Floral preferences of mountain bumble bees are constrained by functional traits but flexible through elevation and season

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DATA FILES

1. `floral_tax.csv`

Description: Supplies family-level taxonomy for the floral taxa in our study.

Columns:

1. `plant.sp` = plant species
2. `plant.genus` = plant genus
3. `plant.family` = plant family

2. `visitation.rds`

Description: Bumble- bee-wildflower visitation data

Columns:

1. `sample.id` = site and date of sample
2. `bb.sp` = abbreviated bumble bee species name
3. `caste` = bumble bee caste (queen, male, worker, NA = parasitic *Psithryus*)
4. `plant.sp` = full plant species name
5. `visited` = binary variable indicating that a plant was visited (1) or unvisited (0); in this dataset, all were visited
6. `plant.genus` = plant genus name
7. `plant.family` = plant family name
8. `ktype` = flower morphotype based on Kugler's classification

3. floral_survey.csv

Description: Floral survey data used in all analysis of (1) floral abundance and (2) floral beta-diversity.

Columns:

1. year = year
2. dayofyear = day of year since January 1
3. site = site name
4. snowcover = whether site was snow-covered
5. plant.sp = full plant species name
6. plant.genus = plant genus name
7. flower cover = flower cover in m^2 to the nearest 0.01 m^2
8. day = day of month
9. month = month
10. date = date

4. site_data.csv

Description: Site data including elevation, management, and geographic coordinates.

Columns:

1. site = site name
2. elev.class = elevation category (oben, mitte, unten)
3. management = site management (mowing, grasing, none)
4. temp.mean = mean temperature recorded with iButton devices
5. elev.mean = mean elevation
6. transect = transect name
7. slope.calc = slope calculated from min and max elevation
8. slope.est = estimated slope
9. elev.min = minimum elevation within site
10. elev.max = maximum elevation within site
11. lat = latitude (decimal degrees)
12. lon = longitude (decimal degrees)
13. elev.class2 = alternative elevation binning
14. tree_line = whether a site was above or below the tree line; only for sites included in analysis (hence NAs)

4. bb_traits.csv

Description: Bumble bee trait data

Clade and subgenus classifications are based on Williams et al (2008).

Tongue length data are from Arbetman et al. (2017), Obeso (1992), and Durieux (2000)

Columns:

1. clade = bumble bee clade: LF = long faced, SH = short faced, M = Mendacibombus
2. subgenus = bumble bee subgenus

3. `bb.sp.lat` = full bumble bee species name
4. `bb.sp` = abbreviated bumble bee species name
5. `pbl.w` = worker tongue length based primarily on Arbetman et al. (2017) and supplemented where necessary from Durieux (2000) and Obeso (1992)
6. `pbl.w.class` = discretized worker tongue length
7. `pbl.w.class2` = simplified discretized worker tongue length
8. `pbl.w.ref` = reference from which pbl.w was gathered
9. `Notes` = notes on pbl.w
10. `pbl.w.durieux` = alternative set of tongue length based primarily on Durieux (2000) and supplemented where necessary from Arbetman et al. (2017) and Obeso (1992)
11. `notes_durieux` = notes on pbl.w.durieux

5. `fl_traits.csv`

Description: Kugler's (1970) floral morphotype classification for floral species

For a description of Kugler's morphotype codes, see `kugler_key.tsv`.

Data were accessed in April 2020 via the Bioflor plant trait database (Klotz et al. 2002). Missing data were manually supplemented as descrtibed in `fl_trait_proc.R`.

Columns:

1. `plant.sp` = plant species
2. `plant.genus` = plant genus
3. `plant.family` = plant family
4. `k.type` = Kugler morphotype
5. `k.type.s` = Kugler morphotype simplified to 1 decimal place
6. `k.type.ss` = Kugler morphotype simplified to 0 decimal places

6. `kugler_key.tsv`

Description: A verbal description of Kugler's (1970) floral morphotype classification

Data were accessed in April 2020 via the Bioflor plant trait database (Klotz et al. 2002).

Columns:

1. `code` = Morphotype code
2. `description` = Morphotype description

7. `flower_cover_ktype.rds`

Description: Flower cover of each morphotype on each site-date (i.e. sample)

Columns:

1. `sample.id` = site and date of sample
2. `ktype` = flower morphotype based on Kugler's classification
3. `cover` = flower cover in m^2

8. `Appendix2.xlsx`

Description: Sources of botanical illustrations used in paper

Columns:

1. `ktype` = flower morphotype based on Kugler's classification
2. `species` = plant species name
3. `source` = name of illustrator
4. `link` = URL to source of illustration (all archived on www.plantillustrations.org)

CODE FILES

1. `Appendix1_rev.Rmd`

Description: R script for running analytical workflow.

References

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Arbetman MP, Gleiser G,Morales CL, Williams P, Aizen MA. 2017 Global decline of bumblebees is phylogenetically structured and inversely related to species range size and pathogen incidence. Proc. R. Soc. B 284: 20170204.

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Durieux E-A. 2000. Etude des choix floraux des bourdons (Hymenoptera, Apidae) de la commune d'eyne (france, Pyrénées-Orientales). PhD thesis, Université de Mons-Hainaut.

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