
DIR30S2\1004

Quinoa-associated fungi and bacteria in Bolivia: conservation and sustainable use

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Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

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GMS ORGANISATION





Type	Organisation
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Section 2 - Title, Ecosystems, Approaches & Summary

Q3. Title:

Quinoa-associated fungi and bacteria in Bolivia: conservation and sustainable use

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What was your Stage 1 reference number? e.g. DIR29S1\1123

DIR30S1\1202

Q4. Key Ecosystems, Approaches and Threats

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

Deserts and semi-deserts

Biome 2

Polar-alpine

Biome 3

Intensive land-use systems

Conservation Action 1

Land / Water Management

Conservation Action 2

Education & Training

Conservation Action 3

Institutional Development

Threat 1

Climate change & severe weather

Threat 2

Agriculture & aquaculture (incl. plantations)

Threat 3

Pollution (domestic, commercial, agricultural)

Q5. 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.

Quinoa, Bolivia's signature grain, is grown organically by altiplano smallholder households, many headed by women. In such extreme environments, climate change and other threats make harvests unpredictable. Research shows beneficial fungi and bacteria could help. Jointly with village collectives, this project explores that largely unknown diversity, developing new bioproducts from promising strains to improve crop resilience for these communities. The diversity found will also contribute to an initiative to include fungi and bacteria, currently totally overlooked, in Bolivia's conservation policies.

Section 3 - Title, Dates & Budget Summary

Q6. Country(ies)

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

Country 1	Bolivia	Country 2	No Response
Country 3	No Response	Country 4	No Response

Do you require more fields?

- Yes
 No

Q7. Project dates

Start date:	End date:	Duration (e.g. 2 years, 3 months):
01 July 2024	31 March 2027	2 years, 9 months

Q8. Budget summary

Year:	2024/25	2025/26	2026/27	
Amount:	£218,604.00	£207,202.00	£159,074.00	£ 584,880.00

Q9. Do you have matched funding arrangements?

- Yes

Please ensure you clearly outline your matched funding arrangement in the budget.

Q10. If you have a significant amount of unconfirmed matched funding, please clarify how you will deliver the project if you don't manage to secure this?

No Response

Q11. Have you received, applied for or plan to apply for any other UK Government funding for the proposed project or similar?

Section 4 - Problem statement

Q12. 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.

Quinoa, a grain crop, native to the Andes, is adapted to high-altitude, arid, cold, hypersaline environments. Its traditional cultivation, on Bolivia's altiplano, faces significant threats including climate change, water stress, mining impacts, and the emergence of large-scale quinoa-farming enterprises elsewhere, producing cheaper but lower-quality crops often reliant on heavy use of agrochemicals. These threaten the livelihoods of Andean growers who rely on traditional methods tied to biodiversity-friendly land use to produce quinoa organically using diverse local varieties. With globalization, small-scale growers face difficulties exporting and commercializing their product in larger markets, lack bargaining power to negotiate better prices and conditions, and struggle to meet quality and safety standards of larger and more demanding markets. Quinoa's popularity as a superfood in Europe and North America, with a boom between 2011 and 2014, catalysed these additional adverse changes in the economics of production, leaving many traditional farmers very vulnerable, and endangering the specific extreme habitats where the crop is grown, and their unique biodiversity.

Much of the 160,000 ton annual global harvest comes from smallholder households on Bolivia's altiplano, about 40% headed by women. Multi-dimensional poverty (deficient infrastructure, gender inequality, low incomes, poor education) is widespread. In combination, these specific circumstances require the simultaneous amelioration of livelihoods and conservation of the biodiversity threatened in the extreme environment where the crop is grown. The present proposal addresses those problems.

Although its unpredictable harvests depend entirely on biodiversity-based ecosystem services, astonishingly little is known about quinoa's symbionts. The GBIF database lists fewer than 50 quinoa-associated fungi, and no quinoa-associated bacteria [here, and throughout this proposal, the term "bacteria" includes the prokaryote kingdom Archaea]. Research involving our team (Ortuño et al., 2014) has revealed considerable quinoa-associated diversity with significant potential as biocontrol agents, biofertilizers, drought tolerance inducers, growth enhancers and other applications. This project explores that diversity, promoting its conservation, identifying those potentially beneficial strains, and seeking to develop novel bioproducts for greater crop and ecosystem resilience. Its aim is thereby to mitigate climate change and other threats, and provide the altiplano farming communities with sustainable alternatives to intrusive agro-industry.

The scant information about quinoa symbionts reflects a general lack of information about Bolivia's fungi and bacteria. GBIF holds about twenty-six thousand fungal records for megadiverse Bolivia compared with nearly five million for the much smaller UK. The country has no known societies promoting their study, and mycological expertise is scarce. Conservation implications are enormous. Fungi are essential for sustainable life: to conserve producers (plants) and consumers (animals), fungi, the recyclers, also need protection (and they do much more than recycle). Conservation NGOs working in Bolivia, a biodiversity hotspot, overlook fungi in plans and priorities. National CBD strategies and action plans are similarly deficient. For bacteria, even more diverse than fungi and certainly no less important, the neglect is worse. Our project's work in quinoa-growing areas will start to address Bolivia's fungal and bacterial biodiversity conservation black hole.

Section 5 - Darwin Objectives and Conventions

Q13. Biodiversity Conventions, Treaties and Agreements

Q13a. 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)
- Global Goals for Sustainable Development (SDGs)

Q13b. National and International Policy Alignment

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

National policy. Bolivia's 2019-2030 NBSAP mentions fungi only twice and completely overlooks bacteria. This project will raise awareness of their protection needs. For fungi, starting with quinoa-growing areas, existing and newly generated information will be compiled, added to existing open-access on-line databases and additionally published as a peer-reviewed, national survey presenting current knowledge digested and ready for incorporation in CBD documents and use with Bolivia's Mother Earth Law. The survey will include assessments of positive and negative economic impacts of fungi, identification of threats they face, recommended in-situ and ex-situ conservation actions, links between poverty and fungal diversity loss, listed knowledge gaps, and proposals for mycological capacity building, with advice regarding Aichi and post-Aichi Targets. The Project Leader is already doing similar work in Sub-Saharan Africa through Darwin project 30-020, with the aspiration there of providing such assessments there for at least six countries. For bacteria, universally overlooked by conservationists, the starting point is much lower. Evidence is growing that some are threatened, but calls for their protection, while growing in frequency, are still not widely acknowledged. We will prepare a pioneering pilot review for Bolivia of their basic conservation needs, focusing on species in the altiplano's extreme environments.

Access and benefit sharing. The project team recognizes and acknowledges that this is essential, with one partner explicitly responsible for monitoring Nagoya compliance. At a local level, through collaboration between partner scientists and village collectives, and prioritizing gender equality among growers, fungi and bacteria associated with quinoa and the wider crop environment will be sampled. Samples will then be identified and a sub-set assessed for properties potentially beneficial to this crop, with an aspiration to develop bioproducts enhancing crop resilience and yields, thereby alleviating the multi-dimensional poverty of altiplano quinoa farmers. A project Steering Group composed of village collective representatives and partners [see Question 14] will establish priorities for this work, and will oversee bioproduct development. At open meetings with villagers, Steering Group members will raise awareness of the value to communities of their natural capital, and of access and benefit sharing issues. Village collective representatives will be encouraged and supported in developing relevant negotiating skills in preparation for addressing those issues. These activities will contribute to the following policies and goals.

Bolivia's NDCs [https://unfccc.int/sites/default/files/NDC/2022-06/NDC_Bolivia-2021-2030_UNFCCC_en.pdf] goals: 26 [reduced food insecurity]; 28 [recovery of degraded soils]; 29 [crop production increase]; 30 [crop yield increase]; 31 [investment in resilience].

