Populações e Comunidades Vegetais

Estrutura de Populações

Alexandre Adalardo de Oliveira

Ecologia- IBUSP Agosto 2021

Estrutura Populacional de Plantas

Estrutura Populacional de Plantas

- definições
- principais estruturas
  - estrutura espacial
    - escala
    - inferência de processos

Definições

- Ecologia Vegetal
  - Distribuição e abundância das plantas
- Estrutura de População
  - Relação entre entidades do sistema
  - Padrões
  - Variação não aleatória

    - etária
    - tamanho
    - genética
    - espacial

População Estruturada

- Taxas vitais
  - estádios ontogenéticos
  - idade
  - tamanho

Estrutura Etária

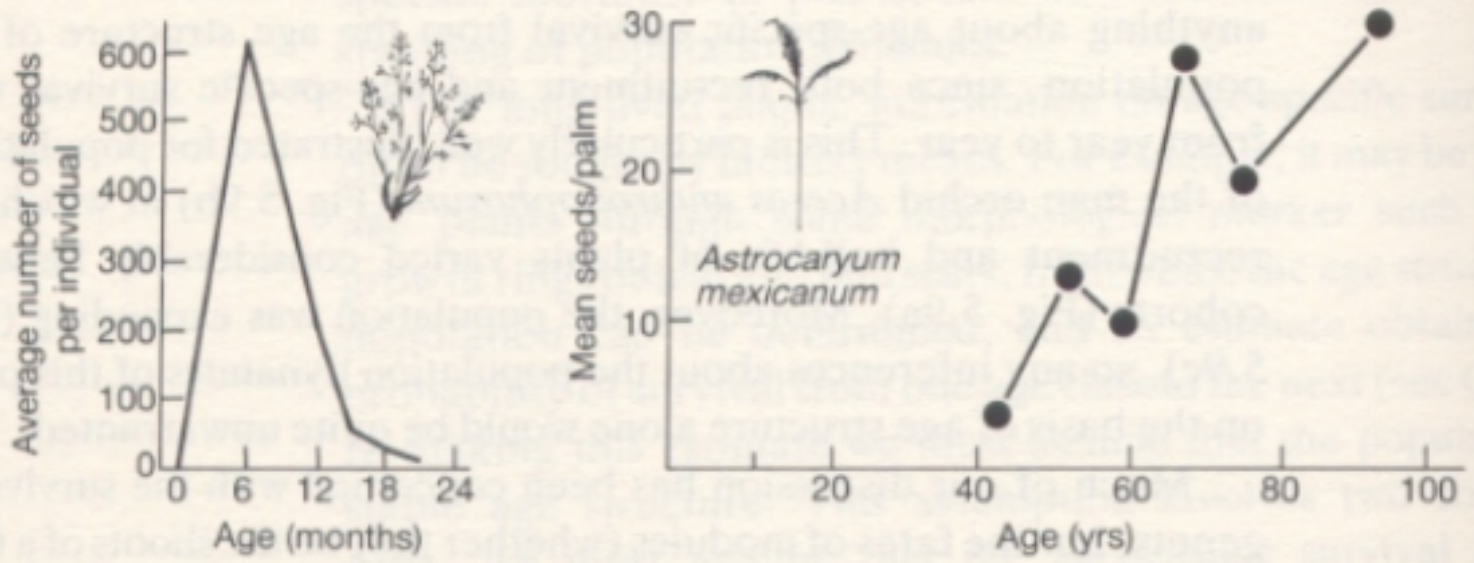
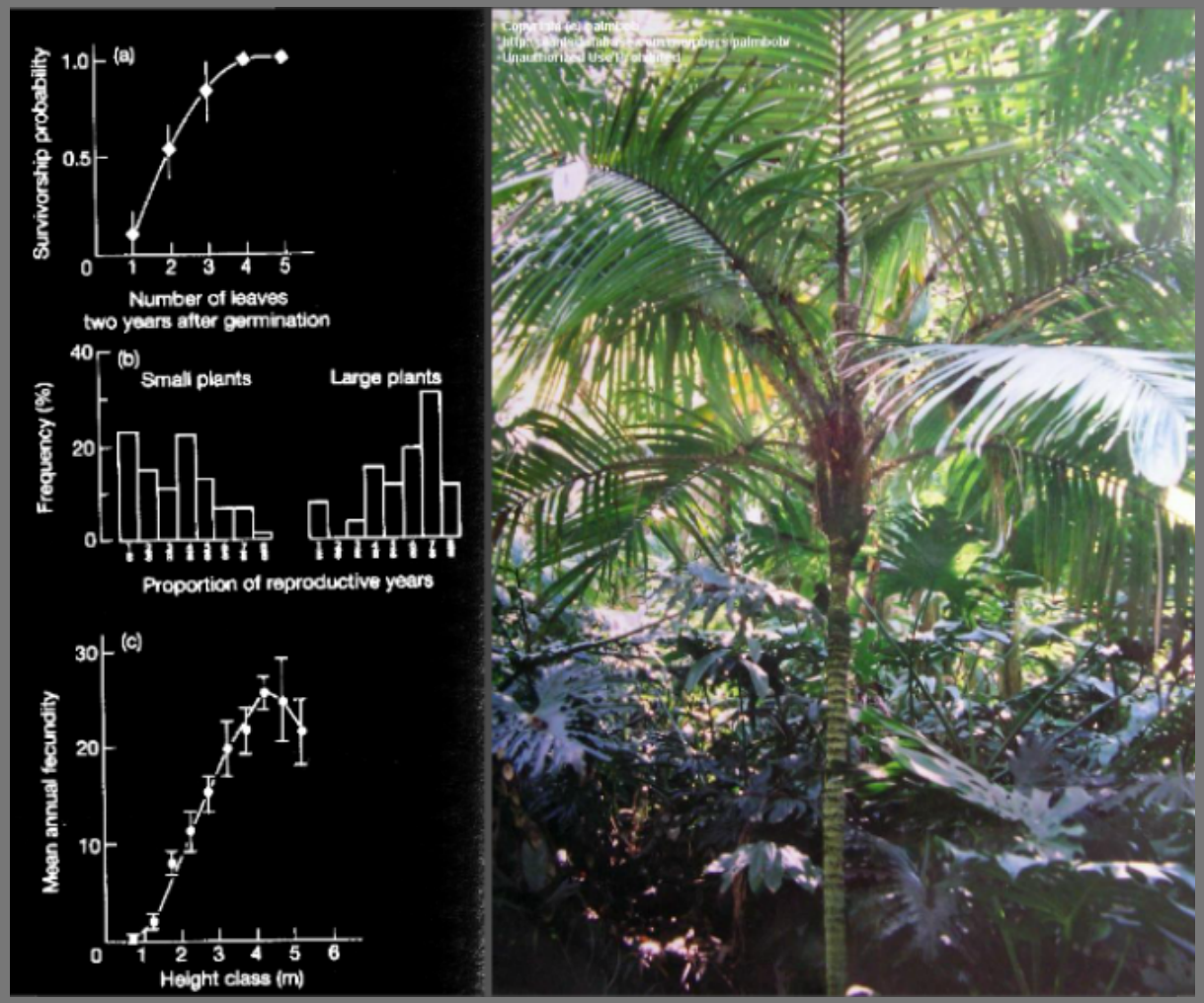


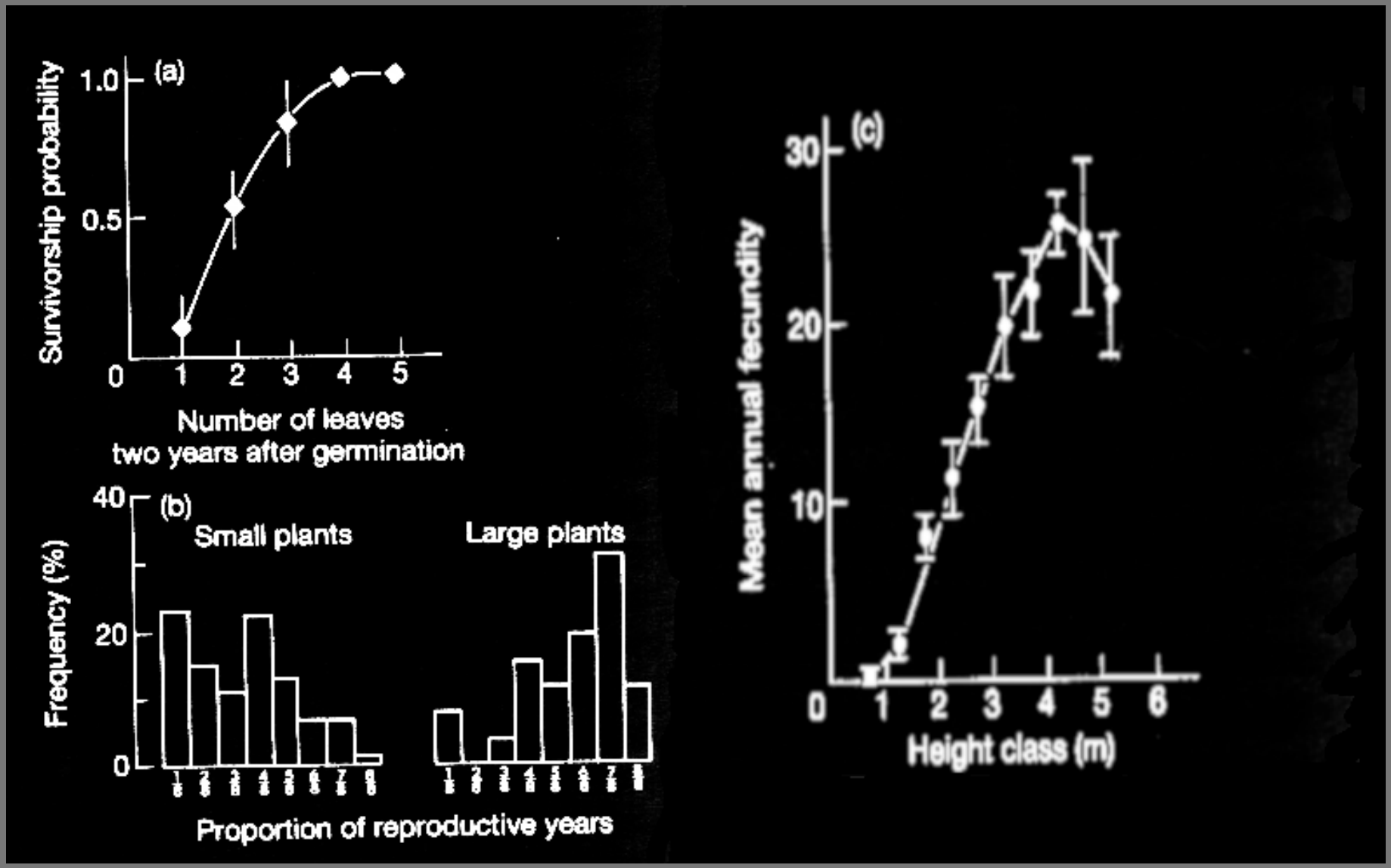
Fig. 5.11. Age-specific fecundity for (a) annual meadow grass, *Poa annua* (from Law, 1975); and (b) the tropical understorey palm, *Astrocaryum mexicanum*. From Sarukhán (1980).

Estrutura de Tamanho



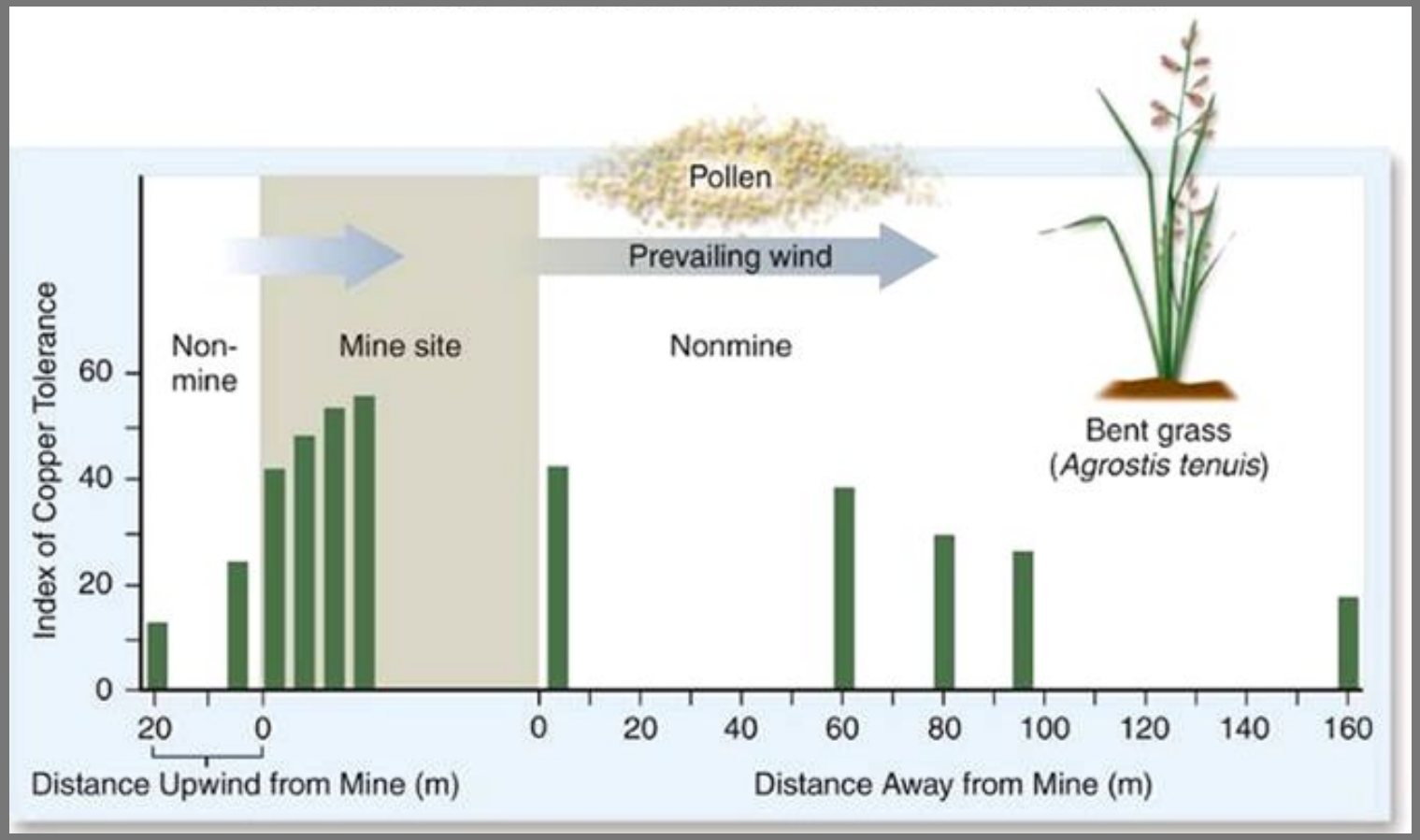
Daniel Piñedo & Miguel Martinez-Ramos. 1970-1980. *Astrocarium mexicanum*

