Assessing the impacts of climate change on the Phenology of native Mauritian plants

Poonam Tatayah (Mrs)

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Phenology

Timing of specific biological events with relation to seasonal and climatic change

Background

- A phenology Project at MWF was initiated in 2007
  - Decline in number of endemic birds was suspected to be caused by:

    Degraded habitats, scarcity of natural foods coupled with changes in local climate

  - Supplementary feeding to boost up population
  - Understand timing and duration of natural food availability in the forest
  - Reduce supplementary feeding when natural foods were plentiful

- Current project involves setting up of meteorological equipment five stations to monitor temperature and rainfall.

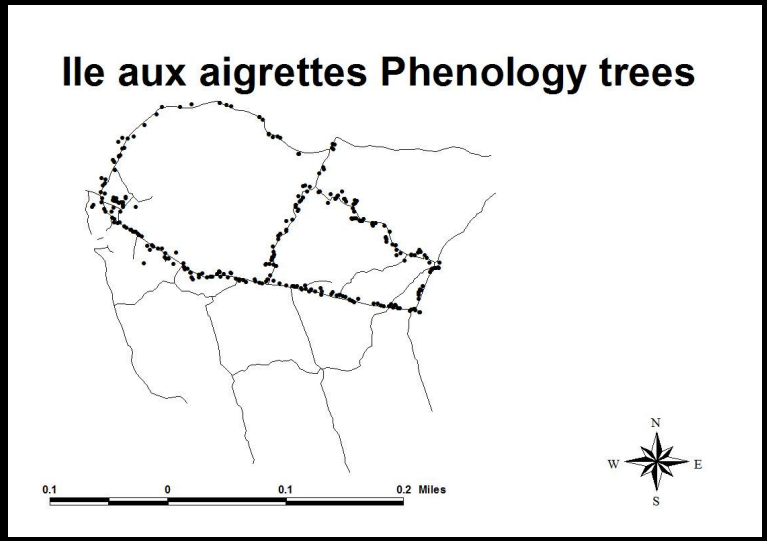
Analysis of data will show effect of climatic changes on our plants

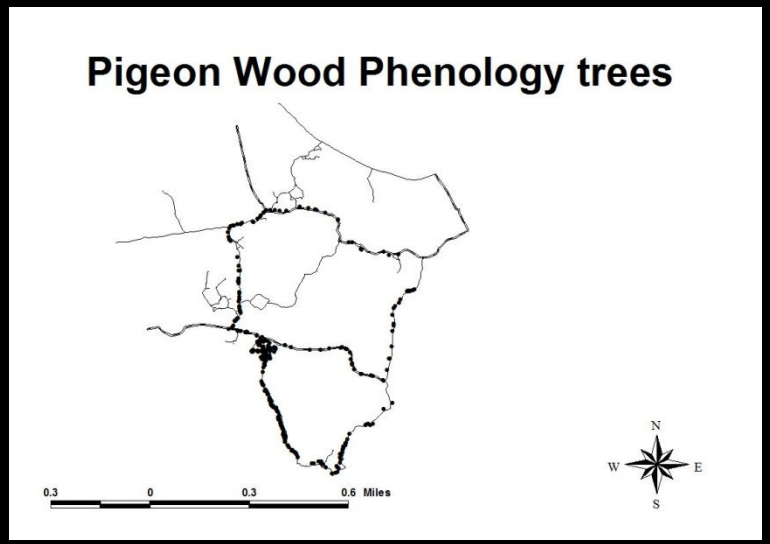
Aims and objectives

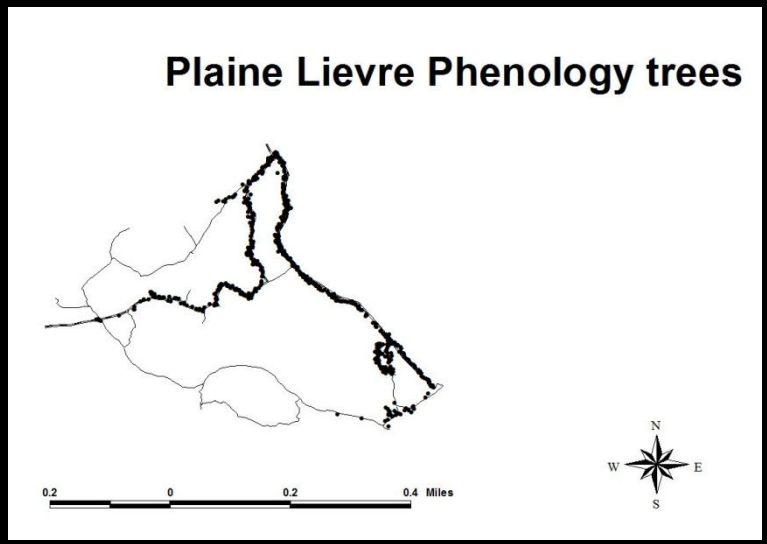
- To study the phenology of selected native and exotic plants within the Mauritian forest.
- To forecast the impact of climate change on some selected native and exotic species within the Mauritian forest.
- To provide recommendations to improve resilience of native forests to climate change.

