

Project Number	Project Title	Summary	Eligible nationalities	Qualifications and experience
1	Cattle-targeted interventions for control of arthropod vectors of malaria and other diseases of humans and livestock	Livestock, especially cattle are host to many hematophagous arthropods including a wide range of mosquito species, ticks and biting flies including tsetse flies. Most malaria vectors around the world are primarily attracted to livestock; and most vectors in Asia and Latin America and so-called secondary vectors in Africa bite outside houses (exophilic) and feed on animals other than man (zoophilic). In Africa, many livestock live close to humans, and this provides an ideal opportunity to control harmful arthropods where they converge and plausibly develop a cost-effective and comprehensive vector control strategy. Work done at <i>icipe</i> recently, has shown that (1) livestock are an important alternative host, even for primary malaria vectors in sub-Saharan Africa when humans are not available or are well protected by indoor interventions as currently recommended for malaria control; (2) livestock are the primary host for secondary vectors that were rarely considered in the past but have since been found important in residual transmission settings, limiting our ability of malaria elimination. We propose to investigate novel biorational cattle-targeted control agents that have been extensively researched at <i>icipe</i> , namely an entomopathogenic fungus and an insect growth regulator for integrated vector management of human and animal disease vectors. We are specifically interested in combining mosquito, tsetse and tick control using the entomopathogenic fungus, <i>Metharizium anisopliae</i> , which has just been registered as a tick control product for cattle in Kenya.	any sub-Saharan country	MSc in Medical Entomology, One Health or related field relevant to the research project. Proven ability working with human and/or animal disease vectors. Knowledge of working with entomopathogenic fungi an advantage. A background in community engagement and qualitative research would be an added benefit. Motivation to work under very challenging field conditions. Ability to solve problems. Excellent team player. Proficient user of Microsoft office applications and proficient in statistical data analysis (e.g. SPSS, R).

2	Enhancing efficacy of pheromone lures and traps for effective monitoring and management of Fall armyworm ( <i>Spodoptera frugiperda</i> )	<p>The Fall armyworm (FAW), <i>Spodoptera frugiperda</i> (Lepidoptera: Noctuidae) is a damaging insect pest native to tropical and subtropical regions of Americas. It feeds on over 80 plant species including economically important crops such as maize, sorghum, sugarcane, legumes and cotton (CABI, 2017). The pest is new to Africa but has rapidly spread to almost all countries in Africa since its first detection in Central and West Africa in early 2016 (IITA, 2016) and more recently to Asia. Recent reports have confirmed that the pest is already causing significant damage to staple food crops, particularly maize and sorghum, in Africa (CABI, 2017; FAO, 2017). Effective management of FAW is achievable only in the early life stages such as egg and early instars. Hence, early detection of FAW is a pivotal first step for timely and effective <i>S. frugiperda</i> management and mitigating yield loss. Pheromone traps are useful tools for early detection of the insects, especially lepidopterans. Being an exotic pest recently introduced to the continent, limited work has been done towards determining the efficacy of different pheromone lures and traps designs for effective monitoring and management of <i>S. frugiperda</i> in Africa. This project will investigate different lures and traps, determine the correlation between trap catches and life stages of the pest and crop damage level in the field and evaluate the use of plant odours and non-pheromonal attractants to enhance responses to pheromones. Moreover, we will establish the proportions of the two sympatrically occurring <i>S. frugiperda</i> strains (maize and rice) at different representative locations and determine regional variations in their sex pheromone composition.</p>	any sub-Saharan country, except Kenya	BSc in biology, agriculture or chemistry; MSc in Entomology/Chemistry
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3	An assessment of cost-effectiveness, economic and nutrition effects and potential adoption of the integrated tsetse and ticks control management technologies in Kenya and Ethiopia.	Growth in livestock production and productivity is critical to ensure food security and generate income for farmers in Africa. However, Livestock health and productivity in Africa are critically challenged by African Animal Trypanosomiasis (AAT), ticks and tick-borne diseases (TBD) resulting to GDP losses of about US\$2.5 billion in East Africa. Therefore, improving livestock health in smallholder farms in East Africa through integrated control of diseases transmitted by tsetse and ticks is paramount in ensuring food security. To realize this the project will introduce integrated tsetse and ticks control management technologies and their cost-effectiveness and socio-economic performance will be evaluated. About 1000 cattle keeping households in Kenya and Ethiopia will be assigned into the treatment and control groups to evaluate the technologies. The success of the African livestock industry is expected to promote growth of the local industries and improve employment opportunities to the youth and women.	Kenya only	MSc in Agricultural or development Economics with Thesis; knowledge of econometrics, analytical software; impact evaluation and techniques
4	An evaluation of potential risk of Yellow Fever virus re-emergence in parts of Kenya; A look in to the bionomics of key mosquito vectors and virus prevalence.	Despite the availability of an effective human vaccine, Yellow fever (YF) still poses a significant public health threat. This is exemplified by recent outbreaks in Uganda, Ethiopia, DRC, Congo and Angola with resulting high human mortality. Our understanding of the ecology of the vectors involved remains poor, yet this knowledge is important in risk assessment to inform cost-effective vaccination efforts. Concerns have been raised about the risk of urban YF in East Africa although the last outbreak of YF (1992-95) in Kenya in the Rift Valley, was largely sylvatic. The critical question is how the vector ecology compares in this area and in urban areas where there has been increased incidences of Aedes-borne viral diseases (e.g. dengue) which shares a niche with YF. The proposed study will assess the ecology and vectorial capacity of key vectors of YF in Kenya in selected vulnerable sites in the Coast and North Rift Kenya, and also establish evidence of virus activity in the human population. Findings will inform prioritization of vaccination and integrated vector management plans for YF in these areas.	Ethiopia, Tanzania or Uganda only	MSc in biological sciences and with some level of knowledge or exposure in entomology (field and lab), virology, microbiology or immunology.

