Supplementary S1

Habitat Ecological Infrastructure's Diversity Index (HEIDI) Floristic suitability initial scoring criteria and references

1. Short-range dispersers

Assumptions and criteria used to score different plant taxa according to their suitability for seed dispersal by short-range dispersers (ants):

Based on the vector used for the plant dispersal mode:

1. We considered plants with abiotic dispersal types such as anemochory (with wind dispersal adaptations - e.g., seeds with wings, plumes or hairs playing a role in airborne transport), hydrochory (dispersed by water – e.g., floating seeds), autochory (unassisted dispersal) and ballistic dispersal or ballochory (dispersed by launching) unlikely to be attracted and dispersed by ants [1] – Score = 0

a. We considered plants species with ballistic dispersal more likely to be secondarily dispersed by ants. The combination of two dispersal mechanisms is called diplochory, and myrmecochory is often a second phase mechanism of seeds dispersed ballistically. Nevertheless, plants species with seeds secondarily dispersed by ants usually have a relatively small elaiosome compared with species lacking ballistic dispersal [2] – Score = +2

b. We considered plant species with endozoochory, i. e., seed dispersal by vertebrates that ingest fruit and either regurgitate or defecate seeds unharmed, more likely to be secondarily dispersed by ants. Diplochory involving frugivory followed by myrmecochory is common in temperate habitats. Diaspores adapted for both these modes of dispersal generally offer two distinct food rewards: fruit pulp that is attractive to vertebrate frugivores and an elaiosome that passes through the digestive tract of the frugivore and attracts ants [2]. In general, we considered plants with dry fruit types more likely to attract ants than fleshy fruit types [1,3], nevertheless ants can also be interested in fleshy fruits of bird-dispersed plants such as *Pistacia lentiscus* L., *Phillyrea angustifolia* L. and *Arum italicum* Mill. [4] – Score = +2

2. We considered plants adapted to myrmecochory, i.e., plants with elaiosome-bearing seeds, the most likely to be attracted and dispersed by ants; Myrmecochory is mediated by elaiosomes, i.e., lipid-rich seed appendages that attract ants and serve as rewards for dispersal [1] – Score = 10

a. whether it is the plant species in question – Score = 10

b. whether it occurs in all plant species of the genus – Score = 10

c. if it is a plant species of the same genus – Score = -2

d. if it is a plant species of the same family – Score = -6

e. In addition to elaiosomes, we considered plants possessing fatty seed coats and extrafloral nectaries as more likely to attract ants than the ones without these structures [5,6] – Score = 10

Based on bibliographic references:

3. Consideration has been given to plant species referred to in the bibliography as transported or attracting ants in general, or a certain species (e.g., *Messor barbarus* L., *Aphaenogaster senilis* Mayr, *Goniomma kugleri* Espadaler) [4,7-12]:

a. whether it is the plant species in question – Score = 8

b. whether it occurs in all plant species of the genus – Score = 8

c. if it is a plant species of the same genus – Score = -2

d. if it is a plant species of the same family – Score = -6

4. We considered species producing no seeds unlikely to attract ants. *Tradescantia* spp. are usually self-sterile, so that individual plants and clones derived from them produce no seed [13] – Score = 0

Based on seed weight and morphology:

1. Although heavier seeds are more likely to be carried by ants, as seed removal rates are significantly correlated with elaiosome size [5] and plant species that have cumbersome morphological seed adaptations, such as the awns of grasses, or that produce heavy diaspores less subject to wind dispersal, are more likely to benefit from the presence of harvester ants since their seeds are more easily dropped and dispersed by foragers [7], we considered plant species with hard-coated seeds, hoarding diaspores such as the *Quercus* spp. less likely to attract ants since they are too large (>1700 g) – Score = 0

2. We considered seeds with mucilage secretion and spherical or lens-shaped less likely to be transported by ants than the seeds with no mucilage and more elongated shape [14] – Score = 0

Based on the scores given to the plant species and genus of a certain plant family:

3. The score given to the plant family is the median of the scores of the species and genera of that family.

Based on the abundances of plant taxa:

1. The following criteria was used to attribute the above mentioned scores considering the abundance of tree, shrub and herbaceous taxa:

	Abundance							
Vegetation type	**Present**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**
Tree	[Score x 3/4]	[Score x 4/4]	-	-	-	-	-	-
Shrub	-	-	[Score x 2/4]	[Score x 3/4]	[Score x 4/4]	-	-	-
Herbaceous	-	-	-	-	-	[Score x 1/4]	[Score x 3/4]	[Score x 4/4]

Bibliography:

We searched for the information on myrmecochorous species and seed dispersal of plants from literature (articles, reviews and available information of databases. For a complete list of bibliographic references that were used please see Supplementary Materials Tables S2-S4.

