

DPLR2\1024

Darwin Plus Local - Final Report (1)

Officer: Linzi Ogden

Section 1 - Darwin Plus Local Project Information (Essential)

Project Reference Number

DPLR2\1024

Q1. Project Title

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

Overseas Territory(ies)

British Virgin Islands (BVI)

Lead Organisation or Individual

Good Moon Farm

Partner Organisation(s)

Cornell University , CIRAD Fr, Portsmouth University, Maharishi University, Fertile Earth Worm Farm

Value of Darwin Plus Local Grant Award

£48,501.00

Project Start Date

09 October 2023

Project End Date

30 March 2024

Project Leader Name

Aragorn Dick-Read

Project Website/Twitter/Blog etc.

www.goodmoonfarm.com

Report Author(s)

Report Date

17 May 2024

Project Summary

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 vermicompost as a soil amendment for agricultural use.

Project Outcomes

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.**

Section 2 - Project Outcomes (Essential)

On a scale of 1 (high – outcome substantially exceeded) to 5 (low – outcome substantially did not meet expectation), how successful do you think your project has been?

2 - Outcome moderately exceeded

Project outcomes and justification for rating above


i) We have been extremely fortunate to have engaged some of the top soil and worm scientists in the world for this project. All are in agreement that the research on the Pontodrilus (sp) earth worm's consumption of Sargassum seaweed and the quality of the resultant vermicompost they produce offers an exciting new perspective on what has been considered up to now as "the problem" of Sargassum inundations in the Caribbean region. The encouraging results from our tests suggest that further research into the efficacy of the Pontodrilus Vermicompost on different plant species for agricultural and conservation would be a logical next step.


ii) Yes we can certainly say we have achieved our objectives, especially in understanding more of the


Pontodrilus's adaptive behaviour and the analysis of their vermicompost. The detailed Lab results show the levels of Arsenic and Heavy metals levels in the Sargassum prior to consumption by the Pontodrilus have been significantly reduced in the post-consumption vermicompost . All the samples tested (except one with extremely high salinity reading in the Hansome bay sample) are well within Environment Protection Agency standards as a potentially useful soil amendment for Agriculture and Conservation. This result alone is the projects most encouraging success, but the resultant data has opened up an imperative to research deeper into potential additional benefits of this naturally derived product.

Supporting Evidence - file(s) upload


 [Description of Evidence files Darwin Plus](#)


 28/05/2024


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 [Sargassum Penn State Results Summary 1](#)


 26/05/2024


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 [Sargassum Penn State Results summary 2](#)


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 [Sargassum Penn State Results summary 3](#)


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 [Email communication Sam](#)


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 [Mary interpretation preliminary results](#)


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 [Bonhotal Export Final](#)

 21/05/2024

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Supporting Evidence - links to published document/online materials

This research project has only been a pilot project to ascertain the potential viability of the Pontodrilus Vermicompost as a suitable soil amendment for Agriculture. The results are positive and encouraging, but not conclusive enough to publish anything other than a preliminary success report.

We were privileged to host a visit from Governor Daniel Pruce on Good Moon Farm. During the visit we showed him our experimental Sargassum / Pontodrilus bins , sifting equipment and observation jars etc. this site visit was published on GMF Face Book page.

Gov Daniel Pruce was very interested in the projects out comes identifying a freely available bio processed Vermicompost material that could be a valuable soil amendment in the future for the anticipated regeneration of the BVI and regional Agricultural sectors.

The Project team have agreed a short article in the Biocycle Journal (<https://www.biocycle.net/>) would be appropriate. We don't have enough data to submit a peer review paper.

Project Challenges

The project has run relatively smoothly. This was the first time undertaken a scientific project of this magnitude so there have been some learning curves on how to structure research with the daily obligations of running a

small farm business.

