Permanent Plots Network in Aragón to study natural dynamics in Mediterranean forests
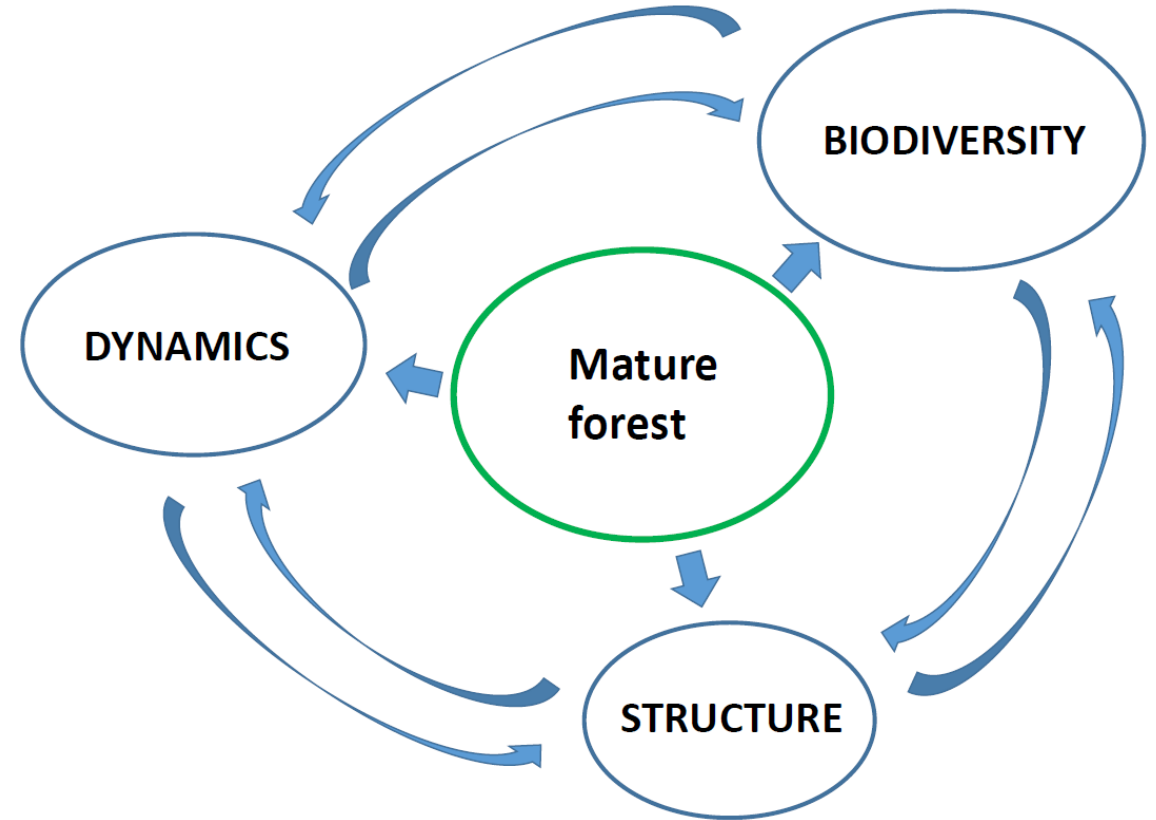
Oscar Schwendtner, Barry Barnard, Josep Sabaté, Xavier García-Martí, José Miguel Olano, Klaas van Dort & Emili Martínez-Ibarz

1.- Why monitoring mature forests?