Bolivia's NAP [aka 'MNACC'] policies: conservation of agro-biodiversity; identification of climate-sensitive ecosystems.

Global SDGs: 1 [no poverty], 2 [zero hunger], 3 [good health and well-being], 5 [gender equality] and 13 [climate action].

More profoundly, by supporting traditional quinoa production, this project will help ensure survival of a sustainable way of life important in Bolivia's cultural heritage.

Section 6 - Method, Change Expected, Gender & Exit Strategy

Q14. 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 will be the **main activities** and where will these take place.
- how you will **manage the work** (governance, roles and responsibilities, project management tools, risks etc.).

This proposal builds on long-established, close, active links between Bolivian partners and quinoa-growing village communities. These are supported by a formal, well-organized outreach infrastructure, including representation to, from and within collectives, with regular dialogue, trust and goodwill. The project team is accordingly aware of the profound agricultural, ecological and economic consequences for crop producers resulting from climate change and quinoa's popularity as a superfood (globalization, decreased soil fertility, increased need for cultivation equipment, novel pests, pressures to use artificial fertilizers, price instability, soil erosion, yield declines etc.). The Permaculture Association partner has worked with disadvantaged rural women in Egypt's Sinai Desert, another extreme environment, and is a long-standing member of the UN Women's Major Group. These different backgrounds and experiences combined result in strong empathy and understanding of the problems quinoa farming communities face, and a powerful synergy in addressing the resulting poverty and gender inequality.

There is considerable evidence from our team and beyond, of fungi and bacteria with potentially beneficial use in quinoa cultivation. CABI, and Bolivian and Mexican partners have extensive experience identifying such organisms by traditional and molecular techniques, with proven expertise using such species and the consortia they form to develop and roll out bioproducts with beneficial agricultural applications. The Project Leader has over 30 years experience leading Darwin Initiative projects, and even more handling fungal databases for biodiversity conservation [these include Darwin project 16-008 of 2007 which started the fungal conservation ball rolling, and the currently active project [30-020] in Sub-Saharan Africa with many objectives similar to those considered here].

Methodology for project output 1 (strains and consortia of fungi and bacteria with potential for enhancing quinoa crops). With guidance from Bolivian partner outreach specialists, suitable beneficiary villages will be approached. At community meetings the objectives of the project, and its implications including benefit sharing will be explained. Stakeholder representatives will then be invited to establish a Steering Group jointly with project partners, its composition upholding gender equality and social inclusion. The group will convene regularly (under conditions explicitly favourable to participation by women stakeholders) to manage this project component, monitoring and evaluating, and advising on priorities.

Under its guidance, we will survey symbionts in sites with different growing conditions and quinoa strains, sampling all plant parts, living and dead, including phyllospheres, rhizospheres, soil, and substrata other than quinoa. Villagers showing aptitude and interest will be trained to collect samples, encouraging involvement and a

sense of project ownership. Sampled fungi and bacteria will be identified using direct observation and, for a subset, by pure culture and molecular techniques [metagenomics]. They and the consortia they form will then be screened for potential value for the crop, with selected strains added to existing partner reference collections. Following Steering Group guidance regarding priority needs, taking into account Nagoya requirements, and applying partner expertise, microbial-based and microbial-derived bioproducts will be developed from promising strains and tested for effectiveness using replicates and controls.

Methodology for project output 2 (outreach and support programme for natural capital management by traditional altiplano quinoa growers). Through the Permaculture Association, village collectives will be supported in improving existing and establishing new nurseries of plants advantageous for quinoa crops (a known community priority). This will include delivery of equipment needed for the project and routine crop production. Workshops in participating villages will establish sound local understanding of Nagoya requirements and the scientific basis for project activities, with training in negotiating skills, particularly for women, and with permaculture training of trainers. Local schools will receive basic resources, talks, and excursions led by project staff, to promote awareness and interest in nature including biodiversity beyond animals and plants.

Methodology for project output 3 (capacity development for national CBD focus point). For fungi, project-generated records and existing information about Bolivian species will be digitized using database structures and standards already in use for Darwin project 30-020 in Sub-Saharan Africa. All new records will be made accessible by depositing Darwin Core data in GBIF (with copies to all participants) and with on-line availability in a structured format handling associations and relationships between different organisms, including substrata. A new website will be established for Bolivian fungi, with bibliographies, interactive distribution maps, and lists of potential endemics. For bacteria, similar project-generated data, focusing on quinoa associates and altiplano extremophiles, will be made available in an exciting, ambitious and pioneering step to raise awareness of their need for conservation.

Activities and results will be widely disseminated via social media, leaflets, newspaper articles, radio, television, exhibitions, talks, scientific publications, international conferences and websites.

Q15. 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 GESI considerations), and the post-project value to the country.

National level. Bolivia's CBD national focus point will receive peer-reviewed assessments with high quality, up-to-date information about the status of its fungi and bacteria, including identification of knowledge gaps. This will be the first opportunity for the country to incorporate these organisms in conservation planning, resource management and similar activities. All information will also be freely available on-line. GBIF's coverage of fungi and bacteria from Bolivia will be significantly enlarged, providing additional long-term security for records digitized through this project. Of necessity, the assessment of bacteria will be more tentative and preliminary, given that this part of the project will be truly pioneering work: supplying information about these organisms from a conservation perspective seems never previously to have been attempted. Bolivia's CBD National Focus Point has indicated support orally, and a formal support letter has been promised, indicating that the potential post-project value of these contributions is already recognized.

Organizational level. Bolivian national partners will benefit from new equipment, enlarged reference collections, bibliographic resources and websites relevant to conservation and sustainable use of fungi and bacteria. Their existing experience in sustainable use of these organisms will be augmented by new expertise applying those skills in the arena of conservation. Pioneering work on bacterial conservation will potentially place them and the Mexican partner among world leaders in that field.

Local/individual level. Participating villages will be strengthened as communities by new equipment, school resources, and introduction to permaculture techniques. Individuals will benefit from training in negotiation, promotion of gender neutral practices, strengthened social inclusion, and better understanding of the value of their natural capital, coupled with Steering Group experience. Bioproduct(s) developed by, or after the end of this project, will increase their ability to maintain traditional organic quinoa farming and its associated protection of biodiversity in this extreme environment.

Q16. Gender equality and social inclusion

All applicants must consider whether and how their project will contribute to promoting equality between persons of different gender and social characteristics. Explain your understanding of how individuals may be 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 engage participants in a meaningful way.

Our project plans reflect an understanding of gender equality based on the 2011 World Bank report, "Gender Dynamics and Climate Change in Rural Bolivia"

[<http://documents.worldbank.org/curated/en/679991468006884906/Gender-dynamics-and-climate-change-in-rural-Bolivia>]. We recognize increased access by women to resources, and measures to avoid social exclusion can improve project outcomes and our project's design mirrors this. Specifically, we will:

- encourage access and participation by women, including setting up a Steering Group, with its principal activities and meetings held locally to participating villages, with explicit encouragement for village women to become involved and take on leading roles, and for selection of village representatives to be gender neutral; this group will oversee and manage sampling work, selection of promising strains, and subsequent development of bioproduct(s);
- use methodologies appropriate for the specific groups of women participating;
- provide smallholder technical training within communities, not remotely, making it easier for women to attend;
- promote activities reducing the workload of women smallholders, including sessions for women and men alike exploring food preservation methods (novel use of fungi and bacteria) and permaculture principles for water harvesting;
- listen to and support women's strategies in response to environmental threats such as climate change.

