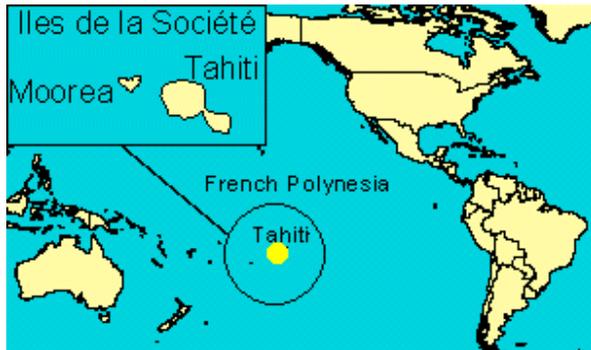


# Biodiversity Loss : Biological invasion the case of Miconia

by Pascal Peduzzi and Jean-Yves Meyer

## Introduction



One of the most striking example of pest propagation on an island, is probably the case of *Miconia calvenscens* (MC) in Tahiti - French Polynesia. This plant originally coming from tropical America, has been introduced in 1937 as an ornamental plant in the botanical garden of Papeari, in the southeast of the island. In several decades it became a dominant invasive plant, it spread over

the island and on a recent survey, it appeared to be present on 70% of the island, thus representing a threat for the biodiversity of the island.

"Small populations were recently discovered in the Marqueses, in New Caledonia, Sri Lanka and in the Australian State of Queensland (...) MC Provides an interesting study-case for understanding of biological invasions in islands, and a catastrophic example of an alien invasive species that threatens the biodiversity of islands" (from Epidemiology of the Invasion by *Miconia Calvenscens* and reasons For a Spectacular Success, J.Y. Meyer).



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Leaves of M.C. are dark green on the up side and are purple underneath. This specificity has been very popular and M.C. was appreciated as decoration plant.



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This example shows the risk of introducing a new species into an ecosystem. This should be kept in mind when introducing new seeds for agriculture, or new animals. The case of Genetically Modified Organisms (GMO), could also cause some problem when introduced in place with native plants of the same family, as some of them have been modified in order to resist to pesticides, herbicides and natural

predators, thus providing them with an incredible resistance and invasive power.

### The Endemic vegetation

As all remote and isolated islands, the level of endemic species is very high in Tahiti. The species have been protected for a long time from foreign incursion, thus did not stimulate their means of defense and natural selection. Primitive vegetation, such as ferns are not as competitive as Miconia.



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Natural vegetation, Mt Aorai

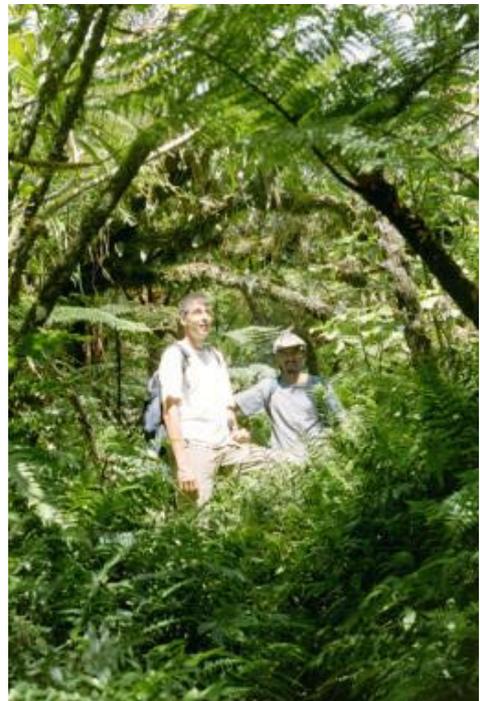


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Ferns from Tahiti copyright: Photo, Pascal Peduzzi, May 2000



