Applicant: **Azrag, Abdelmutalab**
Organisation: **International Centre of Insect Physiology and Ecology (ICIPE)**
Funding Sought: **£0.00**

DIR31IN\1332

Nature-based Management of the spotted-wing Drosophila: Biodiversity Protection in Agricultural-Landscape

Drosophila suzukii, a recent invader in Kenya, is causing significant damage to berries, leading to substantial economic losses. Farmers rely on broad-spectrum insecticides, which harm biodiversity and “One Health.” Sustainable management is urgently needed. Biological control using parasitoids and biopesticides can result in sustainable pest control and biodiversity protection/conservation. This project aims to test the efficacy of the parasitoid Ganaspis brasiliensis and the biopesticide Metarhizium anisopliae for the biological control of D. suzukii, promoting sustainable pest management and biodiversity conservation.

PRIMARY APPLICANT DETAILS

Title	Dr
Name	Abdelmutalab
Surname	Azrag
Organisation	International Centre of Insect Physiology and Ecology (ICIPE)
Website (Work)	[redacted]
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Address	[redacted]

DIR31IN\1332

Nature-based Management of the spotted-wing Drosophila: Biodiversity Protection in Agricultural-Landscape

Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

Title	Dr
Name	Abdelmutalab
Surname	Azrag
Organisation	International Centre of Insect Physiology and Ecology (ICIPE)
Website (Work)	[redacted]
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GMS ORGANISATION

Type	**Trusted Organisation**
Name	International Centre of Insect Physiology and Ecology (ICIPE)
Phone (Work)	[redacted]
Email (Work)	
Website (Work)	
Address	

Section 2 - Project Summary, Ecosystems, Approaches and Threats

Q3. Project Title

Nature-based Management of the spotted-wing Drosophila: Biodiversity Protection in Agricultural-Landscape

Please attach a cover letter as a PDF document.

Cover letter_based Management of the spotted wing Drosophila
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Q4a. Is this a resubmission of a previously unsuccessful application?

No

Q5. Key Ecosystems, Approaches and Threats

Please select up to 3 biomes that are of focus, up to 3 conservation actions that characterise your approach, and up to 3 threats to biodiversity you intend to address, from dropdown lists.

Biome 1

Intensive land-use systems

Biome 2

Tropical-subtropical forests

Biome 3

No Response

Conservation Action 1

Species Management

Conservation Action 2

Research & Monitoring

Conservation Action 3

Education & Training

Threat 1

Invasive & other problematic species, genes & diseases

Threat 2

Agriculture & aquaculture (incl. plantations)

Threat 3

No Response

Q6. Summary of project

Please provide a brief non-technical summary of your project: the problem/need it is trying to address, its aims, and the key activities you plan on undertaking.

Drosophila suzukii, a recent invader in Kenya, is causing significant damage to berries, leading to substantial economic losses. Farmers rely on broad-spectrum insecticides, which harm biodiversity and “One Health.”

Sustainable management is urgently needed. Biological control using parasitoids and biopesticides can result in sustainable pest control and biodiversity protection/conservation. This project aims to test the efficacy of the parasitoid Ganaspis brasiliensis and the biopesticide Metarhizium anisopliae for the biological control of D. suzukii, promoting sustainable pest management and biodiversity conservation.

Section 3 - Dates & Budget Summary

Q7. Country(ies)

Which eligible country(ies) will your project be working in?

Country 1	Kenya	**Country 2**	*No Response*
Country 3	*No Response*	**Country 4**	*No Response*

Do you require more fields?

⦿ No

Q8. Project dates

Start date:	End date:	Duration (e.g. 1 year, 8 months):
01 April 2025	31 March 2027	2 Years

Q9. Budget Summary

Darwin Initiative Funding Request	2025/26	2026/27	Total request
(1 Apr - 31 Mar) £	£100,000.00	£100,000.00	200,000.00

Q10. Do you have proposed matched funding arrangements?

⦿ No

Please explain why:

The project leader Dr. Abdelmutalab G. A. Azrag will be fully involved in the project coordination and implementation with matching support of 20% (= [redacted] by his home institution. Dr. Samira A. Mohamed classical biological control specialist will serve as the project supervisor at 15% of her time, with matching support of 10% ([redacted]. Mr. Farid Ibrahim Maholidy a PhD student, will be involved in the project with a matching fund of 75% of his time (= [redacted]. Dr. Alexander Muvea a biological control specialist from Kenya Plant Health Inspectorate Service (KEPHIS) will assist in permit issuance and the creation of pre-release awareness of the parasitoid among the stakeholders with 2% of his time and matching support of 100% ([redacted].

Q11. If you have a significant amount of unconfirmed matched funding, please clarify how you will fund the project if you don't manage to secure this?

No Response

Q12. Have you received, applied for, or plan to apply for any other UK Government funding for your proposed project or a similar project?

⊙ No

Section 4 - Darwin Objectives and Conventions

Q13. Problem the project is trying to address

Please describe the problem your project is trying to address in terms of biodiversity and its relationship with multi-dimensional poverty.

Kenya is among the ten mega-biodiverse countries (Volpato&Ellena, 2023). The country is home to 4,623 plant species, 393 mammals, 260 reptile and amphibian species, 1,105 birds and 769 fish species (Kenya National Report to the Convention on Biological Diversity (KNR_CBD,2020). However, this rich biodiversity is threatened by many factors, including the excessive use of pesticides, which affects many organisms along the food chain (Abong'o et al.,2014). Also, KNR_CBD (2020) highlighted invasive species among the key threats to biodiversity. The agriculture sector, especially the horticulture sub-sector, attracts extensive pesticide use to tackle invasive species, which in turn threatens biodiversity.

Therefore, this project seeks to address the problem of biodiversity loss due to the invasive pest, Spotted-wing Drosophila, (SWD), Drosophila suzukii, in berries farms. Berry cultivation has become attractive to many growers in Kenya because it offers substantial economic returns per unit area (Rich Farm, 2023). However, since its first detection in Kenya (Kwadha et al.,2021), SWD has rapidly spread within the country, causing huge economic losses to horticultural industry. For example, this pest caused losses exceeding £100 million annually per fruit crop (blueberry, strawberry, etc.) in Europe and America (Mazzi et al.2017). Smallholder farmers in Kenya who rely on soft fruit production for their income have experienced reduced yields and lower-quality produce due to SWD. This has led to lower market prices for affected fruits, and, coupled with increased pest management costs, has reduced household income and exacerbated poverty. The decline in fruit production may also affect local food availability, leading to nutritional deficiencies, especially in rural areas where fruits are a significant part of the diet. With reduced household income, families may struggle to pay school fees, resulting in increased absenteeism or dropout rates among children, particularly in rural areas.

Field observations and consultations with berry farmers in Kenya revealed that the invasion of SWD necessitates the urgent development of sustainable management solutions. The lack of such measures has driven farmers to rely mostly on pesticides (Asplen et al.,2015; Mazzi et al.,2017). In Kenya and many other infested countries, extremely toxic mixtures are used, and farmers are becoming trapped on a 'pesticide treadmill'. These pesticides negatively impact biodiversity, leading to the decline or disappearance of beneficial insects and other ecosystem service providers, such as pollinators (Kitivo et al.,2021), birds, mammals, amphibians, and fish, as well as degrading soil health. Indeed, pesticides are reported to be the second most significant driver of the global decline in beneficial arthropods (Sánchez-Bayo&Wyckhuys,2019). Additionally, increased use of chemical pesticides to manage SWD poses health risks to farmers and communities, affecting their overall well-being and increasing production costs, leading to perpetuating cycles of poverty.
Biological control offers sustainable pest management, protects biodiversity in crops, supports higher yields, and reduces pesticide dependence. Therefore, this initiative seeks to develop nature-based and environmentally

friendly packages including parasitoids and biopesticides for the management of SWD. The success of this initiative will lead to sustainable management of SWD, which will directly contribute to biodiversity protection while addressing various dimensions of poverty.

Q14. Biodiversity Conventions, Treaties and Agreements

Q14a. Your project must support the commitments of one or more of the agreements listed below. Please indicate which agreement(s) will be supported.

- ☑ Convention on Biological Diversity (CBD)
- ☑ Nagoya Protocol on Access and Benefit Sharing (ABS)

Q14b. National and International Policy Alignment

Using evidence where available, please detail how your project will contribute to national policy (including NBSAPs, NDCs, NAPs etc.) and in turn international biodiversity and development conventions, treaties and agreements that the country is a signatory of.

