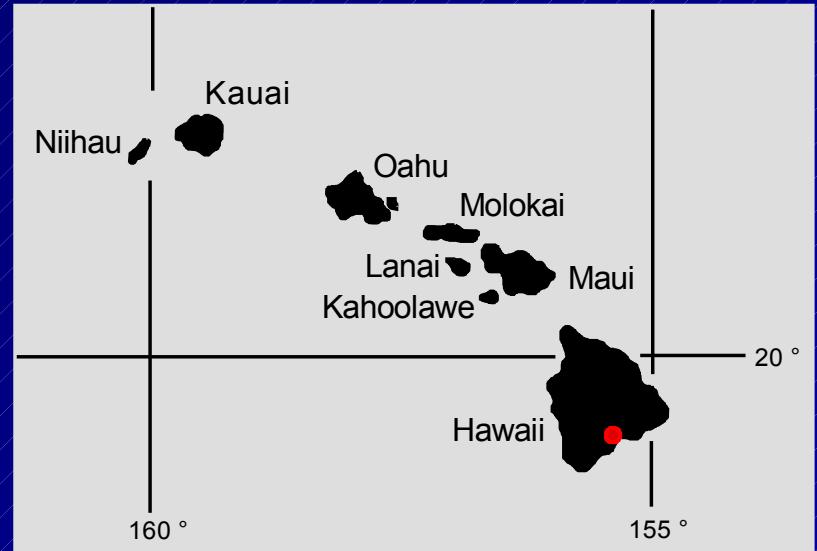




Effects Of Invasive Alien Ginger (*Hedychium gardnerianum*)
On Native Plant Species Regeneration In A Hawaiian Rainforest

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Porembski



Area: 10 443 km²

- 1196-1231 m above sea
- Temp. Min: 11,4 °C/a
Max: 20,6 °C/a
- No seasonality
- Precipitation: 2770 mm/a

Layers of a montane rainforest on Hawai'i

- TL1: > 10 m
- TL2: 5 - 10 m
- FSL: 2 - 5 m
- HL: 0,1 - 2 m
- MHL: < 10 cm
- ML: Mosses

Tree species

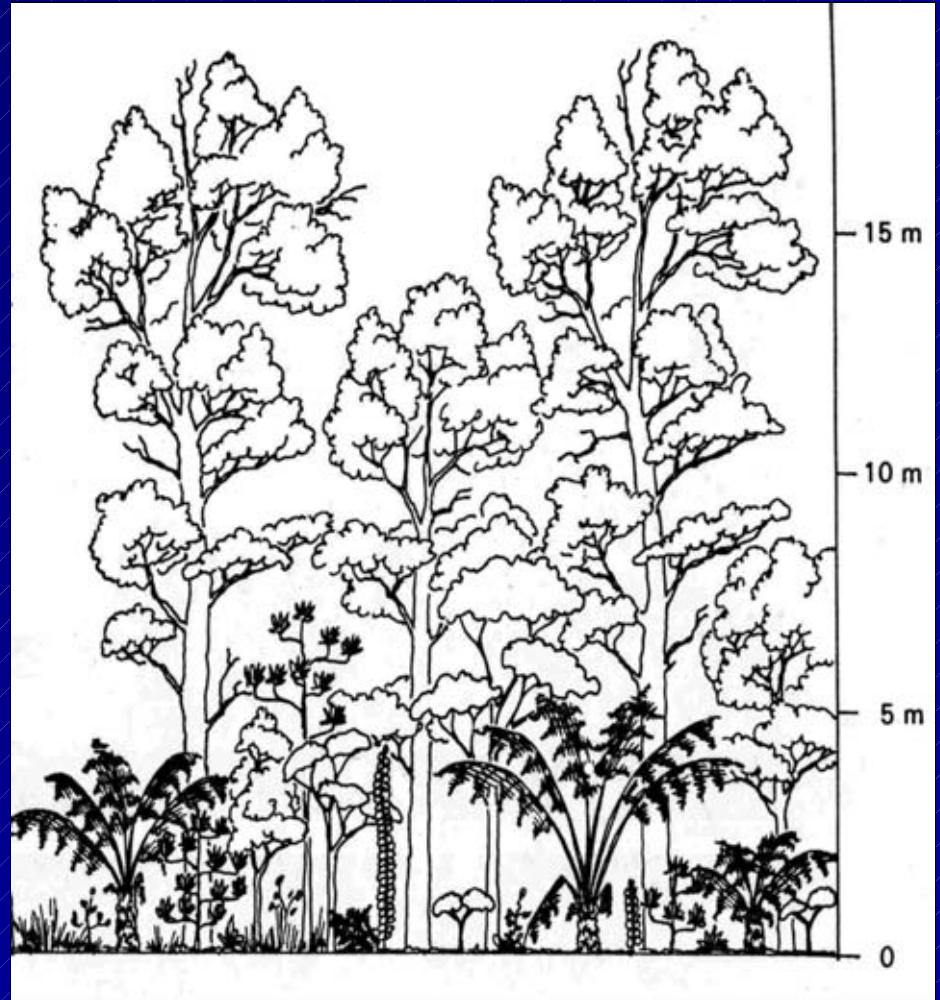
- *Metrosideros polymorpha*
- *Ilex anomala*
- *Myrsine lessertiana*
- *Coprosma ochracea*