For all project activities, promotion of gender equality and social inclusion will be expected from partners. Bullying, harassment and other abusive behaviour will not be tolerated. In all interactions, but particularly those with stakeholders in Steering Group discussions, a culture will be fostered, regardless of gender, of participants showing polite interest when listening to speakers, not interrupting them, and considering points on merit alone. The gender-equality impact of proposals will routinely be considered before a decision is made.

Q17. Change expected

Detail the expected changes 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 life of the project) and b) in the long-term (after the project has ended).

When talking about how people will benefit, please remember to give details of who will benefit, differences in benefits by gender or other layers of diversity within stakeholders, and the number of beneficiaries expected. The number of communities is insufficient detail - number of households should be the largest unit used.

Poverty reduction. Villagers in participating communities will benefit.

Short term. Outreach activities in target communities will accompany sampling work and subsequent bioproduct development, and will be framed to promote awareness of gender-equality issues. Activities will include provision of shared equipment of value to both recipient communities and the project, and support of existing and establishment of new plant nurseries. During our Darwin Initiative Partnership Project visit in February 2022, women villagers stressed that these inputs, impossible for them on their own to obtain in their cash-strapped circumstances, would have a large and very positive impact on their lives. Outreach activities will also include workshops raising awareness of quinoa symbionts and promoting understanding of the underlying science and issues relating to use of natural capital, and provision of school resources. Steering Group stakeholder representatives will gain experience and, where helpful, training support in management and negotiation. Collectively, these will contribute to local poverty alleviation through greater resilience and gender equality [estimated beneficiaries: 1000 people, about 50% female; 350 households]. The project will additionally consider quinoa crop productivity, one important indicator of livelihood levels. For Bolivia as a whole this is currently static at about 650 kg/ha, significantly lower than for Peru, where productivity is rising (FAO, 2020). At onset, we will seek to establish accurate local baseline productivity information, currently unavailable, and measure any change observed against those and national level figures.

Long term. Villagers in participating communities and beyond will benefit. Successful development of quinoa-friendly bioproducts, subject to proper benefit-sharing arrangements, could substantially enhance community resilience.

Potential to scale. Bolivia has an estimated 70,000 smallholder quinoa growers (Stockholm Environment Institute report, *The Potential of Quinoa in Bolivia's Bioeconomy*, 2020). Most are single-adult households, with about 40% (a proportion which is rising) led by women, all potential long-term beneficiaries. Given correct benefit-sharing arrangements, bioproducts could be exported or produced under licence in neighbouring countries, helping alleviate their similar quinoa-smallholder poverty and gender equality problems.

Biodiversity. What will change: fungi and bacteria will for the first time be factored into Bolivia's biodiversity conservation arena.

Short term. For the altiplano there will be increased awareness that the natural quinoa-cultivation landscape, its accompanying extremophile biodiversity and ecosystem services provided by quinoa associates all need protecting. Nationally, for the first time, Bolivia will have structured information about its fungi, accessible to non-specialists, including a detailed assessment of their status, knowledge gaps and threats, conservation advice and policy recommendations. There will also be similar pilot information for some bacteria.

Long term. This work will enable Bolivia to include neglected organisms in CBD NBSAPs, reports and similar documents. If implemented, this would profoundly strengthen national biodiversity conservation. Our pioneering work on quinoa symbionts will contribute to growing calls for conservation coverage globally to be extended to bacteria.

Potential to scale. Similar structured, accessible national reviews of neglected organisms, promoting their conservation, are being done in Sub-Saharan Africa, and could be done elsewhere. They are needed by, more or less, all CBD countries [www.fungal-conservation.org/micheli.htm].

Q18. Pathway to change

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

Poverty. Current position: economic globalization, climate change and other impacts threaten quinoa crop viability for Bolivia's smallholder growers (increasingly women, as men seek work in cities); research suggests quinoa's largely unknown fungal and bacterial associates could significantly enhance crop resilience. Logic: if growers are receptive, quinoa associates can be collected, identified and screened; if screening reveals species / consortia with potential, new crop-supporting bioproducts can be developed and tested; if tests show effectiveness, and benefit-sharing is agreed, production can be scaled for widespread use [Outcome]; if widespread use is successful, quinoa harvests will improve. Impact: improved quinoa crops reduce grower poverty.

Biodiversity. Current position: fungi and bacteria, major components of Bolivia's biodiversity, lack protection because national CBD documents overlook them. Logic: if existing information about these organisms in Bolivia is compiled, and new information added, the knowledge gap about them and some indication of their status can be estimated; if those estimates are obtained, plans can be made to fill the knowledge gap and to conserve based on existing evidence [Outcome]; if those plans are published and the government is receptive, they can be incorporated in CBD documents. Impact: conservation of species included in CBD documents becomes explicit official policy.

Q19. Sustainable benefits and scaling potential


Q19a. 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?


Partners in Bolivia and Mexico have considerable experience and resources for bioproduct development and roll-out, ensuring sustained post-project delivery of crop resilience benefits. Grower collective management through the project's Steering Group will be sustained post-project through PROINPA. Darwin Core fields for all new digitized records will be uploaded to GBIF (open access), with copies to each partner for their own use, including (as additional security) CABI. New data will also go to Cybertruffle (open access) where the country websites will also be housed, as in the Darwin Initiative's current project on fungal conservation in Sub-Saharan Africa [Darwin project 30-020]. In 2022, the Cybertruffle server was updated with new hardware and software, and succession planning is in preparation. Records generated by all earlier Darwin Initiative projects involving the present Project Leader have been available on Cybertruffle since 2007, in some cases long after other outlets have ceased to function.


Q19b. 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?

Bioproducts. Under management by the project's Steering Group, given due care, compliance and respect for indigenous natural capital rights, Nagoya regulations, and potential commercial considerations, it should be possible to extend use of any resulting bioproducts through Landscape Scaling. In its native South America, quinoa is grown principally in Bolivia, Ecuador and Peru, but also in Argentina, Chile and Colombia. Bioproducts are likely to be effective in these very similar environments. Worldwide, quinoa cultivation has extended to many non-indigenous areas, particularly China, India and North America, and with climate change the crop's tolerance of water stress is likely to result in further introductions. Given climate change, a bioproduct which could enhance that tolerance has exciting implications. Digitized records and assessments. These are already an example of Replication Scaling, bringing to South America an initiative started in the Darwin Initiative's current project on fungal conservation in Sub-Saharan Africa [Darwin project 30-020].

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

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Section 7 - Risk Management

Q20. Risk Management

Please outline the 6 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, one Safeguarding, and one Delivery Chain Risk.

Risk Description	Impact	Prob.	Gross Risk	Mitigation Header	Residual Risk
Fiduciary Fiduciary risk (a threat risk) is perceived as low: least likely for salaries, almost all earmarked for people already personally known to the Project Leader; very unlikely, but possible, for non-salary costs (in-country travel, consumables, sequencing services, reagents and materials etc.).	40	5	45	Funding for stakeholders, and Bolivian and Mexican partners will go through PROINPA, UAEM and UMSS, three long-established reputable organizations, each with a track-record, checked by the Project Leader, of securely handling international funding, and each contributing significant matched funding to this project. Non-salary expenditure will be subject to particular scrutiny.	5
Safeguarding The biggest expected safeguarding risks are to staff and international participants during fieldwork and villager liaison: altitude sickness, road travel dangers including disruption by protests, gender discrimination, harassment, stomach bugs, express kidnapping and robbery. For women participants from village collectives continued background gender discrimination is probably the greatest risk.	20	10	30	Zero-tolerance of assaults, gender discrimination and harassment of and by staff and collaborators; provision of appropriate medications and acclimatizing time; no solitary course or field work when higher risks anticipated; safest available transport, and suitable protective equipment (e.g. crash helmets) used; gender issues handled promptly and sensitively; staff streetwise awareness-raising.	10