Bio-based pest management approaches significantly contribute to reducing or eliminating synthetic insecticide applications. Therefore, the implementation of this project will certainly contribute to the conservation of biodiversity. This aligns the project with the agenda of Kenya National Biodiversity Strategy & Action Plan 2019–2030 (KNBSAP, 2019–2030) that promotes sustainable climate-smart agriculture methods and properly balances all life forms and ecosystems to ensure a positive impact on the nation's growth. By tackling the invasion of the alien devasting pest, D. suzukii, the project further conforms to KNBSAP, which highlights alien invasive species among the key threats to biodiversity. Furthermore, the use of bio-based approach for D. suzukii contributes to the Kenya National Adaptation Plan 2015-2030 (KNAP, 2015-2030) which promotes sustainable, climate-smart agriculture practices that enhance resilience to the impacts of climate change.

Beyond the national policies, the project is well aliens with COP13 Decision XIII, which recognises the use of biocontrol agents for the management of alien species like D. suzukii. The project further aligned with "Convention on Biological Diversity" through its contribution to the conservation of biodiversity as well as the fair and equitable sharing of benefits arising from the use of genetic resources. In terms of parasitoid importation, the project conforms to the guidelines of FAO code of conduct for the import and release of exotic biological control agents based on International Standards for Phytosanitary Measures (ISPM 3), to which Kenya is a contracting party. For biopesticides, the Ministry of Agriculture in Kenya (The Pest Control Products Board) has approved the use of several isolates of Metarhizium anisopliae-based biopesticides that were developed by ICIPE and commercialised such as Campaign®, Real Metarhizium®, and Met 69®; for the management of invasive species (e.g. see https://realipm.com/). These isolates among others can be tested against SWD.

Section 5 - Method, Innovation, Capability & Capacity

Q15. Methodology

Describe the methods and approach you will use to achieve your intended Outcome and contribute towards your Impact. Provide information on:

- **how you have reflected on and incorporated evidence and lessons learnt from past and present similar activities and projects in the design of this project.**
- **the specific approach you are using, supported by evidence that it will be effective, and justifying why you expect it will be successful in this context.**
- **how you will undertake the work (activities, materials and methods).**
- **what the main activities will be and where these will take place.**
- **how you will manage the work (governance, roles and responsibilities, project management tools, risks etc.).**

The International Centre of Insect Physiology and Ecology (ICIPE) has a renowned and long-standing history in classical biological control of alien invasive pests. For instance, following the invasion of the fruit fly Bactrocera dorsalis across Africa, the Centre led classical biological control program by introducing, evaluating, and releasing two efficient parasitoids, Fopius arisanus and Diachasmimorpha longicaudata (Mohamed et al.,2016), which are now released in >15 African countries with outstanding success. Recently, we imported the parasitoid Dolichogenidea gelechiidivoris from Peru for the classical biological control of tomato leafminer Phthorimaea absoluta. Based on the outcome of the pre-release assessment (Aigbedion-Atalor et al.,2020), this parasitoid is currently being released in three East African countries for the management of this pest since its transatlantic invasion in 2006.

In terms of biopesticide development, ICIPE houses a rich collection of >475 fungal strains and has, over the years, identified potent fungal isolates targeting various insect pests (Akutse et al.,2020).

Building on our extensive knowledge of classical biological control, first, we will follow the standard approach outlined in the FAO code of conduct (ISPM3) for the import and export of biological control agents, to introduce Ganaspis brasiliensis. Ganaspis brasiliensis has been previously tested on non-target organisms (Girod et al.2018a; Seehausen et al.2020; 2022; Fellin et al.,2023; 2024). These studies showed that a biotype of this species, G. brasiliensis (G1), now considered a distinct species (Sosa-Calvo et al. 2024), is specific to D. suzukii living in ripe-fruits. G. brasiliensis has been released in Italy, Switzerland, USA and Israel and it has not been found attacking any non-target species. Thus, in Kenya, we expect to pass the pre-release assessment, followed by subsequent field release. Potent isolates that can cause high mortality to SWD will be screened. Some of these isolates have been commercialised for the management of alien insect pests in Africa, including Kenya (Akutse et al.,2020). In a third step, the compatibility between parasitoids and entomopathogenic fungi will be tested, as we have previously done for other pests such as P. absoluta and the false codling moth (Mkiga et al.,2021; MamaSambo et al.,2022).

Main Activity 1: Introduction of the Parasitoid and Pre-release Assessment
 Import and establish colonies of the parasitoid Ganaspis brasiliensis G1 in quarantine Facility.
 Determine the parasitism rates of the parasitoid on SWD.
 Assess host specificity of parasitoid
 Undertake field release of the parasitoid.
Main Activity 2: Screening, Testing, and Identifying Potent Isolates Against SWD
 Evaluate the effect of fungal isolates on the mortality rate of SWD.
 Test the compatibility between the parasitoid and the fungal isolates.
Dr. Abdelmutalab Azrag, the project leader, will be responsible for project coordination and reporting to the donor, assisted by the technician and PhD student in implementing the project activities. Dr. Samira Mohamed will oversee the overall supervision of the project. The partner institute, CABI, will handle the shipment of parasitoids to Kenya. The ME&L specialist will closely monitor the progress of the project and will take timely corrective measures if any risks arise.

Q16. Innovation

Please specifically outline how your approach or project is innovative.

Is it the application of a proven approach in a distinctly different geography/issue/stakeholder (novel to the area), or in a different sector (novel to the sector), or an unproven approach in any sector (novel to the world)?

This project is pioneering in several key aspects, making it a significant and innovative approach for controlling SWD in Kenya and potentially in sub-Saharan Africa. Considering the lack of efficient parasitoids in Africa, the project will introduce a new parasitoid, Ganaspis brasiliensis G1, into Kenya. This species has demonstrated high specificity and effectiveness in controlling SWD in other countries. It is also the main parasitoid of D. suzukii in its native range, with up to 75.6% parasitism rates (Girod et al.2018b), showcasing its potential as a highly effective solution for managing SWD populations. In addition, this project will be the first to test Metarhizium anisopliae-

based biopesticides against SWD. These biopesticides have previously proven their specificity, safety, and effectiveness against other invasive pests like fruit flies. By integrating G. brasiliensis G1 and Metarhizium anisopliae-based biopesticides, the project adopts a holistic pest management strategy. Therefore, the success of this project could lead to its scaling under different initiatives, with the potential for releasing G. brasiliensis G1 in wide areas. The use of these biocontrol agents will minimise pest damage, increase crop yield, and provide environmentally friendly alternatives to pesticides, reducing harmful effects on beneficial organisms and conserving biodiversity in the agricultural landscape.

Overall, this project represents a novel approach to pest management in Kenya, leveraging cutting-edge biocontrol agents and biopesticides to sustainably address the challenges of SWD. Additionally, the project serves as a model for other countries in sub-Saharan Africa, demonstrating how innovative biocontrol methods can be implemented to tackle invasive pests.

Q17. Capability and Capacity

How will the project support the strengthening of capability and capacity of identified local and national partners, and stakeholders during its lifetime at organisational or individual levels? Please provide details of what form this will take, who will benefit (noting any Gender Equality and Social Inclusion (GESI) considerations), and the post-project value to the country.

In close collaboration with national and international partners, ICIPE has previously developed an IPM toolbox, including classical biological control and biopesticides, to control alien invasive pests like fruit flies and tomato leafminer. Building on this experience, this project will provide scientific evidence on the effectiveness of biocontrol agents in managing the population of SWD in Kenya. This knowledge will be disseminated to the scientific community and National Plant Protection Organizations (NPPOs), including Kenya Plant Health Inspectorate Service (KEPHIS), which will grant the permit for the parasitoid release within the country.

The integration of two biocontrol tools—parasitoids and biopesticides—represents a significant advancement in efforts to manage and eradicate alien invasive species in Kenya. These tools will operate synergistically to strengthen the capacity of organisations like KEPHIS and Ministry of Agriculture in combating alien invasive species.
During parasitoid release, there will be a deliberate effort to ensure gender equity by involving women farmers so they can benefit from biocontrol agents. The project will also train a PhD student in biocontrol techniques, building their expertise and capacity in biodiversity conservation. This future leader will continue to advance research, and develop innovative solutions.

A training of trainers (ToT) workshop will be organised, providing participants with hands-on training in various aspects of SWD management, including parasitoid rearing, release, and follow-up on its establishment. The training will also cover the appropriate use of fungal-based biopesticides and other aspects of SWD management, like trapping and greenhouse/orchard sanitation. Farmers' field day will be organised to build the capacity of grassroots beneficiaries. Gender mainstreaming will be an integral part of participant selection for all training sessions.

