



## Darwin Initiative Annual Report



### Important note:

*to be completed with reference to the Reporting Guidance Notes for Project L  
expected that this report will be about 10 pages in length, excluding annexes*

**Submission deadline 30 April 2009**

### Darwin Project Information

Project Ref Number	<b>16-012</b>
Project Title	Orchid Seed Stores for Sustainable Use
Country(ies)	Ecuador, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Guatemala, <u>Mexico</u> , China, <u>India</u> , Indonesia, the Philippines, Singapore, Thailand and Vietnam.
UK Contract Holder Institution	Royal Botanic Gardens, Kew
Host country Partner Institution(s)	None
Other Partner Institution(s)	Jardin Botánico de Quito, Ecuador; University of Cuenca, Ecuador; Universidad Tecnica Particular de Loja, Ecuador; BIOFAN, Universidad Autonoma Gabriel Rene Moreno (UAGRM), Bolivia; Agronomia Faculdade de Ciências Agrárias Universidade do Oeste Paulista – UNOESTE, Brazil; Banco Base de Semillas, Instituto de Investigaciones Agropecuarias (INIA), Chile; Jardín Botánico Nacional, Viña del Mar, Chile; Fundación Jardín Botánico de Cali, Colombia; Jardin Botanico Lankester, Costa Rica; Orquideario Soroa, University of Pinar del Río, Cuba; Universidad del Valle de Guatemala, Guatemala; <u>Jardín Botánico, Universidad Autónoma de México</u> ; Sichuan Hengduan Mts Bio-technology, Chengdu, China; Kunming Institute of Botany, Yunnan, China; Beijing Botanic Gardens, China; Institute of Botany, the Chinese Academy of Sciences; Hainan University, College of Horticulture, China; <u>Botanic Garden of Indian Republic (BGIR), India</u> ; Bogor Botanic Garden, Indonesia; Purwadadi Botanical Garden, Indonesia; Institute of Plant Breeding, College of Agriculture, the Philippines; Mahidol University, Thailand; Singapore Botanic Gardens, Singapore; Dalat Institute of Biology, Vietnam.
Darwin Grant Value	£ 220049
Start/End dates of Project	1 Oct 2007 to 30 Sept 2010
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 Apr 2008 to 31 Mar 2009 Report No. 2
Project Leader Name	Prof. Hugh W. Pritchard
Project website	<a href="http://osssu.org">http://osssu.org</a>
Author(s) and main contributors, date	Prof. Hugh W. Pritchard and Philip T. Seaton 30 April 2009

## 1. Project Background

The need for a global network of orchid seed storage facilities for sustainable use was raised for the first time more than 20 years ago at the 11<sup>th</sup> World Orchid Conference (1984, Miami). This general need was re-iterated in the Orchids Status Survey and Conservation Action Plan of the IUCN/SSC Orchid Specialist Group (1996), which stated that “seed banking has great potential for orchid conservation because long-term seed storage will allow one to maintain an enormous array of species very economically.” The *Action Plan* also recommends the sustainable use of germplasm through the “propagation of plants where possible from seed, usually in aseptic conditions” and that “orchid societies, establish and support *ex situ* propagation units in countries with high orchid biodiversity.” The Proceedings of the Second International Orchid Conservation Congress (Sarasota, 2004) continued the call for conservation by proclaiming “that, by 2010, 90% of threatened orchids will be in *ex situ* collections” in support of Target 8 of the GSPC. This project aims to help reach that target. Whilst the threat to orchid species through, inter alia, habitat fragmentation and over harvesting is accepted to be of considerable concern, the exact number of orchid species (out of > 20000) that are threatened remains conjecture. This situation will change as in many of the countries with whom we have corresponded, including Ecuador and China, we understand that in-house red-listing of orchids is underway. Importantly, we have through discussion identified countries that cover many of the accepted biodiversity hotspots for orchid species. Indeed, our potential list of collaborating institutes / countries embraces thousands of orchid species. Although in many cases the countries do not have fully functional BAPs, the desire to support positive action on orchid conservation and sustainable use is absolutely clear from the supporting correspondence we have received (see above). In addition to responding to this overdue need for action, numerous other targets of the GSPC and CBD will be supported by this project .

## 2. Project Partnerships

The key host country partners are **Ecuador** and **China**, who are acting as regional, scientific hubs and training sites; they with the other countries\* undertake conservation activities (seed harvesting, storage), laboratory studies (including germination protocol development), maintain conservation collections, develop education programmes and disseminate outputs.

\* (Americas) **Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Guatemala, Mexico**;  
(Asia) **India, Indonesia, the Philippines, Singapore, Thailand, Vietnam**.