- Big (old) trees
- Deadwood
- Gaps and regeneration
- Uneven-aged forest
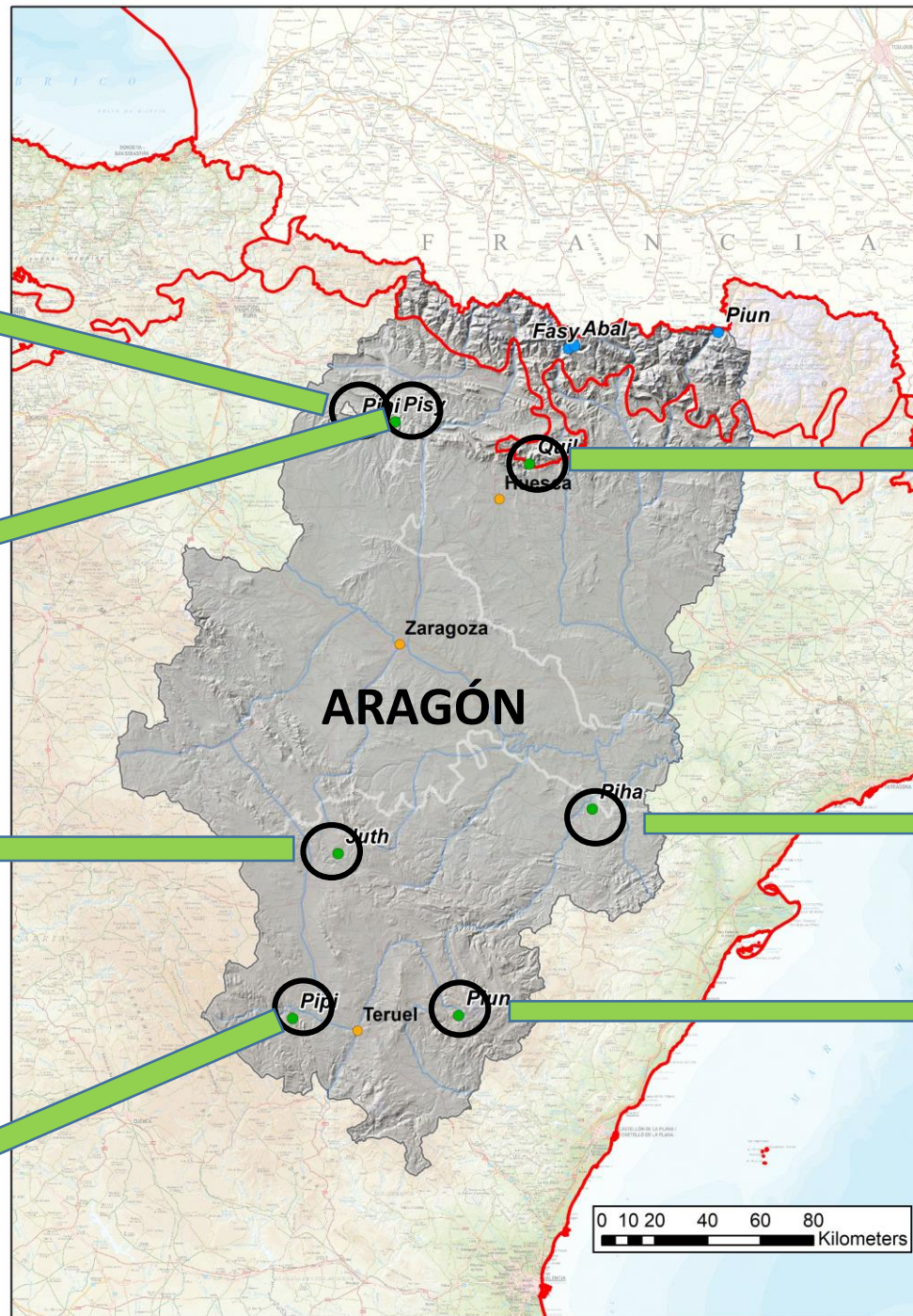- Tree-related microhabitats