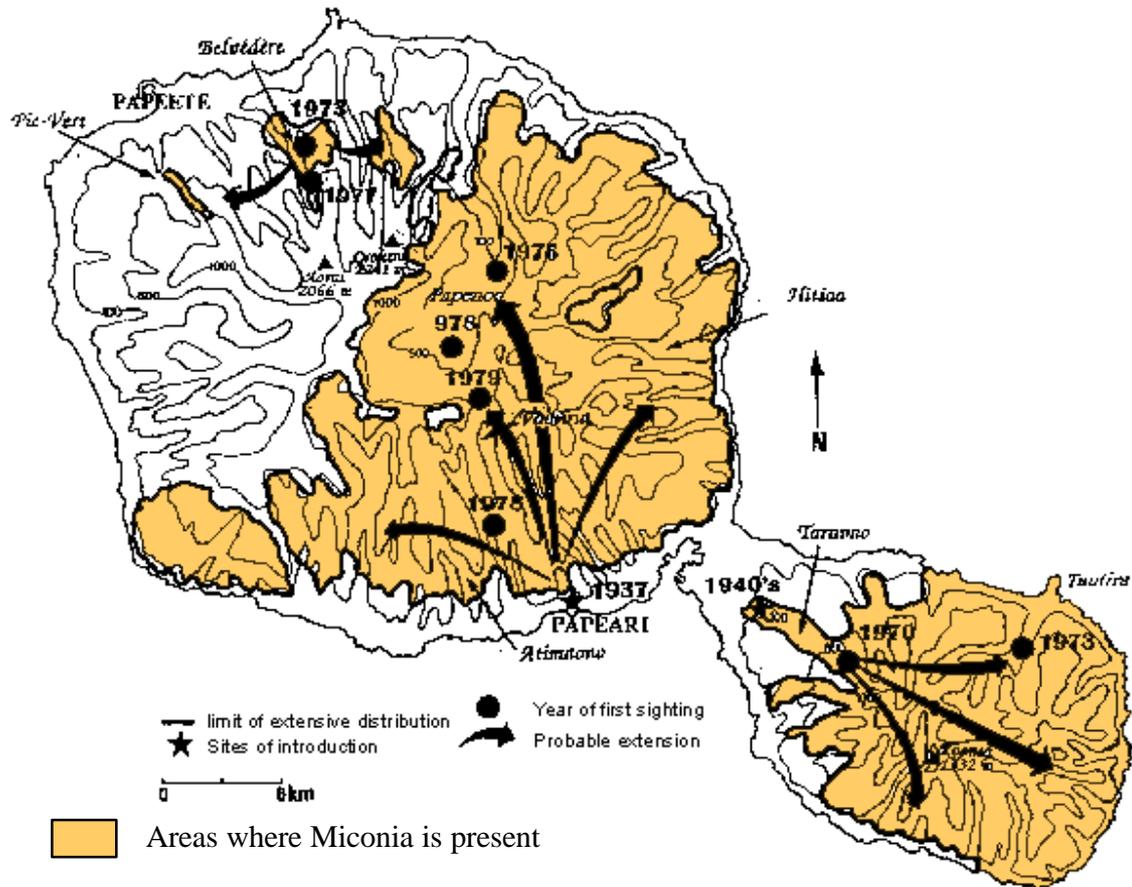
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Dense forest, Fataoua valley

## Distribution

The invasion of *Miconia calvenscens* was unnoticed until the 1970's, however it is now considered as the first national enemy.

The real extent of the invasion was revealed, according to J.-Y. Meyer, by the hurricane season 1982-83 that hit Tahiti severely. The gusts of wind removed the canopy and revealed the significance of the invasion. Taking advantage of this extra light caused by the removal of the canopy, M.C. grew stronger and larger, at full size the plant can produce up to 100'000 seeds per year.



Map 1. Historical spread of M.C. in Tahiti according to published records  
 J.-Y. Meyer (1997)



Propagation of Miconia in yellow

### The spread

Miconia has already affected 80'000 ha in Tahiti. In Moorea (the closest island), 2000 ha were detected. Birds is the main vector of infection, however tires of trucks transported from one island to the other is probably one of the main reason. This risk induced the authorities to force the persons to wash thoroughly the vehicles before they leave the island, thus generating higher costs for the country.

This picture taken on the hillside of Mt Aorai (Tahiti), shows the spreading capacity of the Miconia and its faculty to cover the ground.

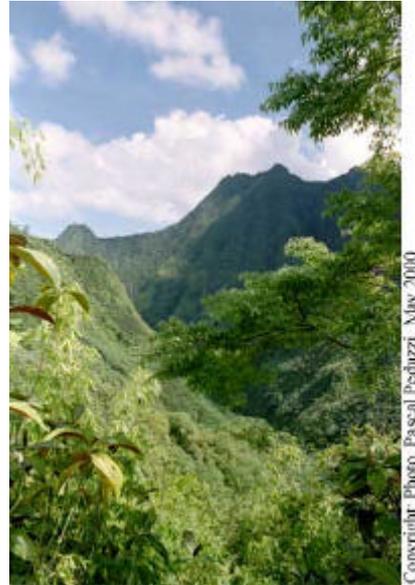
Miconia can spread and reach area as height as 1300

m. It grows quickly, the dark color of the leaves absorbs all the light and change the quality of the undergrowth.