The 14 countries shown in bold are those with whom OSSSU has MoUs in place. Discussions are ongoing with Mexico, but there are continuing difficulties with India with respect to securing replies to correspondence.

The UK partners mainly provide technical backstopping, act as the clearing house for orchid seed conservation biotechnology information and manage the project.

## 3. Project progress

### 3.1 Progress in carrying out project activities

The main thrust of the work has been the pollination and capsule harvesting for seed storage from around 121 species (also see comment below) in Year 2. The target for Y2 was 90 species.

The information is held in an Excel database that lists 575 plants. The vast majority of the listing is for plants held within current living collections of the collaborating institutes. The exception is Chile, where seeds (of a small number of species) are being harvested from the wild under a legally-binding fieldwork agreement within the Millennium Seed Bank Project of the Royal Botanic Gardens Kew.

The database is starting to yield some valuable comparative information. We now know (from the first 18 months of OSSSU) that of the available material, 208 species have been pollinated and capsules harvested from 177 species. In other words 85% of species pollinated have set capsules. The cumulative number of species 'reported' by collaborators for Years 1-2 work is listed in Annex 3 as being 166. This 6% variance with the information in the database requires further checking, and may relate to issues of synonymy or double listing. The worst case scenario from this evidence appears to be that the 18 month species target of 40 + 90 species (130 sp) has been exceeded by at least 36 species. In reality though, the number of species worked on is higher as we are awaiting confirmation of the species numbers from the Philippines, Costa Rica and Vietnam.

The database is also revealing valuable data on capsule maturation times and germination. Representative data is shown in Annex 3. Capsule maturation times across 15 species varied from 6 (*Bromheadia finlaysonianum*) to 48 weeks (*Cattleya quadricolor*, Colombia; *Rhynchostylis gigantea*, Thailand ).

Similarly, germination on the best medium for 26 species in Indonesia varied from < 10% (*Phalaenopsis amboinensis*) to 100 % (*Rhynchostylis retusa*, *Vandopsis lissochiloides*). It is worthy of note however, that 19 of these 26 species had germination values of 70% or better. Collaborators are also sowing seeds for *in vitro* germination on more than one medium so that comparisons can be made on the efficacy of a traditional medium from the 1940s to modern equivalents.

Some of the differences in germination for the Indonesian species were observed in the storage experiments, which has extended to 9 months for 6 species and 6 months for 6 more species (see Annex 3). Given the sometimes lengthy capsule maturation time post-pollination, this is excellent progress in the first 18 months of this project.

### 3.2 Progress towards project outputs

Basically on schedule. See tabulated data and comments below in reply to the evaluators' comments to the Y1 report.

### 3.3 Standard Measures

**Table 1 Project Standard Output Measures**

Code No.	Description (Text refers to Y2 only)	Year 1	Y 2	Y 3	Y4	Total to date	Total planned from application
4B & 8 Training delivery	<p><b>Brazil</b> = 6 undergraduate students</p> <p><b>China</b> = 1 student (CHEN Aihua) from the Agricultural University of Yunnan</p> <p><b>Colombia</b> = Phil Seaton delivered public lecture to the Cauca Valley Orchid Association; Vicente Perdomo and Jorge Orjuela lectured at Cali BG;</p> <p><b>Cuba</b> = presentation to municipal event for 'Brigadas Tecnicas Juveniles'</p> <p><b>Thailand</b> = 13<sup>th</sup> orchid training to 8 people</p> <p><b>Indonesia</b> = 5 students and 1 staff member</p>	<p><b>35 x 5d</b></p> <p><b>= 175 pd</b></p> <p><b>+</b></p> <p><b>6 pd</b></p> <p><b>+</b></p> <p><b>?</b></p> <p><b>?</b></p> <p><b>?</b></p> <p><b>14 pd</b></p>	<p>6 x 1 d = 6 pd</p> <p>1 x 5 d = 5 pd</p> <p>??</p> <p>??</p> <p>8 x 2 d = 16 pd</p> <p>??</p>			<p><b>79 staff / students and 222 pd</b></p>	<p>32 technicians trained for 5 days, i.e. 160 person days (pd). <b>(exceeded by 39% on pd basis)</b></p>
8	Phil Seaton 2 weeks in country (Mexico, Brazil, Colombia, Ecuador) plus Pritchard 3 d in China at main partners and associates	<b>3 wks</b>	<b>2 wks</b>			<b>&gt; 5 wks</b>	2 weeks <b>(exceeded by 150%)</b>
7	Book on 'Copies of Growing Orchids from Seed' given to each participating institution.	<b>1</b>	<b>0</b>			<b>1</b>	1 in English

