



icipe biennial highlights

2011 – 2012

collaborations and partnerships



African Insect Science for Food and Health

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ACRONYMS AND ABBREVIATIONS

AU-IBAR	African Union’s Interafrican Bureau for Animal Resources
CERNVec	Community of Excellence for Research in Neglected Vector-Borne & Zoonotic Diseases
CNHR	Consortium for National Health Research
DDSR	Division of Disease Surveillance and Response
FAO	Food and Agricultural Organisation of the United Nations
GEF	Global Environmental Facility
GIS	Geographic Information Systems
IITA	International Institute of Tropical Agriculture
IPM	Integrated Pest Management
ISMA	Integrated <i>Striga</i> Management in Africa
IVM	Integrated Vector Management
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KEMRI	Kenya Medical Research Institute
LLIN	Long-Lasting Insecticidal Nets
LSHTM	London School of Hygiene and Tropical Medicine
MoPHS	Kenyan Ministry of Public Health and Sanitation
NCST	Kenya National Council for Science and Technology
NEPAD	The New Partnership for Africa’s Development
NTD	Neglected Tropical Diseases
PAAT	Programme Against African Trypanosomosis
POPs	Persistent Organic Pollutants
SSA	Sub-Saharan Africa
THRiVE	Training of Health Researchers into Vocational Excellence in East Africa
UNEP	United Nations Environmental Programme
UVRI	Uganda Virus Research Institute
WHO	World Health Organization

FOREWORD

The great American industrialist, Henry Ford, once said: *Coming together is a beginning, staying together is progress and working together is success.* It is a quote that touches the very core of the five stories in this publication, which is dedicated to recent partnerships developed by *icipe* towards solving some of Africa's most critical problems.



Prof. Christian Borgemeister,
Director General, *icipe*

As we observe in this report, Africa continues to shoulder a disproportionate share of the global disease burden, amid a weak and under-resourced infrastructure for scientific research and training. We highlight *icipe's* involvement in two initiatives that are responding to the critical need to build capacity in health research. The first is the Training of Health Researchers into Vocational Excellence in East Africa (THRiVE), a consortium funded by the Wellcome Trust and coordinated by Uganda's Makerere University, whose aim is to contribute improved infrastructure, training, increased collaboration and investment in young researchers. The second is the *icipe*-led Community of Excellence for Research in Neglected Vector-Borne & Zoonotic Diseases (CERNVec), which is supporting the establishment of a community of excellence for research and capacity building in neglected vector-borne and zoonotic diseases in Kenya.

Further, we note that a range of complexities – current and projected – continue to hinder Africa's quest towards improved agriculture and food security. Existing problems, which include insect pests and diseases, water scarcity and poor soil health, are expected to be exacerbated by the impacts of climate change. This scenario stipulates more regional collaborative activity in agricultural research. We discuss two formal collaborative arrangements that we have recently instituted towards enabling smallholder farmers, on whom most agricultural activity in Africa depends, access the appropriate technologies and strategies to address existing and emerging constraints. One is a Memorandum of Cooperation with the International Institute of Tropical Agriculture (IITA). The other is a partnership agreement signed with the African Agricultural Technology Foundation (AATF), developed under ISMA, the Integrated *Striga* Management in Africa project, to develop a package of *Striga* control options for smallholder farmers in Kenya and Nigeria.

In this report, we also discuss the confidence being invested by international development partners in *icipe's* infrastructure, expertise and leadership in R&D. This conviction is demonstrated through two key accomplishments. The first is the designation of *icipe* as a Food and Agricultural Organisation of the United Nations (FAO) Reference Centre for vectors and vector-borne animal diseases. This appointment is based on *icipe's* strong mission towards the development of integrated strategies and tools for control of vectors of animal diseases in sub-Saharan Africa. It is also hinged on prior collaboration between *icipe* and FAO towards strengthening regional capacity in this area. Further, the recent launch of *icipe's* Martin Lüscher Emerging Infectious Diseases Laboratory greatly enhances the R&D infrastructure of the Centre. As we observe in

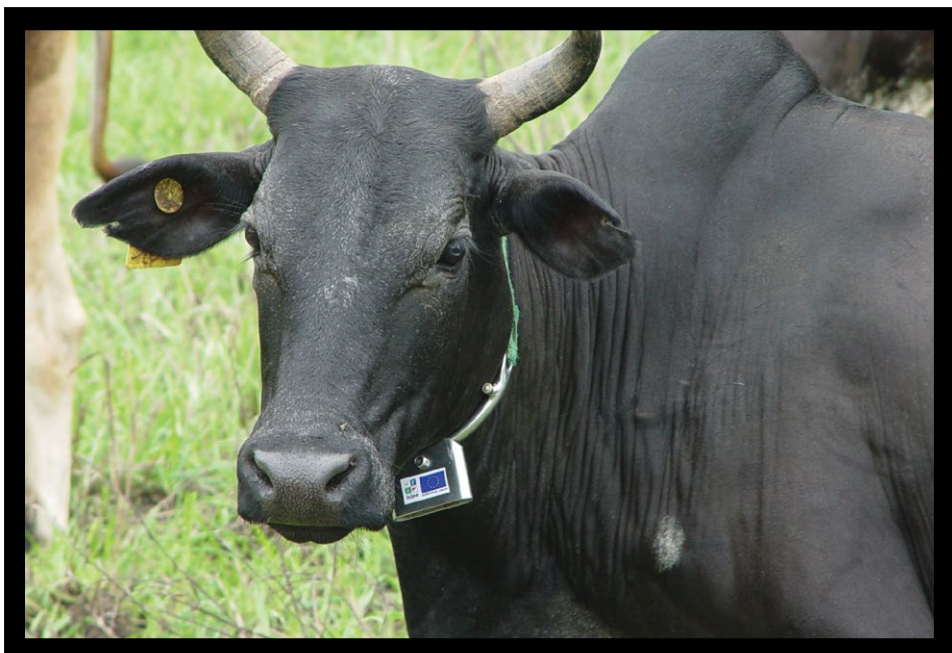


Photo: Rajinder Saini

icipe DESIGNATED AS AN FAO REFERENCE CENTRE

In September 2012, icipe was designated as a Food and Agricultural Organisation of the United Nations (FAO) Reference Centre for vectors and vector-borne animal diseases. Below, Rajinder Saini, icipe's Head of the Animal Health Division discusses the importance of this recognition.

