

Spot light.

Celebrating
women farmers

PAGE 14

**CO-CREATING
HEALTH EQUITY**

Insights from Microsporidia MB
malaria control research in Africa

PAGE 05

**MORE THAN A
SCHOOL MEAL**

Using insects to nourish children
and support agrifood systems

PAGE 09

Acknowledgement

icipe gratefully acknowledges the financial and technical support of our core donors: Government of Norway; German Federal Ministry for Economic Cooperation and Development (BMZ) commissioned by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through the Fund International Agricultural Research (FIA); Australian Centre for International Agricultural Research (ACIAR); Swedish International Development Cooperation Agency (Sida); and Government of the Republic of Kenya (Ministry of Education, State Department of University Education and Research). We also recognise specific restricted project donors, as presented at the end of this publication.

Concept and Editorial Lead: Dr Liz Ng'ang'a

Contributors: Dr Liz Ng'ang'a, Jemima Mukasa, Jemal Giday and Fetiya Ahmed (*icipe*); Susanna Cartmell, Georgina Smith and Olivia Frost (WRENmedia Ltd)

Review: Dr Abdou Tenkouano, Dr Sunday Ekesi and Kidest Tita

Editing and Proofreading: Dr Idupulapati Rao and Olivia Frost

Design and layout: Olivia Frost and Brian Mwash

***icipe* Communication Task Force members:** Dr Sunday Ekesi, Dr Julius Ecuru, Veronica Waiyaki and Mary Ngure

We appreciate the immeasurable contribution of the entire *icipe* team, and numerous partners and collaborators, to this report.

Cover photo: Mrs Mary Kamutu, from Kinangop, Kenya's major potato growing region, displays high yielding, potato cyst nematode (PCN)-resistant varieties, introduced by *icipe* and IITA.

All photos belong to *icipe* (except where otherwise specified), and have been used with permission. Page 3, 10, 13 and 14 photo credit: MAMAH project, Uganda. Page 23 photo credit: Lal Honey.

©2026 — International Centre of Insect Physiology and Ecology (*icipe*)

Citation:

icipe (2026). *icipe Spotlight — Stories of Resilience and Transformation*. Volume 2, Issue 2. International Centre of Insect Physiology and Ecology.

ISSN 2309-3838 | ISBN 978-9966-063-72-4

International Centre of Insect Physiology and Ecology (*icipe*)
PO Box 30772-00100 Nairobi, Kenya
icipe@icipe.org
www.icipe.org



Table of Contents

Foreword	04
Global Health	
Co-creating health equity	06
Insights from <i>Microsporidia MB</i> malaria control research	
Environment and Biodiversity	
More than a school meal	10
Using insects to nourish children and support agrifood systems	
Agrifood Systems	
Celebrating women farmers	15
For sustaining Africa's food systems	
Climate Change Mitigation and Adaptation	
Restoring lives and landscapes	20
Women beekeepers building sustainable lives and landscapes	
Policy and Enabling Environment	
Edible insects standards launched in Africa	24
<i>icipe</i> , ARSO and partners advance Africa's insect-based bioeconomy	
Donors and partners	29



Dr Abdou Tenkouano
Director General
icipe

Foreword

Dear Friends and Colleagues,

It is a great pleasure to welcome you to the second edition of the *icipe Spotlight* magazine. We launched this publication in 2025 with a special goal: to bring to life our science and discoveries and, importantly, their transformative impact on nature and society.

This issue offers a glimpse of the early outcomes of the *icipe Vision and Strategy, 2026–2030*. Through five stories, we illustrate how we are advancing global health security, agrifood systems transformation, environment and biodiversity conservation, climate change, mitigation and adaptation, and policy and enabling environment.

As 2026 marks the United Nations International Year of the Woman Farmer, our cover story celebrates women farmers and their vital contribution to agrifood systems. Through the testimonials of four women farmers from Ghana, Kenya, Rwanda and Tanzania, we show that with equitable opportunities, knowledge and tools, women thrive and communities prosper.

Drawing on *icipe's* research on *Microsporidia MB*, an emerging malaria control tool, we demonstrate how the Centre is co-creating health equity with communities and stakeholders, advancing Global Health.

Across Africa, home-grown school meals programmes are gaining importance. We showcase the potential of edible and beneficial insect biodiversity to nourish young learners while strengthening local food production and resilient environments.

From Ethiopia, we bring a heartwarming story of how integrated beekeeping is enabling young women to rebuild their lives, restore degraded landscapes and build climate resilience.

In a landmark policy moment, in 2025, *icipe*, African Organisation for Standardisation (ARSO) and partners launched the African Standards for Edible Insects. We chronicle the journey to this milestone, its impact on Africa's emerging insect-based bioeconomy, and lessons for policy development.

Thank you for your time, support, and for being a witness to the reality of transformative power of insect-based, nature-positive innovation. We gratefully look forward to your continued support.

Spotlight is a metaphor of *icipe*'s desire to illuminate our scientific breakthroughs and the lives they touch. While we celebrate our contribution to the global knowledge hub, our deepest fulfilment is in witnessing how the knowledge and innovations transform lives and foster resilience.

Co-creating health equity

Insights from *Microsporidia* MB malaria control research

At first glance, Takawiri Island, in the north-eastern corner of Lake Victoria, appears to be a peaceful retreat. Palm trees and white beaches surround a small fishing community in Homa Bay County, Kenya. But daily life is shaped by the lake and the mosquitoes that thrive in its hot, humid environment, exposing residents to bites day and night. Yet change is underway.



Photo: Anthony Mutai, Research Officer, icipe, in discussion with Linet Juma, a Community Health Practitioner from Takawiri Island.

For the past three years, the community has been involved in *icipe* research exploring a new approach to malaria control based on a naturally occurring microbe, *Microsporidia MB*. Discovered by *icipe* researchers in 2020, the microbe can block malaria transmission from mosquitoes to people.

The innovation is still under development, but the research is already changing how people understand and respond to malaria. The people of Takawiri are gaining knowledge and confidence, while taking a more active role in understanding the risks they face and shaping the research being conducted in their community.

For young community member Bill Clinton Orao, taking part has changed how he sees the threat of malaria and what can be done about it. “It has transformed me,” he says. “I realised there are activities we can do and measures we can take to limit risk from mosquitoes.” Simple measures, from clearing vegetation around homes to covering stored water, are helping people reduce their exposure to mosquitoes.

This growing ownership illustrates a central principle of *icipe*’s Global Health approach: people affected by health challenges have a role in shaping the solutions.

Global health

Global Health is one of the five impact domains in the *icipe Vision and Strategy 2026–2030*. For *icipe*, it brings together scientific innovation with two interconnected pillars: Health Equity and Health Systems Strengthening. The first focuses on ensuring that marginalised and underserved groups can access health solutions and play a part in shaping them. The second strengthens the people, institutions and capacity needed to deliver and sustain those solutions over time.

For Dr Dan Masiga, Head, Human Health Theme, *icipe*, co-creation is central to this approach. “Global Health looks at health equity and I think that is where co-creation with community engagement comes in.”

Developing a scientific solution is only part of the challenge. As Dr Masiga stresses, “Having a solution doesn’t mean it will get used.” Communities, ministries and frontline workers need to be involved, while strong local research capacity and ownership help ensure solutions can be sustained over time.

“At *icipe*, Global Health draws on a One Health approach, recognising that human health is interconnected to animals, plants and the environment. This means developing new tools with an understanding of the ecological and social settings.”



A novel solution for malaria

Malaria still takes a heavy toll on families and communities across Africa, affecting health, livelihoods and everyday life. Existing control measures remain vital, but insecticide resistance and exposure to mosquitoes outside the home leave important gaps in protection. Researchers are therefore looking for additional ways to interrupt transmission.

One promising approach is *Microsporidia MB*, a microbe that lives naturally inside mosquitoes and blocks the malaria parasite from developing. Rather than killing mosquitoes, it prevents them from passing malaria on to people. The microbe can also spread through mosquito populations, including from mothers to their offspring, which could offer a more sustained way to reduce transmission.

> 70%

reduction in malaria parasite levels in wild mosquitoes carrying *Microsporidia MB*



The story of *Microsporidia MB* began in western Kenya, where *icipe* researchers worked with local communities to collect mosquitoes and understand how malaria transmission happens under real-world conditions. Some of the field mosquitoes did not become infected with malaria parasites despite being exposed to them, prompting the team to investigate further and ultimately identify the microbe.

