The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Dánae Cabrera Toledo
Project title	Population Ecology for conservation of key species of the Tehuacán-Cuicatlán valley: Merging scientific knowledge with sustainable management options
RSG reference	10735
Reporting period	November 2011-November 2012
Amount of grant	£3935
Your email address	danaetoledo@gmail.com
Date of this report	November 27th 2012

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Demographic data collection at two populations of *Dioon caputoi* in San Luis Atolotitlán.			✓	We have completed 8 years of demographic data collection, the last one financed by RSG.
Environmental education workshop about demographic data of *Dioon caputoi*			✓	We found low participation, however we began to setting up important topics about management actions in wild populations of *Dioon caputoi* based on our demographic data. Also we established a collaboration to motivate for the capacitation meeting that was done in Xalapa, Veracruz.
Training of farmers in cycad cultivation at Jardín Botánico "Francisco Javier Clavijero" in Xalapa, Veracruz.			✓	People of San Luis Atolotitlán and Caltepec communities, both in Puebla state, were transported to Xalapa for the workshop. These people had the opportunity to know the great Mexican cycad collection and other plants. This was a wonderful experience by itself, they were very grateful for this. In the workshop, we had the assistance of technicians of Natural Resources of the government of Puebla state, as well as researchers in ornamental product marketing, with whom we began important collaborations.
Training and exchange of experiences in a successfully cycad nursery in Monte Oscuro, Veracruz.			✓	Sr. Concepción Díaz, owner of a Cycad nursery in a locality known as Monte Oscuro, talk about his experience from the difficult beginning of which once was a community project and end in his actual personal project. From farmer to farmer, he talked about all aspects, cultivation, legislation, administration, marketing, etc.
Projection of demographic data analysis			✓	After 8 years of data collection some marks to follow the plant growth were not available. We are now dealing with this problem by finding a way to fit past year's data with actual ones. This is important in order to resolve if

				populations are viable and which management actions will affect or benefit plant populations in the future. We noticed that some plants were missing, suggesting illegal plant extraction.
Demographic data collection at one population in Caltepec.	✓			We realized that authorities of the Tehuacán-Cuicatlán Biosphere Reserved are already tacking data at this locality. Then, we decided not be involved directly in data collection but we give some advisory when this is required. We transfer the budget of this activity to others in the project as was being required.
Leaf tissue samples collection of *Agave potatorum* for genetic diversity analysis		✓		Samples of leaf tissue were collected already in seven populations (210 samples) of *Agave potatorum*. We have some problems of space in the freezer, so we decided to work with these populations first and as soon as we solve this problem, to complete the sample collection with five to seven more accessions.
Evaluation of molecular markers (microsatellites) to determine genetic diversity (DNA extraction, PCR amplification, genotyping)		✓		We have had some lab troubles with the optimisation of the PCRs, we are trying to solve this situation. However preliminary results indicate that we have enough variation to use 10 microsatellite loci in the population genetics evaluation.
Scientific papers		✓		We are working on the next scientific paper. "Population viability analysis and management scenarios in *Dioon caputoi* form central Mexico". Also in a discussion article: "Lenta entre las lentas: Remanentes de una larga historia de vida"

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

We did not realise that community of San Luis Atolotitlán had so many internal political conflicts. Capacitation was supplied to two farmers of this community and two farmers of Caltepec (the neighbour community). Our objective was to give some information and to encourage the

community of San Luis Atolotitlán in order to re-open a cycad nursery that was closed several years ago, however, this re-opening hasn't been possible. Fortunately, as a result of the workshop in Xalapa, Veracruz, we make contact with authorities of the Natural Resources Administration of Puebla State Government, whom have shown a great disposition to help with legalisation support of the cycad nursery and they are also interested in make the first buying of plants. We are now expecting farmers of San Luis Atolotitlán to take this great opportunity. In the other hand Caltepec town is beginning with great disposition in the cultivation of *Dioon caputoi*, however they have to wait until these plants has bigger size and to have legislation in order to begin with some sales.

With respect to *Agave potatorum* we have had some lab troubles with the optimization of PCRs. We did not complete the objective to evaluate the genetic diversity that will be the base to propose reforestation plans. We are working in this by making collaboration with other research groups interested in the implementation of this kind of studies in *Agave* species that are exploited to make mezcal. As a result of these collaborations, using a genome sequenced in LANGEBIO (National Laboratory of Genomics for Biodiversity, http://www.langebio.cinvestav.mx) for *Agave tequilana* (species from where tequila is extracted) we are working with the design of some primers to obtain more microsatellite amplifications and then to get more loci to evaluate.