Pinus nigra salzmannii

Pinus sylvestris

Juniperus thurifera

Pinus pinaster

Quercus ilex ballota

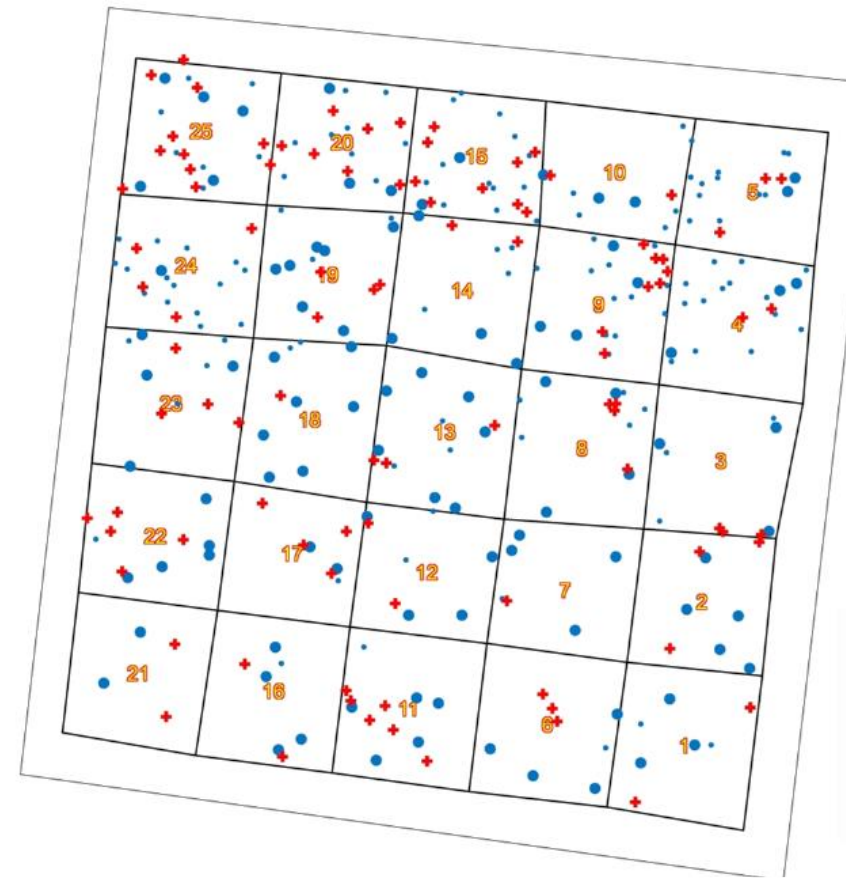*Pinus halepensis*

Pinus uncinata

ARAGÓN

Zaragoza

Teruel

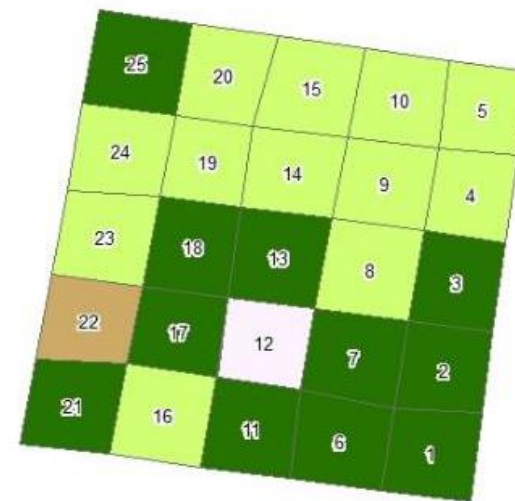Huesca

3.- Plots design

Location of trees in a *Pinus pinaster plot.*
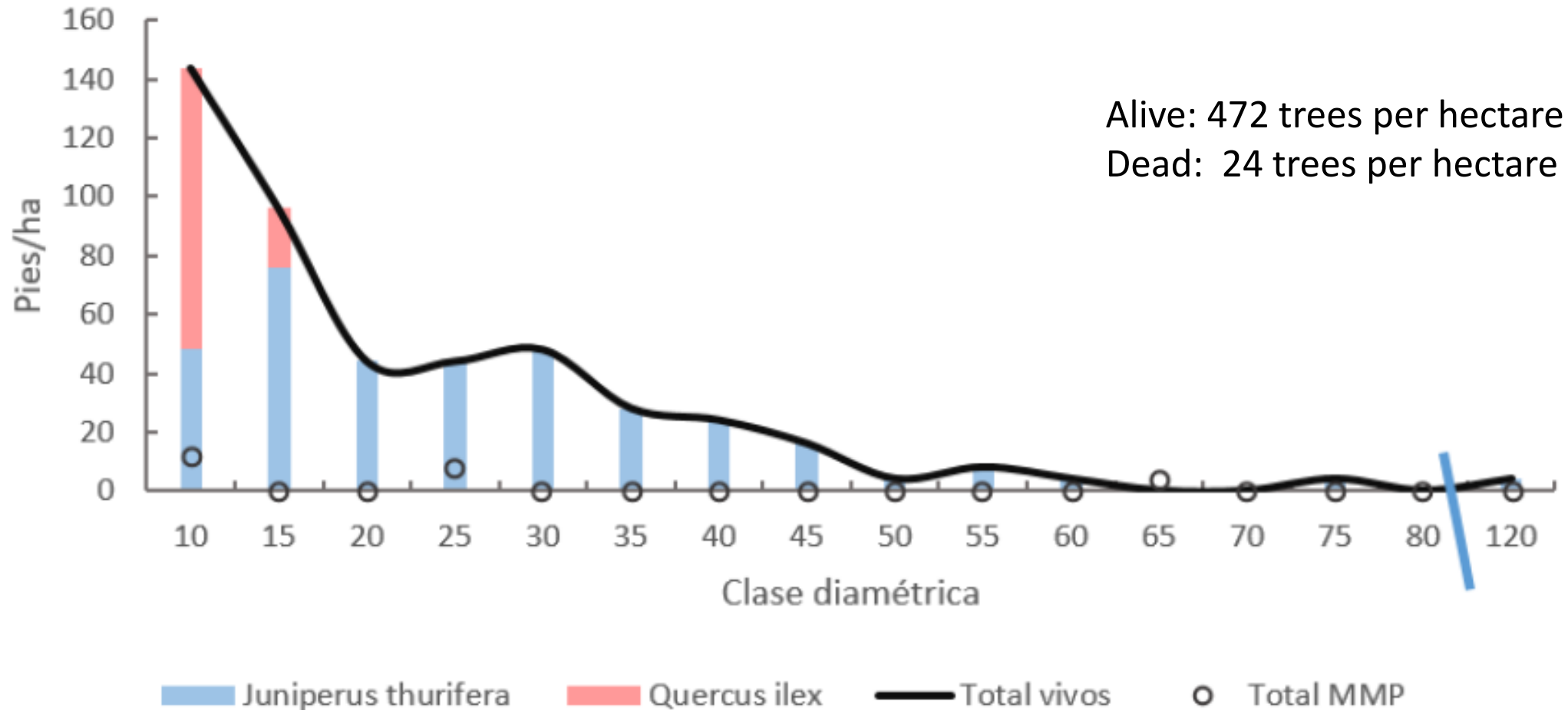Albarracín, Teruel.
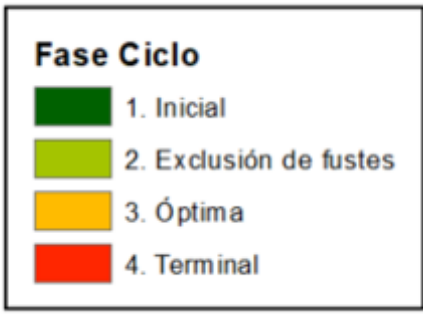
Plot:
50 x 50 m

