Submit by 21 January 2005

DARWIN INITIATIVE APPLICATION FOR GRANT ROUND 13 COMPETITION: STAGE 2

Please read the Guidance Notes before completing this form. Applications will be considered on the basis of information submitted on this form and you should give a full answer to each question. Please do not cross-refer to information in separate documents except where invited on this form. The space provided indicates the level of detail required. Please do not reduce the font size below 11pt or alter the paragraph spacing. Keep within word limits.

1. Name and address of organisation

Name:	**Address:**
The University of Reading	School of Plant Sciences, The University of Reading, Whiteknights, PO Box 217, Reading, Berkshire. RG6 6AS.

2. Project title (not exceeding 10 words)

Certification to support conservation of endangered Mexican desert cacti.

3. Project dates, duration and total Darwin Initiative Grant requested

Proposed start date: September 2005				**Duration of project:** 3 years	
Darwin funding requested	**Total**	**2005/06**	**2006/07**	**2007/08**	**2008/09**
	£240 106	£66 819	£75 263	£69160	**£** 28 864

4. Define the purpose of the project in line with the logical framework

This project aims to support the conservation, sustainable harvest and use of Mexican desert cacti, whilst ensuring that the various stakeholders get a fair and equitable share of the benefits arising out of exploitation by the horticultural trade. A DNA-based CBD and CITES compliant certification scheme for nursery-propagated, traded cacti will be developed in consultation with stakeholders and policy-makers, and the DNA fingerprinting for certification and identification technologies in support of the scheme will be developed and implemented in Mexico.

5. Principals in project. Please provide a one page CV for each of these named individuals

Details	**Project Leader**	**Other UK personnel (working more than 50% of their time on project)**	**Main project partner or co-ordinator in host country**
Surname	Dr Hawkins		Dr Barcenas Luna
Forename (s)	Julie A.		Rolando T.
Post held	Lecturer		Profesor Investigador (tbc)
Institution	The University of Reading		Universidad Autonoma de Querétaro
Department	School of Plant Sciences		Facultad de Ciencias Naturales - Biologia

6. Has your organisation received funding under the Darwin Initiative before? If so, give details

Yes. The University of Reading has been involved in a range of Darwin projects in Morocco (10/028, 8/066), Vietnam (10/029), Mauritius (8/064), India (9/018) and St Helena (7/115).

7. IF YOU ANSWERED NO TO QUESTION 6 describe briefly the aims, activities and achievements of your organisation. (Large institutions please note that this should describe your unit or department)

Aims (50 words)

Activities (50 words)

Achievements (50 words)

8. Please list the overseas partners that will be involved in their project and explain their roles and responsibilities in the project. Describe the extent of their involvement at all stages, including project development. What steps have been taken to ensure the benefits of the project will continue despite any staff changes in these organisations? Please provide written evidence of partnerships.

Rolando Bárcenas Luna (RTBL, Universidad Autonoma de Querétaro [UAQ], lead partner: project management, laboratory management, curation of data and DNA), Héctor Hernández (HH, Universidad Nacional Autónoma de México [UNAM], provision of material from ex-situ collections, fieldwork and expert identification, co-chair of stakeholders' workshops), Eduardo Peters (EP, Instituto Nacional de Ecología [INE], environmental policy and legislation), Felipe Ramírez Ruiz de Velasco (FR, Secretaría de Medio Ambiente y Recursos Naturales [SEMARNAT and CITES Management Authority], CITES compliance), Francisco Navarrete Estrada (FNE, Procuraduría Federal de Protección al Ambiente [PROFEPA], enforcement), Carlos Gómez (CG, UNAM, field work and identification), Luis G. Hernández Sandoval, (LGHS, UAQ, fieldwork), 2 x research exchange scholars (to be appointed), technician (to be appointed), recipients of molecular training, data collection, fieldwork (technician only). RTBL and the UK PI have made equal contributions to the development of the project proposal. All partners will attend workshops in year 1 and 3 to ensure involvement in project development and implementation. Each partner has a nominated reserve partner to be appraised of the role of the partner institution and to ensure continuation of the project in the event of staffing changes, and a letter of agreement between the University of Reading (UoR) and the UAQ will be prepared.

