***Supplementary Information for***

**An integrative approach to discern the seed dispersal role of frugivorous guilds in a Mediterranean semiarid priority habitat**

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**Fig. S1** Estimated distribution map of 5220 Habitat\* in Spain. (Source:Atlas de los Hábitat de España, 2005).

**Fig. S2** Interaction matrix of dispersed seeds of fleshy-fruited species featuring modules.

**Table S1.** Density of fleshy-fruited shrub species (individuals/100m2) recorded in vegetation sampling of habitat 5220\* of Sierra de la Fausilla (Murcia Region - Spain).

**Table S2.** Plant species dispersed by mammals and birds in Sierra de la Fausilla (Murcia Region, Spain). Values are the amount of seeds of each plant species found in animal-dispersed samples (i.e. faeces of mammals and faeces and regurgitations of birds).

**Table S3.** Permutational Multivariate Analysis of Variance PERMANOVA with Bonferroni correction, using Bray Curtis distances and 9999 permutation of plant communities dispersed by mamals, birds and censed in plots.

**Table S4.** Species-specific level parameters of the network between fleshy-fruited plants and vertebrates (mammals and birds) in the coast of Cartagena (SE Spain). The highest values for each parameter are shown in bold.

**Fig. S1** Estimated distribution map of 5220 Habitat\* in Spain. (**Source:** Atlas de los Hábitat de España, 2005).

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**Fig. S2** Interaction matrix of dispersed seeds of fleshy-fruited species featuring modules (red boxes delineate five modules). Darker blue squares indicate more observed interactions.

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**Table S1.** Density of fleshy-fruited shrub species (individuals/100m2) recorded in vegetation sampling of habitat 5220\* of Sierra de la Fausilla (Murcia Region - Spain).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- |
| **Plants**  | **Sampling site** |
| **Family** | **Species** | **Escombreras** | **Gorguel** | **Cola de Caballo** |
| Anacardiaceae |  |  |  |  |
|  | *Pistacia lentiscus* | - | 12 | 17 |
| Arecaceae |  |  |  |  |
|  | *Chamaerops humilis* | 1 | 20 | 31 |
| Asparagaceae |  |  |  |  |
|  | *Asparagus albus* | 64 | 1 | 1 |
|  | *Asparagus horridus* | 17 | 28 | 7 |
| Celastraceae |  |  |  |  |
|  | *Maytenus senegalensis* | 9 | - | 5 |
| Rhamnaceae |  |  |  |  |
|  | *Rhamnus alaternus* | - | - | 2 |
|  | *Rhamnus lycioides* | 1 | 2 | 17 |
| Rubiaceae |  |  |  |  |
|  | *Rubia peregrina* | 2 | - | - |
| Santalaceae |  |  |  |  |
|  | *Osyris lanceolata* | 2 | 41 | 13 |
| Solanaceae |  |  |  |  |
|  | *Lycium intricatum* | 18 | - | - |
|  | *Withania frutescens* | 8 | - | 2 |
| Thymelaeaceae |  |  |  |  |
|  | *Daphne gnidium* | - | - | 1  |
| **Density (average ± standard deviation)** | 10 ± 18. 1 | 8.6 ± 13.8 | 8 ± 9.6 |

**Table S2.** Plant species dispersed by mammals and birds in Sierra de la Fausilla (Murcia Region, Spain). Values are the amount of seeds of each plant species found in animal-dispersed samples (i.e. faeces of mammals and faeces and regurgitations of birds).

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| --- |
|  |
| **Plants** | **Seed dispersers** |
| **Family** | **Species** | **Mammals** | **Birds** |
| Anacardiaceae |  |  |  |
|  | *Pistacia lentiscus* | - | 45 |
| Arecaceae |  |  |  |
|  | *Chamaerops humilis* | 7 | - |
|  | *Phoenix roebelenii* | 3 | - |
|  | *Phoenix dactylifera* | 10 | 1 |
| Asparagaceae |  |  |  |
|  | *Asparagus albus* | - | 45 |
|  | *Asparagus horridus* | - | 15 |
| Fabaceae |  |  |  |
|  | *Ceratonia siliqua* | 14 | - |
| Moraceae |  |  |  |
|  | *Ficus carica* | 723 | 10 |
| Myrtaceae |  |  |  |
|  | *Myrtus communis* | - | 3 |
| Rhamnaceae |  |  |  |
|  | *Rhamnus alaternus* | 1 | 1 |
|  | *Rhamnus lycioides* | 4 | - |
| Santalaceae |  |  |  |
|  | *Osyris lanceolata* | - | 36 |
| Solanaceae |  |  |  |
|  | *Lycium intricatum* | - | 112 |
|  | *Withania frutescens* | - | 49 |
| Thymelaeaceae |  |  |  |
|   | *Daphne gnidium* | - | 8 |

