

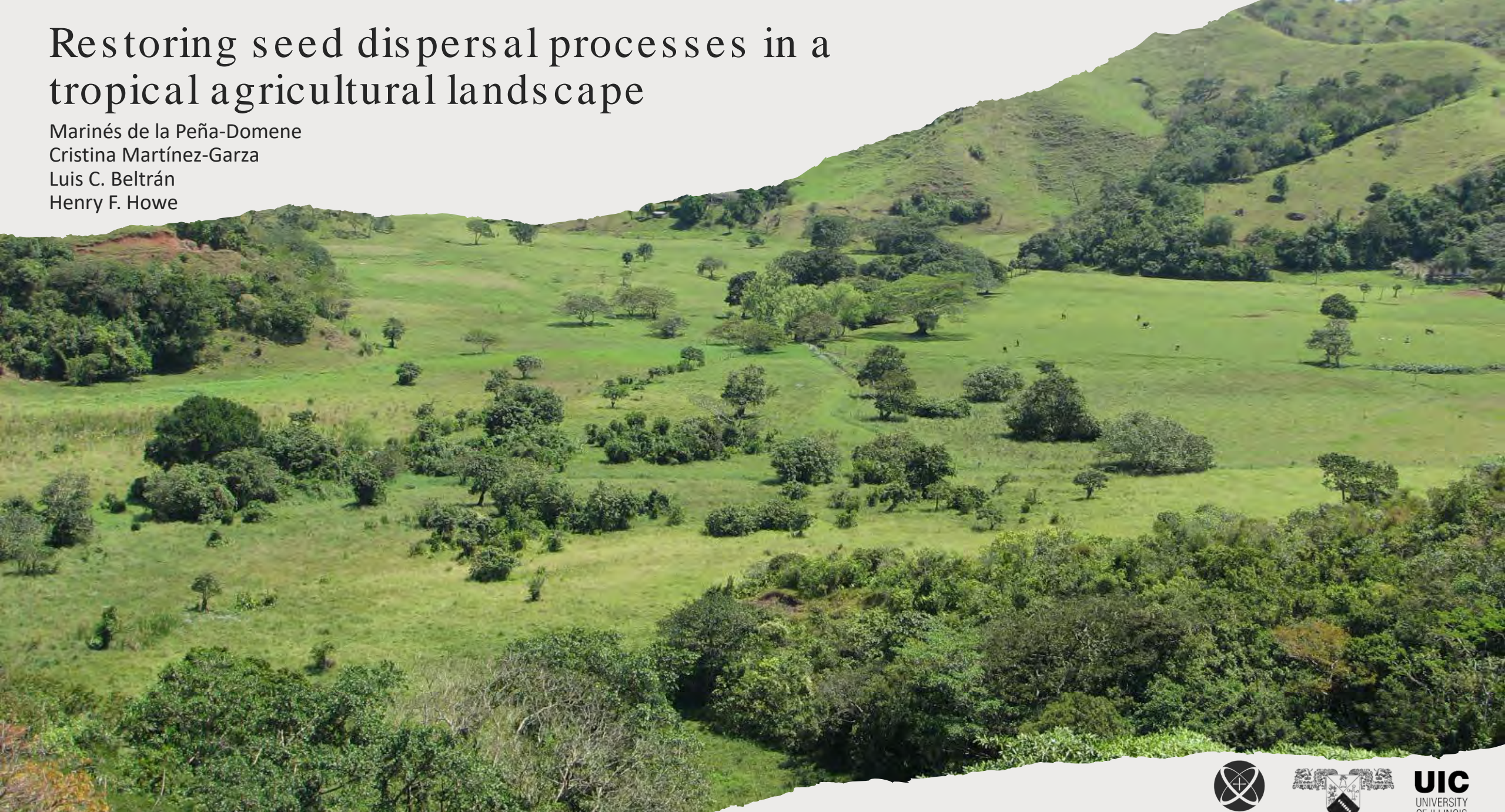
Restoring seed dispersal processes in a tropical agricultural landscape

Marinés de la Peña-Domene

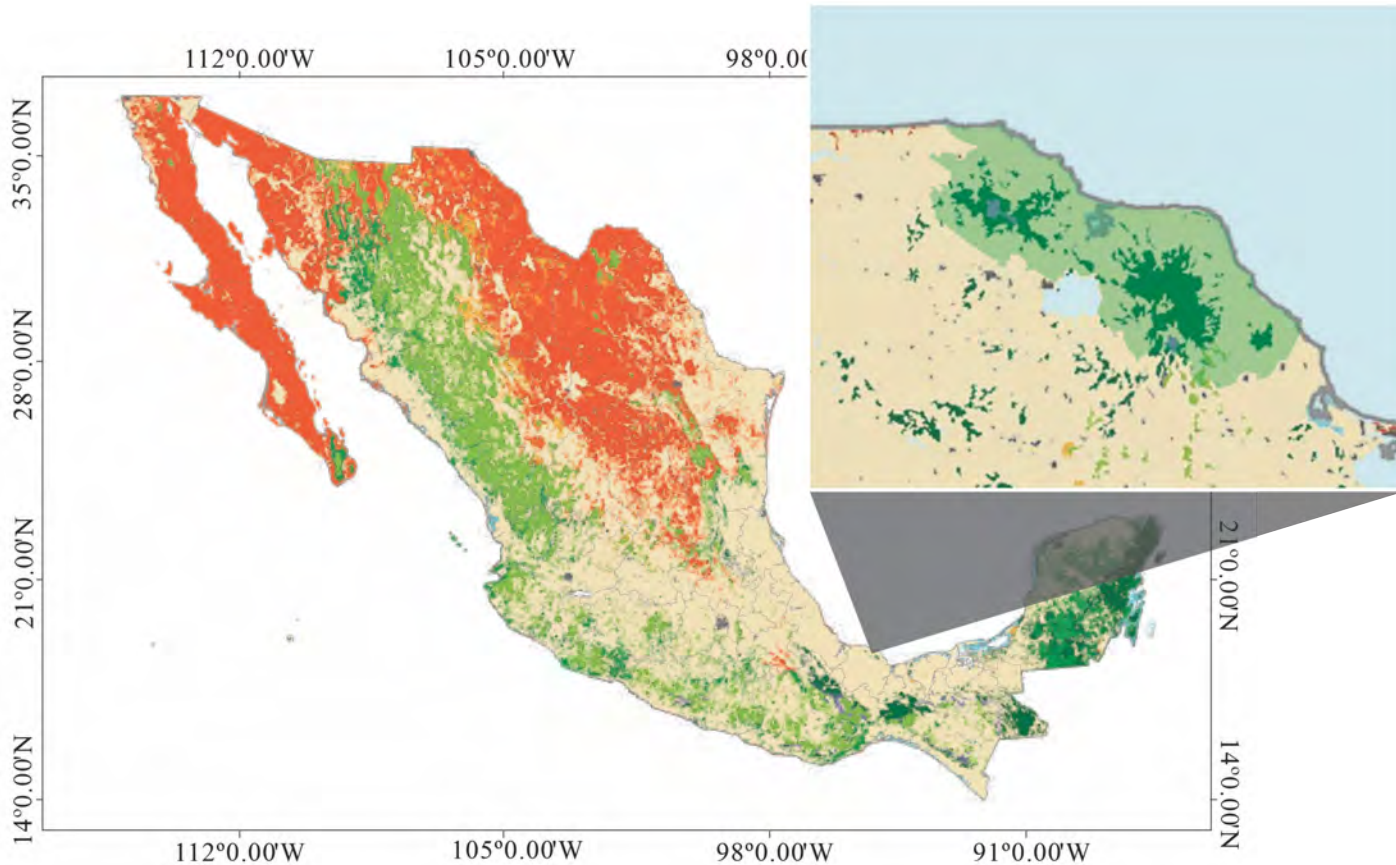
Cristina Martínez-Garza

Luis C. Beltrán

Henry F. Howe



Los Tuxtlas



- Tropical Rainforest
- Open pastures
- Fragmented landscape
- Project start: 2006
- Oj. Restore ecological interactions
 - seed dispersal processes
 - Movement of plants and animals

2006

2009

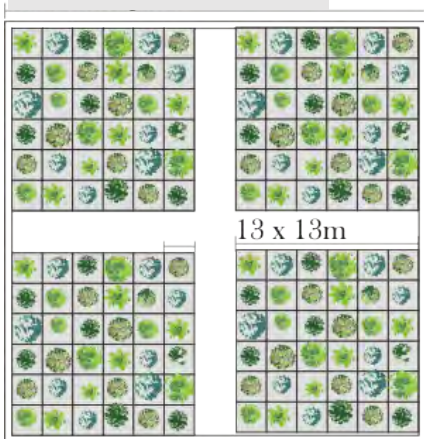
2012

2015

2018

2021

(30 x 30 m)