Every tree is located and measured

25 subplots
10 x 10 m
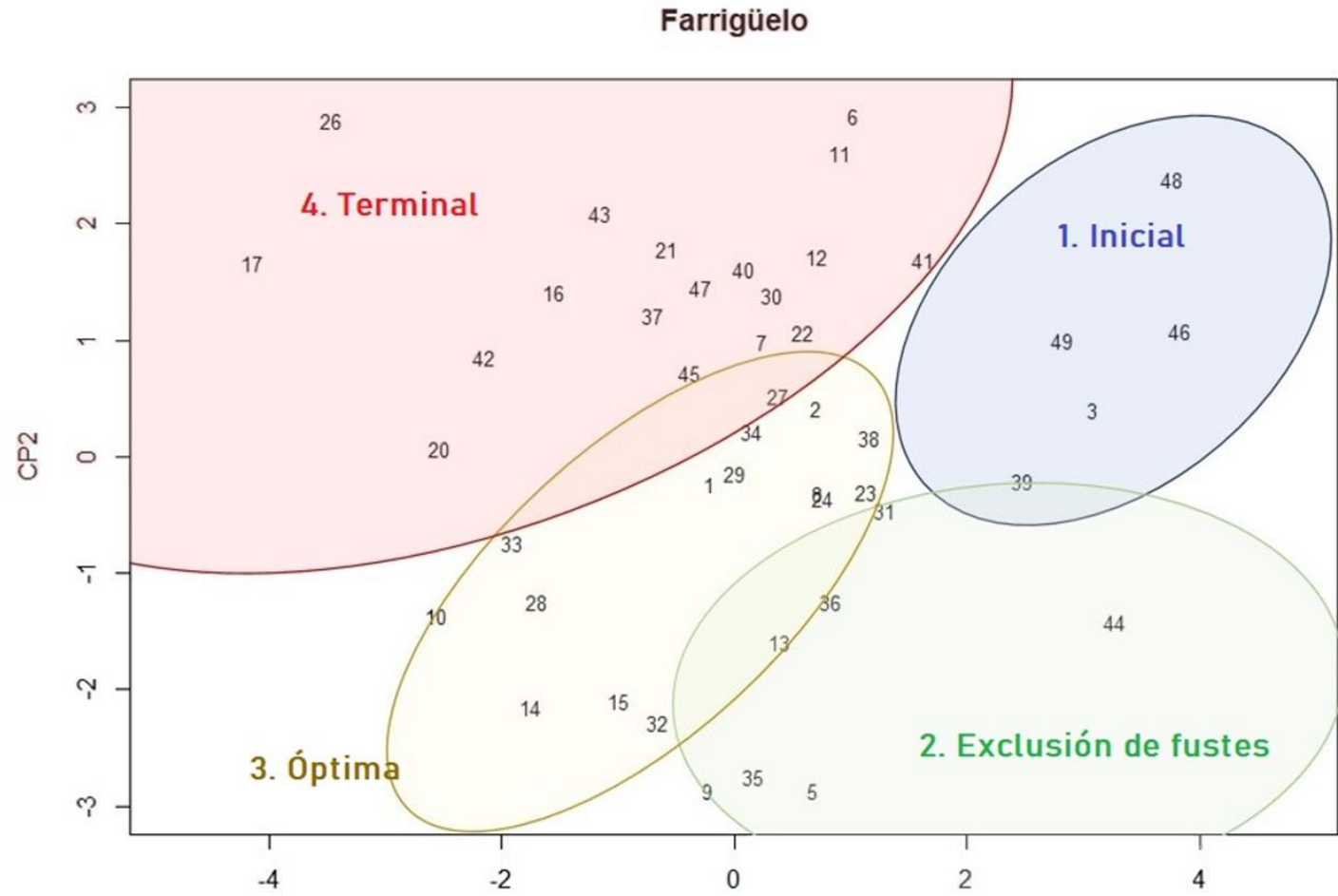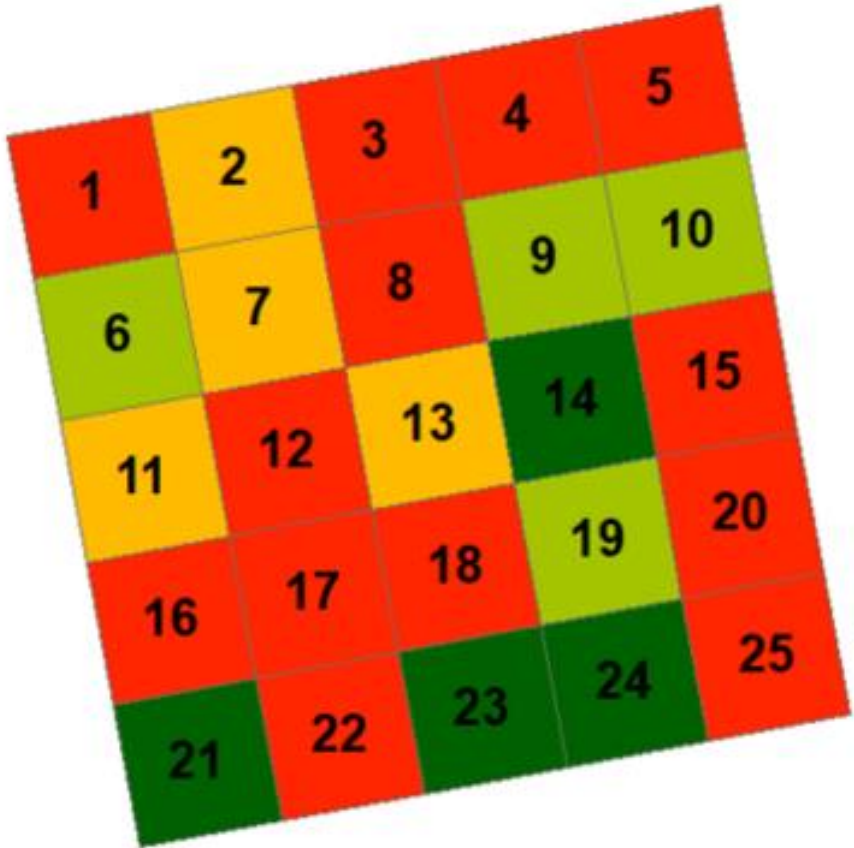Represented with attributes