Our initial goal to work with the new Darwin funded Soil Lab at the BVI H Lavity Stout Community College however it transpired that the equipment there was not capable of testing for Arsenic and Heavy Metals. The connection with Mary Schwarz and Jean Bonhotal from Cornell Universtiy,USA. and their guidance to the Penn State Uni labs helped us to overcome this issue.

For much of the projects duration there were relatively few Sargassum inundations making it difficult to collect sufficient samples from the Miami and Martinique sites. Thankfully just enough came in to these sites within the time required for the Pontodrilus to consume the material needed for testing. There had been enough Sargassum deposits in the BVI during Sept and Oct for sample collections to be collected and sent for testing.

A personal challenge for me on this project is my digital deficiencies ... I have been working on an iPad and for the next project I will certainly need a computer to store files more efficiently etc.

Lessons Learned

i) Decomposing Sargassum embedded with Pontodrilus.sp was gathered for analysis from coastal deposits for bio-processing in our bins. The Pontodrilus adapted well to life in a controlled environment , reproducing rapidly and consuming the Sargassum voraciously. The simple metric : recognizable as Sargassum to unrecognizable, was used to define when the vermi composting process was completed. This took more or less 3 months. This has demonstrated the feasibility of 'Farming' the Pontodrilus to dispose of and repurpose the Sargassum.

The multi purpose compost facility built with Darwin funds to process the Sargassum with the Pontodrilus is a model that can be copied by other farmers for both Pontodrilus vermicomposting and regular composting.

ii) The Sargassum inundations during the project duration were not been very consistent causing delays in the testing.

One shore side Vermicompost sample from Hansome Bay ,BVI, showed a huge salinity reading. The sample was collected in the vicinity of a local sea water desalination plant. The extreme concentrations of salt flowing from the plant has contaminated the Sargassum that washes up in the area.

We should have got prior approval from BVI H Lavity Stout Community College for a formal collaboration. It turns out the equipment that they have was not suitable for testing heavy metals, it would have been good to include more BVI students.

iii) Organize time better between running our farm business and the project.

iv) My recommendation to other projects is to employ a dedicated project team separate from regular income generation.

Section 3 - Project Finance (Essential)