The post-project value to the country is multidimensional, including but not limited to increased agricultural productivity, economic benefits, sustainable pest management, biodiversity protection, capacity building, and global leadership in biodiversity conservation.

If necessary, please provide supporting documentation e.g. maps, diagrams, references etc., as a PDF using the File Upload below:

References
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pdf 98.15 KB

Section 6 - GESI, Awareness, Change Expected & Exit Strategy

Q18. Gender Equality and Social Inclusion (GESI)

All applicants must consider whether and how their project will contribute to promoting equality between persons of different gender and social characteristics. Please include reference to the GESI context in which your project seeks to work. Explain your understanding of how individuals may be disadvantaged or excluded from equal participation within the context of your project, and how you seek to address this. You should consider how your project will proactively contribute to ensuring individuals achieve equitable outcomes and how you will ensure meaningful participation for all those engaged.

Like other horticultural subsectors, berry farming is labour-intensive and has high rates of employment along the value chain. While the majority of the workforce consists of women and youth, other genders, including males and boys, are also involved, representing various educational and social backgrounds. With this in mind, and to ensure the success of the proposed intervention, the project management—led by a female scientist—will ensure gender balance and social inclusion, including physically disadvantaged individuals across all strata of project beneficiaries.

Although women are the largest contributors to the agricultural sector in Africa, they are often excluded from decision-making within their households and communities and are underrepresented in capacity-building programs. This project will strive to break this norm. For example, all training sessions, whether for ToT or farmer's field days, will be gender-inclusive. Deliberate efforts will be made to include women, including providing childcare for female ToT participants if needed and scheduling farmer's field days at times when women are less occupied with household chores. Additionally, physically challenged individuals will be given equal opportunities to participate in all project events by facilitating their movement.

Given that a core component of the proposed initiative is the use of biobased solutions to tackle SWD, the mass field release of this parasitoid will contribute to gender equality. The released parasitoid will spread beyond the release points, benefiting all farmers regardless of gender or social status.
Anecdotal evidence suggests that the production of certain crops, like cucurbits and avocados, which rely on insect pollination, is declining in areas where pesticides are extensively used for pest management. Resource-limited smallholder farmers, particularly women, are most affected by biodiversity loss as they depend directly on insect pollinators for their crop production. Therefore, this project will indirectly support all farmers, regardless of gender, in increasing their production.

Q19. Change expected

Detail the expected changes and benefits to both biodiversity and multi-dimensional poverty reduction, and links between them, that this work will deliver. You should identify what will change and who exactly will benefit a) in the short-term (i.e. during the lifetime of the project) and b) in the long-term (after the project has ended).

The outcome of the proposed intervention has multifaceted benefits on biodiversity through (1) The use of biobased management of SWD and the reduction of the usage of synthetic chemical insecticides will result in biodiversity conservation including that of pollinators and other ecosystem service providers (2) suppression of the alien invasive pest, which otherwise would displace the indigenous related species, affecting the biodiversity, (3) The invasive pest having strong immune system against the native parasitoid fauna, represent a reproductive sink to these parasitoids, and through its management, the biodiversity of these parasitoids will be conserved.

Additionally, the proposed project is expected to increase the volume and quality of berries, boosting the income of farmers and other stakeholders along the value chain, thereby reducing poverty. Resource-poor communities in Kenya rely on natural goods and services, like pollinators for crop production and wild honey harvesting to generate income. By contributing to biodiversity conservation, the project is expected to support poverty alleviation in its multidimensions, including increased income and improved access to better health and education.

Short-term Benefits:
1) The project will generate scientific knowledge on the effectiveness of biobased management against SWD, benefiting thousands of researchers and NPPOs worldwide.

2) The project could lead to the adoption of one or two IPM components for SWD management, resulting in reduced populations and associated crop damage.

3) Around 2,000 parasitoids will be released in the first phase, which should lead to its establishment and spread, directly benefiting thousands of farmers by reducing crop damage and enhancing biodiversity.

4) Reducing crop damage and pesticide use leads to economic gains for farmers, improving their yields, incomes, and food security. This benefit is especially important for women, who are more vulnerable to agricultural losses and have limited access to resources and markets.

5) Biobased management approach reduces the heavy use of synthetic pesticides, thereby mitigating negative impacts on ecosystem services, biodiversity, and non-target organisms, and promoting environmental sustainability.
Long-term Benefits:
1) Incomes for smallholder farmers will increase due to better quality fruit, fetching higher prices, and savings from reduced pesticide application.

2) Unlike synthetic pesticides, which can lead to resistance in target pests and harm non-target organisms, biological control agents offer a more balanced and sustainable approach to pest management over time.

3) The adoption of biocontrol agents will contribute to the restoration and preservation of biodiversity in agricultural landscapes. By reducing reliance on chemical pesticides, the project promotes the recovery of natural ecosystems and the conservation of native species. This benefits not only farmers but also broader ecosystems and wildlife populations.

In addition to the direct beneficiaries, thousands of growers will also benefit from the wide dispersal of the parasitoid, which will help suppress SWD. The investment in classical biological control is expected to yield a positive benefit-to-cost ratio, as demonstrated in our previous initiatives in Kenya against fruit flies, where a highly favorable benefit-to-cost ratio (US$ 93:1) was achieved (Agboka et al.,2023). The investment generated a significant net present value of US$42.8 million over 16 years.

Q20. Pathway to change

Please outline your project's expected pathway to change. This should be an overview of the overall project logic and outline <u>why and how</u> you expect your Outputs to contribute towards your overall Outcome and, in the longer term, your expected Impact.

The alien invasive pests like SWD often arrive in a new area without their co-evolved natural enemies (parasitoids and predators) and this allows them to establish, multiply rapidly and reach high population densities, leading to significant damage to crops. Once the alien pest is established in the country, stakeholders

including farmers cannot effectively manage the pest as they lack effective and sustainable pest control technologies and access to actionable information. Consequently, farmers continue to incur crop losses related to inappropriate and indiscriminate pesticide use, which exacerbates pest problems, affecting their food security and biodiversity. Therefore, this project aims to develop effective biocontrol tools to sustainably manage SWD to support food security and conserve/protect biodiversity. We will introduce a new parasitoid G. brasiliensis G1 and develop a biopesticide against SWD. These two IPM components will be promoted in Kenya to serve as a scalable model for sustainable management of this pest in other affected countries. The capacity of a PhD student will be strengthened in classical biological control, conservation and augmentative release of G. brasiliensis G1, along with climate-smart conservation practices, providing long-term benefits to biodiversity conservation and multidimensional poverty reduction.

Q21. Sustainable benefits and scaling potential

Q21a. How will the project reach a point where benefits can be sustained post-funding? How will the required knowledge and skills remain available to sustain the benefits? How will you ensure your data and evidence will be accessible to others?

If proven effective, the project has strong potential to be upscaled by promoting the biocontrol agents in Kenya and beyond. The project will release the parasitoid capable of sustainably managing SWD after the project timeline. It will also build strong partnerships with local and international organisations and farmers, enabling these partners to continue applying and developing biocontrol tools after the project ends. The research findings will be shared with NPPOs and published in peer-reviewed open-access journals, ensuring that researchers and practitioners can easily retrieve and use the information beyond the project's duration. The datasets will be deposited in reputable data repositories with proper metadata to facilitate easy access and understanding. Additionally, the developed protocols on biocontrol techniques can be used by researchers beyond the project's timeline. Furthermore, the project will train a PhD student on biocontrol, creating a pool of knowledgeable individuals who can continue to work on biodiversity conservation.

Q21b. If your approach works, what potential is there for scaling the approach further? Refer to Scalable Approaches (Landscape, Replication, System Change, Capacitation) in the guidance. What might prevent scaling, and how could this be addressed?

If the biocontrol tools for managing SWD are successful, there is significant potential for scaling the approach further. Since SWD is a global pest, the recommended biocontrol tools can be implemented across different geographical regions, benefiting millions of stakeholders. The parasitoid can be area-wide released for the management of SWD in Kenya and sub-Saharan Africa. Also, the biopesticide can be commercialised by the private sector and become readily available for different stakeholders in different regions to manage SWD. In addition, the project will open a strong capacity-building component, targeting different stakeholder categories through workshops to enhance their capacity and knowledge on biological control of insect pests hence biodiversity conservation. However, different countries have varying regulatory requirements, which can slow the approval and adoption of biocontrol agents. This can be solved by early engagement with regulatory bodies, harmonisation of standards, and comprehensive risk assessments can streamline approval processes.