Q. What are FAO Reference Centres?

A. 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, their commitment to capacity building and provision

Photo caption: A cow fitted with a tsetse repellent collar, which keeps livestock and herdsmen protected from tsetse and other biting flies. The technology, which has been developed by icipe, is currently being upscaled and outscaled with financial support from the European Union

of services. The designation is also based on *icipe*'s prior collaboration with FAO and contribution to the organisation's programmes as well as the Centre's demonstrated ability to contribute to capacity building in animal health.

Q. What led to the designation of *icipe* as an FAO Reference Centre?

A. *icipe* was designated as a Reference Centre of FAO after a thorough evaluation of its mandate, main activities and competencies in vector-borne animal diseases. Since its founding more than 40 years ago, *icipe* has had a strong mission towards the development of integrated strategies and tools for control of vectors of animal diseases in sub-Saharan Africa (SSA). Over the years, the Centre has used basic knowledge to develop simple, effective, integrated tools and strategies towards the control of important arthropod vectors affecting animal health.

One of the Centre's main focus in this regard has been research on tsetse flies and animal trypanosomiasis, leading to two major discoveries. The first is the development of the NGU series of traps, which are affordable and easy to use. The second is the repellent collars, which contain either synthetic equivalents of the odours of animals that tsetse flies tend to avoid, for instance waterbucks, or chemicals developed through molecular optimisation of natural repellents found in the urine of cows. Worn around the neck of cattle, these repellent collars slowly dispense the chemicals in them, thereby protecting the animals from the flies.

icipe has also conducted extensive research on ticks, which transmit a number of very important livestock diseases including East Coast fever. The Centre's work has led to the development of biological control strategies that can be used in conjunction with conventional approaches like acaricides in an integrated manner, to manage ticks in smallholder farming systems. These approaches include the use of botanicals and anti-tick pasture plants and repellents developed through behavioural modification of semiochemicals that ticks use to find hosts and mates.

An important factor in *icipe*'s capacity in animal health research was the launch



Photo: *icipe*

The launch of the Martin Lüscher EID Laboratory at icipe has enhanced the Centre's infrastructure to conduct research, including studies on vectors and vector-borne diseases. The laboratory includes an automated DNA/Viral RNA extractor, molecular diagnostics and Mass Spectrometry equipment, and viral culture facilities. Here Geoffrey Jagero and Jandouwe Villingier are working on cell culture.

icipe's research in tsetse control strategies has led to the development of repellent collars, a mobile technology that is particularly ideal for Maasai herdsmen and their livestock, who are often on the move in search of pasture.



Photo: Rajinder Saini

of the Martin Lüscher Emerging Infectious Diseases (EID) Laboratory (<http://eidlab.icipe.org/>) in November 2011, which greatly enhances the infrastructure of the Centre. The laboratory provides a specialised platform to undertake studies that will improve risk detection, early warning and response capabilities, to outbreaks of infectious diseases within national programmes in Kenya and beyond. The facility, which includes several state-of-the-art biosafety level 2 laboratories and insectaries, molecular diagnostics rooms, as well as a biosafety level 3 containment laboratory, is the only EID laboratory of this magnitude and design in East Africa.

Further, the selection of *icipe* as an FAO Reference Centre is based on prior collaboration with the organisation. For instance, *icipe* has previously partnered with FAO's Animal Health Services, in particular within the Programme Against African Trypanosomosis (PAAT). In fact, Dr Rajinder Saini has been a member of the steering committee of PAAT since 1998.

The choice of *icipe* was also supported by the Centre's efforts towards strengthening regional capacity in SSA towards the management of vector and vector-borne animal diseases. *icipe* is a collaborator in the African Union's Interafrican Bureau for Animal Resources (AU-IBAR). The Centre is also involved in other pan-African initiatives that are vital in integrating the control of vectors and vector-borne animal diseases into development processes. These include the African Union initiative for implementing the Comprehensive Africa Agriculture Development Programme (CAADP), the Forum of Agricultural Research in Africa (FARA) and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

It is important to also note that the designation of *icipe* as an FAO Reference Centre was endorsed by the Government of Kenya, through its Department of Veterinary Services.

Q. How does the designation enhance *icipe's* mission?

A. A key part of *icipe's* mission is to enhance livestock health and productivity as well as the livelihood of livestock keepers in SSA. Currently, there are numerous challenges towards this goal, which include increased demand for livestock products amidst rising impediments by vectors and vector-borne diseases. In addition, disease vectors are rapidly becoming resistant to drugs and acaricides. Moreover, the impact of climate change might increase the distribution and efficiency of vectors.

Therefore, there is an urgent need to develop more holistic tools for controlling vectors and vector-borne diseases. In this regard, a significant issue for *icipe* is the commercialisation and up-scaling of the uptake of the Centre's tsetse repellent technology. Further, it is necessary to undertake in-depth studies on the effect that climate change might have on vectors and vector-borne diseases. Such studies will include broadening the scope of research to focus on other diseases, for instance blue tongue, lumpy skin disease, Rift Valley fever, and on fly vectors. It is also important to develop packages to improve the health and productivity of other animals such as camels. These efforts will require building capacity at all levels to ensure sustainability.

The designation as a Reference Centre strengthens *icipe's* role as a leader in addressing these challenges. *icipe* will provide FAO and its members with specific, independent technical and scientific advice, as well as capacity building support, for the control of vectors and vector-borne animal diseases. In addition, *icipe* will also help to improve the performance and harmonisation of vector and disease diagnostic services, by sharing biological materials with FAO and its other relevant reference centres. In addition, *icipe* will identify vectors of animal African trypanosomoses and arthropod transmitted viral animal pathogens and advise on their ecology.

