

Final Report

Project: **Conservation of *Melocactus actinacanthus* (Cactaceae)**

Bronze Award

Submitted to

BP Conservation Programme

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I. Summary

The project started up on August 2004. Since that time twelve field trips were made to Santa Clara serpentine region where the population of *M. actinacanthus* occurs. Surrounding areas to the wild population of this species were surveyed prioritizing cliffs. Two subpopulations were found near the classic locality of this species in July 2005. The total population is composed by three subpopulations containing three mature plants and 10 young plants. This dwarf Turk's Cap cactus grows in the xeromorphic serpentine thickets over rocks or on areas with thick soil layer. They use grow associated to nurseries plants of *Agave brittoniana*. Two *ex situ* collections were created one in the protected area 'Sabanas de Santa Clara' where this cactus occurs and the second in the Cuban National Botanical Garden. However, collections that contain this species were identified and their owners or managers were encouraging to work toward the conservation of this cactus. Fruits of this species contain an average of 9 seeds per fruits. The 90 percent of seeds germinates during tests on natural substrates and enriches one. The first environmental education activity was the establishment of an environmentalist local group named 'Saving our Melocactus' advised by the BP team. This partnership allow the organization of two Environmental Festival attended by people of surrounding populations, the establishment of a local plant nursery and a continue work toward the increase of local and regional public awareness on the values of this cactus and the thicket ecosystem. A workshop for the Conservation of Cuban Cacti was organized in March 2005 and two training in field ecology were taught to undergraduates and local techniques. A workshop on alternative environmental education techniques were taught to the environmental activists of the protected areas of the whole regions.

II. Project Progress

A. Goals and Objectives

The aim of our project was to design and start up a conservation strategy to recover *M. actinacanthus* populations based on its natural potentialities.

The specifics objectives of the project are:

1. to make a survey searching for unknown populations
2. to characterize populations structure
3. to gather data about the reproductive capacity of each populations
4. to gather data about the biology of reproduction of this specie
5. to characterize species habitat
6. to establish *ex situ* collections of this species
7. to design and start up an environmental education program
8. to train technicians of the protected area on monitoring methodology and *ex situ* collection management

B. Results achieved

1. Surveys

We have surveyed the 50 % of the Agabama Hills mainly in cliff and other areas with primary vegetation. We found two subpopulations of *M. actinacanthus* near the classical locality of this species. Twelve field trips were made two the region.

2. Characterization of wild population

Table 1. Dimensions (height, radio, perimeter) of wild plants.

Number	Height (cm)	Radio (cm)	Perimeter (cm)
Classical subpopulation			
1	7	4	20
2	7	8	25
3	5	5	20
4 [^]	7	9	35
Subpopulation 1			
5 [^]	10	15	32
6	6	3	26
7	5	3	25
8	4	3	24
Subpoblation 2*			
9 [^]	11	16	35
10	7	5	28
11	7	5	29
12	6	4	26
13	5	3	23

Notes:

[^] Mature plant.

* There are 23 very small young plant (heigh < 2cm, radio < 1 cm, diameter <3 cm) not measured to avoid their damages.

The plant with the number 1 had to be harvest from the locality due to his bad health conditions. The plant now is growing very well in the *ex situ* collection of Santa Clara.

3. Reproductive capacity of *Melocactus actinacanthus*

Seeds for germination test were donated by a private collector and the other were collected from wild mature plants. Humid germination chambers were prepared according to Rodriguez & Apezteguia (1985) with two type of substrate: (1) serpentine soil and (2) serpentine soil improved with organic matter. Fifteen seeds were planted in each pot and successful seeds were counted after germination. The 90% of planted seeds germinate in both substrates. The average of Cuban *M. actinacanthus* seed production (9 seeds per fruit) is smaller than those individuals that were growing at Kew (UK) (15 seeds per fruit).