Invasive species

- *Psidium cattleianum* / *Myrica faya*

Tree ferns

- *Cibotium glaucum*, *C. chamissoi*
- *Sadleria pallida*, *S. cyatheoides*



Hedychium gardnerianum

- Zingiberaceae (Ginger family)
- Origin: India (Himalaya-region)
- Introduction to Hawaii 1943
- Area in National Park 500 ha
- 0 m to 1700 m above sea
- Rhizomes as storage organs
- Ca. 2 m high, leaves 50 cm long
- Seeds dispersed by birds → colonization of remote sites



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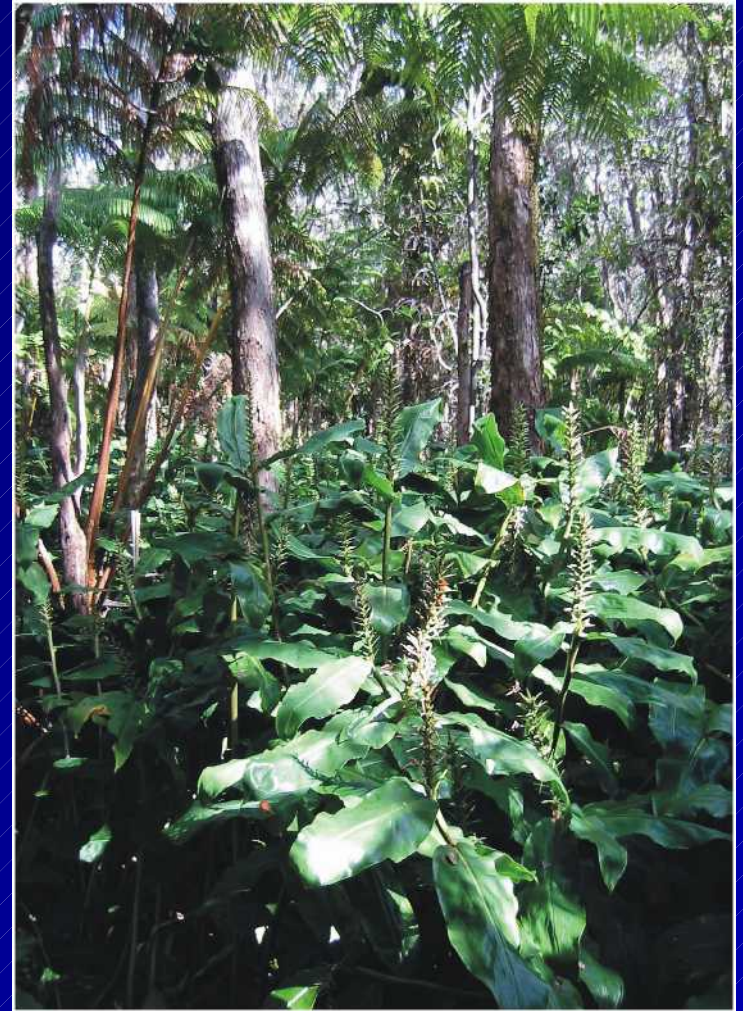
Ginger Plots (G)