Methodology

- Five study sites: Plaine Lievre , Pigeon Wood, Combo, Bel Ombre and Ile Aux Aigrettes







- 20 individuals of 48 native and 16 exotic food plants tagged
- Plants are monitored monthly

PHENOLOGY MONITORING SHEET

Sub-population: PIGEON WOOD **Start time:** **End time:**

Observer (full name):

Date: **^Weather during the walk:**

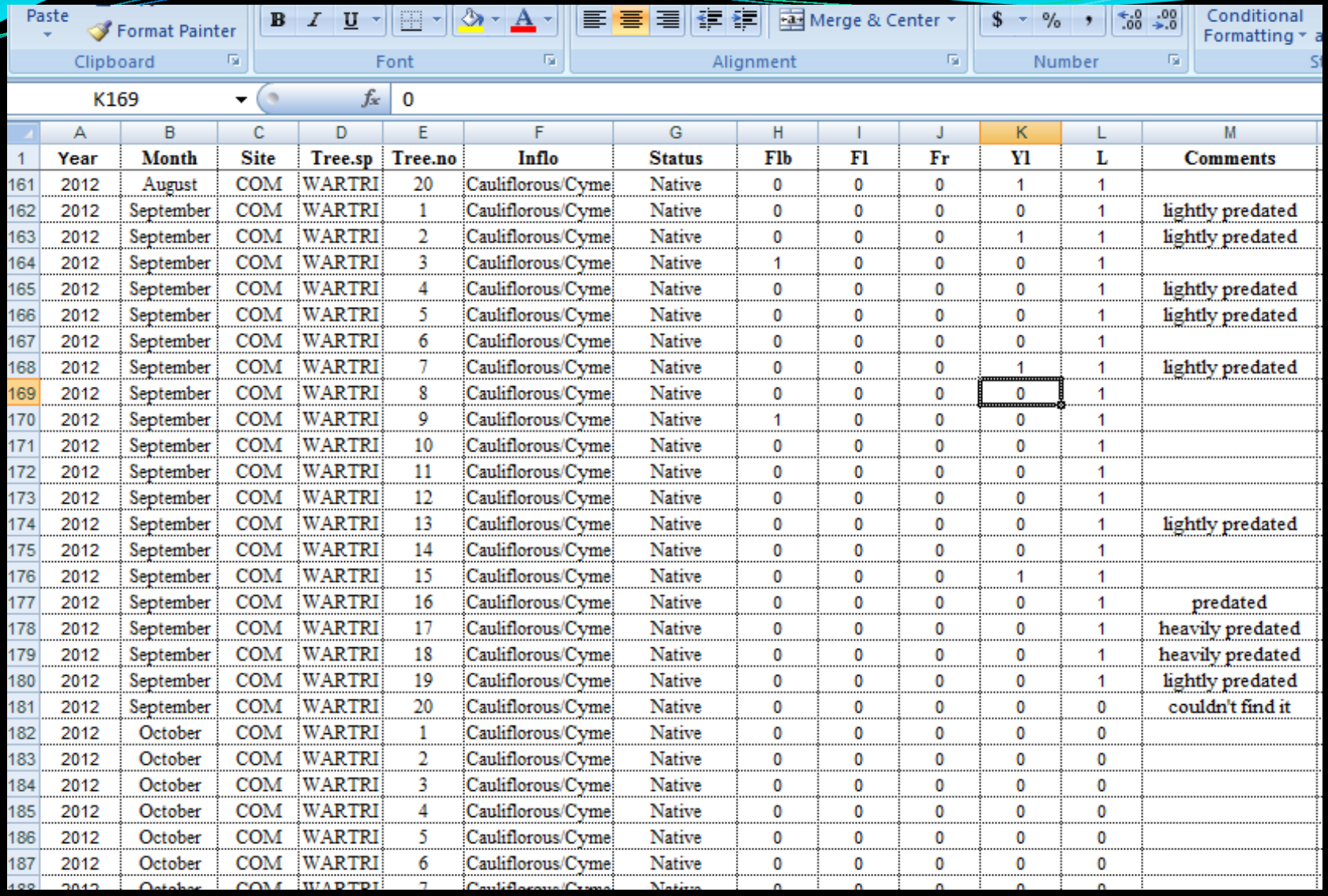
Sr. no.		Observed tree species	Tree no.	Inflorescence	*FlB	*Fl	*Fr	*Yl	*Lv	¯ Comments
Fenced area around house										
1		CALCIT	1	Axillary/Racaeme						
2		NUXVER	1	Terminal/Racaeme						
3		OCHMAU	1	Ter-Axi/Cyme						
4		LITMON	1	Axillary/Cyme						
6		ANTMAD	1	Cauli-Axi/Racaeme						
7		GAESPP	1	Terminal/Cyme						
8		TABPER	1	Terminal/Cyme						
9		LITGLU	1	Axillary/Cyme						
10		HOMSPP	1	Axillary/Racaeme						
11		ERYMON	9	Terminal/Cyme						