3. Briefly describe the three most important outcomes of your project.

1. We completed an important time interval of taking demographic data in a very long-lived plant (*Dioon caputoi*). This information is ready to be implemented in the management plan that is required for the cycad nursery legislation.

2. We finally got revive the interest of both communities, San Luis Atolotitlán and Caltepec, to grow sustainably *D. caputoi* plants. Even when we failed in the re-opening of the cycad nursery in a year, we set the foundation to continue in the struggle for this goal.

3. We collected leaf samples of half of the entire distribution of *Agave popatorum*. Evaluations of preliminary results indicate that near of 10 microsatellites show enough variation between a few individual plants, this means that we can use at least 10 loci for the evaluation of the total samples. We are working in obtaining more microsatellites in order to generate solid results of population genetics evaluation. Also, this methodological experience let us key collaborations with other research groups to extend this kind of studies to more *Agave* species and have a more regional perspective.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Recently, San Luis Atolotitlán as well as Caltepec community have been more involved with the legislation requirements of the re-opening of the cycad nursery, in the first case, and in the starting operation in the second case. All we hope that this goal could be achieved with the help of a service provider specialised in these legislation areas. We feel that communities have benefitted from the project by having capacitation on ecological and horticultural topics that will be relevant when they have to make practical decisions, for example, how many seeds could be extracted and how to manage them in the nursery? When is a good moment to reintroduce plants to the wild population? How many plants are necessary to sustain the increment of the population in the future?

5. Are there any plans to continue this work?

Yes definitely, we think that this is the beginning of more long-term objectives. Subsequent monitory of these kinds of projects are the key of successful. Also, once we have finished the population genetics evaluation of *Agave potatorum* we have to continue with management plans to restore extinct populations.

6. How do you plan to share the results of your work with others?

We expect to have the publication of scientific and diffusion papers as well as academic meetings and conferences. We also have the expectation to be in permanent contact with communities to give all the information we find with respect to other communities experiences as well as our own research.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

We started to use RSG founds as soon as this was available in the bank count since December 8th 2011. We are still using it in lab materials and we still have some budget to plan another field trip to collect more leaf samples in the south point of the distribution of *Agave potatorum*.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

The local exchange rate used was approximately 1£ = $21.39 (at the time we received the money). £3935 = $84,169.65 **Amount received: $81,580.57 mexican pesos (with bank discounts and commissions)**

Item	Budgeted Amount	Actual Amount	Difference	Comments
Field trip 1: Sampling material of Agave potatorum Toll: 101 Food and accommodation: 160 Gas: 140 Material for sample collection (liquid nitrogen and silica gel): 78	720	**479**	+241	This money will be use to make another filed trip to collect over the southern distribution area.
Field trip 2: monitoring demographic data of Dioon caputoi Toll: 55 Food and accommodation: 90 Gas: 100	245	**245**	0	
Field trip 3: 1st Workshop at Sn. Luis Atolotilán and Caltepec communities Toll: 55 Food and accommodation: 90 Gas: 100	245	**245**	0	

Field trip 4: 2nd Workshop at Xalapa and Monte Oscuro, Veracruz Toll: 91 Food and accommodation for seven persons: 800 Gas: 320	1200	**1211**	-11	
Microsatellites Genotyping Amplification of SSR 3 kit Multiplex: 716 16 Primers: 461 DNA Extraction: Fenol:Cloroformo: Alcohol Isoamyl: 102	1525	**1279**	+246	This money will be use for the amplification of SSR in the samples that will be collected soon. We made modifications to the administration of this part of the project. Microsatellites genotyping was not included in this budget. We changed for cheaper methods than the originally planed and will be afforded with other funds.
Total	3935	**3459**	476	

9. Looking ahead, what do you feel are the important next steps?

- To keep in contact with communities in order to verify that the management plan we propose is been implemented.
- To complete the population genetics study of *Agave potatorum* and have a meeting with communities in order to establish a reforestation plan in extinct localities.
- Compilation of demographic and population genetics information in diffusion documents (magazines) or didactic material (educational posters).

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

- We use the RSGF logo in the PPTs that were presented in meetings within communities.
- The name of Rufford Small Grants appears in credits of a diffusion video (http://www.youtube.com/watch?v=pesXCU_bwsI) that shows scenes of the workshop in Xalapa, Veracruz and the exchange of experiences in Monte Oscuro, Veracruz.

11. Any other comments?

“Merging scientific knowledge with sustainable management options” is part of this project title; we learned that this is not a trivial issue.