

DPLR2\1024

Enquiry into the Pontodrilus sp. earthworm's consumption of sargassum seaweed.

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Section 1 - Project Title & Contact Details

Q1. Project Title

Enquiry into the Pontodrilus sp. earthworm's consumption of sargassum seaweed.

Q2. Please select whether you are applying as an organisation or as an individual (Guidance section 3 and Guidance Glossary)

Organisation

CONTACT DETAILS

| | |
|---------------------|--|
| Name | Aragorn |
| Surname | Dick-Read |
| Website | Www.Goodmoonfarm.Com |
| Tel | [REDACTED] |
| Email (Work) | [REDACTED] |
| Address | [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] |

GMS ORGANISATION

| Type | Organisation |
|----------------|--|
| Name | Good Moon Farm |
| Phone | [REDACTED] |
| Email | [REDACTED] |
| Website | Www.goodmoonfarm.com |
| Address | [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] |

Section 2 - Overseas Territory(ies)

Q3. Overseas Territory (Guidance section 1.3):

Which UK Overseas Territory(ies) will your project be working in? Please note that in case of a non-permanent resident population you need to demonstrate a clear, meaningful, long-term link to the territory.

British Virgin Islands (BVI)

* if you have indicated a territory group with an asterisk, please give detail on which territories you are working on here:

No Response

In addition to the UKOT(s) you have indicated, will your project directly benefit any other UK OT(s) or country(ies)?

Yes

Please list these below and describe how they will benefit:

Caribbean coastlines are being inundated by sargassum seaweed which has created significant management and removal challenges that are negatively impacting tourism and coastal ecosystem health. The Pontodrilus sp. earth worm has been found to consume sargassum - we intend to research the lifecycle, habitats and consumption habits of the Pontodrilus sp. worms found in the BVI to provide a comprehensive toxicity and nutrient analysis of the vermi-compost produced by these worms post-consumption. This case study has potential benefits for all Caribbean UKOTs and the wider region in terms of sargassum management and soil amendment for use in agriculture, horticulture and conservation.

Section 3 - Project Partners

Q4. Project partners (Guidance section 3.2)

In this section, please give details of all the partners involved (including the Lead Partner) and provide a summary of their roles.

Project Leader name (Guidance section 3.1): Aragorn Dick-Read

Lead Partner name (if applying as an organisation; Guidance section 3.1): Good Moon Farm

Lead Partner Website (if applicable): [Www.goodmoonfarm.com](http://www.goodmoonfarm.com)

Is the Lead Partner based in a UKOT where the project is working (Guidance section 3.1)? Yes

H Lavity Stout Community College, HLSCC, Tortola, BVI.

University of Portsmouth.
Dr Fay Couceiro,
Professor Richard Teeuw ,
Dr Muhammad Al

List other partners involved and where are they based (Guidance section 3.2):

Center Cooperation International In Agricultural Research Development , Martinique
Dr Mathieu Coulis,

Cornell University,USA. Professor Jean Bonhotal , www.Cornell.edu

Maharishi International University, Iowa, USA. Professor Sam James ,
www.mid.edu

Earth Worm Farm, Miami, USA. Dr Lanette Sobel MS DPM ,
www.fertileearthwormfarm.Com

H Lavity Stout Community College, Tortola, BVI.: Soil laboratory facilities

Portsmouth University,UK.
Dr Muhammad Ali: vermiculture and waste management;
Dr Fay Couciero: soil and water chemistry: assays of Sargassum and Pontodrilus for nutrients and contaminants (e.g. arsenic & heavy metals);
Professor Richard Teeuw: applied soil science, advisory role.

Summary of roles and responsibilities of each partner in the project:

Cornell University,USA. Jean Bonhotal : Tests and assays : Nutrient values and biology of the post Pontodrilus sp. vermi-compost samples collected.

CIRAD.Fr, Martinique ,Dr Mathieu Coulis, : Conduct parallel surveys, experiments and tests on the life cycle and habits of the Pontodrilus.