## Solutions

The manual removal is a long lasting and hard task to conduct. The lack of access and the significant size of the area affected are the main reason that prevent the removal to be efficient. The plant is growing faster than we can remove it.

A new technic is now tested on the "Plateau de Taravao". It consists on the biological control of the Miconia by the introduction of a fungus the "*Colletotrichum gloeosporioides forma specialis miconiae*". After successful tests conducted in Hawaii (an other island infected by Miconia) and tested in laboratory to see if it was a specific predator for miconia. It has been introduced on 14 April 2000 in a selected test area. If the results are satisfying it could then be extrapolated to the rest of the island. However, J.-Y. Meyer warns that if the fungus is efficient on small plants, it may not be as good on larger specimens, where manual removal may still be the only remaining solution.



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This photo shows the difficulty of access to the area affected. Miconia is present on the left foreground of the image.

## Other pests

The case of Miconia is not the only invasive species in Tahiti, but it is the worst.

Other present plant pest are:

*Ardisia elliptica* (Myrsinaceae), *Lantana camara* (Verbenaceae), *Acacia farnesiana*, *Leucaena leucocephala* (Leguminosae), *Rubus rosifolius* (Rosaceae), *Psidium cattleianum*, *Syzygium cumini* et *Syzygium jambos* (Myrtaceae); *Cecropia peltata* (Cecropiaceae), *Spathodea campanulata* et *Tecoma stans* (Bignoniaceae), *Melinis minutiflora* (Gramineae), *Psidium guajava* (Myrtaceae), *Paraserianthes falcataria* (Leguminosae), *Mimosa invisa* (Leguminosae) and *Merremia peltata* (Convolvulaceae).



This photo shows the difficulty of access to the area affected. Miconia is present on the left foreground of the image.



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## Conclusions

Islands are fragile ecosystems, in such touristic destinations, people and goods are coming from all over the world. Endemic species does not have the same strength to compete with some imported species.

A single importation of several specimens for ornamental purpose as conducted to a wide infestation over 70% of the area. This invasion will required costly and long lasting actions to remove Miconia. Pest are a recurrent problem for island, Australia is experiencing it with animal and vegetable introduced for specific purpose, at a time when the problem of pest propagation was not known.

The Mediterranean see is infested by *Caulerpa taxifolia* a seaweed coming from south America, which escaped from an aquarium and is now spreading a such speed that no solutions are found yet to prevent the

invasion.

The new economy is forcing to open the border for import/export, without considerations for ecosystems. The example of Miconia delineates the risk associated with such

practices and it would never be too much emphasis that great care should be taken while introducing a new species into any area.

This should also apply to Genetically Modified Organisms (GMO), such plants are also modified to resist against pesticides, herbicides or natural predators. Side effects are not always known and it may takes decades before the situation is discovered, generating high cost to return to a normal situation

### ***Want to know more about the subject ?***

#### **Specialist on the subject:**

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#### **Articles:**

MEYER, J.-Y.(1997), Epidemiology of the Invasion by *Miconia calvenscens* and reasons For a Spectacular Success, in Proceedings of the First Regional Conference on *Miconia* Control, Papeete, Tahiti, French Polynesia. Gouvernement de Polynesie française, University of Hawaii at Manoa, Centre ORSTOM de Tahiti, 90p.

MEYER, J.-Y. (1996). Status of *Miconia calvenscens* (Melastomataceae), a dominant invasive tree in the Society Islands (French Polynesia). *Pacific Science* 50(1): 66-76.

MEYER, J.-Y. & FLORENCE, J. (1996). Tahiti's native flora endangered by the invasion of *Miconia calvenscens* DC (Melastomataceae) . *Journal of Biogeography* 23(6): 775-783.

#### **Interesting websites:**

About *Miconia*

<http://www.hear.org/MiconiaInHawaii/index.html> Other biological invasion: the case of *Caulerpa Taxifolia*

[http://www.unice.fr/LEML/html/caulerpa\\_taxifolia.htm](http://www.unice.fr/LEML/html/caulerpa_taxifolia.htm)

About Biodiversity loss

<http://www.grid.unep.ch/preview/net/htm/biodiversity.php>