



## Darwin Initiative Main: Final Report

To be completed with reference to the “Project Reporting Information Note”:  
(<https://www.darwininitiative.org.uk/resources-for-projects/information-notes-learning-notes-briefing-papers-and-reviews/>).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes.

**Submission Deadline: no later than 3 months after agreed end date.**

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### Darwin Initiative Project Information

Project reference	27-016
Project title	Responsible exchange of plant genetic resources for research and development
Country(ies)	Ethiopia, Uganda
Lead Partner	Botanic Gardens Conservation International (BGCI)
Project partner(s)	Addis Ababa University (Ethiopia) Makerere University (Uganda) University of Vienna (Austria) African Botanic Garden Network European Botanic Gardens Consortium
Darwin Initiative grant value	£326,530.00
Start/end dates of project	1 April 2020 to 31 March 2023
Project Leader name	Dr Paul Smith
Project website/blog/social media	<a href="https://www.bgci.org/our-work/projects-and-case-studies/responsible-exchange-of-plant-genetic-resources-for-research-and-development/">https://www.bgci.org/our-work/projects-and-case-studies/responsible-exchange-of-plant-genetic-resources-for-research-and-development/</a>
Report author(s) and date	Paul Smith, Sebsebe Demissew, James Kalema & Michael Kiehn, 30 June 2023

## 1 Project Summary

Foresters, agronomists and plant conservationists in developing countries are prevented from exchanging plant material because of poor quality collections, incomplete data, poor knowledge of access and benefit sharing, biosafety, CITES and other compliance requirements, and uncertainty about how material is handled and tracked. These constraints – identified through workshops, consultation and questionnaires - have negative impacts on biodiversity conservation and research that supports sustainable development. Under this project, we have developed plant material exchange tools and a compliance certification process that enable researchers and practitioners to access and share plant material and data with international collaborators responsibly and safely, leading to positive impacts on biodiversity conservation and sustainable development, and helping to enhance confidence and trust in the partners involved in plant material exchange. This project focuses on Europe and Africa, but has global relevance.

## 2 Project Partnerships

### *Project partners*

The main project partners are Botanic Gardens Conservation International (UK), Addis Ababa University (Ethiopia), Makerere University (Uganda) and the University of Vienna (Austria). In addition, the European Consortium of Botanic Gardens and the African Botanic Gardens Network have been engaged with the project through BGCI, which provides the secretariat for both of these networks. The partnerships are demand-driven, with a previous Darwin Initiative project ([3319](#)) identifying impediments to the exchange of plant material with African botanical institutions, and European botanical institutions raising concerns about increased bureaucracy associated with EU regulations on biosecurity and the Nagoya Protocol. All partners were involved in the project planning, and all have been actively engaged since the project started in July 2020.

Botanic Gardens Conservation International (BGCI) has led and co-ordinated project activities. It also hosts the plant material exchange tools, and certifications in Access and Benefit-Sharing, biosecurity and CITES compliance. Both the tools and the certifications build on previous platforms and accreditation mechanisms established by BGCI and its extensive network of >800 botanical institutions worldwide.

Addis Ababa University (AAU) appointed a PhD student (Ashenafi Ayenew) to carry out a study on **the exchange of plant material between developed and developing countries, and impediments to such exchange**. The European Consortium provided substantial data on plant material sent out and received over the last 10 years to support Ashenafi's study, and Ashenafi presented his preliminary results during the project consultation [workshop](#) on March 9<sup>th</sup> 2021. Ashenafi also developed a [questionnaire](#), which requested information from botanical institutions on exchange of plant material, which closed on March 15<sup>th</sup> 2021. The study was supervised by Prof. Sebsebe Demissew and Dr Paul Smith. The results of Ashenafi's research have been written up into a paper (see Achievements, below). AAU also hosted the Year 3 training workshop in collections data management and the use of the exchange tools.

Makerere University (MU) appointed a student (Peter Omaswa) to carry out an MSc study on **the importance of the exchange of plant material to plant conservation and sustainable development**. Professors James Kalema and Patrick Mucunguzi supervised Peter's study. In year 2, Peter produced a dissertation on the topic above as part of the requirements for his Masters degree, which has now been awarded (see Achievements, below).

The University of Vienna (UV) worked with BGCI to develop and submit a paper entitled **The Nagoya Protocol and Access and Benefit Sharing Regulations of the Convention on Biological Diversity (CBD) and its Impacts on Botanic Gardens' Collections and Research** to CAB Reviews. (see Achievements, below).

All of the above partners, including the European Consortium of Botanic Gardens and the African Botanic Gardens Network, actively contributed to the development of the main project outputs – the plant material exchange tools and the development and testing of the compliance certifications. In addition, all of the main partners contributed to writing this final report.

The partners will continue their relationships after the project has ended through continued membership of the African Botanic Gardens Network and European Consortium of Botanic Gardens and through continued use of the tools developed through this project. In addition, BGCI is working with AAU and MU on additional projects supported by UK and German overseas development agencies.

### *Other stakeholders*

The main external specialist who has been involved in the project is Keith Damiani, a software developer who was contracted to develop the plant material exchange tools, which are one of the main outputs of this project. In addition, Cambridge University Plant Sciences assisted the project with analysis of >17,000 requests for plant material made through BGCI's PlantSearch

platform over the past 10 years. The University has contributed student time and their expertise in analysing specific uses of material to support plant conservation and sustainable development. In addition, the Ethiopian Biodiversity Institute has contributed time and expertise to developing the certification scheme recognising best practices in ABS, biosecurity and CITES compliance. Finally, the University of Tasmania has developed a Climate Assessment Tool, which has been made available as part of the plant material exchange platform to help ensure that appropriate plant species are exchanged in current and future climate change scenarios.

### Challenges

Project workshops had originally been planned as face to face meetings to be held in Ethiopia and at Eurogard in Budapest in May 2021. However, due to COVID-19 (a Change Request was granted), workshops were held online on Zoom instead, which worked well. Further consultation with project partners and more widely on Outputs 3 and 4 took place face to face at the re-scheduled Eurogard meeting in Budapest during the week of May 16-20<sup>th</sup> 2022. Postponement of COP-15 due to COVID-19 also meant that we had to delay the drafting of ABS compliance guidance until year 3 – particularly due to the disagreements about Digital Sequence Information (DSI) under the Nagoya Protocol.

## 3 Project Achievements

### 3.1 Outputs

All of the project outputs were largely met within the project timeframe or we expect to be achieved shortly. Taking them one by one:

#### **Output 1. Levels of plant material/data exchange between European and African PGR organisations characterized and quantified.**

Indicator 1.1. Baseline survey carried out on extent and nature of plant material exchange between European and African organisations by end of year 1.

Indicator 1.2. At least one peer-reviewed paper published on the value of biodiversity for sustainable development, and impediments to its use by end of year 2

Indicator 1.3. Survey repeated at end of project in year 3.

Peter Omaswa, MSc student at Makerere University in Uganda, was awarded his MSc based on his research and thesis on *The importance of the exchange of plant material to plant conservation and sustainable development* in support of his MSc at Makerere University (**Supporting paper 1**).

Ashenafi Ayenew, a PhD student at Addis Ababa University, published a paper entitled '*Investigating the exchange of plant material between European and African botanical institutions for research and development*' (**Supporting paper 2**), in the peer-reviewed journal *Plants, People, Planet* in support of his PhD studies at Addis Ababa University (Activity 1.2). Ashenafi also developed a [questionnaire](#), which requested information from botanical institutions on the exchange of plant material, and which was used in his research, and the research carried out by Peter Omaswa (see above). Sadly, Ashenafi Ayenew passed away in May 2023 before he could complete his PhD studies.

One peer-reviewed paper entitled '*The Nagoya Protocol and Access and Benefit Sharing regulations of the Convention on Biological Diversity (CBD) and its impacts on botanic gardens' collections and research*' was submitted and published by *CAB Reviews* (**Supporting paper 3**). In addition, BGCI has published another paper pertinent to the importance of botanical collections for sustainable development: Hudson, A., Smith, P., Gori, B. and Sharrock, S. (2021) *Botanic Garden Collections—An Under-Utilised Resource*. *American Journal of Plant Sciences*, **12**, 1436-1444. doi: [10.4236/ajps.2021.129101](https://doi.org/10.4236/ajps.2021.129101) (see **Supporting paper 4**).