Delivery Chain	None of the collected and cultured fungi and bacteria and their consortia have detectable potential as organisms beneficial for quinoa crop resilience (a threat risk).	50	10	60	Pre-project research, and scoping during our preceding Darwin Initiative Partnership Project all indicate that this is unlikely. To minimize this risk further, short-listing of strains and consortia will start with a search for drought-resistant and saline-tolerant properties, both amenable to laboratory rather than field testing.	10
Risk 4	Additional resources, techniques and technologies may be needed to develop bioproducts from promising source strains (an opportunity risk).	50	15	65	Scientists with strong track-record of innovation selected as participants. M&E primed to provide early alert if a bioproduct emerges with strong potential for international commercial success and, well before any wider roll-out, project plans adapted to identify and obtain additional resources necessary for strong stakeholder rights protection.	20
Risk 5	Cultural and/or linguistic misunderstandings, and unrealistic expectations on either side affect relations between village collectives and project partners (a threat risk).	50	10	60	Milton Vilca [PROINPA], a native of the Uyuni area, will handle liaison with villagers and their collectives, advising key project staff regarding agreements, expectations and understandings. Claudia Rodriguez, another PROINPA employee, will provide a consistent contact point for the Bioproduct Development Committee. Additional expertise for liaison is available from UMSS.	10
Risk 6	A threat risk: core Staff welcome project risk management, but not all have adequate active risk management skills. Although Core Staff collectively have a long history of successful project delivery, past risk management has, for some, been intuitive rather than conscious. New project staff may be unaware of risk management.	20	30	50	Prompt action at start of project to ensure all Core Staff fully understand risk management and its tools, and to upgrade and increase project M&E activities to reflect that better understanding. Training in risk management for all new project staff.	5

Q21. 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


Q22. Workplan

Provide a project implementation timetable that shows the key milestones in project activities.

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Section 9 - Monitoring and Evaluation

Q23. Monitoring and evaluation (M&E)

Describe how the progress of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E.

Darwin Initiative projects are expected to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. M&E is expected to be built into the project and not an 'add' on. It is as important to measure for negative impacts as it is for positive impact. Additionally, please indicate an approximate budget and level of effort (person days) to be spent on M&E.

The Project Leader will have overall responsibility for M&E, which will be managed on a day-to-day basis by Ms Soliman, who has considerable relevant professional expertise and experience. Ms Soliman will chair a special M&E panel with representatives from each partner, which will meet periodically to review progress of the project. Each panel member will be responsible for a specific aspect of the project's work, ensuring that M&E covers all activities and outputs.

The first project activity will be to ensure the representatives of all five project partners are fully familiar with M&E procedures (including use of the Gender Analysis Matrix Framework and Gender Equality Markers). Next, where not already established, baseline data for each output will be agreed, and checks made to ensure all activities have SMART indicators. Monitoring by those representatives will then commence.

Responsibility for Outputs will be as follows. For Output 1, M&E of sample acquisition will be overseen by the UMSS representative, M&E of work to identify fungi and bacteria, and of molecular work on the samples will be overseen jointly by the UMSS and UAEM representatives, and M&E of subsequent laboratory and field trials, together with product development, will be overseen by the PROINPA representative. PROINPA will also determine baseline local crop productivity information and monitor subsequent comparable productivity. For Output 2, M&E will be carried out by the PROINPA representative jointly with Ms Soliman as representative of the Permaculture Association, with particular focus on disaggregated gender information and measured changes in livelihoods. M&E of Output 3 will be carried out by Dr Minter as Project Leader. This will include establishing baseline information about fungal and bacterial diversity of altiplano quinoa growing areas against which future biodiversity work can be measured.

Results of monitoring will be evaluated at six monthly or annual intervals as appropriate by the person responsible for each output. Results and evaluations will then be considered collectively by the whole M&E team, and minuted by Ms Rodríguez [PROINPA] acting as panel secretary. If a sufficiently significant unplanned event occurs, an unscheduled meeting of the M&E team will be held. M&E team meetings will review possible opportunities arising from positive impacts, and suitable corrective action arising from negative impacts, with decisions on necessary action minuted. Minutes will inform the periodic project reports made for the Darwin Initiative. Minuted actions will then be implemented, and plans for the next M&E period revised.

In the event of this project being funded (i.e. even before formal start of the project), all Core Staff will also meet remotely, several times if necessary, to be familiarized with risk management. Following that meeting, Core Staff will revise project plans to ensure that, like M&E, risk management is integral. Plans will include a programme for reviewing and redefining risks as the project develops.

Total project budget for M&E (£)	£ [REDACTED]
(this may include Staff and Travel and Subsistence Costs)	
Total project budget for M&E (%)	[REDACTED]
(this may include Staff and Travel and Subsistence Costs)	
Number of days planned for M&E	170

Section 10 - Logical Framework

Q24. 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 will measure progress against these and how we can verify this.

[dir30s2_1004_logframe](#)

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14:40:07

pdf 79.21 KB

Impact:

Fungi and bacteria recognised in Bolivia's environmental laws and CBD strategies as organisms which merit conservation and are valued for the key ecosystem services they provide and their livelihoods-enhancing potential.

Outcome:

Conserving Bolivia's fungi and bacteria made realistic through new in-depth assessments and recommendations, with evidence of their crop resilience / poverty alleviation potential through a case-study in altiplano quinoa-farming communities.

Project Outputs

Output 1:

A collection of living strains and consortia of fungi and bacteria with potential for enhancing quinoa crops.

Output 2:

Enhanced capability and capacity for natural capital management by traditional altiplano quinoa-growers.

Output 3:

CBD national focus point capability and capacity enhanced through new resources enabling coverage of fungi and bacteria in CBD strategies and reports.

Output 4:

No Response

Output 5:

No Response

Do you require more Output fields?

No

Activities

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

Output 1 [strains and consortia of fungi and bacteria with potential for enhancing quinoa crops]

- 1.1 (1). Collect representative samples of all parts of quinoa plants, and from adjacent soils, companion plants etc., establishing and maintaining accessions information for all specimens collected.
- 1.1 (2). Examine samples microscopically, where possible identifying fungi present using classic morphology and developmental characters, and isolating fungi and bacteria using a range of culture media.
- 1.1 (3). Assess the physicochemical characteristics of the plant and soil samples.
- 1.1 (4). Identify isolated fungi and bacteria using molecular techniques.
- 1.1 (5). Carry out metagenomic analysis of the samples, shortlisting suitable strains / consortia.
- 1.2 (1). Using in vitro techniques, evaluate shortlisted strains / consortia for potential to enhance resilience (as biofertilizers, plant-growth promoters, protection against drought and salinity, etc.).
- 1.3 (1). Establish field test baseline parameters, including local quinoa crop yields (kg/ha).
- 1.3 (2). Carry out field tests of the ten most promising strains / consortia.
- 1.3 (3). Assess results for strains / consortia against established parameters.
- 1.3 (4). Select most suitable strain(s) / consortia for bioproduct development.
- 1.4 (1). Develop bioproduct.

Output 2 [outreach and support programme for natural capital management by traditional altiplano quinoa-growers]

- 2.1 (1). Through village meetings, explain project, and establish priorities for collective infrastructure, local school biodiversity-teaching needs, and a commitment to due care for project-donated equipment.
- 2.2 (1). Through village meetings, elicit Steering Group representatives.
- 2.2 (2). Hold inaugural meeting of Steering Group; establish its objectives, mode of operating (chair, secretary etc.) and meetings timetable.
- 2.2 (3). Ensure effective management of bioproduct development through subsequent meetings.
- 2.3 (1). In addition to already known infrastructural priorities, locate, obtain and deliver as many further collective facilities as possible for quinoa production.
- 2.4 (1). Locate, obtain and deliver biodiversity-teaching resources for local schools and, where invited and

compatible with routine visits, contribute to classes on this theme.