4 pioneers

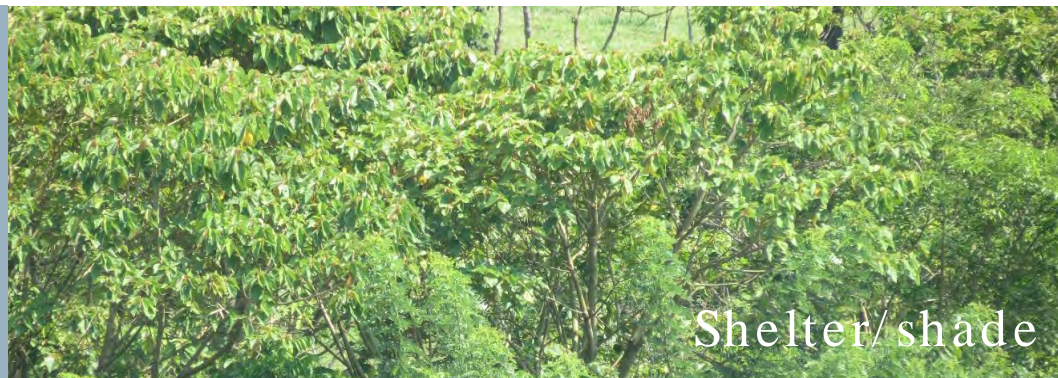
8 non pioneers

12 species per treatment

ANIMAL



WIND



CONTROL



2006

2009

2012

2015

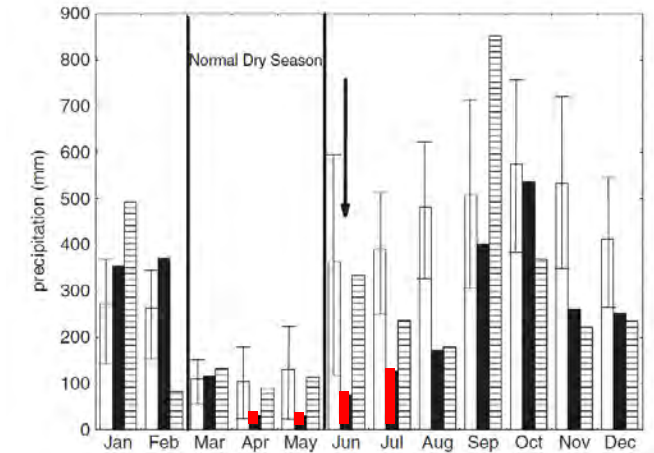
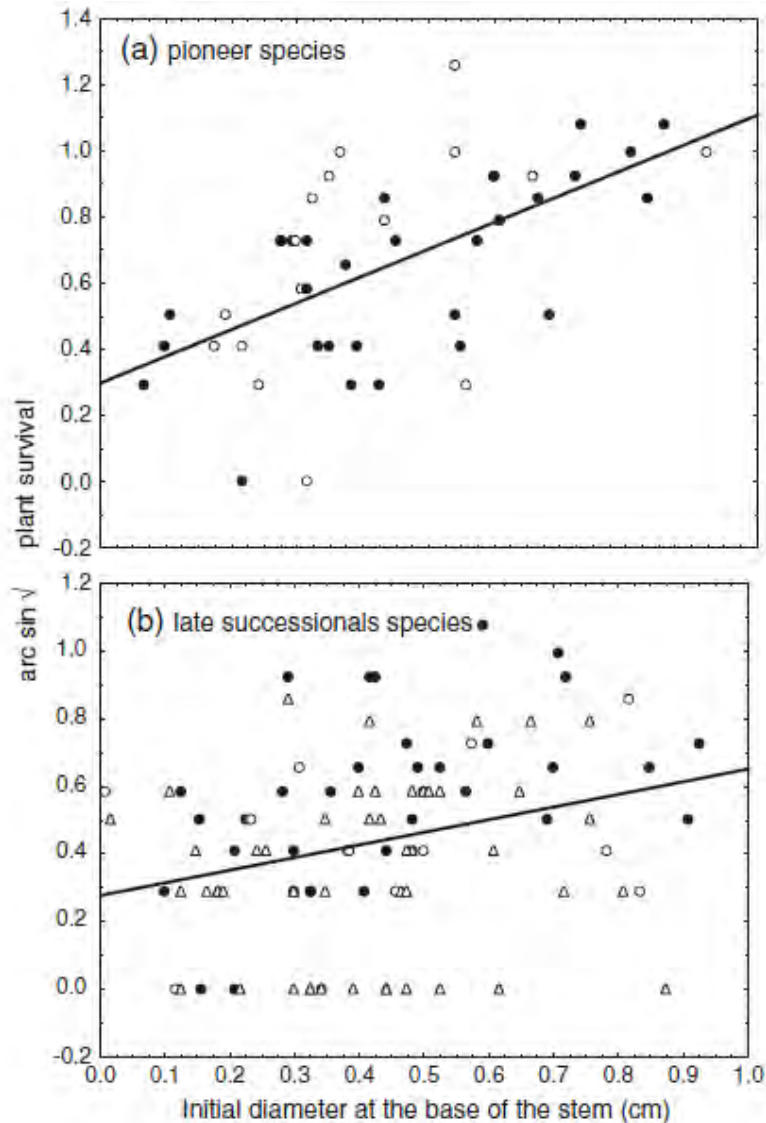
2018

2021

2005

2021





An extreme dry season in 2007 killed 72% of the seedlings. Survival of six pioneer species and 12 late successional species was mainly explained by:

1. the initial basal diameter at the time of sowing
2. soil depth for pioneers
3. the elevation position on the slope for late succession.

2006

2008

2009

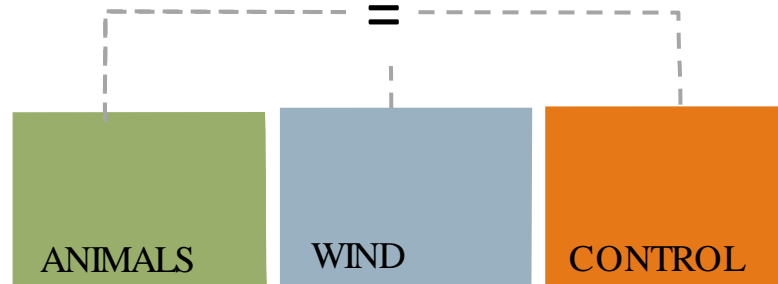
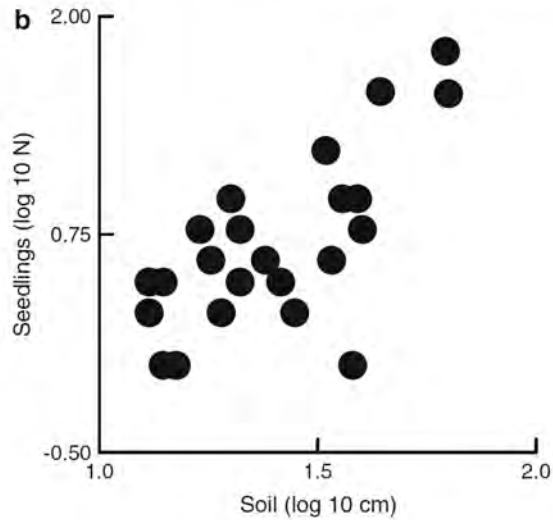
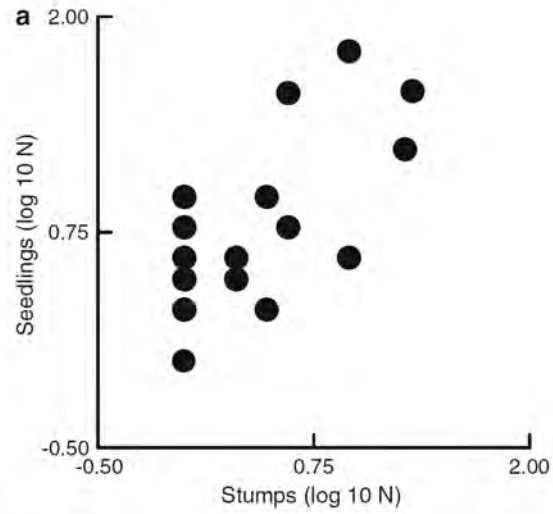
2012