List of plant taxa and Floristic suitability initial scoring results for short-range dispersers (ants):

Please see Supplementary Materials Tables S2-S4.

2. Medium-range dispersers

Assumptions and criteria used to score different plant taxa according to their suitability for pollination by medium-range dispersers (pollinators):

Based on bibliographic references:

1. We followed the expert pollination scores for medium-range dispersers (1-10) developed by Santos et al. [15] and further complemented missing plant families with additional references. For a complete list of the bibliographic references that were used please see Supplementary Materials Tables S5-S7.

Based on the abundances of plant taxa:

1. The following criteria was used to attribute the above mentioned scores considering the abundance of tree, shrub and herbaceous taxa:

	Abundance							
Vegetation type	**Present**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**
Tree	[Score x 3/4]	[Score x 4/4]	-	-	-	-	-	-
Shrub	-	-	[Score x 2/4]	[Score x 3/4]	[Score x 4/4]	-	-	-
Herbaceous	-	-	-	-	-	[Score x 1/4]	[Score x 3/4]	[Score x 4/4]

List of plant taxa and Floristic suitability initial scoring results for medium-range dispersers (pollinators):

Please see Supplementary Materials Tables S5-S7.

3. Long-range dispersers

Assumptions and criteria used to score different plant taxa according to their suitability for seed dispersal by long-range dispersers (birds and non-flying small mammals):

Based on the vector used for the plant dispersal mode, diaspore morphology and fruit type:

1. We considered plants with abiotic dispersal types such as anemochory (with wind dispersal adaptations - e.g., seeds with wings, plumes or hairs playing a role in airborne transport), hydrochory (dispersed by water – e.g., floating seeds), autochory (unassisted dispersal) and ballistic dispersal or ballochory (dispersed by launching) unlikely to be attracted by vertebrates – Score = 0

a. We considered plants with fleshy fruits more likely to attract and be dispersed by vertebrates than plants with dry fruits, as the vast majority of Mediterranean fleshy-fruited plants are dispersed either by birds alone or by some combination of birds and carnivorous mammals [3,16] – Score = +2

2. We considered plants adapted to epizoochory or exozoochory, i.e., externally vertebrate-dispersed, if the seeds and fruits had hooks, barbs or sticky substances that attach

to feather and fur. These are likely to be dispersed by vertebrates, however it is by chance [17,18] – Score = 0

3. We considered plants adapted to myrmecochory, i.e., plants with elaiosome-bearing seeds and dispersed by ants, unlikely to be attracted and dispersed by vertebrates [1] – Score = 0

4. We considered plants dispersed primarily by endozoochory, the most likely to be attracted by vertebrates. Consideration has been given to plant species referred in the bibliography as transported by birds and/or mammals in general, or to a certain vertebrate species [18] – Score = 10

a. whether it is the plant species in question – Score = 10

b. whether it occurs in all plant species of the genus – Score = 10

c. if it is a plant species of the same genus – Score = -2

d. if it is only secondarily dispersed by vertebrates (referred in the bibliography as likely to be dispersed by others (e.g., wind, water, invertebrates) - potential endozoochory. Birds are the main dispersers of most plants with mixed dispersal [3] – Score = -6

5. We considered plants with hoarding diaspores (hard coated seeds such as nuts from *Quercus* spp.) likely to attract vertebrates [17] – Score = 8

Based on the scores given to the plant species and genus of a certain plant family:

1. The score given to the plant family is the median of the scores of the species and genera of that family.

Based on the abundances of plant taxa:

1. The following criteria was used to attribute the above mentioned scores considering the abundance of tree, shrub and herbaceous taxa:

	Abundance							
Vegetation type	**Present**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**	**Isolated Individuals**	**Abundant**	**Dominant**
Tree	[Score x 3/4]	[Score x 4/4]	-	-	-	-	-	-
Shrub	-	-	[Score x 2/4]	[Score x 3/4]	[Score x 4/4]	-	-	-
Herbaceous	-	-	-	-	-	[Score x 1/4]	[Score x 3/4]	[Score x 4/4]

Bibliography:

We searched for the information on seed dispersal of plants from literature (articles, reviews and available information of databases. For a complete list of bibliographic references please see Supplementary Materials Tables S8-S10.