Code No.	Description (Text refers to Y2 only)	Year 1	Y 2	Y 3	Y4	Total to date	Total planned from application
	Books translated into Spanish and Chinese in Year 1. Spanish book at printers and paid for. Negotiating printing of Chinese version in-country; could be an e-book.  Protocols (guidelines) developed in Y1 distributed to new 'associate' members in Year 2.	1	0			1	(achieved), Spanish and Chinese (progress still being made)  1 (achieved and also being sent to associates)
<b>14B</b>	<b>Thailand</b> = Kanchit Thammasiri gave talk to 70 persons at 8 <sup>th</sup> Orchid Festival, Chantraburi Province. <b>China</b> = Hugh Pritchard gave 3 lectures 100 staff / students at Kunming Institute of Botany, Kadoorie Farm & BG (Hong Kong) and the Institute of Botany (Beijing) promoting OSSSU <b>Ecuador</b> = Phil Seaton gave invited lecture on orchid conservation and OSSSU at the Quito International Orchid Show (Feb 09) <b>UK</b> = Phil Seaton addressed the British Orchid Council meeting (2008)	5	6			5	0 (exceeded)
<b>15 A, B Press Releases</b>	El Telegrafo. Ecuador; O Imparcial. Brazil; Oeste Noticias. Brazil Winston Churchill Memorial Trust Webpage	6	4			10	16 local press releases 16 national press releases <b>(31 % of target)</b>
<b>15 C, Press Releases</b>	The Straits Times. Malaysia (on Singapore collaboration)	5	1			6	1 international press release; 2 'notices' in international journals <b>(exceeded by 100%)</b>
<b>18A</b>	Cuba = OSSSU mentioned in national television programme	2	1			3	0 (exceeded)
<b>19 Local Radio interviews</b>	Cuba = OSSSU mentioned in radio programme	1	1			2	1 interview with local radio (2, but overseas)
<b>20</b>	See details in Appendix 3	0	14			14	16 (all 14 countries with MoUs now have dedicated freezers )
New -Project specific measures							

**Table 2 Publications**

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Orchids (journal article)	Life in the Freezer: Orchid seed banking for the future. Philip T. Seaton and Hugh W. Pritchard. October 2008, pp 762-773	The American Orchid Society)	<a href="http://www.aos.org/AM/Template.cfm?Section=join">http://www.aos.org/AM/Template.cfm?Section=join</a> American Orchid Society 16700 AOS Lane Delray Beach, FL 33446-4351	\$60-72 per annum for membership of the AoS ensures delivery of the magazine
Orchids (journal article)	Visiting Papallacta Ecuador. Making a field trip to high elevations in South America. Philip T. Seaton. November 2008, pp 862-4	The American Orchid Society)	<a href="http://www.aos.org/AM/Template.cfm?Section=join">http://www.aos.org/AM/Template.cfm?Section=join</a> American Orchid Society 16700 AOS Lane Delray Beach, FL 33446-4351	\$60-72 per annum for membership of the AoS ensures delivery of the magazine
Orchids (journal article)	Field trip to Huanglong, China. Philip T. Seaton and Holger Perner. Nov 2008, 3 pp. <a href="http://www.aos.org/AM/Template.cfm?Section=Search&amp;template=/CM/HTMLDisplay">Aos.org/AM/Template.cfm?Section=Search&amp;template=/CM/HTMLDisplay</a>	The American Orchid Society)	<a href="http://www.aos.org/AM/Template.cfm?Section=join">http://www.aos.org/AM/Template.cfm?Section=join</a> American Orchid Society 16700 AOS Lane Delray Beach, FL 33446-4351	\$60-72 per annum for membership of the AoS ensures delivery of the magazine
El Telegrafo (Newspaper)	Jardin Botanico rescata orquideas. La reproduccion in vitro es la alternativa para mantener la existencia de especies endemicas. Maria Augusta Sandoval. P18 Sociedad.	El Telegrafo. Ecuador	<a href="http://www.telegrafo.com.ec">http://www.telegrafo.com.ec</a>	Daily rate
O Imparcial (Newspaper article)	Britanico busca parceria com universidade para conservacao de sementes de orquideas. 15 August 2008. Front page picture of Philip Seaton and article on Page 4 ( Professor britanico busca parcerias em PP).	O Imparcial. Brazil	<a href="http://www.oimparcial.com.br/">http://www.oimparcial.com.br/</a>	Daily rate
Oeste Noticias. (Newspaper article)	Projeto Darwin Initiative plus image of 'A reitoria de Unoeste recebe o britanico Philip Seaton'. 15 August 2008	Oeste Noticias. Brazil	<a href="http://www.oestenoticias.com.br/">http://www.oestenoticias.com.br/</a>	Daily rate
The Straits Times (Newspaper article)	Singapore Botanic Garden Develops Seed Bank. Interview with Dr Chin See Chung (Director of Singapore Botanic Gardens) by Neil Chatterjee. April 20, 2009.	The Straits Times. Malaysia	<a href="http://www.straitstimes.com/">http://www.straitstimes.com/</a>	
Webpage report	Fellows Today. Philip Seaton. 17 March 2009.	Winston Churchill Memorial Trust	Winston Churchill Memorial Trust. 15 Queens Gate Terrace, London SW7 5PR. <a href="mailto:Office@wcmt.org.uk">Office@wcmt.org.uk</a>	free