9. What other consultation or co-operation will take place or has taken place already with other stakeholders such as local communities? Please include details of any contact with the government not already provided.

RTBL consulted with stakeholders, including community leaders, landowners and nursery growers, whilst working as consultant editor on the WWF-IUCN-Traffic project, "Chihuahuan Desert Cacti in Mexico: an Assessment of Trade, Management, and Conservation Priorities". The outcomes of this research are published as Robbins, Christopher S., ed. 2003. *Prickly Trade: Trade and Conservation of Chihuahuan Desert Cacti*, by Christopher S. Robbins and Rolando Tenoch Bárcenas Luna, TRAFFIC North America. Washington D.C.: World Wildlife Fund. All parties consulted during this research expressed enthusiasm for a certification scheme, and community leaders, landowners and nursery growers will participate in the first stakeholders' workshop. Nursery growers have agreed to provide material for fingerprinting of plants already in cultivation as well as information on the history of propagation of their collections where such information is available. The governmental permitting authority in Mexico, INE, is a partner in the project. Collecting permits for field collection are already held by the Mexican partner HH. Additional permits will be sought for RTBL and the Mexican technician to be employed by this project.

PROJECT DETAILS

10. Is this a new initiative or a development of existing work (funded through any source?) Are you aware of any other individuals/organisations carrying out similar work, or of any completed or existing Darwin Initiative projects relevant to your work? If so, please give details explaining similarities and differences and showing how results of your work will be additional to any similar work and what attempts have/will be made to co-operate with and learn lessons from such work for mutual benefits.

DNA identification and certification have not been used for cacti and rarely for other plants. Thus this is a new initiative, though the co-PIs have a long-term collaboration. The UK PI is partner on an existing Darwin Project (5% time; 12008, round 11) which includes fieldwork comparable to the project proposed here. There is also an existing project (13018, round 12) concerned with trafficking of birds. If successful we propose the UK PI will contact Prof. Burke in Sheffield. We will also use existing contacts to liaise with non-DNA certification schemes (e.g. forest schemes), since some of the challenges will be similar. In terms of the technical application of DNA markers, UoR has significant expertise in using plant DNA markers for species and provenance identification.

11. How will the project assist the host country in its implementation of the Convention on Biological Diversity? Please make reference to the relevant article(s) of the CBD thematic programmes and/or cross-cutting themes (see Annex C for list and worked example) and rank the relevance of the project to these by indicating percentages. Is any liaison proposed with the CBD national focal point in the host country? Further information about the CBD can be found on the Darwin website or CBD website.

The illegal cactus trade presents a significant challenge to Mexico in terms of meeting obligations as a signatory of the CBD. The project facilitates sustainable use of cacti to meet national and international market demands and encourages the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources of cacti. This is achieved by transfer of relevant technologies. By providing a DNA-based identification tool and a certification scheme for nursery-propagated, traded cacti the project will support implementation of Articles 8 (regulatory provision for management of activities – 10%), 10 (cooperation between governmental authorities and the private sector; use of biological resources to avoid or minimise adverse impacts on biological diversity – 30%), 12 (education and training in biotechnology – 20%), 15 (sharing in a fair and equitable way the benefits arising from the commercial utilisation of genetic resources – 20%),16 (technology transfer and use of genetic resources -10%), 17 (exchange of information and specialised knowledge – 5%) and 18 (cooperation and exchange of expertise -5%).

12. How does the work meet a clearly identifiable biodiversity need or priority defined by the host country? Please indicate how this work will fit in with National Biodiversity Strategies or Environmental Action Plans, if applicable.

The Mexican National Strategy (coordinated by SEMARNAT, policed by PROFEPA - project partners) has four strands. The first comprises seven actions for protection and conservation including Action 5, prevention and control of illegal acts. Approximately 18% of Mexican desert cacti are CITES Appendix 1, and trafficking puts pressure on all wild populations. Mexican legislation prohibiting trade of wild-collected cacti but permitting nursery growers to collect wild plants as mother plants for propagation is hard to enforce. We will relieve pressure on wild populations by facilitating identification and certifying plants as nursery progeny of legally collected plants. The National Strategy also highlights commercialisation (Strand four). Our work responds to this priority by ensuring stakeholders receive a share of benefits arising from the horticultural trade.

