

## Darwin Initiative/Darwin Plus Projects Half Year Report (due 31<sup>st</sup> October 2020)

<b>Project reference</b>	DPLUS102
<b>Project title</b>	Saving Tristan's only native tree and its associated unique buntings
<b>Country(ies)/territory(ies)</b>	Tristan da Cunha Island Group
<b>Lead organisation</b>	Royal Society for the Protection of Birds (RSPB)
<b>Partner(s)</b>	Conservation Department, Tristan Government Centre for Agriculture and Bioscience International (CABI) The Food and Environment Research Agency (FERA)
<b>Project leader</b>	<i>Andy Schofield</i>
<b>Report date and number (e.g. HYR3)</b>	<i>HYR1</i>
<b>Project website/blog/social media</b>	<i>n/a</i>

**1. Outline progress over the last 6 months (April – Sept) against the agreed project implementation timetable (if your project has started less than 6 months ago, please report on the period since start up to end September).**

Due to the unforeseen impacts of Covid-19, the project officially commenced on 1 July 2020 and began with a revision of the timeframe and budget. We are therefore reporting on progress made on activities over the first three months of the project. Overall, the project is progressing well and, in some activities, we are ahead of schedule.

*1.1 Identification of scale insect from samples collected on Tristan; use of molecular methods to identify the strain/subspecies present on Tristan*

Twenty samples of *Phyllica arborea* twigs infested with soft scale insects were received from Nightingale. The foliage in all samples was densely covered in sooty mould and the scale insect density was relatively low. The scale insects were found mainly on the upper surface of the foliage, which is atypical, as they normally feed on the lower surface to enable the egested honeydew to drop away from the colony. This is probably due to the dense hairs on the lower leaf surface making it difficult for the first instars to find a suitable feeding site. Adult female and first instar scales were slide mounted and compared with specimens deposited in the Fera reference collections. The scales from Nightingale were found to be morphologically consistent with *Coccus hesperidum* L. (Hemiptera: Coccidae). Three adult specimens were sequenced but the results only showed the presence of the bacteria *Wolbachia*. Most scale insects are host to obligate symbiotic microorganisms, such as *Wolbachia* spp. It appears that the method of storing the *C. hesperidum* was unsuitable for the preservation of the scale insect DNA.

*1.2 Analysis of pre-project survey and literature survey to match agents to scale taxon present on Tristan; this includes climate matching of previous successful control projects of *C. hesperidum* with the conditions present on Tristan*

At the start of the project, a literature review of natural enemies of *Coccus hesperidum* revealed that parasitoid wasps (Hymenoptera: Chalcidoidea) were the most important group, with more than 170 species reared from the scales. We then undertook a review of previous classical biological control (CBC) efforts for *Coccus hesperidum* under outdoor conditions. Most previous

attempts using biological control agents focused on citrus orchards and were conducted decades ago. The lack of previous CBC projects for this species is most likely due to *C. hesperidum* normally being well controlled by natural enemies under outdoor conditions. As there seems to be no precedence of other CBC attempts for this species under climatic conditions similar to Tristan da Cunha, testing of potential biological control agents (BCA) for their climate suitability will remain a major focus of the project.

### *1.3 Selection of suitable and readily available agents, including use of agents commercially available and agents currently used in other research institutes*

The literature review revealed a significant list of potentially suitable BCA and it was decided to start testing with a commercially available hymenopteran parasitoid with a good track record of efficiently controlling *C. hesperidum*. See 3.1 for further information.

### *1.4 Shipment of living scale insects from Tristan to quarantine at CABI to test agents on the correct target taxon*

Despite very limited expectations to be able to ship brown scales from Tristan during the ongoing pandemic, we managed to ship living scales to the UK via South Africa in mid-August.

### *1.5 Culturing of C. hesperidum from Tristan at CABI for testing and mass rearing of agents*

Only a few scales survived the month-long journey from Tristan, but these have been successfully transferred onto Malabar spinach and are slowly increasing in numbers. First tests using this scale population are scheduled to go ahead in Q43 once a sufficient population is established.

### *1.8 Efficacy testing of agents in quarantine at Egham UK looking into infestation rates and rates of encapsulation by the target species*

Population levels of *C. hesperidum* (UK populations) and the primary BCA (*M. nietneri*) are now high enough to start with a first series of efficacy tests for this control agents during the coming months. In view of the delayed start of the project this is considerably ahead of schedule.

### *3.1 Rearing of agents for release at CABI*

In order to setup a first culture of the BCA, as a first step suitable hosts plants were grown to support a scale insect population large enough to provide enough specimens to keep a culture of parasitoids permanently going. Therefore, the first weeks of the project focused on growing ivy (*Hedera helix*) cuttings as this species is easy to obtain and is a well-known host of *C. hesperidum*. However, it turned out that, under artificial light conditions, ivy is slow growing and prone to infestation by the two-spotted spider-mite. Development of scales on ivy under artificial light conditions also turned out not to be ideal. We therefore switched host plants production to Malabar spinach (*Basella alba*) in August. Malabar spinach proved to be a much better suited host plant to support a healthy brown scale population, a fact which is also supported by literature.