List of plant taxa and Floristic suitability initial scoring results for long-range dispersers (birds and non-flying small mammals):

Please see Supplementary Materials Tables S8-S10.

References:

1. Lengyel, S., Gove, A.D., Latimer, A.M., Majer, J.D., & Dunn, R.R. (2010). Convergent evolution of seed dispersal by ants, and phylogeny and biogeography in flowering plants: A global survey. Perspectives in Plant Ecology, Evolution and Systematics, 12:43-55

2. Vander Wall, S.B., & Longland, W. (2004). Diplochory: are two seed dispersers better than one? Trends in Ecology and Evolution, 19:155– 161

3. Herrera; C.M. Plant-vertebrates seed dispersal systems in the Mediterranean: Ecological, Evolutionary, and Historical Determinants. *Annu. Rev. Ecol. Syst.* **1995**, 26:705-727

4. Barroso, A.; Amor, F.; Cerdá, X.; Boulay, R.R. Dispersal of non-myrmecochorous plants by a "keystone disperser" ant in a Mediterranean habitat reveals asymmetric interdependence. *Insectes Sociaux* **2013**, 60:75–86

5. Peters, M.; Oberrath, R.; Böhning-Gaese, K. Seed dispersal by ants: are seeds preferences influenced by foraging strategies or historical constraints? *Flora* **2003**, 198:413-420

6. Lange, D.; Calixto, E.S.; Del-Claro, K. Variation in Extrafloral Nectary Productivity Influences the Ant Foraging. *PLoS ONE* **2017**, 12:e0169492

7. Detrain, C.; Tasse, O. Seed drops and caches by the harvester ant Messor barbarus: do they contribute to seed dispersal in Mediterranean grasslands? *Naturwissenschaften* **2000**, 87:373-376

8. Hensen, I. Seed predation by ants in south-eastern Spain (Desierto de Tabernas, Almería). *Anales de Biología* **2002**, 24:89-96

9. Azcárate, F.M.; Arqueros, L.; Sánchez, A.M.; Peco, B. Seed and fruit selection by harvester ants, Messor barbarus, in Mediterranean grassland and scrubland. *Functional Ecology* **2005**, 19:273-283

10. Bastida, F.; Talavera, S.; Ortiz, P.L.; Arista, M. The interaction between *Cistaceae* and a highly specific seed-harvester ant in a Mediterranean scrubland. *Plant Biology* **2009**, 11:46-56

11. Minkey, D.M.; Spafford, H. Removal and Burial of Weed Seeds by Ants (Hymenoptera: Formicidae) From the Soil Surface of a Cropped Area in Western Australia. *Environ Entomol* **2016**, 45:1199-1204

12. Deus, E.; Silva, J.S.; Marchante, H.; Marchante, E.; Félix, C. Are post-dispersed seeds of *Eucalyptus globulus* predated in the introduced range? Evidence from an experiment in Portugal. *Web Ecol.* **2018**, 18:67-79

13. CABI. Invasive Species Compendium. Wallingford, UK: CAB International. 2021 www.cabi.org/isc.

14. Engelbrecht, M.; García-Fayos, P. Mucilage secretion by seeds doubles the chance to escape removal by ants. *Plant Ecology* **2012**, 213:1167-1175

15. Santos, A.; Fernandes, M. R.; Aguiar, F. C.; Branco, M. R.; Ferreira, M. T. Effects of riverine landscape changes on pollination services: A case study on the River Minho, Portugal. *Ecological Indicators* **2018**, 89(February), 656–666. https://doi.org/10.1016/j.ecolind.2018.02.036

16. Rosalino, L. M.; Rosa, S.; Santos-Reis, M. The role of carnivores as Mediterranean seed dispersers. *Annales Zoologici Fennici* **2010**, 47(3), 195–205. https://doi.org/10.5735/086.047.0304

17. Howe, H.F.; Smallwood, J. Ecology of seed dispersal. *Annual Review of Ecology and Systematics* **1982**, 13:201-228

18. Costa, J. M.; Ramos, J. A.; da Silva, L. P.; Timoteo, S.; Araújo, P. M.; Felgueiras, M. S.; … Heleno, R. H. Endozoochory largely outweighs epizoochory in migrating passerines. *Journal of Avian Biology* **2014**, 45(1), 59–64. https://doi.org/10.1111/j.1600-048X.2013.00271.x