The above papers and reports include analysis on the extent and nature of plant material exchange between European and African organisations, identify constraints to material

exchange and assess the potential impacts of the current lack of material exchange on biodiversity conservation and sustainable development. The project was based on the assumption that the exchange of plant material and data between African and European botanical institutions was minimal, and that this would have negative impacts on plant conservation and research supporting human development. This was borne out by the research (see **section 3.3.** below for more details).

## **Output 2: Constraints to germplasm/data exchange identified, and mutually agreed mechanisms for efficient and responsible exchange of plant data and material agreed by African and European PGR institutions**

Indicator 2.1. Consultation workshop held in Ethiopia and attended by at least 5 European and 5 African PGR institutions and policy makers from at least 5 countries with equal male/female representation by the end of year 1.

Indicator 2.2. Specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.

The consultation workshop on developing mechanisms for efficient and responsible exchange of plant data and material (Indicator 2.1) was planned to be a face to face meeting in Addis Ababa, Ethiopia. However, due to COVID-19, the workshop was held on a virtual platform on 9<sup>th</sup> March 2021. It was attended by 66 people, including 32 people from African institutions in 11 countries and 33 people from European institutions in 17 countries. 21 of the participants were female and 45 were male. The workshop was co-led by Keith Damiani (software developer, US). The consultation workshop was recorded, and can be viewed online [here](#). A list of participants is included in the supplementary materials (**Supporting paper 5**).

Specifications for a digital platform were agreed (Indicator 2.2) and a software company engaged by the end of year 1. This was achieved following a total of 14 consultation meetings on the specification of the digital platform held internally in BGCI (13 July; 3 August; 7 September 2020), with botanical institution partners (2, 9 July; 9, 18, 24 September 2020) and with potential developers (28 July; 13, 20, 28 August; 4, 22 September 2020). In addition, a specification outline was written and circulated. A software developer, Keith Damiani, was contracted in November 2020 to deliver the platform. The platform design wireframes were presented at the March 9<sup>th</sup> 2021 consultation workshop, which can be viewed online [here](#).

## **Output 3. Digital platform for efficient and responsible exchange and tracking of plant data and material designed, developed, launched and used by the global research community**

Indicator 3.1. Digital platform for germplasm/data exchange designed by the end of year 1.

Indicator 3.2. Country by country data on ABS, biosafety and CITES compliance gathered by the 2nd quarter of year 2.

Indicator 3.3 Digital platform tested and launched by the end of year 2.

Indicator 3.4. Platform use results in an increase in annual exchange of plant material between African and European institutions of at least 20% against the project baseline by end of project.

As indicated above, the platform design wireframes (Indicator 3.1) were presented at the March 9<sup>h</sup> 2021 consultation workshop, which can be viewed online [here](#).

Activities relating to indicators 3.2 and 3.3 were carried forward to Year 3 under a Change Request following the repeated postponement of COP-15 due to COVID-19, and continued uncertainty about the status of Digital Sequence Information under the Nagoya Protocol. COP-15 finally happened on 7-19<sup>th</sup> December 2022 in Montreal but this had little bearing on the compliance guidance information we have provided (see 4.2, below), which directs users to information resources that are country-specific and continually updated as policy changes are made. In addition, for the exchange of plant material, it is obligatory for the provider of that material to stipulate any compliance requirements associated with the exchange of that material and associated data.

Testing of the digital exchange platform (Indicator 3.3) continued throughout 2021 and into 2022, including through an online consultation workshop held on November 9<sup>th</sup> 2021. A video of this workshop is available [here](#).

The digital material/data exchange platform (Indicator 3.3) was launched publicly in September 2022, and comprises two exchange tools – [Index Seminum](#) and [PlantShare](#). The Index Seminum tool builds on a (largely European) user network established over the past 200 years, and enables the exchange of seeds only. The PlantShare tool is more flexible, enabling exchange of any kind of plant material. Instructional videos are provided for both of these tools (follow the links above), and for both plant material suppliers and recipients. The support of the Darwin Initiative is acknowledged on the landing pages of both of these tools. The exchange platform was promoted at three major meetings in 2022 – Eurogard in Budapest, Hungary (May 16-20<sup>th</sup>), AETFAT/African Botanic Garden Network meeting in Livingstone, Zambia (26<sup>h</sup> June-1<sup>st</sup> July) and the 7<sup>th</sup> Global Botanic Gardens Congress in Melbourne, Australia (September 26-30<sup>th</sup>).

As of the end of March 2023, the figures for use of the Index Seminum tool were as follows:

- Number of catalogues uploaded: 20
- Number of accessions uploaded: 5,668
- Number of organisations uploaded catalogues: 20 (**Supporting paper 8**)
- Number of organisations that requested material: 43 (**Supporting paper 8**)
- Number of accessions exchanged: 118 requested, 94 confirmed as having been fulfilled

Of the 20 institutions that uploaded catalogues, only 2 (10%) were not from Europe (Colombia and Canada). Similarly, only 3 (7%) of the 43 organisations that requested material were not from Europe (South Korea, Canada and the USA). Given the overwhelmingly European tradition of publishing Index Seminum catalogues, the catalogue figures are not surprising. What we expect to change is:

1. Increased accessibility of Index Seminum to non-European institutions through the digital tool
2. Certainty about compliance requirements for exchange of material leading to more confidence amongst recipients (and suppliers) of material.

By the end of March 2023, no users were registered on the PlantShare platform but, again, this is not surprising given that it was only a few months old, and is an entirely new tool. We are confident that with further promotion and time, these two tools will be widely adopted as they are the only such tools available.

#### **Output 4. A mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice ABS and biosafety procedures is developed and launched**

Indicator 4.1. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2

Indicator 4.2. Accreditation scheme developed to assess and accredit organisations adhering to ABS, biosafety and CITES best practice by end of 2nd quarter in year 3, and launched and adopted by at least 20 organisations by the end of the project.

Output 4 is designed to identify and recognise botanical institutions carrying out best practice regarding ABS/biosecurity/CITES compliance, providing assurances to suppliers and recipients of material that the material has been managed responsibly. A draft set of criteria and questions related to ABS/biosecurity/CITES compliance certification (indicators 4.1 and 4.2) were presented to our Ethiopian partners at a consultation workshop held on 20<sup>th</sup> September 2021 (see **Supporting paper 6a**). The draft criteria and questions were modified following this consultation (**Supporting paper 6b**). Ethiopia was selected for this consultation because ABS legislation in Ethiopia is amongst the toughest in the world. As a consequence, the bar was set very high in the draft online certification scheme that was designed as a result of this workshop. Further consultation took place with our European partners at a workshop at the Eurogard meeting in Budapest on May 20<sup>h</sup> 2022. The workshop was attended by 21 people (10 females and 11 males) from 16 botanical organisations. The workshop participants split into groups and

went through the criteria and questions for each of the ABS, biosecurity and CITES certifications, testing them and refining them where further clarity was needed. The certification scheme questionnaires (activity 4.2) were modified accordingly and are now online [here](#). Guidance documentation on [ABS](#), [biosecurity](#) and [CITES](#) (Indicator 3.2) is provided on the landing pages of each certification.

Due to the delays in the project explained above, the certification scheme was launched at the end of the project, and by project end, there had been no applicants for certification. However, with further promotion, we expect the scheme to be adopted widely by the European Consortium in 2023.

### **Output 5 Researchers trained in data management and the use of the digital platform.**

Indicator 5.1. Online training content developed, and webinar training module launched by the second quarter of year 3, and used by at least 50 researchers with equal gender representation by the end of the project.

Indicator 5.2. Face-to-face training in Ethiopia provided to at least 30 African researchers (equal male/female representation) by the end of the 3rd quarter in year 3

Indicator 5.3. Staff from at least 40 institutions using the tool for exchange of material by the end of the project.

Online training videos have been produced for both the plant exchange tools, [PlantShare](#) and [Index Seminum](#), with instructions provided for both providers and recipients of material (Indicator 5.1). In addition, an online training webinar in the use of PlantShare/Index Seminum was held on December 1<sup>st</sup> 2022, and attended by 140 people (45% male; 55% female). The webinar can be watched [here](#). A second meeting was held in Magdeburg on the 3<sup>rd</sup> of March 2023, which was attended by 37 people (73% male; 27% female).

A face to face training workshop (Indicator 5.2) was held from January 23-25, 2023 at the College of Natural and Computational Sciences, Addis Ababa University. Prof. Sebsebe Demissew and his team invited participants from the Region (Makerere University, Uganda and Geed Deeble Botanic Garden, Somaliland) and the rest were from seven Ethiopian botanical institutions that either have or are initiating a botanic garden. A report on the workshop is appended (**Supporting paper 7**), including the list of participants. In total there were 20 African participants from three countries. However, only two of the participants (10%) were female – reflecting the preponderance of male scientists in the region.