Maharishi University ,Iowa USA . Sam James ,Earth Worm Taxonomist, specializing in Caribbean worms . To identify the species and interpret findings of life cycle and optimal habits etc

Fertile Earth Worm Farm, Miami, USA. Dr Lanette Sobel, Consultant for future Pontodrilus sp. worm farm systems development.

I confirm that all listed partners are aware of this application and have indicated support:

Checked

Attach a Cover Letter for your application (Guidance section 4.2).

 [Cover letter DPLR2 1024](#)
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 [Pontodrilus letter of support cpy](#)
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 [Letter of Support](#)
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 [BVI Darwi Local UoP sargassum](#)
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 [Maharishi Letter of support](#)
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Section 4 - Project Summary & Description

Q5. Project Summary (Guidance section 3.8)

Please provide a brief summary of your project. This may be used in communication activities and/or published online, if your application is successful.

Our project intends to confirm the identity of Pontodrilus sp. earth worms found in the BVI to compare with others found in the region, specifically Martinique. Our goal is to undertake a comprehensive study of the Pontodrilus sp. earth worms life cycle, optimal habitats and eating habits, particularly the consumption of sargassum seaweed in order to test the nutrients, potential toxicity and suitability of the resultant vermi-compost as a soil amendment for agricultural use.

Q6a. Description (Guidance section 2.1 and 6)

Please provide a description of your project, including:

- the overall objective
- the current situation and the problem the project is trying to address
- what success will look like and how you will measure it

Please be as specific as possible when describing the project, using quantified data and evidence where available. You may wish to consider: what are the specific threats to the environment that the project will attempt to address, and what should we know about these threats? What does your successful project look like? And how will you demonstrate whether and how your project has been successful?

The BVI is vulnerable to numerous natural disasters and economic shocks which can affect the resilience of the territory. Two significant areas of concern are food security/sovereignty and tourism contributions to the economy. Sargassum seaweed decomposition threatens public health and the tourist product but also, if the projects findings are positive, it could offer opportunities to improve soil health and subsequently food security/sovereignty.

Project History : Over the past year Good Moon Farm has been collecting samples of decomposing sargassum for simple Worm bin tests to observe the behavior of the Pontodrilus sp.worms that are found to be consuming sargassum along the shore lines of the BVI.

We have noticed the Pontodrilus sp. seem to flourish and multiply whilst consuming sargassum in a controlled environment. We have harvested a substantial amount of vermi-compost from our test bins and have done some positive preliminary plant tests , but we have been cautious about using it in all our farm soil mixes until we fully understand it potential toxicity and biological contents.

This project will enquire whether or not Pontodrilus sp. vermi-compost are a valuable resource for Agriculture/ horticulture/ conservation as a viable soil amendment to increase soil health and food production, with a further potential for economic opportunities both to remove and process the sargassum.

This will be achieved by:

- 1) Addressing the lack of scientific knowledge about the Pontodrilus sp.earth worm, its life-cycle and its processes of consuming sargassum. We aim to confirm the identity of Pontodrilus sp. earth worms in the BVI and compare it with those found in Martinique. This will be done in collaboration with Mr Mathieu Coulis at the CIRAD Lab and Professor Sam James, Caribbean earthworm taxonomist at Maharishi International University. We intend to undertake a comprehensive study of the Pontodrilus sp.life cycle, optimal habitats and consumption habits, particularly its consumption of the sargassum. This will be done by setting up controlled observations in the BVI and for a regional comparison, in Martinique . We will monitor the time taken for Pontodrilus sp. worms to consume measured portions of sargassum in different states (fresh from the sea and partially decomposed on the shore).
- 2) Providing clarity regarding purported heavy metal and arsenic contamination of sargassum and whether there is any toxic contamination in the resultant vermi-compost. Toxicity tests (for heavy metal and arsenic) will be undertaken on samples of raw and decomposing Sargassum as well as on the Pontodrilus sp.vermi-castings and the Pontodrilus sp.worms themselves.These will be collected in the BVI and in Martinique. This will be done at the HHLS Community College's DPLUS 160 soil laboratory in the BVI by Professor Fay Couceiro, the University of Portsmouth.
- 3) Conducting nutrient and biological content testing on raw and decomposed sargassum, as well as on the Pontodrilus sp. vermi-compost from both the BVI and Martinique. These tests will be done by Professor Jean Bonhotal, of Cornell University, USA. The goals of these test is to ascertain the potential value of Pontodrilus sp.vermi-compost for agricultural, horticultural and conservation use.

