

Weed control and restoration around the El Junco Lagoon, San Cristóbal, Galápagos-Ecuador

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Summary In late 2000 the Galápagos National Park Service (GNPS) started a program to restore the *Miconia robinsoniana* Cogn. (Melastomataceae) shrublands around El Junco Lagoon, a crater lake on San Cristóbal Island and one of the few sources of fresh water in Galápagos. *Miconia robinsoniana* is an endemic species that is dominant in a community type that formerly occupied a larger area and changed due to clearing for agriculture and invasions by invasive species. The GNPS fenced 90 ha around this lagoon to stop grazing by animals from neighbouring farms. In September 2001 control of introduced plant species including blackberries (*Rubus niveus* Thunb.) and guava (*Psidium guajava* L.) commenced and as part of an attempt to re-establish native vegetation *M. robinsoniana* seedlings were transplanted. The objective of this study is to evaluate the effectiveness of weed control and transplanting *Miconia robinsoniana* as a means of restoration.

Thirty 5 m × 5 m plots were spaced 10 m apart in two grids of 15 on the northwest side of El Junco with 15 being located near the top of the crater and 15 being located approximately 50 m further down slope. Three treatments were assigned randomly to each plot. They were:

1. not controlling weeds, not planting *Miconia*;
2. controlling weeds, not planting *Miconia*; and
3. controlling weeds, planting *Miconia* at 30 seedlings per plot.

Control of weeds was undertaken using a picloram and metsulfuron mix for guava and glyphosate for blackberries. Every six months between October 2001 and February 2004 we recorded data about plant species presence, their percentage of cover, and the survival and growth of planted *Miconia* in all plots.

In plots without weed control, there was little recovery of native vegetation and no recruitment of *Miconia*. With weed control, the abundance of native species (including *Miconia* in some plots) increased and recruitment of weed species decreased.

In plots with weed control and planting of *Miconia*, the average survival of *Miconia* from February 2002 to February 2004 was 19 individuals per plot or $63.7 \pm 33\%$ (mean \pm SD). The average growth from February 2002 to February 2004 of the surviving *Miconia* was 69.1 ± 22.6 cm. The *Miconia* higher than 1.1 m has started to produce their first flowers and fruits. Hence, we expect to have natural recruitment as a key factor for restoration around the lagoon.

In conclusion, controlling weeds during the establishment phase is essential for restoration of *Miconia* shrublands. Although the planting of *Miconia* greatly assists in the rate of succession, probably the most important factor was the exclusion of grazing animals that graze all vegetation flat and compact the soil, preventing recruitment of shrub species.

Keywords Galápagos Islands, weed control, ecological restoration, *Miconia robinsoniana*.