As indicated above, staff from 48 institutions in 25 countries had used the Index Seminum material exchange tool by the end of March 2023 (Indicator 5.3 **Supporting paper 8**).

## **3.2 Outcome**

### **Outcome: Improved capacity for biodiversity conservation and sustainable development in developing countries achieved through increased sharing of knowledge, facilities, data and plant material between institutions in the north and south**

Indicator 0.1 Baseline survey carried out on extent and nature of plant material and data exchange between European and African organisations by end of year 1. Survey repeated at end of project.

Indicator 0.2 Consultation workshop held and specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.

Indicator 0.3. Digital platform for germplasm/data exchange and tracking designed, developed and launched by end of year 2 results in increase in exchange of data and material between African and European institutions of at least 20% against the project baseline by end of project.

Indicator 0.4. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2, and scheme developed to assess and accredit organisations adhering to ABS, biosafety and CITES best practice launched and adopted by at least 20 organisations by the end of the project.

Indicator 0.5 Training in data management and use of the tool provided to at least 80 individuals (equal male and female) from at least 50 organisations through webinars and face to face meetings resulting in at least 40 organisations using the tool for exchange of plant material by the end of the project.

The project outcome has not yet been fully achieved but we are confident that the outputs above build a strong foundation on which the outcome will be achieved over time. This project has:

1. Raised awareness of constraints to the exchange of plant material with African institutions and the potential impacts caused by the current lack of exchange of material;
2. Created two innovative, new online tools that streamline and simplify material/data exchange between institutions;
3. Created a basis for assessing the “bona fide” status of organisations intending to be involved in seed and plant material exchange”.
4. Built safeguards into the exchange tools that will help to ensure compliance with ABS, biosecurity and CITES regulations, and ensure *responsible* exchange of material and data, and;
5. Trained >200 users in the principles of responsible collecting, managing and exchanging plant material for conservation and research purposes.

Indicators 0.1 and 0.2 have been fully achieved.

Indicator 0.3 has not been fully achieved yet – largely due to delays caused by COVID-19 (see **Section 8**, below). The digital platform comprising the PlantShare and Index Seminum tools is up and running well but, to date, it has only been used by institutions from Europe, North America, Asia and South America. We fully expect it to be widely used by African institutions with further promotion. Amongst other things, it provides African institutions with additional confidence that the recipients of plant material will comply with ABS legislation, and will track material.

Similarly, the certifications that recognise ABS, biosafety and CITES best practice (Indicator 0.4) have not yet been adopted but they were only launched in the last three months of the project. BGCI will promote them through the African Botanic Garden and European Botanic Garden networks, and we are confident that they will be adopted and widely used because they are designed to independently identify ‘trusted’ institutions that apply best practice compliance procedures.

The online plant material exchange platform and the associated certifications are innovative and ground breaking for the non-crop botanical community. Key features include:

- A firewall and peer review process that ensures that only *bona fide* botanical and forestry conservation and research organisations can access the platform. It is not open to private individuals or commercial entities.
- Institutional accounts for both suppliers and recipients
- Independent certification in ABS, biosecurity or CITES compliance enabling suppliers or recipients to identify ‘trusted’ organisations carrying out best practice in use and tracking of material.
- High standards of provenance data requirements for material suppliers
- Obligatory requirement for suppliers of material to state compliance regulations associated with that material
- The ability for recipients of material to filter and select material from a wide range of attributes
- Feedback mechanisms for recipients to contact suppliers and vice versa
- Additional tools, such as the [Climate Assessment Tool](#), enabling users to select climate-adapted material.
- Compatibility with crop/forestry databases, including GRIN Global.

The online material exchange platform has been available to users for just a few months but has already attracted users from 48 institutions in 25 countries (Indicator 0.5). In addition, ca. 200 people have been trained in data management and use of the tools. This training will continue, and improvements will continue to be made to the platform.

### 3.3 Monitoring of assumptions

The main assumptions on which the project was built were that (a) exchange of plant material and data between European and African botanical institutions was very low, and (b) that this would have a negative impact on plant conservation and human development research.

These assumptions were borne out by the studies carried out by the project partners. The findings of the Ayenew *et al.* study (**supporting paper 2**) are summarised as follows:

- The aim of this study was to assess the extent of plant material exchange between European and African Plant Genetic Resources (PGR) organizations for research and development.
- Data were collected from Index Seminum databases, the BGCI PlantSearch database and through a survey questionnaire. They were statistically analyzed using a chi-square test and Spearman correlation coefficient using SPSS, Version 25.
- The study indicated that the extent of plant material exchange between African and European PGR organizations for research and development is insignificant compared to the exchange between European institutions. Plant material exchange usually included benefit sharing, and the most commonly shared benefits were knowledge transfer, participation in research, access to research results, and joint-authorship of publications.
- Many of the respondents to the questionnaire were not very familiar with ABS (Access and Benefit-Sharing) principles and regulations. The major constraints to plant material exchange were found to be cumbersome bureaucratic procedures, poor knowledge of compliance requirements, lack of national ABS regulations, poor quality of data associated with collections, and lack of tracking mechanisms.
- The low level of plant material exchange between African and European institutions is also most probably due to the perceived mistrust in the use of plant genetic resources by recipient institutions and limited human and technological capacity in African institutions that restrict their involvement in research and development. Therefore, there is a need to build trust and to increase human and technological capacities for research in African institutions to strengthen collaboration by ensuring facilitated exchange and equitable benefit sharing.

The Kiehn *et al.* (2021) and the Hudson *et al.* (2021) studies (**supporting papers 3 and 4**, respectively) indicate the consequences of lack of exchange of plant material. These include poor access to the tens of thousands of plants of conservation concern and/or socio-economic value held in the world's 3000 botanical gardens and arboreta, creating impediments to conservation (and thereby biodiversity) and to fundamental research, and consequently human development.

The risks identified at the beginning of the project were as follows:

- *Assumption 1: University closures/strikes are not in place in Uganda and/or Ethiopia*  
Although the COVID pandemic (see below) delayed some courses or moved them online, both universities remained open, and it was possible to register the students and for them to carry out their (desk-based) research studies.
- *Assumption 2: The political situation in Ethiopia remains stable, and the country is safe to visit.*  
In years 1 and 2, Ethiopia and Uganda were red listed by the UK government due to the COVID pandemic but we were able to adjust to online consultation and meetings. In year 3, the restrictions due to COVID were lifted. In addition, the political situation in Ethiopia has stabilised over recent months with the war in Tigray, and this enabled face to face training to take place in Ethiopia in January 2023.
- *Assumption 3: National legislation or permitting procedures do not prevent the exchange of germplasm between some countries. In some cases, procedures may continue to be prohibitive and/or slow to adapt regardless of project outcomes.*



This remains a risk to the project outcome – particularly the increasing bureaucracy and expense of sharing material. However, it is our intention that if the botanical community can demonstrate best practice with regard to ABS, biosecurity and CITES compliance through the use of these tools, that we can apply for exemption from current government procedures that are primarily designed for commercial nurseries, and thereby streamline material exchange processes for the botanical research community.

- *Assumption 4: Consensus can be reached about how to measure compliance amongst users.* This risk/assumption relates to Output 4 – the certification mechanism – and this risk didn't materialise. Good consensus was reached.

The COVID-19 pandemic was not foreseen, and this caused significant delays to the project (see Section 8, below).

### **3.4 Impact: achievement of positive impact on biodiversity and poverty reduction**

**Impact: Biodiversity conservation and the well-being and livelihoods of poor people in developing countries is improved through increased north-south collaborative research in plant conservation and sustainable development.**

This project has made a significant contribution to understanding the extent and nature of north-south collaborative research on plant genetic resources, and the constraints to such collaboration. Currently, exchange of plant material between institutions in Europe and Africa is minimal, and 92% respondents to the study questionnaire felt that there were major constraints to international exchange of plant material, with 90% of respondents saying this had negative impacts on collaborative scientific research, 83% indicating negative impacts on plant conservation, 48% saying it had negative impacts on higher education opportunities and 43% indicating it had negative impacts on sustainable development.