^ Fill in the appropriate: - cloudy/drizzling/ light shower/ heavy rain/ windy/ sunny (it can be just sunny **or** sunny, windy and drizzle **or** cloudy, light shower and then sunny)

* Note down presence of flower buds **(FlB)**, lowers **(Fl)**, fruits**(Fr)**, young leaves **(Yl)** and leaves **(Lv)** on the tree as '1' for presence and '0' for absence

¯ Fill in the appropriate **A** - exotic/other native bird species seen feeding or pecking (specify the bird species), **B** - evidence of destruction caused by monkeys to the tree food source (you can illustrate), **C** - Tree dead, **D** - any other interesting observation (please specify)

- Flowering, fruiting, presence of flower buds , young leaves and old leaves recorded



	Year	Month	Site	Tree.sp	Tree.no	Inflo	Status	Flb	Fl	Fr	Yl	L	Comments
161	2012	August	COM	WARTRI	20	Cauliflorous/Cyme	Native	0	0	0	1	1	
162	2012	September	COM	WARTRI	1	Cauliflorous/Cyme	Native	0	0	0	0	1	lightly predated
163	2012	September	COM	WARTRI	2	Cauliflorous/Cyme	Native	0	0	0	1	1	lightly predated
164	2012	September	COM	WARTRI	3	Cauliflorous/Cyme	Native	1	0	0	0	1	
165	2012	September	COM	WARTRI	4	Cauliflorous/Cyme	Native	0	0	0	0	1	lightly predated
166	2012	September	COM	WARTRI	5	Cauliflorous/Cyme	Native	0	0	0	0	1	lightly predated
167	2012	September	COM	WARTRI	6	Cauliflorous/Cyme	Native	0	0	0	0	1	
168	2012	September	COM	WARTRI	7	Cauliflorous/Cyme	Native	0	0	0	1	1	lightly predated
169	2012	September	COM	WARTRI	8	Cauliflorous/Cyme	Native	0	0	0	0	1	
170	2012	September	COM	WARTRI	9	Cauliflorous/Cyme	Native	1	0	0	0	1	
171	2012	September	COM	WARTRI	10	Cauliflorous/Cyme	Native	0	0	0	0	1	
172	2012	September	COM	WARTRI	11	Cauliflorous/Cyme	Native	0	0	0	0	1	
173	2012	September	COM	WARTRI	12	Cauliflorous/Cyme	Native	0	0	0	0	1	
174	2012	September	COM	WARTRI	13	Cauliflorous/Cyme	Native	0	0	0	0	1	lightly predated
175	2012	September	COM	WARTRI	14	Cauliflorous/Cyme	Native	0	0	0	0	1	
176	2012	September	COM	WARTRI	15	Cauliflorous/Cyme	Native	0	0	0	1	1	
177	2012	September	COM	WARTRI	16	Cauliflorous/Cyme	Native	0	0	0	0	1	predated
178	2012	September	COM	WARTRI	17	Cauliflorous/Cyme	Native	0	0	0	0	1	heavily predated
179	2012	September	COM	WARTRI	18	Cauliflorous/Cyme	Native	0	0	0	0	1	heavily predated
180	2012	September	COM	WARTRI	19	Cauliflorous/Cyme	Native	0	0	0	0	1	lightly predated
181	2012	September	COM	WARTRI	20	Cauliflorous/Cyme	Native	0	0	0	0	0	couldn't find it
182	2012	October	COM	WARTRI	1	Cauliflorous/Cyme	Native	0	0	0	0	0	
183	2012	October	COM	WARTRI	2	Cauliflorous/Cyme	Native	0	0	0	0	0	
184	2012	October	COM	WARTRI	3	Cauliflorous/Cyme	Native	0	0	0	0	0	
185	2012	October	COM	WARTRI	4	Cauliflorous/Cyme	Native	0	0	0	0	0	
186	2012	October	COM	WARTRI	5	Cauliflorous/Cyme	Native	0	0	0	0	0	
187	2012	October	COM	WARTRI	6	Cauliflorous/Cyme	Native	0	0	0	0	0	