Estrutura de Tamanho



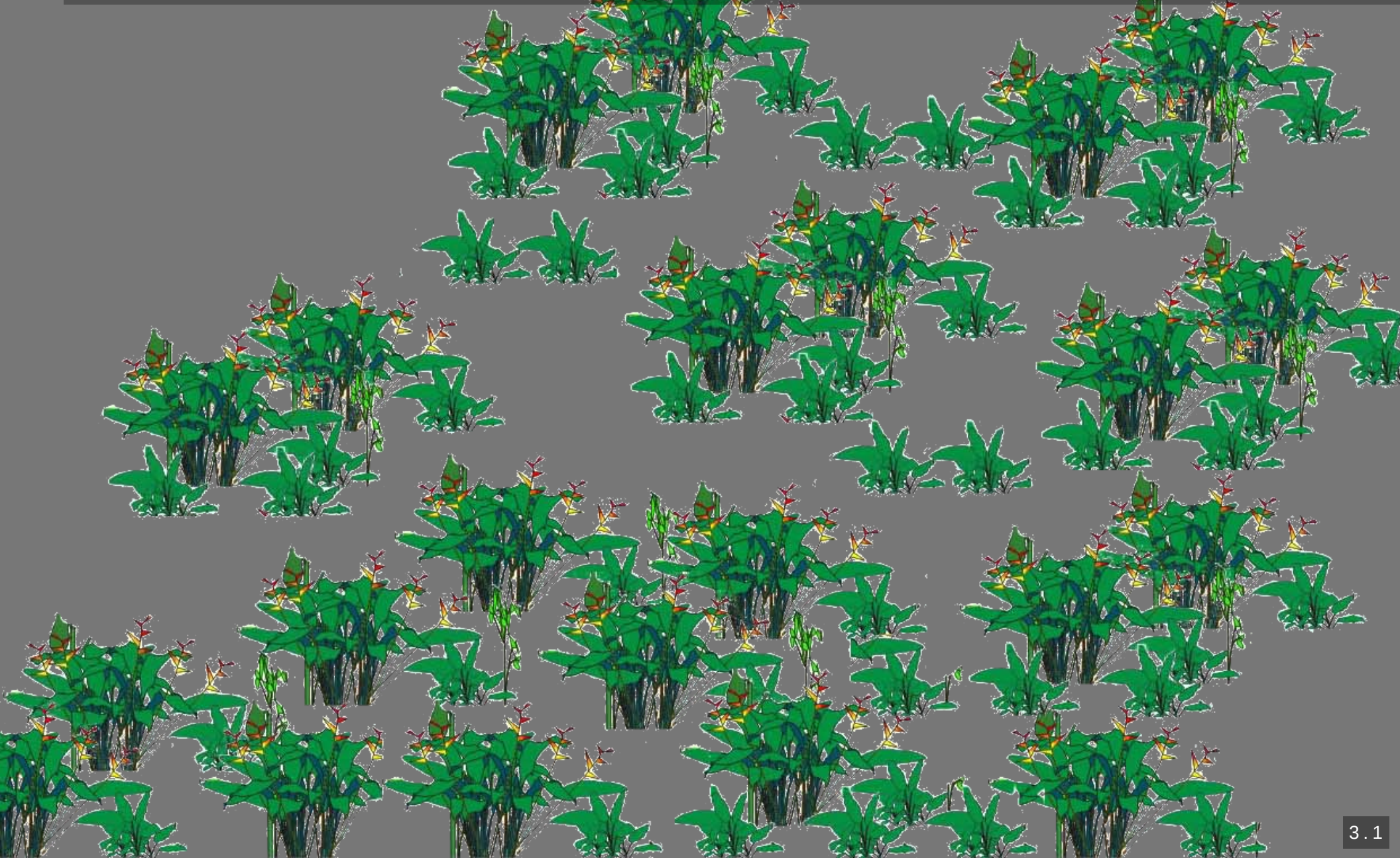
Acompanhamento de coorte

Estrutura Genética: seleção

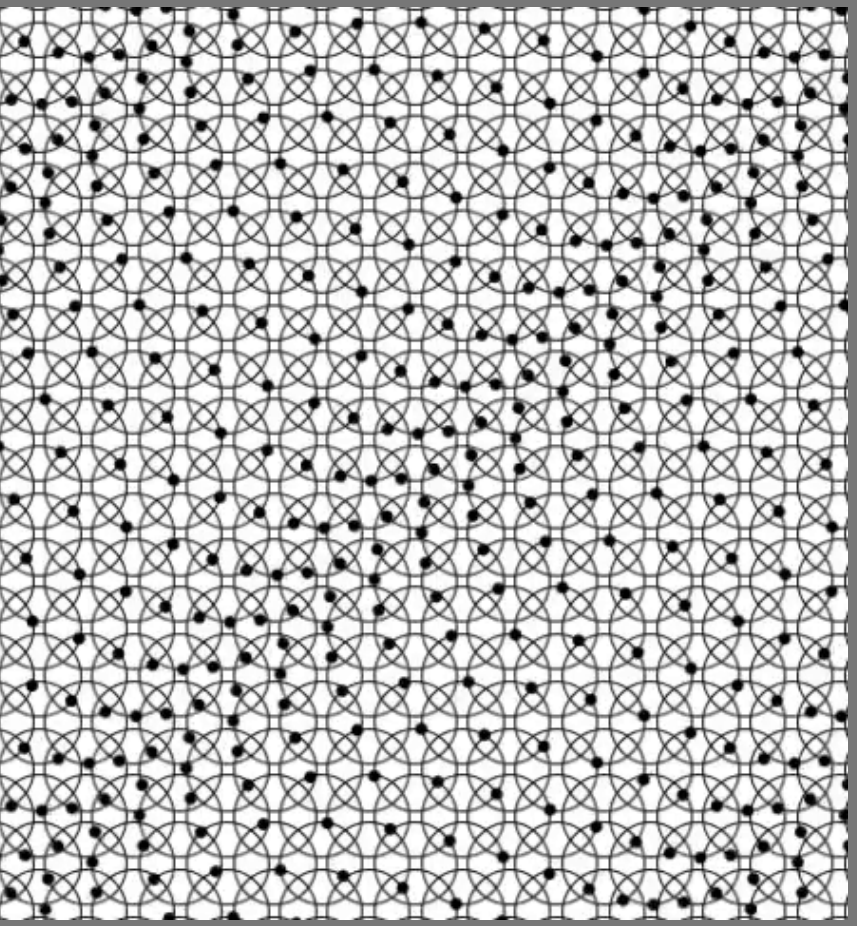


Bradshaw et al. 1960 – 1970. Tolerância a metal pesado: adaptação local e dispersão.

