

Final Evaluation Report

Your Details	
Full Name	Aquetzalli Nayelli Rivera Villanueva
Project Title	Seasonal ecology and conservation of <i>Leptonycteris yerbabuenae</i> in Central Mexico
Application ID	30707-1
Grant Amount	£6,000
Email Address	godmostir@hotmail.com
Date of this Report	February 11st, 2022.

1. 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
Install the fence surrounding the cave				We needed first to install the fence before the pit-tag system and the solar panels in order to avoid robbery.
Install the pit-tag system				The pit-tag system was bought in March 2021, but due to the restrictions in the community we were able to enter to the area until December 2021.
Install the weather station				
Activities awareness with the people				
Agrochemical surveys				
Pitaya phenology survey				

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

The main difficulties of the project were the restrictions to work with people due to the pandemic. So, everything of the project was applied and install until we had permission of the community to work there. The money was given in February 2021, but we start and finish all the objectives until December 2021.

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

One of the most important outcomes of the project was the results of the questionnaires that were applied to the local community (farmers, ranchers, general public, government agencies and relevant stakeholders) before and after the awareness activities. The most important outcome was reflected not only on the results of the raise of awareness on the questionnaires, but also in real life. About the results of the questionnaires, more than 90% of the people raises their willingness to help in bat conservation. After the talks in the three most important municipalities for the production of pitaya, the general public and farmers want to participate in more future collaborations for the conservation of nectar-feeding bats. Also, many farmers change their mind about the use of agrochemicals and ask for help about how to do organic farming with their columnar cacti (*Stenocereus queretaroensis*) in order to have organic pitayas. This outcome will change the future of *Leptonycteris yerbabuena*, because will reduce the threats that bats are facing in the area (Sayulla Basin).

The other important outcome of the project was the banning of the bat culling in the main cave of *L. yerbabuena*, which provides the ecosystem service of pollination to the pitayas crop, since is the main pollinator of the pitaya. This outcome will be a game changer to the conservation of bats in the community and not only for *L. yerbabuena*. This outcome was thanks to the awareness activities in the local community and with talks with the owner of the land where is located the cave.

The third important outcome of this project was the installation of the pit-tag system and the fence in the main cave of *L. yerbabuena*. This is the first long-term monitoring system installed in an agroecosystem. The pit-tag system will allow us to: 1) understand the migration route of the species and 2) detect possible mismatches with the arrive of the migratory *L. yerbabuena* and the flowering season of the pitayas (*Stenocereus queretaroensis*). The fence of cyclonic mesh was installed 10 m from the entrance of the cave and is 2 m high. It was designed to have a door locked, so only the team and the owner will have the keys to enter the cave. No bats will be disturbed since the fence is 10 m away from the entrance.

4. What do you consider to be the most significant achievement of this work?

5. Briefly describe the involvement of local communities and how they have benefitted from the project.

The pitaya fruit is a socio-economic important crop in Sayula Basin. Also, previously my supervisor (Dr. Verónica Zamora-Gutierrez) found that 40% of gross income across producers of the community comes from bats. Hence, the main income of the already vulnerable local community in Sayula Basin is the commerce of the pitaya fruit. For that reason, if the nectar-feeding bats (*L. yerbabuena*) that pollinate the pitayas maintain the ecosystem service of pollination, the local community will be highly benefitted.

6. Are there any plans to continue this work?

For sure there are plans to continue this work. The project was planned to be also a long-term study (thanks to the pit-tag system). Besides, my advisor has 5 years working in the zone (Sayula Basin), creating a local network. Hence, the plan to continue working in the project will continue for long-terms.

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

We are still analysing the data of the questionnaires because we will publish an article about the raise of awareness about nectar-feeding bats and their importance for conservation in the local community with the highest production of pitaya (a columnar cactus that is animal-pollination dependent and *L. yerbabuena* is the main pollinator).

Also, in the awareness activities, I shared previous findings about the importance of bat-pollination. This demonstrate that the results will be shared in next talks with the community.

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

The Rufford Foundation grant was used from March 2021 to February 2022. This was because we could not enter to the community due to the large amount of Covid cases. The use of the money was as expected because it was limited the dates to enter to the community.

9. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Pit-tag system	4,991	4,991		The budget was made with the current prices of the enterprise from which I bought the materials.
Meteorological system	109	109		
Solar Panel for the pit-tag system	900	900		
Total	6,000	6,000		

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

The next steps are: 1) continue with the awareness activities with the local community (farmers, ranchers, general public, government agencies and relevant stakeholders), 2) continue tagging more bats for the long-term monitoring and assess whether is happening a mismatch between the arrival of the nectar-feeding bats and the flowering season of *Stenocereus queretaroensis* (pitaya columnar cacti).

11. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, in all the awareness activities about the importance of the ecosystem service that provide *L. yerbabuena* to the pitaya's crops, it was used the logo of Rufford.

12. Please provide a full list of all the members of your team and briefly what was their role in the project.

Dr. Verónica Zamora-Gutierrez, she is my supervisor and the leader of the team of nectar-feeding bats and pitayas.

Dr. Winifred Frick, she is the chief scientist of Bat Conservation International, and she taught us how to install and program the pit-tag system for the long-term monitoring.

Dr. Ana Ibarra, she is helping us with the programming of the pit-tag system.

13. Any other comments?

This project has local, national and international importance. The commitment of the team is not only with the project, but also with the community. The network with the local community helps us to interchange in a formal and informal way, points of view about the importance of bat pollination and the importance to do conservation of bats. The involvement with the community were with all the covid precautions, such as social distancing, face mask, etc.

Also, the pit-tag system is ready, however we need to wait to have more data to analyse for the possible mismatch between the arrival of bats and the flowering season of the pitayas. This will help us to continue working in the area.



Here I am (Nayelli Rivera) applying questionnaires to the local community () about their perceptions about bats, the possible dangers of using agrochemicals and willingness to stop culling bats, do organic farming and stop disturbing bats in their cave.



Doña Alicia showed us her pitayo (*S. queretaroensis*) that was product of bat pollination and is not a clone as all the pitayos that are used in the production of the pitaya fruit. This was after she attended to one of awareness the activities, we made with the community in Techaluta de Montenegro, municipality.



The pit-tag system is installed to monitor the entrance and exit of bats in the main cave of *L. yerbabuena* in the area. The fence of cyclonic mesh was installed 10 meters from the entrance of the cave and is 2-meters high.



At the end of the awareness activities, we give them as a gift pitayos (*Stenocereus queretaroensis*) that were product of bat-pollination and not were clone as all the pitayos that are used in the pitaya farming. This were also accompanied with talks about the importance of organic farming.



I was talking about the importance of organic farming. Also, specialists about bat rabies talk about the alternatives to avoid rabies in the livestock in order to avoid and ban the bat culling. Also, it was applied questionnaires before and after these talks, in order to assess their willingness to change to a bat-friendly behaviour (Organic farming, stop bat culling and stop disturbing bats in their cave).