Q. Are there any examples of how the collaboration will work?

A. A good example is an ongoing project by *icipe* and FAO, in collaboration with the International Fund for Agricultural Development (IFAD), which aims



Photo: Rajinder Saini

*The designation as an FAO Reference Centre strengthens *icipe's* leadership in enhancing the health and productivity of livestock and the livelihood of livestock keepers in SSA. For instance, wider dissemination and adaptation of the Centre's tsetse control strategies could contribute to more draught power for tilling agricultural land.*

at developing innovative, site-specific, holistic strategies for diverse livestock keepers: from those in smallholder farming systems, large-scale dairy farmers, pastoralists and to those in post conflict areas. The initiative will develop tools to manage and control animal disease constraints that pose risks to improved livestock production. It will also build capacity of community members, paying special attention to gender issues, opportunities for rural development, food security and overall poverty alleviation.

Further, several of the ongoing activities in the Martin Lüscher EID Laboratory, which are focusing on the ecology and surveillance of livestock diseases, additionally illustrate *icipe's* role as an FAO reference centre. The research is being undertaken in close collaboration between *icipe* and several partner institutes. So far, the laboratory has facilitated the development of state-of-the-art molecular techniques for screening potential arboviral infections. The aim is to develop high-throughput screening and identification systems for mosquito-transmitted arboviral diseases such as Rift Valley fever, but also leishmaniasis, trypanosomosis, malaria, and bacterial pathogens in mosquito, tick, livestock, wildlife, and human samples. This research will also focus on the identification and differentiation of potential insect vectors of these emerging and re-emerging diseases. Such tools will facilitate the development of risk maps and the management of a variety of EIDs in East Africa and beyond.



Photo: Santiago Escobar

***icipe's* ROLE AS A STOCKHOLM CONVENTION REGIONAL CENTRE**

In July 2010, icipe was selected as a regional centre under the Stockholm Convention on Persistent Organic Pollutants (POPs). Below Richard Mukabana discusses the importance of this new role in regard to the icipe's integrated vector management (IVM) programmes.

Q. What is the Stockholm Convention on POPs?

A. The Stockholm Convention is a United Nations international environmental treaty, which was signed in 2001, coming into effect in May 2004. Its aim is to protect people, animals and the environment from chemicals (POPs) that are highly dangerous with long-lasting deleterious effects.

Photo caption: *David Owaga, a research technician at icipe's Thomas Risley Odhiambo Campus, Mbita, feeding caged mosquitoes. Understanding the behaviour of mosquitoes through laboratory studies is an important aspect in the development of IVM strategies for their control.*

The Convention endeavours to achieve its goals by restricting and ultimately eliminating the production, use, trade, release and storage of POPs. Its implementation is overseen by the Conference of the Parties (COP), through decisions taken during periodic meetings. In addition, several institutions have been selected as regional and sub-regional centres, with the mandate of assisting developing countries to fulfill their obligations under the Convention, through capacity building and transfer of technology.

Q. How did *icipe*'s appointment as a Stockholm Convention Regional Centre come about?

A. By 2005, there were two Stockholm Convention regional centres in Africa: the Basel Convention Regional Centre in Senegal and the National Centre for Cleaner Technology Production in Algeria. As these two centres are located in Francophone Africa, the Secretariat of the United Nations Environmental Programme (UNEP) found it necessary to have additional regional centres, to cater for Anglophone Africa.

In accordance, UNEP conducted an assessment, which identified *icipe* as a potential regional centre of the Stockholm Convention on POPs. The process of having *icipe* formally endorsed was overseen by two scientists: John Githure, the former head of the Human Health Division, and Charles Mbogo, who is currently a visiting scientist at *icipe*. The two scientists made a strong case based on *icipe*'s past accomplishments. Since its founding, *icipe* has remained committed to developing environmentally safe tools and strategies for the management of arthropods. An example of this is the Centre's integrated vector management (IVM) programmes. *icipe*'s IVM strategies incorporate different approaches to control mosquitoes in adult and larval stages. This approach includes scaling up the use of long-lasting insecticidal nets, larval control using *Bacillus thuringiensis israelensis* (Bti), community education, sensitisation and mobilisation.

icipe's suitability as a regional centre was also supported by its leading role in articulating issues surrounding DDT, one of the pesticides regulated by the Stockholm Convention. The use of DDT was banned in most industrialised



Photo: Santiago Escobar

Mosquito eggs in water inside a semi-sealed mosquito rearing facility at icipe. The Centre's IVM strategies incorporate different approaches to control mosquitoes in adult and larval stages, which are first tested for efficacy in the laboratory.

As part of its role as a regional centre under the Stockholm Convention, *icipe* plans to create linkages with government partners to ensure the consideration of IVM in national policies. Among the issues to be addressed, are environmentally-safe approaches to eliminate mosquitoes, for instance by tackling their breeding sites, which include these hoof prints made by hippopotami.



Photo: Santiago Escobar

countries in the 1970s based on evidence of its risks to human, animal and environmental health. Currently, COP allows the use of DDT for public health interventions, for instance in the control of malaria-transmitting mosquitoes, through indoor spraying by national health authorities under the supervision of the World Health Organisation (WHO). Today, there are about 11 countries that use DDT – most of them in sub-Saharan Africa.

icipe believes that, in addition to its documented hazards, the use of DDT has wider implications, for instance, the possible rejection of horticultural and fish exports from Africa to European markets in view of tightening restrictions on insecticide residues on products. In addition, there is widespread resistance to DDT in mosquito populations in Africa, meaning that the pesticide does not offer a sustainable solution to their control.