### **3.4 Progress towards the project purpose and outcomes**

Please refer to table

### **3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits**

Longer-term conservation goals across the network are being strongly encouraged, with active promotion of OSSSU through 6 lectures to > 200 people at conferences in China, Thailand, Ecuador and the UK. Moreover, cascade training has continued; reaching 20 staff / students in 6 countries (Brazil, China, Colombia, Cuba, Thailand, Indonesia) during the report period. As a result, both the legacy of and interest in OSSSU have been enhanced. This year, associates have joined OSSSU from China, Estonia, Canada, USA and Peru. In this context, there are now 18 countries involved in OSSSU. The management team (Seaton and Pritchard), in particular, is tremendously heartened by this progress.

In terms of the biodiversity / conservation objectives of the project, it is clear that a substantial part of the taxonomic diversity in the family is being worked on by collaborators; the species having been chosen by the specific country institutes in relation to conservation need. This approach has been warmly welcomed by the government officials that the management team have met, including in Ecuador (Seaton) and at the Ecuadorian Embassy in London (Pritchard's meeting with the Commercial Section). The latter meeting resulted in a request from the Government to inform collaborators about the interenational orchid meeting to be held in Quito in February 2009. This the Management Team did, as well as circulating leaflets provided by the embassy to about 10 regional members of the British Orchid Council. In addition, OSSSU was promoted when representatives of the Brazilian embassy visited Wakehurst Place on 4 June 2008 - Carlos Pacha (First Secretary) and Ruy Pachero de Azevedo Amaral (Minister Counsellor).

Overall, the collecting of seeds from another > 100 orchid species this year is a valuable contribution towards the conservation of biodiversity, individual country programmes for conservation are being supported, in vitro propagation protocols are being resolved for all species, all of which support the sustainable use of seed material. The project has also contributed to other objectives of the CBD including international co-operation in conservation research and through building human capacity for orchid conservation.

## **4. Monitoring, evaluation and lessons**

The six-monthly progress report was distributed to the Advisory Team. No specific issues were raised as a result and consequently the Team has not had a formal meeting during 2008-09. The external advisor has been kept informed of progress as Prof Hutchings sits on the Orchid Conservation International Board of Trustees with Phil Seaton and on the Kew-University of Sussex Inter-institutional Steering Group with Prof Pritchard.

The main lesson from this year, in many ways as in Year 1, is the need to maintain regular email and phone conversations with the collaborators. This Phil Seaton does diligently and expertly, helped of course by his command of Spanish. Even so, some countries still failed to report on time. Whilst this can be frustrating, OSSSU has tremendous impetus. We intend to add more technical resources (e.g. articles) to the web site in Year 3 and to explore the introduction of a password-protected area so that collaborators can see collated data that has been generated by OSSSU but has not been published. This we believe will encourage an even higher level of engagement by all collaborators.

## 5. Actions taken in response to previous reviews (if applicable)

The evaluator of the Year 1 report drew our attention to undertake some specific actions, which are listed here with our responses.