= infested sites

- High coverage *H. gardnerianum*
- Only few other species



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Boehmer 2004

Cleared Plots (C)

= treated sites

- Summer 1998
- Escort® (Metsulfuron methyl)
- Inhibitor of cell division



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Natural Plots (N)

= natural sites = Controls

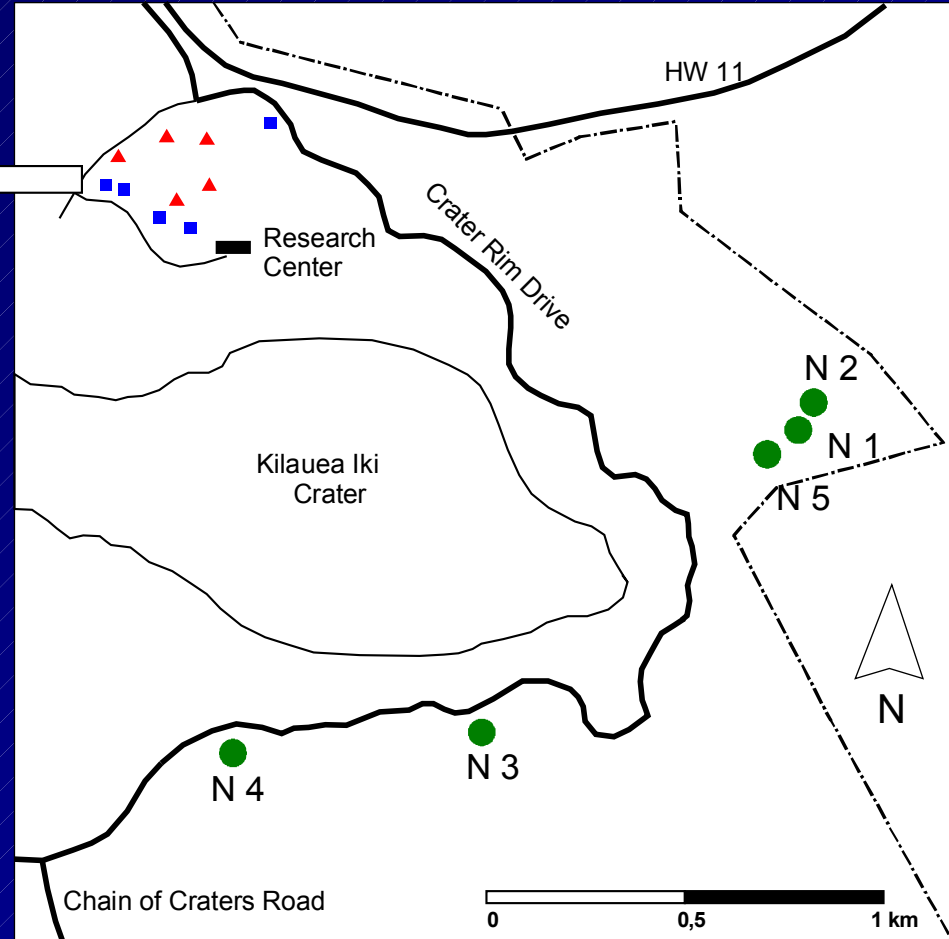
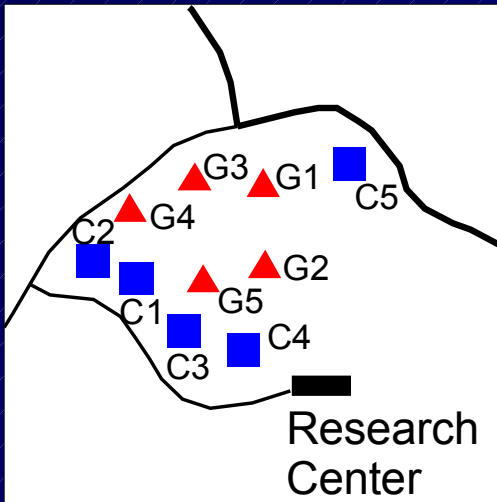
- Only few species in Tree Layers
- Distinct Tree fern Layer