Detecting *Microsporidia MB* requires high-power microscopy or DNA-based methods, bringing advanced laboratory science together with field research in the communities where malaria transmission occurs.

"It required being curious about what is happening, going to the field, ground zero for malaria transmission, and doing the work there," says Dr Jeremy Herren, Senior Scientist, *icipe*.

As *Microsporidia MB* is already present in wild mosquito populations, *icipe* is now investigating how its presence could safely and effectively be increased. The eventual intervention could involve mosquito releases, spore dissemination, environmental management or a combination. Which approach is taken will depend both on the scientific evidence and on what communities find acceptable. The aim is to complement, rather than replace, existing malaria-control measures.

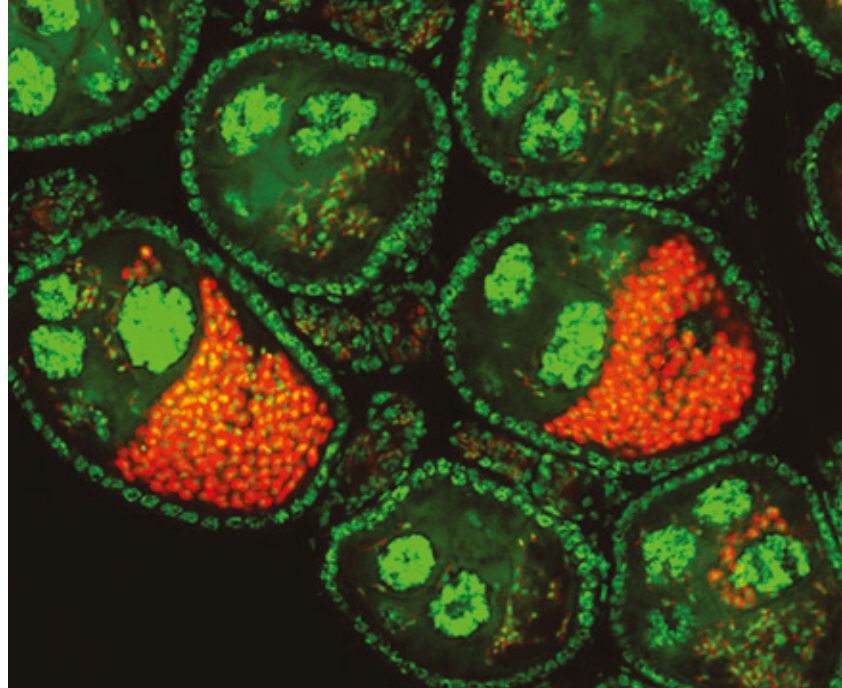


Photo: *Microsporidia MB* in female reproductive organs

Co-creating innovation

Across five counties of Bungoma, Homa Bay, Kwale, Turkana and West Pokot, the *icipe* research team has used community meetings, focus groups, one-to-one interviews and photovoice, with local people acting as co-researchers to document daily life and malaria challenges. Different groups, including women, men, young people, Community Health Promoters (CHPs) and expectant mothers, have been engaged separately, creating spaces where people can speak openly and bring different perspectives into the research.

On Takawiri Island, people have shared knowledge of where mosquitoes breed, rest and feed, and how fishing and daily routines affect exposure. Their experiences, concerns and priorities are helping shape discussions about how *Microsporidia MB* might eventually be used.

Dr Tullu Bukhari, Scientist, *icipe*, explains how this feedback influences the science itself. Concerns about possible effects on livestock, for example, have reinforced the need for evidence on whether *Microsporidia MB* affects other organisms. "Co-creation feels like it is slowing you down and you have to keep on adjusting your research to the feedback that is coming in," she says. But by doing this alongside the scientific development, "you know that this is going to be acceptable" when a potential solution is ready.

The process is also strengthening the people who connect research with communities and health services. CHPs provide a particularly important link between researchers, health services and the people they serve. Linet Juma, a CHP on Takawiri Island, says the partnership has strengthened her knowledge of malaria and her ability to engage with her community. "People have trust in me. When they have problems, they reach out to me."



Photo: The use of photovoice, combining photography and storytelling, is empowering community members as co-researchers in the project.

Homa Bay County's health team has also been involved from the outset, helping to select study sites, engage communities, support approvals and contribute local knowledge. Dr Thedeus Owiti, Research and Innovation Coordinator, Homa Bay County, contrasts this with previous relationships between research and local health authorities.

"In the past, we were scavengers of information," Dr Owiti says. "This time, we have walked the journey together and participated in generating knowledge, not just as consumers of the information."

Regulators have also been involved from an early stage. Joyce Imende, Head, Biodiversity Section, National Environment Management Authority (NEMA) Department of Compliance, Enforcement and Field Operations, recalls: "Our journey with *icipi* started when they came seeking guidance to understand the legal formats. We took them through the regulatory requirements."

NEMA's compliance framework has since become part of the co-creation process, bringing environmental assessment, public participation, community consent and benefit-sharing into the research as it develops, rather than only when a technology is ready for approval.

From discovery to impact

With communities, county health teams and regulators already helping to shape the research, *icipi* is continuing to build the evidence needed to determine how *Microsporidia MB* could be used safely and effectively in different ecological and social settings.

This is Global Health in practice: developing promising science alongside the people and institutions who will help determine whether and how it can become a locally owned and sustainable solution.

As Dr Masiga puts it: "We do not work for ourselves. We work for the communities that we seek solutions for."

Way forward

- 1 Build the scientific evidence needed to determine how *Microsporidia MB* can be safely and effectively increased in mosquito populations and sustained over time.
- 2 Assess potential approaches, including mosquito releases, spore dissemination and environmental management, to identify options that are scientifically robust and acceptable to communities.
- 3 Continue co-creation across Bungoma, Homa Bay, Kwale, Turkana and West Pokot, with community perspectives and informed consent shaping any future field testing.
- 4 Strengthen community and institutional readiness, working with CHPs, county health teams, national malaria authorities and regulators.
- 5 Complete the regulatory and environmental processes needed to support future testing of the most appropriate intervention approach.
- 6 Generate evidence across different ecological and social settings to guide potential scale-up, while positioning *Microsporidia MB* alongside existing malaria-control measures.

More than a school meal

Using insects to nourish children and build agrifood systems resilience

Across Africa, school meal programmes are being increasingly recognised as a strategic public investment in children's education, health and broader national development. There is also growing awareness that sustainable models, such as Home-Grown School Meal programmes that provide nutritious food sourced directly from local farmers and suppliers, have far-reaching benefits. They diversify children's diets while supporting agrifood systems, livelihoods, environmental and climate resilience. icipe is demonstrating how beneficial and edible insects, and the ecosystem services they provide, can contribute to more nutritious, sustainable and locally-rooted school meal programmes.

Edible insects are nutrient rich and can provide high-quality protein and beneficial fats, particularly in diets that rely heavily on staple foods. Insects also strengthen the production systems behind Home-Grown School Meals. Turning this potential into practical solutions for school meals requires sound science, technology, innovations and partnerships that connect food production, nutrition, education, enterprises and commercialisation. icipe and partners are contributing to this vision through several aspects, including: supporting edible insect farming within schools; integrating insect farming with other climate-resilient farming approaches and value chains; and helping vulnerable communities produce nutritious food.

Photo: A team member of the Mothers Against Malnutrition and Hunger (MAMAH), Uganda, as part of efforts to improve access to nutritious school meals through locally-produced mealworms.



From training to transformation

At Nambale Magnet School in western Kenya, a model is emerging that shows how edible insect farming can become part of a wider, circular food and learning system. Founded 16 years ago, the school empowers women and children through education and practical skills, providing quality primary education for vulnerable children while its farm generates income and supports agricultural training.

When *icipe* researchers first visited in June 2024, the school's original black soldier fly facility had collapsed, and the farm manager, Esther Nafula, had struggled to find reliable technical advice.

"Successful black soldier fly farming starts with the right knowledge, the right training and the right information," says Dr Shaphan Chia, Scientist, *icipe*.

icipe invited Ms Nafula to Nairobi for hands-on training in black soldier fly breeding, feeding, harvesting and processing. The Centre also provided basic equipment and starter kits containing black soldier fly larvae to establish a new facility, alongside technical support.