Project Expenditure

Project Spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total actual Darwin Plus Costs (£)	Variance %	Comments (please explain significant variances)
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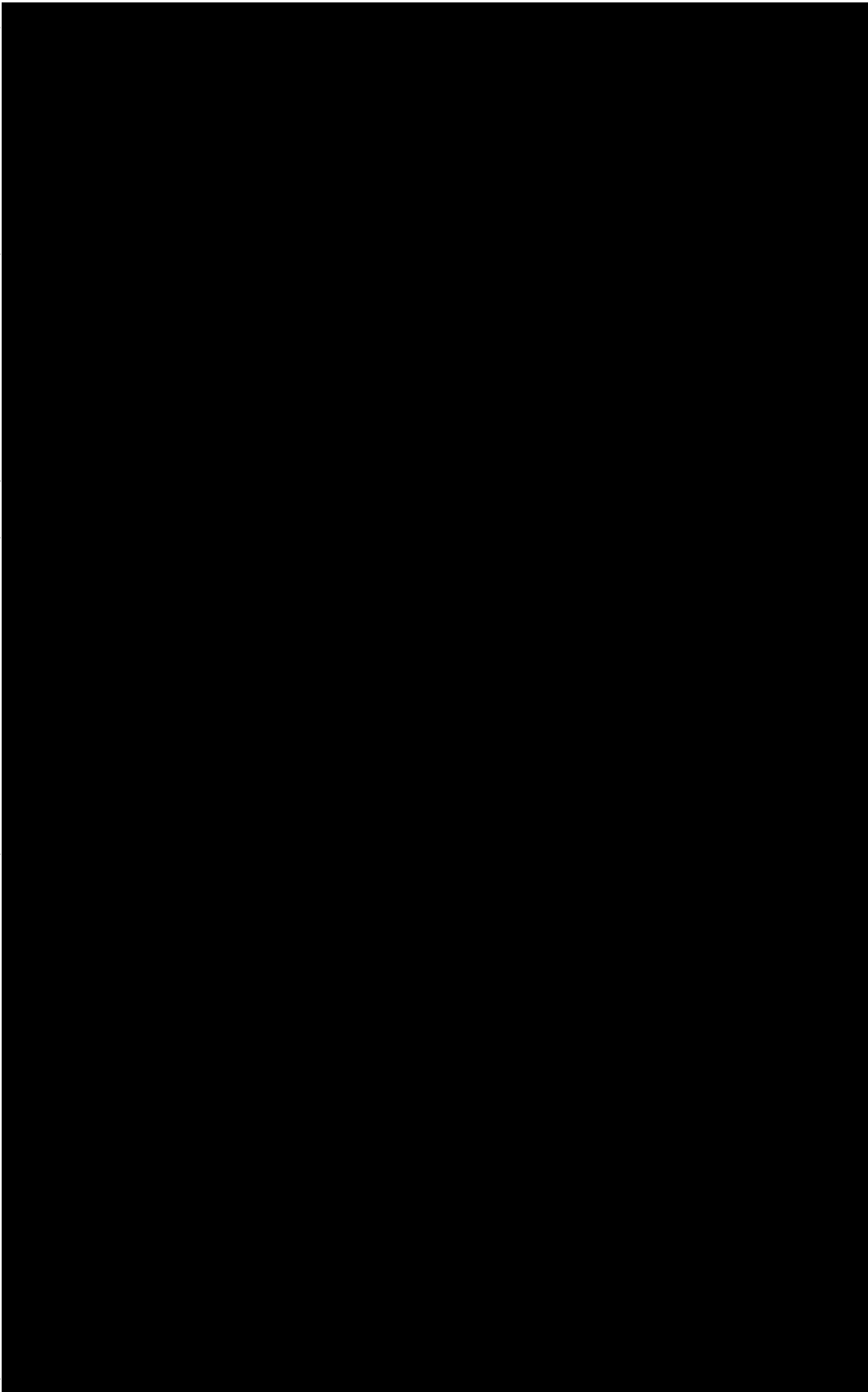
Staff Costs

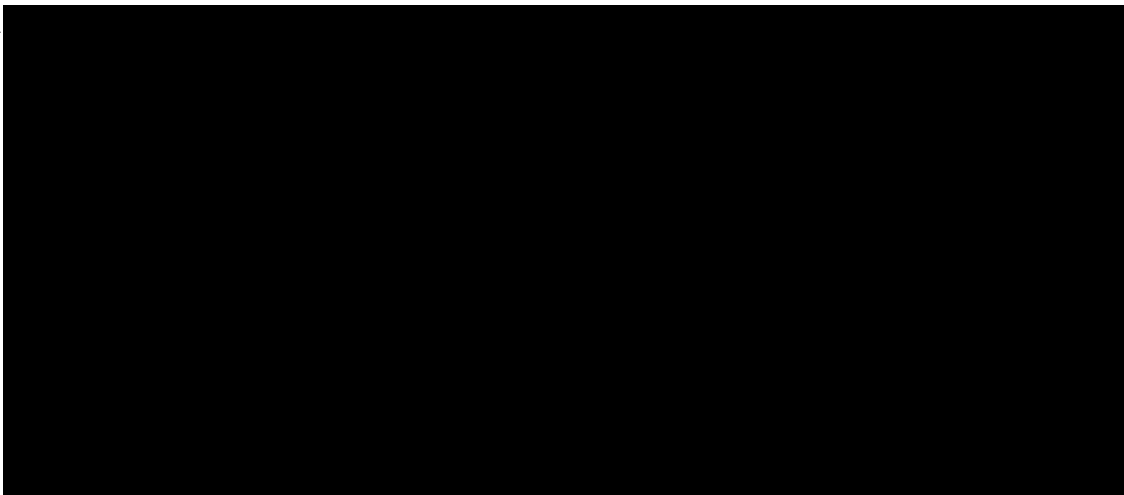
Consultancy Costs

Overhead Costs

**Travel and
Subsistence**

Operating Costs



Capital Items			
Others			
Total	48,501.00	37,986.46	21.68

Please provide a short narrative summary on project finances.