- Data is entered into the main database

Setting up of equipment

Setting up of equipment done with the help of technical staff from the Mauritius Meteorological Services and National Parks and Conservation Service

Pigeon Wood

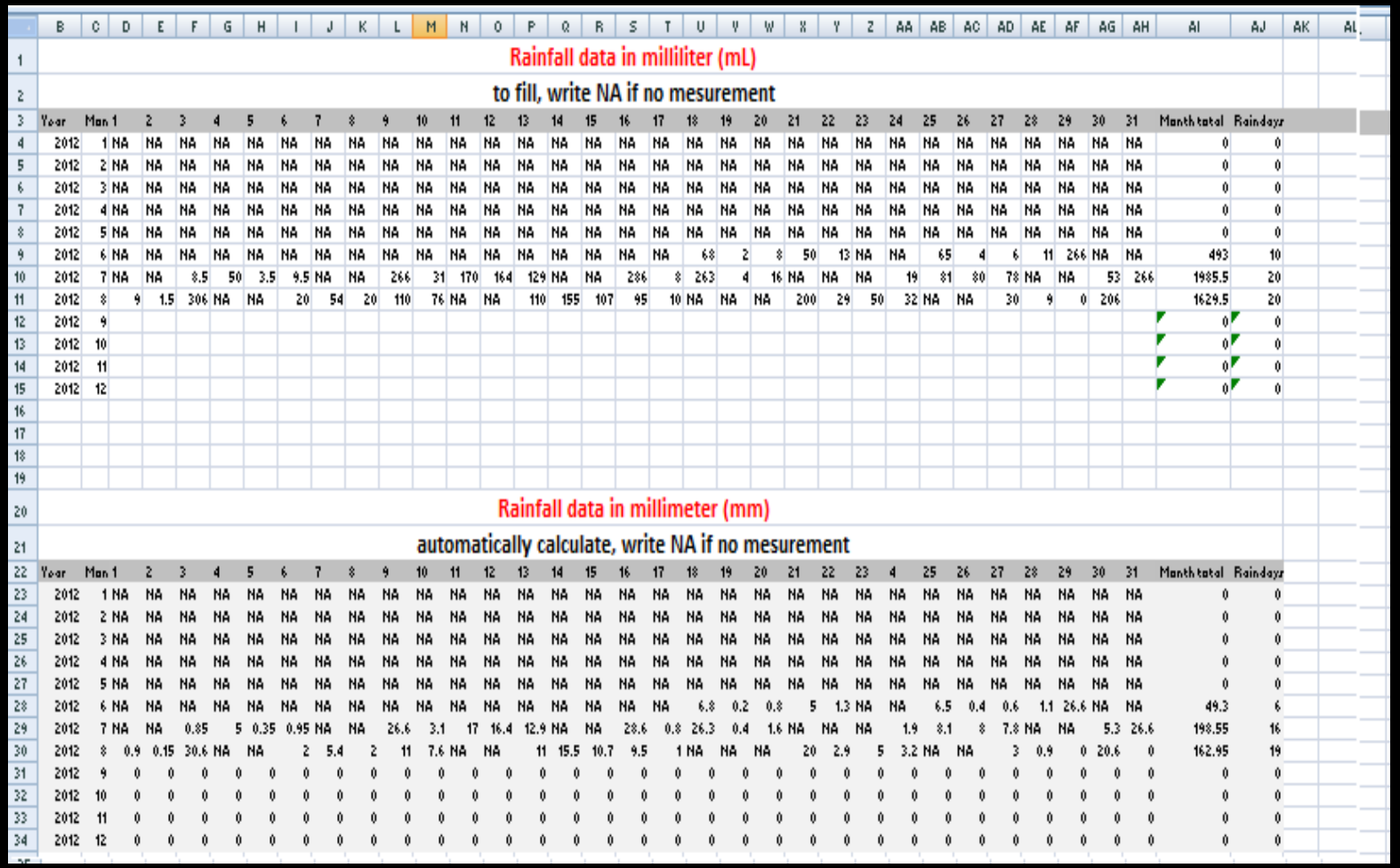
Brise Fer

Training of field staff

MWF staff have been trained for monitoring the phenology of plants

Training of field staff

Staff have been trained to collect rainfall and temperature data



Rainfall data in milliliter (mL)