Estrutura no espaço



Estrutura no espaço

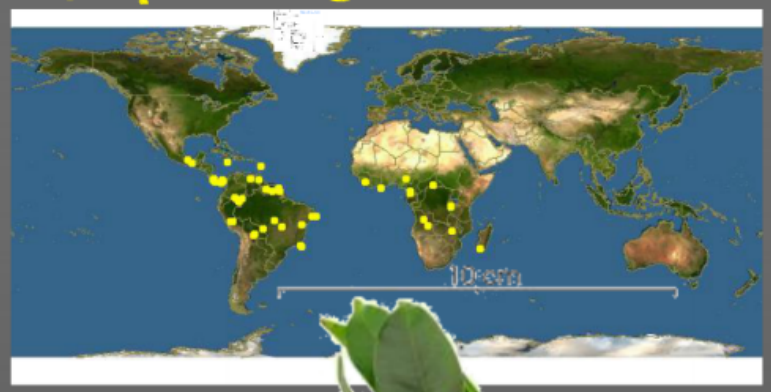


Distribuiçã

Padrão e P

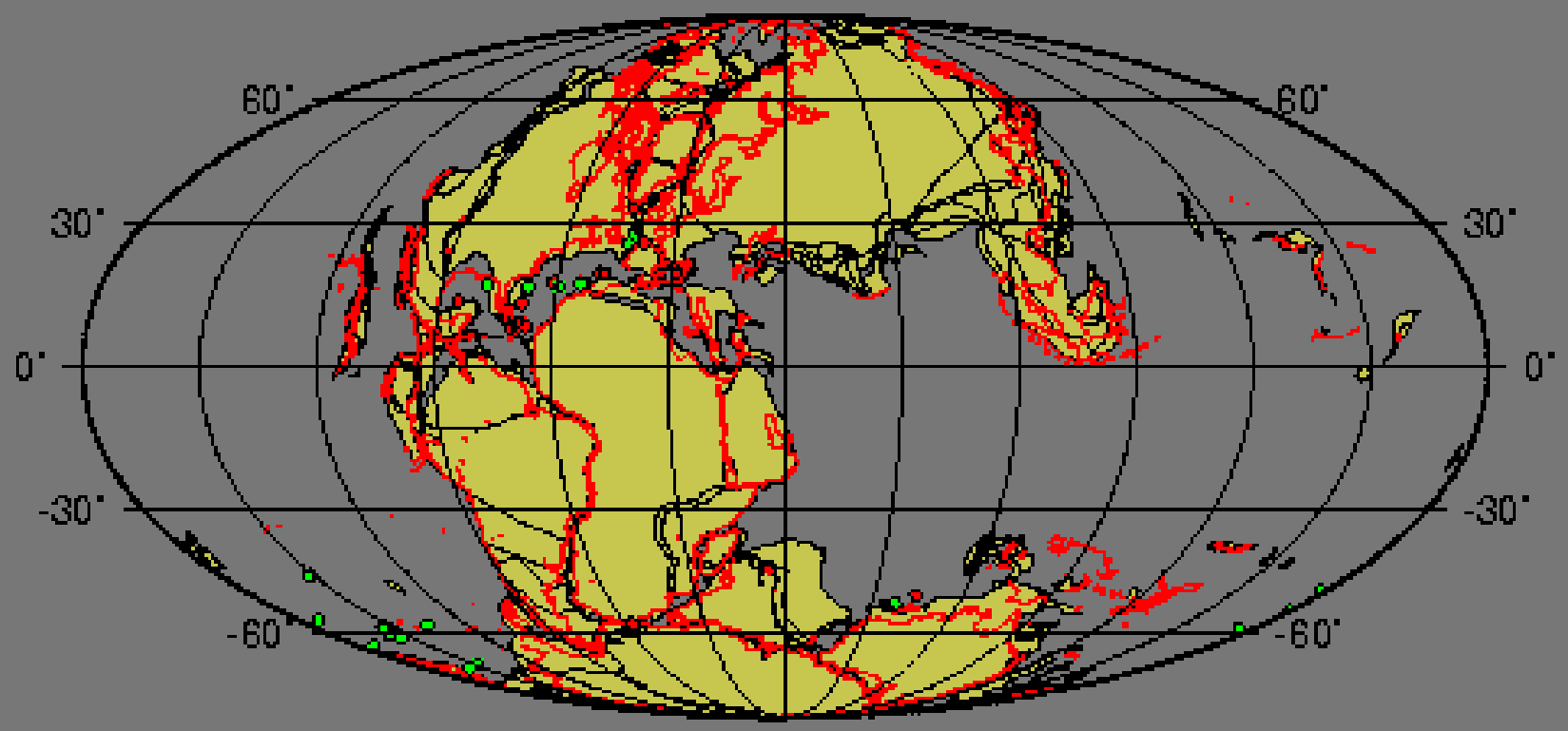
- difere
- proces

Escala Geográfica



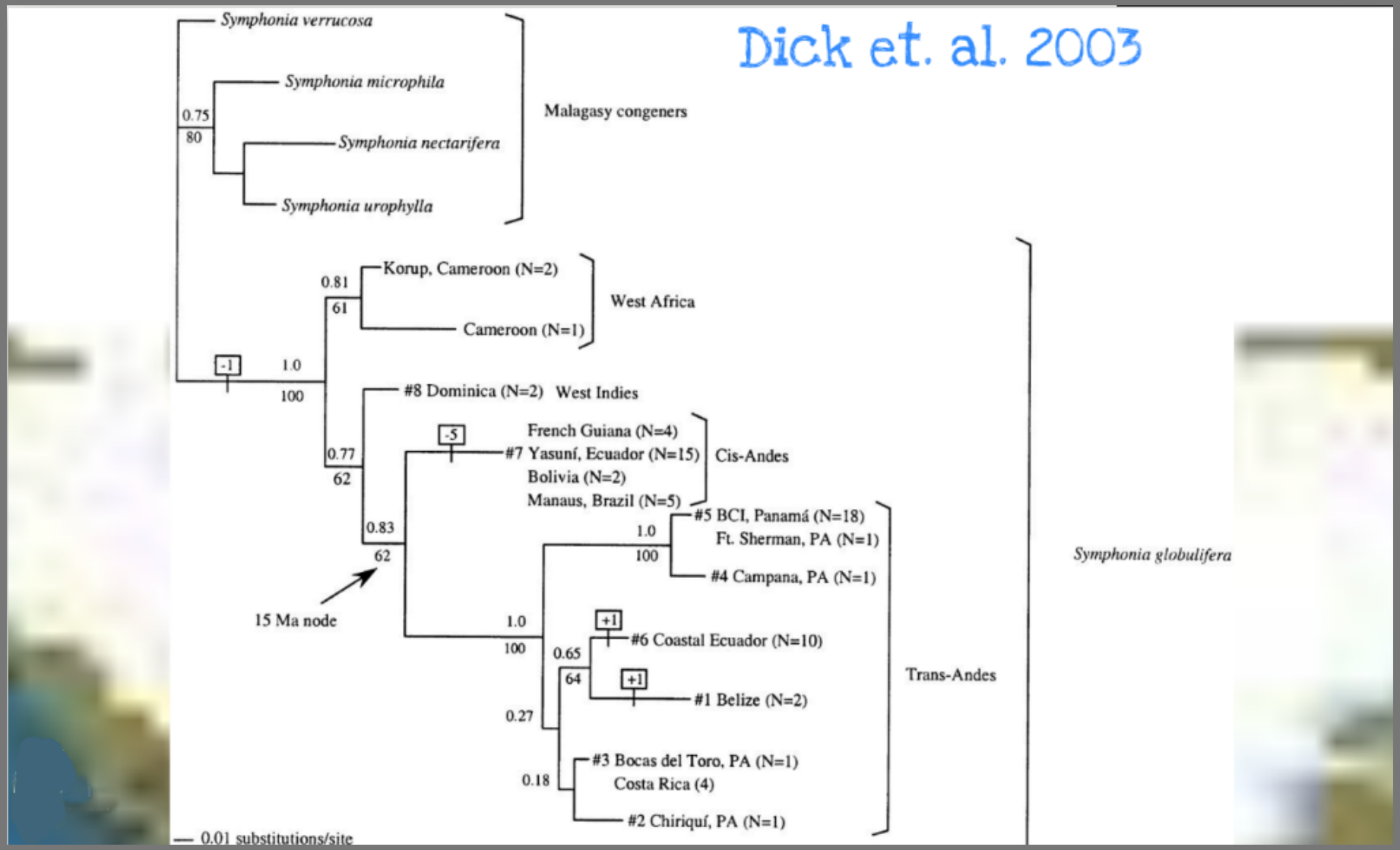
Dick, C. 2003. The American Naturalist

Escala Geográfica



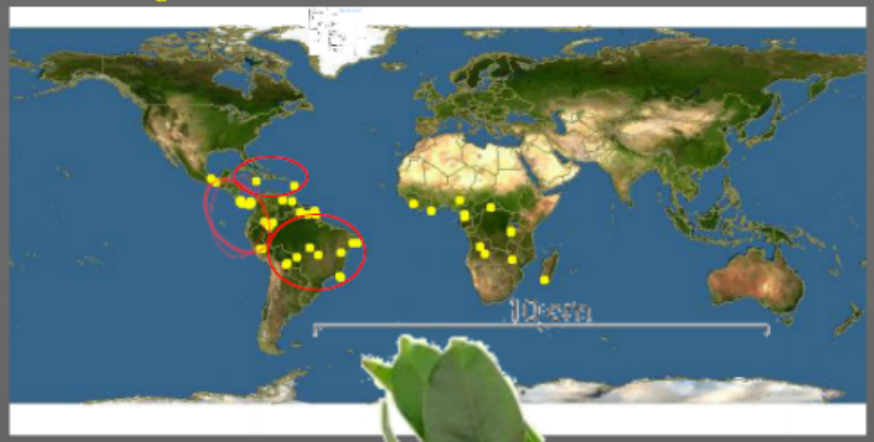
150 My Reconstruction

Escala Geográfica

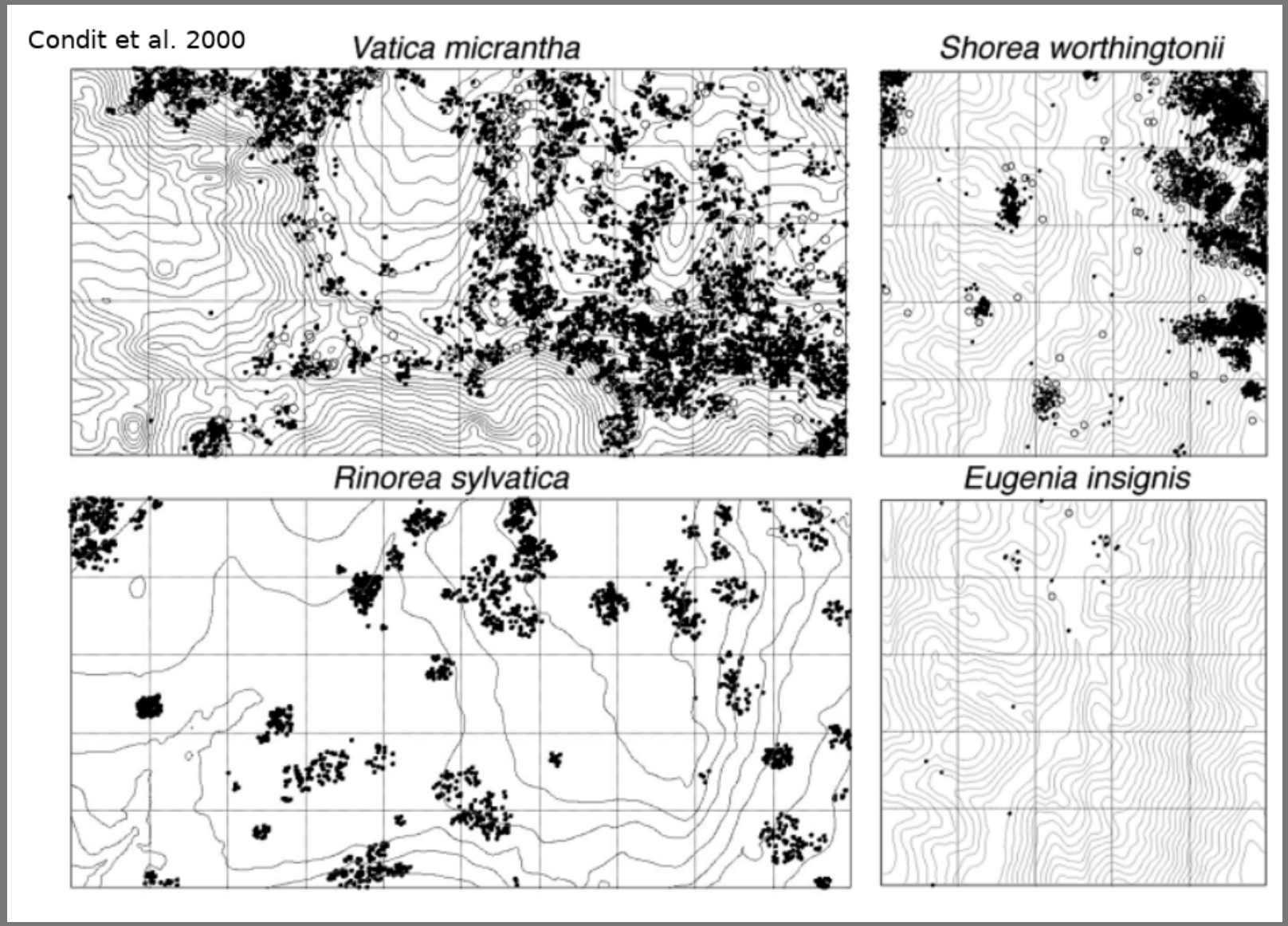


Escala Geográfica

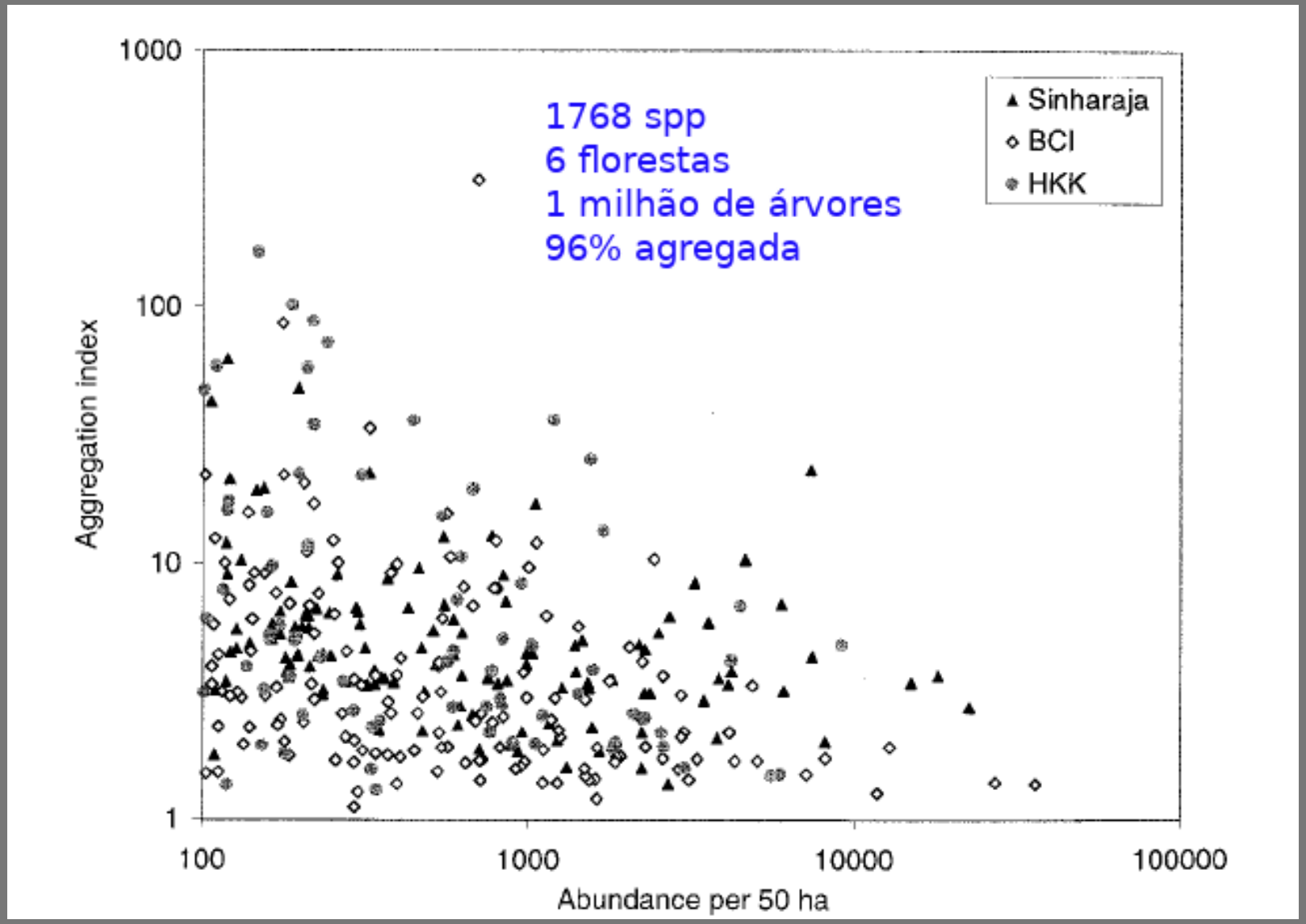
Symphonia globulifera L.



