

Life Sciences Reporting Summary

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► Experimental design

1. Sample size

Describe how sample size was determined.

All mountain summits in Europe with repeated vegetation surveys known to the authors were integrated in the analyses.

2. Data exclusions

Describe any data exclusions.

Historic records were excluded if data description did not allow an evaluation of data quality and completeness of sampling (see Burg et al. 2015 JVS for detailed discussion). Only one record fulfilling this criteria was excluded (Monte Perdido, Pyrenees), because it was sampled in 1802 (70 years before the next sample in the data, no coverage with climate data).

3. Replication

Describe whether the experimental findings were reliably reproduced.

No experimental treatments were applied. Reproducibility of field surveys (i.e. observer bias) was studied and described for a subset of field sites (see Burg et al 2015 JVC for details) and discussed in supplementary materials.

4. Randomization

Describe how samples/organisms/participants were allocated into experimental groups.

Mountain regions were used as random factors in analyses. Mountain regions were defined according to their geographical distinctness within the European continent.

5. Blinding

Describe whether the investigators were blinded to group allocation during data collection and/or analysis.

Blinding was applied in data collection with respect to results of the previous survey (no knowledge of historical species lists during summit resurveys). As group allocation was based on geography, blinding to group allocation is not relevant nor possible in this study.

Note: all studies involving animals and/or human research participants must disclose whether blinding and randomization were used.

6. Statistical parameters

For all figures and tables that use statistical methods, confirm that the following items are present in relevant figure legends (or in the Methods section if additional space is needed).

n/a Confirmed

- ☐ ☒ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement (animals, litters, cultures, etc.)
- ☐ ☒ A description of how samples were collected, noting whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☒ ☐ A statement indicating how many times each experiment was replicated
- ☐ ☒ The statistical test(s) used and whether they are one- or two-sided (note: only common tests should be described solely by name; more complex techniques should be described in the Methods section)
- ☐ ☒ A description of any assumptions or corrections, such as an adjustment for multiple comparisons
- ☐ ☒ The test results (e.g. P values) given as exact values whenever possible and with confidence intervals noted
- ☐ ☒ A clear description of statistics including central tendency (e.g. median, mean) and variation (e.g. standard deviation, interquartile range)
- ☐ ☒ Clearly defined error bars

See the web collection on [statistics for biologists](#) for further resources and guidance.

► Software

Policy information about [availability of computer code](#)

7. Software

Describe the software used to analyze the data in this study.

All analyses are implemented in R (R Core Team 2016. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.)

For manuscripts utilizing custom algorithms or software that are central to the paper but not yet described in the published literature, software must be made available to editors and reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). *Nature Methods* [guidance for providing algorithms and software for publication](#) provides further information on this topic.

► Materials and reagents

Policy information about [availability of materials](#)

8. Materials availability

Indicate whether there are restrictions on availability of unique materials or if these materials are only available for distribution by a for-profit company.

No unique materials were used in this study.

9. Antibodies

Describe the antibodies used and how they were validated for use in the system under study (i.e. assay and species).

No antibodies were used in this study.

10. Eukaryotic cell lines

a. State the source of each eukaryotic cell line used.

No cell lines were used in this study.

b. Describe the method of cell line authentication used.

No cell lines were used in this study.

c. Report whether the cell lines were tested for mycoplasma contamination.

No cell lines were used in this study.

d. If any of the cell lines used are listed in the database of commonly misidentified cell lines maintained by [ICLAC](#), provide a scientific rationale for their use.

No cell lines were used in this study.

► Animals and human research participants

Policy information about [studies involving animals](#); when reporting animal research, follow the [ARRIVE guidelines](#)

11. Description of research animals

Provide details on animals and/or animal-derived materials used in the study.

No animals were used in this study.

12. Description of human research participants

Describe the covariate-relevant population characteristics of the human research participants.

No humans were used in this study.