Success of the Pontodrilus sp. project hopes to answer questions not currently known to science. It is our intention to complete a comprehensive scientific analysis of the life cycle, processes and products of the Pontodrilus sp. The longer term objective would be to scale up and create duplicable systems for vermi-composting facilities in the BVI, in the first instance and subsequently in any islands and coastlines effected by the sargassum inundations. The resulting vermi-compost , if proven safe, could be a stimulus to regional employment generation and be of benefit for agricultural productivity.

Q6b. Long-term sustainability (Guidance section 2.1 and 6)

Please describe the long-term benefits of the project and the change it will bring about. How will the outcomes of the project be sustained after the funding is finished?

Understanding the role of Pontodrilus sp. and the potential value of using sargassum to produce vermi-compost offers the opportunity for long term benefit for agricultural/horticultural/conservation activities in the BVI and wider Caribbean region.

It is anticipated that a successful pilot project will confirm the suitability or otherwise of Pontodrilus worms as an agent to support the management and processing of sargassum seaweed from shorelines in the BVI. If this suitability is indeed confirmed then there will be an economic incentive for local entrepreneurs and organizations to collect and process sargassum via Pontodrilus farms as part of a sustainable financial model with positive benefits to tourism, public health and soil health with associated potential contributions to community economic and food security. This project falls very much in line with the spirit of the recently passed , BVI Food Security and Sustainability Act 2022.

In anticipation of positive nutrient testing ,Good Moon Farm intends to continue to be a testing and trial site to study the efficacy of Pontodrilus sp. vermi-compost on different plants species.

(Optional) Please upload any additional and supporting materials or files (such as maps of project sites, etc) below. Maximum of 5 pages:

No Response

Section 5 - Project Outcome(s)

Q7. Project Outcome(s) (Guidance section 1.2)

Successful Darwin Plus Local projects must demonstrate measurable outcomes in at least one of the themes of Darwin Plus, either by the end of the project or soon after through a credible plan.

Please tick which theme(s) of Darwin Plus your project contributes to:

Checked **Biodiversity: improving and conserving biodiversity, and slowing or reversing biodiversity loss and degradation;**

Checked **Climate change: responding to, mitigating and adapting to climate change and its effects on the natural environment and local communities;**

Checked **Environmental quality: improving the condition and protection of the natural environment**

Checked **Capability and capacity building: enhancing the capacity within OTs, including through community engagement and awareness, to support the environment in the short- and long-term.**

Please justify your selection. Please use quantitative information where possible here.

This enquiry into Pontodrilus sp. will improve our understanding of the role it plays as a fertilizer of the foreshore in nature and as a harnessable resource to support agricultural, horticultural and conservation in the BVI and broader region.

Harvesting and processing sargassum in large quantities will increase resiliency of communities by improving their soil fertility and increasing their ability to produce food.

Sargassum derived vermi-compost has many long term benefits for coastal soil health and agricultural soil health and productivity.

Project aims to identify the beneficial values of Pontodrilus Vermi-compost for its potential impact on agriculture and food security/sovereignty.

