README

Title: **The timing of seed dispersal effectiveness**

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DATASETS

seed_rain_pistacia.csv

Data on the magnitude of seed rain in seed traps placed in different microhabitat types and in each of the study periods (*early*, *mid* and *late*) of the 2014–2015 fruiting season of *Pistacia lentiscus* (FIGURE 2a).

Variables:

- **trap_code**: identity code of each seed trap.
- **mh_type**: microhabitat type (trees: 'tree'; fruit-bearing shrubs: 'fb_shrub'; non-fb shrubs: 'shrub').
- **period**: 'early', 'mid' and 'late'.
- **nseeds**: number of *Pistacia lentiscus* seeds.

seeds_pistacia_barcoding_viability.csv

Data on the *Pistacia lentiscus* seeds sampled for DNA barcoding analyses, which includes the bird species responsible for dispersal (FIGURE 2b) and the outcome of the viability test (FIGURE 3a).

Variables:

- **sample_code**: a unique code for each sample
- **period**: 'early', 'mid' and 'late'.
- **date**: sampling date.
- **trap_code**: identity code for each seed trap.
- **mh_type**: microhabitat type (trees: 'tree'; fruit-bearing shrubs: 'fb_shrub'; non-fb shrubs: 'shrub').
- **nseeds**: number of *Pistacia lentiscus* seeds.
- **disperser**: bird species identified through DNA barcoding.
- **flotation_test**: result of the viability test ('flotation/sink' method: the seed floated = 1; the seed sank = 0). Note that flotation is coded inversely to viability, because viable seeds sink.
- **sequence**: nucleotide sequence obtained through DNA barcoding analysis to identify the disperser species.
- **seq_length**: sequence length (base pairs).

viability_seeds_fruits.csv

Data on the viability test ('flotation/sink' method) conducted on depulped seeds from *Pistacia lentiscus* ripe (black) fruits (Figure S3 in Supplementary Material).

Variables:

- **period**: 'early', 'mid' and 'late'.
- **date**: day when the fruits were sampled.
- **plant_id**: identity code for each mother plant sampled.
- **sink**: number of seeds that sank (i.e. viable).
- **float**: number of seeds that floated (i.e. unviable).

seed_predation_pistacia.csv

Data on the seed predation experiment (FIGURE 3b). Each row corresponds to an individual *Pistacia lentiscus* seed within a seed depot.

Variables:

- **period**: 'early', 'mid' and 'late'.
- **start_date**: start date of the seed predation experiment in each period.
- **mh_type**: microhabitat type (trees: 'tree'; fruit-bearing shrubs: 'fb_shrub'; non-fb shrubs: 'shrub').
- **code_depot**: identity code for each seed depot.
- **predation**: outcome after 2 weeks (seed predation = 1; no seed predation = 0).

sowing_experiment_pistacia.csv

Data on the sowing experiment of *Pistacia lentiscus* seeds to assess seed germination (FIGURE 3c) and seedling survival (FIGURE 3d). Each row corresponds to an individual *Pistacia lentiscus* seed within a sowing station.

Variables:

- **period**: 'early', 'mid' and 'late'.
- **sowing_date**: sowing date in each period.
- **mh_type**: microhabitat type (trees: 'tree'; fruit-bearing shrubs: 'fb_shrub'; non-fb shrubs: 'shrub').
- **code_station**: identity code for each sowing station.
- **seed**: seed identity number within each sowing station.
- **Gfinal**: germination outcome (germination = 1; no germination = 0).
- **Gtime**: germination time (weeks after sowing); data for seeds that germinated.
- **Surv**: survival outcome (survival = 1; no survival = 0); data for seeds that germinated and for sowing stations that were not disturbed (see Table S2 in Supplementary Material).
- **Mtime**: mortality time (weeks after sowing); data for seedlings that died.
- **disturbed**: whether the sowing station was disturbed or not ('yes' and 'no', respectively), which caused the loss of data for seed germination and seedling survival (see Table S2 in Supplementary Material).
- **disturbance_time**: time of disturbance (weeks after sowing); data for disturbed sowing stations (see Table S2 in Supplementary Material).

`timing_sde_pistacia.csv`

Mean values of multiple demographic processes used to calculate the quantity (QT) and (QL) components of seed dispersal effectiveness (SDE) for different bird species groups contributing to seed dispersal in different periods and microhabitat types (FIGURE 4).

Variables:

- **period**: 'early', 'mid' and 'late'.
- **mh_type**: microhabitat type (trees: 'tree'; fruit-bearing shrubs: 'fb_shrub'; non-fb shrubs: 'shrub').
- **bird_group**: bird species groups according to their migratory strategy (residents: 'resident'; European migrants: 'short_dist'; sub-Saharan migrants: 'long_dist').
- **rel_contribution**: relative contribution (frequency) of bird species group i to period j and microhabitat k (f_{ijk}).
- **dseeds**: mean seed rain density (seeds per m^2) in period j and microhabitat k (d_{jk}).
- **QT**: quantity of seed deposition contributed by each bird species group in each 'microhabitat–period' combination ($QT_{ijk} = d_{jk} \times f_{ijk}$).
- **mean_viab**: mean probability of viability among bird-dispersed seeds in period j (v_j).
- **mean_seed_surv**: mean probability of escaping to post-dispersal seed predation in period j and microhabitat k (p_{jk}).
- **nzero_seed_surv**: for operational purposes, in order to avoid zeros in the computed QL_{jk}, we assigned a constant probability of $p_{jk} = 0.01$ (1%) because predation rates showed no variability and were almost total across periods and microhabitats (TABLE 2 and FIGURE 3b).
- **mean_germ**: mean probability of germination for seeds sown in period j and microhabitat k (g_{jk}).
- **mean_seedling_surv**: mean probability of seedling survival for seeds sown in period j and microhabitat k (s_{jk}).
- **nzero_seedling_surv**: for operational purposes, in order to avoid zeros in the computed QL_{jk}, we conservatively replaced the two zero values obtained for s_{jk} with the minimum non-zero value we obtained for the probability of seedling survival ($s = 0.09$) across 'microhabitat–period' combinations (FIGURE 3d).
- **QL**: quality component calculated as the cumulative probability of recruitment of dispersed seeds in each 'microhabitat–period' combination ($QL_{jk} = v_j \times p_{jk} \times g_{jk} \times s_{jk}$).
- **SDE**: seed dispersal effectiveness of each bird species group contributing to seed rain in different periods and microhabitats ($SDE_{ijk} = QT_{ijk} \times QL_{jk}$).