2015

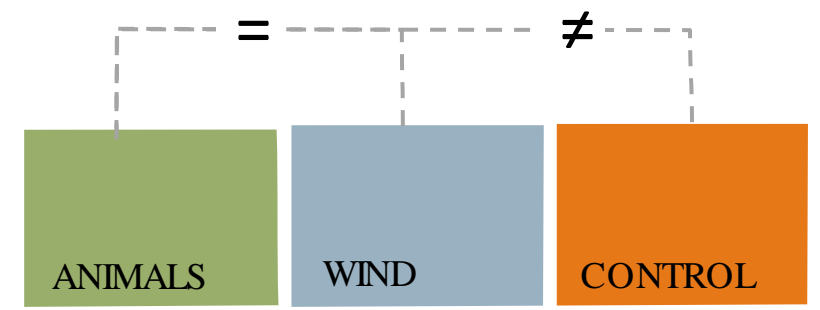
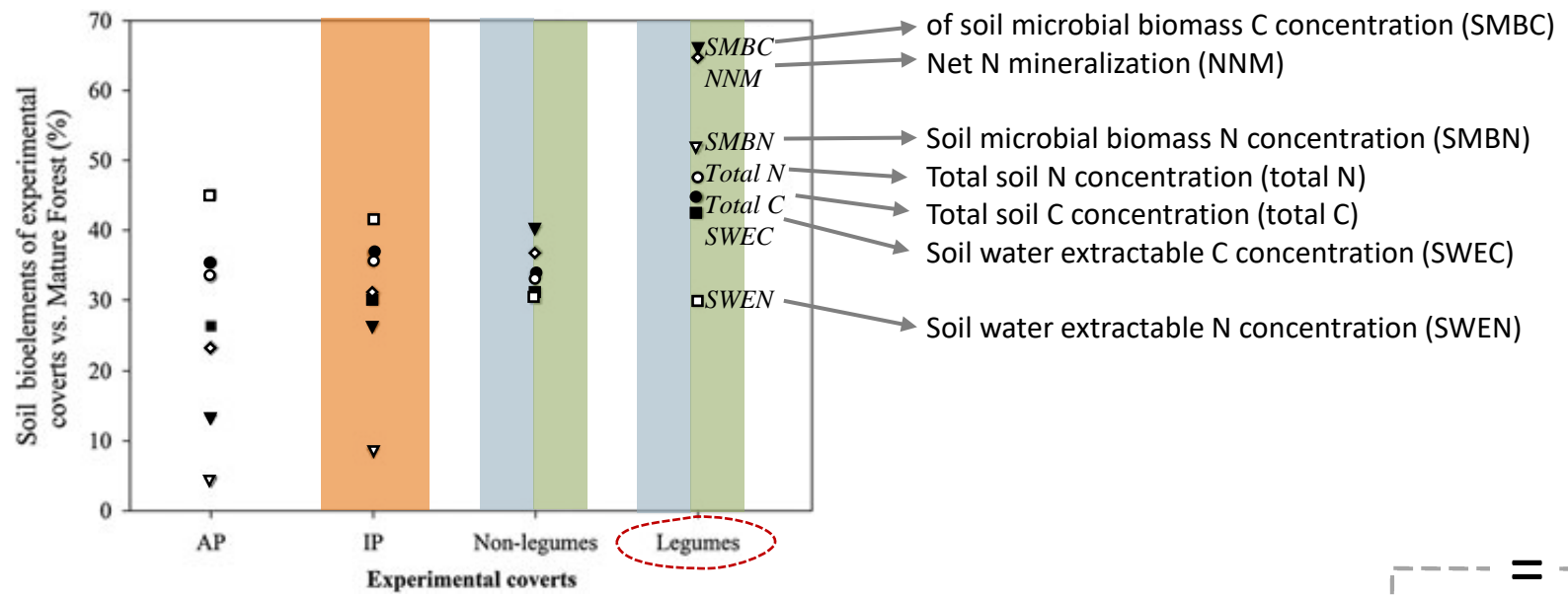
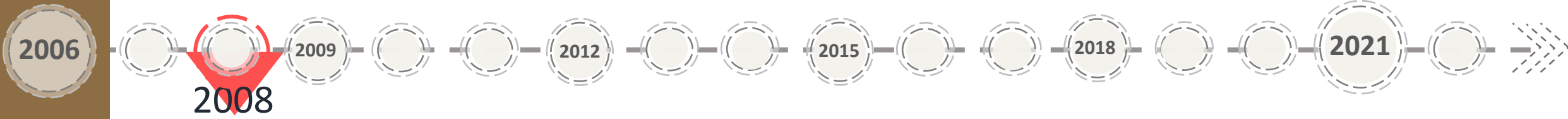
2018