Not to delay the establishment of a parasitoid culture whilst waiting for scales to arrive from Tristan: a scale culture using local *C. hesperidum* specimens was setup instead. This culture was established under temperature-controlled conditions inside a CT-room. Only after sufficient scale insects were produced by late July a contingent of *Microterys nietneri*, a soft scale specialist widely used for brown scale control in greenhouses, was acquired from a commercial seller. As this species is not licensed for release in the UK (although the species is established outdoors in the UK) a culture was setup in quarantine. The culture of this BCA is now well established and, at the time of writing, is already in its third generation since setup. Initial temperature assessments showed that the BCA remains active at 16°C and is still actively attacking brown scales and developing inside them under such a low temperature. A more detailed climate testing running at a range of different temperatures is scheduled to commence within the coming months.

### *3.2 Development of training material and rearing protocols for Tristan*

Two videos were sent to Tristan da Cunha, one to explain to the public and other stakeholders the basic principals of biological control, and the second explained how to set up rearing boxes to try to detect parasitoid wasps that might already be present on the archipelago.

### 3.3 Establishment of polytunnel rearing facilities on Tristan

Polytunnel specifications to withstand high windspeeds have been established with a supplier and construction of the structure is underway.

#### **2a. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months (for Covid-19 specific delays/problems, please use 2b). Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.**

The shipment of live scale insects from Tristan was logistically challenging and relatively costly. This was due to additional quarantine procedures causing a hold up in Cape Town and restricted flights available from South Africa to the UK. Despite this, small numbers of soft brown scales survived and the setup of a population sufficiently large for the planned efficacy testing is well on its way. Even though it will take some time to build up a culture from just a handful of surviving specimens, the shipment was a much greater success than we realistically had hoped for under the given circumstances and we have learnt how to successfully ship live scales should more shipments be required. However, the challenges may impact on the way we ship control agents back to Tristan. Revised modes of transport (adult parasitoids instead of infected scales on plant parts) complemented by remote training are already under discussion in the team.

Unexpectedly, the GeoSearcher (a fishing vessel; one of two vessels which services Tristan) went down on 15 October at Gough after striking a rock. Fortunately, no major injuries were sustained. The knock-on impacts are yet to be determined but it is possible that there will be significant changes to the project timeline this year as a result of due process and amendments to the sailing schedule and availability of vessels. It is possible that staff may not be able to get to Tristan in Q4 which would result in a one-year delay to the first release (Output 4) and flax control (Output 5). The situation will be much clearer in the coming weeks and a change request submitted in due course.

#### **2b. Please outline any specific issues which your project has encountered as a result of Covid-19. Where you have adapted your project activities in response to the pandemic, please briefly outline how you have done so here. Explain what residual impact there may be on your project and whether the changes will affect the budget and timetable of project activities.**

The project has faced a significant number of difficulties due to Covid-19:

- Delayed project start date of 3 months resulting in an extension to the project end date by one year (to March 2024) to ensure three full field seasons and sufficient monitoring of control agents and scale insects can be undertaken at the end of the project;
- Challenges with shipping live scale insects to the UK for culturing;
- Due to travel restrictions, the survey in South Africa for additional agents (*Activity 1.6*) has been moved to Year 2;
- Furlough of the Project Lead coupled with travel restrictions in the UK and South Africa resulted in no travel to Tristan as was planned in Q2. For this reason, the face to face community engagement (*Activity 2.1*) has been delayed to Year 2 with remote engagement planned in Year 1.

It is worth noting that if the issues are resolved relating to the vessel schedule and availability, it is still possible that Covid-19 could preclude travel to Tristan and the ability to carry out fieldwork relating to Output 4 and 5.

#### **2c. Have any of these issues been discussed with LTS International and if so, have changes been made to the original agreement?**

Discussed with LTS:	<b>Yes</b>
Formal change request submitted:	<b>Yes</b>
Received confirmation of change acceptance	<b>Yes</b>

**3a. Do you currently expect to have any significant (e.g. more than £5,000) underspend in your budget for this year?**

**It is currently unclear whether it will be possible to travel to Tristan in Q4 due to the shipwreck of October 2020; if travel does not go ahead, there is an estimated underspend.**

**3b. If yes, then you need to consider your project budget needs carefully.** Please remember that any funds agreed for this financial year are only available to the project in this financial year.

**If you anticipate a significant underspend because of justifiable changes within the project, please submit a rebudget Change Request as soon as possible. There is no guarantee that Defra will agree a rebudget so please ensure you have enough time to make appropriate changes if necessary. Please DO NOT send these in the same email as your report.**

**4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?**

N/A

**If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document.**

**Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but **should also** be raised with LTS International through a Change Request. **Please DO NOT send these in the same email.****

Please send your **completed report by email** to [Darwin-Projects@ltsi.co.uk](mailto:Darwin-Projects@ltsi.co.uk). The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message e.g. Subject: 25-001 Darwin Half Year Report**