5	Classical biological control of <i>Tuta absoluta</i> (Meyrick) in East Africa	<p>The recent Afro-Eurasian invasion by the devastating and fast spreading moth <i>Tuta absoluta</i>, presents a major challenge to tomato production in invaded ranges. Tomato growers in Africa are severely hit by high infestation of the pest and enormous tomato yield losses, which have resulted in up to 10-fold increases in tomato selling price in affected countries, thereby jeopardizing the livelihood of millions of growers and beneficiaries along the crop value-chain. In response, growers have resorted to indiscriminate use of broad-spectrum insecticides which are likely to lead to development of resistance. Parasitism by indigenous parasitoids never exceeds 10%. <i>Dolichogenedia gelichidivoris</i>, a coevolved efficient parasitoid, was imported from the pest's aboriginal home of Peru and is currently maintained in quarantine at <i>icip</i>e pending field releases. This study seeks to determine the functional response of this parasitoid against <i>T. absoluta</i>, establish its performance at multi-trophic levels as well as assess its impact on <i>T. absoluta</i> following field-releases.</p>	Any sub-Saharan country, except Kenya	BSc in Agriculture/Biological Sciences MSc in Agricultural Entomology;
6	Deployment of improved vector sampling and diagnostic tools to facilitate characterization of residual malaria in selected areas of Ethiopia	<p>Intense vector control has largely led to a decline in mosquito and malaria cases in most parts of Ethiopia. To guide elimination efforts, improved vector monitoring is critical for accurate assessment of the epidemiological landscape relating to parasite infections, vector density and movements. This project seeks to develop a bait technology based on attractive cues, for use as a sensitive monitoring tool that adequately reveals the adult vector density and population dynamics of key and other secondary malaria vectors. The study will be conducted in selected villages of Finote-Selam and Jabi districts of Western Ethiopia, and will also incorporate genomic approaches to analyse the specimens to detect changes in parasite-vector associations/structure which may emerge to perpetuate risk to humans through stealth transmission in a given transmission focus. Specifically, we will quantify the mosquitoes attracted to phytochemical-based cues in combination with promising lures targeting specific mosquito stages (blood seeking and gravid). Using this information, we will determine and design an inexpensive (not requiring the use of CO<sub>2</sub>) and highly effective tool (lure/trap type) or combination of tools that are optimal for specific malaria vectors in various settings. Effective monitoring of vector populations using genomics approaches should allow for more rapid identification of emerging trends in vector-Plasmodium associations, movement or dispersal patterns and for the development of better predictive models to forecast these trends within vector populations.</p>	Ethiopia, Tanzania or Uganda only	MSc in biological sciences. Knowledge or experience in entomology (field and lab) and molecular biology techniques.