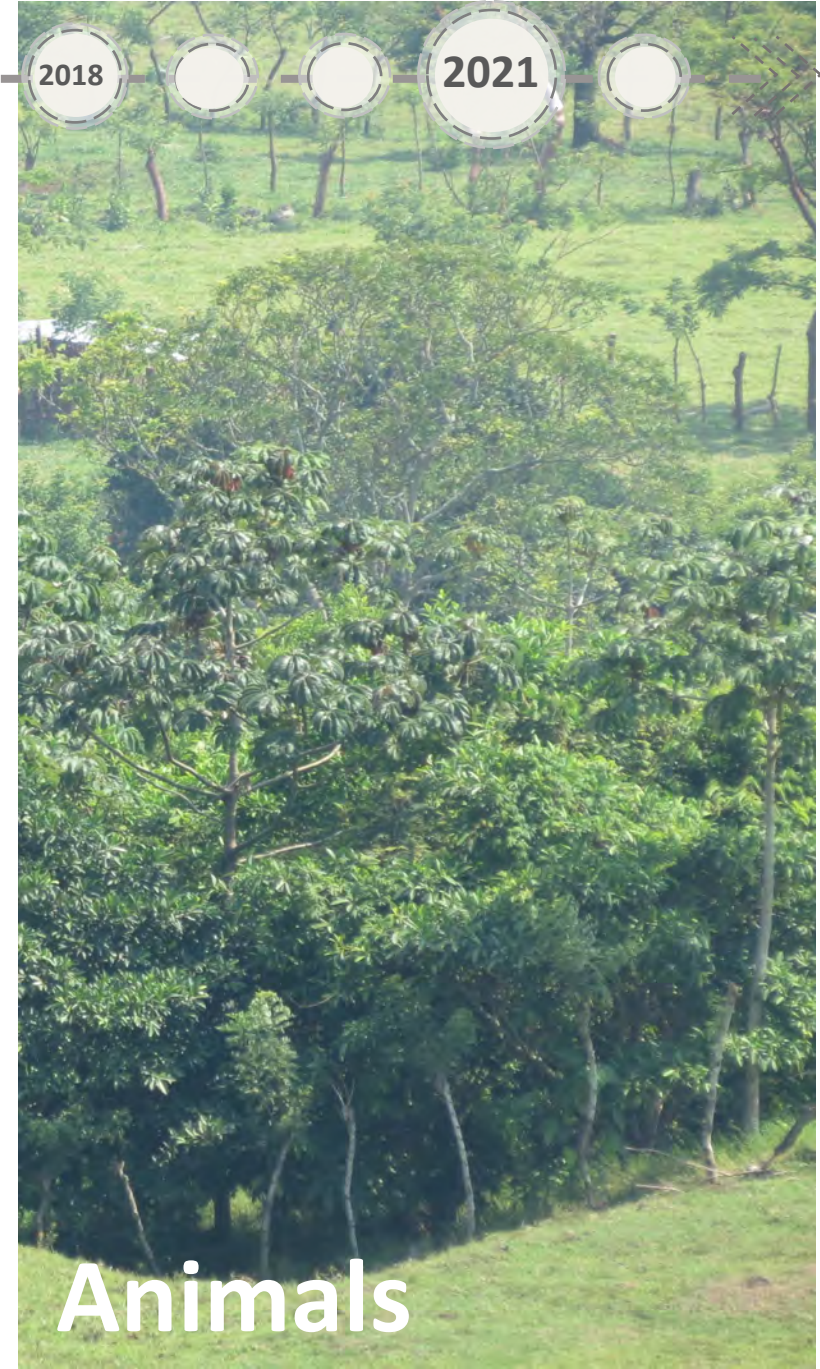
2021

SEEDLING RECRUITMENT



SOIL PROPERTIES





2006

2009

2012

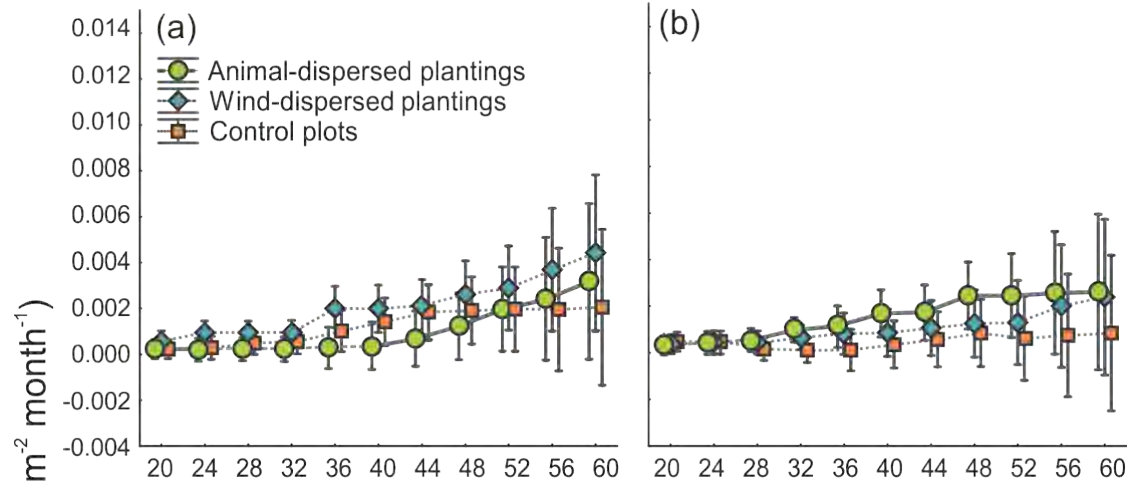
2015

2018

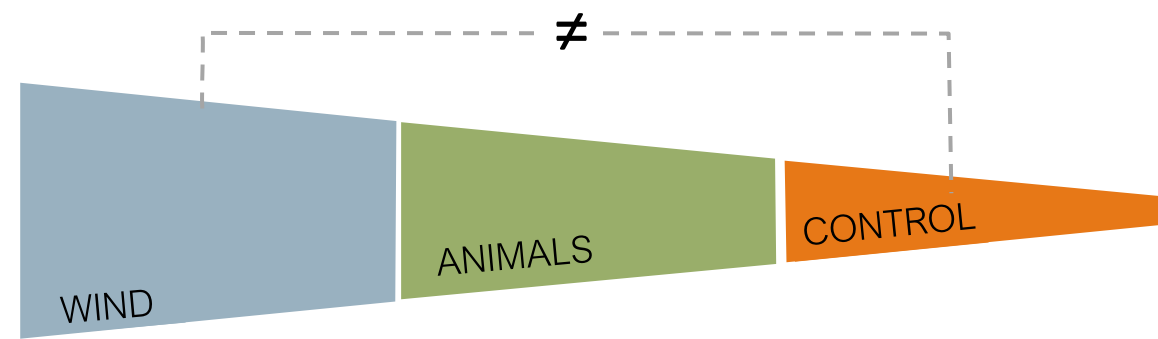
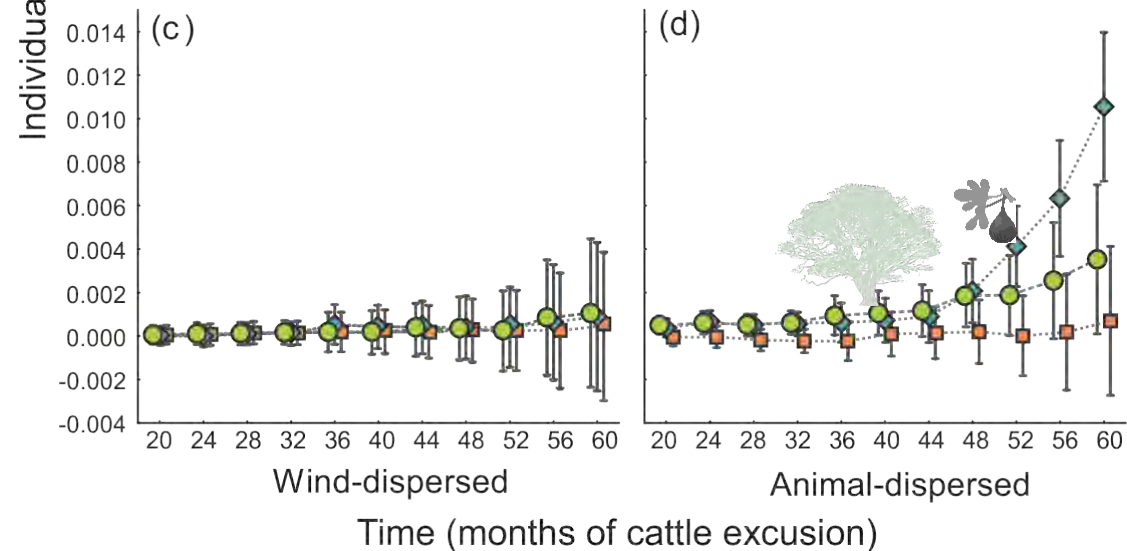
2021

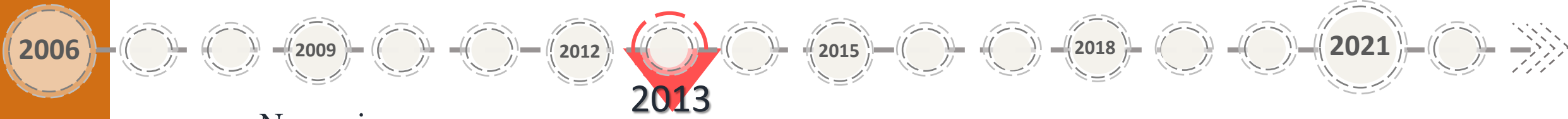
SEEDLING RECRUITMENT

Only early-successionals

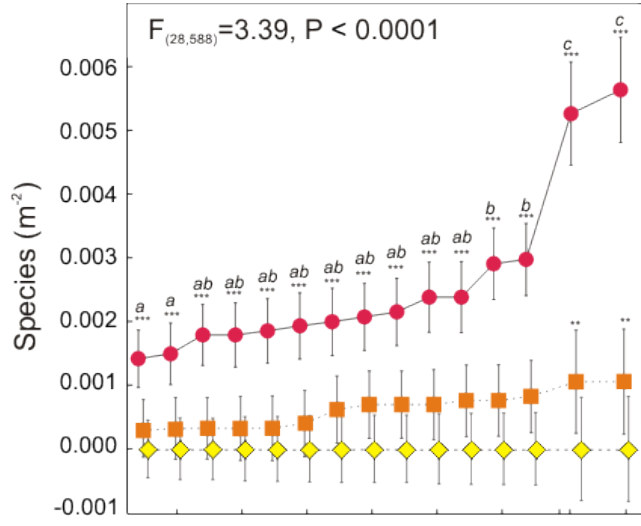


Only later-successionals



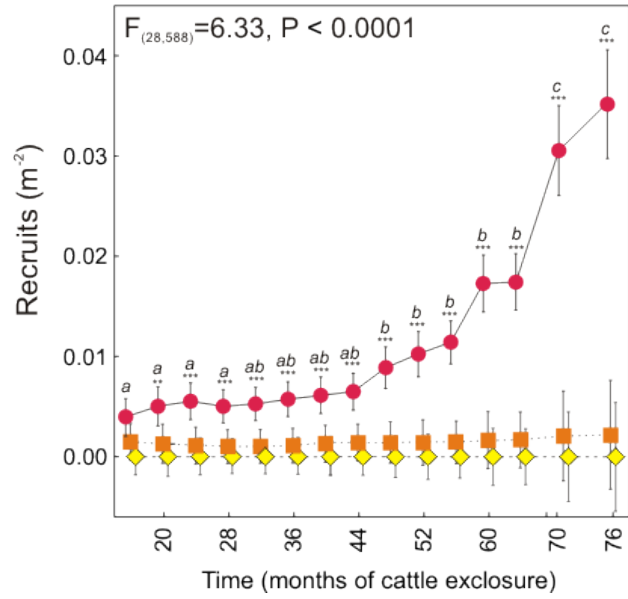


Non pioneers

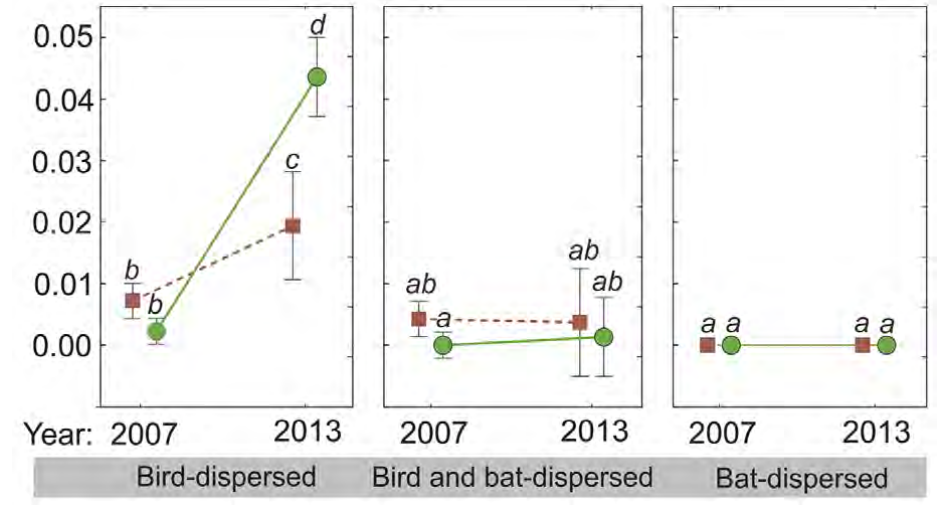
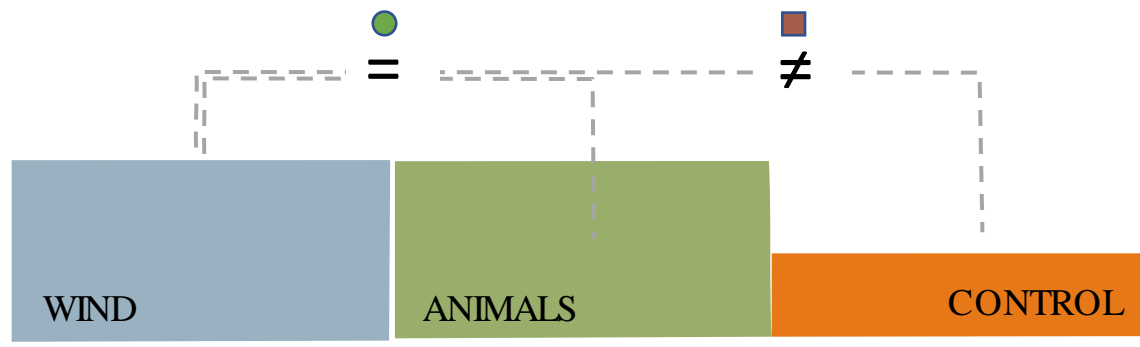