4. As regarding the reproduction biology

The very small number of mature plants did not allow the development of field studies on this subject. Neither visitors nor dispersers were seen during the twelfth field works. This fact could be related with the little and irregular production of nectar and fruits (recompense) of this small population not enough to maintain the attraction of pollinators and dispersers.

5. Ultramafic (serpentine) vegetation

The primary vegetation of Agabama Hills is an ultramafic thorny xeromorphic thicket but large areas are already covered by pine and eucalyptus plantations, and secondary grasslands and thickets.

In the cliff where *M. actinacanthus* occurs the primary thicket turns into less dense brushwood with plants assembled around fixed rocks. Shrubs like *Guettarda claraensis*, *Gochnatia cowelli*, and *Rondeletia camarioca*, and little trees of *Plumeria cubensis* are the larger plants of this cliff. The herb layer is also clear and it is composed of *Agave brittoniana*, *Crossopetalum aquifolium*, *M. actinacanthus*, and *Setaria sp.*

Primary ultramafic thickets used to have less dense scattered patches in which *M. actinacanthus* could have grown. So the surveys have been focused on ultramafic areas with primary vegetation, not only cliffs, because we think this species may have had a broad distribution in the past within Santa Clara ultramafic regions, but now we are only seeing the last refuge of this species.

6. Establish *ex situ* collections of this species

Two *ex situ* collections were established. One in the Protected Area containing 11 young plants and 48 seedlings and the second in the Cuban National Botanical Garden composed by 7 young plants and 40 seedlings. The team contacted institutional and private collectors to interchange seeds of this species to increase the genetic diversity of our collection for the re-enforcement program. We receive more than 250 seeds from Kew collection and a young plant from a private Cuban collector.

7. The environmental education program

The environmental education program involves local people into conservation actions. Children have played a key role to attract adults' attention. We organized the environmentalist group "Saving our Melocactus". This group helps the BP team to organize the environmental activities but it also created its own ones. Environmental education banners for the local community are hand made by the children of the "Saving our Melocactus" group. At the beginning of the project, we taught a course about environmental education techniques including some alternatives techniques to the environmental activists of the protected areas of the Central region or the country.

Project achievements were diffused by interviews on national radio stations (Radio Rebelde, Radio Habana Cuba, Radio Progreso, Radio COCO, Radio Taino, Radio Metropolitana) and

newspapers on line. A project updates were published in the British Cactus and Succulent Journal, Latin American Cactus and Succulent Society Bulletin and the Cuban National Botanical Garden website.

8. Training on field work methodology

Two training course one week long were organized for undergraduates and reserve technicians. Both courses were aimed to teach and practice census, monitoring and sampling techniques. A total of 40 people attended to both courses. One course on pollination biology was taught to undergraduates (30 students) and a training course on this subject was taught to undergraduates and reserves technicians (9 peoples).

9. The Workshop for the Conservation of Cuban Cacti

The Workshop ‘Conservation of Cuban Cacti’ was attended by forty people from the whole country and an invited colleague -Nigel Taylor- from Kew (UK). Thirteen cactus species were categorized the very first day of the workshop with the advisor of members of the Cuban Plant Specialist Group from IUCN/SSC. Eighteen speeches were lectured covering key topics for Cuban cacti conservation such as: the taxonomic status of the family in Cuba, the importance of *ex situ* collections for conservation, the experiences on cacti management, the usefulness of biotechnological techniques for native cactus conservation, the local use of Cuban cacti, contributions about specifics taxa and the distribution of native cactus within particular regions. Most of these contributions were compiled in a proceedings book that it will be a reference for subsequent conservation actions. The workshop allowed the interchange of information and experience between the different groups that there are working on cactus conservation in the country and to identify the priorities for the conservation of the native species. However, one of the most important achievements of this workshop was the conjunction of researchers and the usually underestimated collectors in a meeting for the very first time in many years and their agreement to work together for the conservation of Cuban cacti.

