

Species Action Plan – *Impatiens gordonii*

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Species description

As described in Hansen & Laboudallon (2013), *Impatiens gordonii* is a perennial, tall, fleshy herb to 1 m high, smooth in all parts and with alternate, long-stalked, narrowly ovate and pointed leaves to 16 cm long. The leaf margins are crenated or slightly serrated and petioles long to 6 cm. The axillary inflorescences group up to three flowers to 5 cm wide, with pedicels to 6 cm long. The flowers are composed of three sepals and three petals. The two upper, lateral sepals are deltoid and to 6.5 mm long, while the third, lower and median one contracted into a long, distinct, curved and white to slightly rose spur to 7 cm long. The three petals are white with a pink tinged on the upper side and grey on the back. The upper one is to 2 cm long and the two lateral ones a bit longer to 2.5 cm and deeply two-lobed. The five stamens have partly fused, rose filaments and purple anthers fused into a small “crown” directly on the ovary, which is to 3 mm long and with the stigmas imbedded on the surface. The fruit is a smooth, green, spindle-shaped and dehiscent capsule to 1.4 cm long.

The flowering season is normally throughout the wet season, from November to April.

Impatiens appears to be reproducing mostly by cuttings of broken stems. Information on its biology is found in Gerlach (2011) and Griffiths (2004, 2006). It grows mostly on big boulders in ravines. Pollinators are unknown. The species specificity to submontane and montane ravine forests also reduces its capacity to spread in large areas.

In the past, two names have been used for this endemic *Impatiens* in the Seychelles, with *Impatiens thomassetii* thought to be a synonym of *I. gordonii*. The affinities of the Seychelles plants, whether as one or two species, have been considered to be with *I. walleriana* and *I. usambarensis*. However, phylogenetic data using ITS provided strong support for the East African species *I. usambarensis* as sister to *I. gordonii*, with *I. walleriana* sister to that species pair. Additionally, gower-metric principle coordinate analysis recognised *I. walleriana*, *I. usambarensis* and *I. gordonii* as separate morphological entities and confirmed *I. thomassetii* as a synonym of *I. gordonii* (Griffiths & Matatiken 2013).

Conservation status

This species has been assessed as Critically Endangered under criterion B2ab (iii,v) as the area of occupancy is estimated to be less than 10 km² and the populations are severely fragmented and there is an observed continuing decline in area, extent and quality of habitat as well as the number of mature individuals.

[Link to IUCN assessment when available online](#)

Distribution

This species has historically been known from eight distinct populations in Seychelles: on Mahé (four populations) and Silhouette Island (four populations). Today, only one population potentially remains on Mahé, at Trois Frères, but a recent exploration in March 2018 done by the authors of this study did not manage to record the species. Co-authors of the studies led by A. Griffiths in 2005 have also revisited that site without being able to relocate the *Impatiens* population (J. Mougou, pers. comm. 2018).

On Silhouette, two sites are known to host the species. The population on the South slope of Mont Dauban has been discovered recently and was confirmed by the authors of this study. The population in the Anse Mondon valley, historically and currently the most abundant one, still remains at present. The semi-natural population at Jardin Marron, planted by Gerlach in 2001, has recently disappeared and was last seen in 2012. Finally, the population at Rende d’Avance, mentioned by a knowledgeable

inhabitant of Silhouette, Abdulah Jumaye, hasn't been relocated during this study but more exploration is needed to confirm if it is still existent.

Overall, the species is restricted in an area less than 8 km². The total extent of occurrence of the species is 0.256 km².

Habitat

The habitat-type where *Impatiens gordonii* is found appears typically to be "Submontane ravine forests" (Senterre & Wagner 2014). This habitat-type is rare, has been intensely deforested in the past, and is at the same time under-explored due to its difficult accessibility. Additionally, most explorers have focussed primarily on the hottest spots of endemism, i.e. in the montane belt. *Impatiens* has probably never been a very abundant species, considering its narrow ecological range, but has suffered from invasive alien species encroachment (e.g. *Clidemia hirta*, *Psidium cattleianum*, *Coffea spp.*), herbivory by *Hippotion eson* (The Common Striped Hawkmoth) (Griffiths & Matatiken 2013), habitat destruction and possibly poaching from collectors.