As a result, since 2000, *icipe* has been working with WHO and UNEP to assist countries in Africa to reduce their reliance on DDT for malaria vector control, mainly through training on alternative IVM strategies. The Centre's researchers have participated in several COP meetings to articulate alternatives to DDT. *icipe* is also part of the 'Stop-DDT Alliance', which also includes the Washington-based Millennium Institute and the Biovision Foundation of Switzerland.

Q. How does the selection as a regional centre under the Stockholm Convention advance *icipe's* mission?

A. Under the Stockholm Convention, the global community has committed to reduce and eventually eliminate reliance on DDT worldwide by assisting countries adopt safer and more effective alternative malaria control approaches. *icipe* considers the up-scaling and integration of IVM strategies to be a key element towards this goal. However, the Centre recognises that many stakeholders working in mosquito and malaria control do not have the evidence, or the access to decision-making processes, that are key prerequisites for the adoption of IVM strategies.

The appointment of *icipe* as a Stockholm Convention regional centre provides the Centre with the opportunity to strengthen the capacity of partners in Africa towards the incorporation of IVM into national strategies. Since 2010, *icipe* has organised three major training workshops on IVM as an alternative solution to the use of DDT for malaria vector control. The first five-day session, held in June 2010, was attended by 18 public and environmental health specialists from nine countries in the eastern and southern African region. The workshop, which was facilitated by researchers from the Kenya Medical Research Institute (KEMRI), Kenyatta University and Kenya's Ministry of Environment and Mineral Resources, provided participants with technical skills on IVM. Importantly, the participants also visited the Mwea Rice Irrigation Scheme, an *icipe* malaria study site in central Kenya, where they observed the implementation of IVM strategies.

In March 2011, *icipe* organised a second 10-day training workshop for eight public health and environmental health specialists from Kenya, Tanzania, Zambia and Rwanda. The main objective of the workshop was to strengthen the capacity of countries to develop alternatives to DDT, in line with the Global Alliance mission. In addition, the sessions also aimed to provide technical skills on IVM as an alternative to harmful chemicals.

In August 2012, *icipe* and WHO organised a third workshop, this time on data collection, information exchange and informed decision-making on IVM. It was attended by national coordinators of the vector control programme and Stockholm Convention Focal Points from Ethiopia, The Gambia, Madagascar, Mauritius, Mozambique, Senegal, Swaziland, Uganda and Zambia. The workshop analysed the status in different countries regarding the management of DDT and other chemicals being used in vector control. The participants identified gaps, barriers and key elements required towards sound management of DDT. They also shared experiences in implementing disease vector control programmes within the IVM principles. The workshop facilitated the development of a work plan for the implementation of a project by WHO and the Global Environmental Facility (GEF), on the establishment of efficient and effective data collection and reporting procedures for evaluating the continued need of DDT for disease vector control.



Photo: Santiago Escobar

The appointment of icipe as a regional centre under the Stockholm Convention provides the Centre with the opportunity to lead the incorporation of IVM into national strategies in Africa, contributing to saving lives, especially those of children under five years, who are most susceptible to malaria.

In addition to the training workshops, in August 2012, *icipe* hosted the Fourth Interim Steering Committee Meeting of the Global Alliance for the Development and Deployment of Alternatives to DDT for Disease Vector Control. The main agenda of the forum was to evaluate cost-effective alternatives to DDT for disease vector control.

Q. What are some of future activities planned by *icipe* as a Stockholm Convention regional centre?

A. *icipe's* vision includes working with partners to develop national plans for the promotion and management of IVM as an alternative to DDT. The Centre also hopes to create linkages with government partners to ensure the consideration of IVM in national policies. A key part of the process will involve the development of a national core group of IVM managers and technicians as well as the strengthening of regional networking for information sharing. And of course, training, through workshops and field experience, will remain a key part of the *icipe's* approach.



Photo: Jandouwe Villingier

THRiVE: ENHANCING AFRICA'S HEALTH RESEARCH CAPACITY

In 2009, icipe joined a consortium known as the Training of Health Researchers into Vocational Excellence in East Africa (THRiVE), which brings together research institutions in Kenya, Uganda, Tanzania, Rwanda and the United Kingdom. Below, Dan Masiga, THRiVE Team Leader at icipe, discusses the motivation behind the initiative and its impact on the Centre's research capacity.

Africa's disproportionate share of the global disease burden is well documented. It is also widely acknowledged that in many parts of the continent, the scientific infrastructure and research training is largely weak and under-resourced. As a result, many African countries are unable to utilise modern technologies to address the

Photo caption: *icipe's research towards the control of mosquito-borne pathogens involves studies on the ecology of mosquito vectors. The THRiVE consortium is contributing towards this goal, by funding Thomas Ogao (pictured), an MSc student at icipe, to conduct critical studies on water parameters in mosquito breeding pools on the shores of Lake Victoria.*

health challenges that continue to take a huge toll on economic development.

Therefore, the strengthening of the indigenous scientific research base is one of the most urgent needs facing Africa. While a desirable approach would be to pool available resources, there have been few effective strategies for networking and collaboration among Africa's institutions of scientific research.

THRiVE is a novel effort that is responding to the critical requirement for regional research capacity by nurturing collaborative relationships between research facilities (www.thrive.or.ug). THRiVE is one of seven partnerships funded through a £30 million grant from the Wellcome Trust, under its African Institutions Initiative (www.africaninstitutionsinitiative.org), which aims at developing leadership and excellence amongst African professionals and institutions while reversing the trend of North-driven research agendas in the South.

The THRiVE consortium is led by Uganda's Makerere University, and in addition to *icipe*, other institutions involved include Gulu University and Uganda Virus Research Institute (UVRI), both from Uganda; the Kilimanjaro Christian Medical College (KCMC) and the Tanzanian National Institute for Medical Research (NIMR) in Mwanza; Rwanda's National University and from the UK the London School of Hygiene and Tropical Medicine (LSHTM) and the University of Cambridge.

These nine institutions have different characteristics in terms of their geographical location, their research strengths and their foundations. However, under the THRiVE consortium they are bound together by several key attributes, which include a quest to support world-class research in health sciences, the vision of empowering African institutions to develop their infrastructure, administrative and scientific staff capacity and the commitment towards strengthening South–South linkages bolstered by northern collaborators.