Two years later, a circular system is in place. Organic vegetable and crop waste is used to rear black soldier fly larvae, providing protein-rich feed for poultry and pigs. The larvae also produce frass fertiliser, which

improves soil health and supports the production of vegetables and cereals. The school's beehives provide both pollination and honey.

The crops and animal produce are all important components of the school's nutritious meals, which are served to about 800 children and staff each day, including more than 550 vulnerable children.

The farm has become what Dr Chia calls an "interactive life classroom". Learners work in groups, taking responsibility for individual crops, from planting to harvest, while learning how frass fertiliser nourishes the soil and supports healthy crop production.

The lessons travel home. Several parents have visited the school and begun applying the practices themselves. With *icipe*'s support, the school is also becoming a local training hub, with 500 women and young people already trained in black soldier fly farming.

"We are not only building the capacity of producers, but also 'trainers of trainers' who will ensure that the knowledge is disseminated widely," says Dr Chia.

The aim, he says, is to create "agents of change", helping communities increasingly "solve their local problems without necessarily importing solutions into the area."

Photo: Esther Nafula, Farm Manager, Nambale Magnet School, giving learners hands-on experience of insect-based food production.



Integration from farm to fork

In 2024, *icipe* and the Alliance of Bioversity International and the International Center for Tropical Agriculture (The Alliance), through the Pan-Africa Bean Research Alliance (PABRA), commenced a partnership to integrate bean and fruit-tree production with insect-based innovations, including beneficial insects, edible insect farming and other climate-smart technologies.

The initiative builds on PABRA's decades of expertise in bean breeding, while *icipe* spearheads the insect science, technology and innovation aspects.

At the farm level, insect-based innovations such as frass fertiliser and biological control tools for pests, strengthen bean and fruit-tree production, while bees pollinate crops and provide honey and hive products for sale. "This integration happens across the entire value chain, from production on the farm, all the way to the table and fork," says Dr Ayuka Fombong, Scientist, *icipe*.

In Arusha, BIVAC Tanzania Company, a food processor, developed a bean flour porridge for schools. The researchers have built on this product by developing a prototype that combines bean flour and grasshopper powder. The approach incorporates insect-based ingredients into local food cultures rather than imposing a single formula everywhere.

"Some of the innovations that people did not think could work together actually work best," says Dennis Ong'or, Monitoring, Evaluation and Learning Specialist, The Alliance. "By integrating bean flour with insect-derived products, a child gets a far more complete diet than any one intervention could provide on its own."

The initiative's approach also reaches beyond the plate. "It's not just bringing nutritious food to the children, but it's also teaching them at an early age how they can produce it," says Dr Fombong. School gardens give pupils first-hand experience of growing food, while some schools are also introducing beekeeping and other insect-based food initiatives.

In Rwanda, the school-production model is being tested in three districts, with government interest in a wider rollout. Kenyan counties have also shown interest.

Currently, the initiative's school meals activities have reached around 460,000 learners in 550 schools across 15 countries.



Photo: Nyota and Angaza beans, developed by Pan-Africa Bean Research Alliance (PABRA) and Kenya Agricultural and Livestock Research Organisation (KALRO), are rich in protein, iron and zinc. Combined with fruits, such as mangoes, and insects, like crickets, they can help provide nutritious, diverse diets.

From school meal to community ownership

icipe and partners are testing approaches to enable vulnerable communities to become nutritionally self-reliant, using edible insects. For example, in Kyaka II Refugee Settlement, Uganda, children face severe nutritional pressures: 55.4% of under-fives are stunted, while families have limited access to land, income and nutritious food. A nutritious school meal can make a critical difference to what children eat each day.

"We were looking for innovative ways to go beyond just simply providing food, and for an approach that would enable the communities to produce nutritious food themselves," says Dr Violet Gwokyalya, founder and CEO, Mothers Against Malnutrition and Hunger (MAMAH), a Ugandan organisation working to tackle malnutrition among vulnerable communities. In partnership with *icipe*, through a project running between 2022–2026, MAMAH is testing the potential of insect-based food biofortification.

To test the nutritional benefits of the mealworm-fortified porridge, the researchers conducted a 14-week randomised controlled trial involving 342 children aged six to nine at two primary schools, one in Kyaka II Settlement and the other in a neighbouring host community. Children receiving mealworm-fortified porridge showed measurable gains in height and fat-free body mass compared with those given conventional maize porridge.

Once the trial ended, school meals had to pause while the project built up its mealworm colony to meet growing demand. Parents and district authorities began asking when the porridge would be available again.

“Where is that porridge fortified with insects that our children have been passionately enjoying?” parents asked, recalls Dr Gwokyalya. The introduction of nutritious insect-enriched porridge, she says, was helping to improve children’s attendance at school.

That interest soon spread beyond the school meal. At one school, parents began contributing to the mealworm-based porridge initiative by supplying household waste, cassava and potato peelings to support increased production and availability of the highly popular mealworm powder. More than 200 households are now rearing mealworms, with early producers teaching others and some beginning to sell surplus locally for use in mealworm-fortified porridge at household level in the community.

“They really took ownership of the school meals initiative,” says Dr Gwokyalya.

For Dr Gwokyalya, this points to a wider shift from food assistance towards local capacity: “When we equip [communities] with the right technologies and knowledge, they can drive their own transformation.”

icipe Scientist, Dr Dennis Beesigamukama, explains that the refugee host communities are also integrating insect farming into their local agrifood systems. They have established vegetable gardens producing kale, spinach, amaranth and cabbage, using frass fertiliser to support production for home consumption and sale to nearby households and markets. They have also designated specific days for harvesting, preparation and consumption of mealworm-based foods.



Photo: Measuring children’s growth status before they receive mealworm-enriched porridge as part of the RefIPro study in Kyaka II refugee settlement, Uganda.

Data panel

87m

children received school meals in sub-Saharan Africa in 2024 (WFP, 2025).¹

15

African countries targeted to be reached through the integrated bean, beneficial insects, edible insects and fruit-tree initiative.

60.7% protein, 12.3mg of iron and 23.7mg zinc, per 100g dry weight, in *Gryllus bimaculatus*, commonly known as the two-spotted cricket or African field cricket; an edible insect species widely consumed across the continent.

6,000

chicken, 50 pigs, 26 dairy cattle, alongside fodder and vegetables, beekeeping, black soldier fly rearing, are being produced through the Nambale Magnet School circular economy system.

+0.24cm

additional height gain among children receiving mealworm-enriched porridge in a 14-week trial.

¹ WFP. 2025. State of School Feeding Worldwide 2024. Rome.

Way forward

- 1 The integrated beans, beneficial insects, edible insects and fruit-tree initiative will be scaled through private-sector partnerships.
- 2 The **15 harmonised continental standards for edible insects as food and feed** provide an important platform for wider uptake, supporting safe production and market development.
- 3 The training facility at Nambale Magnet School demonstrates a hub model for circular food and learning system with community-level impact, which could be adopted by other institutions.
- 4 *icipe* and partners are conceptualising new areas of research on the impact of insect-based school meals, including studies on cognitive outcomes, serum zinc levels, long-term health and economic impacts, as well as cultural adaptability and acceptability.
- 5 The highlighted initiatives have helped to develop protocols, for example on insect-based food formulation. Alongside awareness creation of the protocols, training of local trainers in the relevant technologies will support wider uptake, enabling schools and community hubs to adopt these innovations.

Photo: The yellow mealworm, *Tenebrio molitor*, is a nutrient-rich food source, containing 34.7% protein by dry weight, alongside important micronutrients such as iron and zinc.



03

SPECIAL FEATURE

Celebrating women farmers

As the world marks the United Nations International Year of the Woman Farmer (IYWF 2026), at icipe we are recognising the millions of women farmers who partner with our Centre. We celebrate them because their labour sustains Africa's food systems. Their resilience, leadership and vision shape our present and will define our future. Here, we feature personal narratives of four women farmers who represent many others from across Africa and beyond. These stories strengthen our commitment to gender empowerment and our optimism that when women thrive, communities prosper and progress becomes unstoppable.



Wankambeta Daudi Shalua

Sangananu village, Arusha, Tanzania

Partner in the AGROVEG project (*push-pull for vegetables*)

My journey to becoming a successful farmer was not easy. I only received primary school education. I got married and, after having my first child at a very young age, I turned to farming to support my family. I was able to buy one acre of land and to begin building my life as a farmer.