4.- Dasometric data

Alive: 472 trees per hectare
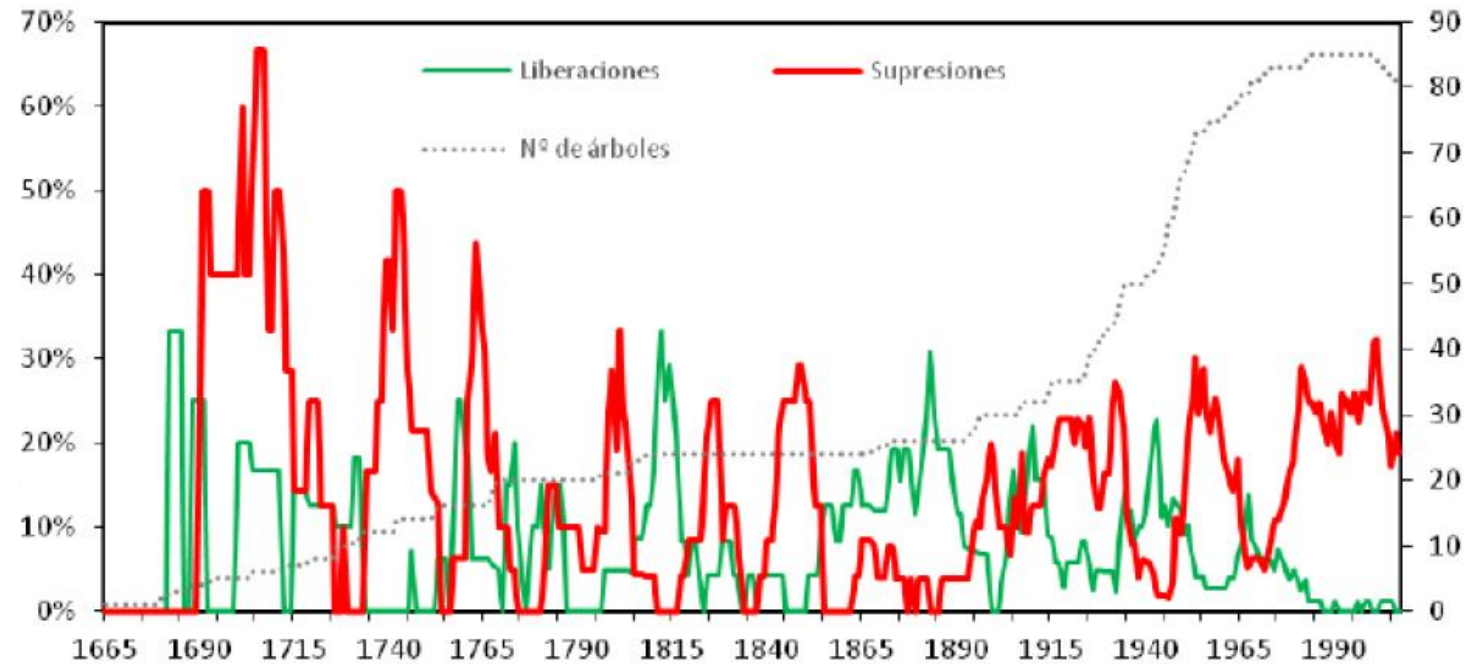Dead: 24 trees per hectare