C. Difficulties

- The real size of the wild population is smaller than the estimated one so studies on reproductive biology could not be carried out.
- The prices of all products increased from 5 to 10 % during the project then we have to readjust the budget.
- The protected area has not enough technicians to guaranty long-term monitoring then we have to increase our work with local people.

D. Impacts on conservation

- A short note about the project was published in Cuttings, the newsletter of Botanic Garden Conservation International (BGCS).
- An update about the conservation status of *M. actinacanthus* was published in the British Cactus and Succulents Journal, the journal of the British Cactus and Succulents Society.
- A Workshop for Cuban Cactus Conservation that joined cactus conservationists from the whole country to interchange experience on this topic. This workshop is the base for the Programme for the Conservation of Cuban cacti (in preparation).
- A book with the proceedings of the Workshop for Cuban Cactus Conservation that gathers useful data on Cuban cacti and general tips for conservation.
- A short note about the Workshop on Cuban Cactus Conservation was published in the Bulletin of the Latin American Cactus and Succulents Society.
- More than 60 people (undergraduates, postgraduates, technicians) have received training in field work and/or environmental education techniques.
- Local people and collectors are involving in the protection of this species against harvesting (the principal threats for *M. actinacanthus*).
- The increase of *ex situ* collection sizes and their genetic diversity too.
- The environmental workshop taught to environmental activists of the regional protected areas showed us the main problems of this area, they also learned techniques to work with teachers, adult people and children.
- The whole community is involved in conservation actions. The environmental festivals involved a lot of people from Revacadero and adjacent areas mainly women and children, at the very end some men arrived and joint to the activity.

Note: The training workshops were also supported by a Rufford Small Grant.

The Workshop for Cuban Cactus Conservation was also supported by a grant from the British Cactus and Succulents Society.

E. Professional Growth during reporting period.

Grants and Awards

The team got a grant from The Rufford Foundation to the project: Serpentine areas of Guamuhaya Mountains: a hot spot of Cuban flora which needs protection.

We also got a grant from the BCSS Conservation Committee to support a Workshop for the Cuban Cactus Conservation.

We also got an Alumni Grant from the BP Conservation Programme for a training course in Pollination Biology.

Symposiums and Meetings presentations

L.R. González-Torres, J. Matos Mederos, A. Torres Bilbao, F. Areces Berazaín, A. Palmarola Bejerano. *Colecciones ex situ de Melocactus actinacanthus: una estrategia para la conservación de la especie*. (poster presented on the Meeting for the Centenary of the National Herbarium)

L.R. González-Torres, J. Matos Mederos, A. Torres Bilbao, F. Areces Berazaín, A. Palmarola Bejerano, A. Rodríguez Fuentes. *Conservation status of Melocactus actinacanthus (Cactaceae) population. Perspectives for this species*. (poster presented on IV Mexican and III Latin American Meeting on Cactus and Succulents)

J. Matos. Manejo de cactáceas cubanas. (conference presented IV Mexican and III Latin American Meeting on Cactus and Succulents)

L.R. González-Torres. Conservación de *Melocactus actinacanthus*. (conference presented in the Workshop for Cuban Cactus Conservation)

J. Matos. Manejo de especies endémicas amenazadas. (conference presented in the Workshop for Cuban Cactus Conservation)

A. Izquierdo. Educación ambiental en la comunidad de Revacadero. (conference presented in the Workshop for Cuban Cactus Conservation)

Publications

L.R. González-Torres, J. Matos Mederos, A. Palmarola Bejerano, F. Areces Berazaín, A. Rodríguez Fuentes, A. Torres Bilbao. Saving a Dwarf Turk's Cap Cactus species. (in press, BCSJ)

L.R. González-Torres, A. Palmarola, A. Rodríguez, eds. 2005. Memorias del Taller Conservación de Cactus Cubanos. Jardín Botánico Nacional, Universidad de La Habana, 23-25 de marzo del 2005. Ed. Feijóo, Santa Clara.