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**Table S3.** Permutational Multivariate Analysis of Variance PERMANOVA with Bonferroni correction, using Bray Curtis distances and 9999 permutation of plant communities dispersed by mammals, birds and censed in plots.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Degree freedom** | **Sum of squares**  | **Average sum of squares** | **F** | **R2** | **p-value** | **p-value adjusted** |
| *General* | 2 | 3.822 | 1.911 | 6.179 | 0.208 | <0.001 |  |
| Residuals | 47 | 14.535 | 0.309 |  | 0.792 |  |  |
| Total | 49 | 18.357 |  |  | 1 |  |  |
| --- |  |  |  |  |  |  |  |
| *Pair comparison* |  |  |  |  |  |  |  |
| Plants dispersed by mammals *vs.* Plants dispersed by birds |  |  |  | 5.355 | 0.196 | 0.001 | 0.003 |
| Plants dispersed by mammals *vs.*Plants of semiarid shrubs  |  |  |  | 10.142 | 0.229 | 0.001 | 0.003 |
| Plants dispersed by birds *vs.*  Plants of semiarid shrubs |  |  |  | 3.377 | 0.082 | 0.002 | 0.006 |

**Table S4.** Species-specific level parameters of the network between fleshy-fruited plants and vertebrates (mammals and birds) in the coast of Cartagena (SE Spain). The highest values for each parameter are shown in bold

|  |  |  |  |
| --- | --- | --- | --- |
| **Plants** | **Degree** | **Species strength** | **d’** |
| *Phoenix dactylifera* | 2 | 0.342 | 0.455 |
| *Ficus carica* | 4 | 1.351 | 0.458 |
| *Phoenix roebelenii* | 2 | 0.222 | 0.420 |
| *Ceratonia siliqua* | 3 | 1.778 | 0.711 |
| *Rhamnus lycioides* | 1 | 1.000 | **1.000** |
| *Rhamnus alaternus* | 2 | 0.064 | 0.056 |
| *Chamaerops humilis* | 2 | 0.278 | 0.436 |
| *Asparagus albus* | 3 | 0.841 | 0.194 |
| *Asparagus horridus* | 1 | 0.088 | 0.100 |
| *Daphne gnidium* | 2 | 0.395 | 0.105 |
| *Lycium intricatum* | 2 | 0.442 | 0.158 |
| *Myrtus comunis* | 1 | 0.009 | 0.000 |
| *Osyris lanceolata* | 2 | 1.212 | 0.228 |
| *Pistacia lentiscus* | **7** | **4.093** | 0.363 |
| *Withania frutescens* | 2 | 0.884 | 0.308 |
| **Dispersers** |  |  |  |
| *Martes foina* | 3 | 1.119 | 0.634 |
| *Meles meles* | 2 | 0.714 | 0.671 |
| *Vulpes vulpes* | 6 | 3.238 | 0.734 |
| *Oryctolagus cuniculus* | 1 | 1.000 | **1.000** |
| *Erinaceus europaeus* | 1 | 0.143 | 0.443 |
| *Erithacus rubecula* | 1 | 0.212 | 0.481 |
| *Phoenicurus ochruros* | 3 | 0.433 | 0.448 |
| *Sylvia atricapilla* | 1 | 0.040 | 0.079 |
| *Sylvia melanocephala* | 2 | 0.370 | 0.395 |
| *Sylvia undata* | 1 | 0.030 | 0.000 |
| *Turdus merula* | 2 | 0.130 | 0.159 |
| *Turdus philomelos* | 2 | 0.186 | 0.238 |
| *Turdus viscivorus* | **11** | **7.385** | 0.403 |

**References**

Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente (MAPAMA). (2005). Atlas de los Hábitat de España. Spain. <http://www.mapama.gob.es>