CRITICAL ECOSYSTEM PARTNERSHIP FUND

Pest Management Plan

10th June 2016

CEPF Grant 65990

Ferney Co. Ltd

Support to Private Sector to Engage in Conservation of Mauritius' Threatened Bird Species

Bambous Mountain Range (MUS-2), Mauritius, Madagascar and Indian Ocean Islands

Grant Summary

1. Grantee organization	Mauritian Wildlife Foundation
2. Grant Title	Support to private sector to conservation in Mauritius
3. GEM Number	65990
4. Grant Amount	US $222,225.00
5. Proposed dates of grant	1st July 2016 to 30th June 2019
6. Countries or Territories where pesticides will be applied.	Mauritius
7. Full name, title, telephone numbers, and electronic mail address of Grantee personnel responsible for the pest management plan.	Arnaud Berthelot General Manager +230 5728 2425 aberthelot-valleedeferney@intnet.mu
8. Summary of the project.	The project aims to reintroduce or reinforce threatened endemic Mauritian birds in suitable Mauritian private sector estates, and provide post-release supportive management.
9. Date of preparation of the pest management plan	10th June 2016

Pest Management Approach: This section should describe the applicant's understanding of the problem, their experience with pest management issues, and their proposed actions during the project. Specifically, what do you intend to do and how will you do it? The information presented should include methods of application, e.g. by hand or via aerial spraying.

10. Current and anticipated pest problems relevant to the project.

Invasive alien plants are the greatest threat to the preservation of Mauritius' remnant forest. At Ferney, the commonest exotic trees are the traveller's palm (*Ravenala madagascariensis*) and Cinnamomum tree (*Cinnamomum verrum*), which forms dense monotypic stands in some loactions and suppresses other species. Among the exotic species recorded at Ferney, *Hiptage benghalensis, Ligustrum robustum*, *Mikania micrantha*, *Chromolaena odorata*, *Psidium cattleianum*, *Clidemia hirta*, *Cinnamomum verum, Ardisia elliptica, Flacourtia indica* and are listed among the worst invasive species by the Invasive Species Specialist Group. Targeted weeding of these species at restoration plots are done annually to prevent its expansion.

11. Current and proposed pest management practices.

Our current and proposed practices include the following methods depending on the species to be controlled:

- Exotic herbaceous species, namely vines, herbs and grasses: manually uprooted (no herbicide) when they compete for resources with native plants. This technique is generally only done within a 0.5m diameter around small native plants. Native grasses are encouraged between, but not encroaching, planted seedlings as they help stabilize soil, act as a natural weed mat and keep soil humidity. Herbaceous weeds, excluding vines, which

do not compete with young plants, are left if not in close proximity. Once a closed canopy forms and a dense leaf litter develops, light-loving weeds are less problematic.

- Large trees (>4m +): ring-barking technique with either a machete or chainsaw followed by the application of herbicide on the cut surface with a paint brush to encourage the tree to die slowly and minimize damage from falling branches.
- Soft-wood trees such as ravenale (*Ravenala madagascariensis*) are controlled by injecting herbicide about 1m above the base. A hole is made with a drill to the centre of the trunk and then herbicide injected with a syringe. A wooden pole slightly larger than the hole is then used as a stopper to prevent the tree exuding the herbicide. This method ensures that softwood trees die slowly and fall over with minimal damage to surrounding plants.
- Small trees: if these can be cut without damage to surrounding native vegetation then they are cut close to the base and herbicide applied with a paint brush directly to the cut stump.

Cutting woody weeds without the application of herbicides is an ineffective use of labour and finances as the cut stumps of most woody species simply resprout producing multiple stems and in some instances larger root systems. Subsequent control is thus harder. Herbicides reduce costs by extending maintenance cycles, limit soil erosion, and enable difficult to control species to be targeted. Uprooting woody stumps is not advisable at several Ferney sites as the slopes are steep and the soil fragile.

As fast-growing weeds are the greatest threat to open restoration sites, we have adopted a number of approaches to reduce weed establishment:

- Avoid adjacent open restoration sites as weeds can spread rapidly over large areas, increasing the need for regular maintenance. Keeping natural vegetation barriers reduces the spread of weeds between sites, thereby reducing management.
- Thin invaded areas and gradually replace the exotic vegetation to minimize light levels.

Removal of cut or uprooted material is important and some species can readily resprout (e.g. *Mikania micrantha*, *Hiptage benghalensis, Clidermia hirta, Ardisia elliptica, Wikstroemia indica, Kalanchoe pinnata*).

12. Relevant integrated pest management experience within the project area, country or region.

Herbicide trials and advice from the Mauritian Wildlife Foundation, University of Mauritius and National Parks and Conservation Services have guided the design of a weed management strategy. Ferney Co. Ltd has also refined it's techniques with over a decade of restoration activities in Mauritius.