Initially, I grew cabbage, kale (*sukuma wiki*), and onions using traditional, unguided methods. I struggled with poor input management, low yields and crop pests. Like many farmers in my village, I believed that heavy chemical spraying was the secret to successful farming. But my harvests were minimal and my crops were saturated with toxic chemical residues.

Everything changed when I joined the AGROVEG project being implemented by *icipe* and WorldVeg. I received training and support in agroecological farming approaches that have completely transformed the way I farm. I learned to build raised planting beds, prepare organic compost, pesticides and botanicals, and practice intercropping to maximise harvests.

The most revolutionary technique I have adopted is the vegetable “push-pull” method, which involves intercropping the main vegetable crop with various companion crops to naturally control pests. For example, cabbage and kale are highly attacked by pests, including diamondback moth and aphids. By planting onions and spider plant, known locally as *mgagani*, alongside cabbages and kale, I create an effective repel and trap system. The pests are naturally repelled by the onions, and they are also drawn to the *mgagani*. This means that the cabbage and kale are left untouched by the pests.

In the past, my farming was entirely focused on the crops. Now, I feed both the plant and the soil. With the health of my land restored, my crop yields have soared. My cabbage yields have doubled, leaping from 5,000kg to an impressive 10,000kg. I have also earned extra income from the yields of the companion plants. In addition to better yields of the main crop (cabbage or kale), I have also gained more income through the companion plants (*mgagani* or onion) yields.

The AGROVEG project has brought invaluable nutrition education to our entire village. We have learned that vegetables are not just a minor side dish but

Photo: Wankambeta in her vegetable ‘push-pull’ garden.

are essential for the health of our families. Moreover, although *mgagani* is a nutrient-rich traditional vegetable, we were previously not consuming it. Now, we have a valuable addition to our diet.

Today, my shamba has become a living classroom where other farmers frequently come to learn about agroecological innovations. While I am not a formal instructor, more than 200 farmers have visited my field to learn about the seed variety I use, my soil management approaches, and how I control pests naturally.

“The transition to ecological farming has been immensely rewarding in ways I never could have imagined. I am preserving our land, ensuring that it remains fertile, healthy and full of life for the future.”



Photo: Malaika is one of the PCN resistant potato varieties introduced by icipe and IITA. Meaning 'angel' in Swahili, it was named after my daughter, who helped to grow the first seedlings. This is a special recognition of her contribution to our farm and this journey.

Mary Kamutu

Kinangop, Nyandarua County, Kenya

Partner in icipe Nematology Research

My journey as a potato farmer began about 20 years ago, and my husband, Jesse Kamutu, a former teacher, has now joined me.

Our farm is called Jekam, a name that comes from Jesse, Angel (our daughter) and Mary because, as a family, we are all important parts of the machine. Jesse is responsible for production, while Angel and I handle the finances and business operations.

Kinangop is one of main potato producing regions in Kenya, so for many years we focused mainly on the crop. About 10 years ago, we noticed that something was wrong. Our potatoes were becoming elongated, stunted and oddly shaped, and the yield declined. We thought perhaps heavy rains and excess watering were affecting the crop, or that we were making mistakes when planting.

Little did we know that an invisible pest was multiplying beneath our feet and damaging our potatoes.

In 2018, a joint team of nematologists from *icipe* and International Institute of Tropical Agriculture (IITA), known as NemAfrica, approached us to collaborate on field trials of technologies to control nematodes. They sampled our soil and confirmed that it was heavily infested with nematodes, including the devastating potato cyst nematode (PCN), an invasive species first reported in Kenya in 2014.

Working with the researchers, we explored ways to manage the soil and reduce nematode populations. We tried an approach of rotating potatoes with African nightshade, an indigenous vegetable known locally as *managu*, and saw an improvement in our yields. We also helped to conduct trials of a banana fibre technology that suppresses nematodes and other soil-borne pests, providing feedback to the researchers on its potential.

Eventually, we tested what I believe is one of the biggest breakthroughs: potato varieties that are resistant to PCN.

In our county, most farmers depend heavily on a potato variety known in Kenya as Shangii, largely because of its popularity and strong market demand. But Shangii is highly susceptible to PCN.

The NemAfrica team introduced two alternative potato varieties, Malaika and Glen. Through trials, these varieties have been confirmed to be resistant to PCN. They are also fast-maturing and produce higher yields. Where we previously averaged about 4 tonnes (t) per acre, we are now harvesting between 6–8t per acre with the new varieties.

At Jekam Farm, what began as a mission to understand why our potatoes were failing has grown into something bigger. Our vision is to become large-scale producers of clean, quality seed potatoes and make them widely accessible to farmers.

Empowered by our collaboration with the NemAfrica researchers, I also share the knowledge we have gained with other farmers. We hold educational sessions where we explain what nematodes are, how they affect potatoes and what farmers can do to manage them.

“Women are key to potato farming and are the backbone of many households. My experience shows that, given opportunities, knowledge, tools and innovations, women can build incomes, support families and lead successful businesses and communities confidently.”

Adeline Mukiyere

Kamonyi District, Rwanda

Partner in the 'Integrated black soldier fly and vegetable integrated push-pull technology' project

Before venturing into farming, I worked with an international humanitarian organisation for about 10 years, closely interacting with farming communities. I witnessed the benefits of investing in children's education, as well as the struggles that many school leavers faced in finding employment or starting businesses.

I founded DAVET Farm in 2015 to help bridge that gap. We started as an agri-vet business serving farmers in Bugesera District, eastern Rwanda, supplying seeds, livestock and mushroom farming inputs on credit to farmers and cooperatives. Alongside this venture, we operated a 3ha poultry farm.



My vision was to build a farming enterprise where horticulture, livestock and organic fertiliser production worked together. We invested in training and expanded our operations to 9ha, initially under lease and now fully owned. In 2022, we began producing horticultural crops for export. As the farm evolved, we naturally integrated crop production, livestock and composting. At the time, I did not recognise this as a circular farming system.

Our partnership with *icipe* started in 2024, following a visit to our farm by Dr Athanase Hategekimana, Crop Protection Program Coordinator, Rwanda Agriculture and Animal Resources Development Board (RAB). He connected us with *icipe*, and we became partners in a project that is testing the potential of combining black soldier fly farming and vegetable integrated push-pull technology to create more regenerative and resilient agrifood systems. Since then, we have worked closely with the Centre's technical team to strengthen our circular farming practices. A particularly valuable aspect of the partnership has been on-farm demonstrations comparing conventional compost with black soldier fly frass fertiliser. Our joint studies with *icipe* and RAB show that where conventional compost produced approximately 1t of vegetables, frass fertiliser increased production to 1.5t.

Through 'Waste to Wealth' programme in Rwanda, we collect organic waste from markets, schools, restaurants and slaughterhouses, recycling it to produce around 60t of compost annually. We also incorporate the black soldier fly larvae into livestock feed. Through the push-pull technology, we intercrop cereals with *Brachiaria*, a fodder grass, and *Desmodium*, a legume that has nitrogen fixing and nutritional properties. We are improving natural pest management, soil health and the availability of livestock forage.

We produce premium-quality green chillies and French beans for export, and in November 2025, we achieved Global G.A.P. certification (a farm assurance standard for food safety and sustainability). In addition, we are rearing chickens, pigs and rabbits. DAVET Farm has also become a learning and demonstration centre. Since 2024, we have trained over 120 farmers. Most have diversified their crop and livestock enterprises and adopted more sustainable farming practices. Through training and partnerships, including connecting smallholder farmers with exporters, our network includes more than 500 partner farmers. Our operations are supported by nine permanent staff and nearly 120 temporary workers during peak production seasons. We also work with partner farmers across approximately 80ha.

Creating opportunities for women and young people remains at the heart of everything we do. Women make up around 80% of our workforce and approximately 70% of our partners.

Photo: Adeline in the black soldier fly rearing unit at DAVET Farm.

Comfort Konama

Amoma, Kintampo South, Ghana

Partner in the 'Building Equitable Climate-Resilient African Bean and Insect Sectors (BRAINS)' project

I have been farming for about 30 years. I started farming under the guidance of an agricultural extension officer, focusing on traditional crops like maize and yam. Later, the officer encouraged me to transition into tree crops. As a result, I established a mango orchard.