L.R. González-Torres, J. Matos, A. Palmarola, F. Areces, A. Torres, R. Mederos. 2005. Conservación de *Melocactus actinacanthus*. In: González-Torres, L.R., Palmarola, A., Rodríguez, A. eds. Memorias del Taller Conservación de Cactus Cubanos. Jardín Botánico Nacional, Universidad de La Habana, 23-25 de marzo del 2005. Ed. Feijóo, Santa Clara. Pp. 59-62.

J. Matos, L.R. González-Torres, A. Palmarola, F. Areces, R. Mederos, A. Torres, D. Bayate. 2005. Manejo ex situ de *Melocactus actinacanthus*. In: González-Torres, L.R., Palmarola, A., Rodríguez, A. eds. Memorias del Taller Conservación de Cactus Cubanos. Jardín Botánico Nacional, Universidad de La Habana, 23-25 de marzo del 2005. Ed. Feijóo, Santa Clara. Pp. 63-66.

A. Izquierdo, J. Matos, L.R. González-Torres, A. Palmarola, A. Torres, R. Mederos. 2005. El Melocactus de Alabama, una especie bandera para la educación ambiental en la comunidad de Revacadero, Villa Clara. In: González-Torres, L.R., Palmarola, A., Rodríguez, A. eds. Memorias del Taller Conservación de Cactus Cubanos. Jardín Botánico Nacional, Universidad de La Habana, 23-25 de marzo del 2005. Ed. Feijóo, Santa Clara. Pp. 67-69.

Scientific Degrees

- One MS dissertation
- One Ph.D. thesis in progress
- Two Ms thesis in progress
- Five undergraduate thesis in progress

III. FINANCIAL UPDATE

	Currency	Amount	Amount (USD)
Field work related expenses			
Digital Camera EOS 300D + accessories	Pounds	1043.90*	1952.10
Tents (1)	USD	183.95	183.95
Backpaks (3)	Pounds	90.00*	170.10
Lens 2x	USD	195.00	195.00
Measuring tape	USD	23.50	23.50
Batteries (3)	USD	47.96	47.96
Boots (8)	USD	400.00	400.00
Field trips (12 for field works & 3 for environmental activities – 2 festivals + 1 workshop)	USD	1500.00	1500.00
Field rations	USD	600.00	600.00
Subtotal			5072.61
Environmental education expenses			
t-shirts	USD	600.00	600.00
Crayons, colour pencils, aquarelle	USD	120.00	115.11
Food for Environmental festivals	USD	140.00	140.00
Subtotal			855.11
Cuban Cactus Conservation Workshop expenses			
Coffee breaks	USD	130.00	130.78
Transportation	USD	80.00	80.00
Notebooks	USD	45.00	45.00
PVC transparent data envelope	USD	52.50	52.50
Pen	USD	5.00	5.00
Subtotal			313.28

	Currency	Amount	Amount (USD)
Training courses on field work methodology			
Transportation	USD	270.00	200.00
Field rations	USD	300.00	300.00
	Subtotal		500.00
Office materials**			
Paper 8 ½ x 11	USD	400.00	400.00
Inkjet HP Cartridges	USD	290.00	290.00
Whiteboard marker	USD	50.00	50.00
Scotch tape	USD	10.00	10.00
Stapler	USD	9.00	9.00
	Subtotal		759.00
Total			7500.00

* These items were bought in July 2004 when the change tax was around 1.87.

** In this section we summarized the office materials used during the whole project (including partial and final report, printed materials for workshops and training courses).

IV. Next Steps

1. To finish the design of the Programme for the Conservation of Cuban Cacti according workshop experiences.
2. Fund raising for the Programme for the Conservation of Cuban Cacti.
3. We will continue searching for seeds and plants from private collectors and characterize these ones.
4. We will increase the genetic diversity of *ex situ* collections of *M. actinacanthus*.
5. Continue the Environmental Education program in the reserve.
6. Continue the studies on the ecology of this habitat to enhance restoring actions.