Bird dispersed

Bird & bat dispersed



Bat dispersed



EFFICIENT DISPERSORS

2006

PHYLOGENETIC AND FUNCTIONAL DIVERSITY

2009

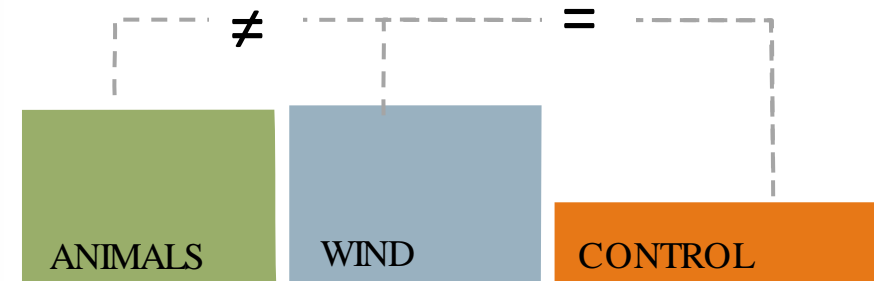
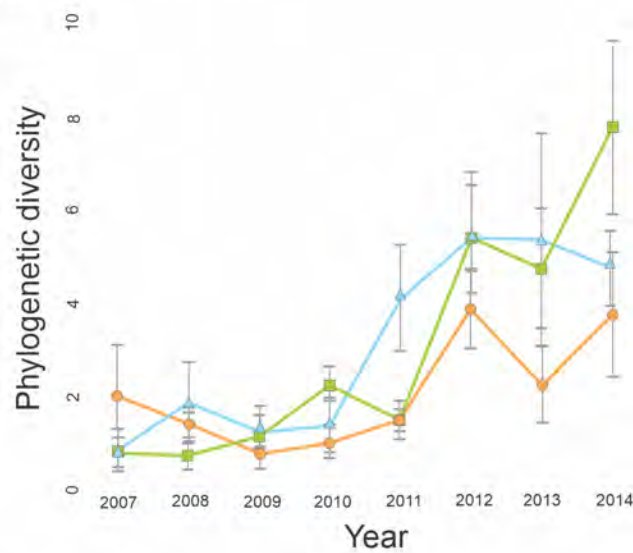
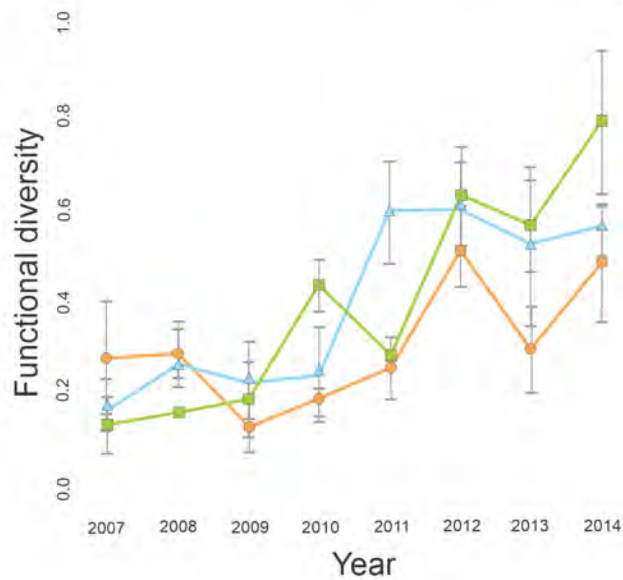
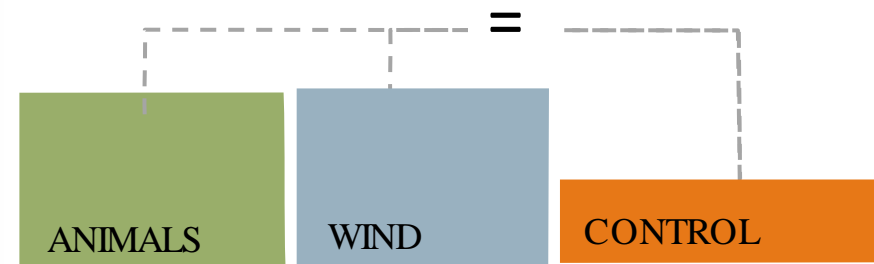
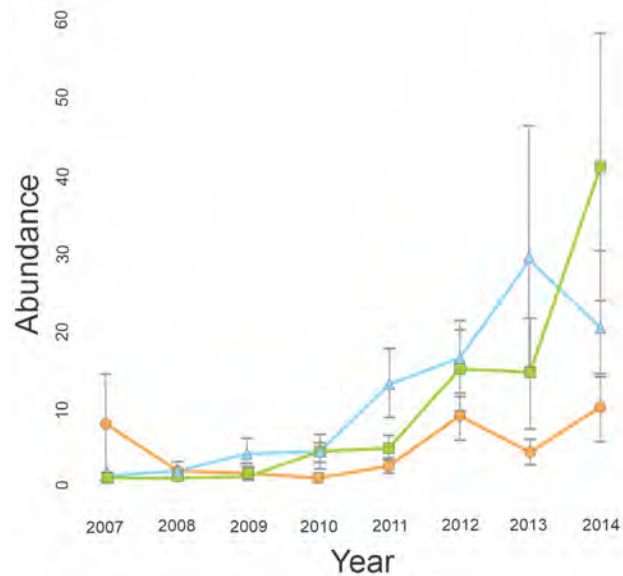
2012