While mangoes provided a stable foundation, it was not until 2024, when I joined the BRAINS project, led by *icipe* and The Alliance of Bioversity and CIAT, that I learned how to optimise my land. I have since integrated beekeeping, cover crops and integrated pest management (IPM), transforming the orchard into a complementary, regenerative and climate-smart agricultural system.

Introducing beekeeping has been one of the most significant changes. The bees forage in the orchard, pollinating the mango flowers and improving fruit quality. A well-positioned beehive requires minimal ongoing investment, while the honey provides a highly profitable income stream.

We have also introduced beans into the orchard. By planting them between the rows of mango trees, we suppress weeds and protect the soil. After harvesting the beans, we either plough the organic residues back into the soil or use them as mulch around the mango trees. This simple practice returns essential nutrients to the soil and helps retain moisture naturally.

Previously, our farming methods were tough on the environment. We practised 'slash-and-burn' to clear land, leaving the soil exposed and vulnerable to weather stress. During droughts, the parched soil became unproductive.

We have now transitioned to conservation farming. We prune our mango trees after harvest and return the organic material to the ground. We also apply organic manure to maintain soil fertility, improve soil structure and retain moisture.

This shift extends to how we manage the wider landscape. We no longer clear native trees around the farm. The flowering trees provide additional forage for bees while helping to conserve the surrounding ecosystem.

Pests and diseases have always been one of our biggest challenges in mango production. For years, fruit flies and other pests caused severe fruit damage, poor yields and postharvest losses. Through the BRAINS project, we are now using biological IPM tools, including sticky traps and pheromone lures, to monitor and capture pests. This approach has substantially reduced pest damage. Our mangoes are now larger and healthier, with less fruit rotting on the trees, resulting in a marked increase in yields.



Photo: "I use sticky traps and pheromone lures to monitor and capture pests, reducing fruit damage and rot. As a result, my mangoes are larger and healthier, and my yields have increased."

"Growing mangoes and beans, and harvesting honey, has diversified our income, helping to cushion the impact of climate and market fluctuations."

As a woman farmer, I have also become highly empowered. I am now a member of the Amoma Beekeepers Association, where members work collaboratively. Importantly, female members obtain support on arduous tasks, such as honey harvesting.



Photo: Tsige, on land that was once degraded but is now thriving through integrated beekeeping activities.

Restoring lives and landscapes

How women beekeepers are building socio-ecologically sustainable livelihoods

Tsige Araya is a young female beekeeper from Kilete-Awlaelo District, Eastern Tigray, Ethiopia. A mother of four, she has not only thrived in a male-dominated sector, but her distinctive extra-white honey is now finding its way into the skies, being served on Ethiopian Airlines flights. On the ground, her beekeeping activities are helping to restore both her livelihood and degraded watersheds.

Tsige is one of more than 300 young women, many of them disadvantaged by conflict, who are participating in an initiative by *icipe* and Biovision Foundation for Ecological Development, Switzerland. The project aims to use integrated beekeeping to improve livelihoods, youth employment, landscapes and climate resilience in Tigray Region.

A rugged, high-altitude area, Eastern Tigray is characterised by dry highlands, mountains, plateaus and lowlands. Climate variability, erratic rainfall, drought, erosion, land degradation and water scarcity constrain agriculture and rural resilience.

"Our farming is rain-fed. But the rainfall in our area is unpredictable. Also, the land sizes are small. I own just 0.25ha of arable land," says Tsige.

"Together with partners, *icipe* aims to build the resilience of women to natural and human-induced shocks in landscapes," says Lulseged Belayhun, Beekeeping Manager, *icipe*. "This approach balances environmental and socioeconomic benefits to support equitable socio-ecological sustainability."

The women are breaking long-standing notions. They are proving that women can be successful beekeepers, and that they can overcome economic challenges and participate equally in village-level income-generating activities.

Many of the women share similar stories. They dropped out of school early, married and began their families at a young age. They have had limited access to economic opportunities and have struggled to support their families. Their situations became worse during the conflict in the region. Some lost their spouses and were displaced, and many, their livelihoods, assets and belongings.



Photo (left): Besides its extra white colour, the honey in the region has a creamy texture, pleasant taste and distinctive aroma, which is highly appreciated by consumers. It has good market demand and premium price.

Photo (below): The women beekeepers have restored about 40ha of land, planting a range of multipurpose trees and forage plants. They include two species that are dominant during the peak honey flow season, known locally as tebebe (*Becium grandiflorum*) and Swakerni (*Leucas abyssinica*). These plants are responsible for the extra white honey. They have also planted African bitter leaf (*Vernonia amygdalina*), jelly bean tree (*Parkinsonia aculeata*), alongside sunflower and basil.

Once recruited into the *icipe*-led initiative the women form enterprises or common interest groups. They receive training in entrepreneurship, life skills, basic beekeeping, honey harvesting and postharvest handling, apiary management, agroforestry practices, tree nursery management, landscape restoration, and marketing and financial management.

“This training, complemented by village-level experience-sharing, equips them with the knowledge and skills to run their enterprises. The members also receive customised psychosocial counselling,” explains Lulseged.

After the training, each enterprise member receives two frame hives, protective clothing, a manual honey-processing machine and essential beekeeping tools. The group members contribute honeybee colonies. They then set up group apiaries on degraded land allocated to them by the government, as well as in their own homesteads, known as backyard apiaries.

“As soon as I received my two frame hives and beekeeping kit, I established an apiary in my backyard. I have since expanded the apiary, and I now have 13 modern hives, all with thriving colonies. During the last season, I harvested 65kg of honey, generating ETB 130,000 (≈ USD 1,000) from the honey,” says Tsige, who is a member of the Marewalet Beekeeping Enterprise.

Having also received training in bee colony multiplication, Tsige has multiplied an additional eight bee colonies, generating ETB 64,000 (≈ USD 400) from honeybee colonies sales.





Photo: *Birhan proudly displays a bunch of swiss chard, harvested from her backyard garden. Vegetable growing is part of the integrated beekeeping initiative.*

Birhan Gebreyesus, the chairperson of Maebel Beekeeping Enterprise, which comprises 13 women, also has a success story. She has expanded her beekeeping by adding four more hives. She harvested 36kg of honey in one season, generating ETB 72,000 (USD 450) from the honey.

Through Biovision Foundation, the Negash Marketing Cooperative has been established, and it has set up a market for honey aggregation and processing. This platform helps to link producers with exporters and major honey buyers, including Ethiopian Airlines. The Cooperative has also launched the One Honey Festival, and the Tigray Tourism Bureau has connected the festival to eco-tourism and marketing opportunities. A similar model operates through the Meles Beekeepers Cooperative, set up with support through *icipe* from the International Fund for Agricultural Development (IFAD).

In addition to providing bee forage, the enterprises cultivate multipurpose agroforestry species that provide food, animal feed, fuelwood, farm materials and income, while supporting landscape restoration.

The women also nurture vegetable seedlings in group nurseries and have established vegetable gardens in their own backyards. They grow vegetables such as onions, cabbage, tomatoes, spinach and cucumber, with farmers receiving seeds for cabbage, carrot, pepper, Swiss chard and cucumber. The surplus vegetable, forage and tree seedlings are sold for additional income.

With the support of the Tigray Regional Bureau of Agriculture and Rural Development, the enterprises are venturing into irrigation. Studies are ongoing on the ecological indicators of soil fertility and structure, and vegetation cover in the target landscape, including the watershed and backyards.

"Organising women into self-help groups and encouraging them to establish group savings have certainly contributed to socio-ecological resilience," says Lulseged.

"I plan to expand my apiary by purchasing additional frame hives, constructing transitional hives, splitting honeybee colonies and collecting beeswax. I dream of growing my business and empowering young women in my neighbourhood," said Birhan, "Looking back on my beekeeping journey, I take pride in my progress, filled with joy and renewed energy as I move forward with determination to achieve my dream of becoming a successful entrepreneur."

"My life has taken a new direction. This initiative gave us hope by equipping us with the skills and tools to rebuild our livelihoods," said Tsige.

icipe and partners are encouraged by the recent recognition of the initiative by the Regional Government as a model women-focused beekeeping and livelihoods diversification project that also cares for the environment.