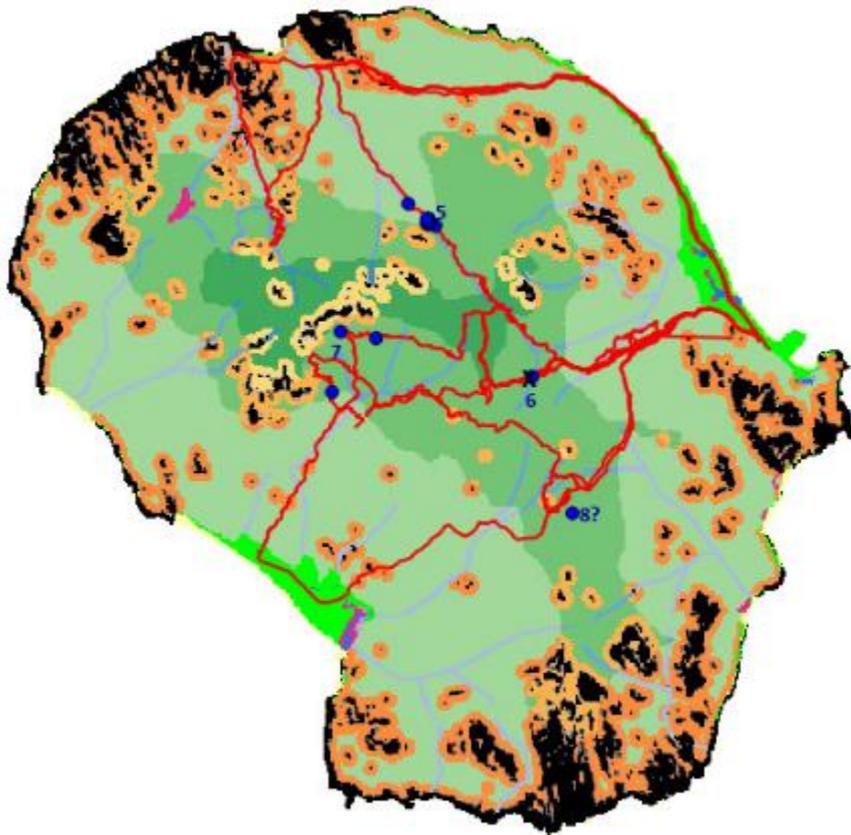


Figure 1 Distribution map of *Impatiens gordonii*. The background map represents the different types of habitats (see Senterre & Wagner 2014).

Populations

Out of the eight historically known populations, five are thought to be extinct. The Morne Seychellois population (last seen by Friedmann 1994) has been actively searched by J. Mougale and Griffiths from 2001 to 2003 and is therefore more likely to have disappeared. The Jardin Marron population (introduced there by J. Gerlach in 2001 from 59 individuals collected from the Anse Mondon population) was well known, being next to the trail, therefore it disappeared between 2014 and 2015.

The Trois Frères population (discovered in the 1970s) was last assessed by Mougat (2005) and Griffiths (2004, 2006) who recorded 14-22 individuals in three clumps. However, an exploration by the authors of this study in March 2018 and recent explorations by the co-authors of the studies led by Griffiths in 2005 did not succeed to record any individuals. Thus, the Trois Frères population is thought to be extinct due to herbivory (J. Mougat, pers. comm. 2018).

The most important historical population, at the Anse Mondon valley, remains until today but seems to have reduced. From 100-200 individuals estimated at its discovery (Matyot 1995), the population dropped to 108 individuals counted by Griffiths (2004) and to 67 individuals counted by Senterre *et al.* (2018) in a large patch interrupted by two gaps. All plants observed were adults or subadults, and no seedlings have been observed recently.

The Mont Dauban population was discovered in 2009 by Dr. Bruno Senterre, consisting of one isolated clump of ca. five individuals. During the 2017-2018 study, the area was revisited and two additional clumps were found within a relatively large area on the upper slopes south of Mont Dauban, which appears to be very wet, on huge rock boulders and particularly difficult to explore. In total 22 individuals have been observed and more clumps are probably present.

Finally, a knowledgeable inhabitant of Silhouette (Abdulah Jumaye), mentioned that the largest population he knew was to be found not far from the trail Grand Barbe-La Passe, at Rende d'Avance. More efforts are required to try to relocate that population, as no individuals have been found during the 2017-2018 survey.

The table below, extracted from Senterre *et al.* 2018, summarizes the data on the eight populations from Silhouette Island and from Mahé.