Boehmer 2004



Holland 2004



- 5 Plots per area type → 15 Plots
- Plotsize 200 m² (10 x 20 m)
- period of survey: April to August 2004

Methods:

Abundances of:

- Saplings (woody)
(50 cm – 5 m)
- Seedlings (all species)
(2 – 50 cm)

Statistical Analysis:

Nonparametric H- and U-Test



Metrosideros polymorpha

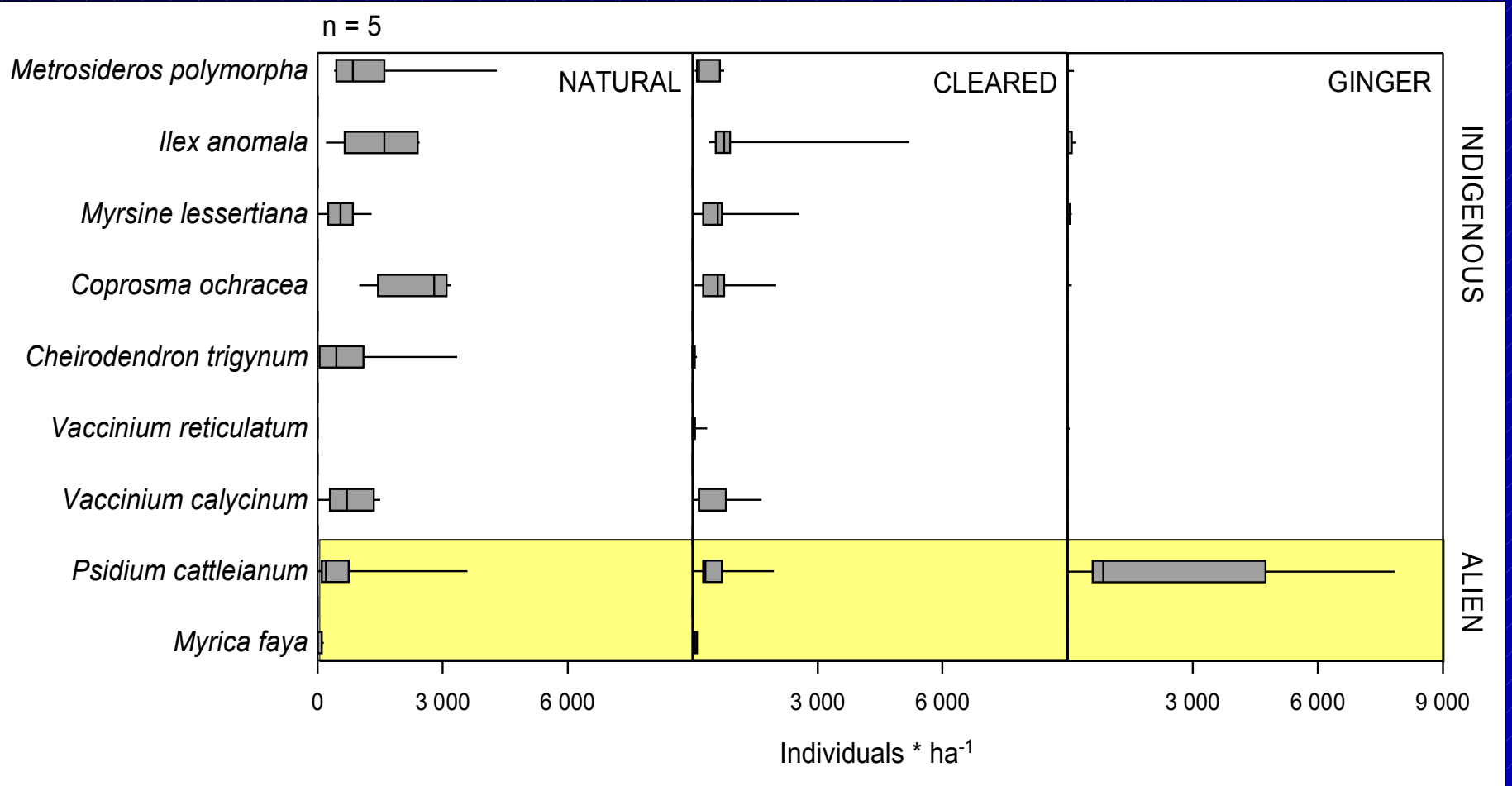