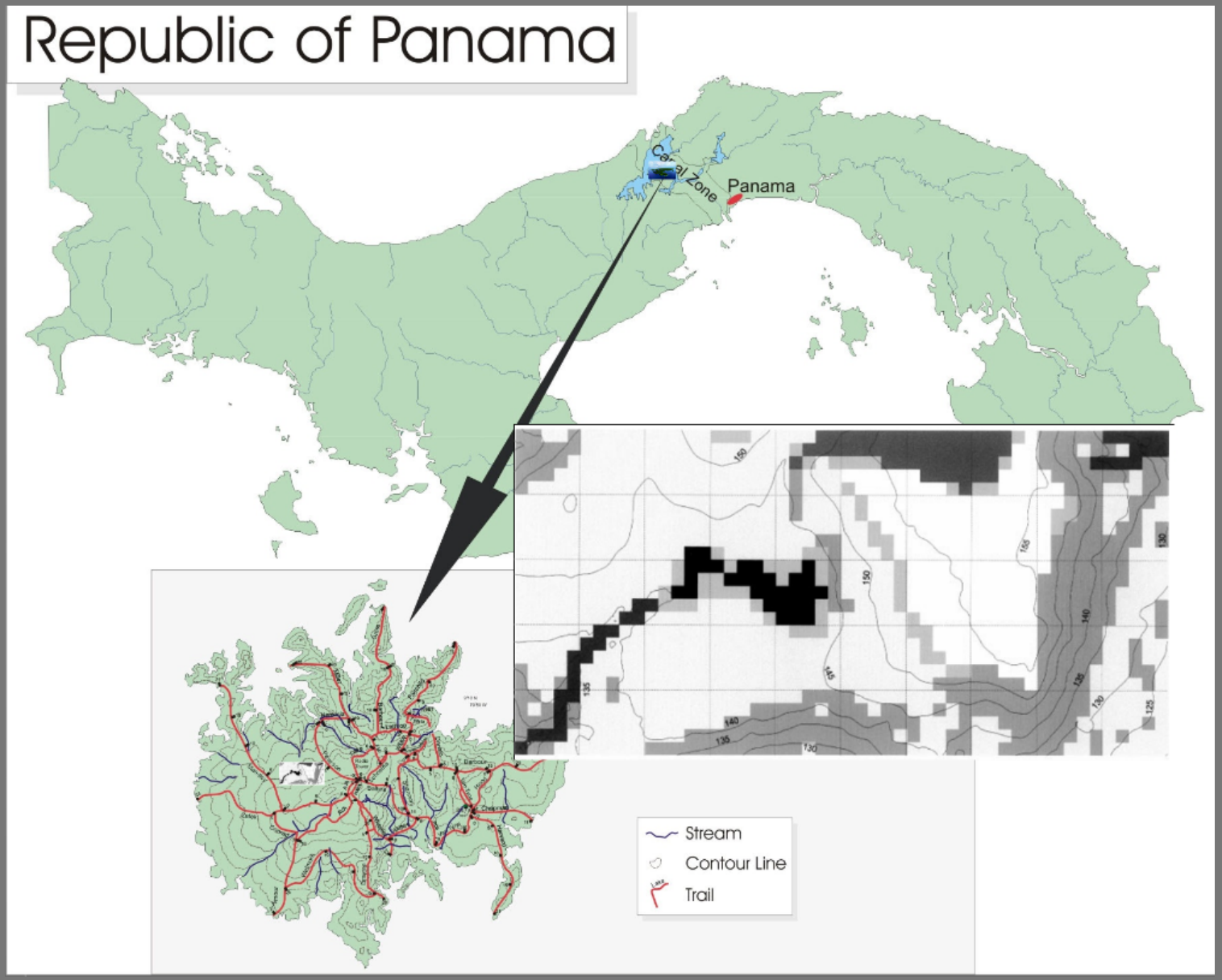
Escala Local



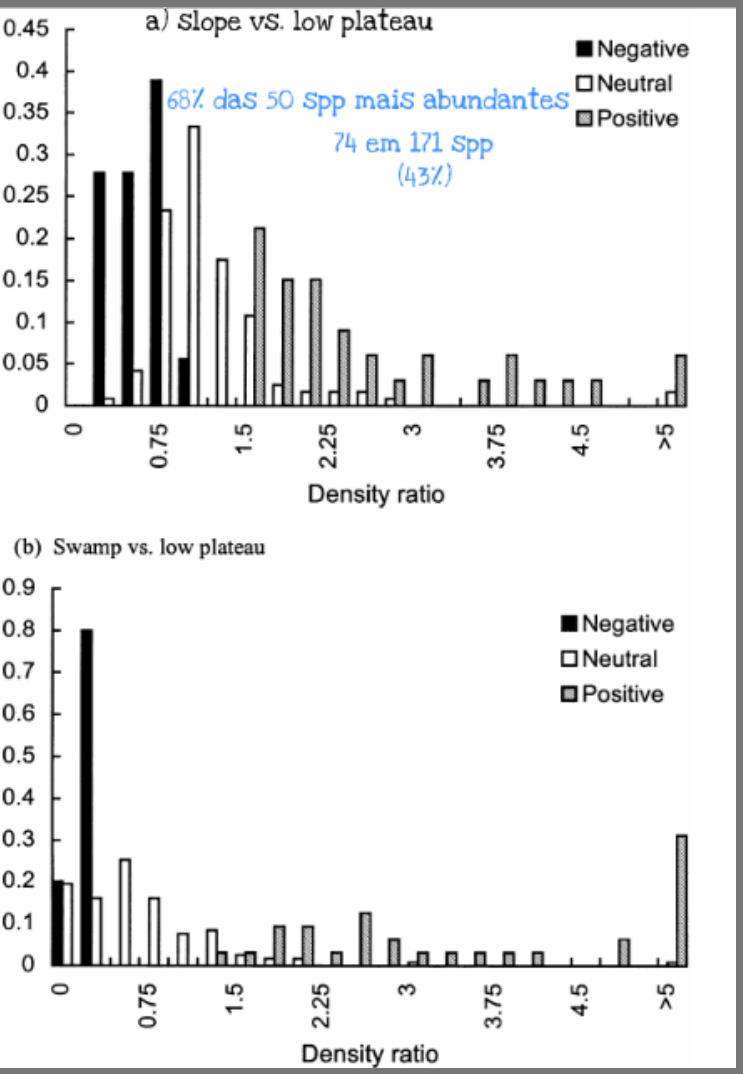
Condit 2000


1768 spp
6 florestas
1 milhão de árvores
96% agregada
Sinharaja
BCI
HKK
Aggregation index
1000
100
10
1
100
1000
10000
100000
Abundance per 50 ha

