Beneficial multivariate masting:
inter-annual variability of global seed crops in a changing climate

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01 Introduction

Temporal reproductive traits: Temporal variability may increase fitness for some plants.

Research question: How do temporal reproductive traits vary as a function of species, environment and time?

Data: MASTREE+ subset

- **955** population-level time-series (≥ 10 years) of reproductive output (**seed**, **fruit**, and/or **cones**)
- **275** wild, perennial plant species, **34** countries

02 Distinct Inter- & Intraspecific temporal trait distribution?

Methods

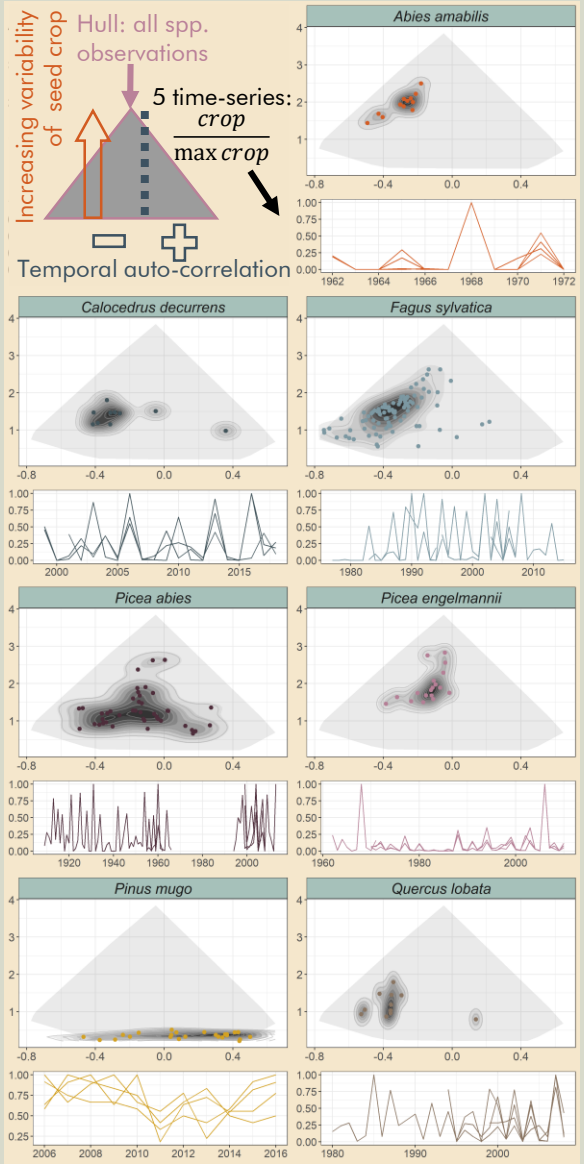
1) **Trait scatterplots**: Temporal traits described with:
   - Temporal variability (CV_p);
   - Autocorrelation coefficient of first lag (AR1) after linear detrending.
2) **Hierarchical clustering**: (traits examined: time-series moments and temporal autocorrelations)

Results

1) **Interspecific differences**: e.g. *Abies amabilis* v. *Pinus mugo*.
Intraspecific differences: e.g. trait space occupied by *Fagus sylvatica* & *Picea abies*.

2) Despite visual differences, hierarchical clustering revealed no distinct clusters! Continuum of strategies?

Any suggestions on how to identify reproductive strategies with other metrics?



03 Is inter-annual variability changing? (preliminary exploration)

Preliminary methods

A) Map: time-series split in 2 parts. Change in CV_p plotted (dCV_p).

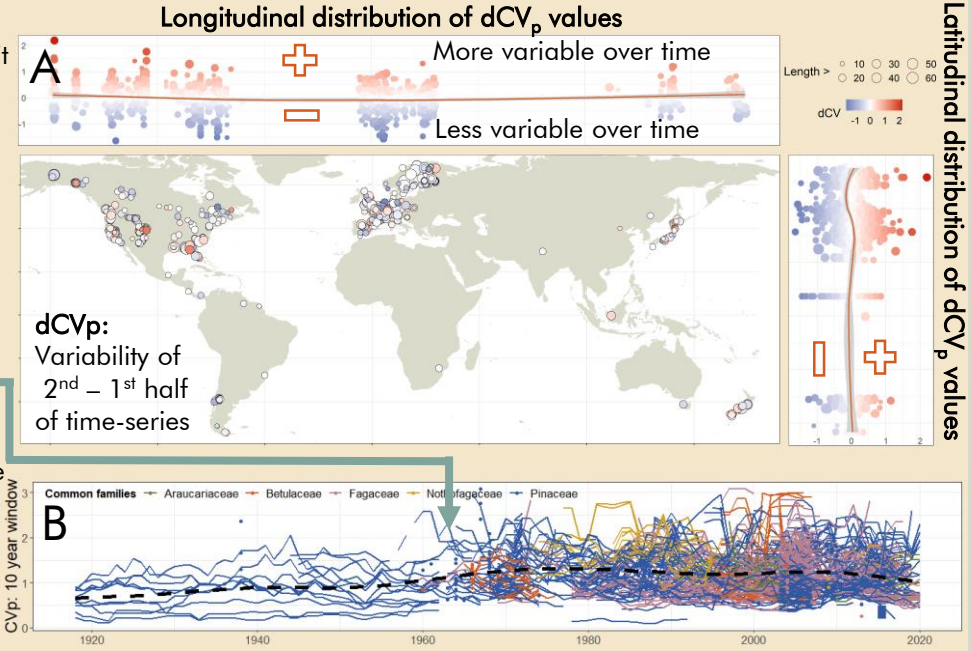
B) Trends: **CV_p** (moving windows), **Mean crop size** (regression)

Results (trends)

Trends in CV_p variable across time and space.
Global trend may be grouping artefact.

Trends in mean:
- 4.6% significant +ve
- 2.4% significant -ve

Do spatio-temporal patterns relate to environmental change, and life-history?



04 Key findings

High temporal trait plasticity

- Inter- and intra-specific differences in temporal traits: Move from masting vs. no masting species to population position in "variability space"

Population-level time trends

- There seems to be no clear global signal of the effect of time on seed crop variability, therefore, local trends need to be examined.

05 Food for thought

- How do we more accurately characterise different reproductive strategies?
- Why does the CV - AR1 relationship have this distinct cone shape?
- What factors drive temporal trait plasticity?
- Is ΔCV_p explained by environmental change (climate, age, nutrients?) and/or life-history?
- How do environmental conditions and life-history relate to multivariate trait space position?

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