Does *Hedychium gardnerianum*

- replace native species ?
- suppress the regeneration of native species ?
- increase the invasiveness of other species ?

Are native forests able to recover from the impact
of *H. gardnerianum* ?

- Comparison of infested and treated sites -

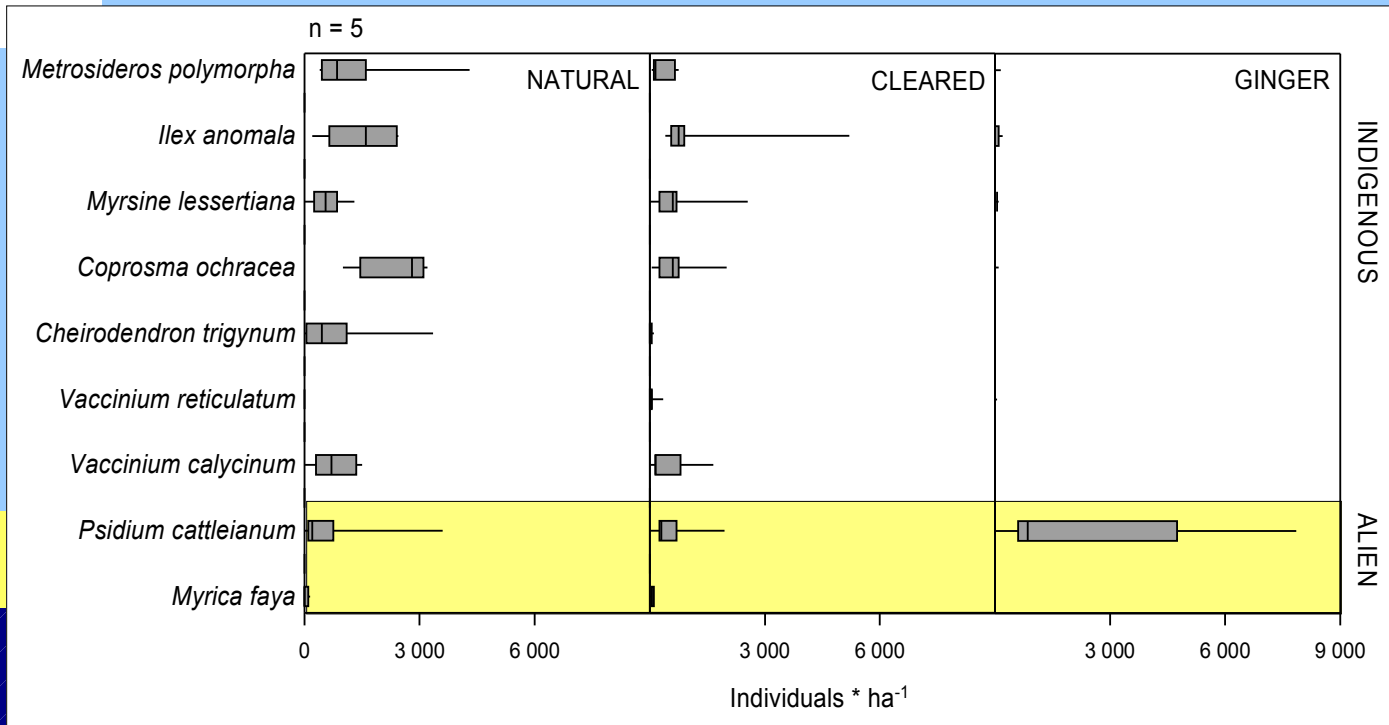
Saplings (0,5 – 5m)