The initial plan to make a temporary project work space was changed to better use the funding to make permanent multi purpose vermi and regular compost bins to a hurricane resistant standard. Our design can be used as a model for other farms. We built the structure and our sifting equipment with 'in house' labour, using purchased and recycled materials

We used smart phones to make short video evidence where necessary.

We found that it was not possible to set up an independent project bank account. Bank regulations made the process difficult at short notice so we used our Good Moon Farm account. My wife Federica manages this account, so we didn't need to use an accountant.

Initial travel estimates were higher than anticipated. We were lucky that Jean Bonhotal flight costs to the USVI were funded by another agency.

Dr Sorbels visit to the BVI was additionally constructive for building the relationship between our Govt Solid Waste division and the BVI Agriculture sector. Junior Minister for Agriculture , Mr Karl Dawson invited her to a meeting with all Govt and Private stake holders in these sectors to share her extensive experience in the large scale Composting of household waste as well as commercial Vermicomposting. Dr Sorbel also did a compost training workshop with our farm team and 3 other BVI farmers.

Most work done by our team of Scientists has been done in kind. However a nominal fee was charged.

We used glass storage jars instead of custom made observatories.

Section 4 - Contribution of Project to Darwin Plus Programme Objectives

Please select up to **one** indicator that applies within **each group/indicator list (A, B, C, D)** and report your results for that indicator in the text box

underneath. If you do not have relevant results to report for any of the indicators in a particular group, you can leave them blank.

Please also submit some form of evidence (above) to demonstrate any results you list below, where possible.

Group A: Capability and Capacity - Core Darwin Plus Standard Indicators (select one)

Unchecked	DPLUS-A01: Number of people from key national and local stakeholder groups completing structured and relevant training.
Unchecked	DPLUS-A02: Number of secondments or placements completed by individuals of key local and national stakeholders.
Unchecked	DPLUS-A03: Number of local/national organisations with improved capability and capacity as a result of project.
Checked	DPLUS-A04: Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.
Unchecked	DPLUS-A05: Number of trainers trained reporting to have delivered further training by the end of the project.

Group A Indicator Results

Good Moon Farm team (3 employees -2 men,1 woman) and 3 BVI farmers are now fully versed with the process of collecting the decomposing Sargassum with Pontodrilus . The training included placing the worms and feedstock in the vermi compost bins for controlled bio-processing. The training included the sifting,

Group B: Policies, Practices and Management- Core Darwin Plus Standard Indicators (select one)

Unchecked	DPLUS-B01: Number of new/improved habitat management plans available and endorsed.
Unchecked	DPLUS-B02: Number of new/improved species management plans available and endorsed.
Unchecked	DPLUS-B03: Number of new/improved community management plans available and endorsed.
Unchecked	DPLUS-B04: Number of new/improved sustainable enterprises/ community benefits management plans available and endorsed.
Checked	DPLUS-B05: Number of people with increased participation in local communities / local management organisations (i.e., participation in Governance/citizen engagement).

Unchecked **DPLUS-B06: Number of Local Stakeholders and Local Communities (people) with strengthened (recognised/clarified) tenure and/or rights.**

Group B Indicator Results

Sargassum bio processing with Pontodrilus worms is a feasible way for communities to dispose of a repurpose Sargassum.