	Locality	First seen	Last seen	Max. abundance	Current abundance
1	Cascade	Thomasset (1901)			0 (Friedmann 1994)
2	Morne Blanc	Thomasset (1905)			0 (Friedmann 1994)
3	Morne Seychellois	Procter (1970)	1994		0 (Mougat 2001)
4	Trois Frères	Procter (1974)	2004	25	0 (Senterre 2018)
5	Valée de l'Anse Mondon	Matyot (1995)	2018	150	67
6	Jardin Marron	Gerlach (2001)	2012	59	0 (Senterre 2015)
7	Mont Dauban	Senterre (2009)	2018	22	22
8	Rende D'Avance	Jumaye (2000?)		Unknown	Unknown

Table 1 Summary of the 8 populations for *Impatiens gordonii*.

Threats

Climate change is probably the dominant threat to *Impatiens gordonii*. The submontane belt (being at the bottom of the cloud belt) is more likely to be affected by climate change (and thus elevation of the cloud belt) compared to lowland forest species and montane forest species (both being more distant from the ecological transition in air humidity). In addition, the plants most likely to be affected by a possible change in the cloud belt pattern would certainly be non-woody corticolous (epiphytic) and rupicolous (growing on rocks) small seeded species (see also Blanc 2002).

Invasive alien species colonisation of ravine forest, especially *Clidemia hirta* and *Begonia ulmifolia*, is also a threat to the survival of *Impatiens gordonii*. The populations on the South Slope of Mont Dauban have been observed surrounded by thick bushes of *Clidemia hirta*, competing for the light and habitat. *Begonia ulmifolia* also grows on big boulders and potentially compete with *Impatiens* for the same niche.

With respect to the Jardin Marron semi-natural population, poaching is most likely the main threat that affected it. Additionally, inadequate habitat and management led to a possible lack of canopy resulting in higher light intensity, temperature and humidity that have impacted the population.

In his Red List assessment from 2013, Griffiths also mentioned the impact of the Common Striped Hawkmoth, habitat destruction and inbreeding depression indicated by the malformed spur found in the Trois Frères subpopulation on Mahé, and from experimental findings of reproductive biology and breeding studies (Griffiths 2006).

Recovery actions

Past and Current Management Actions

93% of Silhouette Island, including all *Impatiens* populations, has been declared National Park in 2010. The island is owned by the Seychelles Government that gave a lease to the Islands Development Company (IDC) to manage it since 1983. In 2008, the Silhouette Foundation, regrouping all main stakeholders from Silhouette Island (Ministry of Environment, Energy and Climate Change (MEECC), Seychelles National Parks Authority (SNPA), Islands Development Company (IDC) and Island Conservation Society (ICS), was created in order to conserve, rehabilitate & enhance Silhouette ecosystems in harmony with sustainable low impact human development and eco-tourism. The Silhouette National Park is managed under the Silhouette Foundation by the Island Conservation Society, a non-governmental organization, in collaboration with SNPA and MEECC. However, an official Regulation Order is lacking to define clear rules and regulations within the boundaries of the National Park.

On Mahé, the Trois Frères population is likely extinct considering that James Mougale and Damien Doudeé both searched for it in recent years, unsuccessfully, as well as the authors of this study.

There are four known *ex situ* collections of *Impatiens gordonii* (BGCI 2018). However, propagation was once flourishing for *Impatiens gordonii*, both in Europe (Kew, Brest, Nancy, and other botanical gardens) and in Seychelles' Botanical Garden and Barbaron Biodiversity centre. As part of a Darwin Initiative project, in collaboration with the University of Reading, the Ministry of Environment and Natural Resources and Transport (MENRT, Seychelles), and the Eden Project, "Ray of Hope", a hybrid between *I. gordonii* and *I. walleriana* was produced in 2006. The money raised has gone back to the conservation of the Seychelles flora including training local people and establishing vital nursery protocols for the endemic flora of the islands. The project also investigated the species recovery of *Impatiens gordonii*. Since 2010, this project has stopped and only four individuals of "Ray of Hope" are currently kept in the Eden Project back-up collection. As of today, 14 individuals of *Impatiens gordonii* are grown in the Eden Project nursery in the UK and their status checked regularly. Only one record of spontaneous self-seeding has been recorded (L. MacKinnon, pers. comm. 2018).