13. Assessment of proposed or current pest management approach and recommendations for adjustment where necessary.

The proposed and current weed management approaches are built on advice, experience and trials from multiple partners, including our own trials and expertise.

Pesticide Selection and Use: This section aims to get a comprehensive understanding of the pesticide that will be selected, why it was selected and what efforts were made to assess risk. Note that in this section the applicant will

also be required to present information on the potential risk that the selected pesticide will have on non-target species.

14. Description of present, proposed and/or envisaged pesticide use and assessment of whether such use is in line with best management practices.

Garlon 4 (active ingredient: triclopyr).

The only broad spectrum systematic herbicides that targets broad leaf weeds and woody species that are readily available in Mauritius from reputable companies are Garlon 4 and Tordon 101. Originally Tordon 101 was used but this herbicide was deemed less safe due to its volatility, longer decomposition rate and because it was verbally reported to have greater non-target effects on indigenous plants. Garlon 4, albeit more expensive, was chosen instead as it is classified as class III (slightly hazardous) by the WHO Recommended Classification of Pesticides by Hazard (2005). Garlon 4 is applied only to cut stumps, ring-barked trunks, or injected into tree trunks so the risks of affecting non-target organisms are minimal. As application is directed and there is no foliar spraying, there is little chance of herbicide seeping into the groundwater.

15. Indication of type and quantity of pesticides envisaged to be financed by the project (in volume and dollar value) and/or assessment of increase in pesticide use resulting from the project.

Funding from CEPF is not being sought to cover the costs of herbicide.

16. Chemical, trade, and common name of pesticide to be used.

Triclopyr, trichlopyr: 3,5,6-trichloro-2-pyridinyloxyacetric acid butoxethyl ester 61.6 %, Garlon 4

17. Form in which pesticide will be used (e.g., pellet, spray).

Spray form – hand sprayers.

18. Specific geographic description of where the pesticide will be applied: name of province, district, municipality, land owners, or map coordinates (if available); and the total area (hectares) to which the pesticide will be applied.

Ferney Forest Reserve, Mauritius.
Ferney Co. Ltd.

An area of 9 ha. will be weeded using Garlon 4 to control invasive woody weeds.

19. Assessment of environmental, occupational and public health risks associated with the transport, storage, handling and use of the proposed products under local circumstances, and the disposal of empty containers.

Garlon 4 is classified as class III (slightly hazardous) by the WHO Recommended Classification of Pesticides by Hazard (2005). Garlon 4 is applied only to cut stumps, ring-barked trunks, or injected into tree trunks so the risks of affecting non-target organisms are minimal. As application is directed and there is no foliar spraying, there is little chance of herbicide seeping into the groundwater. The application of herbicide is not done during rainfall or if there is a threat of rainfall to avoid it being leached into the soil, affecting non-target organisms and because this water-soluble herbicide would be less effective.

20. Description of plans and results for tracking of damage to and/or deaths of non-target species prior to pesticide application and subsequent to pesticide application.

Damages to non-target species are monitored by regularly visiting the site post-herbicide application. As herbicide does not immediately affect plants, it is possible to monitor impacts once weeding has been done. This is also easier to lower tree density. Any impacted plants can be readily identified by loss of leaves, wilting, bark damage and tree death.

21. Pre-requisites and/or measures required to reduce specific risks associated with envisaged pesticide use under the project (e.g., protective gear, training, upgrading of storage facilities, etc.).

As with all chemicals, there are risks to human health arising from intentional or unintentional direct consumption, improper application resulting in the herbicide coming into direct contact with people or wildlife, inhalation of aerial sprays, or following food consumption. The risks are deemed minimal because of the following.

- Application procedure: directed, no foliar or aerial spraying.
- Rapid absorption of herbicide in through the plant cuticle, becoming completely rainfast within 2 hours.
- Low toxicity to humans. The US Environmental Protection Agency classifies it as Category D – "meaning there is no evidence it causes cancer in humans".
- Follow manufacturer's recommendations in terms of health and safety and application rates.
- Use of Bazasol Red, a colourant dye, to indicate where the herbicide has been applied, prevent unintended double applications, and to safeguard the staff as the dye can be detected if it comes into contact with skin or clothing. Dye markers allow for greater precision and accuracy as spray patterns can be easily identified, giving early indications of drift to non-target areas. Colourants also help reveal any faults in nozzles, applicators or safety clothing, and so can help to reduce operator contamination. Broken or poorly functioning equipment is replaced and only good quality applicators are purchased.
- Annual staff training about the risks of herbicide use and how to apply and handle herbicide safely both for the environment and staff well-being.
- Provision of vinyl gloves, gardening gloves and masks to reduce contact with the skin and inhalation.
- Labeling of containers used for the application of herbicides and storage in a locked cupboard in an area only accessible by authorized personnel.
- A first aid kit is carried by personnel and one is kept in the staff mess room at all times. There are three trained first aiders on site who receive annual training and there is a protocol to follow should staff require additional medical treatment. All staffs have access to the company doctor, an allowance of sick leave and medical insurance. Activities are always performed in teams.
- A Material Safety Data Sheet for Garlon 4 is kept with the chemical, with instructions on what to do should the product be ingested.
- Participation in weeding activities by the general public will be restricted to hand pulling to avoid the use of herbicides as well as potentially dangerous tools.
- If herbicide application is needed in an area frequented by the general public, then this work will be done before the arrival of visitors. Visitors will be requested to remain on the paths and be explained that herbicides have been applied.