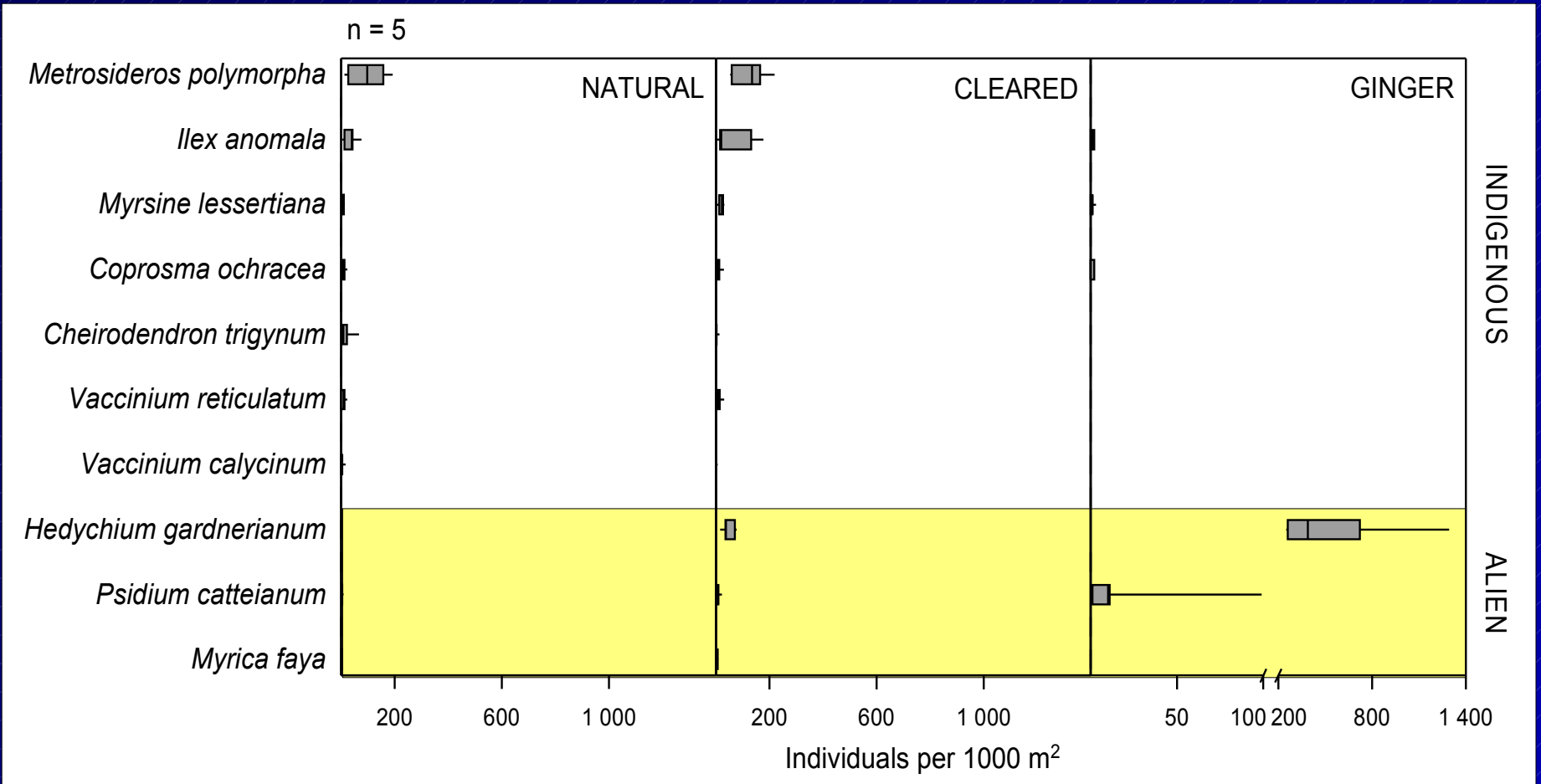
Saplings

(0,5 – 5m)