2014

2015

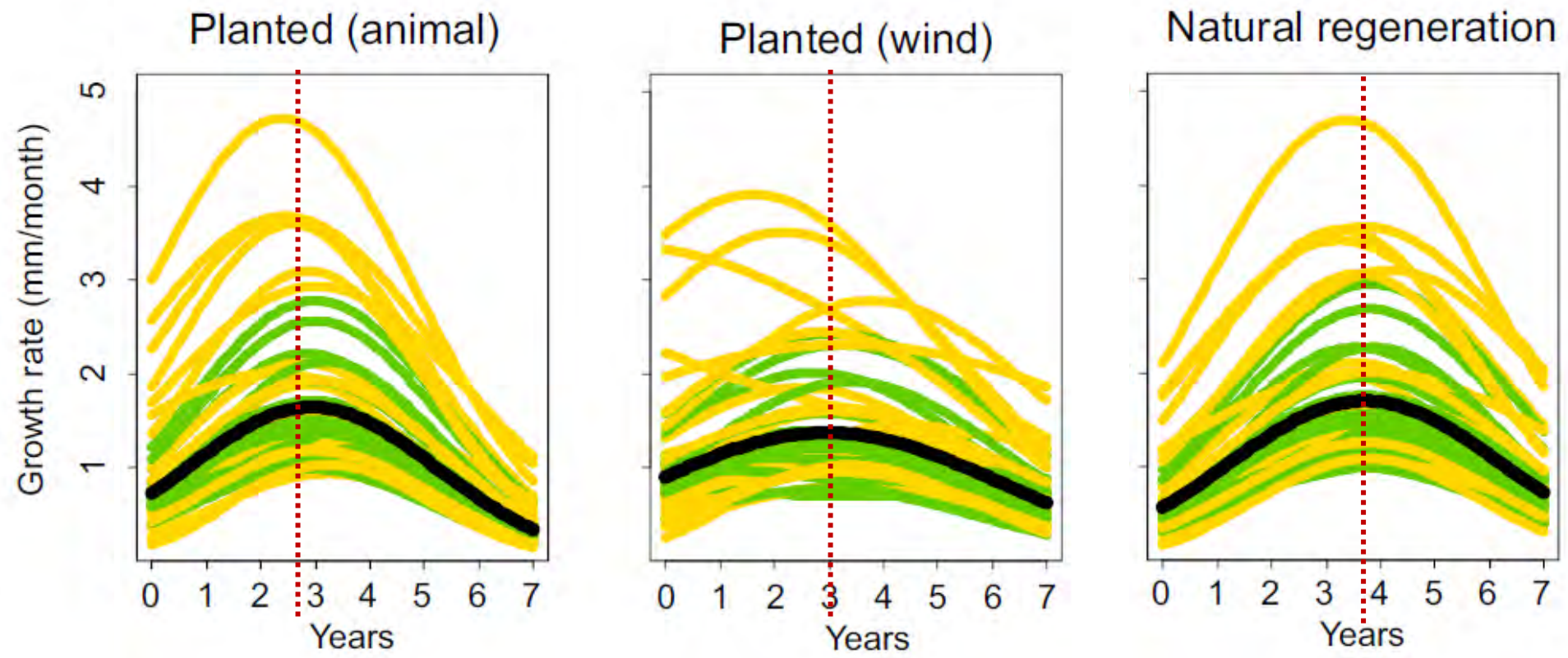
2018

2021



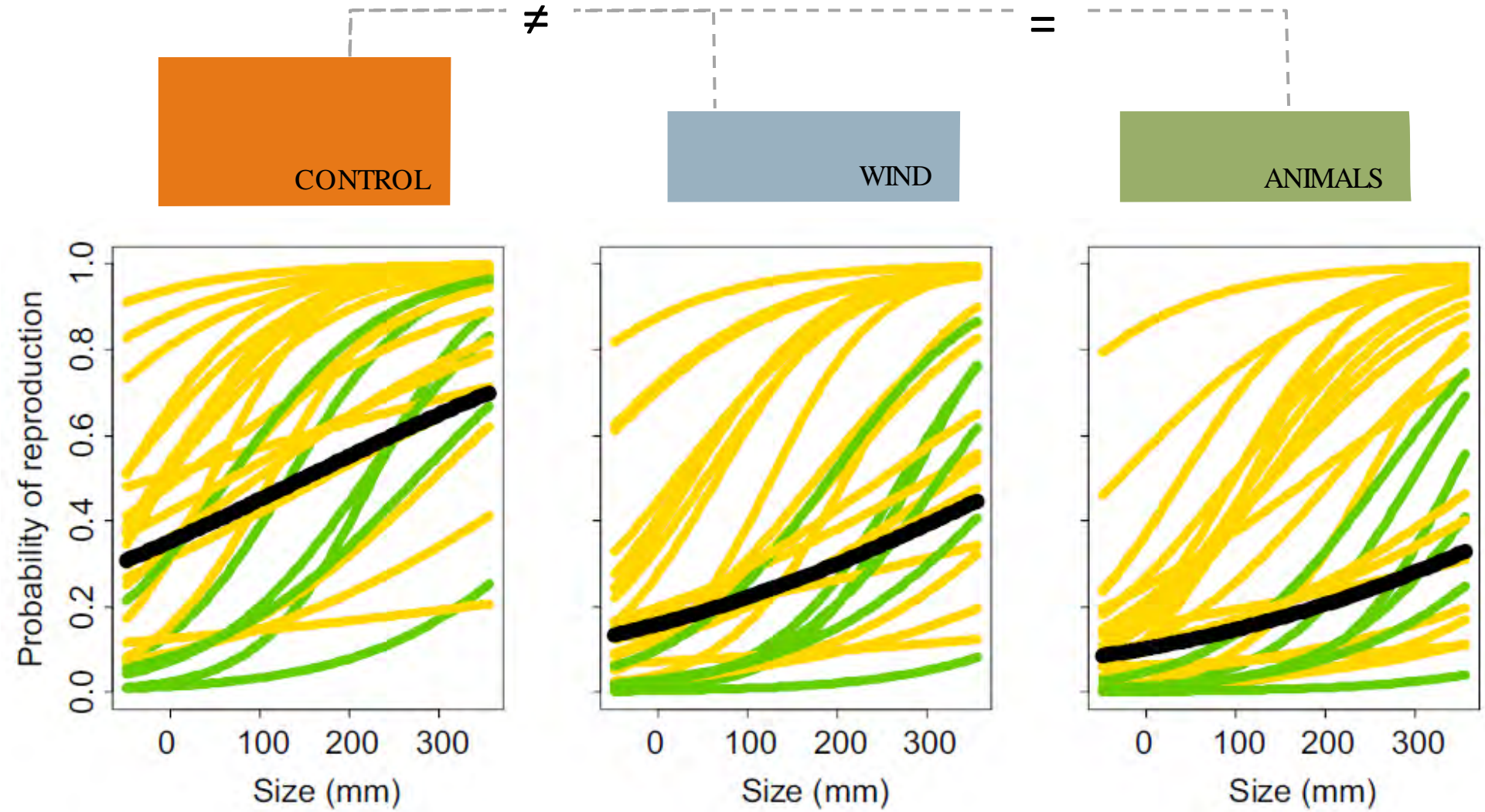


SEEDLING GROWTH RATE





SEEDLING FRUCTIFICATION



2006

2009

2012

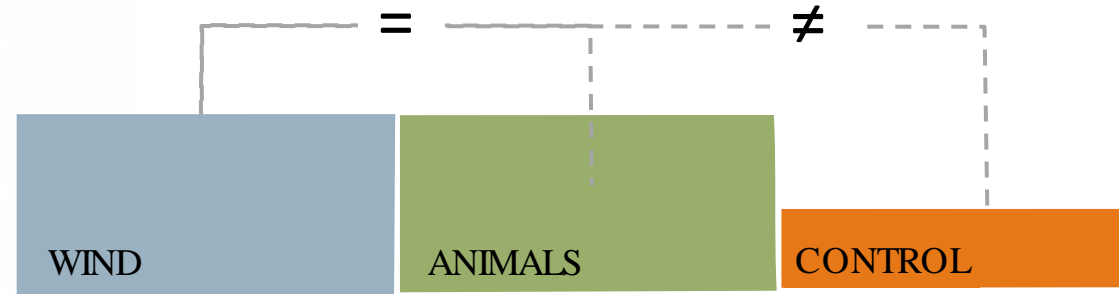
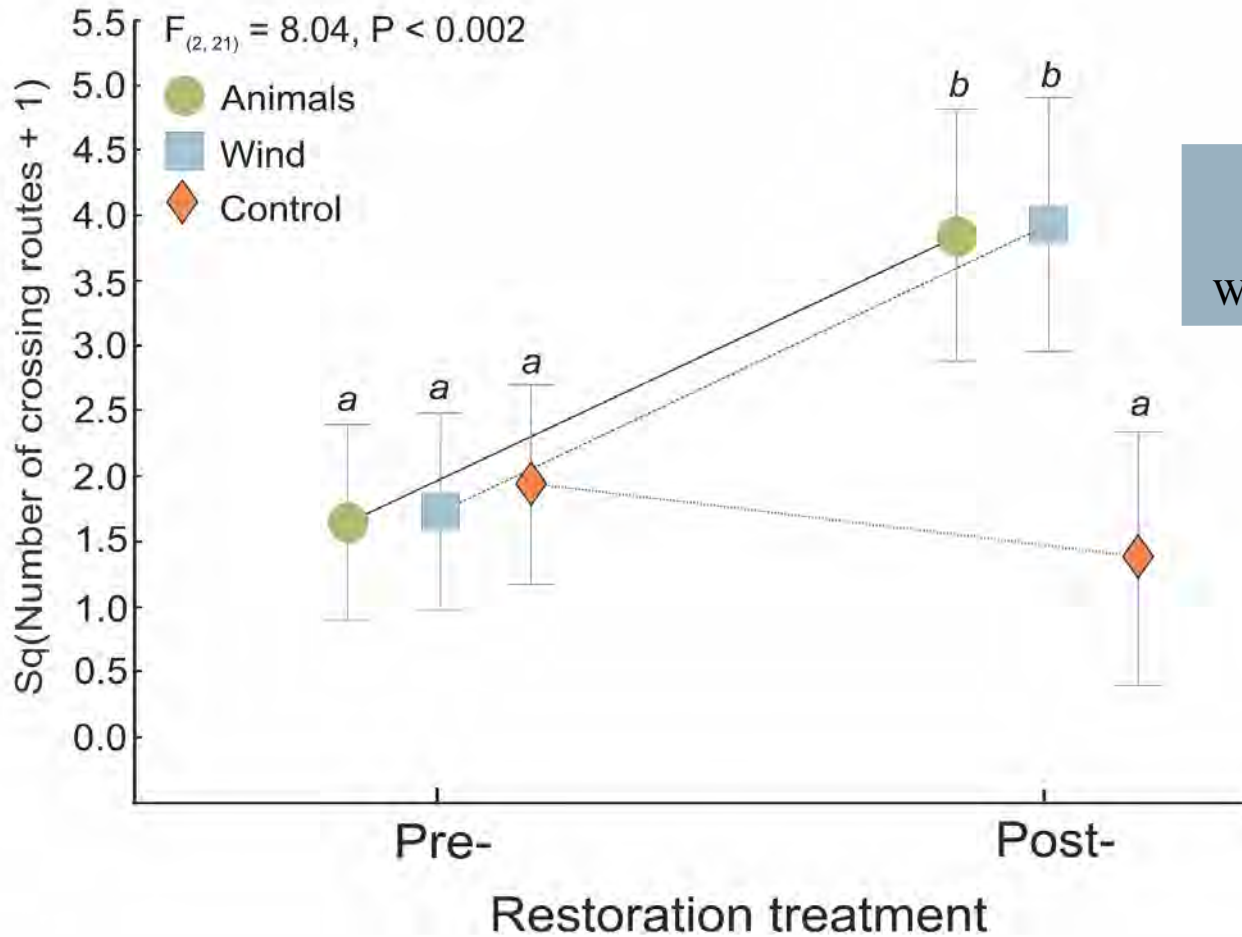
2015

2018

2021

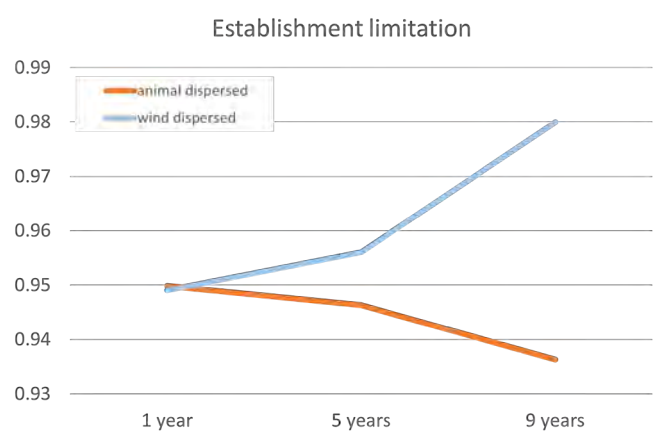
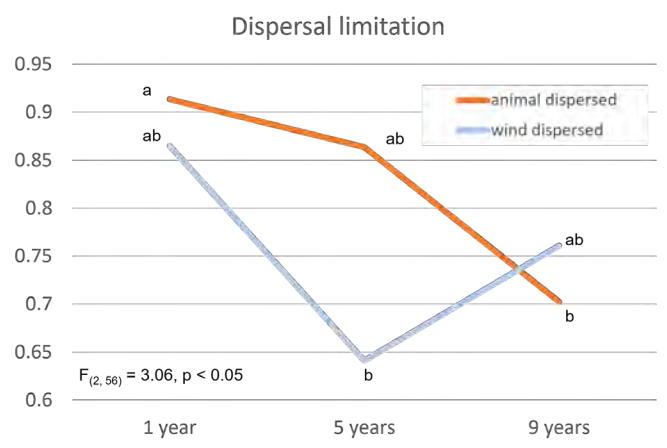
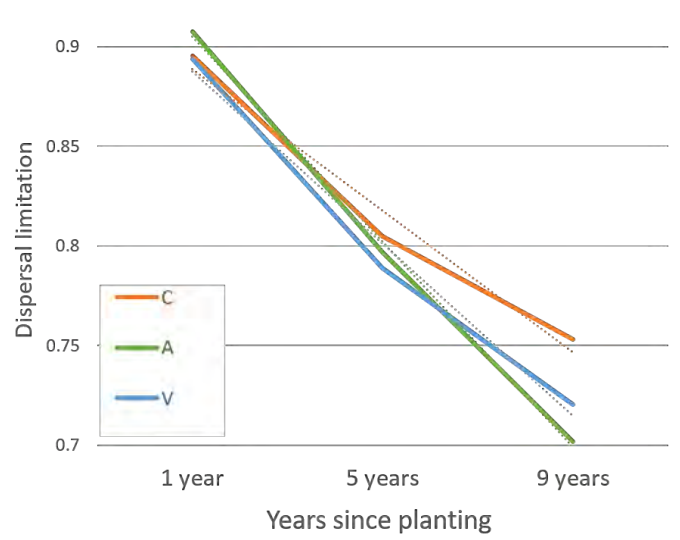
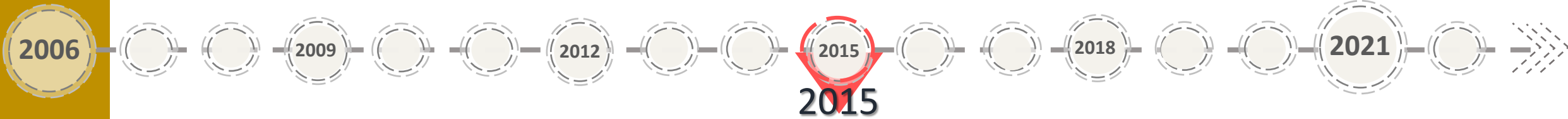
2015