2.5 (1). Visit each participating village several times to explain bioproduct(s) and train villagers in their use, and reinforce that training.

Output 3 [capacity development for national CBD focus point]

3.1 (1). Train researcher in Bolivia to identify sources of information about Bolivian fungi and bacteria, gather records from those sources, then digitize and edit them.

3.1 (2). Supervise work of the trained researcher in Bolivia, ensuring quality and compatibility.

3.1 (3). Avoiding duplicates, upload Darwin Core data of accumulated records to GBIF with copy to CABI.

3.2 (1). Design websites for Bolivia's fungi and bacteria, modelled on existing Cybertruffle websites for other countries and similar to those planned for Darwin Initiative project DIR29S2\1032.

3.2 (2) Make digitized records available on-line through the new websites, clearly acknowledging sources.

3.3 (1). Finalize specifications for national assessments of Bolivia's fungi and bacteria (currently in draft).

3.3 (2). Incorporate the digitized records in the fungal and bacterial assessments.

3.3 (3). Incorporate information about ecosystems, and associated organisms, particularly those which are endemic or threatened, presenting the data from the perspective of fungi and bacteria.

3.3 (4). Accumulate information about national awareness of fungi and bacteria among administrators and politicians, in education, and in the general public.

3.3 (5). Accumulate information about how diversity of these organisms promotes wealth and well-being, and how its loss impacts poverty and gender issues.

3.3 (6). Using accumulated information, prepare detailed draft assessments of Bolivia's fungi and bacteria, including proposed plans for their conservation.


3.3 (7). Circulate those drafts to suitable colleagues for review and feedback and, based on comments received, prepare final versions.


3.3 (8). Present finalized assessments to CBD National Focus Point, and make them available on-line.


Section 11 - Budget and Funding

Q25. Budget

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

 [dir30s2_1004_budget](#)

 27/11/2023

 14:42:15

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Q26. 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.

Q26a. Is this new work or does it build on existing/past activities (delivered by anyone and funded through any source)?

New Initiative

Please provide details:

Output 1. Other than exploratory work by our team, we know of no work involving fungi or bacteria relevant to this output.

Output 2. There is an enormous body of work on livelihoods of traditional quinoa farmers in Bolivia but, other than exploratory work by our team, we know of none from the perspective of fungi and bacteria as natural capital.

Output 3. For fungi, the databases and expertise making this output realistic and achievable stem from earlier Darwin awards: 3-054 (1993-1996); 6-056 (1997-2000); 8-011 (1999-2002); 10-001 (2001-2004); 11-026 (2002-2005), and particularly Darwin project 16-008, "Conservation of Microfungi, a voice for unprotected and vulnerable organisms" (2007-2010). Through that catalytic work the need for fungal conservation is now widely acknowledged. Darwin project 30-020 (2023-2026) is leading the next stage of that conservation journey, helping Sub-Saharan CBD countries incorporate fungi, hitherto almost totally neglected, in their future strategies and plans. The present project extends that initiative into South America, where nothing similar has previously been attempted and, as a revolutionary step, seeks to extend conservation coverage for the first time to bacteria.

Q26b. Are you aware of any current or future plans for work in the geographic/thematic area to the proposed project that may duplicate or cut across this 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.

We know of no current work involving fungi or bacteria relevant to Outputs 1 or 2, and we know no current work involving bacteria and similar to Output 3 of this project. For fungi, work similar to Output 3 is being carried out in Sub-Saharan Africa by Darwin project 30-020 (2023-2026). Fundación Fungi [<https://ffungi.org>], a fungal conservation NGO based in Chile, also recognizes the need to include fungi in South American CBD documents, and there is full co-operation and a mutual exchange of lessons learned between that NGO and proposers of the present project. The present project will also foster already growing interest in such work within the IUCN Species Survival Commission (Dr Minter chairs one of its five Fungal Specialist Groups).

Q27. 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?

This project seeks to be frugal, efficient and effective, with integral M&E, continuous improvement, scrupulous financial management and zero waste. It is distinct, with a realistic budget, timeframe, end date, specific measurable results and significant matched funding. It neither cuts across nor duplicates other work, is light on international travel, and operates in South America's poorest country.

Its design reflects the Lead Applicant's experience, including six earlier Darwin main projects all successfully completed on-time and within budget. It applies the Permaculture Association's sustainability precepts, benefitting synergistically from the Association's networks and long-established emphasis on gender equality. It seeks to deliver maximum impact through optimal resource use, and delivers results which would not otherwise happen.

Output 1 focuses on quinoa farmed in the extreme environment of Bolivia's altiplano and threatened by climate change and plans for lithium mines; it seeks beneficial associated fungi and bacteria to develop into bioproducts conferring crop resilience. Output 2 supports, encourages and teaches the altiplano's impoverished traditional

farmers, mostly women, to manage that development and apply its results. Output 3 addresses the CBD's complete failure to protect fungi and bacteria, biological kingdoms vital for sustainable life on this planet, and far more speciose and diverse than plants. It develops resources to improve national conservation policy in Bolivia, with excellent scalability prospects. It aims to provide the conservation movement with a global, pioneering and revolutionary opportunity to reflect true biodiversity, not just fauna and flora. The cost is modest, and the expected legacy sustainable, permanent and global.

Q28. Capital items

If you plan to purchase capital items with Darwin Initiative 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.

Agricultural machinery and greenhouses will remain with village collectives; the freeze-drier, incu-shaker and microbial incubator will remain with PROINPA; the laminar flow cabinet and external hard drive will remain with UMSS; facilities for metagenomic analysis and their will remain with and be shared by UMSS and UAEM.

Section 12 - Safeguarding and Ethics

Q29. 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 place.

Please upload the following required policies:

- **Safeguarding Policy:** including a statement of commitment to safeguarding and a zero tolerance statement on bullying, harassment and sexual exploitation and abuse.
- **Whistleblowing Policy:** which details a clear process for dealing with concerns raised and protects whistle blowers from reprisals.
- **Code of Conduct:** which sets out clear expectations of behaviours – inside and outside the workplace – for all involved in the project and makes clear what will happen in the event of non-compliance or breach of these standards, including compliance with IASC 6 Principles.

If any of these policies are integrated into a broader policy document or handbook, please upload just the relevant or equivalent sub-sections to the above policies, with (unofficial) English translations where needed.

Please outline how (a) beneficiaries, the public, implementing partners, and staff are made aware of your safeguarding commitment and how to 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 uphold these policies.

If your approach is currently limited or in the early stages of development, please clearly set out your plans address this.

CABI employees are formally required to accept and implement its policies regarding safeguarding, ethical business conduct and whistleblowing when conducting work on projects. These policies are publicly available at <https://www.cabi.org/about-cabi/our-policies>, and are drawn to the attention of partners as a part of their contractual obligations on any project where they are involved. Any reported breaches of these policies are formally investigated by CABI's Director of Human Resources, Mr Neil MacIntosh, and reported to the funding

source of the project where the breach has occurred. Appropriate disciplinary action will be taken where a report of activity that does not comply with our policies is upheld, and this is built into the employment contracts of all CABI staff. Breach of contract by partner organisations in regard to these policies would also attract appropriate action.