Photo: Dr Seble Makonnen and her husband, Selamu Bekele, Procurement Manager, Lal Honey, examining honey in Harrena Forest, Bale Zone, Oromia Region, Ethiopia.

Sweet connections: *icipe* and Lal Honey, Ethiopia

In 2017, Dr Seble Makonnen, an Ethiopian-born US pharmacist with more than 20 years of combined experience in pharmacy and agribusiness, founded Lal The Honey Company (Lal Honey). Her mission was to preserve and promote Ethiopia's centuries-old beekeeping heritage while modernizing production and showcasing the country's distinctive honeys to the world.

Lal Honey sources raw and semi-processed honey directly from beekeepers across Ethiopia's diverse agroecological zones, supplying middle- and high-income consumers in domestic and export markets. Its business model emphasizes the geographic origins, distinctive flavours and cultural heritage of Ethiopian honey. By raising international awareness of Ethiopia's diverse honeys, the company also aims to improve the livelihoods of local beekeepers.

In 2022, *icipe* and Lal Honey established a partnership to help the company infiltrate Ethiopia's diverse honey producing regions. Through the partnership, Lal Honey has gained access to a network of *icipe*-supported, youth-led enterprises, enabling it to source high-quality honey from different parts of the country. In return, these enterprises benefit from a reliable buyer, transparent pricing and prompt payments, as well as opportunities to reach markets beyond their local communities. *icipe* also provides Lal Honey with technical assistance and capacity building in areas such as bee health management, honey quality assessment and marketing.

In October 2025, Dr Makonnen visited *icipe*'s integrated beekeeping and landscape restoration initiative in Negash Village, Tigray Region. Since then, Lal Honey has sourced a total of 1,040kg of honey from the Meles Union and Nigisty Honey Product and Marketing Cooperative in the village.

Lal Honey also participates in Ethiopian Airlines' "Fly Ethiopian Go Organic" campaign, launched in 2022 to promote healthy, organic, and sustainably produced Ethiopian agricultural products. Following an invitation to join the campaign, Lal Honey began supplying honey to Ethiopian Airlines and its Ethiopian Skylight Hotel. Between June 2025 and April 2026, the company supplied approximately 4,400kg of honey to Ethiopian Airlines.

Edible insects standards launched in Africa

icipe, ARSO and partners advance Africa's insect-based bioeconomy

On 25 September 2025, Africa reached a major milestone with the launch of 15 African Standards for Edible Insects and Capacity Building on Good Farming and Harvesting Practices. Developed by the African Organisation for Standardisation (ARSO), icipe and partners, the standards will boost the emerging insect-based bioeconomy, with the insects for food and feed sector alone projected to reach USD 8 billion by 2030.

Since the early 2000s, insects have buzzed and hummed their way into the limelight, becoming increasingly valued for their role in transforming agrifood systems and advancing resilient circular economies.

This shift has led to the emergence of an insect-based bioeconomy, a model that harnesses insects for food, feed, biowaste recycling and industrial products. The World Bank projects that the global insect food and feed market, growing at 24% annually, will reach USD 8 billion by 2030.

In Africa, this story has deep beginnings.

Insects have long been part of food cultures, with the continent being home to about 500 edible insect species. Building on this foundation, Africa's insect-based bioeconomy has progressed rapidly, with immense potential. A study by *icipe* estimates that edible insect farming could contribute 2.21% of Africa's GDP, annually.

But, despite their importance, in Africa, edible insects have primarily been seen as a fringe resource. Therefore, the 15 harmonised continental standards mark a defining moment. They provide a unified regulatory "passport", and an enabling framework to safely produce, trade and use edible insects at commercial scale, and to mainstream them into sustainable development.

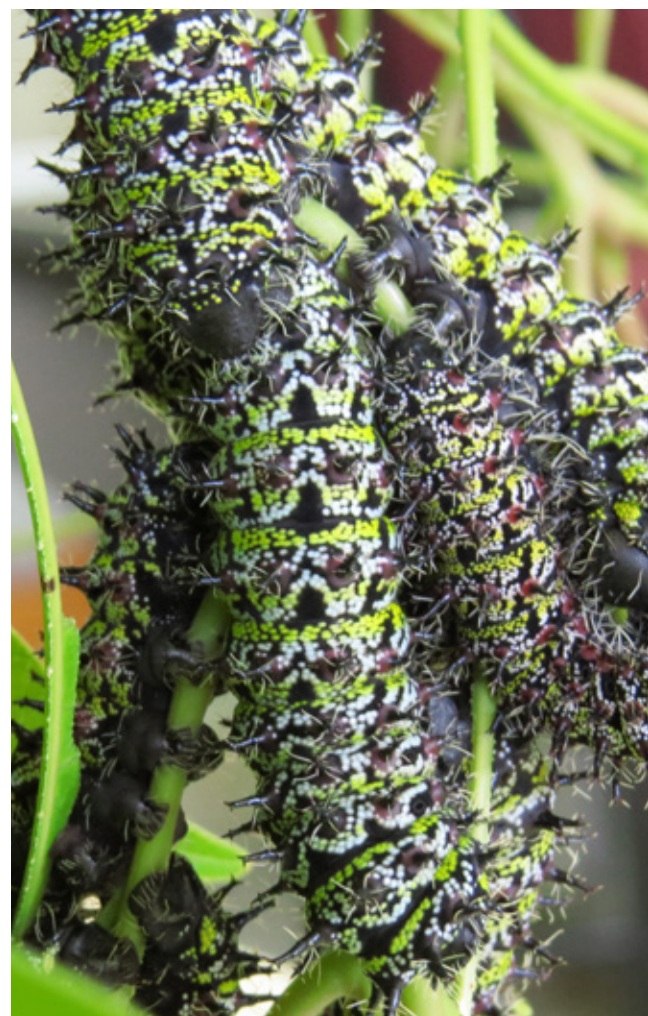


Photo: Trade in Mopane worms (*Gonimbrasia belina*), a delicacy in Southern Africa, is expected to benefit from the harmonised continental standards.

“We made sure that the standards were launched in a high-profile manner, so that stakeholders are aware they exist and from where to obtain them,” says Mr Reuben Gisore, Technical Director, ARSO, Africa’s intergovernmental standards body.

“We believe that the continental standards are a game changer. Together with the national standards they provide a clear pathway to improve product quality, consumer trust and opportunities for insect farmers,” says Dr Deborah Ruth Amulen, co-founder and CEO, Center for Insect Research and Development (CIRD).

Dr Julius Ecuru, Head, Integrated Policy and Stakeholder Engagement Platform, *icipe*, considers the milestone a triumph for evidence-based policy diplomacy.

“The strength of the scientific knowledge generated by *icipe* and other institutions, alongside stakeholder engagement and collaboration among researchers, policymakers, private sector actors, entrepreneurs and farmers, is what led to this landmark,” he says.

The journey starts: national standards in Eastern Africa

As Dr Chrys Tanga, Head, **Insects for Food, Feed and Other Uses** (INSEFF) Programme explains, Africa’s edible insect policy journey began with the development of national standards.

“It all started as an audacious idea at an international conference held in 2016, in Kisumu, Kenya, bringing together researchers, regulators, policymakers, private-sector actors and development partners,” he says.

The forum was convened by development partners aiming to capitalise on the knowledge being generated by research institutions such as *icipe*, to engage policymakers, primarily in Eastern Africa, on legislation and policy. The conference brought together researchers, regulators, policymakers, private-sector actors and development partners. They made a variety of recommendations and, in particular, flagged the urgency for an enabling policy and legislative environment. While these goals were ambitious, progress was swift.

Regarding policy development, *icipe* recognised the scope of the Centre’s mandate as a research organisation. Thus, the Centre fostered collaboration with regulatory authorities in various countries. “Alongside other research institutions, we provided the evidence data, while the agencies led the process internally,” explains Dr Tanga.

“The insect circular economy is interesting. It encompasses the entire value chain, creating linkages with the concept of One Health, thus impacting on employment and livelihoods.”



Photo: Delegates from Kenya and Uganda regulatory bodies, pictured during a workshop to develop the harmonised standards for edible insects, held in Gaborone, Botswana in March 2024. Centre: John Kinyuru, Kenya and (l-r) Rehema Meeme, Geoffrey Ssepuya, Charles Muyanja, all from Uganda, National Bureau of Standards.