Diametric distribution in a *Juniperus thurifera* plot. Live and dead tres.
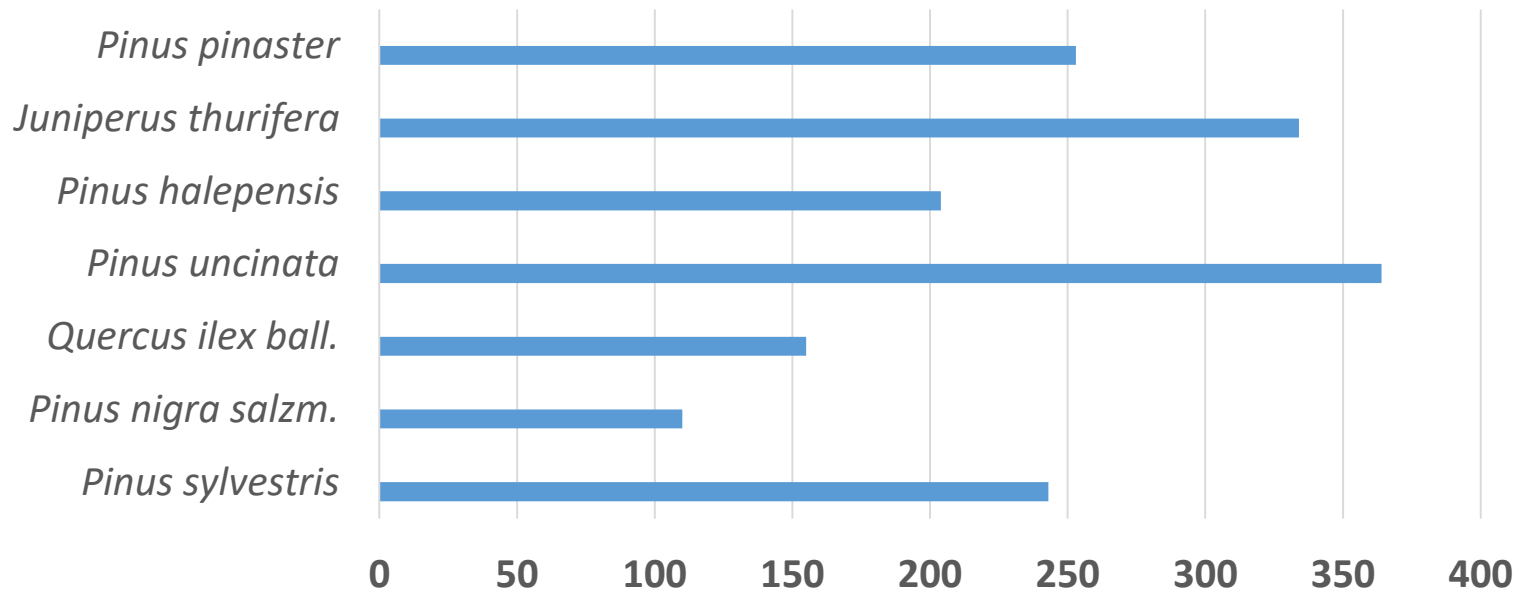Olalla, Teruel, Spain.

5.- Dynamics: sylvogenetic cycle phases

Example of determination of the sylvogenetic cycle phases in a *Pinus sylvestris* plot.
Farrigüelo, Zaragoza, Spain.

6.- Tree story

Growth release (green) and suppression (red) events in a *Pinus uncinata* plot. Gudar, Teruel.

Maximum age

7.- Old-growth bioindicators

Survey of epiphytic lichens and bryophytes

Calicium viride over an old *Pinus uncinata,* Gudar, Teruel.
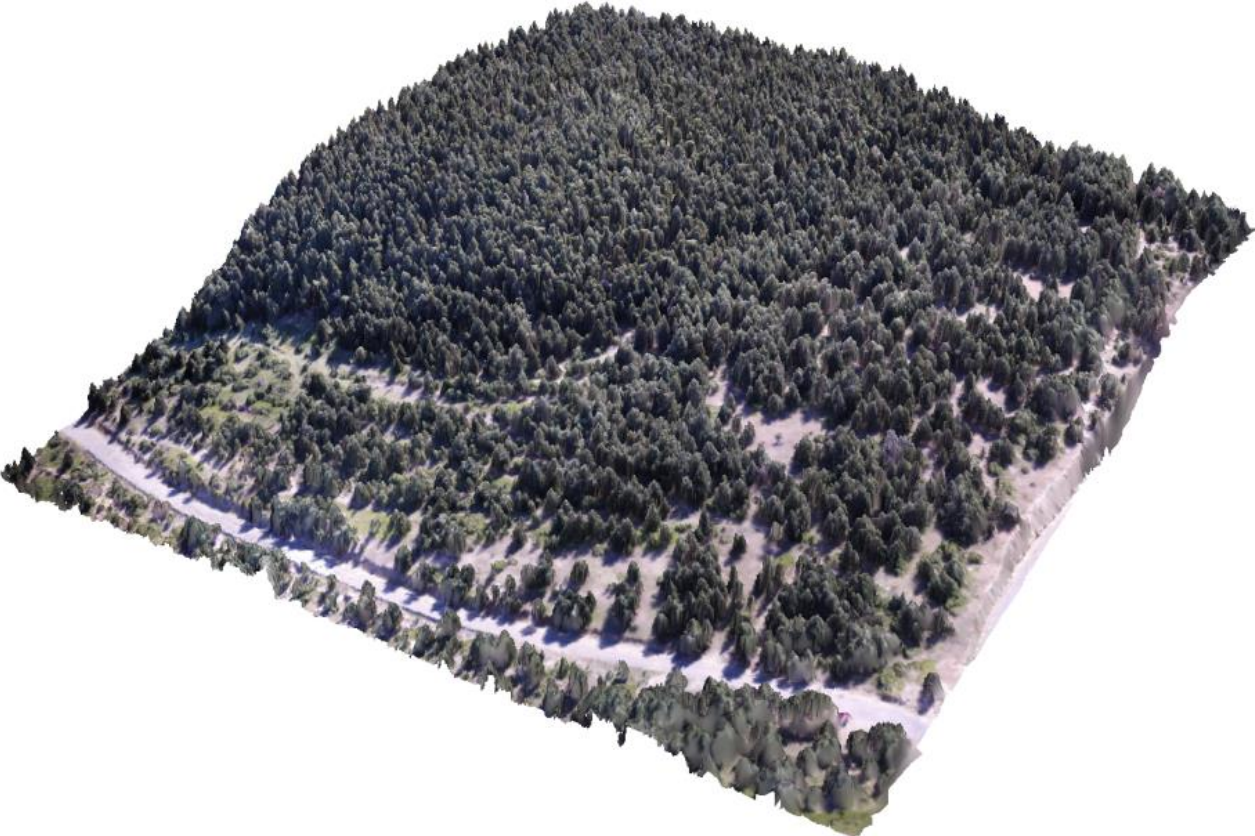

