Exchange Service (DAAD)
- German Research Foundation (DFG)
- Global Environment Facility (GEF)/United Nations Environment Programme (UNEP)
- Grand Challenges Canada (GCC)
- Humidtropics CGIAR Research Programme (CRP) led by International Institute of Tropical Agriculture (IITA)
- International Atomic Energy Agency (IAEA)
- International Centre for Genetic Engineering and Biotechnology (ICGEB)
- International Fund for Agricultural Development (IFAD)
- IRD, Institut de Recherche pour le Développement, France
- Liechtenstein Development Service (LED), Principality of Liechtenstein
- McKnight Foundation, USA
- Ministry for Foreign Affairs of Finland
- National Commission for Science, Technology and Innovation (NACOSTI), Kenya
- Netherlands Organisation for Scientific Research (NWO)
- R. Geigy Foundation, Switzerland
- Research Institute of Organic Agriculture (FiBL), Switzerland
- Russell IPM Ltd, UK
- Swiss National Science Foundation (SNSF)
- SWITCH Africa Green
- The MasterCard Foundation, Canada
- The Volkswagen Foundation, Germany
- USAID—United States Agency for International Development's IPM Innovation Lab (Feed The Future Innovation Lab for Integrated Pest Management) of Virginia Tech, USA
- United States Agency for International Development Partnerships for Enhanced Engagement in Research (USAID-PEER) Science program with funding from National Academy of Sciences (NAS)
- United States Department of Agriculture (USDA)
- United States National Institutes of Health (NIH)
- United States National Science Foundation (NSF)
- Wellcome Trust, UK
- World Federation of Scientists through the ICSC-World Laboratory
- World Health Organization
- World Trade Organization (WTO) – Enhanced Integrated Framework (EIF)

In realising its mission, *icipe* also benefits from extensive partnerships with research partners (including universities and research institutes in Africa and beyond), private sector partners, and communities across Africa.

For more information on these and other topics, please visit our

Website: <http://www.icipe.org> or contact us through our

Email address: icipe@icipe.org