Driven by these factors, in the past three years, THRiVE has evolved from a concept, progressing closer to its vision. Indeed, the benefits of the consortium are now being realised at institutional level. At *icipe*, the impact of THRiVE is illustrated in four key outcomes, the first being the improvement of the Centre's research infrastructure. For



Photo: *icipe*

The THRiVE postdoctorate fellowship programmes enable young researchers to undertake part of their research at the University of Cambridge or at LSHTM. Sabina Wachira (left), a THRiVE Postdoctoral Fellow based at icipe, is pictured working in the laboratory of Dr David Spring at Cambridge, where she spent a month in 2012. With her is Dr Esther Aiza, a Postdoctoral Fellow in the laboratory.

THRiVE considers upcoming scientists, such as the ones pictured here in the *icipe* Information Resources Centre, to be a great asset in improving Africa's health research capacity. Therefore, one of the key goals of the consortium is the development of young scientific talent, by providing them with exciting research projects and mentors.

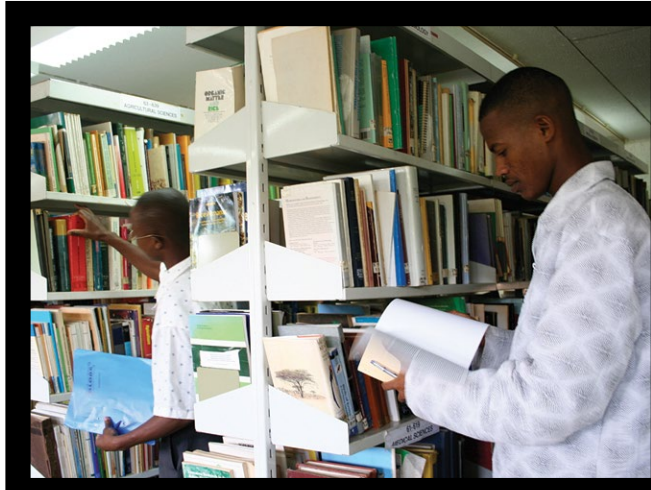


Photo: Santiago Escobar

instance, with support from THRiVE, *icipe* acquired key laboratory equipment, which includes a Liquid Chromatography Mass Spectrometer (LC-MS). This equipment is enabling the Centre's researchers to conduct their work more effectively. For instance, the scientists at *icipe* are using it to conduct studies on identifying aflatoxins in maize and on the chemicals that plants use to communicate with each other. The equipment also provides several long-term benefits, since the availability of advanced research infrastructure allows *icipe* to attract more projects and more support beyond THRiVE.

A second benefit is the contribution of the training provided by THRiVE towards *icipe*'s research management capacity. The Centre's researchers, administration and finance staff have attended sessions organised by the consortium, gaining additional knowledge and skills in identifying funding opportunities, writing and submitting proposals for grants and managing awards more effectively. The courses have also focused on issues of intellectual property relating to data rights, patents and trademarks.

Third, *icipe* has profited from one of the key goals of THRiVE, which is the development of young scientific talent. The consortium considers upcoming scientists to be a great asset in improving Africa's health research capacity, and envisions that investing in them will accelerate innovation, research and development. Therefore, THRiVE strives to provide outstanding young researchers with projects, environment, as well as mentorship opportunities that will stimulate their intellectual growth so that they can become internationally competitive and self-sustaining scientific leaders.

One of the components of this mission is a postdoctorate fellowships scheme, which is implemented jointly between the Africa and the UK based members of the consortium. Under the scheme, THRiVE matches outstanding young researchers with exciting projects on African priorities and a team of mentors over a wide range of disciplines. The young researchers are offered two-year fellowships with the possibility of spending up to eight months with their co-supervisors at Cambridge or LSHTM. THRiVE fellows therefore have access to a range of specialised training and transferable skills courses, lectures and seminars at the associated research institutes.

Currently, *icipe* is hosting one THRiVE postdoctoral fellow, Sabina Wachira, who joined the Centre in 2011. Her research tackles important questions regarding the egg-

laying and feeding behaviour of *Anopheles gambiae*, the main malaria-transmitting mosquito species in Africa. The knowledge generated from Sabina's research has significant potential in the control of the disease. At *icipe*, she is using the LC-MS equipment discussed previously to identify secondary metabolites ingested by mosquitoes from plants. In addition, in 2012, Sabina spent four weeks at Cambridge under the mentorship of Dr David Spring. The access to the University's research and its outstanding research capabilities has had a significant impact on the progress of her study. Based on the advances she has made so far, Sabina has now been awarded a grant by the Kenyan National Council for Science and Technology (NCST), which will enable her to proceed with her research even further. Importantly, the NCST award demonstrates the recognition by the Kenyan Government of THRiVE's contribution towards the improvement of research capacity in health sciences in the country.

A fourth illustration of the impact of THRiVE on *icipe* is two newly-established South-South collaborations. These initiatives have been facilitated by what are known as THRiVE pump-priming grants, which are awarded competitively to researchers in the consortium to facilitate the development of partnerships and new areas of research. The funding supports exchange visits between researchers, by catering for travel expenses, accommodation and research costs for up to six months. The aim of the visits is to enable researchers to collect preliminary data, so that they can later write proposals leading to larger grants. This strategy has helped *icipe* to establish a partnership with UVRI, focusing on the development of molecular tools for studying the population biology of mosquitoes that are vectors of arboviruses. The project is being led by *icipe*'s Jandouwe Villinger and Josephine Birungi from UVRI. Their preliminary research has already generated an additional PhD fellowship to undertake research in population genetics with funding outside THRiVE.