Distribuição Espacial



Associação de Habitat



Harms et. al

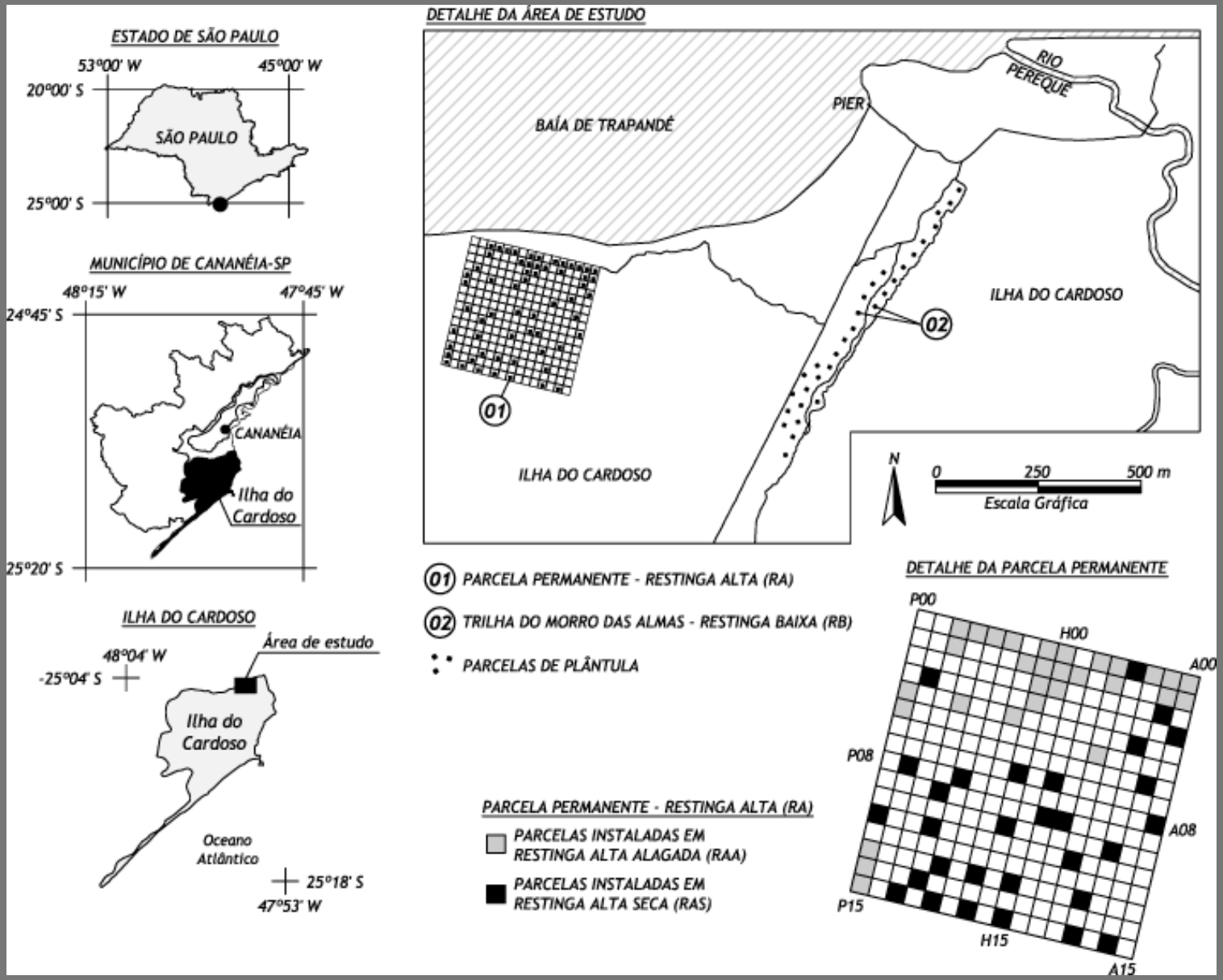
Barro Colo

- Low pla
- Low pla
- Swamp
- Swamp

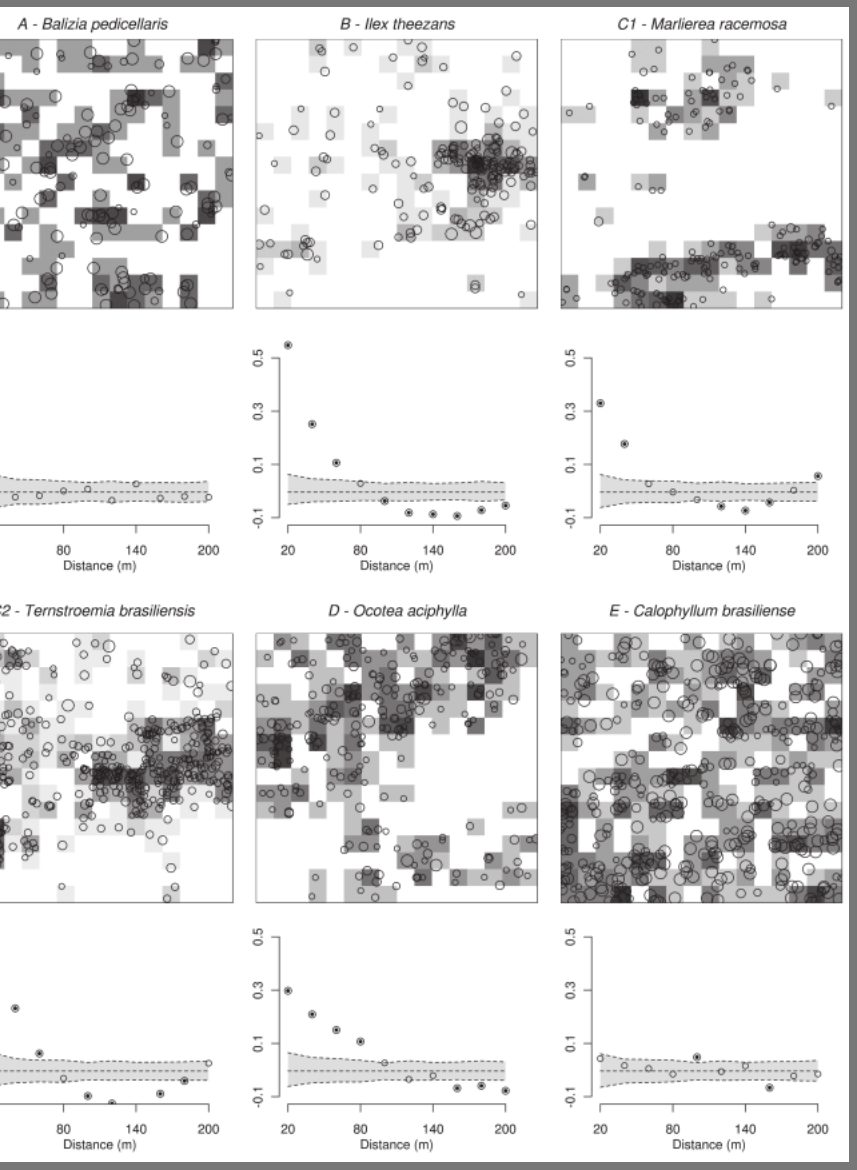
"Habitat Asso

Restinga PEIC

Parcela Permanente PEIC



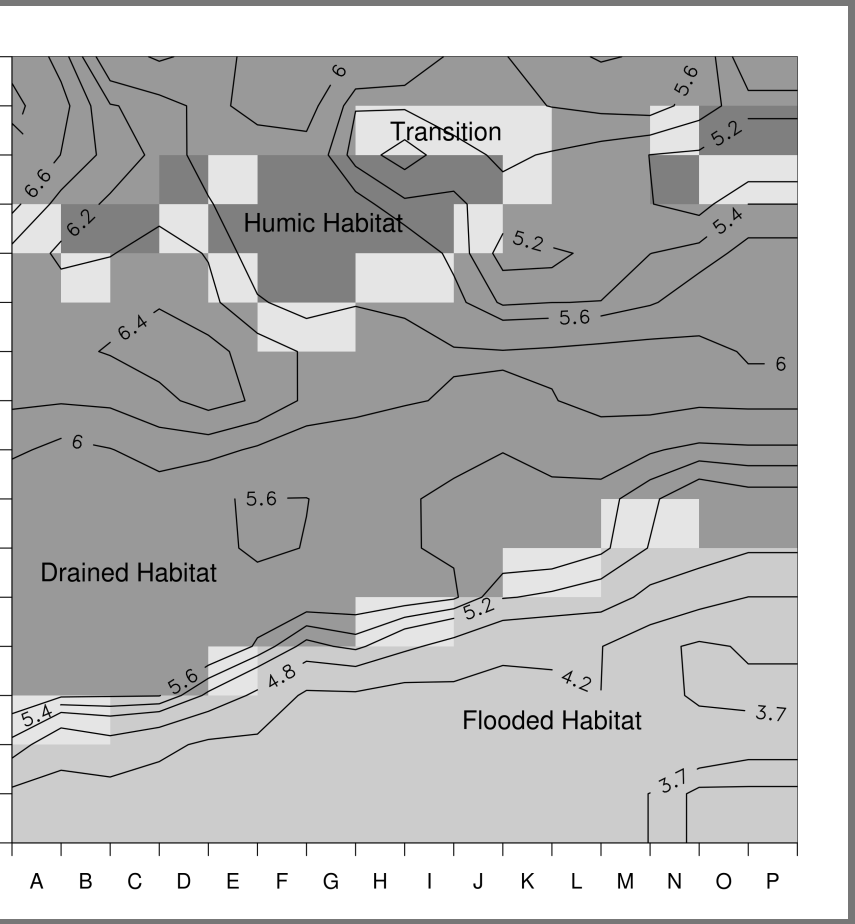
Padrão Espacial



Resultados

- dap > 4.7 c
- 37/40 ssp m
  são agregad
- 5 padrões d

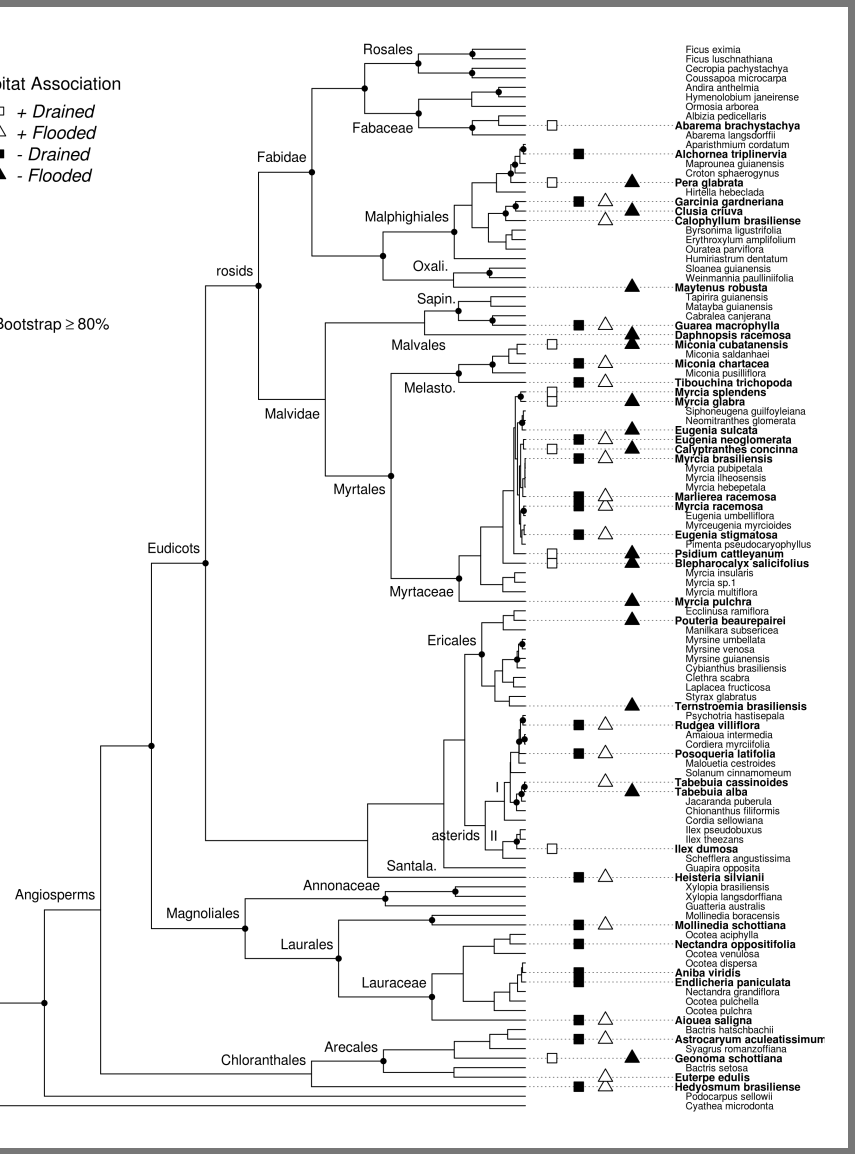
Habitats Edáficos



Oliveira et al

- 99 spp >
- 52% hab
- Flooded:
- No-Floo

Habitat e Filogenia



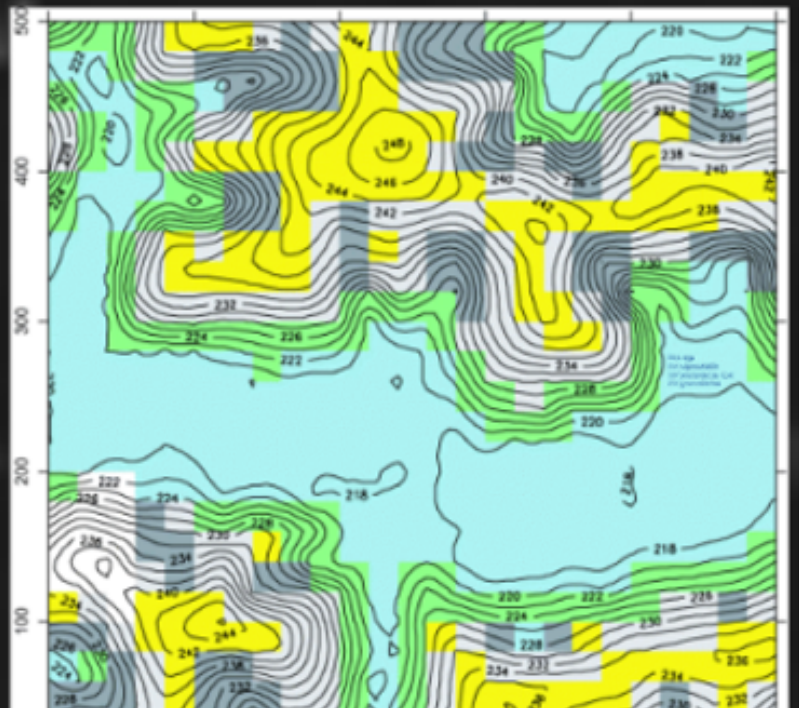
- 99 spp >
- 52% hab
- Flooded:
- No-Floo

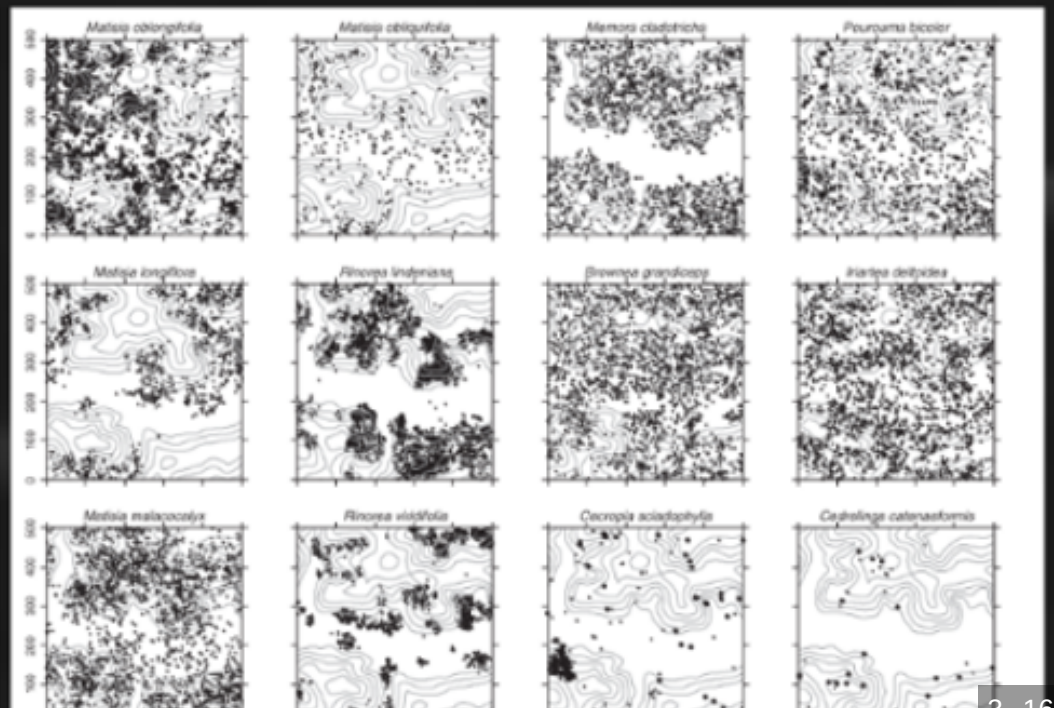
Habitat s

Clo
dif

Valencia et al. 2004

- 152353 arv.
- 1104 spp





Yasuni

1104 spp
25% especialista
50% preferência >1,5x
25% generalistas

Valencia et al. 2004. Journal of Ecology

Habitat Specialization is important!

Kraft et al., 2008

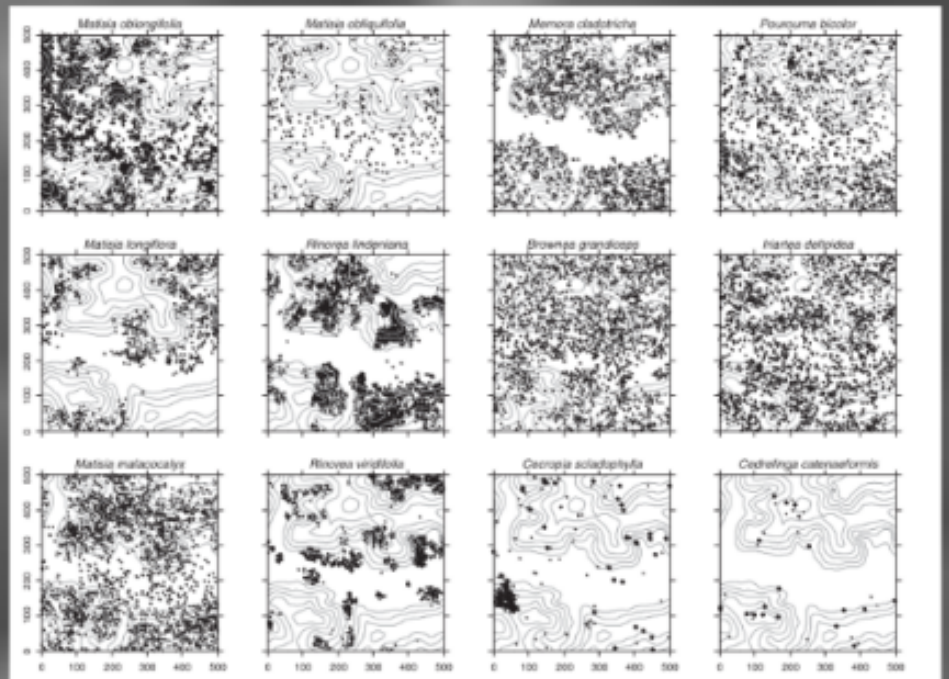
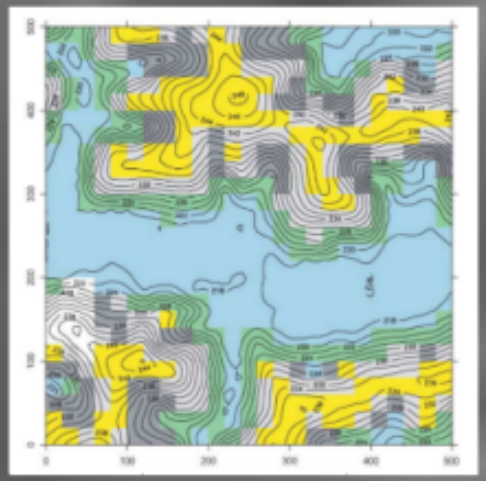
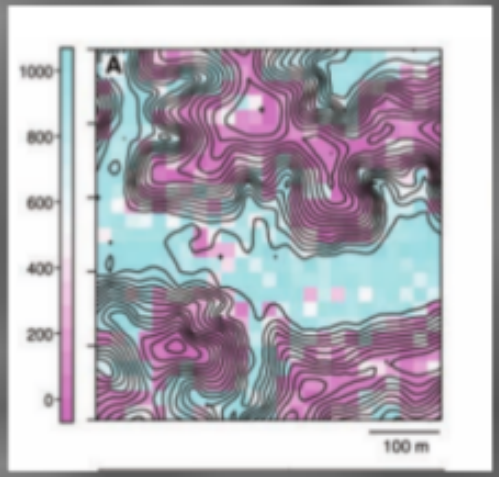


Fig. 4 Species distribution maps overlain on 5-m contours. Points come in three sizes: the largest indicate trees with d.b.h. ≥ 300 mm, medium indicate d.b.h. ≥ 100 and < 300 mm, and the smallest indicate d.b.h. ≥ 10 and < 100 mm.



HABITATS



SLA

Yi-Ching 2011

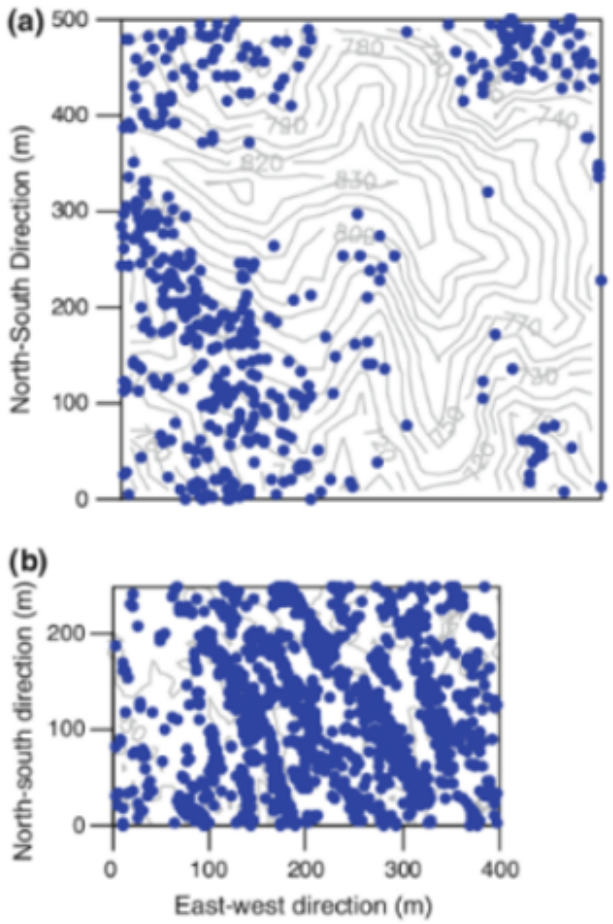
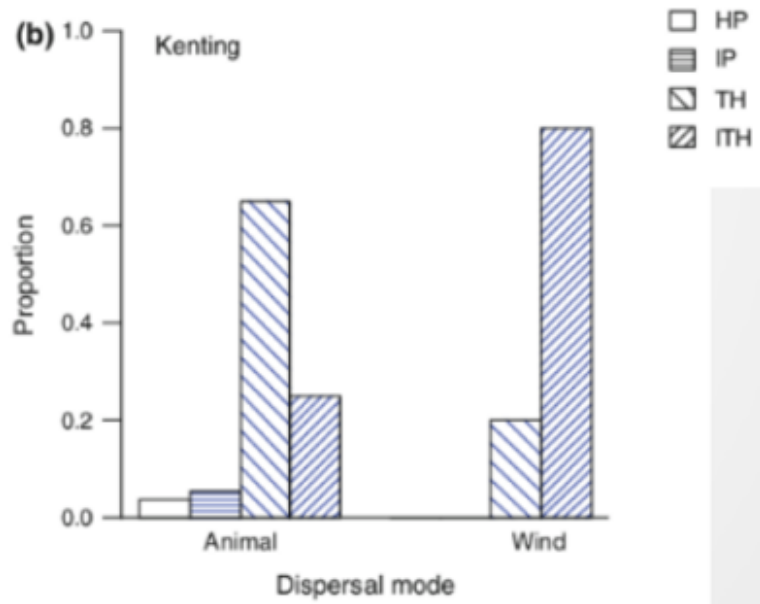