Section 7 - Risk Management

Q22. Risk Management

Please outline the 7 key risks to achievement of your Project Outcome and how these risks will be managed and mitigated, referring to the Risk Guidance. This should include at least one Fiduciary, two Safeguarding, and one Delivery Chain Risk.

Risk Description	Impact	Prob.	Gross Risk	Mitigation	Residual Risk
Fiduciary (financial): funds not used for intended purposes or not accounted for (fraud, corruption, mishandling or misappropriated). Exchange rate fluctuations and funds are not managed probably leading to reduced programmatic impact	Moderate	Unlikely	Minor	The lead institution (ICIPE) will maintain the operating currency to GBP. ICIPE has robust and proven financial management systems with multiple layers of safeguarding (multiple layers of approval). The institute conducts both internal and external annual audits.	Minor
Safeguarding: risk of sexual exploitation abuse and harassment (SEAH), or unintended harm to beneficiaries, the public, implementing partners, and staff. Sexual exploitation abuse and harassment during the project implementation.	Minor	Rare	Minor	ICIPE's safeguarding policy against sexual exploitation, abuse, and harassment protects staff and partners through preventive measures and effective remedies. This ensures dignity, respect, and awareness of roles and responsibilities in maintaining a secure and safe workplace.	Minor
Safeguarding: risks to health, safety and security (HSS) of beneficiaries, the public. Implementing partners, and staff. The parasitoid G. brasiliensis G1 may affect non-target organisms, leading to unintended ecological consequences.	Minor	Unlikely	Minor	This parasitoid is reported in different parts of the world to be specific to SWD. Extensive host specificity testing has been conducted and new tests in quarantine will ensure its specificity before release. A comprehensive risk assessment report will be submitted to KEPHIS to obtain a release permit.	Minor
Delivery Chain: the overall risk associated with your delivery model. The partner does not deliver on his responsibility on time	Moderate	Unlikely	Minor	Project management adopts timely communication and efficient feedback mechanisms, and takes corrective measures if need be.	Minor
Risk 5 Anticipated matched funding not materialising in time	Minor	Rare	Minor	The matched funding has been secured.	Minor

Risk 6 The parasitoid not shipped to Kenya on time	Moderate	Unlikely	Moderate	The importation permit to Kenya has been granted to ICIPE and the partner has a vibrant parasitoid colony that can be quickly multiplied and shipped to Kenya upon the receive of the funds.	Minor
Risk 7 The release permit for parasitoid not granted by the authorities on time.	Moderate	Unlikely	Moderate	The comprehensive risk assessment report of the parasitoid will be submitted to KEPHIS for approval 8 months prior to release.	Moderate

Q23. Project sensitivities

Please indicate whether there are sensitivities associated with this project that need to be considered if details are published (detailed species location data that would increase threats, political sensitivities, prosecutions for illegal activities, security of staff etc.).

⦿ No

Section 8 - Workplan

Q24. Workplan

Provide a project workplan that shows the key milestones in project activities.

Work plan_Nature-based Management of the spotted-wing Drosophila
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Section 9 - Monitoring and Evaluation

Q25. Monitoring and evaluation (M&E)

Describe how the performance of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E. How will the project robustly evaluate the innovation to support its future application?

ICIPE will lead the overall Monitoring and Evaluation (M&E) process of the project, ensuring that project activities are on track and outputs are delivered on time. At the project's inception, an M&E plan will be created to clearly define milestones, outputs, and measurable indicators of progress. The M&E specialist of ICIPE will adhere to this plan to evaluate the progress against the Logframe's output indicators to ensure that milestones and deliverables are achieved. The project team will meet every 3 months to review progress based on the M&E plan and make any necessary adjustments needed to successfully deliver the outcome in consultation with the Darwin Secretariat.

Initially, the parasitoid G. brasiliensis G1 will be imported from CABI-Switzerland into the ICIPE quarantine facility

to initiate the colony. Then the effectiveness of parasitoid on the Kenyan populations of SWD will be evaluated. The parasitoid will also be tested on native species of Drosophilidae and other fruit flies to ensure its specificity before its release in the field. The technical report on the efficacy and host specificity of the parasitoid will be submitted to KEPHIS for evaluation and permit issuance for the field release. On the other hand, dozens of ICIPE's Metarhizium anisopliae fungi isolates (i.e., ICIPE 20, ICIPE 30, ICIPE78 etc.) will be screened against SWD to select the effective isolate that causes the highest mortality level of the pest. The compatibility between the parasitoid and selected fungal isolate will be tested.

All gathered data will be analysed and used to write the technical reports that will be submitted to KEPHIS and manuscripts that will be submitted to peer-reviewed Journals for publication. These reports and publications, in addition to periodic reports by the student, will be used to monitor and evaluate the project.

Total project budget for M&E (£) **(this may include Staff and Travel and Subsistence Costs)**	[redacted]
Total project budget for M&E (%) **(this may include Staff and Travel and Subsistence Costs)**	[redacted]
Number of days planned for M&E	[redacted]

Section 10 - Logical Framework & Standard Indicators

Q26a. Logical Framework (logframe)

Darwin Initiative projects will be required to monitor and report against their progress towards their Outputs and Outcome. This section sets out the expected Outputs and Outcome of your project, how you expect to measure progress against these and how we can verify this.

Logframe&theroy
15/10/2024
15:14:23
pdf 86.93 KB

Impact:

Sustainable management of spotted-wing Drosophila achieved in Kenya through the promotion of biological control agents to enhance livelihoods and protect native biodiversity threatened by pesticide use in agricultural landscape

Outcome:

Biodiversity conservation in agricultural landscapes enhanced through effective biobased management of Drosophila suzukii

Project Outputs
Output 1: Efficient coevolved parasitoid (Ganaspis brasiliensis) imported into Kenya and its mass rearing optimised

Output 2:

Scientific- evidence-based on performance and specificity of G. brasiliensis generated under quarantine conditions.

Output 3:

Virulence fungal isolates against D. suzukii identified

Output 4:

The compatibility of two identified biocontrol agents (the parasitoid, G. brasiliensis and fungal isolate) for the management of D. suzukii established

Output 5:

Establishment and impact of the released parasitoid on D. suzukii population under field conditions determined.

Do you require more Output fields?
It is advised to have less than 6 Outputs since this level of detail can be provided at the activity level.

⦿ Yes

Output 6:

Awareness and capacity building of the beneficiaries on safe production of berries and biodiversity conservation using an ecologically friendly approach of management of D. suzukii enhanced

Output 7:

No Response

Output 8:

No Response

Activities

Each activity is numbered according to the Output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1.

Activity 1.1: Filed survey to collect SWD, Drosophila suzukii from local infested plots for initial laboratory colonies.
Activity 1.2: Develop effective rearing protocol (artificial diet formulations) for mass rearing of D. suzukii.
Activity 1.3: Obtain necessary permits and regulatory approvals for importing the parasitiod Ganaspis brasiliensis.
Activity 1.4: Production and safe transportation of G. brasiliensis from Switzerland to icipe quarantine facility.
Activity 1.5: Develop an effective rearing protocol for the rearing of G. brasiliensis in icipe quarantine facility.
Activity 2.1: Evaluate the parasitism rate of G. brasiliensis on D. suzukii under laboratory conduction.
Activity 2.2: Assess host specificity of G. brasiliensis on D. suzukii and other related species under laboratory conduction.
Activity 2.3: Determine the functional response of G. brasiliensis on D. suzukii under laboratory conduction.
Activity 3.1: Screen various fungal isolates for their virulence (pathogenicity) against D. suzukii adults.
Activity 3.2: Fungal spore uptake by D. suzukii adults determined under laboratory conduction.
Activity 3.3: The horizontal transmission of the fungal isolates on D. suzukii evaluated.
Activity 3.4: The repeated infection by the fungal isolates evaluated against D. suzukii adults.
Activity 3.5: The effect of different fungal isolates on the fecundity of D. suzukii evaluated.