Governments quickly took ownership of the idea, due to compelling evidence of insect-based innovations as locally available solutions to rising animal feed costs, fertiliser import challenges, and growing needs for organic waste recycling and valorisation.

“When we presented the proposal for edible insect standards to the Kenya Bureau of Standards (KEBS), it was received enthusiastically,” reflects Dr John Kinyuru, Food Scientist, Jomo Kenyatta University of Agriculture and Technology (JKUAT), and a member of the KEBS Technical Committee on Nutritious Food Products.

Kenya became the continent’s trailblazer, launching national standards in 2017, followed by Uganda in the same year, Rwanda (2022), Tanzania (2024) and Ethiopia (2025). In 2023, the East African Standards Committee (EASC), developed the regional version.

Towards continental standards

The proliferation of insect-based enterprises in Eastern Africa spurred wide demand of the innovations across Africa. “We asked ourselves, why not develop standards at the continental level, which would then cascade to regional, national and grassroots levels?” recalls Dr Tanga.

“ARSO had been collaborating with *icipe* since 2005. Around 2013, we were exploring ways to harmonise standards for livestock feeds, and we approached *icipe* in that regard. That we learned about the potential of insects in the sector. Everything fell into place,” explains Mr Gisore.

Thus, ARSO assumed leadership of the development of harmonised continental standards for edible insects. The process was highly collaborative, bringing together regulators, researchers, entrepreneurs and communities. A Technical Harmonisation Project Committee (PC) was set up. Research evidence, most of it from *icipe*, was collated and cross-referenced with global data. Development partners rallied behind the effort, while *icipe* pooled funding from ongoing research projects.

With insect circular economy being a novel concept in many countries, the Centre’s initiatives, demonstrations, and on-farm and validation sites provided convincing evidence.

“In October 2023, we convened a workshop at *icipe*, with 31 delegates from 12 African countries, including producers and farmers. They brought samples of edible insect products. In the field, we witnessed a range of insect products and how they were being commercialised,” recalls Mr Gisore.

The PC also undertook a range of fact-finding missions across Africa. “At CIRDC we had the privilege of hosting the ARSO delegation. As a social enterprise working directly with insect farmers and product developers, we contributed practical perspectives and the realities faced by emerging insect enterprises,” explains Dr Amulen.

The development of the continental standards was completed well ahead of the five-year roadmap, set in 2013, with the standards being launched in September 2025.

Photo: Jimmy Pittchar (right), Station Manager, *icipe* Thomas Odhiambo Campus, receiving a certificate of recognition on behalf of *icipe* from Dr Hermogene Nsengimana, ARSO Secretary General, during the launch of the continental standards.

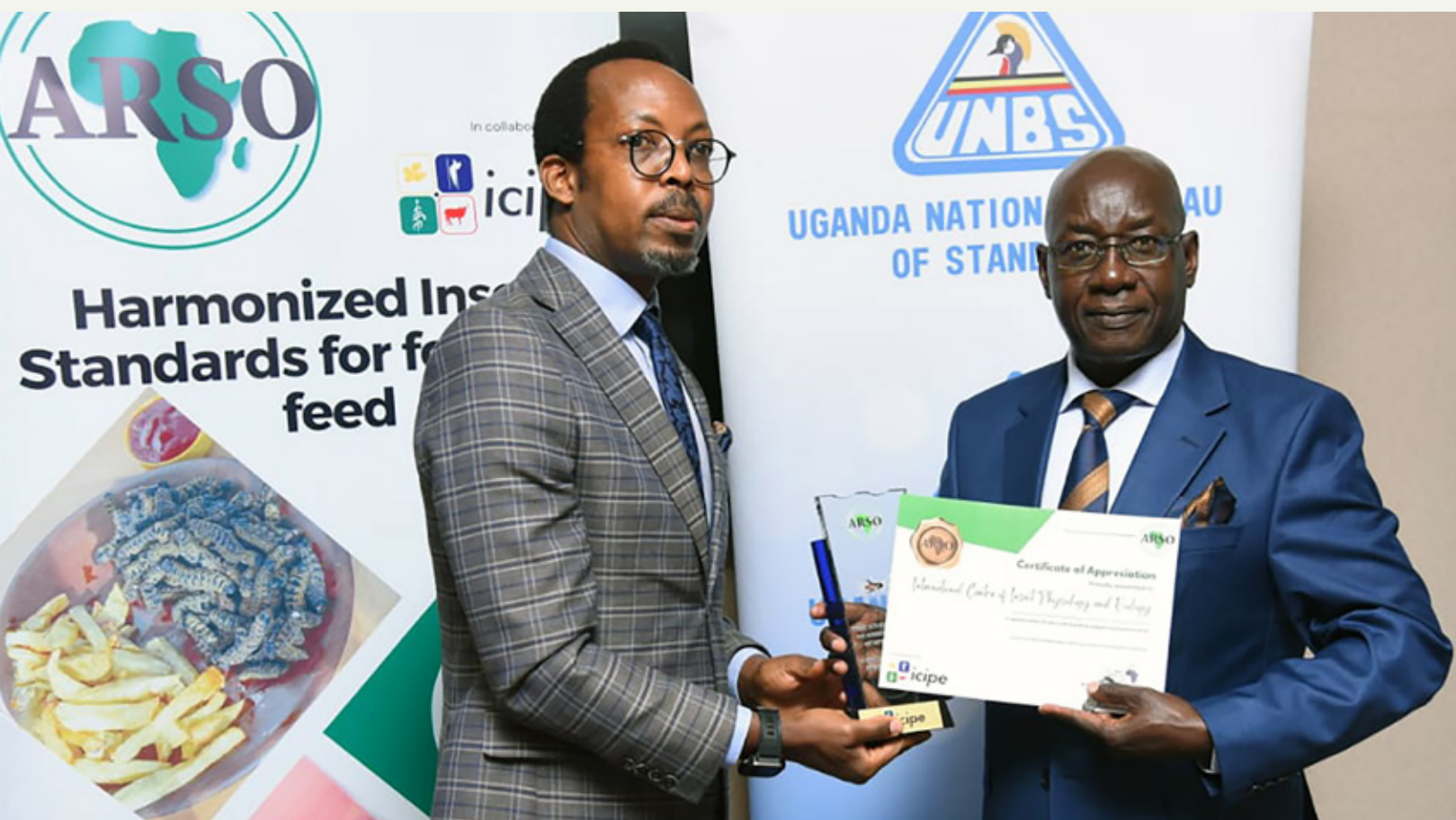


Photo: At CIRD, Dr Amulen and her team have translated the continental standards into practical tools that farmers and businesses can use.

The official launch of the standards was preceded by a major milestone in July 2025: the launch of two critical precursor documents. The *Continental Position Paper on Edible Insects and Derived Products in Africa* advocates for the recognition of the resource in food security, climate resilience, and national and continental priorities. It presents a historical perspective on insect consumption, and evidence to address malnutrition and diversify the food basket. The document also outlines pathways for the use of insects while conserving ecosystems. The *Policy Framework* promotes investment and trade in edible insects farming and derived products in Africa. For policymakers, the document demystifies how a traditional resource, like insects, can be accommodated in law, and also addresses potential legal framing considerations. For investors, the framework outlines the various national institutions responsible for the coordination of the investment process.

Progress and prospects

Since 2025, ARSO has led the promotion and awareness creation on the harmonised continental standards through high-level publicity, webinars and training of delegates from Member States.

“The industry can now leverage these standards to build a thriving sector. They provide a basis to attract investment, expand production and meet growing global demand for insect-based products,” says Dr Kinyuru.

“Before we had good science and good products. The standards provide certainty for consumers. They also give incentives and an avenue for developers to market their products,” says Dr Ecuru.



One novel area that is opening up is product certification. “Recently, at *icipe*, we conducted a product certification mentorship process for 40 small- and medium-sized enterprises from across Africa. Most qualified, while a few are being supported towards maturity,” explains Dr Tanga.

At CIRD, Dr Amulen and her team have translated the continental standards into practical tools and user-friendly resources for farmers and businesses. “We have noticed that entrepreneurs are aligning with the standards, from farm design, production, processing and quality assurance,” she says. “Our mission to develop competitive, resilient, market-driven insect enterprises has been bolstered.”

At the continental level, stakeholders believe that the standards will help to unlock the great potential of the insect-based bioeconomy to contribute to the aspirations of Agenda 2063, Africa’s blueprint for sustainable development. In particular, the standards are well-aligned with the African Continental Free Trade Area (AfCFTA).