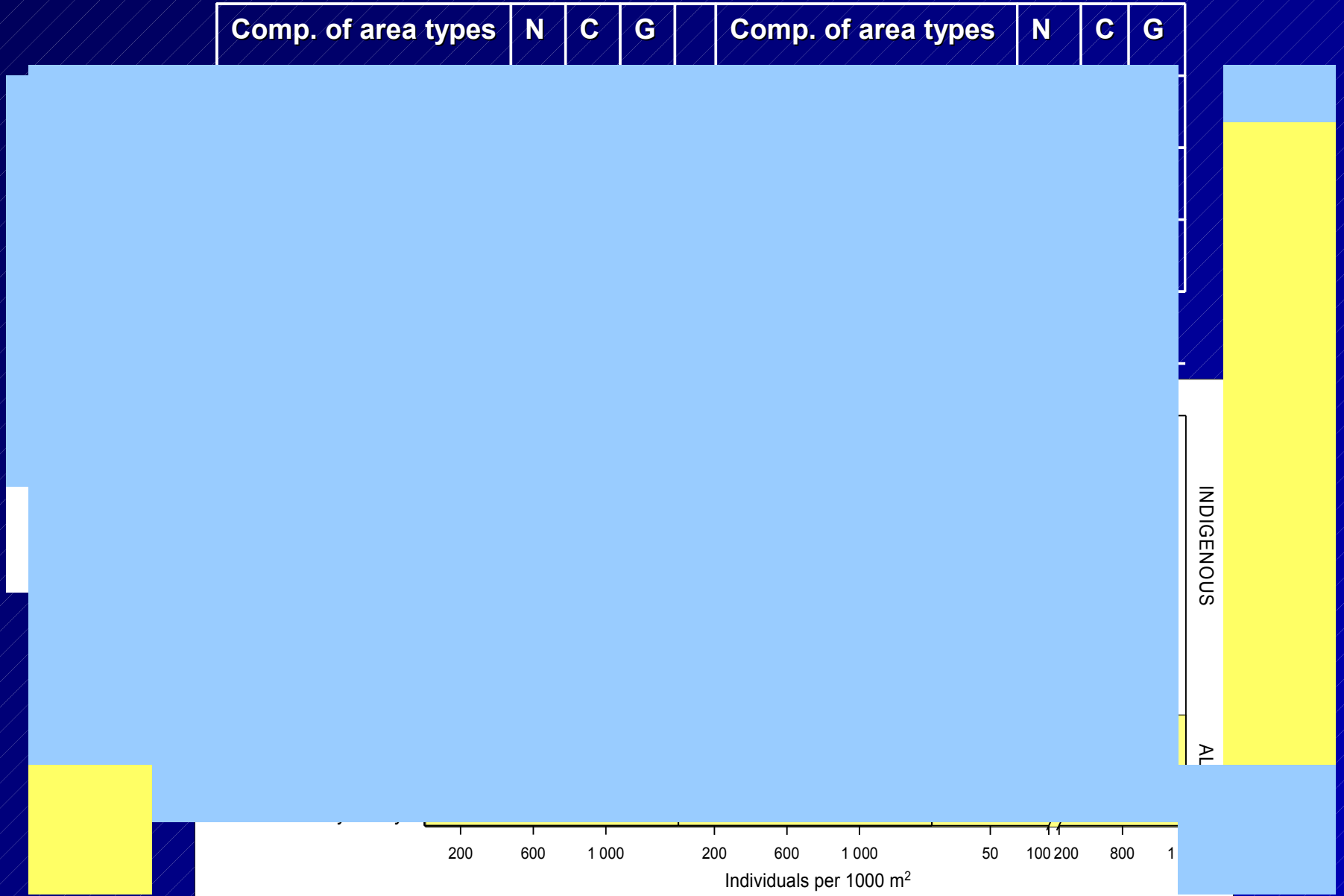
Comp. of area types	N	C	G	Comp. of area types	N	C	G
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Seedlings (2 – 50 cm)



Seedlings (2 – 50 cm)



Does *Hedychium gardnerianum* replace native species?