Q30. Ethics

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

With the support of CABI's Ethics Committee, the Project Leader is responsible for ensuring key ethical principles are followed. All named project staff have read (or for non-English speakers been appraised of) and accept those principles as outlined in Darwin guidance. They are committed to meeting them, and strongly want the project's environment to foster such principles. Collectively, throughout their careers, their record in this respect is long and unblemished. A similar approach will be encouraged in other project staff and downstream collaborators.

Prior to appointment, new project staff will be required to read the principles, with acceptance a condition of appointment. Project monitoring and evaluation will routinely check that activities and results have adhered to and reflect those principles.

Additional to staff health and safety welfare, this project will particularly strive to deliver best practice for the following Darwin guidance principles:

- credibility of evidence, research and other findings, to be upheld in on-line databases, scientific publications, and websites;
- incorporation of interests, prior consent, privacy, respect for traditional knowledge, rights, safety and well-being of people impacted by project activities, especially during courses and site visits;
- access and benefit sharing, legal obligations, and use of genetic resources.

Section 13 - British embassy or high commission engagement


Q31. 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.


Yes

Please attach evidence of request or advice if received.

 [dir30s2_1004_embassy_contact](#)

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Section 14 - Project Staff

Q32. 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?
David Minter	Project Leader	30	Checked
Daniel Guzmán	Representing UMSS; team leader; CBD and Nagoya liaison; bacterial genomics specialist	50	Checked
Rolando Oros	Representing PROINPA; team leader; supervising village collective outreach and bioproduct development	30	Checked
Ramón Batista	Representing UAEM; fungal genomics specialist	50	Checked


Do you require more fields?


Yes


Name (First name, Surname)	Role	% time on project	1 page CV or job description attached?
Gihan Soliman	Representing Permaculture Association; M&E leader; village collective outreach	20	Checked
Genaro Aroni	Based in Uyuni; village collective liaison as Aymara speaker	60	Checked
Milton Villca	Based in Uyuni; village collective liaison as Quechua speaker	40	Checked
Claudia Rodriguez	PROINPA (Cochabamba); administration, Steering Group support	30	Checked
Bilma Rios Caero	PROINPA (Cochabamba); bioproduct development	40	Checked
Jimmy Ciancas	PROINPA (Cochabamba); bioproduct development	40	Checked
Claudia Hoepfner Loayza	UMSS; records of fungi and bacteria; bacterial genomics and strain/consortia evaluation	50	Checked
Jerry Solis	UMSS; records of fungi and bacteria; bacterial genomics and strain/consortia evaluation	50	Checked

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

 [dir30s2_1004_cvs](#)

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Have you attached all project staff CVs?

Yes

Section 15 - Project Partners

Q33. Project Partners

Please list all the Project Partners (including the Lead Partner 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.

This section should demonstrate the capability and capacity of the Project Partners to successfully deliver the project. Please provide Letters of Support for all project partners or explain why this has not been included. The order of the letters must be the same as the order they are presented in below.

Lead partner name: CABI

Website address: www.cabi.org

Engagement. Full engagement to date and future full engagement planned.

Roles & Responsibilities. Project leadership; conservation expertise; classical mycology; databases. Reporting to Darwin. Management of project and of project risk; financial control; delivering value for money; compliance with ethical practice and gender-neutral policies; ensuring effective monitoring & evaluation; supervising assembly of fungal and bacterial assessments; supervising digitizing records of occurrence of fungi and bacteria; supervising website construction; supervising non-molecular identification of fungi.

Why is this organisation the Lead Partner, and what value to they bring to the project? (including roles, responsibilities and capabilities and capacity):

Capabilities & capacity. CABI is a very long-established international organization widely recognized for its extensive informational resources, scientific expertise and impartiality. CABI is dedicated to sharing knowledge and science. It tackles global issues like poverty, hunger, education, equality, sustainability, climate change and biodiversity, by helping farmers grow more and lose less of their produce, by combating threats to agriculture and the environment from pests and diseases, by protecting natural habitats from invasive species, and by improving access to scientific knowledge. Dr Minter has produced hundreds of peer-reviewed papers on microfungi and has described hundreds of new taxa, including new orders, new families and new genera. He has worked with databases for biological recording for over 40 years.

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 Partner? Yes

Do you have partners involved in the Project?

Yes

1. Partner Name: Universidad Mayor de San Simón

Website address: www.umss.edu.bo

Engagement. Full engagement to date, and future full engagement planned.

Roles & Responsibilities. Liaison with Bolivian CBD national focus point; assurance of compliance with Nagoya; maintenance of project-collected samples and associated accessions information; isolation of fungi and bacteria into pure culture; molecular identification of bacteria and, liaising with Mexican partner, fungi; identification of quinoa-associated microbial diversity and molecular studies on those clusters; laboratory tests prospecting for species and consortia with potential to enhance quinoa crop resilience and / or to benefit grower livelihoods; some non-molecular identification of fungi; supervised digitizing Bolivian records of fungi and bacteria; supervised construction of websites; collaborator in drafting assessments of fungi and bacteria.

What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):

Capabilities & capacity. The UMSS Faculty of Science & Technology and its Center of Biotechnology have a long tradition of work in microbiology. In addition to topics covered in UMSS Team Leader Prof. Guzmán's CV, the present project includes UMSS researchers working on microbial diversity characterization of extreme environments using metagenomic approaches, and potential biotechnological application of these microorganisms, including: biogas production by extremophilic bacteria from Uyuni's salt lake, purification, characterization and activity improvement of bacterial enzymes, and developing scalable processes for ethanol production from waste products.

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

2. Partner Name: PROINPA [Fundación para la Promoción e Investigación de Productos Andinos]

Website address: www.proinpa.org

Engagement. Full engagement to date, and future full engagement planned.

Roles & Responsibilities. Liaison and interface with village collectives; delivery of their project equipment; administrative support for the Steering Group; field-trial evaluations of selected fungi, bacteria and microbial consortia; bioproduct development from those delivering promising trial results.

Capabilities & capacity. The PROINPA Foundation is a science and technology organization which aims to generate positive impacts on families of producers, micro-enterprises and agricultural companies through technological innovation. It especially focuses on adaptation to environmental changes and identifying opportunities in that area. It is recognized in Bolivia and abroad for its efficiency, and its contribution and commitment to agricultural development. Two of its principal objectives are to develop technology for agro-ecological management of crops, and to promote sustainable management of agrobiodiversity. This includes a strong track-record in development of bioproducts.

PROINPA is based in Cochabamba, where it maintains strong links with UMSS, and has regional offices throughout Bolivia, including one in Uyuni. Its outreach services have a long history of close, direct and positive links with traditional quinoa growers in and around Uyuni. The relevant outreach staff, included in this project's budgeted staff, are Aymara and Quechua speakers native to Uyuni.

What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):

International/In-country Partner: In-country

Allocated budget: £ ██████████

Representation on the Project Board (or other management structure): Yes

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

3. Partner Name: Universidad Autónoma del Estado de Morelos

Website address: www.uaem.mx

Engagement. Full engagement to date, and future full engagement planned.

Roles & Responsibilities. i) isolation, characterization and conservation of quinoa-associated fungi, ii) culture-based and culture-independent approaches to study fungal communities associated with quinoa, iii) response of quinoa-associated fungi to global change. Prof. Batista will particularly focus on molecular and genomic aspects, and this fungal component will complement parallel work being carried out on bacteria through this project at UMSS.

What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):

Capabilities and capacity. The UAEM Research Center for Cell Dynamics, where Prof. Batista heads the Laboratory of Extremophile Microorganisms, has an impressive, established and proven track record of research relevant to the present project. This includes collaboration to develop novel biofertilizers based on extremophilic fungi, study of fungal diversity using genomics, metagenomics and transcriptomics, isolation of microbes with biotechnological potential, response of fungal communities to global change in arid and hyperarid environments such as Uyuni, extremophilic fungi and their application in bioremediation, industrial wastewater treatment using extremophilic fungi, extremophilic fungi degradation of xenobiotics and micropollutants, in-situ microbial bioremediation, study of molecular mechanisms for microbial bioremediation, and experience connecting innovation stakeholders and moving inventions from creators to public and private users.