Section 6 - Workplan

Q8. Workplan (Guidance section 2.2)

Please provide anticipated dates for the start and end of your planned project here. Please use the Darwin Plus Local Project Workplan (available at: <https://darwinplus.org.uk/apply>) to provide a list of the individual activities you have planned for this project, a brief description of what each activity entails, and the months in which the activities will be carried out. If the project involves only one activity (e.g. a purchase), please still provide project start and end dates (noting estimated times for procurement). Please note that your project must be completed by 31 March 2024.

| | | |
|-----------------|---------------|---------------------------|
| Start date: | End date: | Duration (e.g. 3 months): |
| 02 October 2023 | 31 March 2024 | 6 months |

Please upload the completed Darwin Plus Local Project Workplan with your proposed project activities here

 [Appendix DPLR2 1024](#)

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Section 7 - Costs

Q9. Costs (Guidance section 2.2 and please read the Finance Guidance)

Please provide a breakdown of costs to be funded through Darwin Plus Local (in GBP).

Are you seeking any matched funding for this project? (Please note that this is optional and there is no requirement to seek matched funding for Darwin Plus Local projects).

No

| Budget line | Explanation | Cost in GBP |
|-------------|-------------|-------------|
|-------------|-------------|-------------|

Staff costs:

Consultancy costs:

Overhead costs:

Travel & subsistence costs:

Operating costs:

Capital equipment:

Other Costs

Total:

48,501.00

This section provides more information on the budget to help evaluators understand how you will use the funds you are requesting. You do not need to list all costs, but please list and detail costs of

more than £1,000 per item below, under the appropriate budget line.

Details of staff costs over £1,000 (if relevant)

Lead will be employed by the project for 36 days with the 6 month period.

Field Assistant will be needed for 20 day to collect samples and prepare them for testing and or shipment

An accountant will be engaged to control the budget and account for expenditure.

A media and videographer will be engaged to share progress on social media and prepare a short video to accompany the final report

Details of overhead costs over £1,000 (if relevant):

All vehicles and location use will be given to the project in kind, however monthly energy costs will be billed to the project.

Details of travel and subsistence costs over £1,000 (if relevant):

The 3 key scientists constitute expertise that are not available in the BVI and will therefore need to travel to the BVI during the project to undertake tests, set up observations and write assays.

The lead will travel to Martinique to monitor the progress of parallel experiments and observations being undertaken in the CIRAD labs.

Details of operating costs over £1,000 (if relevant):

Shipping of samples to the better equipped labs engaged in this project is an inevitable part of our process.

The testing and analysis of these samples will accrue lab time charges.

Details of capital equipment costs over £1,000 (if relevant):

In order to successfully undertake this enquiry Good Moon Farm will need a dedicated workspace to separate the project from our usual farm activities.

The project will need to have specific and dedicated equipments through out the period of the project.

Details of consultancy costs over £1,000 (if relevant):

The three primary scientists we are engaging in the project will all require enumeration for their time and intellectual property shared to the project.

Details of other costs over £1,000 (if relevant)

We have put in a 5% contingency for variables of inflation and or 'acts of god' that may effect the progress of the project.

If your project budget was prepared in another currency and converted to GBP, please provide the exchange rate, its source, and the date it was accessed:

| Other currency: | Exchange rate: | Source of this exchange rate: | Date exchange rate accessed: |
|------------------------|-----------------------|--------------------------------------|-------------------------------------|
|------------------------|-----------------------|--------------------------------------|-------------------------------------|

Darwin Plus Local has been created to build capacity and contribute to local economies in-territory.

What % of the total will be spent in the OTs?



If less than 80% of the total project spend is to be spent within the OT(s), please explain why.

No Response

Section 8 - Local and National Priorities

Q10. Local and national priorities

Please explain how this project aligns with local and national priorities? You may wish to consider the project in the context of national environmental laws, objectives, strategies, territory specific agreements, action plans or policies.

This project will hopefully produce evidence to demonstrate the viability of using sargassum sea weed as a food source for farming *Pontodrilus* sp. worms, that in turn can process the sargassum into a useful vermicompost soil amendment for agricultural and conservation use. This project supports the Virgin Islands Food Security and Sustainability Bill 2022 and the UN Sustainable Development Goals 12,14 and 15.