In summary, through improved infrastructure, training, increased collaboration and investment in young researchers, THRiVE is contributing to *icipe*'s health research activities. The benefits accruing from the consortium were particularly evident in June 2012, when *icipe* hosted the fourth annual general meeting (AGM) of THRiVE. The forum, which was attended by nearly 90 delegates, including health researchers, administrators and students from across the consortium and other regional and international institutions, was an important occasion to showcase *icipe*'s research

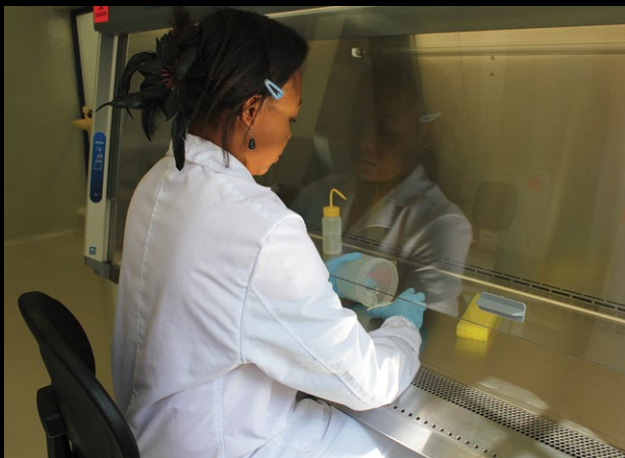


Photo: *icipe*

The THRiVE pump-priming grants, which are awarded competitively to researchers in the consortium, have facilitated the development of new collaborative research projects. For instance, Yvonne Obiekwe, a PhD student under the icipe ARPPIS programme, is conducting research on the genetics of mosquito vectors of arboviruses in collaboration with UVRI.

(Left to right) Dan Masiga, the leader of the THRiVE Consortium at icipe, Prof. Nelson K. Sewankambo, of Makerere University, Uganda, who is the Director of THRiVE and Prof. Shaukat Abdulrazak, Secretary and Chief Executive Officer of Kenya's National Council of Science and Technology (NCST), follow the proceedings of the THRiVE AGM, which was held at the icipe Duduville Campus in Nairobi, in June 2012. Hosting the meeting signified icipe's critical role in the consortium.



activities within and beyond THRiVE. The meeting was officially opened by the Secretary and Chief Executive Officer of Kenya's National Council of Science and Technology (NCST), Prof. Shaukat Abdulrazak, underscoring *icipes* ability to promote THRiVE in Kenya and beyond. During the meeting Prof. Abdulrazak expressed the Council's commitment to partner with the consortium to initiate sustainable science, technology and innovation (STI) programmes.

Based on the fact that THRiVE is having similarly important impacts on the other eight member institutions, the consortium has emerged as a key initiative in enhancing Africa's research capacity towards the control of key diseases.



Photo: Fabian Haas

CERNVec: CONTRIBUTING TOWARDS THE ERADICATION OF NEGLECTED DISEASES

Dan Masiga discusses how the icipe-led Community of Excellence for Research in Neglected Vector-Borne & Zoonotic Diseases (CERNVec) is contributing to the eradication of the ‘diseases of the poor’.

In recent years, there has been increasing global concern over the rise of neglected tropical diseases (NTDs). Also known as the ‘diseases of the poor’, NTDs are a group of infectious ailments that affect populations living in low-income areas of Africa, Asia and the Americas, with serious consequences on public health.

Most of the 17 NTDs listed by the World Health Organization (WHO (http://www.who.int/neglected_diseases/diseases/en/)) are vector-borne, where an arthropod is

Photo caption: *The interaction between people and domestic or wild animals enhances transmission of zoonotic diseases, a group of NTDs that have a significant impact on public health and veterinary services.*

responsible for transmitting the pathogen or disease-causing organism from one infected individual to another, or through an intermediate animal host to human beings. There are other NTDs, such as rabies, that affect human beings as well as animals, which are not transmitted by vectors. The NTDs that are of human and animal health significance are known as zoonotic diseases. NTDs include Rift Valley fever, dengue, yellow fever, schistosomiasis and African trypanosomiasis.

Almost invariably, NTDs affect poor and marginalised people who live in close contact with animals, largely in unsanitary conditions. In Kenya, according to official statistics, 50% of the population is at risk of at least one NTD. Indeed, in 2011, the Kenyan Ministry of Public Health and Sanitation (MoPHS) embarked on a mission to curb the menace by launching the 2011–2015 National Multi-Year Strategic Plan for Control of NTDs. In collaboration with other government and non-governmental institutions, MoPHS has also recently launched the Zoonotic Diseases Unit (ZDU).

The aim of CERNVec is to support the efforts of the government by establishing a community of excellence for research and capacity building in neglected vector-borne and zoonotic diseases in Kenya. Funded by the Consortium for National Health Research (CNHR – www.cnhrkenya.org), the network is led by *icipe*, with MoPHS, Kenya Medical Research Institute (KEMRI), Kenyatta University (KU) and Jomo Kenyatta University of Agriculture and Technology (JKUAT) as partners.

CERNVec brings together various complementary skills, expertise and existing structures towards several goals. One of its key aims is to promote linkages between research and policy development. CERNVec also endeavours to build institutional and individual capacity by facilitating acquisition of the necessary equipment, sharing of resources and knowledge. In part, this objective will be achieved through collaborative research, implemented through postdoctoral fellowships, visiting scientists and associate schemes, which will enable partners to share facilities. For instance, CERNVec partner institutions will have access to *icipe*'s new Martin Lüscher Laboratory for Emerging Infectious Diseases, located at the Centre's headquarters in Duduville, Kasarani, Nairobi. The facility, which was constructed with financial support from the Swiss and German governments, is one of the few laboratories in Africa that provide most of the vital infrastructure for research on NTDs.



Photo: *icipe*

Geofrey Jagero (left), the manager of the Martin Lüscher EID Laboratory, is pictured with Martin Mbaya, a Research Assistant at icipe, using a Roche MagNA Pure 96 System robot, which facilitates the extraction of nucleic acids from a large number of samples. CERNVec promotes complementation of resources among researchers, towards shared R&D objectives.