Based on responses to the questionnaire and consultation workshop discussions, the main reasons for the lack of collaborative research are overly bureaucratic regulations and permitting procedures (83%); poor knowledge of ABS, biosecurity etc. compliance requirements (41%); lack of ABS legislation and permitting systems (33%); poor quality data (30%); lack of tracking mechanisms for shared material (22%) and lack of trust in compliance mechanisms by recipient organisations (20%). This project is designed to address the most important of the issues identified. Specifically:

1. The plant material exchange tools flag ABS compliance requirements, and streamline the plant material/data exchange process.
2. The tools also record whether exchanged material is tracked, increasing confidence amongst providers of material and data that material is being used responsibly for research and not for commercial purposes.
3. The ABS/biosecurity/CITES compliance certifications help to provide assurance to provider organisations that best practice will be followed and it also explicitly recognises benefit-sharing by recipient organisations, including capacity building support.

If increased plant material exchange and collaboration can be achieved, it is a reasonable assumption that this will have a positive impact on biodiversity conservation and research supporting livelihoods. In a study carried out by Cambridge University, analysing ca. 17,000 requests for plant material made through BGCI's PlantSearch database between 2008-2019, research is the top use of material requested (**Supporting paper 9**). Similarly, the results of the questionnaire in **Supporting paper 1** indicate that research, closely followed by conservation are the main purposes for which material is exchanged.

## **4 Contribution to Darwin Initiative Programme Objectives**

### **4.1 Project support to the Conventions or Treaties (e.g. CBD, Nagoya Protocol, ITPGRFA, CITES, Ramsar, CMS, UNFCCC)**

The project has had direct impacts on implementation of the Access and Benefit-Sharing principles of the Nagoya Protocol and on CITES. For the first time, institutions supplying plant material and data must state whether that material is subject to CITES restrictions, ABS regulations or agreements. This includes material originally sourced from third parties. Similarly, country of origin is a required field. Furthermore, the ABS and CITES best practice certifications are designed to identify and recognise organisations that adhere to the provisions of the Nagoya Protocol and CITES, respectively, giving confidence to suppliers of material that that material will be well managed.

**4.2 Project support to poverty reduction**

This project is primarily focused on facilitating north-south collaborative research to support sustainable development and plant conservation. Therefore, impacts on poverty alleviation are likely to be indirect and long term. The research carried out by Cambridge University, based on >17,000 requests for botanic garden material to support collaborative research, education, horticulture and conservation over the past 10 years (**Supporting paper 9**) shows that the majority of material requested is to support research and education. We also know from data showing the levels of actual international exchange of plant material that current exchange between European and African institutions is almost non-existent – despite strong historic links between the two continents (Indicators 1.1 and 2.1). Finally, analysis carried out by BGCI recently, looking at the proportion of socio-economically important plant species in botanic garden/arboretum living collections, suggests that this is higher than that in crop and forestry gene banks (see **Supporting paper 4**).

**Supporting paper 10** is the draft of a BGCI Technical Review that will be published later this year, which looks at the *purpose and trends in exchange of plant material between botanic gardens*. It includes case studies on the value of botanical collections in supporting adaptation research, in particular, Case Study 15, which is reproduced below:

**Case Study 15: Millennium Seed Bank and Crop Trust**

The [Adapting Agriculture to Climate Change Project](#), led by Kew’s Millennium Seed Bank and the Crop Trust set out to improve the diversity, quantity, and accessibility of germplasm collections of Crop Wild Relatives (CWR). Between 2013-2018, partners in 25 countries undertook seed collecting expeditions targeting CWR of 28 crops of global significance for agriculture. A total of 4,587 unique seed samples from at least 355 CWR taxa were collected, conserved *ex situ*, safely duplicated in national and international genebanks, and made available through the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture. A [study](#) commissioned by Kew at the project outset, and carried out by PWC, concluded that the current and potential value of benefits from CWR traits derived from the CWRs targeted by the project was US\$42 billion and US\$120 billion, respectively.

Clearly, if 99% of plant material exchange is between institutions in the north, as Ashenafi and Omaswa’s studies show, then African institutions are missing out on research and education opportunities related to socio-economically important species, and this will negatively impact poverty alleviation.

**4.3 Gender equality and social inclusion**

Please quantify the proportion of women on the Project Board <sup>1</sup> .	43%
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women <sup>2</sup> .	50%

<sup>1</sup> A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

<sup>2</sup> Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

This project was not designed to have direct gender impacts. However, the project has encouraged equal gender participation, and has tracked participation through disaggregated gender data (given above).

While online consultations which primarily involved European researchers showed good gender balance (e.g. the questionnaire, December 1<sup>st</sup> 2022 webinar), women were less well represented in African consultation and training workshops (e.g. Ethiopian ABS consultation workshop 20<sup>th</sup> September 2021 and the Collections Management training workshop January 23-25<sup>th</sup> 2023). This reflects the preponderance of men in scientific positions in Ethiopia and Africa more widely.

#### 4.4 Transfer of knowledge

Transfer of knowledge has taken many forms in this project, for example:

- Identification and sharing of knowledge on constraints to sharing plant material and carrying out applied research;
- Sharing of experiences and concerns related to the exchange, use and tracking of plant material for research, conservation and education;
- Sharing of knowledge on critical collections data fields (e.g. provenance, use, regulations) maximising the utility of that material for scientific research, education and conservation;
- Training on collections and data management (see below);
- Making available a shared material exchange platform that creates the opportunity for organisations in any country to acquire plant material with a few clicks of the mouse;
- Making available a mechanism for suppliers of plant material to recognise trusted organisations that will manage material responsibly and according to the conditions under which it is supplied;
- Additional tools, such as the [Climate Assessment Tool](#), enabling users to select climate-adapted material.
- Coaching and support in writing scientific reports and papers;
- Supervision of a PhD and MSc.
- Three peer reviewed publications highlighting the challenges and opportunities associated with plant material exchange.

#### 4.5 Capacity building

Face to face training was particularly difficult during the Covid pandemic but the project adjusted by switching to online training webinars. Online training videos were produced for both the plant exchange tools, [PlantShare](#) and [Index Seminum](#), with instructions provided for both providers and recipients of material (Indicator 5.1). In addition, an online training webinar in the use of PlantShare/Index Seminum was held on December 1<sup>st</sup> 2022, and attended by 140 people (45% male; 55% female). The webinar can be watched [here](#). A second meeting was held in Magdeburg on the 3<sup>rd</sup> of March 2023, which was attended by 37 people (73% male; 27% female).

A face to face training workshop (Indicator 5.2) took place from January 23-25, 2023 at the College of Natural and Computational Sciences, Addis Ababa University. Prof. Sebsebe Demissew and his team invited participants from the Region (Makerere University, Uganda and Geed Deble botanic Garden, Somaliland) and the rest were from seven Ethiopian botanical institutions that either have or are initiating a botanic garden. A report on the workshop is appended (**Supporting paper 7**), including the list of participants. In total there were 20 African participants from three countries. However, only two of the participants (10%) were female – reflecting the preponderance of male scientists in the region.

The project also supported two post-graduate studies: (1) The PhD study of Ashenafi Ayenew (Addis Ababa University, Ethiopia), and (2) the MSc study of Peter Omaswa (Makerere University, Uganda). Peter Omaswa was awarded his MSc in 2022 but, sadly, Ashenafi Ayenew passed away in May 2023 after a short illness, and was therefore unable to complete his PhD studies. He is lead author on a peer-reviewed scientific paper that has been accepted for publication though (**Supporting paper 2**).

## 5 Monitoring and evaluation

There were no major changes in the project design. The Change Requests made (and granted) were all related to the Covid pandemic, and included university closures, travel restrictions, delayed regional conferences and delays to COP-15.

The plant exchange tool designs, and the ABS/biosecurity/CITES certification methodologies were all subject to third party scrutiny, and input through workshops, webinars and conferences. These tools and methods have been co-created by the international botanical community, not just the project partners. Furthermore, they will continue to evolve and be improved by feedback we receive.

## 6 Actions taken in response to Annual Report reviews

The Annual Report 2 reviewer says: 'Accepting that 'impacts on poverty alleviation are likely to be indirect and long term', it would be interesting if the Final Report could describe the likely pathways to poverty alleviation from successful delivery of the Project Outcome..... These impacts are said to be associated with the missed research and education opportunities relating to the many socio-economically important species found in botanic garden/arboretum living collections and which have seldom, to date, featured in north-south plant material exchanges. This would be a useful area for the project's Final Report to expand upon. E.g., are there examples of plant material from botanic gardens being used in research which has addressed poverty alleviation?'