International/In-country Partner: International

Allocated budget: £ ██████████

Representation on the Project Board (or other management structure) Yes

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

4. Partner Name: Permaculture Association

Website address: www.permaculture.org.uk

Engagement. Full engagement to date, and future full engagement planned.

Roles & Responsibilities. Specialist partner for grass-roots sustainable development; lead in M&E, including promoting gender equality, and overseeing protection of indigenous rights to natural capital; publicity, co-ordinating project blogs, publicity & social media outputs; input from Permaculture Association to village collective meetings; support and training for village collectives in negotiation and management skills.

What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):

Capabilities & capacity. The Permaculture Association works to change the way we live, radically and positively. It actively supports a worldwide movement, helping to educate, network, support and redesign all aspects of daily life to transform people, communities and landscapes. The Association promotes design of intelligent systems which meet human needs while enhancing biodiversity, reducing human impact on the planet, and creating a fairer world. Separate from her honorary position as an elected Trustee of the Permaculture Association, Ms Soliman has extensive experience working in food security, and particularly with day-to-day delivery of monitoring and evaluation, and the whistle-blowing sometimes required. By chairing its M&E team, she will bring that extensive experience to the present project.

International/In-country Partner: International

Allocated budget: £ ██████████

Representation on the Project Board (or other management structure): Yes

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

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.

 [dir30s2_1004_support_letters](#)

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Section 16 - Lead Partner Capability and Capacity

Q34. Lead Partner 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)?

Yes

If yes, please provide details of the most recent awards (up to 6 examples).

Reference No	Project Leader	Title
--------------	----------------	-------

DARPP220	David Minter	Quinoa-associated fungi in the Andes: diversity, conservation and sustainable use
29-012	Ivan Rwomushana	Protecting biodiversity through biocontrol of papaya mealybug in East Africa
DARCC013	René Eschen	Coordinated invasive plant management to protect Tanzanian biodiversity and livelihoods
22-001	Steve Edgington	Rescuing and restoring the native flora of Robinson Crusoe Island
16-008	David Minter	Conservation of Microfungi: a voice for unprotected and vulnerable organisms
15-004	Dave Moore	Conserving and Using Entomopathogenic Fungi and Nematodes within Chile

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

Yes

Section 17 - Certification

Q.35 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 made ineligible.

On behalf of the

Company

of

CAB International, trading as CABI of Nosworthy Way, Wallingford, Oxfordshire, OX10 8DE

I apply for a grant of

£584,880.00

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, cover letter, letters of support, a budget, logframe, Safeguarding and associated policies, and project workplan.
- Our last two sets of signed audited/independently verified accounts and annual report (covering three years) are also enclosed.

Checked

Name





DR RICHARD SHAW





Position in the organisation Senior Regional Director





Signature (please upload e-signature)  [dir30s2_1004_certification](#)
 27/11/2023
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 pdf 19.86 KB

Date 25 November 2023





Please attach the requested signed audited/independently examined accounts.





 [dir30s2_1004_CABI_financial_statement_2022](#)
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 [dir30s2_1004_CABI_financial_statement_2021](#)
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Please upload the Lead Partner's Safeguarding Policy, Whistleblowing Policy and Code of Conduct as a PDF

 [dir30s2_1004_CABI_safeguarding_policy_2023](#)
 27/11/2023
 13:20:00
 pdf 809.28 KB

 [dir30s2_1004_CABI_whistleblowing_policy_2019_1](#)
 27/11/2023
 13:20:00
 pdf 274.71 KB

 [dir30s2_1004_CABI_code_of_business_conduct_2019_2](#)
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 pdf 379.42 KB

Section 18 - Submission Checklist

Checklist for submission

	Check
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 my budget based on UK government financial years i.e. 1 April – 31 March and in GBP.	Checked

I have checked that our budget is complete, correctly adds up and I have included the correct final total at the start of the application.	Checked
The application 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 Partner, outlining how any feedback received at Stage 1 has been addressed where relevant, as a single PDF.	Checked
• my completed logframe as a PDF using the template provided and using “Monitoring Evaluation and Learning Guidance” and “Standard Indicator Guidance”.	Checked
• my budget (which meets the requirements above) using the template provided.	Checked
• a signed copy of the last 2 annual report and accounts (covering three years) for the Lead Partner, or provided an explanation if not.	Checked
• my completed workplan as a PDF using the template provided.	Checked
• a copy of the Lead Partner’s Safeguarding Policy, Whistleblowing Policy and Code of Conduct (Question 29).	Checked
• 1 page CV or job description for all the Project Staff identified at Question 32, including the Project Leader, or provided an explanation of why not, combined into a single PDF.	Checked
• a letter of support from the Lead Partner and partner(s) identified at Question 33, 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
My 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 my responses have been successfully copied into the online application form.	Checked
I have checked the Darwin Initiative 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 Darwin Initiative and our sister grant scheme, the IWT Challenge Fund. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share our quarterly project newsletter. You are free to unsubscribe at any time.

Unchecked

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 partner, project leader, location, and total grant value).

Project Title: Quinoa-associated fungi and bacteria in Bolivia: conservation and sustainable use

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
<p>Impact: Fungi and bacteria recognised in Bolivia's environmental laws and CBD strategies as organisms which merit conservation and are valued for the key ecosystem services they provide and their livelihoods-enhancing potential.</p>			
<p>Outcome: Conserving Bolivia's fungi and bacteria made realistic through new in-depth assessments and recommendations, with evidence of their crop resilience / poverty alleviation potential through a case-study in altiplano quinoa-farming communities.</p>	<p>0.1. CBD National Focus Point for Bolivia has first national assessments and conservation plans for fungi and bacteria (by end of March 2027) [DI-C01]. 0.2. At least one fungal / bacterial strain with crop resilience / poverty alleviation potential identified, documented and under development as bioproduct (by end of March 2027) [DI-C04]. 0.3. At least 10 community representatives (at least 50% women) involved in managing quinoa-associated natural capital [DI-B05].</p>	<p>0.1. Copies of e-mails to National Focus Points with assessments attached; copies of assessments supplied by Project Leader. 0.2. Samples of potential new bioproduct(s); documentation of test results; photographic and video evidence of use. 0.3. Lists of equipment purchased through project; photographs and videos of their use. Agenda and minutes of project management meetings, including meeting attendance lists.</p>	<p>0.1. The Bolivian CBD national focus point will support this work (a formal letter of support has been requested and an oral reply suggests it will be forthcoming). 0.2. Fungi and bacteria suitable as bioproduct sources can be found, collected, cultured and used for development. 0.3. Meetings can be organized at times, in locations and at a frequency convenient for crop producer participation [quinoa-farming communities are remote and sometimes inaccessible; liaison between meetings may also be difficult].</p>
<p>Outputs: 1. A collection of living strains and consortia of fungi and bacteria with potential for enhancing quinoa crops.</p>	<p>1.1. At least 500 samples/specimens of fungi and bacteria directly associated with quinoa or collected from quinoa-growing environments, with a subset of 200 selected for cultural/molecular work (by end of December 2025) [DI-C09]. 1.2. 10 strains / consortia selected and tested in vitro for crop resilience / poverty alleviation capabilities (by end of December 2025) [no DI metric]. 1.3. At least one experimental field test for each strain /</p>	<p>1.1. Reference collection records of accessions and their subsequent curation, with (as appropriate) images, identifications, preliminary suitability assessments and (for short-listed specimens only) cultures and sequences. 1.2. Documentation of strain/consortium assessment and selection processes. 1.3. Records of tests, including documentation of experimental design and results.</p>	<p>1.1. The long-term future of reference collections is secure. 1.3. Where not already existing, suitable techniques for bioproduct development and manufacture can be established by participating scientists using their considerable pool of shared expertise.</p>