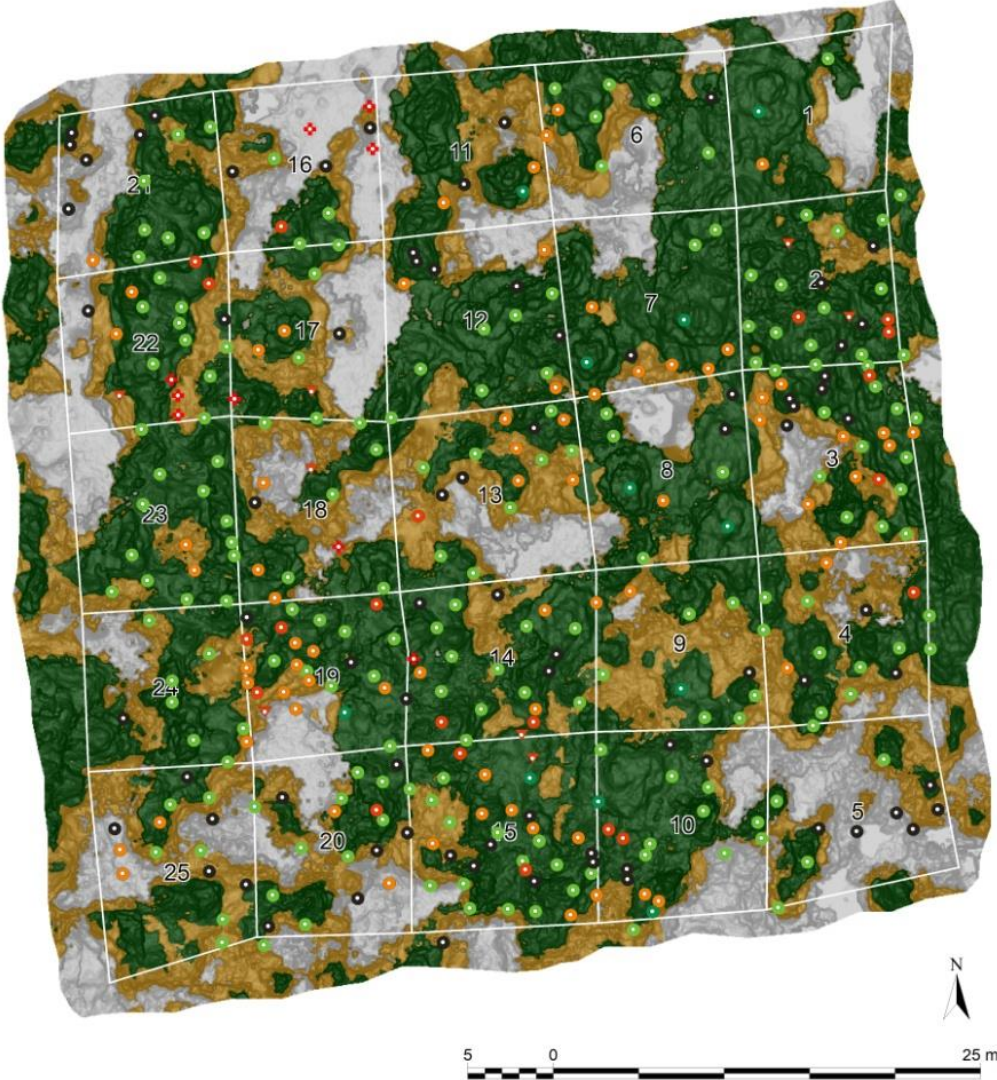Fertile thallus of *Cyphellium tigilare* on deadwood of *P. pinaster*, Albarracín

Lobaria amplissima & *Leptodon smithii* on *Quercus ilex*, Guara, Huesca.