13. If relevant, please explain how the work will contribute to sustainable livelihoods in the host country.

The shift from illegal to legal trade will provide sustainable livelihoods for nursery growers. The project will hire a Mexican technician for three years. The technician's in-post training will be such that they can be employed in biodiversity/biotechnology science. Training in biotechnology of the Mexican technician and the two Mexican exchange students will also contribute to Mexico's increasing capacity to develop and exploit these technologies. The trainees and the technician will also have the opportunity to continue their training by taking higher degrees with research objectives consistent with conservation and sustainable development.

14. What will be the impact of the work, and how will this be achieved? Please include details of how the results of the project will be disseminated and put into effect to achieve this impact.

The project outputs include a Spanish-English stakeholders' report and Spanish-English DNA identification training manual. The report and manual will be distributed in hard-copy to all project partners, and also made available electronically on an external website. DNA data for all 550 species of Mexican Desert Cacti will be made available on Genbank, with unique PCR-RFLP identifiers for species identification determined and published in peer-reviewed scientific journals. For two test species tetra-nucleotide marker profiles which distinguish plants currently in cultivation from those in the field will be identified. These will also be published in peer-reviewed scientific journals. PCR-RFLP primer-enzyme combinations and SSR primer sequences and product profiles will also be made available electronically on an external website. The stakeholder process as presented in the report and the manual will both be useful guides for similar initiatives, but the primary impact will be the use of the markers developed for certification and identification.

15. How will the work leave a lasting legacy in the host country or region?

Once identified, the markers will be an essential tool for the future implementation of the identification and certification strategy developed as part of this project. The negotiated stakeholders' strategy for certification is likely to be implemented for the two target species after the end of the Darwin Initiative funding. A strategy will be put in place for developing markers for certification of additional species after the project's end. The DNA data generated and the herbarium voucher specimens plus associated data will be a permanent record of the diversity of Mexican desert cacti which can be used by future conservation initiatives.

16. Please give details of a clear exit strategy and state what steps have been taken to identify and address potential problems in achieving impact and legacy.

Potential problems and steps taken to address them: 1. Fail to negotiate strategy for certification: we have Prof. V Heywood, one of the UK's most experienced CBD stakeholder negotiators and fluent Spanish speaker, as co-chair of stakeholders' workshops; we will circulate informative briefings before the workshop 2. Difficulty in collecting and identifying the plants: partners include leading experts in cactus taxonomy and Mexican fieldwork (HH, RTBL, CH, LGHS) 3. Difficulties in handling cactus DNA and in finding markers; we have piloted extraction techniques and primers, our RA1A will be working in a lab where SSRs are routinely developed. Exit strategy: will be refined at the Y3 stakeholders' workshop; continuing employment of Mexican staff gives continuity; ongoing collaboration between UK PI and RTBL anticipated.

17. How will the project be advertised as a Darwin project and in what ways would the Darwin name and logo be used?

The Darwin Initiative name and logo will be used on the front page of stakeholders' report and manual and the consumers' leaflet. The website will use the Darwin logo. Darwin Initiative funding will be acknowledged in all peer-reviewed scientific publications. All herbarium specimens collected as vouchers will have the Darwin Initiative name and logo on the herbarium labels.

18. Will the project include training and development? Please indicate who the trainees will be and criteria for selection and that the level and content of training will be. How many will be involved, and from which countries? How will you measure the effectiveness of the training and will those trained then be able to train others? Where appropriate give the length and dates (if known) of any training course. How will trainee outcomes be monitored after the end of the training?

Training will be for the Mexican technician and two Mexican exchange students. The Mexican technician will be selected following UAQ advertising, short-listing and interview procedures. The exchange students will be selected from the pool of botany MSc students at UAQ and UNAM, based on undergraduate degree results and referees' comments. Exchange students will attend the molecular systematics ten-day intensive course at the UoR (now in its seventh year), and spend six months in Reading molecular laboratories. The UoR intensive course is assessed, and it is anticipated that after 6 months of hands-on experience the two exchange students will be able to train other biologists.

LOGICAL FRAMEWORK

19. Please enter the details of your project onto the matrix using the note at Annex B of the Guidance Note. This should not have substantially changed from the Logical Framework submitted with your Stage 1 application. Please highlight any changes.