- All schoolchildren involved in the project will learn about the importance of invasive alien plant eradication.

22. Basis of selection of pesticides authorized for procurement under the project, taking into consideration WHO and World Bank standards, the above hazards and risks, and availability of newer and less hazardous products and techniques (e.g. bio-pesticides, traps).

Garlon 4 is chosen as it is rapidly absorbed through the plant cuticle, becoming completely rainfast within 2 hours and is regarded as having low toxicity to humans. The US Environmental Protection Agency classifies it as Category D – "meaning there is no evidence it causes cancer in humans".

23. Name and address of source of selected pesticides.

Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, IN 46268

24. Name and address of vendor of selected pesticides.

Blychem Ltd
Industrial Zone
IBL Complex
Rice Terre
Tel: 203-9355/2039350/2039360
Contact: AYESH JEEWOOLALL

25. Name and address of facility where pesticides will be stored.

Ex-Ferney Sugar Factory, Ferney
Herbicide is stored in a locked cupboard in a locked store.

Policy, Regulatory Framework, and Institutional Capacity: This section aims to understand the institutional and legal framework under which the pesticide will be applied, with reference to the documentation and standards required under local and national law and international good practice. Where the particular pesticide is not regulated at the target site, the proponent must identify similar pesticides and the applicable regulation, international laws in neighboring countries that could apply, and international good practice. The proponent must also explain why this particular pesticide is necessary even in the absence of national laws.

26. Policies on plant/animal protection, integrated pest management, and humane treatment of animals.

Animal Welfare Act 2013
The Plant Protection Act 2006
The Dangerous Chemical Control Act 2004
Mauritius Sugarcane Industry Research Institute examines integrated pest management approaches: http://www.msiri.mu/index.php?rub=18

27. Description and assessment of national capacity to develop and implement ecologically-based AIS control.

Mauritius has been controlling and tackling invasive alien plants for more than two decades. Actively involved in the control of invasive plants are the National Parks and Conservation Services, Forestry Services and private sector companies. The Protected Area Network project is

a collaboration between the aforementioned sectors to control invasive plants to protect remnant indigenous forest.

28. Description and assessment of the country's regulatory framework and institutional capacity for control of the distribution and use of pesticides.

The Local Government Act 2011 necessitates that all vendors in pesticides are regulated and have relevant licences. Under the Dangerous Chemical Control Act 2004 an import permit is required for the sale of herbicides. This is issued and enforced by the Ministry of Health & Quality of Life.

29. Proposed project activities to train personnel and strengthen capacity (list # of people and what they are being trained in).

All staff (12 people) are trained annually in weeding, health and safety, planting techniques, nursery management and plant propagation.

30. Confirmation that the appropriate authorities were approached (who and when) and that the appropriate licenses and permissions were obtained by the project.

No specific licences required.

Consultation: This section aims to outline the range of informed consultations that the grantee has had both with experts to optimize the potential for success, and with stakeholders, particularly local communities, who are potentially affected (by proximity, by the use of certain areas for free-ranging livestock or non-timber forest product collection, etc.) by the use of pesticides.

31. Plans for, dates, and results of expert consultations, if necessary.

NA

32. Plans for, dates, and results of consultations with local communities.

The land on which the herbicide will be used is private.

Monitoring and Evaluation: This section aims to outline what steps the proponent will take to monitor and evaluate the purchase, storage, application and effects of the pesticide in the target area.

33. Description of activities related to pest management that require monitoring during implementation.

Purchase, storage and use of herbicide will be monitored. The amount purchased and the use of herbicide will be compared as part of stocktake procedures.

34. Monitoring and supervision plan, implementation responsibilities, required expertise and cost coverage.

Purchase monitoring: all items are signed for and sales are summarized annually providing a record of how much product is purchased.

Stocktake: daily record of stocktake is kept.

Use: the amount of diluted herbicide used in weeding activities, together with the person hours, per restoration site is recorded. This enables analysis of amount of herbicide per hectare to weed different habitat types and in relation to the frequency and number of weed management activities. Use of herbicide can also be checked against purchase.