Group C: Evidence and Best Practices - Core Darwin Plus Standard Indicators (select one)

Unchecked **DPLUS-C01: Number of best practice guides and knowledge products published and endorsed.**

Unchecked **DPLUS-C02: Number of new conservation or species stock assessments published.**

Unchecked **DPLUS-C03: New assessments of habitat conservation action needs published.**

Checked **DPLUS-C04: New assessments of community use of biodiversity resources published.**

Unchecked **DPLUS-C05: Number of projects contributing data, insights, and case studies to national Multilateral Environmental Agreements (MEAs) related reporting processes and calls for evidence.**

Group C Indicator Results

Our results show Pontodrilus Vermicompost is with in EPA standards, however our team feel further plant response testing would be a sensible next step.

Group D: Sustainable Benefits to People, Biodiversity and Climate - Core Darwin Plus Standard Indicators (select one)

Unchecked **DPLUS-D01 Hectares of habitat under sustainable management practices.**

Checked **DPLUS-D02: Number of people whose disaster/climate resilience has been improved.**

Unchecked **DPLUS-D03: Number of policies with biodiversity provisions that have been enacted or amended.**

Group D Indicator Results

Our results have the potential to impact how effected coastal communities can bio-process and repurpose the Sargassum inundations.

Section 5 - Project Partnerships, Wider Impacts and Contributions

Project Partnerships

Jean Bonhotal Cornell University Waste Management Institute , Sargassum and Vermi compost testing and interpretation

<https://cwmi.css.cornell.edu/>

Mary Schwarz. Cornell University Waste Management Institute , Sargassum and Vermi compost testing and interpretation

<https://cwmi.css.cornell.edu/>

Mathieu Coulis. CIRAD, Martinique FWI, Pontodrilus sp Identification and Life Cycle observations

Www.cirad.fr

Dr Sam James , Maharishi University, Pontodrilus sp Identification and Life Cycle observations

[https://www.researchgate.net/institution/Maharishi_International_University?](https://www.researchgate.net/institution/Maharishi_International_University?_tp=eyJjb250ZXh0ljp7ImZpcnN0UGFnZSI6InByb2ZpbGUiLCJwYWdlIjoicHJvZmlsZSJ9fQ)

[_tp=eyJjb250ZXh0ljp7ImZpcnN0UGFnZSI6InByb2ZpbGUiLCJwYWdlIjoicHJvZmlsZSJ9fQ](https://www.researchgate.net/institution/Maharishi_International_University?_tp=eyJjb250ZXh0ljp7ImZpcnN0UGFnZSI6InByb2ZpbGUiLCJwYWdlIjoicHJvZmlsZSJ9fQ)

Dr Sobel, Fertile Earth Worm Farm , Homestead, Florida, USA. - Project advisor on commercial compost and worm farming.

Www.fertileearthwormfarm.com

Dr Richard Teeuw, Portsmouth University, UK - Project steering committee

Www.Port.ac.uk

ii) Mrs Nancy Pascoe , Deputy Director, National Parks Trust of the Virgin Islands has been an invaluable help on the Project Steering Committee.

iii) This project was always intended to be a pilot project to test assumptions and gather information that would lead to a follow up Darwin Main project that will provide a more in-depth assessment. More information and testing of plant responses are needed before our research can be used to inform Government decision making and influence commercial prospects.

Wider Impacts and Decision Making

This project has only been a pilot project. However a few of the regional governments (BVI, Dominica, St Barths, Martinique are now aware we have undertaken this research and are awaiting more research re plant responses etc before including the use of Pontodrilus as an officially approved bio processing technique for Sargassum disposal.

Our project has been recognized , but no immediate policy influences have yet been acted on until further research has proven the efficacy of Pontodrilus Vermicompost as a safe and effective soil amendment for Agriculture.

INSERT HERE - MEETING WITH KARL DAWSON AND DR SOBEL, AGRICULTURE DEPT, SOLID WASTE

Sustainability and Legacy

The permanent structure that was built with project funds will be used in any follow up work.

The scientific relationships built with new institutions will benefit the BVI and open up new regional partnerships for follow-up projects.