***'It is vital that the remaining MoUs are signed early in Year 2 along with the development of the project website'***. Six countries have signed a MoU in Year 2, bringing the total number of countries participating fully in OSSSU to 14, two short of the target. After much negotiation, and the addition of an Annex to the Agreement, the Ecuadorian Government eventually signed to much fanfare at the Orchid Congress in Quito. The situation with India, never really got started, with a failure this year to secure any clear position in writing with our potential collaborators. This country is now not a target for collaboration. Mexico does however remain a target, even if they join as an 'associate'. The associate category of membership entails a commitment to work for the broad conservation target of OSSSU for which institutes receive the protocols and a seed storage pack (about £100 worth of bottles and vials, plus indicator sachets of silica gel). To date, the following institutes have signed up: Xishuangbanna Tropical Botanic Gardens, China; Estonian University of Life Sciences, **Estonia**; Universidade Federal do Paraná, Brazil; Jardin Botanique de Montréal, **Canada**; Kadoorie Farm & Botanic Garden, Hong Kong, China; Club Peruano de Orquídeas, **Peru**; Smithsonian Institute of Natural History, **USA**. Apart from strengthening collaborations in Brazil and China, four new countries are 'associated' with OSSSU, bringing the number of countries involved to 18. The Dominican Republic is also interested in association. As a result of this flexible approach, 22 institutes are associated with OSSSU. We still hope to involve the Universidad Nacional Autonoma de Mexico (UNAM), **Mexico** in the project. However, in Year 3 we will start to build the network in **Africa**, leading into the staging of the final workshop there in Year 4 (April – Sept 2010) and in anticipation of network expansion after this phase of the Darwin Initiative OSSSU Project. The website ([www.ossu.org](http://www.ossu.org)) has been live for many months, although in a skeletal form as it has been extraordinarily difficult to extract content from collaborators. We have resorted to lifting information from the respective institute web sites. Collaborators have been more forthcoming with images and the website certainly has an attractive feel. With about 200 species already worked on, and germination / storage data starting to appear in the collaborators reports, it will be possible in Year 3 to enhance the web site significantly.

Front page (below) and Countries page (right) of the OSSSU web site



***'It is important that the database is developed early in Year 2'***. The participants in the two training workshops at the inception of the project stated a preference for the database to be in Microsoft Excel. This database has the following fields: country / institute; species name; species identification number / code; Redlisting; pollination date; pod parent; pollen parent; number of capsule; date of capsule harvest; number of seeds per capsule; number of seed lots stored; germination % before storage; date of germination sowing; medium for germination; viability % by tetrazolium staining; date seed entered and was removed from storage; images of plants and seeds. As yet, the data is not complete for all species; but collaborators are starting to provide data on a much more regular basis.

The database has 575 plants listed. The vast majority of the listing is for plants held within current living collections of the collaborating institutes. Of the available material, 208 species have been pollinated and capsules harvested from 177 species to date. With 56 species worked on in Y1, this represents 121 species in Y2, compared to a target of 90 species.

## **6. Other comments on progress not covered elsewhere**

None

## **7. Sustainability**

Please see comments above concerning cascade training and country involvement.

From the information in Annex 3, it is clear that many institutes are supporting OSSSU by donating equipment to the conservation cause. Such support at home bodes well for the longer-term sustainability of orchid seed banking in each country. The Management Team's next objective is to use the progress to date to encourage countries / institutes to be more active in Year 3 in applying for additional funding for their work.

## **8. Dissemination**

See tabulated data



## 9. Project Expenditure

**Table 3 Project expenditure during the reporting period (Defra Financial Year 1 April 2008 to 31 March 2009)**

Item	Budget (please indicate which document you refer to if other than your project application or annual grant offer letter)	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment (specify)			
Others (specify)			
Salaries (specify by individual) Phil Seaton Tim Marks Margaret Ramsey Steve Alton Subtotal			
TOTAL			

### Comments on variances:

There were three significant variances related to business overseas. We continued to have some problems transferring monies to some countries, as indeed we had in Year 1, amounting to just over 10% of the allocated budget (**budget line = Others – overseas laboratory costs**). At the same time we strived to secure the signature of Ecuadorian Government, which was critical to the project as Ecuador is the scientific hub for the Latin America countries in OSSSU. Following negotiation with the Embassy in London, Phil Seaton was dispatched to a formal signing of the agreement in Quito in Feb 2009. This resulted in additional international travel and a workload for Phil Seaton far in excess of his contract hours. Consequently, overtime payments were made, which increased the **overhead costs**, and international **travel costs** also increased above budget.

The other item at variance was **Office costs (eg postage, telephone, stationery)** which increased as a result of Information Services at the Royal Botanic Gardens Kew agreeing to typeset the Spanish version of ' Growing Orchids from Seeds.' The book will be ready for dispatch to collaborators early in Year 3 [NB They already have an English version of the book, as it was provided at the time of the workshop in Ecuador (Nov 2007)].