A Maasai herdsman grazing his cows. The use of GIS tools by CERNVec members will assist in the consolidation of data on environmental factors, the distribution of vectors and information on the vulnerability of people and animals to NTDs.



Photo: Santiago Escobar

Further, CERNVec aims to provide mentorship to researchers so as to create leaders of research in neglected zoonotic diseases. This goal is being addressed in a variety of ways, including tailor-made professional development courses on modern NTD research technologies. The training, which is stipulated by the requirements of CERNVec partnering institutions, covers key areas such as molecular diagnostics and pathogen discovery from vectors, and their biology and chemical ecology. The knowledge is disseminated through formal lectures as well as practical sessions in the laboratory, and in the field in collaboration with communities at risk of NTDs.

Of exceptional importance to CERNVec is the use of geographic information systems (GIS), as a key tool for understanding the dynamics of neglected vector-borne & zoonotic diseases. The strength of GIS lies in its ability to integrate data from various perspectives to investigate medical, environmental and socio-economic aspects of diseases. For instance, through the use of GIS, environmental data, the distribution of vectors and information on the vulnerability of people and animals, can be analysed holistically. As a result, GIS makes it possible to map and visualise the distribution of diseases as well as the populations at risk. GIS also helps to document spatial and temporal trends of diseases and the risk factors involved, providing valuable information that is used in designing approaches to management. It therefore facilitates the modelling of the geographic distribution of diseases and the development of early warning and response systems.

icipi is collaborating with the Department of Geography at Kenyatta University to develop GIS expertise within CERNVec. One of the key activities is capacity building in the use of GIS tools and techniques for researchers and health workers. For instance, in 2011 and 2012, hands-on GIS training workshops were held at *icipi* and at Kenyatta University to train representatives from MoPHS' Division of Disease Surveillance and Response (DDSR) in the practical use of GIS tools and software. During the workshop, the participants observed demonstrations on the use of spatial data and discussed their application in public health. One of the sessions focused specifically on the ways in which the data captured by DDSR can be used to map disease hotspots in Kenya. The participants also deliberated on the ways in which DDSR's data system can be improved. CERNVec is supporting DDSR with the technical assistance it needs to implement the necessary changes.

In future, the CERNVec GIS group aims to improve data management by developing a data server for real time disease data management and mapping. The objective is to develop the system into a knowledge-sharing platform, which will ease access to resources using data portals and other networks, to enhance the regional capacity in spatial epidemiology. The group also hopes to develop a curriculum for GIS in health applications and research, and to offer more hands-on and E-learning courses and training.

Overall, CERNVec recognises that the management of NTDs is a complex process. However, the accomplishments being made through the network so far strongly indicate that sustainable solutions for NTDs lie in working together, pooling resources and complementary expertise. CERNVec is, therefore, an important piece in the puzzle towards the development, adaptation and implementation of the tools that will contribute to the eradication of NTDs.



Photo: Santiago Escobar

***icipe* ENHANCES COLLABORATION IN AGRICULTURAL RESEARCH**

icipe Director General, Christian Borgemeister, discusses the Centre's increasing efforts towards strengthening Africa's agricultural research and development agenda, while making technologies and strategies more accessible to the communities most in need of them.

In Africa, agriculture and food security remain constrained by several factors, which include pests and diseases, water scarcity and poor soil health. The impacts of climate change are expected to be magnified, and to exacerbate problems, in already vulnerable agricultural systems. Unfortunately, many smallholder farmers, on whom most agricultural activity in Africa depends, lack access to the appropriate technologies and strategies to address existing and emerging constraints.

Photo caption: The front view of the *icipe* R&D complex in Nairobi. The research being undertaken in the laboratories housed within this building is vital to the development of integrated pest management strategies.

Since many of the agricultural hindrances in Africa extend beyond agro-ecological zones and national boundaries, collective regional action towards developing and disseminating solutions is becoming even more important. For this reason, *icipe* is increasing its efforts towards collaborative efforts by creating formal arrangements that will enable the Centre to incorporate its integrated pest management (IPM) strategies with the activities of like-minded institutions across the continent.

icipe's efforts towards this goal are illustrated through two partnerships signed recently. The first is a memorandum of collaboration (MoC) signed with the International Institute of Tropical Agriculture (IITA - www.iita.org), a centre of the Consultative Group on International Agricultural Research (CGIAR), in December 2011. The MoC formalises what has been an informal relationship between *icipe* and IITA, extending over many years and several projects. Established in 1967 and headquartered in Ibadan, Nigeria, IITA, much like *icipe*, is among the leaders in the quest for solutions to hunger, malnutrition and poverty in Africa. The arrangement is timely, as it comes at a time when IITA has aligned its research strategy to the new CGIAR Research Programmes (CRP). It will therefore allow *icipe* to work more closely with IITA and other CGIAR centres.

For instance, *icipe* is a partner in 'Integrated Systems for the Humid Tropics' (<http://humidtropics.org>), a new CRP that was launched in November 2012 under the leadership of IITA, with the aim of increasing average farm income in the vast hot and wet areas around the equator. Other partners in the project include several CGIAR Centres, for instance, the International Livestock Research Institute (ILRI), World Agroforestry Centre (ICRAF), International Potato Center (CIP), Centro Internacional de Agricultura Tropical (CIAT), Bioversity International and International Water Management Institute (IWMI). Also involved is the Forum for Agricultural Research in Africa (FARA), The World Vegetable Center (AVRDC) and Wageningen University in The Netherlands.

Home to millions of people, the agricultural systems in the humid tropics include integrated tree crops-based systems such as cocoa plantations in West Africa and banana-based systems in East and Central Africa. Therefore, the humid tropics are potentially significant food sources, which could help to meet Africa's own needs and contribute to global food security. The regions are also key to the maintenance



Photo: O Adebayo, IITA

Dr Ylva Hillbur, IITA Deputy Director General, Research for Development, plants a tree at the IITA Campus in Ibadan, Nigeria, to mark the launch of the Integrated Systems for the Humid Tropics. icipe is a partner in this programme, which will assist poor farming families to boost their agricultural productivity while conserving the land for future generations.