Ocotea uxpanapana



LANDSCAPE CONNECTIVITY

DISPERSAL AND ESTABLISHMENT LIMITATION



2006

2009

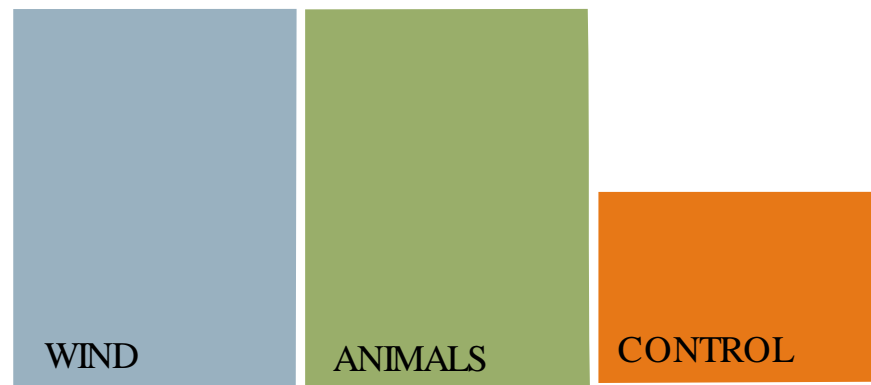
2012

2015

2018

2021

2015



ADULT TREES

2006

2009

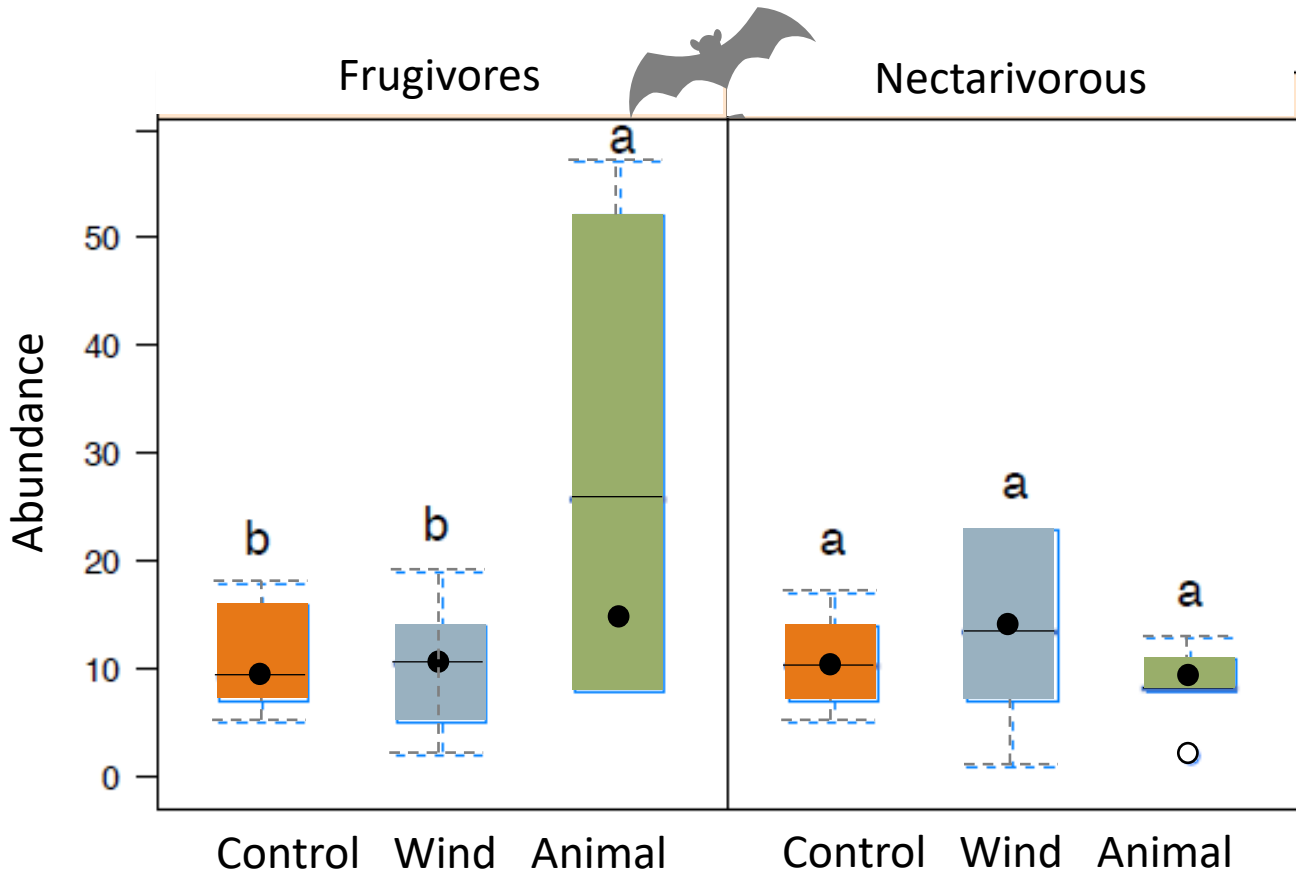
2012

2015

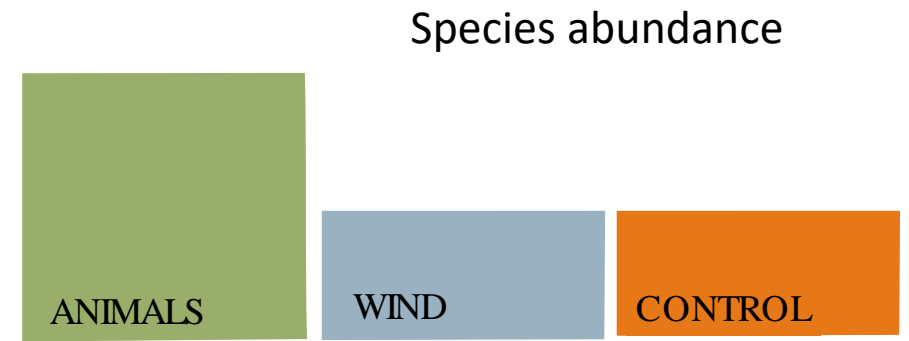
2018

2021

2018



The richness, biomass and composition of bats did not differ between treatments



BATS

2006

2009

2012

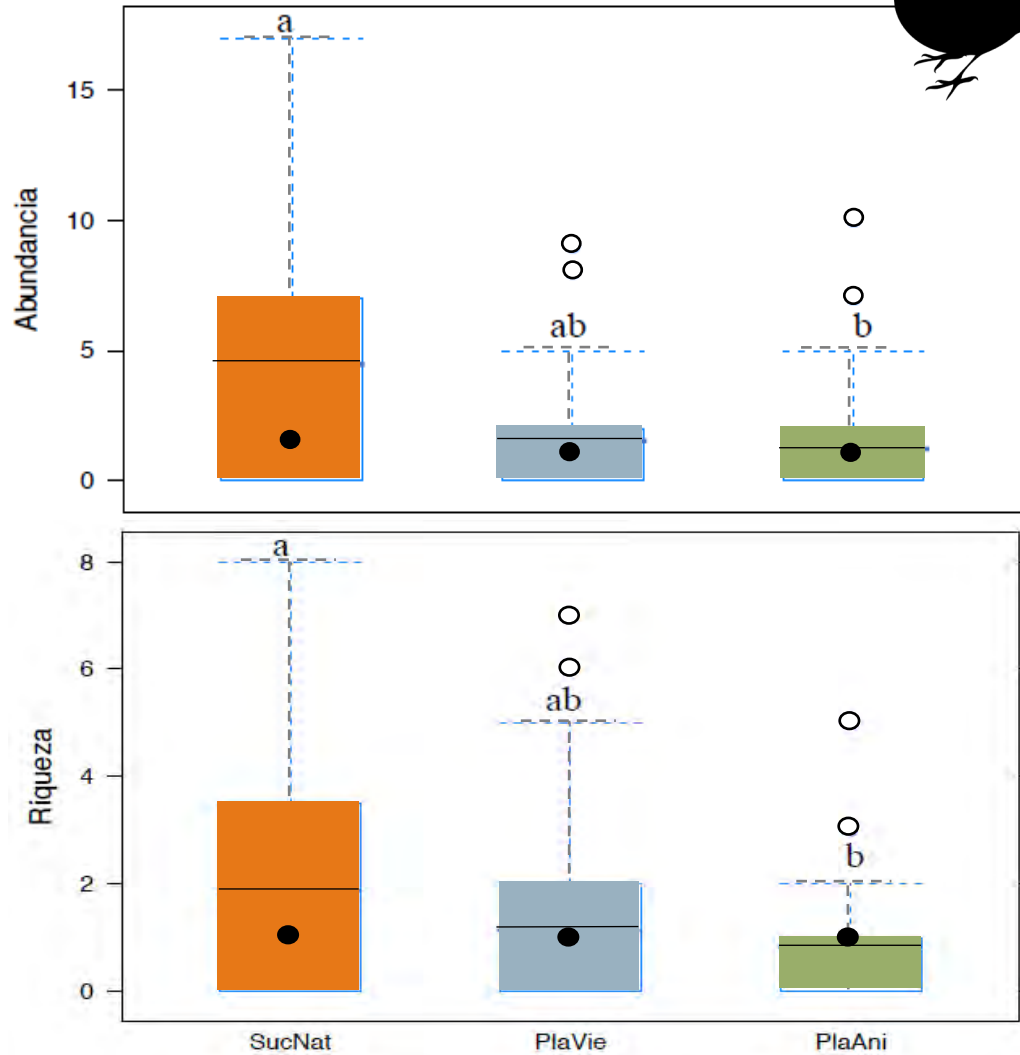
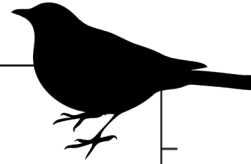
2015