Arguably, the continent’s position in the global insect-based bioeconomy has been elevated. With the standards designed to comply to international criteria, products from Africa can be marketed beyond the continent. The continent’s expertise is also being recognised internationally. Currently, *icipe* is providing support to the Asia Pacific region, with requests also coming in from South America and the Caribbean, which are keen to adapt innovations and best practices to establish their own insect-based industries.

The African Standards for Edible Insects and Capacity Building on Good Farming and Harvesting Practices

1. ARS TR 1290:2025, Glossary of edible insects and products – Identification, preparation and processing
2. ARS PAS 1291-1:2025, Edible insects – Part 1: Edible insects' products – Specification
3. ARS PAS 1291-2:2025, Edible insects – Part 2: Products containing edible insects – Specification
4. ARS PAS 1292:2025, Edible insects – Good farming and wild harvesting practices
5. ARS PAS 1293:2025, Insect products for animal feeds – Code of good practice in production, processing and use in animal feeding
6. ARS PAS 1294:2025, Edible insects – Good agricultural practice on cricket farming
7. ARS 1295, Edible insects – Good hygiene practices for insect farming and processing – Code of practice
8. ARS PAS 1297:2025, Dried insect products for compounding animal feeds – Specification
9. ARS PAS 1261: 2025, Edible insects – Edible crickets – Specification
10. ARS PAS 2050: 2025, Edible insects – Edible dried caterpillars – Specification
11. ARS 1296:2025, Edible insects – Safety of foods based on edible insects
12. ARS 2051: 2023, Rearing structures and equipment for insects for food and feed – Code of practice
13. ARS TR 2053:2025, Compiled inventory of edible insects for human consumption and insects for animal feeds in Africa
14. ARS TR 2054:2025, Insect value-added products – Procedures, hygiene, quality, safety, environmental concerns and standards for trade
15. ARS GL 2052:2025, Regulatory framework guideline for edible insects and insects for feed in Africa

way
forward



ARSO will promote the harmonised continental standards, support Member States in adopting them, and establish a permanent technical committee to review evidence, monitor developments and update the standards.



icipe will work with partners to ensure that the standards translate into gender inclusive, demand-driven innovations and opportunities, as a core measure of the insect-based bioeconomy.



In partnership with forums such as the Academic Society for Insects as Food and Feed (ASIFF), universities will incorporate edible insect research into academic curricula.



Efforts are needed to build an ecosystem of insect farmers, entrepreneurs, finance institutions, business incubators and other value chain actors, to build profitable, sustainable businesses.



Stakeholders will raise awareness of the standards along the value chain, through community networks, private sector actors, government agencies and institutions.

Donors and Partners

The research and development activities featured in this publication have been undertaken with the support of the organisations outlined below, against the story headings.

Co-creating health equity

Insights from *Microsporidia* MB malaria control research

Donors

Gates Foundation; Coefficient Giving; and Children's Investment Fund Foundation (CIFF).

Partners and collaborators

County governments of Homa Bay, Kwale and West Pokot; Community Health Practitioners; National Environment Management Authority (NEMA), Kenya; and National Biosafety Authority.

More than a school meal

Using insects to nourish children and build agrifood systems resilience

From training to transformation:

Donors

French Ministry for Europe and Foreign Affairs; IKEA Foundation, Kingdom of the Netherlands; and Australian Centre for International Agricultural Research (ACIAR).

Partners

Kenya Agricultural and Livestock Research Organization (KALRO), Kenya; University of Embu, Kenya; and Koitaleel Samoei University College, Kenya.

Integration from farm to fork:

Donor

Global Affairs Canada.

Partner

Pan-African Bean Research Alliance (PABRA) of The Alliance of Bioversity and CIAT.

National partners

University of Ghana; Crop Research Institute of the Council for Scientific and Industrial Research (CSIR-CRI), Ghana; Ministry of Agriculture and Animal Resources (MINAGRI), Rwanda; Rwanda Agriculture and Animal Resources Development Board (RAB); Kenya Agricultural and Livestock Research Organization; National Agricultural Research Organisation, Uganda; Kyambogo University, Uganda; Instituto de Investigação Agrária de Moçambique; Eduardo Mondlane University or Universidade Eduardo Mondlane (UEM); Tanzania Agricultural Research Institute; Ministry of Agriculture, Ethiopia; Ethiopian Institute of Agricultural Research (EIAR); Rwanda Agriculture and Animal Resources Development Board; Department of Agricultural Research Services, Malawi;

Department of Research and Specialist Services, Ministry of Agriculture, Plant Quarantine Services Institute, Zimbabwe; Centre National de la Recherche Appliquée au Développement Rural, Madagascar; Université d'Antananarivo, Madagascar; Council for Scientific and Industrial Research (CSIR) Ghana, Crop Research Institute; University of Ghana; Institut National d'Études et de Recherches Agricoles; Université d'Ebolowa, Cameroon; Institute of Agricultural Research for Development, Cameroon; Zambia Agriculture Research Institute; Institut des Sciences Agronomiques du Burundi; and Institut de Recherche Agronomique de Guinée.

Private-sector partners

Pesira Technologies Limited, Kenya; Savannah Honey Africa Ltd, Kenya; Nutreal Research for Development Limited (Nutreal), Uganda; PeaFoods Ltd, Kenya; Bees for Development (BfD), UK; Association of Insect Farming and its Products (AIFIP), Kenya; and BIVAC Tanzania Company Limited, Tanzania.

From school meal to community ownership:

Donor

Novo Nordisk Foundation (NNF), Denmark

Partners

Research and Action for Income Security (RAISE), Denmark; University of Copenhagen, Denmark; Makerere University, Uganda; Mothers Against Malnutrition and Hunger (MAMAH), Uganda; and Bobo Eco Farm, Uganda.

Celebrating women farmers For sustaining Africa's food systems

Mary Kamutu:

Donors

German Federal Ministry for Economic Cooperation and Development (BMZ) commissioned by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through the Fund International Agricultural Research (FIA); Swedish International Development Cooperation Agency (Sida); and Food and Agriculture Organization of the United Nations (FAO).

Partners

VLIRUOS, Belgium; Innovate UK; Ghent University, Belgium; St Andrews University, UK; and James Hutton Institute, UK.

Wankembeta Daudi Shaulua:

Donors

Biovision Foundation for Ecological Development, Switzerland; and Liechtensteinischer Entwicklungsdienst Dienst (LED).

Partners

World Vegetable Center (WorldVeg); and Farming Systems Comparison in the Tropics (SysCom), implemented by the Research Institute of Organic Agriculture (FiBL).

Adeline Mukiyere:

Donor

IKEA Foundation.

Partner

Rwanda Agriculture and Animal Resources Development Board (RAB).

Comfort Konama:

Donor

Global Affairs Canada.

Partner

Pan-African Bean Research Alliance (PABRA) of The Alliance of Bioversity and CIAT.

National partners

University of Ghana; Crop Research Institute, of the Council of Scientific, and Industrial Research (CSIR-CRI), Ghana.

Restoring lives and landscapes

How women beekeepers are building socio-ecologically sustainable livelihoods

Donor

Biovision Foundation for Agroecology Development, Switzerland.

Partners

Tigray Region Bureau of Agriculture, Ethiopia; and Kilte Awulaelo District Agriculture Office, Tigray Region, Ethiopia.

Edible insects standards launched in Africa

icipe, ARSO and partners advance Africa's insect-based bioeconomy

Donors

Australian Centre for International Agricultural Research (ACIAR); The Rockefeller Foundation; European Commission; and Dalberg Catalyst, USA.

Partners

African Organisation for Standardisation (ARSO); and Regulatory agencies in ARSO Member States.



Stories of **Resilience** and **Transformation**

Vision

Transformed livelihoods through insect science and innovation.

Mission

To deliver innovative nature-positive insect science solutions for people and planet.

Value Proposition

As a premier Centre of Excellence for insect science, *icipe* offers holistic solutions that enhance agri-food systems, health, ecosystem services and environmental sustainability.

icipe's internationally competitive standards in research, capacity development, and innovation contribute to livelihood transformation and advance a sustainable bioeconomy in Africa and globally.

www.icipe.org



WOAH Collaborating Centre
for Bee Health in Africa