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

## Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2008/09

Project summary	Measurable Indicators	Progress and Achievements April 2008 - March 2009	Actions required/planned for next period
<p><b>Goal:</b> <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p>			<p><i>(do not fill not applicable)</i></p>
<p><b>Purpose</b></p>	<p>To create an orchid seed bank network across 16 countries to: (1) conserve, as seed, 250 species from diverse habitats of varying levels of endangerment; and (2) develop protocols for the production of in vitro plants in support of the sustainable use of threatened species.</p>	<p>In Year 2, six countries have signed agreements. Four more have become 'associates', bringing the total country involvement to 18.</p>	<p>We will try no further to engage India in this phase of OSSSU unless they request to join. We will continue to explore 'associate' status with Mexico. We will also engage with a limited number of countries in Africa in Year 3 as a prelude to a decision on where to hold the final workshop in 2010.</p>
<p><b>Output 1.</b></p>	<p>Improved 'in-country' facilities for seed storage and in vitro germination;</p>	<p>In Y2 we continued to distribute storage vials and silica gel packets, including to associates. Equipment has been purchased as required and all laboratories are fully functioning, except Cuba where there have been bureaucratic problems in accessing the money OSSSU sent and a hurricane also caused damage to the laboratory. However, we remain committed to helping Cuba contribute to OSSSU.</p>	

<b>Output 2.</b>	Trained staff in orchid conservation biotechnology	In Y2 there was no specific target for staff training, but cascade training was delivered in 6 countries to about 20 people. We will encourage the same basic approach in Y3.
<b>Output 3.</b>	Data and germination protocols, and storage information;	Species work was conducted on c 120 species in Y2, in excess of the target. The Management Team are conscious of the difficulty in securing new orchid seed collections based on the pollination of existing collections because of the long capsule maturation times for some species. Accordingly, we will ask early in Y3 for the species target list per country so that we can monitor progress accurately. In Y2 collaborators certainly did not submit all their germination data to the Management Team and we will strive to get a greater consistency in reporting in Y3. This will enhance the value and use of the Excel database (spreadsheet).
<b>Output 4.</b>	Training materials in Spanish, Chinese and English	In Y2 there was a frustrating delay in the publishing of the Spanish language version of 'Growing orchids from seeds', but it is now at the printers. We are negotiating for the Chinese language version to be published in-country or to appear as an e-book. Accordingly, in Y3 we will have an active programme of distributing the Spanish and Chinese versions of 'Growing orchids from seeds,' within budgetary constraints.
<b>Output 5.</b>	Distributed, searchable electronic database	In Y2 the spreadsheet was designed and includes 17 main information fields (columns; see comment earlier in report). Data has not been submitted for all fields, but the data base has 575 rows for the collections / species that collaborators are working with. The spreadsheet was not distributed in Y2 and we believe that it may be best to produce summary tables of information for uploading into a secure area of the web site in Y3, rather than distribute the whole dataset. This will also allow us to ask collaborators to confirm the information in the summary tables before wider viewing, i.e. enable verification of data accuracy.
<b>Output 6.</b>	Advisory replies to enquiries	Phil Seaton has been fielding a considerable number of email requests for information in Y2. This will continue in Y3.
<b>Output 7.</b>	Conservation collections of seeds / in vitro plants created / strengthened	Although the target for seed collections in Y2 was quite challenging, it was exceeded (see comments above). The same 90 species target is in place for Y3. We received very little data on in vitro germinants contributing to ex situ collections. However, Ecuador (Quito) noted 8 species had been replicated in vitro in 4 – 50 flasks each. In Y3 we will endeavour to collect more of this data, as the amount of older material from germination tests suitable for onward growth will increase.
<b>Output 8.</b>	Public talks (in-country) on integrated conservation strategies and procedures	Collaborators and the Management Team gave numerous public talks in Y2, delivered to about 200 people at conferences and during site visits in 4 countries. We will encourage the same basic approach in Y3.

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## Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p><b>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve: (1) the conservation of biological diversity (2) the sustainable use of its components, and (3) the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</b></p>			
<p><b>Purpose</b> To create an orchid seed bank network across 16 countries to: (1) conserve, as seed, 250 species from diverse habitats of varying levels of endangerment; and (2) develop protocols for the production of in vitro plants in support of the sustainable use of threatened species.</p>	<p>Number of countries actively contributing to the science and sharing information Number of countries wishing to join network (Eol)</p>	<p>DI annual reports, Bulletin Board traffic, etc.  Correspondence</p>	<p>No breakdown in communication and trust between UK lead and the collaborating institutes leading to cancellation of MoUs. No institutional realignment</p>
<p><b>Outputs</b> <b>Improved 'in-country' facilities for seed storage and in vitro germination;</b> Trained staff in orchid conservation biotechnology <b>Data and germination protocols, and storage information;</b> Training materials in Spanish, Chinese and English <b>Distributed, searchable electronic database</b> Advisory replies to enquiries <b>Conservation collections of seeds / in vitro plants created / strengthened</b> Public talks (in-country) on integrated conservation strategies and procedures</p>	<p><b>16 countries</b> &gt; 32 trainees (plus cascade to many more) <b>250 species</b> 1 set of guidelines on orchid seed conservation <b>1 created</b> Response to enquiries within 30 days of receipt <b>1 multispecies collection per institute</b> At least 1 per year per institute</p>	<p><b>Institutional annual reports</b> Attendance lists and workshops reports <b>Publications and web uploads</b> Refer to OSG site <b>Accessible in all 16 countries</b> Correspondence <b>Collections databases held locally</b> Posters / web site notices and head count record</p>	<p><b>Impact of altered institutional budgets tolerable</b> Loss of trained staff from institutes minimal <b>Species germination is not intractable</b> Cost of any translation needs not increase prohibitively <b>Interoperability between countries / software</b> Filing is efficiently performed <b>Created collections maintained adequately / continuity of care</b> Publicity reaches the target audience</p>