**Supporting paper 10** is a BGCi Technical Review that highlights case studies related to the use of botanical collection supporting research, including poverty alleviation research. Case Study 15, which relates to the adaptive value of Crop Wild Relative collections is reproduced in Section 4.2, above. The synthesis report on a study carried out by PWC can be found [here](#), and a useful peer-reviewed, published paper on the use of botanical collections from Kew's Millennium seed Bank is [here](#).

## 7 Lessons learnt

As mentioned in last year's report, we have adapted to Zoom/Teams meetings very well, and have probably benefited in some ways from increased participation.

Where COVID has had more of an impact has been in outsourcing pieces of work. For example, it was difficult to find an institution in the European Consortium to carry out a review of ABS/biosecurity/CITES compliance regulations. We put out a call several times but had no takers, probably because most institutions were engaged in crisis management. COP-15 was delayed too, so incorporating principles related to digital sequence information was not possible.

All these elements have been outside our control and due to unique circumstances. They have also not impeded progress in any major way, so we don't think we would design the project differently if we were to do it again.

## 8 Risk Management

No new risks have arisen in the last 12 months. In fact, some risks (e.g. from Covid-19) have diminished, enabling face to face meetings and training.

The risk that 'In some cases, procedures [related to the exchange of plant material] may continue to be prohibitive and/or slow to adapt regardless of project outcomes' remains, and actually the financial and capacity costs associated with exchanging plant material have worsened during the project's lifetime (see **supporting paper 3**). It is our hope and expectation that IF we can achieve wide adoption of the project tools, THEN we can persuade policymakers and regulators that our community exchanges material responsibly AND we can seek exemption from costs and procedures largely designed for commercial exchange of plant material.

## 9 Sustainability and Legacy

Our planned exit strategy is still valid. The main project outputs are:

1. a digital platform for efficient and responsible exchange of plant material and data, and;
2. a mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice ABS and biosafety procedures.

Both of these outputs are stable and sustainable end points. Both will require continued maintenance and upgrading but they build on existing tools and processes, already widely adopted by the botanical community, and both will continue to be maintained by BGCI and its partner institutions as has been the case hitherto. The training component was initially project dependent but BGCI will continue to maintain and improve its web-based training as it already does for its other training modules, and this should help to ensure a steady increase in the number of people trained in data management and exchange of material beyond the project and well into the future. As result of the workshops and the project interactions, stronger links between the research communities in the participating African and European organisations have been established and are likely to trigger future collaborative projects. In addition, the awareness of the legal requirements and regulations related to plant exchange in the the participating organisations was considerably increased (important in light of the fact, that there is a considerable knowledge gap for these processes - see **supporting paper 2**). As mentioned above in section 8, our longer term aim is to seek exemption for the botanical research/conservation community from costs and regulations that are primarily aimed at the commercial exchange of plant material.

## 10 Darwin Initiative identity

The Darwin Initiative is acknowledged as the funder of this project at the top of the project page on BGCI's website, which can be seen [here](#). It is also acknowledged as the sponsor of the plant material exchange tools, [Index Seminum](#) and [PlantShare](#). The project is recognised as distinct, and has generated a lot of interest in the host countries and internationally. BGCI has promoted the project through its website, social media accounts and newsletter, Cultivate, which reaches >13,000 people working in the botanical research community. Furthermore, the Darwin Initiative is acknowledged in the two project-specific peer review publications (**supporting papers 2 and 3**).

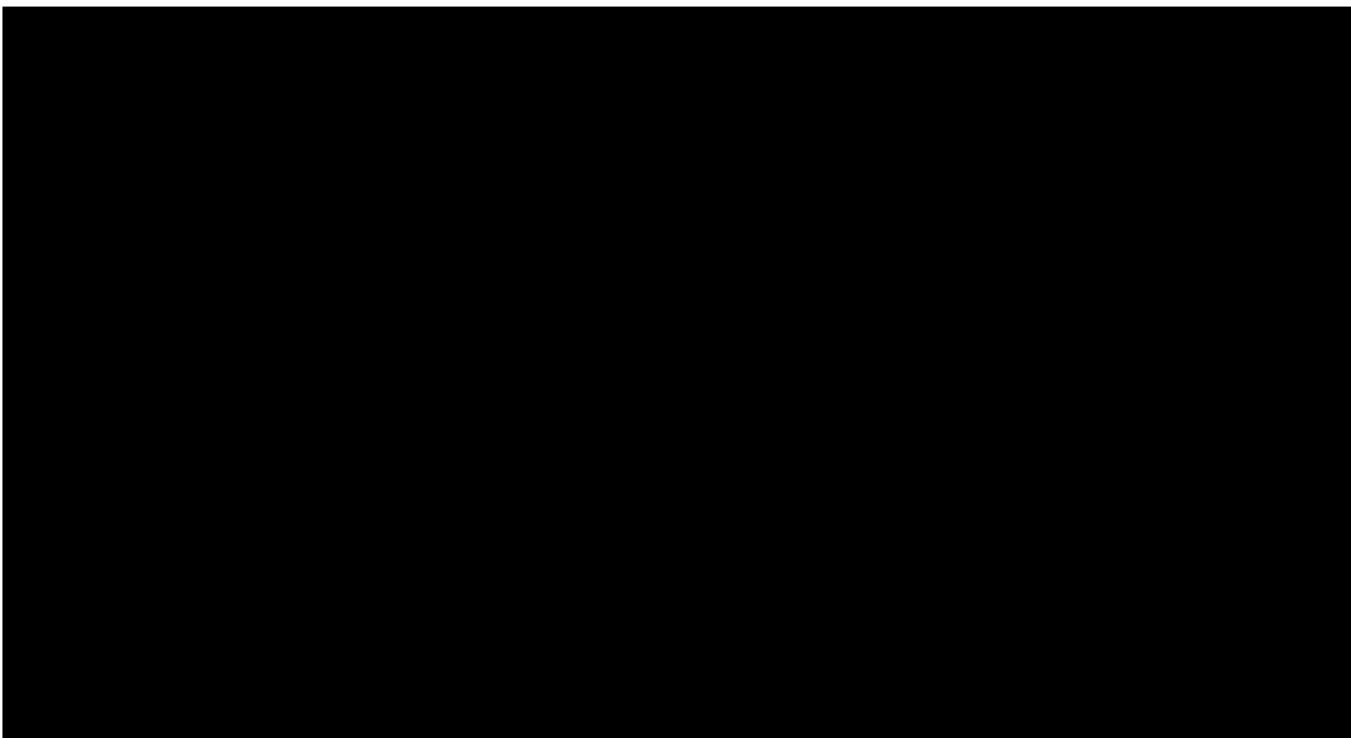
## 11 Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	No
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	Yes. Helen Miller. [REDACTED]
Has the focal point attended any formal training in the last 12 months?	No
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: % [and number] Planned: % [and number]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. No.	

## 12 Finance and administration

## 12.1 Project expenditure

Project spend (indicative) since last Annual Report	2022/23 Grant (£)	2022/23 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
<b>TOTAL</b>	116880	81181	-30%	



<b>Other items – description</b>	<b>Other items – cost (£)</b>
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## 12.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total
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## 12.3 Value for Money

The project has represented excellent value for money. Designing, developing and rolling out two plant material exchange tools available to >3000 botanical and forestry organisations worldwide for less than £ is remarkable. The fact that the two tools will help ensure best practice in compliance with ABS, biosecurity and CITES regulations is good for both people and biodiversity. In addition, this Darwin funding has helped BGCI to leverage further funding from, for example, the University of Cambridge, where a student analysed PlantSearch data (estimated £); the University of Tasmania/RBG Victoria, who developed the Climate Assessment Tool (estimated £) and the US-based federal Institute of Museums and Library Services (US\$) whose grant added functionality to BGCI's botanical collections management toolkit directly relevant to the challenge identified by this project regarding poor collections data. This includes a pedigree tool, enabling the collection and exchange of detailed provenance information, and a propagation protocol database, helping recipients of material to grow it.

## 13

### **OPTIONAL: Outstanding achievements of your project (300-400 words maximum). This section may be used for publicity purposes.**

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section

The online plant material exchange platform and the associated certifications are innovative and ground breaking for the botanical community. Key features include:

- A firewall and peer review process that ensures that only *bona fide* botanical and forestry conservation and research organisations can access the platform. It is not open to private individuals, commercial nurseries etc.
- Institutional accounts for both suppliers and recipients

- Independent certification in ABS, biosecurity or CITES compliance enabling suppliers or recipients to identify 'trusted' organisations carrying out best practice in use and tracking of material.
- High standards of provenance data requirements for material suppliers
- Obligatory requirement for suppliers of material to state compliance regulations associated with that material
- The ability for recipients of material to filter and select material from a wide range of attributes
- Feedback mechanisms for recipients to contact suppliers and vice versa
- Additional tools, such as the [Climate Assessment Tool](#), enabling users to select climate-adapted material.
- Compatibility with crop/forestry databases, including GRIN Global.