This project will not be able to stem the flow of sargassum inundations, nor will be a totally comprehensive means of disposing of sargassum deposits on the shore line, it will however provide another tool to help shore side property owners and governments manage the sargassum. By vermicomposting the decaying sargassum we hope to create a valuable product for farmers, growers and conservationists- from what otherwise would be a mass of rotting waste.

Once processing protocols and equipments are designed, it is hoped that this knowledge can be shared openly for entrepreneurs to develop commercial and employment opportunities in effected countries.

Will the project take place on Government owned land or water or involve biocontrol, invasive alien species control or eradication?

No

Section 9 - Project Risks

Q11. Project Risks

Please demonstrate your consideration of any risks involved in this project and how you intend to manage them. Please note the importance of health and safety and environmental risk assessment in the design of your project. If there is any possibility that your project may have negative impacts on the environment or human health, it is important that you provide a comprehensive analysis of potential environmental and human health risks, and the prevention measures you will take to ensure the work does not cause harm.

Depending on your project, you may wish to consider:

- Biosecurity risks – particularly for projects involving external equipment.
- Safeguarding risks – particularly for projects involving vulnerable groups such as children, older people or people with disabilities.

| Risk | Mitigation |
|---|---|
| Health and Safety risks related to Sargassum Inhalation of sulphuric gases from decomposing Sargassum piles during sample collection. Skin irritation from contact with sargassum | We will wear face masks, long sleeves, gloves and closed toe footwear. |
| Bio security - transportation of Organic biological matter (worms and sargassum samples) | All international transportation will be compliant with international regulations and in the main is expected to be limited due to testing facilities primarily located in the same location as the samples are collected. |
| Project disruption due to weather | The project is scheduled to start at the end of peak hurricane season. If a hurricane or other severe weather was to impact the BVI (or Martinique) then there may be a need to use some of the report writing time in Feb/Mar 24 to complete data collection and testing, with the report being completed on a compressed timescale. If experts are unable to travel to conduct testing we will send samples to their location, taking into account bio security risk described above. |

Do you require more fields?

No

Section 10 - Terms & Conditions

Q12. Terms and conditions (Guidance section 3.10)

By applying for Darwin Plus Local you are adhering in full to the grant Terms and Conditions in full (available at: <https://dplus.darwininitiative.org.uk/apply> and as referenced in the Guidance at section 3.10). For information, the Terms and Conditions include requirements for all applicants to (amongst other requirements as per the full Terms and Conditions):

- Uphold a zero tolerance for inaction approach to tackling sexual exploitation, abuse, and harassment.
- Where appropriate, make all reasonable and adequate efforts to address gender inequality and other power imbalances.
- Notify all cases of fraud and theft (whether proven or suspected) relating to the project to the Grant Administrator as soon as they identified.

Please indicate you have read, and understood, and will adhere to the Terms and Conditions.

Checked

Supporting documents list (please have these ready to attach with application)

- Cover Letter of no more than two A4 pages. (Guidance section: 4.2 has information on what this cover letter should include).
- If the project takes place on public land or water or is addressing invasive alien species, a Letter of support from OT Government.
- Project Workplan in the template provided for Darwin Plus Local (available at: <https://darwinplus.org.uk/apply>).
- Map and additional information (optional) maximum five additional pages.

If your application is successful

If your project application is successful, the Fund Administrator (NIRAS) will ask you to provide some financial evidence for due diligence checks before you receive your project grant. (Please see section 3.3 of the Darwin Plus Local Finance Guidance). Please be ready to provide this evidence promptly.

- **Financial evidence for organisations:** Year-end financial statements, the latest management accounts or audited accounts (if you have these).
- **Financial evidence for individuals:** Proof of identity such as a passport, ID card or driving licence and solvency (such as bank statements) and a police check.

Section 11 - Certification

Certification

I certify that, to the best of my knowledge and belief, the statements made in this application are true and the information provided is correct.

Checked

I have the authority to submit an application on behalf of my organisation.