Recovery aims

- Increasing the number of mature individuals contributing to a viable population, allowing the status of the species to be downgraded.
- A genetic representative *ex situ* collection base.
- A viable population of this species on Mahé Island.

Suggested conservation actions

The conservation actions in the table have been ranked by priority.

Activity	Budget needed to achieve this (per year)	Timeframe	More details
Survey Morne Seychellois National Park and Silhouette National Park to find additional subpopulations and relocate the Rende d'Avance and Trois Frères populations	1250 USD	Once every 2/3 years	5 working days. Consultancy fee: 250\$/d
Monitor the currently known populations	1250 USD	Once a year	5 working days. Consultancy fee: 250\$/d
Make representative <i>ex situ</i> collections of <i>Impatiens gordonii</i> , encompassing the remaining genetic diversity of the species.	700 USD for collection of seeds, seedling and broken branches. Nursery construction: 25 000 USD (once) Nursery maintenance: 1000 USD	Twice a year during fruiting season.	6 working days for 2 staff per year: 6*2=12 days per year. Seed collection from all known adult plants. Limited number of seedlings to be harvested due to Critically Endangered status. Guidelines available on: http://globaltrees.org/wp-content/uploads/2013/11/tree_species_low.pdf
Reinforce current populations by transferring new semi-natural populations to montane forest	700 USD for planting seedlings in montane forest	Once a year during Northwest monsoon	6 days for 2 staff per year: 6*2=12 days per year.

Develop propagation protocols to allow this species to be propagated in various locations.	1750 USD	Once	7 days. Consultancy fee: 250\$/d
Contact international botanical gardens that used to propagate <i>Impatiens gordonii</i> to exchange expertise and information.	In kind	Opportunistic	E-mail exchanges
Reintroduce this species to the montane habitat of Mahé island	500 USD for 6 working days for 15 staffs. Additional boat fare: or 1500 USD	Seedlings should be planted during Northwest monsoon from November to March. Ravine forests around Jardin Marron (away from touristic area) would good restoration sites.	<ul style="list-style-type: none"> • The amount of working days would depend on the amount of seedlings available and manpower. • Ideally, seedlings should be planted once a month from November to March. A team of max. 15 people carrying up to eight seedlings would be necessary. • If labourers from Mahé are to be employed, additional costs are needed for boat transfers. • The budget assumes that a nursery is already available
Integrate this species into future restoration efforts for submontane and montane forest, including on the island of Mahé.	50 000 USD	Seedlings should be planted during Northwest monsoon from November to March. Seedlings can be produced on Silhouette Island and shipped to Mahé for restoration. Ravine forests at Cascade and Mare aux Cochons would be good restoration sites.	<ul style="list-style-type: none"> • The amount of working days would depend on the amount of seedlings available and manpower. • The budget needs to include production costs on Silhouette, biosecurity costs, transport costs from Silhouette to Mahé, transport costs on Mahé and restoration costs on Mahé.

Conclusion

Impatiens gordonii has been assessed as Critically Endangered under the IUCN criterion B1ab(iii,v)+B2ab(iii,v) as the extent of occurrence and area of occupancy is estimated to be less than 10 km², populations are severely fragmented and there is a continuing decline in area, extent and quality of habitat and number of mature individuals. All individuals are potentially restricted to a single island in Seychelles, Silhouette. Therefore, the specific activities highlighted above are essential for the preservation of the species. Additionally, we recommend that more surveys should be done in the Silhouette National Park and on Mahé in order to find additional subpopulations at Mont Dauban, locate the subpopulation at Rende d'Avance and reassess the status of the population at Trois Frères.

Due to the critical status of the species, we recommend that any conservation activities suggested above are undertaken in collaboration with the Ministry of Environment, Energy and Climate change (MEECC) in Seychelles, the Seychelles National Parks Authority (SNPA), the Island Conservation Society (ICS) and international organizations such as Botanic Gardens Conservation International for their expertise. We also recommend that local experts and organizations such as the Seychelles National Herbarium and the Terrestrial Restoration Action Society of Seychelles (TRASS) are involved in the project.

Propagating the species on Silhouette Island and Mahé will require the close collaboration with private stakeholders working on Silhouette Island. For such a project to be successful, additional awareness will be needed in order to get the logistical and financial support of all organizations. The Silhouette Foundation has a limited budget, allowing only basic conservation work on Silhouette so additional funding will need to be sourced. International botanical gardens could be approached in order to develop long-term support and collaborations.

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