2018

2021

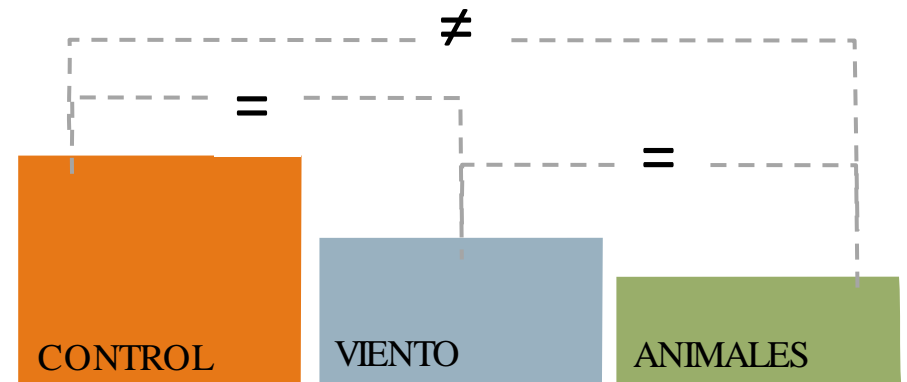
2018

BIRDS



Richness and abundance differed by treatment

- Insectivores > other trophic guilds
- Territoriality of frugivore birds?



2006

2009

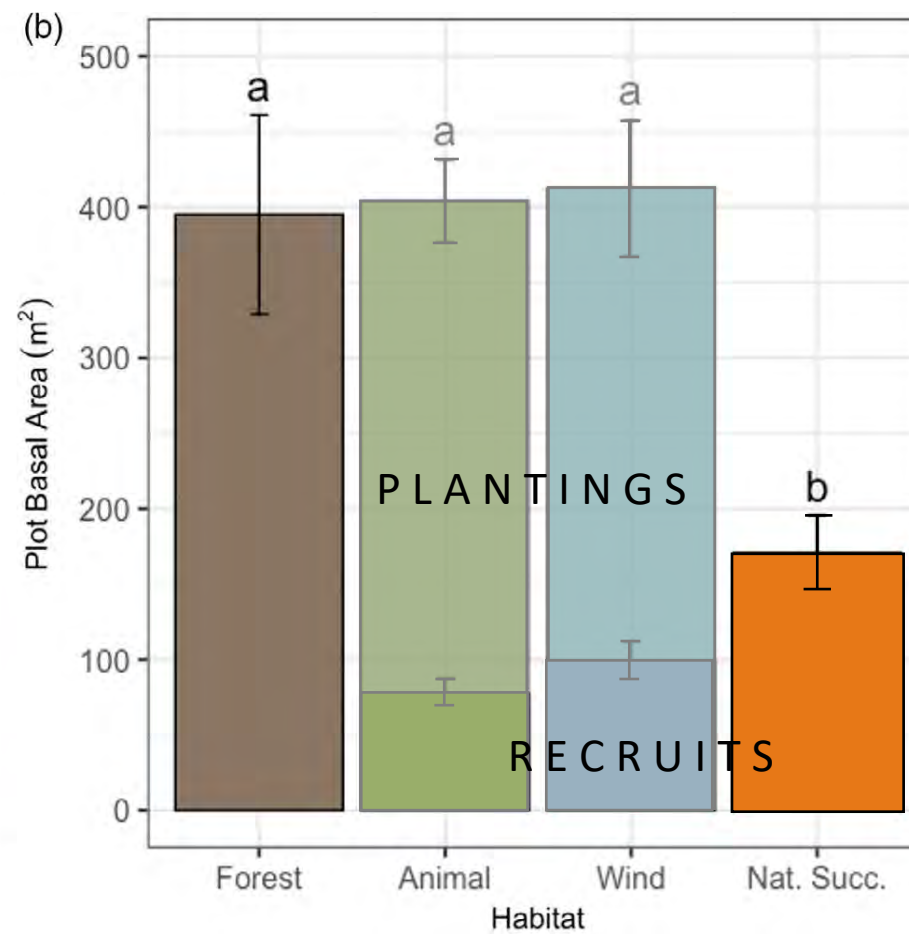
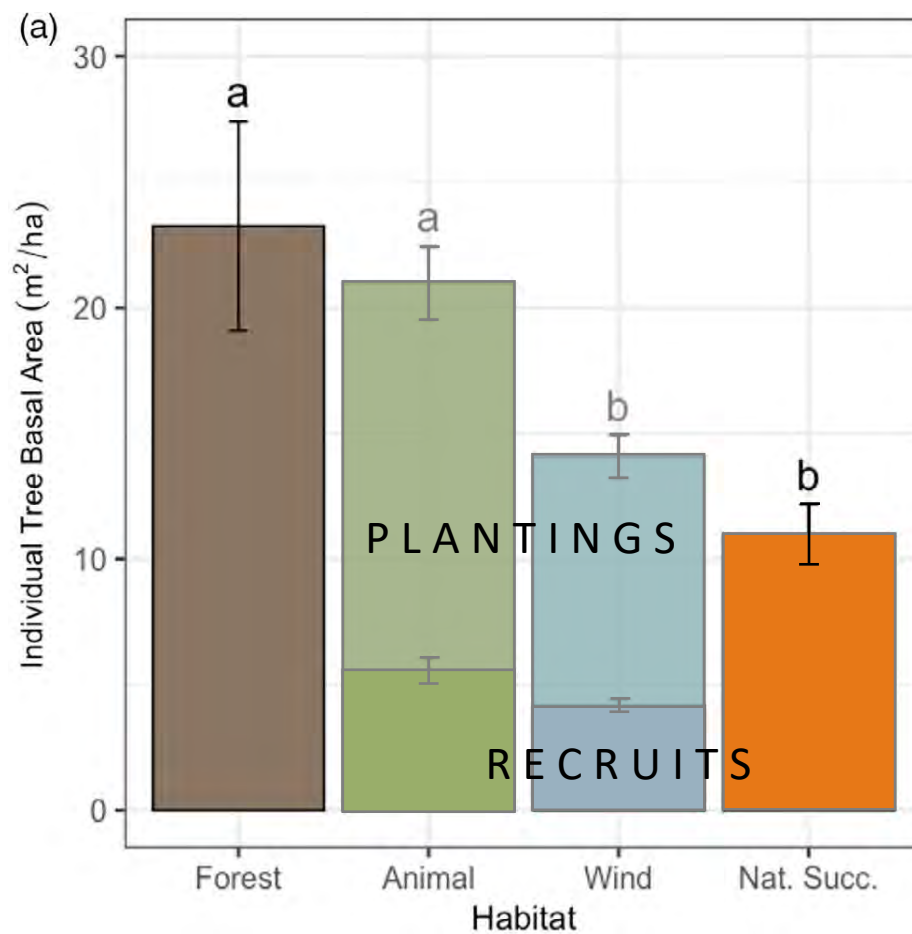
2012

2015

2018

2021

2021



Plantings with animal-dispersed species more closely approximated the primary forest than plantings of wind-dispersed species or controls.

IN A NUT SHELL



ANIMALES

- Better soil conditions
- Recruitment of bird dispersed species
- Functional and phylogenetic diversity
- Early growth rate peak
- Landscape connectivity
- Frugivorous bats
- Animal dispersed adult trees
- Lower dispersal limitation
- Basal areas equivalent to forest++



VIENTO

- Better soil conditions –
- Early recruitment rates
- Recruitment of bird dispersed species
- Landscape connectivity
- Frugivorous bats
- Adult trees dispersed by wind
- Basal area equivalent to forest+



CONTROL

- Early fructification
- Insectivorous birds
- Higher dispersal limitation
- Low landscape connectivity



- Many sites with long periods of intensive management, such as cattle pastures, do not easily recover species composition and density.
- Strategically designed plantations can restore ecological interactions and species diversity
- Integrate rare species or those that are unlikely to arrive on their own in the plantations.
- THERE ARE NO IDEAL RESTORATION STRATEGIES FOR ALL CONTEXTS

... we need to promote other ways of agriculture



Thanks for your support

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