Activity 4.1: Evaluate the effect of the selected fungal isolate on the performance and the longevity of G. brasiliensis adults.
Activity 4.2: Determine the effect of the selected fungal isolate on the survival of G. brasiliensis immature stages.
Activity 4.3: Assess the preference of G. brasiliensis between fungal-sprayed and non-sprayed D. suzukii-infested plants.
Activity 4.4: Ascertain combined efficiency of G. brasiliensis and the selected fungal isolate against D. suzukii.
Activity 5.1: Obtain necessary permits and regulatory approvals for the release of parasitiod G. brasiliensis in the field.
Activity 5.2: Mass rearing of the parasitiod Ganaspis brasiliensis for field releases.
Activity 5.3: Identification of the parasitiod G. brasiliensis release sites.
Activity 5.4: Undertake prelease assessment of D. suzukii population level and their damage on berries crop.
Activity 5.5: Undertake filed release of parasitiod G. brasiliensis in the identified sites.
Activity 5.6: Undertake post release assessment to determine parasitiod establishment and impact on population of D. suzukii.
Activity 6:1 Train a young scientist on D. suzukii management for biodiversity conservation.
Activity 6:2 Build the capacity of agricultural extension officers on the pest identification and its biobased management.
Activity 6:3 Create awareness among berries farmers on biobased management of the pest.
Activity 6:4 Create public awareness on the release of the parasitiod G. brasiliensis.

Q26b. Standard Indicators

Standard Indicator Ref & Wording	Project Output or Outcome this links to	Target number by project end	Provide disaggregated targets here
e.g. DI-A01: Number of people in eligible countries who have completed structured and relevant training	**e.g. Output indicator 3.4 / Output 3**	**e.g. 60**	**e.g. 30 non-indigenous women; 30 non-indigenous men**
DI-A05: Number of trainers trained under the project reporting to have delivered further training	All indicators of Output 6	100	50 males and 50 females
DI-B02: Number of new or improved species management plans available and endorsed	All indicators of Outputs 1 & 2	2	one parasitoid and one biopesticide
DI-C01: Number of best practice guides and knowledge products published and endorsed	indicators of Outputs 1, 2, 3, 4 & 5	5	5 scientific publication
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*

No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*
No Response	*No Response*	*No Response*	*No Response*

If you cannot identify three Standard Indicators you can report against, please justify this here.

No Response

Section 11 - Budget and Funding

Q27. Budget

Please complete the appropriate Excel spreadsheet, which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet.

BCG-budget_Nature-based Management of the spotted-wing Drosophila
15/10/2024
15:54:47
xlsx 94.88 KB

Q28. Alignment with other funding and activities

This question aims to help us understand how familiar you are with other work in the geographic/thematic area, and how this proposed project will build on or align with this to avoid any risks of duplicating or conflicting activities.

Q28a. Is this new work or does it build on existing/past activities (delivered by anyone and funded through any source)?

⦿ Development of existing/past activities

Please give details.

This project builds on Gösta och Anna-Birgit Henrikssonss foundation funds that helped in the detection of SWD in Kenya. Recently, we conducted a survey in five counties namely Nakuru, Kiambu, Nyandarua, Nyeri, and Laikipia which revealed that SWD has spread in three counties including Nakuru, Kiambu, Nyandarua with no natural enemies recovered from the sampled fruits. However, due to the lack of funds, the survey could not cover the whole country. Nevertheless, urgent action is needed for the management of SWD to suppress its population and spread in Kenya and sub-Saharan Africa at large. Under Darwin initiative, the project “Protecting Biodiversity through Biocontrol of papaya mealybug in East Africa” addressed papaya mealybug issues through classical biological control. Thus, the current project will use a similar approach by first importing and testing the parasitoid under laboratory conditions before its filed release.

Q28b. Are you aware of any current or future plans for work in the geographic/thematic area to the proposed project?

⦿ Yes

Please give details explaining similarities and differences, and explaining how your work will be additional, avoiding duplicating and conflicting activities and what attempts have been/will be made to co-operate with and share lessons learnt for mutual benefit.

In Kenya, ICIPE has secured approval to import the parasitoid G. brasiliensis G1, although no fund can support testing and releasing the parasitiod in the field. Darwin funding would enable the pre-release assessment parasitoid under laboratory conditions for their subsequent field release. Also, this fund will enable us to develop an effective biopesticide against SWD. These biocontrol agents can be readily available to the farmers especially the releases of the parasitoid that will be done under this project which can reduce the population density of SWD, resulting in a greater impact on biodiversity and poverty reduction.

Q29. Value for Money

Please demonstrate why your project is good value for money in terms of impact and cost-effectiveness of each pound spend (economy, efficiency, effectiveness and equity). Why is it the best feasible project for the amount of money to be spent? Please make sure you read the guidance documents, before answering this question.

The parasitoid that will be released within the framework of the proposed project is self-perpetuation and is considered a good value for money. This is because this biological control approach, called classical biological control, is low-cost due to the fact that the agents, in this case, the parasitoid, can continue to multiply and spread on its own in the natural habitat once it is initially released and established, thus minimal investment is required in long-term mass-rearing. In addition, the reduction of pesticide uses and the resultant benefit to “One Health” including biodiversity is another avenue for good value for money. The project shall leverage on the intuition infrastructure such as quarantine facility and capital equipment like vehicles from existing initiatives.

Q30. Capital items

If you plan to purchase capital items with Darwin funding, please indicate what you anticipate will happen to the items following project end. If you are requesting more than 10% capital costs, please provide your justification here.

No capital items. These have already been financed from related projects.

Section 12 - Safeguarding & Ethics

Q31. Safeguarding

All projects funded under the Biodiversity Challenge Funds must ensure proactive action is taken to promote the welfare and protect all individuals involved in the project (staff, implementing partners, the public and beneficiaries) from harm. In order to provide assurance of this, projects are required to have specific procedures and policies in operation.

Please outline how your project will ensure:

(a) beneficiaries, the public, implementing partners, and staff are made aware of your safeguarding commitment and how they can confidentially raise a concern,

(b) safeguarding issues are investigated, recorded and what disciplinary procedures are in place when allegations and complaints are upheld,

(c) you will ensure project partners also meet these standards and policies.

Indicate which minimum standard protocol your project follows and how you meet those minimum standards, i.e. CAPSEAH, CHS, IASC MOS-PSEA. If your approach is currently limited or in the early stages of development, please clearly set out your plans to address this.

ICIPE through its safeguarding policy undertake its activities in a way that protects people from any risk or harm that may arise, including ways in which information about individuals in our programmes is gathered and communicated. ICIPE also abides by the General Data Protection Regulations (GDPR) and ensures that data collected during the project is upheld within the key GDPR principles. Therefore, during the project implementation, we shall have a zero-tolerance approach to any form of abuse and discrimination for all people and collaborators who participate in this project to ensure the protection of vulnerable persons. ICIPE will take action against all allegations, suspicions of abuse and discrimination reported directly or through whistleblowing. In the case of collaborators, safeguarding issues will be taken seriously and promptly investigated by a dedicated safeguarding team following a defined protocol. All cases will be documented with due diligence to ensure confidentiality and transparency. Disciplinary actions will be taken up to and including immediate termination of the partnership agreement and the relevant enforcement authorities will be notified when necessary. Our approach aligns with international safeguarding standards, ensuring that all parties involved are treated fairly, and actions are taken to prevent future incidents.

We will require all project partners to adhere to the same safeguarding policies and standards as ICIPE. Safeguarding clauses will be embedded into all partnership agreements, and partners will be required to demonstrate their compliance with safeguarding protocols. We will regularly assess their adherence to these standards through monitoring and reporting mechanisms. ICIPE already meet the minimum requirements of these protocols and will continue to review and improve our safeguarding practices throughout the project lifecycle. If any areas are identified as needing further development, we will address them through specific action plans, including capacity building for staff and partners to enhance safeguarding measures.

Defra recommend you appoint a safeguarding focal point to ensure the project's PSEAH work is taken forward. This can be a separate member of staff or a current member of staff who spends a proportionate amount of time for safeguarding and PSEAH activities. Please name this individual here - this person should also be included in your overall staff list at Q34 and in your budget.

[redacted]

Q32. Ethics

Outline your approach to meeting the key principles of good ethical practice, as outlined in the guidance.

ICIPE impalements a universal ethical code that all its scientists are expected to uphold, alongside a code of business conduct that outlines key standards to ensure legal compliance. Collaborators working with ICIPE in formal associations are similarly expected to adhere to equivalent standards.

As an international organization headquartered in Nairobi, ICIPE has maintained a headquarters agreement with the Government of Kenya since 1995 and consistently meets all legal and ethical obligations. The importation of the parasitoid from Switzerland into Kenya will fully comply with national regulations and the Access and Benefit-Sharing policy. Additionally, FAO's Code of Conduct for the Import and Release of Exotic Biological Control Agents, outlined in ISPM No.3, will be strictly followed during the evaluation and release process.