Fig. 2 Stem maps of *Ardisia sieboldii* in the LHC plot (**a**) and *Aglaia formosana* (**b**) in the Kenting plot. Each *dot* represents an individual

Table 1 Proportion of the best models for tree species in the LHC and Kenting plots in Taiwan as judged by the AIC (ESM S1, S2)

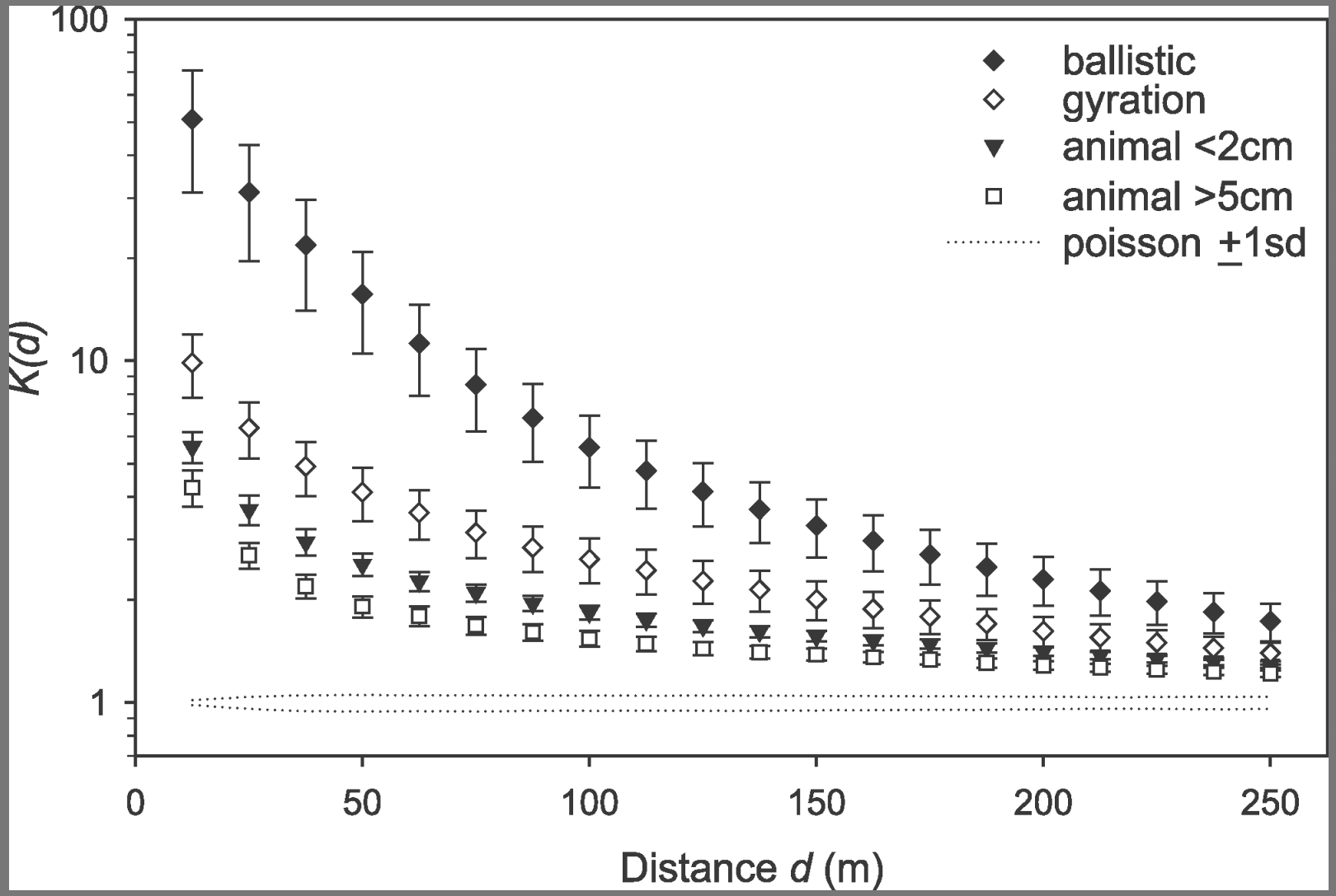
Model	LHC	Kenting
Homogeneous Poisson process	3% (3)	4% (2)
Inhomegenous Poisson process	13% (13)	5% (3)
Homogeneous Thomas process	33% (31)	30% (17)
Inhomogeneous Thomas process	49% (46)	61% (35)



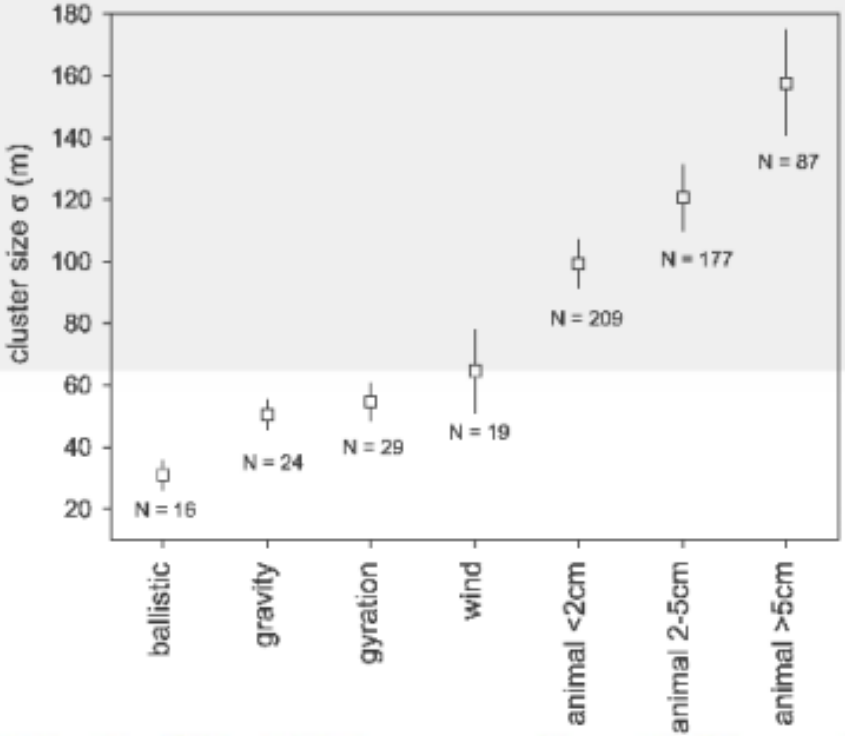
Yi-Ching *et al.* (2011) Oecologia

Dispersão

Siedler & Plotkins, PlosBio 2006



PLOS | BIOLOGY



Brov

CCESS PEER-REVIEWED

H ARTICLE

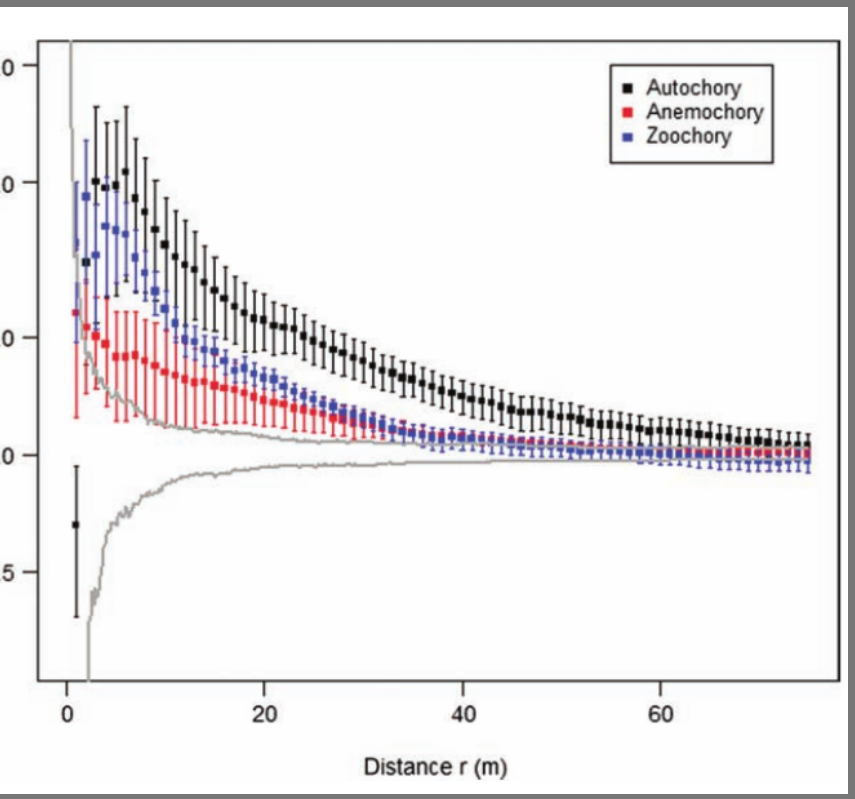
d Dispersal and Spatial Pattern in Tropical Tre

G Seidler, Joshua B Plotkin

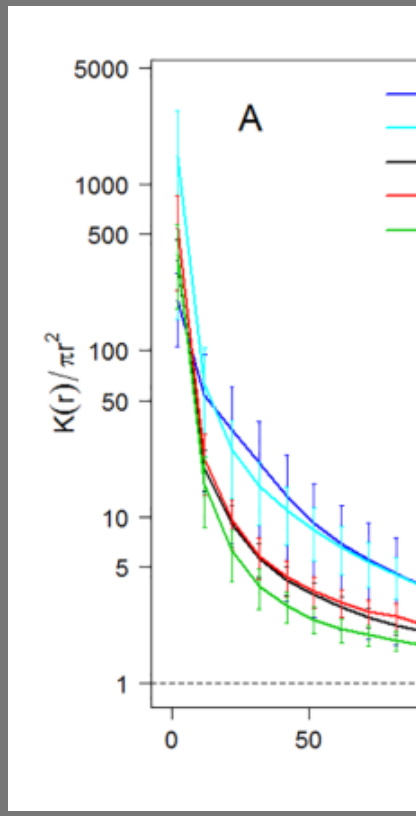
50 hectares Malasia
561 spp árvores

Habitat x Dispersão

uador (Floresta Seca).
errero et al. Oikos 2015



BCI. Ramón et



Habitat x Dispersão

Does spatial heterogeneity blur the signature of dispersal syndromes on spatial patterns of woody species? A test in a tropical dry forest

Andrea Jara-Guerrero, Marcelino De la Cruz, Carlos I. Espinosa, Marcos Méndez and Adrián Escudero

Floresta Seca Equador

- 50% IPCP, 21% HPCP

Environmental heterogeneity blurs the signature of dispersal syndromes on spatial patterns of woody species in a moist tropical forest

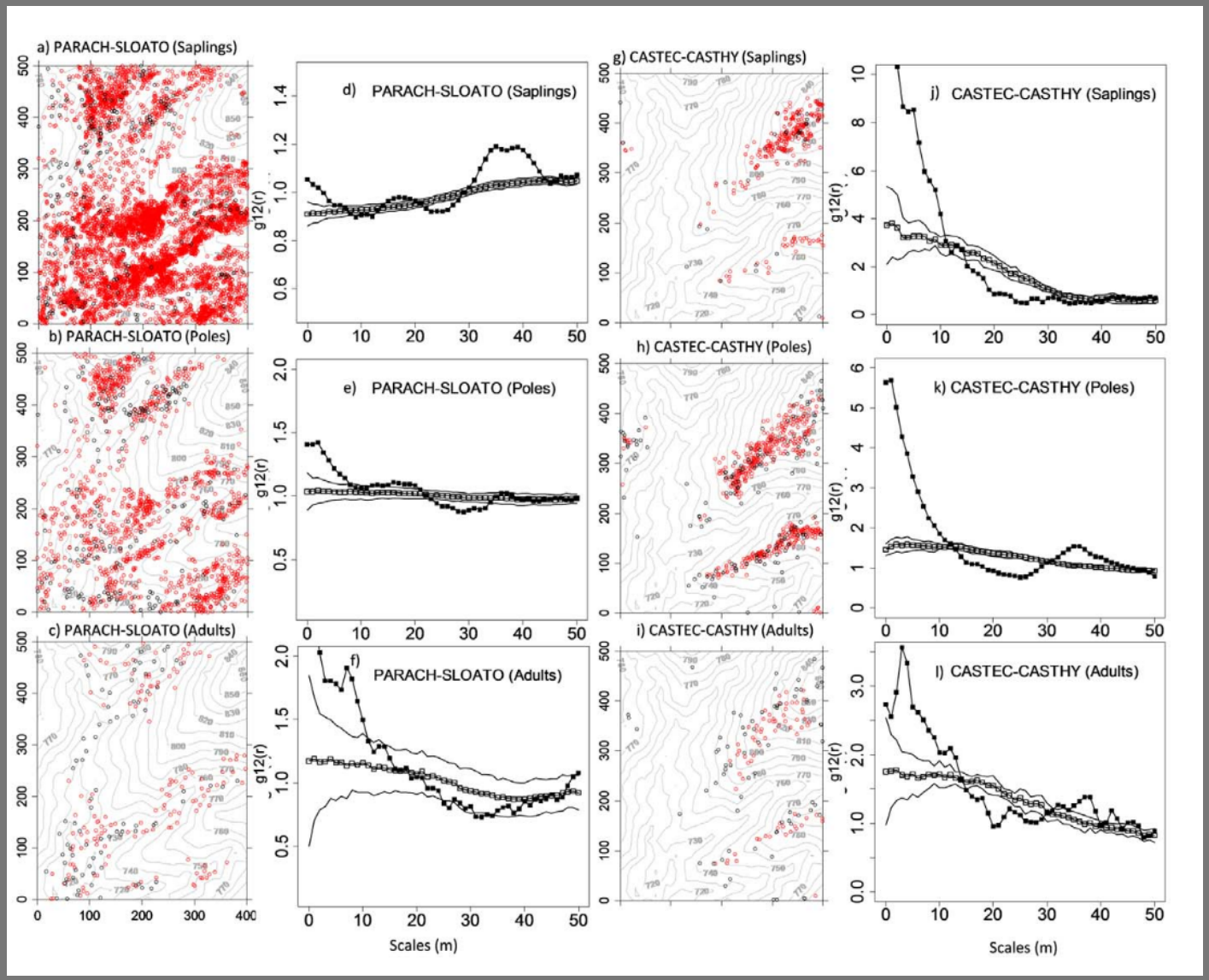
Pablo Ramón[1]*, Eduardo Velázquez[2], Adrián Escudero[3], Marcelino de la Cruz[3]