8.- Using new technologies (I): drone

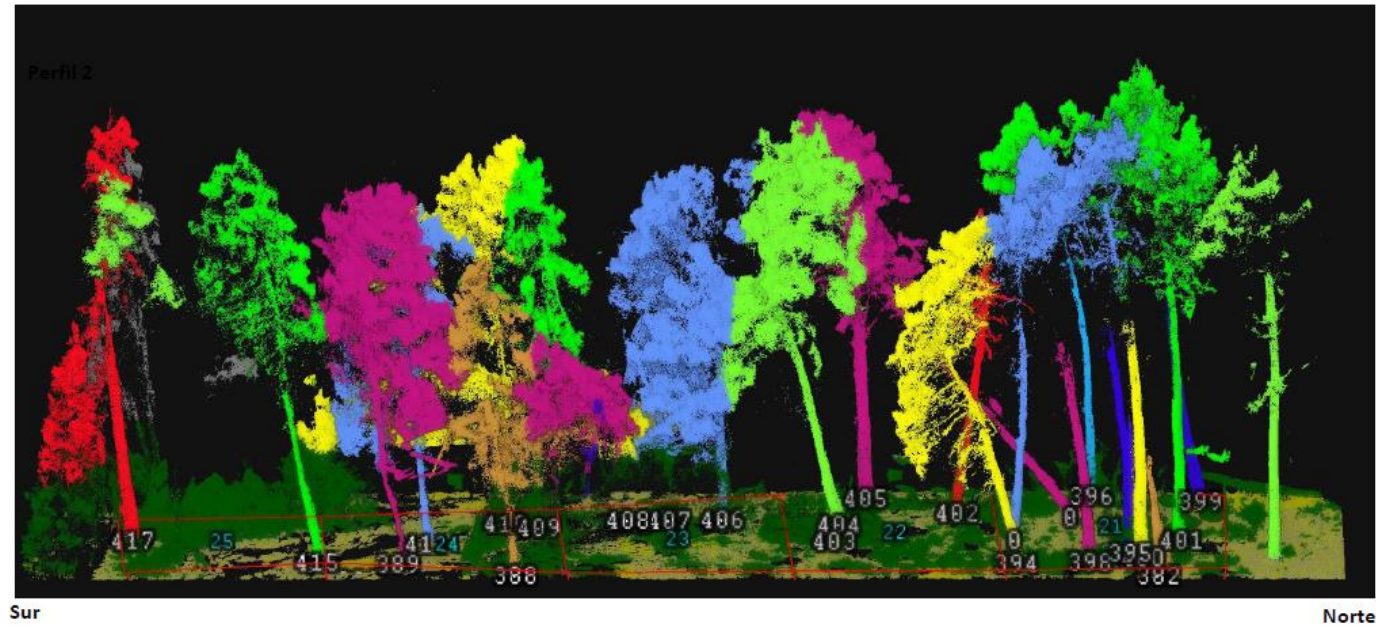3D model from the photogrammetric restitution process in the *Pinus uncinata* stand.

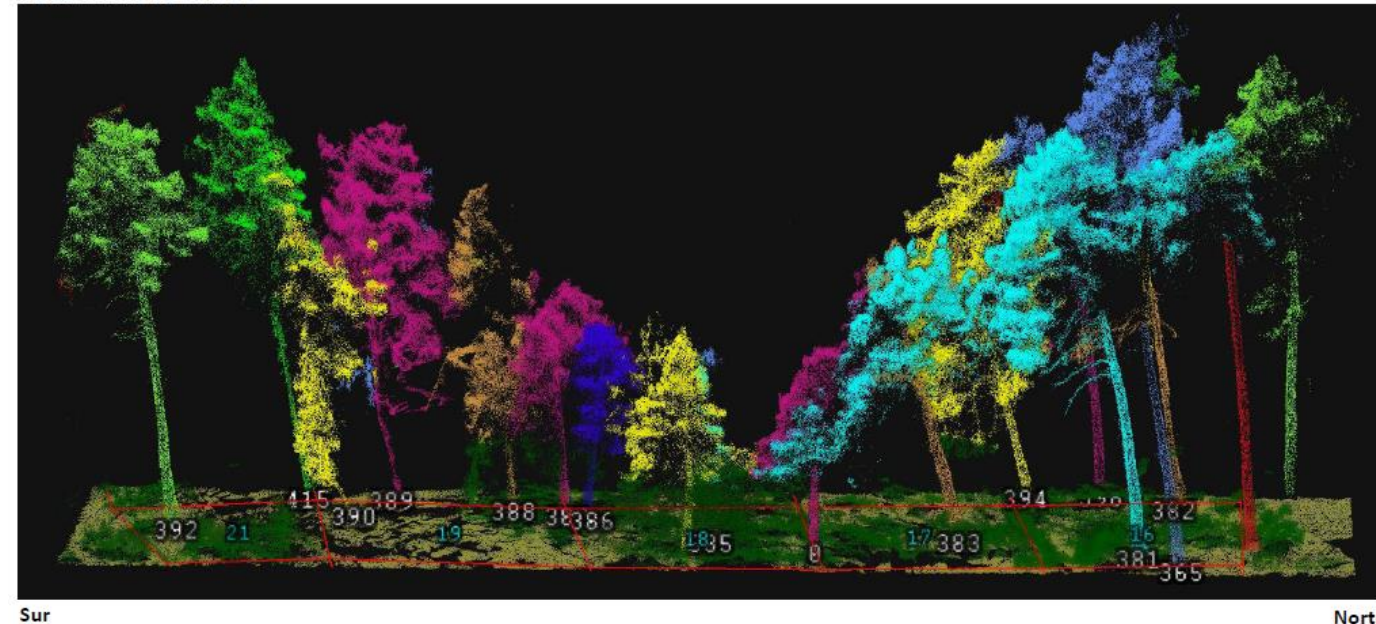Cartography of vertical strata and tree tips obtained from drone images.

8.- Using new technologies (II): Terrestrial LiDAR

Example of transects in a plot of *Pinus pinaster*, Albarracín, Teruel.

9.- Conclusions

- Long-term research

- Active dynamics

- Old trees & biodiversity

- Resilience

- Monitoring changes

- Understanding forest
  ecosystem functioning

Old dead *Pinus uncinata tree* in Valdelinares (Sierra de Guara, Teruel, Spain)