The project's partners include KEPHIS, a national institute with a mandate in pest management. This collaboration will strengthen existing partnerships established through previous initiatives. At the community level, the project will ensure the rights, privacy, and safety of all beneficiaries, both direct and indirect, are respected, with Prior Informed Consent sought before the parasitoid's release. Transparency, conflict of interest declarations, and openness in research methodologies, data analysis, and interpretation will guide the project, ensuring the research findings are widely-accessible.

Section 13 - British Embassy or High Commission Engagement

Q33. British embassy or high commission engagement

It is important for UK Government representatives to understand if UK funding might be spent in the project country/ies. Please indicate if you have contacted the relevant British embassy or high commission to discuss the project and attach details of any advice you have received from them.

⦿ Yes

Please attach evidence of request or advice if received.

British embassy Contact_Nature-based Management of the spotted-wing Drosophil.docx
15/10/2024
16:08:19
pdf 204.12 KB

Section 14 - Project Staff

Q34. Project staff

Please identify the core staff (identified in the budget), their role and what % of their time they will be working on the project.

Name (First name, surname)	Role	% time on project	1 Page CV or job description attached?
Dr Abdelmutalab G. A. Azrag	**Project Leader**	100	Checked
Dr. Samira A. Mohammed	Project supervisor and classical Biological control specialist	15	Checked
Dr. Michael Kidoido	M&E specialist	5	Checked
Farid Ibrahim Maholidy	PhD student	100	Checked

Do you require more fields?

⦿ Yes

Name (First name, surname)	Role	% time on project	1 Page CV or job description attached?
Technician	Provide technical assistance	100	Checked
Dr. Marc Kenis	Biological control specialist	5	Checked
Dr. Alexander Muvea	Biological control specialist	5	Checked

No Response	*No Response*	*No Response*	Unchecked
No Response	*No Response*	*No Response*	Unchecked
No Response	*No Response*	*No Response*	Unchecked
No Response	*No Response*	*No Response*	Unchecked
No Response	*No Response*	*No Response*	Unchecked

Please provide 1 page CVs (or job description if yet to be recruited) for the project staff listed above as a combined PDF.

CVs_Nature-based Management of the spotted-wing Drosophila
15/10/2024
16:13:47
pdf 839.57 KB

Have you attached all project staff CVs?

⦿ Yes

Section 15 - Project Partners

Q35. Project Partners

Please list all the Project Partners (including the Lead Organisation who will administer the grant and coordinate delivery of the project), clearly setting out their roles and responsibilities in the project including the extent of their engagement so far.

Lead Organisation name:	International Centre of Insect Physiology and Ecology (ICIPE)
Website address:	http://www.icipe.org/

Why is this organisation the Lead Organisation, and what value to they bring to the project? **(including roles, responsibilities and capabilities and capacity):**	Established in 1970, the International Centre of Insect Physiology and Ecology (ICIPE) is non-profit African-based research for development organisation that contributes significantly to the science and innovation required to meet the health, food and nutritional security and biodiversity challenges of sub-Saharan Africa and thus, meets the focal area of the current call of Darwin Initiative. The mission of ICIPE is to help poverty alleviation, ensure food security, and improve the overall health status of people of the tropics by developing and extending management tools and strategies for harmful and useful arthropods while preserving the natural resource base through research and capacity building. The Centre aims to contribute towards 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. ICIPE with its partners have previously developed several agroecological-based management toolboxes including classical biological control and fungal-based biopesticide for the management of alien invasive pests such as fruit flies, B. dorsalis and tomato pinworm P. absoluta. These tools are ecologically sustainable and economically feasible which helped farmers to improve crop productivity, generating high income thus reducing poverty and sustaining biodiversity. Building on our previous knowledge of classical biological control of invasive pests, ICIPE has led the design and development of this project and will be responsible for the overall coordination and implementation of the project activities including pre-release evaluation of the parasitoid G. brasiliensis G1, filed release and biopesticide development. ICIPE team including Dr Abdelmutalab G. A. Azrag (Project leader), Dr Samira A. Mohamed (project supervisor and classical biological control specialist and project supervisor), Farid Ibrahim (PhD student) and Dr Michael Kidoido (M&E specialist) will be responsible for the project implementation.
International/In-country Partner	⦿ International
Allocated budget (proportion or value):	[redacted]
Representation on the Project Board (or other management structure)	⦿ Yes
Have you included a Letter of Support from the Lead Organisation?	⦿ Yes

Do you have partners involved in the project?

⦿ Yes

1. Partner Name:	Centre for Agriculture and Bioscience International (CABI)
Website address:	https://www.cabi.org/

What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	CABI is an international, not-for-profit, research organisation in the field of agriculture. CABI's headquarters are established in the United Kingdom, but CABI has a network of centres, laboratories and offices worldwide, including in Kenya. Its centre in Switzerland has extensive expertise in invasive species management including classical biological control. The scientist involved in the project Dr Marc Kenis has led a project on SWD biological control in Switzerland since 2014. His team has collected SWD parasitoids in Asia and has reared and studied them for many years, which led to the selection of G. brasiliensis G1 as the most promising biological control agent against SWD. CABI has released or supported releases of the parasitoid in Italy, USA, Switzerland, France and Israel. In the proposed project, CABI will provide the parasitoid G. brasiliensis G1 to ICIPE and will provide its expertise in the rearing, assessment and release of the parasitoid.
International/In-country Partner	⦿ International
Allocated budget:	[redacted]
Representation on the Project Board (or other management structure)	⦿ Yes
Have you included a Letter of Support from this partner?	⦿ Yes

2. Partner Name:	Kenya Plant Health Inspectorate Service (KEPHIS)
Website address:	https://kephis.go.ke/
What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	Kenya Plant Health Inspectorate Service (KEPHIS) is Kenya's National Plant Protection Organization (NPPO) whose responsibility is to regulate all matters relating to plant protection and administer and enforce sanitary and phytosanitary measures. It further assures the quality of agricultural inputs and produce to prevent adverse impacts on the economy, the environment and human health. KEPHIS further undertakes capacity building in line with its mandate to foster compliance with international SPS market requirements. KEPHIS is the Secretariat to the Kenya Standing Technical Committee on Imports and Exports (KSTCIE) that coordinates the approval of exotic parasitoid introductions and releases in the country. The KEPHIS led by Dr. Alexander Muveawill will carry out the pre and post-release assessments of the parasitoid on behalf of KSTCIE/KEPHIS. KEPHIS will also assist in awareness creation and selection of the plots for parasitoid release.
International/In-country Partner	⦿ In-country
Allocated budget:	[redacted]
Representation on the Project Board (or other management structure)	⦿ Yes

Have you included a Letter of Support from this partner?	⦿ Yes

3. Partner Name:	*No Response*
Website address:	*No Response*
What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	*No Response*
International/In-country Partner	○ International ○ In-country
Allocated budget:	*No Response*
Representation on the Project Board (or other management structure)	○ Yes ○ No
Have you included a Letter of Support from this partner?	○ Yes ○ No

4. Partner Name:	*No Response*
Website address:	*No Response*
What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	*No Response*
International/In-country Partner	○ International ○ In-country
Allocated budget:	*No Response*
Representation on the Project Board (or other management structure)	○ Yes ○ No
Have you included a Letter of Support from this partner?	○ Yes ○ No

5. Partner Name:	*No Response*
Website address:	*No Response*

What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	*No Response*
International/In-country Partner	◯ International ◯ In-country
Allocated budget:	*No Response*
Representation on the Project Board (or other management structure)	◯ Yes ◯ No
Have you included a Letter of Support from this partner?	◯ Yes ◯ No

6. Partner Name:	*No Response*
Website address:	*No Response*
What value does this Partner bring to the project? **(including roles, responsibilities and capabilities and capacity):**	*No Response*
International/In-country Partner	◯ International ◯ In-country
Allocated budget:	*No Response*
Representation on the Project Board (or other management structure)	◯ Yes ◯ No
Have you included a Letter of Support from this partner?	◯ Yes ◯ No

If you require more space to enter details regarding Partners involved in the project, please use the text field below.

No Response

Please provide a combined PDF of all Letters of Support for all project partners or explain why this has not been included.

Letters of Support_Nature-based Management of the spotted-wing Drosophila
15/10/2024
16:20:35
pdf 1009.77 KB

Section 16 - Lead Partner Track Record

Q36. Lead Organisation Capability and Capacity

Has your organisation been awarded Biodiversity Challenge Funds (Darwin Initiative, Darwin Plus or Illegal Wildlife Trade Challenge Fund) funding before (for the purposes of this question, being a partner does not count)?

