

The Rufford Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford 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	Paola Carrion-Aviles
Project Title	The Use Of Formic Acid For Controlling Galapagos Land Bird Nest Infestation By The Avian Parasitic Fly (Philornis Downsi): An Experimental Study.
RSG Reference	20594-1
Reporting Period	01 November 2016 - 01 November 2017
Amount Of Grant	£2780
Your Email Address	Lorena_18ca@Hotmail.Com
Date Of This Report	01 November-2017

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
Know if formic acid repels <i>P. downsi</i> flies in the trials with fly traps				Trails with McPhail traps indicate a significant repellent effect of formic acid on <i>P. downsi</i> and other muscid flies.
Assess if formic acid helps to reduce parasitism of <i>P. downsi</i> inside the land bird nests				Nests and nestlings inside them that received the formic acid treatment showed less numbers of parasites. However, is important to increase sample size.
Know if formic acid contributes to improve the health status of nestlings				Formic acid showed a significant effect for improving nestlings' height. However there was not a significant effect on their weight, and blood samples were not taken due to the reduce amount of nests used in this study.
Investigate if formic acid application in nests increases the survival of nestlings				Even when results indicate not significant results, the data indicates an increase in nestling survival when receive the formic acid treatment. However, it is necessary to increase the sample size.
Identify other major risks for active nests				The places where the cameras were placed did not detect any threats for the nests or nestlings. Factors as wind, rain, or the camera itself could influence these results.

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

During field work I realized I needed more help from other people rather than just my biology colleague, so I required help from volunteers studying at the San Francisco de Quito University at Galapagos, who were really committed with the project and showed great interests and support.

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

- Formic acid has a repellent effect on *P. downsi* flies. The trials performed with McPhail fly traps in 2015 and the ones in 2017 showed a significant repellent

effect of formic acid not only on *P. downsi* but also other muscid flies, which might indicate that formic acid can have further uses.

- Formic acid helps to reduce the number of *P. downsi* parasites inside the nests that were treated with it. The number of larvae and pupae of *P. downsi* found inside the nests that received the formic acid treatment was lower compared to the nest that did not received the treatment.
- Formic acid contributes to improve the health status of nestlings. When reducing the number of *P. downsi* parasites, formic acid allows nestlings to gain more weight and height that are affected when larvae of *P. downsi* feeds on blood and tissue of nestlings.
- Previous findings might indicate that formic acid is a new alternative tool to control the parasitism of *P. downsi* in the Galapagos Islands.

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

At the end of the field part in Galapagos, the project was presented in the facilities of the Galapagos Science Centre to the local people. At the presentation attended staff from the Galapagos National Park and students who asked questions about the fly *P. downsi* and how it affects the land birds of Galapagos. They showed great interest on this topic and indicated their will to help in any program to protect the land birds of the islands. Additionally, I have some local volunteers that showed great commitment to the project and learned to recognise *P. downsi* flies in the field and know when nestlings are parasitized by the fly. I also made a presentation at the workshop developed in Santa Cruz Islands by the Charles Darwin Foundation, where different scientists involved in the study of the fly *Philornis downsi* attended.

5. Are there any plans to continue this work?

My future plans include using formic acid as a control method to assess impact of other factors on the reproductive behaviour of land birds in Galapagos. My objective is to investigate how different agriculture practices are influencing the parasitism level of *P. downsi* on land birds. I would like to do a PhD investigating this topic.

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

My supervisors are currently correcting the manuscript I have prepared about the project and my objective is to get it published by a scientific journal.

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

The grant was used for the field part of the project which lasted from January until April 2017 where the reproductive period of land birds occurs in Galapagos. The grant was used to buy the required equipment (gps, endoscopic camera, haemoglobin meter, and nest cameras), formic acid, and for paying travel, transportation and accommodation expenses for my colleague and me. The funds

lasted exactly 3 months, and I covered the expenses of April. The grant could not cover all the expenses as I planned due to an increase in the prices in transportation and accommodation. When I made the budget I used the prices of 2016 assuming there will be not an increase in prices; however, when I arrived in Galapagos I realized everything was a little more expensive than last year. Local people indicated the increase of prices is due to the low touristic demand of the season.

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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Two round trip tickets Quito-San Cristobal	778	778	0	
Transportation to study site La Loberia	100	155	55	Increase in transportation prices in Galapagos
Transportation to study site Puerto Chino	342	380	38	Increase in transportation prices in Galapagos
Accommodation	900	1000	100	Increase in accommodation prices in Galapagos
Portable Haemoglobin Meter	40	40	0	
Haemoglobin Test Strips	18	18	0	
Endoscope Snake Camera	200	200	0	
Two Wireless Bird Box Cameras	124	124	0	
Two GPS	138	138	0	
Formic Acid	140	140	0	

* Exchange rate 1 GBP= 1.32 USD

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

I think the next steps would be using formic acid as a control method in more land bird nests in order to: reaffirm their effectiveness, understand the impact of other factors as agriculture and climate change in the land bird biodiversity of Galapagos. I think is also important to perform some trials in the laboratory in order to see if formic acid has also an insecticide effect on *Philornis downsi* besides their confirmed repellent effect.

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

Yes, I used the logo of the foundation for my presentation at the Galapagos Science Centre and in the Workshop developed by the Charles Darwin Foundation.



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

- Paola Carrion-Aviles, MSc: main researcher
- Carlos Valle, PhD: supervisor from San Francisco de Quito University
- Charlotte Causton, PhD: supervisor from Charles Darwin Foundation
- Martin Diekmann, PhD: supervisor from the University of Bremen
- Isabel Villarroel, MSc: researcher
- Shaman Patel: exchange student from United States, volunteer
- Victor Renteria: local student from University San Francisco de Quito, campus Galapagos, volunteer
- Katty Cochinche: local student from University San Francisco de Quito, campus Galapagos, volunteer

12. Any other comments?

I wanted to thank the Rufford Foundation for believing in young researchers by providing the fund to develop their scientific projects. Thanks to you we can contribute to the conservation efforts in order to protect the biodiversity of the world that day after day is more threatened by anthropogenic activities and climate change.

I attached a draft of the manuscript that is currently corrected by my supervisors, and a document with pictures of the project. As soon as the paper is accepted for publication, I will send it to you.