<p><b>Activities</b>  Equipment purchase  <b>Information consolidation and distribution</b>  Species seed collected and conserved, database created  <b>Produce in vitro plants via germination.</b>  Organise and run two training courses, write and distribute training materials;  <b>Education programme established</b></p>	<p><b>Activity Milestones</b>  <b>Y1:</b> Sign MoUs (12/07); two training workshops (10-11/07); purchase equipment (10/07 – 3/08); initiate lab work (11/07); collect, clean, store and sow c. 40 orchid species (all year); establish and operate clearing house(CH) , and web site (3/08); design data base (3/08); public lectures (all year). <b>Y2</b> (all year): Collect, clean, store and sow c. 90 orchid species; update database &amp; operate CH; publications and lectures. <b>Y3:</b> Collect, clean, store and sow c. 90 orchid species; update database &amp; operate CH; publications and lectures (all year); <b>Y4:</b> (all year): Collect, clean, store and sow c. 20 orchid species; update database &amp; operate CH; publications and lectures; hold final workshop; issue final guidelines</p>	<p><b>Assumptions</b>  <b>Export of major items from UK avoided;</b>  Kew access to databasing and other e-literature maintained and systems compatibility globally;  <b>Easy access to (targeted) species / plants / seeds continues;</b>  Power supply remains regular and infrastructure intact;  <b>Sufficient staff of appropriate calibre identified and available for the courses.</b>  Fits institutional priorities / timelines</p>
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## Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

This may include outputs of the project, but need not necessarily include all project documentation. For example, the abstract of a conference would be adequate, as would be a summary of a thesis rather than the full document. If we feel that reviewing the full document would be useful, we will contact you again to ask for it to be submitted.

### Summary of species worked on by the 14 collaborating countries (2007-09; i.e. 18 months)

Country	Number of species studied	Key genera
Bolivia	20	<i>Brassia, Cattleya, Coryanthes, Encyclia, Epidendrum, Isochilus, Macradenia, Maxillaria, Pleurothallis, Poneria, Trichoceros, Trichopilia, Pleurothallis, Prosthechea, Xylobium</i>
Brazil	25	<i>Catasetum, Cattleya, Miltonia, Phragmipedium</i>
Chile	13	<i>Bipinnula, Chloraea, Gavilea</i>
China	2	<i>Cypripedium, Paphiopedilum,</i>
Colombia	20	<i>Anguloa, Catasetum, Cattleya, Epidendrum, Lycaste, Miltonopsis, Oncidium, Schomburgia</i>
<b>Costa Rica</b>	<b>??</b>	<b>Late submission of report</b>
Cuba	16	<i>Bletilla, Broughtonia, Cranichis, Cyclopogon, Encyclia, Habenaria, Isochilus, Maxillaria, Oncidium, Pleurothallis, Sacoila, Tolumnia, Tropicdia</i>
Ecuador	3	<i>Cauceae, Cyrtochillum, Odontoglossum,</i>
Guatemala	11	<i>Coelia, Epidendrum, Leochilus, Lycaste, Prosthechea, Trichophilia,</i>
Indonesia	26	<i>Aerides, Arundina, Bulbohyllum, Coelogyne, Cymbidium, Dendrobium, Geodorum, Grammatophyllum, Paraphalaenopsis, Phaius, Phalaenopsis, Rhyncostylis, Spathoglottis, Vanda, Vandopsis</i>
<b>Philippines</b>	<b>??</b>	<b>Late submission of report</b>
Singapore	10	<i>Bromheadia, Dendrobium, Kingidium</i>
Thailand	20	<i>Arundina, Ascocentrum, Dendrobium, Eria, Phaius, Rhynchostylis, Vanda.</i>
<b>Vietnam</b>	<b>??</b>	<b>Late submission of report</b>
<b>Total number of species</b>	<b>166</b>	

Equipment purchased, as summarised in annual reports (2008-09) in addition to the freezers. NB Countries not listed are all using consumables.