The project staff that were trained live in the BVI and are permanent residents. The project leader is a well-known environmental advocate and spokesperson for farmers so news of the Sargassum potential will be shared through out the BVI Agriculture sector and regionally, once we are completely satisfied the Pontodrilus/Sargassum Vermicompost is as beneficial as it appears to be.

Section 6 - Communications & Publicity

Exceptional Outcomes and Achievements

Sargassum is increasingly recognized for its negative impacts on the national economies of affected countries, specifically in the tourism, fishing and marine transportation sectors. It is causing noticeable damage to many coastal habitats as well. Mangroves, sea grass beds, coral reefs and coastal fish populations are all being adversely affected. Finding ways to mitigate or reduce the damage and inconveniences created by the Sargassum by transforming its adverse effects into potential beneficial opportunities is definitely our best response.

I think it is important however to recognize that this is an anthropocentric point of view. We also need be able to see the issues around Sargassum from a Nature-centric perspective. The recent increase in Sargassum inundations and its consumption by the Pontodrilus earth worm, producing vermi compost, could well be understood as part of a Naturally evolutionary process to adapt to or counter human induced environmental changes to the climate, sea level rising etc. Nature is responding to the increased salinity on inundated shorelines with the resultant destruction of the coastal vegetation. A situation also compounded by more violent storms. Nature is auto poetically initiating a rapid re fertilization of the retreating coast line to restore the coastal vegetation.

Sargassum bio mass once processed by Pontodrilus into highly fertile vermicompost could well be part of Nature based solution.


Seeds that fall from the dying trees are landing in a super enriched compost , which is encouraging regrowth of the essential protective coastal vegetation This is clearly observable where ever the coastal conditions match suitable habitats for Pontodrilus with Sargassum catchment. Rock shorelines and coral or pebbles beaches don't require this type of protection.


A balanced perspective is required , both recognizing and where possible mitigating the, physical and financial inconveniences of the Sargassum issues , whilst at the same time seeking to understand the relationship between Sargassum and the Pontodrilus worm as a positive contribution to the Natural Regeneration process. The positive results of our research is a step forward in the endeavor to understand this natural process. Our findings clearly show that Pontodrilus consumption of Sargassum into a vermicompost with significantly reduced the Heavy Metal contents than the original material and that the finished material is well with in EPA standards for commercial compost use. This successful outcome leads the way to further research into the viability of Pontodrilus Vermicompost as a potential valuable Agricultural soil amendment.


Photo, video or graphic to be used for publicity and communications.


Please upload at least one relevant and engaging image, video or graphic that you consent to be used alongside the above text in Defra, JNCC or NIRAS communications material.


 [PhotosPontodrilusProject](#)


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Photo, video, and/or graphic captions and credits.

Facebook.post.DPLR2_1024: Aragorn Dick-Read collecting decomposing sargassum embedded with Pontodrilus from Virgin Gorda

IMG_1779.DPLR2_1024.trummel.sifter.compost.MOV: Trummel compost sifter designed and created in-house using DPL project funds

I agree for the Biodiversity Challenge Funds Secretariat, Administrator, and/or JNCC to publish the content of this section.

Yes, I agree for the BCFs Secretariat and/or JNCC to publish the content of this section.

Please list any accounts that you would like tagged in online posts here. This can include project pages, partners' pages or individuals' accounts for any of the following platforms: LinkedIn, Facebook, Twitter, or Instagram.

Good Moon Farm Instagram

Good Moon Farm facebook page:

<https://www.facebook.com/goodmoonfarmbvi>

Section 7 - Darwin Plus Contacts

Please tick here to confirm that you have read and acknowledge the BCF's Privacy Notice on how contact details will be used and stored and that you have sought agreement from anyone that you are sharing personal details with us on their behalf.

I confirm I have read the Privacy Notice and have consent to share the following contact details

Project Contact Details

Project Contact Name

Aragorn Dick-Read

Role within Darwin Plus Project

Project leader

Email

Phone

Do you need further sections to provide additional contact details?

No