Project summary	**Measurable Indicators**	**Means of verification**	**Important Assumptions**
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** • **the conservation of biological diversity,** • **the sustainable use of its components, and** • **the fair and equitable sharing of benefits arising out of the utilisation of genetic resources**			
Purpose to support the conservation, sustainable harvest and use of Mexican desert cacti and to ensure stake-holders get a fair share of benefits arising out of exploitation by the horticultural trade	• dialogue between stakeholders initiated and ongoing • dialogue informed by technological developments and research findings for targeted cacti • development and implementation of a DNA-based CBD and CITES compliant certification scheme supported by DNA-based identification tools	• stakeholder meeting held, and stakeholders attend; follow-up identifies way forward in light of technological and scientific developments • field and molecular research carried out • low-cost, robust, reliable and reproducible fingerprinting methods for identification of species and genotypes developed and implemented in Mexico	• all stakeholders are able to attend meetings • safety of fieldwork in Sonoran border regions is such that fieldwork possible there • UK and Mexican staff available. UAQ continues to maintain laboratories, and access to herbaria in MEXU and UAQ possible
Outputs • report on methodology/policy for certification • collection of tissue and DNAs for development and testing • low cost, robust DNA technologies developed and transferred • university-level training • peer-reviewed scientific publications • information leaflet	• stakeholders' report, manual and scientific publications prepared • field and lab work make DNA available • new knowledge on sequence variation and SSRs in Mexican desert cacti • appropriate fingerprinting tools methodologies developed • courses and training exchanges equip 3 Mexican scientists to take project forward in Mexico	• all publications available in hardcopy and electronically • database of material collected and extracted • sequence data exploited as SSR and SNP markers implemented in Mexico • 2 Mexican scientists awarded10 European Credits each for intensive course; training exchanges happen	• suitable technician and exchange scholars can be identified and employed • fieldwork successful • permissions already granted to sample from herbarium specimens extended • DNA extraction methods already developed in Reading for Opuntioid cacti are applicable across other groups
Activities 1. Stakeholders' meetings. 2. Field and laboratory work. 3. Courses and training. 4. Reports, publications and publicity.		**Activity Milestones (Summary of Project Implementation Timetable)** 1.2005/09 and 2007/12. 2.Ongoing; completed 2008/06. 3.In UK: 2006/03-09, 2008/10-12 and 2006/10-12. In Mexico 2007/08. 4.Stakeholders' report 2006/06; manual 2008/09; leaflet 2008/09; electronic web-based identification tool 2008/09; press releases 2005/11 and 2008/11; peer reviewed scientific papers submitted by 2008/09.	

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

Project implementation timetable		
Date	**Financial year**	**Key milestones**
	Apr-Mar 2005/6 Apr-Mar 2006/7 Apr-Mar 2007/8	
Dec 2005 (by end of first quarter)	Apr-Mar 2005/6	Mexican technician appointed. Equipment purchased. Initial stakeholders' workshop (3 days). Plant collecting programme finalised. Ongoing programme of plant collecting and molecular work initiated. First two two-week collecting trips to Chihuahuan desert carried out. Target species for SSR maternity/paternity testing demonstrator identified.
Mar 2006 (end of second quarter)	Apr-Mar 2005/6	First draft of stakeholders' report circulated to stakeholders. Web site established. First exchange student selected. Six-week collecting trip to S. Baja carried out. First exchange student visits UoR for molecular systematics intensive short course (10 days) and six-month supervised training in the molecular laboratories. Third two-week collecting trip to Chihuahuan desert carried out.
June 2006 (end of third quarter)	Apr-Mar 2006/7	Stakeholders report (electronic & hard copy) published. Both in-situ and ex-situ collecting of target species for SSR maternity/paternity testing complete.
Sept 2006 (end of first year)	Apr-Mar 2006/7	50% of species (325 species; 400 individuals, including multiple accessions) collected, determined, extracted and sequenced. SSR markers developed, screening underway. Fourth two-week trip to Chihuahuan desert carried out.
Dec 2006 (end of fifth quarter)	Apr-Mar 2006/7	Mexican technician travels to UoR for 3 months' supervised training in molecular methods. Six-week collecting trip to NE Sonora carried out.
March 2007 (end of sixth quarter)	Apr-Mar 2006/7	Six-week collecting trips to N Baja and NE Sonora carried out. SSR maternity/paternity screening for 50% of primer pairs completed for all accessions.
June 2007 (end of seventh quarter)	Apr-Mar 2007/8	Two-week trip to Tehuacan Valley carried out. Agarose-based restriction enzyme screens for single nucleotide polymorphisms (SNPs) developed and tested for species sequenced to date.
Sept 2007 (end of second year)	Apr-Mar 2007/8	75% (488 species; 600 individuals including multiple accessions) collected, determined, extracted and sequenced.
Dec 2007 (end of ninth quarter)	Apr-Mar 2007/8	Second stakeholder workshop (3 days) including update on technical advances. Three UoR staff travel to Mexico for molecular methods workshop (4 days) held in UAQ. Two-week trip to Huizache carried out.
March 2008 (end of tenth quarter)	Apr-Mar 2007/8	Second exchange student to UoR for molecular systematics intensive short course (10 days) and six-month supervised training in the molecular laboratories.
June 2008 (end of eleventh quarter)	Apr-Mar 2008/9	>640 species; 800 individuals including multiple accessions) collected, determined, extracted and sequenced. Postdoc travels to Mexico to ensure smooth running of SSR and SNP screens in UAQ laboratories. First draft of consumer leaflet/website circulated to stakeholders for feedback. Technical manual (electronic & hard copy) published.
Sept 2008 (project end)	Apr-Mar 2008/9	Information leaflet and website for consumers published. Follow-up organised. Final report.