A thriving push-pull field in western Kenya. The technology is one of the strategies being disseminated under ISMA, with the aim of helping over 250,000 smallholder farmers in SSA cope with the constraints posed by *Striga*.



Photo: icipe

of global biodiversity and in the mitigation of greenhouse gases. However, many of these regions are currently characterised by both poor soil fertility and household nutrition. The humid tropics programme aims to assist poor farming families to boost their agricultural productivity while conserving the land for future generations. The programme is also expected to serve as a model for other initiatives seeking to link research on agricultural systems to developmental impact.

icipe's second recent collaborative effort in agricultural research is a partnership agreement signed in March 2012 with the African Agricultural Technology Foundation (AATF - www.aatf-africa.org). Founded in 2002, the Foundation facilitates and promotes public/private partnerships towards making appropriate agricultural technologies more accessible to resource-poor smallholder farmers in sub-Saharan Africa (SSA).

The partnership between *icipe* and AATF was developed under ISMA – Integrated *Striga* Management in Africa – a four-year project launched in June 2011 to develop a package of *Striga* control options for smallholder farmers in Kenya and Nigeria. Other partners in ISMA, which is supported by the Bill and Melinda Gates Foundation, include IITA, the International Centre for Maize and Wheat Improvement (CIMMYT), the Tropical Soil Biology and Fertility Institute of CIAT (TSBF-CIAT), the Kenya Seed Company and a variety of community based organisations (CBOs).

Also known as the witchweed, *Striga* is a highly invasive parasitic weed that infests about 49 million hectares of land devoted to cereal production in Africa causing economic losses in excess of \$1.2 billion annually. *Striga* is a leading cause of food insecurity and rural stagnation in Africa as it reduces the production of the most economically important cereal crops — maize, sorghum, rice and millet — by between 30 and 100%. Indeed, it is not uncommon for farmers to lose entire crops, or to abandon their fields altogether, due to severe *Striga* infestation. Unfortunately, the problem of *Striga* is continuing to extend to new areas in SSA, while effective control of the weed remains largely elusive.

ISMA aims to improve, integrate and make more accessible *Striga* control methods developed by the different project partners. Among the technologies being evaluated and implemented is *icipe's* push-pull (www.push-pull.net). The technology involves

intercropping cereals with a repellent plant such as desmodium, and planting an attractive trap plant, such as Napier grass, as a border crop around the intercrop. Stemborers are repelled or deterred away from the target food crop (push) while, at the same time, they are attracted to the trap crop (pull), leaving the food crop protected. In addition, desmodium stimulates the germination of *Striga* seeds and inhibits their growth after it germinates. The technology protects cereals from stemborer attack and the parasitic *Striga* weeds and provides livestock forage since the companion crops are high quality animal fodder. Furthermore, since both companion plant species are perennial, push-pull conserves soil moisture and improves soil health as well as beneficial biodiversity.

Since the start of ISMA, almost 6,000 additional farmers in the western region of Kenya have access to push-pull. Moreover, community seed producers and seed companies have produced and disseminated about 2.1 tonnes of desmodium seed to farmers, and more than 8,000 farmers have received training on push-pull.

Other technologies being integrated under ISMA include high-yielding maize varieties, soya bean rotation and imazapyr herbicide-tolerant mutant maize (IR maize). Developed by CIMMYT and partners, the IR-maize seeds, which have been commercialised under the trade name StrigAway®, are coated with the herbicide, which kills the *Striga* as it attempts to attach itself to the maize roots.

ISMA project partners are working with the Ministries of Agriculture of Nigeria and Kenya to mainstream the use of the package of *Striga* control technologies into its extension programmes in order to reach more farmers. The project will be scaled out to other SSA countries with similar ecologies, where *Striga* is also a major concern to maize and cowpea production systems, aiming to benefit 250,000 farmers.

Based on the current and envisioned success of the agreements between *icipe*, IITA and AATF, the Centre is convinced of the importance of collaboration towards strengthening the research and development agenda in Africa. This strategy will contribute to the ultimate goal of making agricultural technologies and strategies more accessible to the communities most in need of them.



icipe – Working in Africa for Africa...

icipe – African Insect Science for Food and Health – was established in 1970 in direct response to the need for alternative and environmentally friendly pest and vector management strategies. Headquartered in Nairobi, Kenya, *icipe* is mandated to conduct research and develop methods for pest control that are effective, selective, non-polluting, non-resistance inducing, and affordable to resource-limited rural and urban communities. *icipe's* mandate further extends to the conservation and utilisation of Africa's rich insect biodiversity.

icipe focuses on sustainable development, including human health, as the basis for development, and the environment, as the foundation for sustainability. Working through a holistic and integrated approach through the 4Hs paradigm – Human, Animal, Plant and Environmental Health – *icipe* aims at improving the overall well-being of communities in tropical Africa by addressing the interlinked problems of poverty, poor health, low agricultural productivity and degradation of the environment.

Cover photos:

Top left: Africa's agriculture and food security remains constrained by several factors, which include pests and diseases, water scarcity and poor soil health. *icipe* is enhancing its collaborative efforts towards the strengthening of the research and development agenda in Africa, with the ultimate aim of making agricultural technologies and strategies more accessible to the communities most in need of them.

Top right: *icipe* considers the development of young scientific talent critical towards addressing Africa's health and food security challenges. Therefore, the Centre is partnering with like-minded institutions in the South and in the North to identify and nurture emerging researchers.

Bottom left: Over the years, *icipe* has developed a variety of environmentally safe, integrated management strategies to control the myriad pests and vectors that exist in Africa.

Bottom right: *icipe's* collaborative activities will contribute towards mitigating the immense threat posed by vectors and vector-borne diseases to the productivity of livestock, and the livelihood of livestock keepers.