Checked

Name: Aragorn Dick-Read

**Position in the organisation:
(if applicable)** Owner of Good Moon Farm

Signature (please upload e-signature)  [DEF45509-F5E1-4225-A25D-CD22B93B8942](#)
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Date: 23 June 2023

Section 12 - Submission Checklist

Checklist for submission

| | Check |
|---|-----------|
| I have read the Guidance documents, including the “Darwin Plus Local Guidance” and the “Darwin Plus Local Finance Guidance”. | Checked |
| If my proposed project takes place on public lands or water or is addressing alien invasive species, I have uploaded a Letter of Support from Government. | Unchecked |
| I have uploaded a cover letter that details the information requested in the guidance (Guidance section 4.2 has information on what this cover letter should include). | 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 my project that fit this Round. | Checked |
| I have provided my summary budget based on UK government financial years i.e. 1 April – 31 March and in GBP in the application form. | Checked |
| I have uploaded my project workplan using the specific template provided. | Checked |
| (If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form. | Unchecked |
| The application has been signed by a suitably authorised individual (clear electronic or scanned signatures are acceptable). | Checked |
| I have checked the Darwin Plus website immediately prior to submission to ensure there are no late updates. | Checked |
| I have read and understood the Privacy Notice on the Darwin Plus 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 Darwin Plus. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share project news. 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 Darwin Plus including project details (usually title, lead partner, project leader, location, and total grant value).

Project Title:

Darwin Plus Local

Provide a **Project Workplan** that shows the key milestones in project activities. Complete the following table as appropriate to describe the intended workplan for your project. Round 2 is for a **maximum of six months** with activities starting from 1 October 2023 and all projects must be completed by 31 March 2024.

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and shade only the months in which an activity will be carried out. The workplan can span multiple pages if necessary.

| Activity # | Description (max 25 words) | No. of months | UK Financial Years 2023/24 | | | | | |
|------------|--|---------------|----------------------------|-----|-----|--------------------|-----|-----|
| | | | Calendar Year 2023 | | | Calendar Year 2024 | | |
| | | | Oct | Nov | Dec | Jan | Feb | Mar |
| 1 | Collection of worm samples for identification, BVI (Aragorn Dick-Read) / Martinique (Mathieu Coulis) | | X | X | | | | |
| 2 | Collection of Sargassum samples BVI (Aragorn Dick-Read) / Martinique (Mathieu Coulis) | | X | X | | | | |
| 3 | Analysis of worm species (Prof Sam James) | | | X | X | | | |
| 4 | Observation and analysis of worm species lifecycle and vermicomposting behaviours (BVI - Aragorn Dick-Read, Martinique Mathieu Coulis) | | | X | X | X | | |
| 5 | Toxicity analysis and testing of worms (BVI – Fay Couceiro) | | | X | X | | | |

Project Title:

| Activity # | Description (max 25 words) | No. of months | UK Financial Years 2023/24 | | | | | |
|------------|--|---------------|----------------------------|-----|-----|--------------------|-----|-----|
| | | | Calendar Year 2023 | | | Calendar Year 2024 | | |
| | | | Oct | Nov | Dec | Jan | Feb | Mar |
| 6 | Toxicity analysis and testing of raw sargassum (BVI – Fay Couceiro) | | | X | X | | | |
| 7 | Toxicity analysis and testing of partially decomposed sargassum (BVI – Fay Couceiro) | | | X | X | | | |
| 8 | Toxicity analysis and testing of vermi-composted sargassum (BVI – Fay Couceiro) | | | X | X | | | |
| 9 | Nutrient and biological content analysis and testing of raw sargassum (Prof Jean Bonhotal) | | | | X | X | | |
| 10 | Nutrient and biological content analysis and testing of partially vermi-composted sargassum (Prof Jean Bonhotal) | | | | X | X | | |
| 11 | Nutrient and biological content analysis and testing of fully vermi-composted sargassum (Prof Jean Bonhotal) | | | | X | X | | |
| 12 | Results synthesis and report writing | | | | | | X | X |
| | | | | | | | | |