21. Set out the project's measurable outputs using the separate list of output measures.

PROJECT OUTPUTS		
Year/Month	**Section 1.01Standard output number (see standard output list)**	**Section 1.02Description (include numbers of people involved, publications produced, days/weeks etc.)**
2006/03 + 2008/03	3	Two Mexican exchange students take Intensive Course in Molecular Systematics (10 days; 10 ECTS - European Credit Transfer System).
2005/09	5	Mexican technician for > 3years.
2006/01 + 2008/01	6A/6B	Two exchange students, 26 weeks training each.
2007/08	6A	Six people attend molecular training workshop (three days) by three UoR staff in Mexico.
2008/08	7	Manual "molecular methods for cactus certification and identification" electronic/hard copy.
2006/03 onwards	8	Four UoR staff spend 26-30 weeks in total in Mexico.
2006/06	9	Stakeholders' report, electronic/hard copy.
2008/09	10/12A	Electronic web-based identification tool based on sequence and SNP databases available.
2008/09	11B	Minimum two submissions to peer-reviewed journals.
2008/09	12A	SSR database.
2008/09	13A	DNA collection.
2008/09	13B	Herbarium vouchers.
2005/09 + 2007/12	14A	Two stakeholders' workshops (3 days each).
t.b.c.	14B	Reporting at minimum of one international conference.
2005/11+ 2008/11	15A/C	Two national press releases in Mexico and UK.
2008/09	16A/B/C	Information leaflet and website for consumers – 500 copies distributed through specialist international magazine mailing lists.
t.b.c.	19C	One interview.
2008/09	20	Laboratory equipment to value of £25 300.
2008/09	21	Cactus identification and certification lab established in UAQ.

MONITORING AND EVALUATION

22. Describe, referring to the Indicators in the Logical Framework, how the progress of the project will be monitored and evaluated, including towards delivery of its outputs and in terms of achieving its overall purpose. This should be during the lifetime of the project and at its conclusion. Please include information on how host country partners will be included in the monitoring and evaluation.

A password-accessed web-site will be set up where information will be updated monthly by the Mexican and UK PIs. The status of activities under following targets will be recorded:

1. Against a checklist of accepted names, number of species collected, localities.
2. Number of accessions and localities of species for SSR paternity/maternity analysis collected.
3. Number of DNA sequences produced.
4. Status of manual "molecular methods for cactus certification and identification", in prep.
5. Status of identification tools.
6. Status of manuscripts for submission to journals – in prep.
7. Status of stakeholders' report – in prep.
8. Status of consumers' leaflet and website – in prep.

Actions will be taken if targets are not met, including redeployment of UoR and Mexican staff and/or reprioritisation of current activities.