⦿ No

Please provide the below information on the Lead Organisation.

What year was your organisation established/ incorporated/ registered?	01 January 1970
What is the legal status of your organisation?	⦿ NGO
Other explained	*No Response*
How is your organisation currently funded?	ICIPE is a donor-funded organisation that receives funds from multiple core and project donors to run its activities. It receives core funds from the Swedish International Development Cooperation Agency (Sida), Swiss Agency for Development and Cooperation (SDC); the Australian Centre for International Agricultural Research (ACIAR); the Government of Norway; the German Federal Ministry for Economic Cooperation and Development (BMZ). ICIPE also receive restricted project funds from various Foundations, governments, the European Union, the African Union, World Health Organization, and the World Trade Organization among others.

Describe briefly the aims, activities and achievements of your organisation. Large organisations please note that this should describe your unit or department.

Aims	Our research unit in ICIPE aims to develop and disseminate environmentally friendly management tools and technologies for the management of native and invasive pests of crops as well as build the capacity of young scientists, growers and other stakeholders on nature-based solutions.
Activities	1. To develop environmentally friendly management tools (IPM tools) and technologies for the control of the native and invasive pests of crops. 2. To upscale and disseminate the developed technologies to stakeholders. 3. To build the capacity of young African scientists and create awareness among the growers and other stakeholders.
Achievements	Our unit at ICIPE has developed IPM technologies for several invasive pests including classical biological control of fruit flies, B. dorsalis, and tomato pinworm, Tuta absoluta. We also trained over 100 MSc and PhD students as well as over 1000, 000 growers on the use of nature-based pest management strategies.

Provide detail of 3 contracts/projects held by the Lead Organisation that demonstrate your credibility as an organisation and provide track record relevant to the project proposed. These contracts/awards should have been held in the last 5 years and be of a similar size to the grant requested in your application.

Contract/Project 1 Title	Demand-driven interventions for implementing agroecologically-based and climate resilient IPM technologies to enhance fruit production and nutrition among stallholder farmers in East Africa (Funded by BMZ 2023-present)
Contract value/Project budget (include currency)	[redacted]
Duration (e.g. 2 years, 3 months)	3 Years
Role of organisation in project	Project Coordination and Implementation
Brief summary of the aims, objectives and outcomes of the project	Fruit trees like mango and avocado are mainly grown by smallholder farmers in East Africa and they play a vital role in supporting rural livelihoods. However, their full potential is hindered by infestations of invasive insect pests. Farmers resort to excessive use of synthetic insecticides, which are harmful to "One Health". This project aims to address these issues by upscaling agroecological integrated pest management approach in Ethiopia, Kenya, and Tanzania, targeting pests like fruit flies and white mango scale. It also promotes value addition through green solar energy for mango drying, empowers women and youth, and includes gender-inclusive capacity building.
Client/independent reference contact details (Name, e-mail)	BMZ office, [redacted]

Contract/Project 2 Title	Integrated Sustainable Production of Tomatoes (ISPOT phase 1 & 2) in Kenya (Funded by Biovision Foundation for Ecological Development 2019-current).
Contract value/Project budget (include currency)	[redacted]
Duration (e.g. 2 years, 3 months)	6 Years
Role of organisation in project	Project Coordination and Implementation
Brief summary of the aims, objectives and outcomes of the project	Tomato production in Kenya is vital for income, employment, and food security, and is mainly grown by small-scale farmers. However, the sector faces challenges like soil fertility issues, pests, and diseases. Farmers often rely on the indiscriminate use of synthetic pesticides and fertilizers, leading to environmental and health risks. Despite available IPM technologies for pests like T. absoluta, toxic pesticides are still widely used. To address these issues, this project promotes an eco-friendly integrated approach for soil fertility, pest, and disease management. This was mainly achieved through parasitoid release and capacity building of the farmers and extension officers.

Client/independent reference contact details (Name, e-mail)	Dr. Danny Nef [redacted]

Contract/Project 3 Title	Combating Arthropod Pests for Better Health, Food and Resilience to Climate Change (CAP-Africa) (Funded NORAD 2018-2023)
Contract value/Project budget (include currency)	[redacted]
Duration (e.g. 2 years, 3 months)	5 Years
Role of organisation in project	Project Coordination and Implementation
Brief summary of the aims, objectives and outcomes of the project	This project was implemented in Kenya, Ethiopia and Tanzania and it was built upon three strategic research thrusts: (i) Global health– to reduce the burden of malaria and emerging infectious diseases, (ii) Climate change– to fill critical gaps in knowledge on climate change's impact on ecosystem services and invasive pests and deploying climate-smart technologies to improve food security and systems resilience and (iii) Education– to train at postgraduate level for leadership in scientific research, development, policy, technology dissemination. Impact assessment, M&E and gender analysis are factored into the programme.
Client/independent reference contact details (Name, e-mail)	Dr Thunes H. Karl [redacted]

Have you provided the requested signed audited/independently examined accounts?

⦿ Yes

Section 17 - Certification

Q36. Certification

If this section is incomplete the entire application will be rejected.

Please note if you do not upload the relevant materials below your application may be ineligible.

On behalf of the

Company

of

International Centre of Insect Physiology and Ecology (ICIPE)

I apply for a grant of

£200,000.00

I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.

(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)

- **I have enclosed CVs for key project personnel, a cover letter, letters of support, a budget, logframe, theory of change, Safeguarding and associated policies, and project workplan.**
- **Our last two sets of signed audited/independently verified accounts and annual report (or other financial evidence – see Finance Guidance) are also enclosed.**

Checked

Name	Dr Abdou Tenkouano
Position in the organisation	Director General & CEO
Signature (please upload e-signature)	Certification_based Management of the spotted-wing Drosophil 15/10/2024 16:39:06 pdf 105.02 KB
Date	14 October 2024

Please attach the requested signed audited/independently examined accounts.

Report-and-Financial-Statements_Nature-based Management of the s
15/10/2024
16:39:47
pdf 11.7 MB

Please upload the Lead Organisation's Safeguarding Policy, Whistleblowing Policy and Code of Conduct as a PDF. Optionally you can also upload your Health, Safety and/or Security policy or Security Plan here.

Policies_Nature-based Management of the spott ed-wing Drosophila
15/10/2024
16:43:21
pdf 1.18 MB

Section 18 - Submission Checklist

Checklist for submission

I have read the Guidance**, including the "Darwin Initiative Guidance", "Monitoring Evaluation and Learning Guidance", "Standard Indicator Guidance", "Risk Guidance", and "Finance Guidance".**	Checked
I have read, and can meet, the current Terms and Conditions **for this fund.**	Checked

I have provided actual start and end dates **for the project.**	Checked
I have provided the budget based on UK government financial years **i.e. 1 April – 31 March and in GBP.**	Checked
I have checked that the budget is complete**, correctly adds up and I have included the correct final total at the start of the application.**	Checked
The application has been signed by a suitably authorised individual **(clear electronic or scanned signatures are acceptable).**	Checked
I have attached the below documents to my application: • **a** cover letter from the Lead Organisation.	Checked
• **a** completed logframe **as a PDF using the template provided.**	Checked
• **a 1 page** Theory of Change **as a PDF which includes the key elements listed in the guidance.**	Checked
• **a** budget **(which meets the requirements above) using the template provided.**	Checked
• **a signed** copy of the last 2 annual report and accounts **for the Lead Organisation (or other financial evidence – see Finance Guidance), or provided an explanation if not**	Checked
• **a completed** workplan **as a PDF using the template provided.**	Checked
• **a copy of the** Lead Organisation's Safeguarding Policy, Whistleblowing Policy and Code of Conduct **(Question 31).**	Checked
• **a copy of the Lead Organisation's** Health, Safety and/or Security policy or Security Plan **(Question 31)**	Checked
• **1 page CV or job description for all the Project Staff identified at Question 34, including the Project Leader, or provided an explanation of why not, combined into a single PDF.**	Checked
• **a** letter of support from the Lead Organisation and partner(s) identified at Question 35, or an explanation of why not, as a single PDF.	Checked
I have been in contact with the FCDO **in the project country(ies) and have included any evidence of this. If not, I have provided an explanation of why not.**	Checked
The additional supporting evidence is in line with the requested evidence, amounts to a maximum of 5 sides of A4, and is combined as a single PDF.	Checked
(If copying and pasting into Flexi-Grant) I have checked that all the responses have been successfully copied into the online application form.	Checked
I have checked the Darwin website **immediately prior to submission to ensure there are no late updates.**	Checked
I have read and understood the Privacy Notice on the Darwin Initiative website**.**	Checked

We would like to keep in touch!