The online material exchange platform has been available to users for just a few months but has already attracted users from 48 institutions in 25 countries. In addition, ca. 200 people have been trained in data management and use of the tools. This training will continue, and improvements will continue to be made to the platform.



## Annex 1 Project’s original (or most recently approved) logframe, including indicators, means of verification and assumptions.

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p><b>Impact:</b> Biodiversity conservation and the well-being and livelihoods of poor people in developing countries is improved through increased north-south collaborative research in plant conservation and sustainable development</p>			
<p><b>Outcome:</b> Improved capacity for biodiversity conservation and sustainable development in developing countries achieved through increased sharing of knowledge, facilities, data and plant material between institutions in the north and south</p>	<p>0.1 Consultation workshop held and specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.</p> <p>0.2. Digital platform for germplasm/data exchange and tracking designed, developed and launched by end of year 2 results in increase in exchange of data and material between African and European institutions of at least 20% against the project baseline by end of project.</p> <p>0.3. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2, and scheme developed to assess and accredit organisations adhering to ABS, biosafety and CITES best practice launched and adopted by at least 20 organisations by the end of the project.</p> <p>0.4 Training in data management and use of the tool provided to at least 80 individuals (equal male and female) from at least 50 organisations through webinars and face to face meetings resulting in at least 40 organisations</p>	<p>0.1 Meeting minutes and attendance records; specification document; inputs and agreement from project partners noted in correspondence/meeting minutes</p> <p>0.2. Software developer job specs/contracts; collated ABS/Biosafety data; test site online; written feedback from researchers; digital platform launched online; platform user numbers; plant material exchange records.</p> <p>0.3. Accreditation methodology published in report; inputs and agreement from ECBG and ABGN partners noted in correspondence/ meeting minutes; accreditation scheme online; accreditation application records</p> <p>0.4. Webinar available online; webinar use and completion records and certificates issued; training workshop attendance records; certificates issued; records on exchange of plant material.</p>	<p>University closures/strikes are not in place in Uganda and/or Ethiopia</p> <p>The political situation in Ethiopia remains stable, and the country is safe to visit</p> <p>National legislation or permitting procedures do not prevent the exchange of germplasm between some countries whatever the circumstances.</p> <p>Consensus can be reached about how to measure compliance among users</p>

	using the tool for exchange of plant material by the end of the project.		
<b>Outputs:</b> 1. Levels of plant material/data exchange between European and African PGR organisations characterized and quantified.	1.1. Baseline data and analysis on extent and nature of plant material exchange between European and African organisations completed by the end of year 1  1.2. At least one peer-reviewed paper published on the value of biodiversity for sustainable development, and impediments to its use by end of year 2  1.3. Endline assessment of extent and nature of plant material exchange between European and African organisations completed in year 3.	1.1. Survey report and MSc thesis  1.2. Peer-reviewed scientific paper.  1.3. Survey report; final project report	University closures/strikes in Uganda and/or Ethiopia are not in place (if this happens, there is the possibility of working with different universities or hiring an independent researcher)
2. Constraints to germplasm/data exchange identified and mutually agreed mechanisms for efficient and responsible exchange of plant data and material agreed by African and European PGR institutions	2.1. Consultation workshop held in Ethiopia and attended by at least 5 European and 5 African PGR institutions and policy makers from at least 5 countries by end of year 1.  2.2. Specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.	2.1. Meeting minutes and attendance records.  2.2. Specification document; inputs and agreement from project partners noted in correspondence/meeting minutes.	The political situation in Ethiopia remains stable, and the country is safe to visit (If necessary, the venue can be shifted to Uganda or another neighbouring country)
3. Digital platform for efficient and responsible exchange and tracking of plant data and material designed, developed, launched and used by the global research community	3.1. Digital platform for germplasm/data exchange design completed by the end of year 1.  3.2. Country by country data on ABS, biosafety and CITES compliance available by the 2 <sup>nd</sup> quarter of year 2.  3.3 Digital platform tested and launched by the end of year 2.	3.1. Software developer job specs/contracts; ABS/Biosafety data; test site online; written feedback from researchers.  3.2. Database of ABS, biosafety and CITES compliance requirements assembled  3.3. Digital platform available online  3.4. Plant material exchange records	National legislation or permitting procedures do not prevent the exchange of germplasm between some countries. In some cases, procedures may continue to be prohibitive and/or slow to adapt regardless of project outcomes. However, this will be a minority of countries.

	3.4. Platform use results in an increase in annual exchange of plant material between African and European institutions of at least 20% against the project baseline by end of project		
4. A mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice ABS and biosafety procedures is developed and launched	4.1. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2  4.2. Accreditation scheme to assess and accredit organisations adhering to ABS, biosafety and CITES best practice adopted by at least 20 organisations by the end of the project.	4.1. Accreditation methodology published in report; inputs and agreement from ECBG and ABGN partners noted in correspondence/ meeting minutes  4.2. Accreditation scheme online; application records; accreditations awarded	Consensus can be reached about how to measure compliance amongst users (Many institutions already use BGCI's accreditation schemes and substantial consultation has already taken place)
5. Researchers trained in data management and the use of the digital platform.	5.1. Online training content developed, and webinar training module launched by the second quarter of year 3, and used by at least 50 researchers with equal gender representation by the end of the project.  5.2. Face-to-face training in Ethiopia provided to at least 30 African researchers (equal male/ female representation) by the end of the 3rd quarter in year 3  5.3. Staff from at least 40 institutions using the tool for exchange of material by the end of the project.	5.1. Webinar available online; webinar use and completion records and certificates issued.  5.2. Attendance records; certificates issued.  5.3. Material exchange records	The political situation in Ethiopia remains stable, and the country is safe to visit (If necessary, the venue can be shifted to Uganda or another neighbouring country)
<p><b>Activities</b></p> <p><b>Output 1</b></p> <p>Activity 1.1. Two MSc studies carried out on the extent and nature of plant material exchange for biodiversity conservation and sustainable development (years 1 and 2)</p> <p>Activity 1.2. At least one peer reviewed paper published on the value of biodiversity for sustainable development, and impediments to its use by end of year 2</p> <p>Activity 1.3. Endline survey on extent and nature of plant material exchange repeated by end of year 3</p> <p><b>Output 2</b></p> <p>Activity 2.1. Consultation workshop on constraints to plant material/data exchange and development of digital exchange platform held in Ethiopia by end of year 1</p> <p>Activity 2.2. Specifications for a digital platform agreed and software company engaged by end of year 1</p> <p>Activity 2.2. Software company engaged to develop digital platform by end of 3rd quarter, year 1</p> <p><b>Output 3</b></p>			

Activity 3.1. Digital platform for germplasm/data exchange designed by end of year 1

Activity 3.2. Country by country data on ABS, biosafety and CITES compliance regulations gathered and incorporated into the digital platform by the end of the 2nd quarter year 2

Activity 3.3. Digital platform tested and launched by the end of year 2

Activity 3.4. Digital platform promoted to European and African botanical institutions, and worldwide.