BCI

- 63% IPCP, 20% HPCP

Associação entre Espécies

Xishuangbanna, China (Lan et al. 2012)



Bivariado

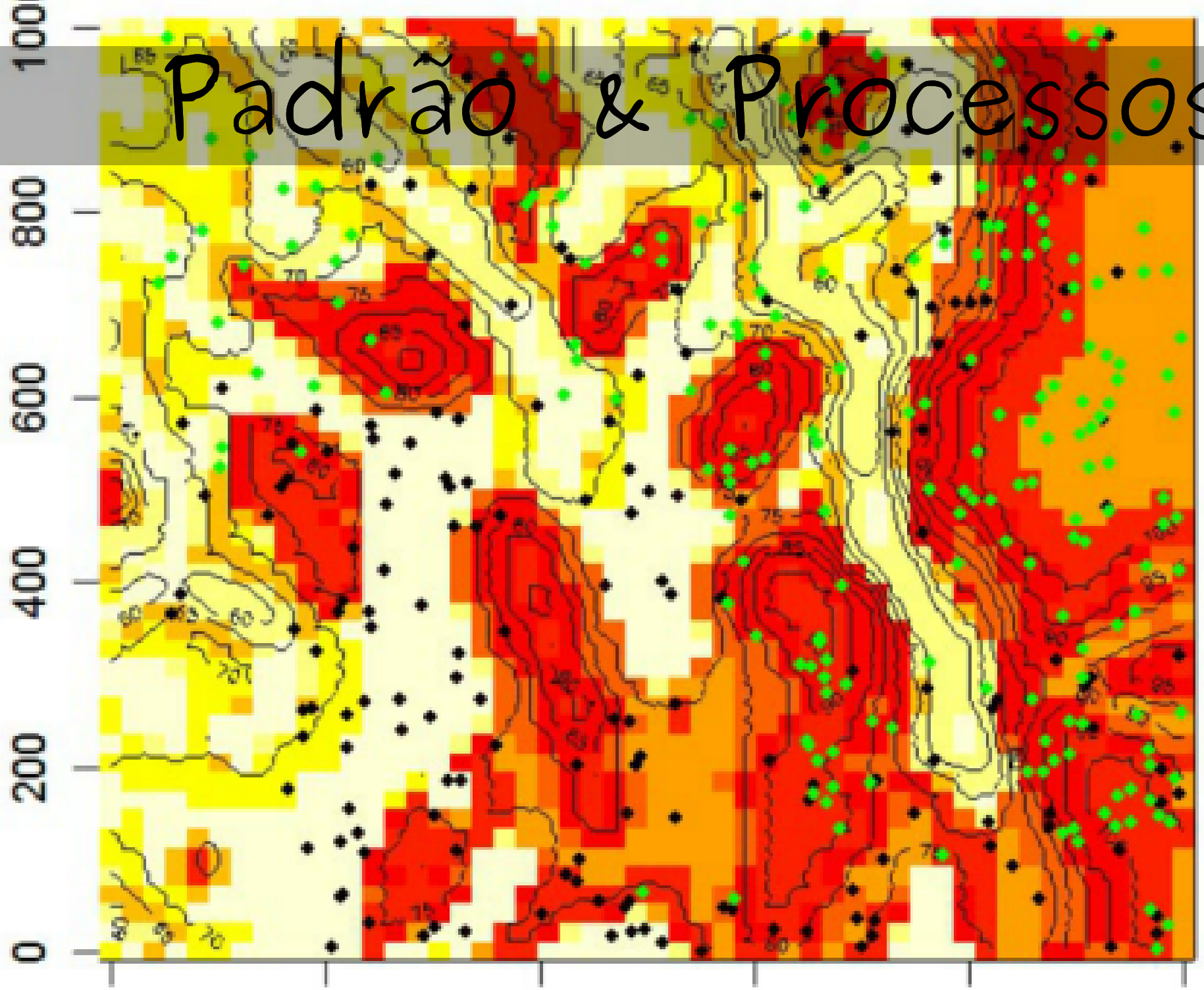
OPEN ACCESS Freely available online PLOS | ONE

Spatial Distribution and Interspecific Associations of Tree Species in a Tropical Seasonal Rain Forest of China

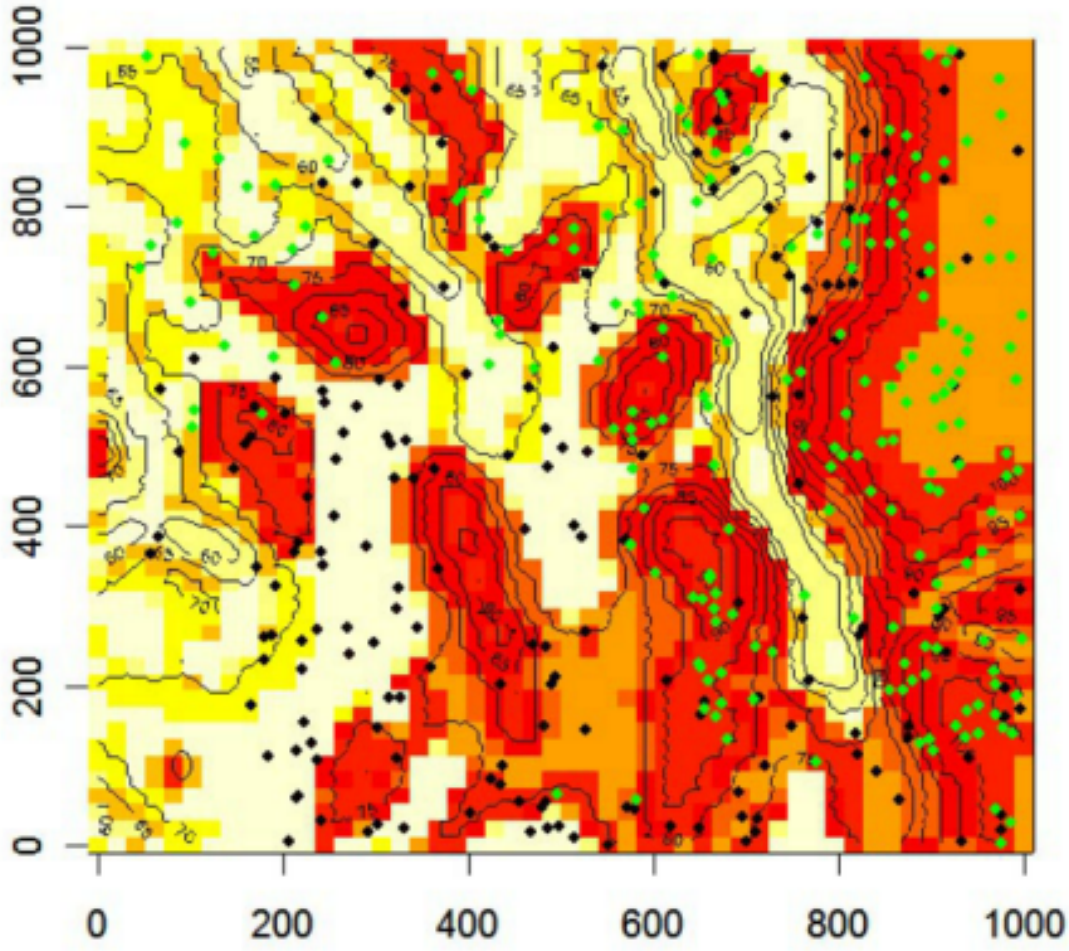
Guoyu Lan[1,2], Stephan Getzin[3], Thorsten Wiegand[3], Yuehua Hu[1], Guishui Xie[2], Hua Zhu[1], Min Cao[1]*

- 14/20 spp associada com habitat (70%)
- diminuição na intensidade de agregação em escalas maiores
- agregação diminui com a ontogenia
- associação entre espécies:
- jovens: + 43% , − 39%
- adultos: + 45% , − 29%

Padrão & Processos



Inferir Processos

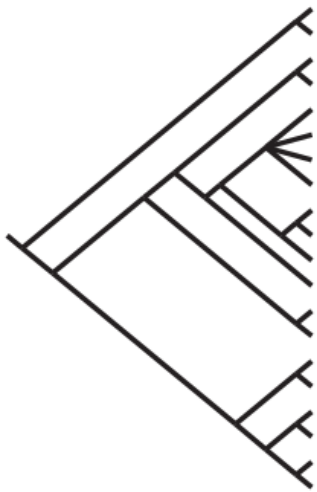


verde = COAL; preto= CORI

Associação Habitats

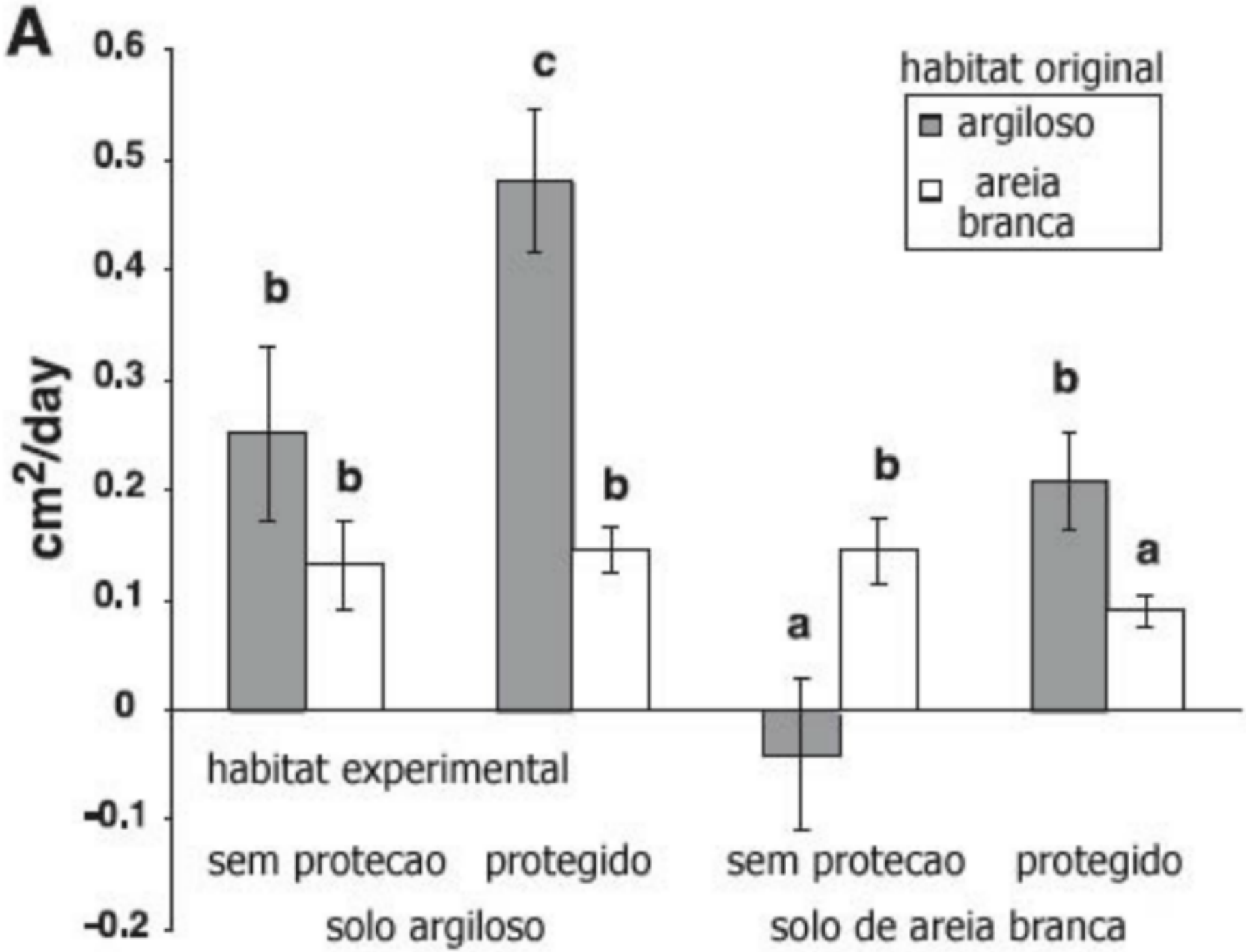
Herbivores Promote Habitat Specialization by Trees in Amazonian Forests