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	<p>consortium, including techniques, replicates, controls and results (by end of December 2026) [no DI metric].</p> <p>1.4. At least one bioproduct under development (by end of March 2027) [no DI metric].</p>		
<p>2. Enhanced capability and capacity for natural capital management by traditional altiplano quinoa-growers.</p>	<p>2.1. 1000 people (about 50% female) / 350 households made aware of the natural capital value of fungi and bacteria associated with quinoa, and involved in managing their development (by end of December 2024) [DI-B05, DI-B07].</p> <p>2.2. At least 10 community-selected representatives (at least 5 women) participating in project's Steering Group (by end of December 2024) [DI-B05, DI-B07].</p> <p>2.3. Five grower collective facilities enhanced by quinoa shelterbelt and companion plant nurseries and other equipment (by end of December 2024) [DI-A03].</p> <p>2.4. 100 resource items (books, hand-lenses, identification guides, microscopes, paper & pencils, posters etc.) for five local schools (by end of December 2024) [DI-A03].</p> <p>2.5. 100 villagers trained in bioproduct use (by end of March</p>	<p>2.1, 2.2. Written reports and photographs of community meetings; agenda and minutes of committee meetings.</p> <p>2.3, 2.4, 2.5, 2.6. Written reports and photographic evidence of courses, enhanced facilities and other resources; lists of participants; lists of delivered materials.</p>	<p>2.1. Quinoa-growers are receptive to interaction with this project (existing close links with Bolivian partners make this a plausible assumption).</p>

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	<p>2027) [DI-A01]. 2.6. 1000 people (about 50% female) / 350 households benefitting from improved sustainable agricultural practices [DI-D11], and reporting improved livelihoods (by end of March 2027) [DI-D16].</p>		
<p>3. CBD national focus point capability and capacity enhanced through new resources enabling coverage of fungi and bacteria in CBD strategies and reports.</p>	<p>3.1. Estimated 10,000 previously undigitized records of Bolivian fungi and (as a pilot scheme only) certain bacteria, from reference collections, published sources and the case-study, digitized, edited, and their Darwin Core fields added to GBIF (by end of December 2026) [DI-C16]. 3.2. Two websites established (one for Bolivian fungi and the other, as a pilot scheme only, for Bolivian bacteria) based on those records (by end of March 2027) [no DI metric]. 3.3. At least two (Fungi, Bacteria) and possibly up to five (Archaea, Chromista, Protists) biological kingdoms covered for Bolivia by detailed national-level assessments and, for the first time, considered for conservation, with breakdown by division, class, order, family, and by associated organisms (by end of December 2026) [no DI metric].</p>	<p>3.1. GBIF website. 3.2. New websites; backed by Google Analytics use statistics. 3.3. Downloadable assessments.</p>	<p>3.1, 3.2, 3.3. Procedures used over many years make this work low risk. Through previous Darwin Initiative and other projects, fungal and (to a lesser extent) bacterial records from many other countries have already been digitized.</p>

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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.)

General

- General (1). At the outset, ensure core project staff understand gender-equal character of project and procedures for M&E, training where necessary.
- General (2). Throughout project, monitor and evaluate work, disaggregating measurables by gender and, where appropriate, by household income level.
- General (3). Maintain already established contact and dialogue with CBD National Focus Point.
- General (4). Recruit graduate project staff on a gender-neutral basis, and train them (this may involve travel to UK).

Output 1 [strains and consortia of fungi and bacteria with potential for enhancing quinoa crops]

- 1.1 (1). Collect representative samples of all parts of quinoa plants, and from adjacent soils, companion plants etc., establishing and maintaining accessions information for all specimens collected.
- 1.1 (2). Examine samples microscopically, where possible identifying fungi present using classic morphology and developmental characters, and isolating fungi and bacteria using a range of culture media.
- 1.1 (3). Assess the physicochemical characteristics of the plant and soil samples.
- 1.1 (4). Identify isolated fungi and bacteria using molecular techniques.
- 1.1 (5). Carry out metagenomic analysis of the samples, shortlisting suitable strains / consortia.
- 1.2 (1). Using in vitro techniques, evaluate shortlisted strains / consortia for potential to enhance resilience (as biofertilizers, plant-growth promoters, protection against drought and salinity, etc.).
- 1.3 (1). Establish field test baseline parameters, including local quinoa crop yields (kg/ha).
- 1.3 (2). Carry out field tests of the ten most promising strains / consortia.
- 1.3 (3). Assess results for strains / consortia against established parameters.
- 1.3 (4). Select most suitable strain(s) / consortia for bioproduct development.
- 1.4 (1). Develop bioproduct.

Output 2 [outreach and support programme for natural capital management by traditional altiplano quinoa-growers]

- 2.1 (1). Through village meetings, explain project, and establish priorities for collective infrastructure, local school biodiversity-teaching needs, and a commitment to due care for project-donated equipment.
- 2.2 (1). Through village meetings, elicit Steering Group representatives.
- 2.2 (2). Hold inaugural meeting of Steering Group; establish its objectives, mode of operating (chair, secretary etc.) and meetings timetable.
- 2.2 (3). Ensure effective management of bioproduct development through subsequent meetings.
- 2.3 (1). In addition to already known infrastructural priorities, locate, obtain and deliver as many further collective facilities as possible for

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- quinoa production.
- 2.4 (1). Locate, obtain and deliver biodiversity-teaching resources for local schools and, where invited and compatible with routine visits, contribute to classes on this theme.
- 2.5 (1). Visit each participating village several times to explain bioproduct(s) and train villagers in their use, and reinforce that training.

Output 3 [capacity development for national CBD focus point]

- 3.1 (1). Train researcher in Bolivia to identify sources of information about Bolivian fungi and bacteria, gather records from those sources, then digitize and edit them.
- 3.1 (2). Supervise work of the trained researcher in Bolivia, ensuring quality and compatibility.
- 3.1 (3). Avoiding duplicates, upload Darwin Core data of accumulated records to GBIF with copy to CABI.
- 3.2 (1). Design websites for Bolivia's fungi and bacteria, modelled on existing Cybertruffle websites for other countries and similar to those planned for Darwin Initiative project DIR29S2\1032.
- 3.2 (2). Make digitized records available on-line through the new websites, clearly acknowledging sources.
- 3.3 (1). Finalize specifications for national assessments of Bolivia's fungi and bacteria (currently in draft).
- 3.3 (2). Incorporate the digitized records in the fungal and bacterial assessments.
- 3.3 (3). Incorporate information about ecosystems, and associated organisms, particularly those which are endemic or threatened, presenting the data from the perspective of fungi and bacteria.
- 3.3 (4). Accumulate information about national awareness of fungi and bacteria among administrators and politicians, in education, and in the general public.
- 3.3 (5). Accumulate information about how diversity of these organisms promotes wealth and well-being, and how its loss impacts poverty and gender issues.
- 3.3 (6). Using accumulated information, prepare detailed draft assessments of Bolivia's fungi and bacteria, including proposed plans for their conservation.
- 3.3 (7). Circulate those drafts to suitable colleagues for review and feedback and, based on comments received, prepare final versions.
- 3.3 (8). Present finalized assessments to CBD National Focus Point, and make them available on-line.