Please check this box if you would be happy for the lead applicant (Flexi-Grant Account Holder) and project leader (if different) to be added to our mailing list. Through our mailing list we share updates on upcoming and current application rounds under the Biodiversity Challenge Funds. We also provide occasional

updates on other UK Government activities related to biodiversity conservation and share our regular newsletter. You are free to unsubscribe at any time.

Checked

Data protection and use of personal data

Information supplied in the application form, including personal data, will be used by Defra as set out in the Privacy Notice, available from the Forms and Guidance Portal**.**
This Privacy Notice must be provided to all individuals whose personal data is supplied in the application form. Some information may be used when publicising the Darwin Initiative including project details (usually title, lead organisation, project leader, location, and total grant value).

Project Title: Nature-based Management of the spotted-wing *Drosophila*: Biodiversity Protection in Agricultural-Landscape

Project Summary	**SMART Indicators (including disaggregated targets)**	**Means of Verification**	**Important Assumptions**
Impact: (Max 30 words) Sustainable management of spotted-wing *Drosophila* achieved in Kenya through the promotion of biological control agents to enhance livelihoods and protect native biodiversity threatened by pesticide use in agricultural landscape			
(Max 30 words) **Outcome:** Biodiversity conservation in agricultural landscapes enhanced through effective biobased management of *Drosophila suzukii*	❖ At least 2 IPM tools developed for the management of *D. suzukii* by March 2027	❖ Parasitoid release in the field ❖ Publications ❖ Reduction in pesticide usage	❖ Berries farmers collaborate ❖ Political stability ❖ Conductive weather conditions
Outputs: **1.** Efficient coevolved parasitoid (*Ganaspis brasiliensis)* imported into Kenya and its mass rearing optimised	❖ Vibrant colony of *D. suzukii* established by May 2025. ❖ 200 parasitoid wasps of *G. brasiliensis* imported from Switzerland into Kenya by June 2025. ❖ Protocol for mass rearing of the parasitoid established and vibrant colony developed by August 2025.	❖ Import permits and documentation. ❖ Project progress report. ❖ Monthly reports on the rearing success of *D. suzukii* and its parasitoid.	❖ Necessary import permits and regulatory approvals granted without significant delay. ❖ Parasitoids adapt to laboratory conditions and reproduce effectively
2. Scientific- evidence-based on performance and specificity of *G. brasiliensis* generated under quarantine conditions.	❖ Percentage of *D. suzukii* larvae parasitised by *G. brasiliensis* (parasitism rate) determined by February 2026. ❖ Percentage of non-target species (other Drosophila spp.) parasitised by *G. brasiliensis* determined by May 2026.	❖ Project progress reports ❖ Publications ❖ Technical report	Vibrant colony of the host, *D. suzukii* and related non target species Vibrant colony of the *parasitoid, G. brasiliensis*

3. Virulence of fungal isolates against *D. suzukii* identified	❖ At least 4 fungal isolates caused 70% mortality of *D. suzukii* screened by September 2025. ❖ Effective fungal isolate that causes at least 70% mortality and affects egg-laying of *D. suzukii* identified and recommended for potential development as biopesticide for management of the pest by April 2026.	❖ Project progress reports ❖ Publications ❖ Technical report	❖ Vibrant colony of *D. suzukii* ❖ The fungal isolates are amendable to mass production
4. The compatibility of two identified biocontrol agents (the parasitoid, *G. brasiliensis* and fungal isolate) for the management of *D. suzukii* established	❖ At least 70% survival rate and successful reproduction of parasitoids in the presence of fungi determined by September 2026 ❖ At 80% mortality as a result of the combined application of the two biocontrol agents achieved by October 2026	❖ Project progress report. ❖ publications	❖ Vibrant colony of the host, *D. suzukii* and parasitoid, *G. brasiliensis* ❖ The fungal isolates are amendable to mass production
5. Establishment and impact of the released parasitoid on *D. suzukii* population under field conditions determined**.**	❖ At last 7, 000 wasps of G. *G. brasiliensis* releases in the key berries producing region of Kenya by November 2026 ❖ Percentage of parasitoids recovery, ❖ At 40% reduction in the population of *D. suzukii* achieved by February 2027	❖ Project progress reports ❖ Publication	❖ Vibrate parasitoid colony ❖ Release permit granted by KEPHIS in Kenya. ❖ No crop failure/drought during the parasitoids release period. ❖ Growers cooperate and allow access to their fields.

	❖ At 40% reduction berries infestation by *D. suzukii* achieved in the project sites by February 2027		
6. Awareness and capacity building of the beneficiaries on safe production of berries and biodiversity conservation using an ecologically friendly approach of management of *D. suzukii* enhanced	❖ At 100 (30% females) beneficiaries trained on *D. suzukii* nature-based management by March,2027 ❖ At least one postgraduate student trained.	❖ Project progress reports ❖ List of beneficiaries trained ❖ Publication ❖ Thesis	❖ Farmers and extension officers willing to participate in training and awareness campaigns.

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1. Each activity should start on a new line and be no more than approximately 25 words.)

Activity 1.1: Filed survey to collect SWD, *Drosophila suzukii* from local infested plots for initial laboratory colonies.
Activity 1.2: Develop effective rearing protocol (artificial diet formulations) for mass rearing of *D. suzukii*.
Activity 1.3: Obtain necessary permits and regulatory approvals for importing the parasitiod *Ganaspis brasiliensis*.
Activity 1.4: Production and safe transportation of *G. brasiliensis* from Switzerland to *icipe* quarantine facility.
Activity 1.5: Develop an effective rearing protocol for the rearing of *G. brasiliensis* in *icipe* quarantine facility.
Activity 2.1: Evaluate the parasitism rate of *G. brasiliensis* on *D. suzukii* under laboratory conduction.
Activity 2.2: Assess host specificity of *G. brasiliensis* on *D. suzukii* and other related species under laboratory conduction.
Activity 2.3: Determine the functional response of *G. brasiliensis* on *D. suzukii* under laboratory conduction.
Activity 3.1: Screen various fungal isolates for their virulence (pathogenicity) against *D. suzukii* adults.
Activity 3.2: Fungal spore uptake by *D. suzukii* adults determined under laboratory conduction.
Activity 3.3: The horizontal transmission of the fungal isolates on *D. suzukii* evaluated.
Activity 3.4: The repeated infection by the fungal isolates evaluated against *D. suzukii* adults.
Activity 3.5: The effect of different fungal isolates on the fecundity of *D. suzukii* evaluated.
Activity 4.1: Evaluate the effect of the selected fungal isolate on the performance and the longevity of *G. brasiliensis* adults.
Activity 4.2: Determine the effect of the selected fungal isolate on the survival of *G. brasiliensis* immature stages.
Activity 4.3: Assess the preference of *G. brasiliensis* between fungal-sprayed and non-sprayed *D. suzukii*-infested plants.
Activity 4.4: Ascertain combined efficiency of *G. brasiliensis* and the selected fungal isolate against *D. suzukii*.

Project Title: Nature-based Management of the spotted-wing *Drosophila*: Biodiversity Protection in Agricultural-Landscape

Activity 5.1: Obtain necessary permits and regulatory approvals for the release of parasitiod *G. brasiliensis* in the field.
Activity 5.2: Mass rearing of the parasitiod *Ganaspis brasiliensis for field releases*.
Activity 5.3: Identification of the parasitiod *G. brasiliensis* release sites.
Activity 5.4: Undertake prelease assessment of *D. suzukii* population level and their damage on berries crop.
Activity 5.5: Undertake filed release of parasitiod *G. brasiliensis* in the identified sites.
Activity 5.6: Undertake post release assessment to determine parasitiod establishment a*nd impact on population of D. suzukii*.
Activity 6:1 Train a young scientist on *D. suzukii* management for biodiversity conservation.
Activity 6:2 Build the capacity of agricultural extension officers on the pest identification and its biobased management.
Activity 6:3 Create awareness among berries farmers on biobased management of the pest.
Activity 6:4 Create public awareness on the release of the parasitiod *G. brasiliensis*.

Guidance (please delete this before attaching your logframe to your application): Refer to the **Monitoring, Evaluation and Learning Guidance** when developing your logical framework.