Country	Equipment	Comment
Brazil	precision balance, computer and scanner for viability assessment;	
Chile	germination incubator, digital camera	
China	digital camera	
Colombia	desiccation chamber, consumables,	
Cuba		Bureaucratic problems with equipment purchase and hurricane damage to site, but collaborators continue to work.
Equador	distilled water, desiccator, pH meter	Quito Orchid Association has donated two flow hoods, orchid media. Quito BG bought aluminium foil, industrial alcohol, glass vessels
Guatemala	Consumables	
Indonesia	consumables and glassware, thermometer,	

Variation in capsule maturation times across 15 species, 12 genera and 4 countries revealed by the OSSSU Excel Database

Country	Species	Pollination date	Capsule harvest date	Weeks development
Singapore	<i>Bromheadia finlaysonianum</i>	12/11/2008	23/01/2009	6
Thailand	<i>Dendrobium antennatum</i>	01/02/2008	01/05/2008	12
Indonesia	<i>Calanthe triplicata</i>	27/02/2008	05/06/2008	13
Indonesia	<i>Aerides odorata</i>	30/04/2008	07/08/2008	14
Thailand	<i>Vanda brunnea</i>	01/04/2008	01/09/2008	20
Singapore	<i>Vanda luzonica</i>	12/05/2007	24/10/2007	22
Colombia	<i>Miltoniopsis roezlii</i>	16/08/2008	01/02/2009	22
Indonesia	<i>Coelogyne asperata</i>	02/06/2008	19/11/2008	23
Colombia	<i>Cattleya trianae semialba 'Leticia'</i>	01/08/2008	01/03/2009	28
Thailand	<i>Eria ornata</i>	01/07/2008	01/01/2009	26
Colombia	<i>Lycaste occulta</i>	01/08/2008	01/03/2009	30
Indonesia	<i>Coelogyne rumphii</i>	01/04/2008	22/12/2008	35
Indonesia	<i>Bulbophyllum phalaenopsis</i>	28/01/2008	27/10/2008	39
Colombia	<i>Cattleya quadricolor</i>	01/06/2008	01/03/2009	48
Thailand	<i>Rhynchostylis gigantea</i>	01/12/2007	01/11/2008	48



**An example of viability data for seeds of 26 species from 15 genera of orchid stored at Bogor Botanic Gardens, Indonesia (2008-09) indicating inter-species variability in seed quality and a general ability to tolerate banking**

<b>Species</b>	<b>Period of storage (months) †</b>	<b>Range of germination % on best selected medium</b>
<i>Aerides odoratum</i>	3	10-18%
<i>Arundina graminifolia</i>	9	66-75
<i>Bulbophyllum phalaenopsis</i>	6	23-26%
<i>Coelogyne asperata</i>	2	20-34
<i>Coelogyne pandurata</i>	3	86-92
<i>Coelogyne rochussenii</i>	3	95-98
<i>Coelogyne rumphii</i>	0 *	71-74
<i>Cymbidium atropurpureum</i>	0 *	92-95
<i>Cymbidium finlaysonianum</i>	6	85-95
<i>Dendrobium anosmum</i>	2	85-88
<i>Dendrobium antennatum</i>	3	77-81
<i>Dendrobium lineale</i>	0	97-98
<i>Dendrobium macrophyllum</i>	1	75-77
<i>Dendrobium mirbelianaum</i>	3	95 #
<i>Dendrobium stratiotes</i>	2	44-51
<i>Dendrobium undulatum</i>	3	70-80
<i>Geodorum densiflorum</i>	6	96-97
<i>Grammatophyllum scriptum</i>	9	94-96
<i>Paraphalaenopsis lycockii</i>	6	38-55
<i>Phaius tankervilleae</i>	9	91-93
<i>Phalaenopsis amabilis</i>	3	59-66
<i>Phalaenopsis amboinensis</i>	1	2-5
<i>Rhyncostylis retusa</i>	2	100 #
<i>Spathoglottis plicata</i>	9	55-71
<i>Vanda tricolor</i>	6	89-96
<i>Vandopsis lissochiloides</i>	6	100 #

† indicative of different times of pollination, seed harvesting and date of entry to cold store;

\*post-desiccation, pre-storage;

# all three replicates sown;

### Checklist for submission

	Check
Is the report less than 5MB? If so, please email to <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> putting the project number in the Subject line.	YES
Is your report more than 5MB? If so, please advise <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> that the report will be send by post on CD, putting the project number in the Subject line.	NO
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	YES
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	YES
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.	

Hyge W. Pritchard

30 April 2009