to fill, write NA if no mesurement

Year	Mon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Month total	Rain days
2012	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	68	2	8	50	13	NA	NA	65	4	6	11	266	NA	NA	493	10
2012	7	NA	NA	8.5	50	3.5	9.5	NA	NA	266	31	170	164	129	NA	NA	286	8	263	4	16	NA	NA	NA	19	81	80	78	NA	NA	53	266	1985.5	20
2012	8	9	1.5	306	NA	NA	20	54	20	110	76	NA	NA	110	155	107	95	10	NA	NA	NA	200	29	50	32	NA	NA	30	9	0	206		1629.5	20
2012	9																															0	0
2012	10																															0	0
2012	11																															0	0
2012	12																															0	0

Rainfall data in millimeter (mm)

automatically calculate, write NA if no mesurement

Year	Mon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	4	25	26	27	28	29	30	31	Month total	Rain days
2012	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
2012	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.8	0.2	0.8	5	1.3	NA	NA	6.5	0.4	0.6	1.1	26.6	NA	NA	49.3	6
2012	7	NA	NA	0.85	5	0.35	0.95	NA	NA	26.6	3.1	17	16.4	12.9	NA	NA	28.6	0.8	26.3	0.4	1.6	NA	NA	NA	1.9	8.1	8	7.8	NA	NA	5.3	26.6	198.55	16
2012	8	0.9	0.15	30.6	NA	NA	2	5.4	2	11	7.6	NA	NA	11	15.5	10.7	9.5	1	NA	NA	NA	20	2.9	5	3.2	NA	NA	3	0.9	0	20.6	0	162.95	19
2012	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- Rainfall data is entered in the main database

- Equipment have been installed at all field stations
- Phenology monitoring ongoing
- Data entry ongoing
- Maintenance of tracks ongoing
- Staff are being trained regularly
- Phenology calendars are being upgraded

In Progress

- Data analysis
- Phenology calendars

Antidesma madagascariense
Euphorbiaceae or Phyllanthaecae

Common name: Bois bigaignon bâtard
Conservation status: Least Concern
Distribution: Intermediate and Upland forests

Description: The tree is ~8m with lots of spreading branches and closed canopy. The bark is light brownish grey, cream-coloured inside and delicately cracked. The leaves are simple alternate, untidily arranged all along the branches. Elliptical lamina, pale yellow to green, pointed acute apex and a rounded base. Red flowers, about 2-3mm, male and female on separate trees. Fleshy green fruits (when young) which turn shiny red and black at maturity (only on female trees).

Phine Lievre

	2007	2008	2009	2010	2011	2012
J			△●	△	△	△
F		△	△	△	△●○	△
M		△	△	△●	△	△●×
A		△●○	△●	NA	△●	△
M			△●		△ ○	△
J		△ ○	△	△	△	△
J		△	△		△ ○	△
A		△	△	△	△	△
S		△			△●	△
O	NA	△	△●		△●	
N	△	△ ×	△●×	△●	△	
D	△	△	△	△●×	△	


Leaves with domatia on midvein

Pigeon Wood

	2007	2008	2009	2010	2011	2012
J		△	△	△ ○	△	△●×○
F		△	△ ×	△ ○	△●×○	△●
M		△	△ ×	△ ○	△●	△●×○
A		△	△●×	△	△●	△ ○
M		△	△ ×○	△	△ ○	△●○
J		△ ×	△ ○		△ ○	△●○
J		△	×○	△	△	△●×○
A		△●	NA	△	△●	△
S	△	△●	△×○		△●○	△●×
O	×	△●	△●×		△	
N	△●×	×	△ ×	△●×○	△●×○	
D	△●×	△●	△	△●	△●	


Inflorescence

KEY	
Young leaves	△
Flower Buds	●
Flowers	×
Fruits	○

Acknowledgement

- **Mauritius Research Council**, the **Ministry of Environment and Sustainable Development**, and **JICA** for funding through the **Africa Adaptation Programme**

- **National Parks and Conservation Service** for permission to conduct study in the Black River Gorges National Parks

- **Mauritius Meteorological Services** for assistance setting up the meteorological equipment and technical advice.

Thank you for your attention !