#### **Output 4**

Activity 4.1. Side-meetings held at European Consortium meeting to test digital platform and to discuss accreditation methodology for recognising ABS and biosafety best practice by end of 2nd quarter year 2

Activity 4.2. Accreditation scheme consultation carried out, and scheme agreed by end of year 2

Activity 4.3. Online accreditation scheme developed by end of 2nd quarter year 3

Activity 4.4. Online accreditation scheme tested and launched by end of the project

#### **Output 5**

Activity 5.1. Online training content on data management and use of the digital platform developed and webinar training module launched online by the 2nd quarter of year 3

Activity 5.2. Training workshop on data management and use of the digital platform held in Ethiopia by the end of the 3rd quarter year 3

Project summary	Measurable Indicators	Progress and Achievements
<p><b>Impact:</b></p> <p>Biodiversity conservation and the well-being and livelihoods of poor people in developing countries is improved through increased north-south collaborative research in plant conservation and sustainable development</p>		<p>This project has increased our understanding of the impediments to north-south collaborative research – in particular, related to the exchange of plant material and data, and benefit-sharing. The development of the plant material exchange tools, and the training of researchers in collections data management take us several steps closer towards addressing practical impediments to collaboration. In addition, if we can encourage and mainstream best practice related to ABS, biosecurity and CITES regulations, we have a strong case to seek exemptions from some of the bureaucratic and costly procedures imposed by policymakers. The result will be increased north-south collaborative research and better outcomes for conservation and sustainable development.</p>
<p><b>Outcome</b></p> <p>Improved capacity for biodiversity conservation and sustainable development in developing countries achieved through increased sharing of knowledge, facilities, data and plant material between institutions in the north and south</p>	<p>0.1 Consultation workshop held and specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.</p> <p>0.2. Digital platform for germplasm/data exchange and tracking designed, developed and launched by end of year 2 results in increase in exchange of data and material between African and European institutions of at least 20% against the project baseline by end of project.</p> <p>0.3. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2, and scheme developed to assess and accredit organisations adhering to ABS, biosafety and CITES best practice launched and adopted by at least 20</p>	<p>The project outcome has not yet been fully achieved but we are confident that the outputs <a href="#">below</a> build a strong foundation on which the outcome will be achieved over time. This project has:</p> <ol style="list-style-type: none"> <li>1. Raised awareness of constraints to the exchange of plant material with African institutions and the potential impacts caused by the current lack of exchange of material;</li> <li>2. Created two innovative, new online tools that streamline and simplify material/data exchange between institutions;</li> <li>3. Created a basis for assessing the “bona fide” status of organisations intending to be involved in seed and plant material exchange”.</li> <li>4. Built safeguards into the exchange tools that will help to ensure compliance with ABS, biosecurity and CITES regulations, and ensure <i>responsible</i> exchange of material and data, and;</li> <li>5. Trained &gt;200 users in the principles of responsible collecting, managing and exchanging plant material for conservation and research purposes.</li> </ol> <p>Indicator 0.3 has not been fully achieved. The digital platform comprising the PlantShare and Index Seminum tools is up and running well but, to date, it has only been used by institutions from Europe, North America, Asia and South America. We fully expect it to be widely used by African institutions with further promotion. Amongst other things, it provides African institutions</p>

Project summary	Measurable Indicators	Progress and Achievements
	<p>organisations by the end of the project.</p> <p>0.4 Training in data management and use of the tool provided to at least 80 individuals (equal male and female) from at least 50 organisations through webinars and face to face meetings resulting in at least 40 organisations using the tool for exchange of plant material by the end of the project.</p>	<p>with additional confidence that the recipients of plant material will comply with ABS legislation, and will track material.</p> <p>Similarly, the certifications that recognise ABS, biosafety and CITES best practice (Indicator 0.4) have not yet been adopted but they were only launched in the last three months of the project. BGCI will promote them through the African Botanic Garden and European Botanic Garden networks, and we are confident that they will be adopted and widely used because they are designed to independently identify 'trusted' institutions that apply best practice compliance procedures.</p>
<p><b>Output 1.</b> Levels of plant material/data exchange between European and African PGR organisations characterized and quantified.</p>	<p>1.1. Baseline data and analysis on extent and nature of plant material exchange between European and African organisations completed by the end of year 1</p> <p>1.2. At least one peer-reviewed paper published on the value of biodiversity for sustainable development, and impediments to its use by end of year 2</p> <p>1.3. Endline assessment of extent and nature of plant material exchange between European and African organisations completed in year 3.</p>	<p>Output 1 has been fully achieved. The published papers and reports (<b>supporting papers 1-4 and 10</b>) include analysis on the extent and nature of plant material exchange between European and African organisations, identify constraints to material exchange and assess the potential impacts of the current lack of material exchange on biodiversity conservation and sustainable development.</p> <p>The project was based on the assumption that the exchange of plant material and data between African and European botanical institutions was minimal, and that this would have negative impacts on plant conservation and research supporting human development. This was borne out by the research (see <b>section 3.3.</b> above for more details).</p>
<p>Activity 1.1. Two MSc studies carried out on the extent and nature of plant material exchange for biodiversity conservation and sustainable development (years 1 and 2)</p>		<p>Achieved. Peter Omaswa, MSc student at Makerere University in Uganda, was awarded his MSc based on his research and thesis on <i>The importance of the exchange of plant material to plant conservation and sustainable development</i> in support of his MSc at Makerere University (<b>Supporting paper 1</b>). Ashenafi Ayenew published a paper entitled '<i>Investigating the exchange of plant material between European and African botanical institutions for research and development</i>' (<b>Supporting paper 2</b>), in the</p>

Project summary	Measurable Indicators	Progress and Achievements
		peer-reviewed journal <i>Plants, People, Planet</i> in support of his MSc/PhD at Addis Ababa University (Activity 1.2)
Activity 1.2. At least one peer reviewed paper published on the value of biodiversity for sustainable development, and impediments to its use by end of year 2		Achieved. Three peer-reviewed papers were published on this topic ( <b>supporting papers 2-4</b> )
Activity 1.3. Endline survey on extent and nature of plant material exchange repeated by end of year 3		Achieved. The new Index Seminum and PlantShare tools automatically record transactions and the institutions involved.
<b>Output 2.</b> Constraints to germplasm/data exchange identified and mutually agreed mechanisms for efficient and responsible exchange of plant data and material agreed by African and European PGR institutions	<p>2.1. Consultation workshop held in Ethiopia and attended by at least 5 European and 5 African PGR institutions and policy makers from at least 5 countries by end of year 1.</p> <p>2.2. Specifications for a digital platform enabling responsible exchange and tracking of plant data and germplasm developed by the end of year 1.</p>	<p>Output 2 has been fully achieved.</p> <p>The consultation workshop was held online due to Covid-19, and was attended by 66 people from 32 European and African countries. The consultation workshop was recorded, and can be viewed online <a href="#">here</a>. A list of participants is included in the supplementary materials (<b>Supporting paper 5</b>). Specifications for a digital platform were agreed (Indicator 2.2) and a software company engaged by the end of year 1. This was achieved following a total of 14 consultation meetings on the specification of the digital platform held internally in BGCI, with botanical institution partners and with potential developers.</p>
Activity 2.1. Consultation workshop on constraints to plant material/data exchange and development of digital exchange platform held in Ethiopia by end of year 1		Achieved but the workshop was held online following a Change Request (see above)
Activity 2.2. Specifications for a digital platform agreed and software company engaged by end of year 1		Achieved (see above).
Activity 2.3. Software company engaged to develop digital platform by end of 3rd quarter, year 1		Achieved. Keith Damiani, a specialist software designer, was contracted to develop and build the platform in November 2020.
<b>Output 3.</b> Digital platform for efficient and responsible exchange and tracking of plant data and material designed, developed, launched and used by the global research community	<p>3.1. Digital platform for germplasm/data exchange design completed by the end of year 1.</p> <p>3.2. Country by country data on ABS, biosafety and CITES compliance available by the 2<sup>nd</sup> quarter of year 2.</p>	<p>Output 3 was largely achieved within the project timeframe. As indicated above, the platform design wireframes (Indicator 3.1) were presented at the March 9<sup>th</sup> 2021 consultation workshop, which can be viewed online <a href="#">here</a>. Testing of the digital exchange platform (Indicator 3.3) continued throughout 2021 and into 2022, including through an online consultation workshop held on November 9<sup>h</sup> 2021. A video of this workshop is available <a href="#">here</a>. The digital material/data exchange platform (Indicator 3.3) was launched publicly in September 2022, and comprises two exchange tools – <a href="#">Index Seminum</a> and <a href="#">PlantShare</a>. Activities relating to indicators 3.2 and 3.3 were carried forward</p>