Saplings:

→ Native species with lower abundances on G-plots

Seedlings:

→ Native species almost absent on G-plots

➔ Substitution of native species by
Hedychium gardnerianum

Does *Hedychium gardnerianum* suppress the regeneration of native species?

Saplings:

→ Native species with lower abundances on G-plots

Seedlings:

→ Native species almost absent on G-plots

➔ Regeneration of native species under impact of *Hedychium gardnerianum* hardly possible

Does *Hedychium gardnerianum* increase the invasiveness of other species?

G-plots:

→ High abundances of *Psidium cattleianum* in seedlings and saplings stage

➔ Abundances of *Psidium cattleianum* possibly encouraged by *Hedychium gardnerianum*

- Are native forests able to recover from
the impact of *H. gardnerianum* ?
- Comparison of infested and treated sites -

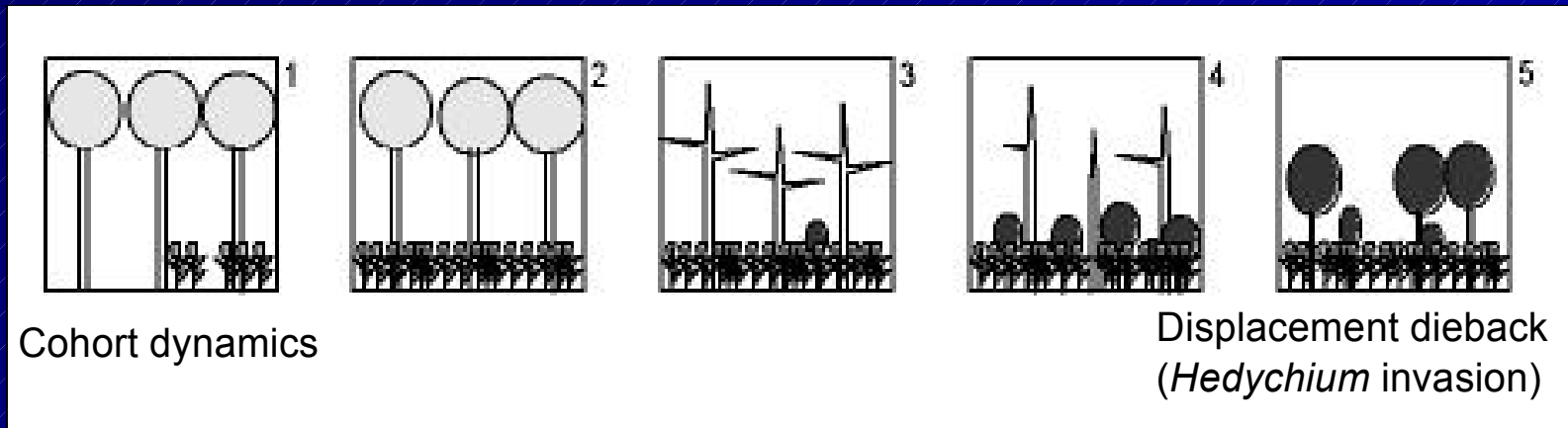
C-plots:

- Little differences to N-plots, but to G-plots
- High abundances of seedlings and saplings

➔ Recovery of native species after removal of
H. gardnerianum possible

Conclusions:

- ➔ Regeneration of native species under impact of *H. gardnerianum* hardly possible
- ➔ Apparently no negative influence on *Psidium cattleianum*
- ➔ Domination of Tree Layer by *P. cattleianum* possible



Boehmer 2005

- ➔ Regeneration of native species after removal of *H. gardnerianum* possible

Thank you