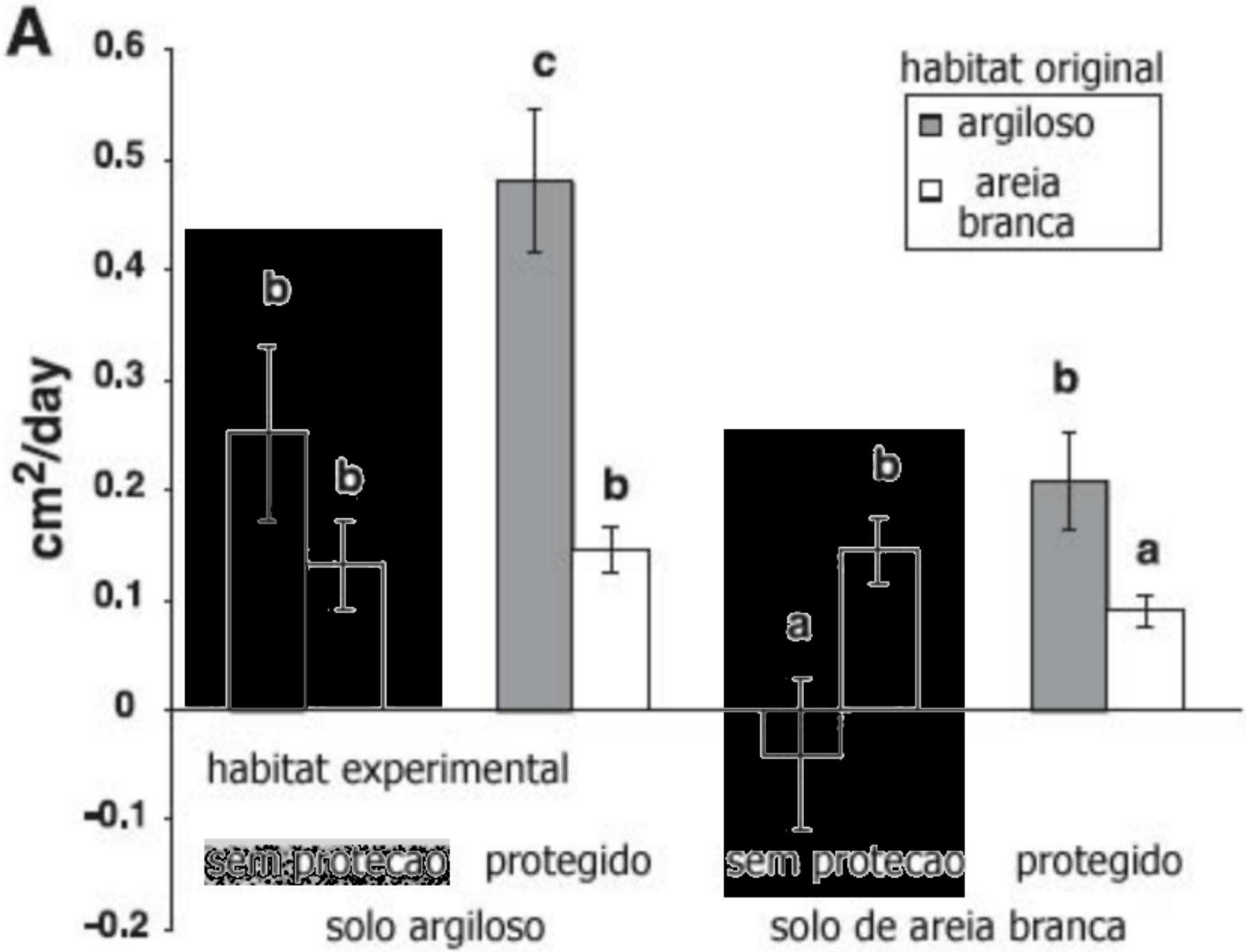
Paul V. A. Fine,[1,2*] Italo Mesones,[3] Phyllis D. Coley[1]



Family	Genus and species	Soil type (origin)
Annonaceae	*Oxandra xylopioides* Diels	Clay
Annonaceae	*Oxandra euneura* Diels	White sand
Burseraceae	*Tetragastris* panamensis* (Engler) Kuntze	Clay
Burseraceae	*Protium subserratum* (Engler) Engler	White sand
Burseraceae	*Protium nodulosum* Swart	Clay
Burseraceae	*Protium paniculatum* Engler	White sand
Burseraceae	*Protium opacum* Swart	Clay
Burseraceae	*Protium calanense* Cuatrec.	White sand
Burseraceae	*Protium trifoliolatum* Engler	Clay
Burseraceae	*Protium krukoffii* Swart	Clay
Burseraceae	*Protium heptaphyllum* subsp. *ulei* (Swart) Daly	White sand
Burseraceae	*Protium hebetatum* Daly	Clay
Malvaceae (Bombacoid)	*Pachira insignis* (Swartz) Swartz ex Savigny	Clay
Malvaceae (Bombacoid)	*Pachira brevipes* (Robyns) Alverson	White sand
Euphorbiaceae	*Mabea pulcherrima* Müll. Arg.	Clay
Euphorbiaceae	*Mabea subsessilis* Pax & Hoffmann	White sand
Fabaceae (Faboid)	*Swartzia arborescens* (Aublet) Pittier	Clay
Fabaceae (Faboid)	*Swartzia cardiosperma* Spruce ex Benth.	White sand
Fabaceae (Mimosoid)	*Parkia multijuga* Benth.	Clay
Fabaceae (Mimosoid)	*Parkia igneiflora* Ducke	White sand

Fine et al., 2004


A
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
cm2/day
habitat original
argiloso
areia branca
b
b
c
b
a
b
b
a
habitat experimental
sem protecao
protegido
sem protecao
protegido
solo argiloso
solo de areia branca


A
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cm2/day
habitat original
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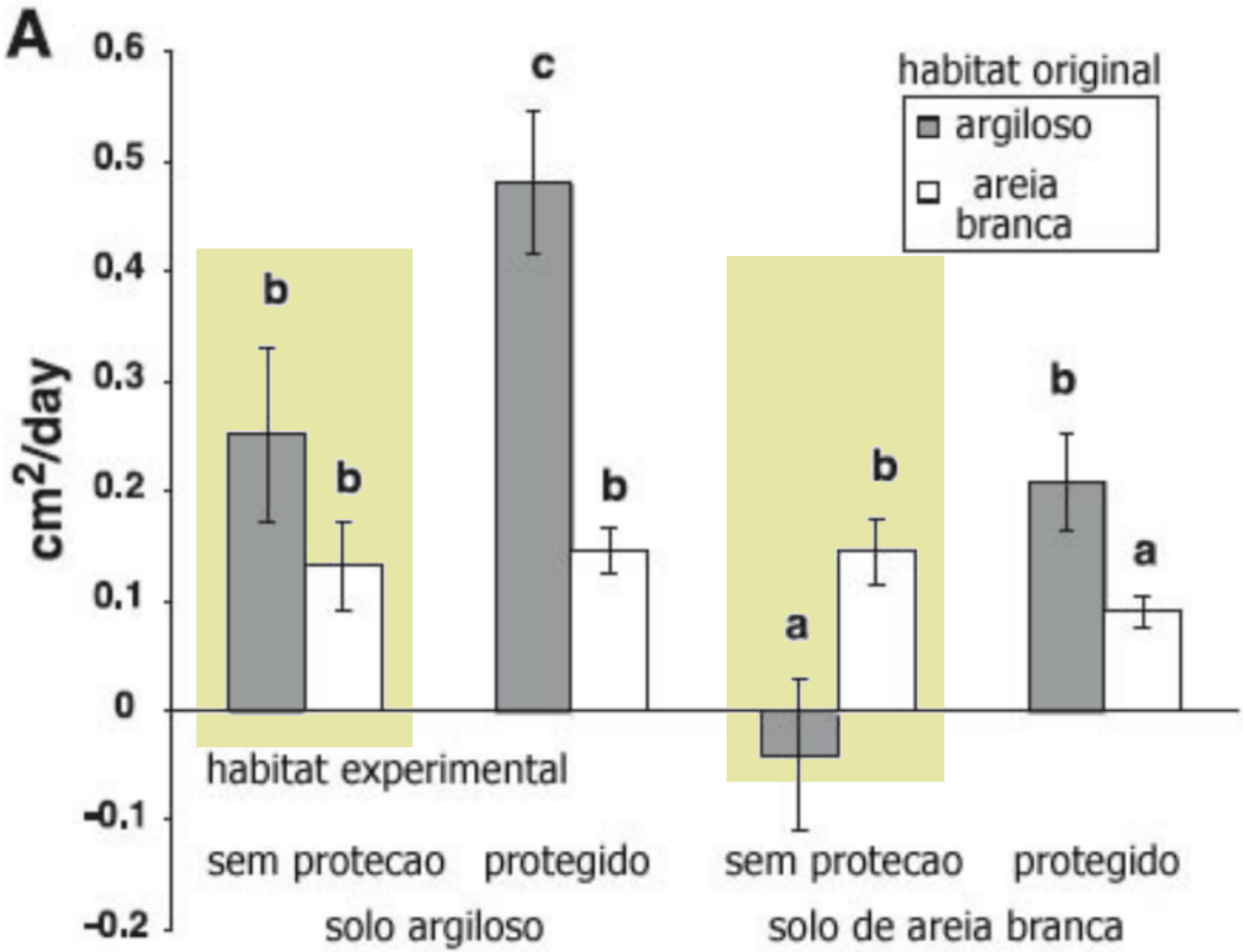
areia branca
c
b
b
b
b
b
a
a
habitat experimental
sem protecao
protegido
sem protecao
protegido
solo argiloso
solo de areia branca


A
0.6
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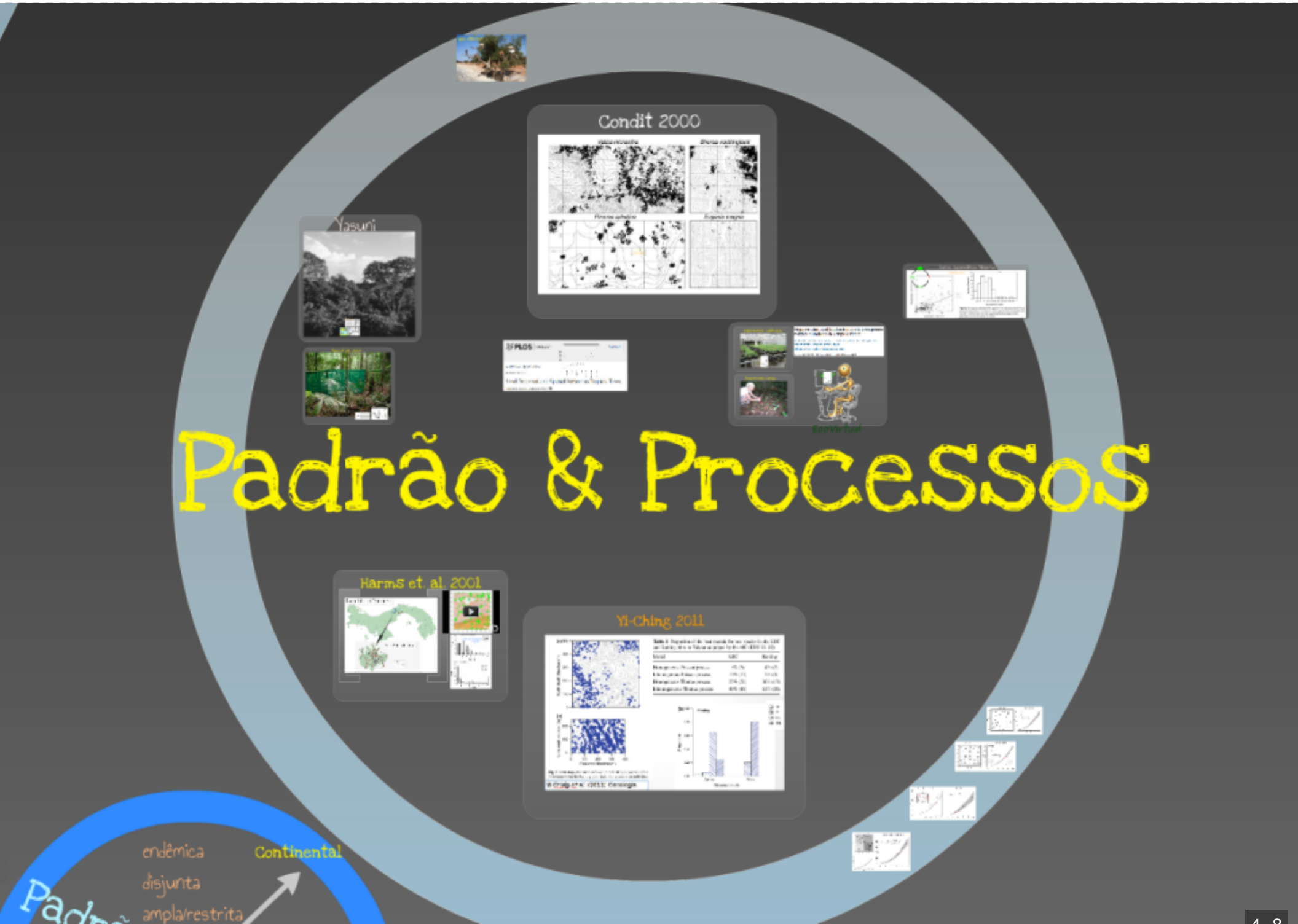
0.4
0.3
0.2
0.1
0
-0.1
-0.2
cm2/day
habitat original
argiloso
areia branca
b
b
c
b
a
b
b
a
habitat experimental
sem protecao
protegido
sem protecao
protegido
solo argiloso
solo de areia branca


Condit 2000
Yasuni
Harms et. al. 2001
Yi-Ching 2011
Padrão & Processos
endêmica
disjunta
ampla/restrita
Continental

FORTE

experimentos manipulativos

força de inferência

desenhos retritos

observacionais

a priori

hipóteses

a posteriori

FRACA


Padrão
endêmica
disjunta
ampla/restrita
agregado
aleatorio
regular
Escala
Continental
-dispersão a longa distância
- barreiras geográficas
- história evolutiva
Regional (km)
Processo
- limitação dispersão
- interações +/-
- especialização habitat
- limitações fisiológicas
Local (m)