Project summary	Measurable Indicators	Progress and Achievements
	<p>3.3 Digital platform tested and launched by the end of year 2.</p> <p>3.4. Platform use results in an increase in annual exchange of plant material between African and European institutions of at least 20% against the project baseline by end of project</p>	<p>to Year 3 under a Change Request following the repeated postponement of COP-15 due to COVID-19, and continued uncertainty about the status of Digital Sequence Information under the Nagoya Protocol. COP-15 finally happened on 7-19<sup>th</sup> December 2022 in Montreal but this had little bearing on the compliance guidance information we have provided (see 4.2, above), which directs users to information resources on <a href="#">ABS</a>, <a href="#">biosecurity</a> and <a href="#">CITES</a> (Indicator 3.2), and which are associated with the compliance certification applications, which can be found <a href="#">here</a>.</p> <p>In addition, for the exchange of plant material, it is obligatory for the provider of that material to stipulate any compliance requirements associated with the exchange of that material and associated data.</p> <p>Indicator 3.4 has not been met in the project timeframe, with African institutions yet to participate in plant material exchange through the new tools by the end of March 2023. However, with continued promotion through the African Botanic Garden Network, we believe that the tools will be widely adopted by African institutions.</p>
Activity 3.1. Digital platform for germplasm/data exchange designed by end of year 1		Achieved (see above).
Activity 3.2. Country by country data on ABS, biosafety and CITES compliance regulations gathered and incorporated into the digital platform by the end of the 2nd quarter year 2		Achieved by project end (see above)
Activity 3.3. Digital platform tested and launched by the end of year 2		Achieved (see above)
Activity 3.4. Digital platform promoted to European and African botanical institutions, and worldwide.		Achieved. The exchange platform was promoted at three major meetings in 2022 – Eurogard in Budapest, Hungary (May 16-20 <sup>th</sup> ), AETFAT/African Botanic Garden Network meeting in Livingstone, Zambia (26 <sup>th</sup> June-1 <sup>st</sup> July) and the 7 <sup>th</sup> Global Botanic Gardens Congress in Melbourne, Australia (September 26-30 <sup>th</sup> ).
<b>Output 4.</b> A mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice	4.1. Accreditation methodology for recognising ABS, biosafety and CITES best practice agreed by the end of year 2	Output 4 has largely been achieved in the timeframe of the project. The accreditation scheme questionnaires (indicator 4.1) were widely consulted on, agreed, and are online <a href="#">here</a> . Guidance documentation is provided on the landing pages of each certification. The launch of the accreditation



Project summary	Measurable Indicators	Progress and Achievements
ABS and biosafety procedures is developed and launched	4.2. Accreditation scheme to assess and accredit organisations adhering to ABS, biosafety and CITES best practice adopted by at least 20 organisations by the end of the project.	scheme only occurred at the end of the project, and Indicator 4.2 has not yet been met. However, with further promotion, we expect the scheme to be widely adopted by the European Consortium in 2023.
Activity 4.1. Side-meetings held at European Consortium meeting to test digital platform and to discuss accreditation methodology for recognising ABS and biosafety best practice by end of 2nd quarter year 2		Achieved. Consultation took place with our European partners at a workshop at the (delayed) Eurogard meeting in Budapest on May 20 <sup>th</sup> 2022. In addition, a consultation workshop was held in Ethiopia on 20 <sup>th</sup> September 2021 (see <b>Supporting paper 6a</b> ). The draft criteria and questions were modified following this consultation ( <b>Supporting paper 6b</b> ).
Activity 4.2. Accreditation scheme consultation carried out, and scheme agreed by end of year 2		Achieved (see above).
Activity 4.3. Online accreditation scheme developed by end of 2nd quarter year 3		Achieved (see above)
Activity 4.4. Online accreditation scheme tested and launched by end of the project		Achieved (see above)
<b>Output 5.</b> Researchers trained in data management and the use of the digital platform.	<p>5.1. Online training content developed, and webinar training module launched by the second quarter of year 3, and used by at least 50 researchers with equal gender representation by the end of the project.</p> <p>5.2. Face-to-face training in Ethiopia provided to at least 30 African researchers (equal male/ female representation) by the end of the 3rd quarter in year 3</p>	Output 5 was fully achieved with the exception of the gender balance targets. Online training videos have been produced for both the plant exchange tools, <a href="#">PlantShare</a> and <a href="#">Index Seminum</a> , with instructions provided for both providers and recipients of material (Indicator 5.1). In addition, an online training webinar in the use of PlantShare/Index Seminum was held on December 1 <sup>st</sup> 2022, and attended by 140 people (45% male; 55% female). The webinar can be watched <a href="#">here</a> . A face to face training workshop (Indicator 5.2) was planned, and executed from January 23-25, 2023 at the College of Natural and Computational Sciences, Addis Ababa University.. A report on the workshop is appended ( <b>Supporting paper 7</b> ), including the list of participants. In total there were 20 African participants from three countries. However, only two of the participants (10%) were female – reflecting the preponderance of male scientists in the region. As indicated above, staff from 48 institutions in 25 countries had used the Index Seminum material exchange tool by the end of March 2023 (Indicator 5.3 <b>Supporting paper 8</b> ).

Project summary	Measurable Indicators	Progress and Achievements
	5.3. Staff from at least 40 institutions using the tool for exchange of material by the end of the project.	
Activity 5.1. Online training content on data management and use of the digital platform developed and webinar training module launched online by the 2nd quarter of year 3		Achieved (see above).
Activity 5.2. Training workshop on data management and use of the digital platform held in Ethiopia by the end of the 3rd quarter year 3		Achieved (see above).

## Annex 3 Standard Indicators

**Table 1 Project Standard Indicators**

Indicator number	Darwin Initiative Standard Indicator	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-A01	Number of people from key national and local stakeholders completing structured and relevant training		197 people	85 female	0	0	197	197	80
DI-A02	Number of secondments or placements completed by individuals of key local and national stakeholders	1 MSc awarded 1 PhD candidate (deceased)	2 people	0 female	2	2	1	1	2
DI-A03	Number of local/national organisations with improved capability and capacity as a result of project.			Ethiopian and Somali botanical institutions	0	0	9	9	9
DI-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.		197	85 female	0	0	197	197	80
DI-C01	Number of best practice guides and knowledge products			Guidance for: 2 x online material exchange tools	0	0	5	5	5

Indicator number	Darwin Initiative Standard Indicator	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
	published and endorsed			3 x certifications in ABS, biosecurity and CITES compliance					
DI-C05	Number of projects contributing data, insights, and case studies to national Multilateral Environmental Agreements (MEAs) related reporting processes and calls for evidence.	Gathering of evidence on implementation of the Nagoya protocol		2 research projects	2	2	2	2	2
DI-C07	Number of projects contributing biodiversity conservation or poverty reduction evidence to policy/regulation/standards consultations.	ABS, biosecurity and CITES compliance accreditation		ABS, biosecurity and CITES compliance certifications	0	0	3	3	3
DI-C13	Number of webinar attendees		177	85 female	0	0	177	177	177
DI-C18	Number of papers published in peer reviewed journals				0	2	1	3	1
DI-D05	Number of people supported to better adapt to climate			Climate Assessment Tool	0	0	>1000	>1000	-

Indicator number	Darwin Initiative Standard Indicator	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
	change as a result of the project								

**Table 2 Publications**

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
The Nagoya Protocol and Access and Benefit Sharing regulations of the Convention on Biological Diversity (CBD) and its impacts on botanic gardens' collections and research*	Journal	Kiehn et al. 2021	Male	Austrian	CAB International	<a href="https://www.cabidigitallibrary.org/doi/10.1079/PAVSNNR202116034">https://www.cabidigitallibrary.org/doi/10.1079/PAVSNNR202116034</a>
Botanic Garden Collections— An Under-Utilised Resource*	Journal	Hudson et al., 2021	Male	UK	American Journal of Plant Sciences	<a href="https://doi.org/10.4236/ajps.2021.129101">https://doi.org/10.4236/ajps.2021.129101</a>
Investigating the exchange of plant	Journal	Ashenafi et al., 2023	Male	Ethiopian	Plants, People, Planet	<a href="https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10394">https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10394</a>

<b>Title</b>	<b>Type</b> (e.g. journals, manual, CDs)	<b>Detail</b> (authors, year)	<b>Gender of Lead Author</b>	<b>Nationality of Lead Author</b>	<b>Publishers</b> (name, city)	<b>Available from</b> (e.g. weblink or publisher if not available online)
material between European and African botanical institutions for research and Development*						

## Checklist for submission

	Check
<b>Is the report less than 10MB?</b> If so, please email to <a href="mailto:BCF-Reports@niras.com">BCF-Reports@niras.com</a> putting the project number in the Subject line.	Yes
<b>Is your report more than 10MB?</b> If so, please discuss with <a href="mailto:BCF-Reports@niras.com">BCF-Reports@niras.com</a> about the best way to deliver the report, putting the project number in the Subject line.	No
If you are submitting photos for publicity purposes, <b>do these meet the outlined requirements (see section 10)?</b>	N/A
<b>Have you included means of verification?</b> You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
<b>Do you have hard copies of material you need to submit with the report?</b> If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 10)?	N/A
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	