




# RecruitNet: A global database of plant recruitment networks

Miguel Verdú<sup>1</sup>  | Jose L. Garrido<sup>2,3</sup>  | Julio M. Alcántara<sup>4,5</sup>  |  
 Alicia Montesinos-Navarro<sup>1</sup>  | Salomón Aguilar<sup>6</sup> | Marcelo A. Aizen<sup>7</sup> |  
 Ali A. Al-Namazi<sup>8</sup>  | Mohamed Alifriqui<sup>9</sup> | David Allen<sup>10</sup>  |  
 Kristina J. Anderson-Teixeira<sup>6,11</sup>  | Cristina Armas<sup>12</sup>  | Jesús M. Bastida<sup>13</sup>  |  
 Tono Bellido<sup>14</sup> | Giuliano Bonanomi<sup>15</sup> | Gustavo B. Paterno<sup>16</sup>  |  
 Herbert Briceño<sup>12</sup> | Ricardo A. C. de Oliveira<sup>17</sup> | Josefina G. Campoy<sup>18</sup>  |  
 Ghassen Chaieb<sup>19</sup> | Chengjin Chu<sup>20</sup> | Sarah E. Collins<sup>1</sup> | Richard Condit<sup>21</sup>  |  
 Elena Constantinou<sup>22</sup> | Cihan Ü. Degirmenci<sup>23</sup> | Leo Delalandre<sup>24</sup>  |  
 Milen Duarte<sup>25</sup>  | Michel Faife<sup>26</sup> | Fatih Fazlioglu<sup>27,28</sup>  |  
 Edwino S. Fernando<sup>29,30</sup> | Joel Flores<sup>31</sup> | Hilda Flores-Olvera<sup>32</sup>  |  
 Ecaterina Fodor<sup>33</sup> | Gislene Ganade<sup>34</sup> | María Begoña Garcia<sup>35</sup>  |  
 Patricio García-Fayos<sup>1</sup>  | Sabrina S. Gavini<sup>7</sup>  | Marta Goberna<sup>36</sup> |  
 Lorena Gómez-Aparicio<sup>37</sup>  | Enrique González-Pendás<sup>38</sup>  |  
 Ana González-Robles<sup>4</sup> | Stephen P. Hubbell<sup>6,39</sup> | Kahraman İpekdal<sup>40</sup>  |  
 María J. Jorquera<sup>12</sup> | Zaal Kikvidze<sup>41</sup>  | Pinar Kütküt<sup>23</sup> | Alicia Ledo<sup>42</sup>  |  
 Sandra Lendínez<sup>2</sup> | Buhang Li<sup>43</sup> | Hanlun Liu<sup>43</sup>  | Francisco Lloret<sup>44</sup> |  
 Ramiro P. López<sup>45</sup> | Álvaro López-García<sup>2</sup>  | Christopher J. Lortie<sup>46</sup>  |  
 Gianalberto Losapio<sup>47</sup>  | James A. Lutz<sup>48</sup>  | Arantzazu L. Luzuriaga<sup>49</sup>  |  
 František Máliš<sup>50</sup>  | Esteban Manrique<sup>51</sup> | Antonio J. Manzaneda<sup>4</sup> |  
 Vinicius Marcilio-Silva<sup>52</sup> | Richard Michalet<sup>19</sup>  | Rafael Molina-Venegas<sup>53</sup>  |  
 José Antonio Navarro-Cano<sup>36</sup>  | Vojtech Novotny<sup>54</sup> | Jens M. Olesen<sup>55</sup> |  
 Juan P. Ortiz-Brunel<sup>56</sup>  | María Pajares-Murgó<sup>4</sup> | Nikolas Parissis<sup>57</sup> |  
 Geoffrey Parker<sup>58</sup> | Antonio J. Perea<sup>4</sup> | Vidal Pérez-Hernández<sup>38</sup>  |  
 María Ángeles Pérez-Navarro<sup>44</sup> | Nuria Pistón<sup>12,59</sup>  | Elisa Pizarro-Carbonell<sup>60</sup> |  
 Iván Prieto<sup>12,61</sup>  | Jorge Prieto-Rubio<sup>2</sup>  | Francisco I. Pugnaire<sup>12</sup>  |  
 Nelson Ramírez<sup>62</sup>  | Rubén Retuerto<sup>18</sup> | Pedro J. Rey<sup>4,5</sup>  |  
 Daniel A. Rodríguez Ginart<sup>1</sup> | Mariana Rodríguez-Sánchez<sup>63</sup> |  
 Ricardo Sánchez-Martín<sup>1</sup>  | Christian Schöb<sup>49,64</sup>  | Çağatay Tavşanoğlu<sup>23</sup> |

For affiliations refer to page 3

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial License](https://creativecommons.org/licenses/by-nc/4.0/), which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2022 The Authors. *Ecology* published by Wiley Periodicals LLC on behalf of The Ecological Society of America.

Giorgi Tedoradze<sup>65</sup> | Amanda Tercero-Araque<sup>4</sup>  | Katja Tielbörger<sup>66</sup> |  
Blaise Touzard<sup>20</sup> | İrem Tüfekcioğlu<sup>24</sup> | Sevda Turkis<sup>67</sup> |  
Francisco M. Usero<sup>12</sup>  | Nurbahar Usta<sup>23</sup>  | Alfonso Valiente-Banuet<sup>68,69</sup> |  
Alexia Vargas-Colin<sup>31</sup> | Ioannis Vogiatzakis<sup>22</sup> | Regino Zamora<sup>5,70</sup>

#### Correspondence

Miguel Verdú

Email: [miguel.verdu@ext.uv.es](mailto:miguel.verdu@ext.uv.es)

#### Funding information

Fondo Europeo de Desarrollo Regional,

Grant/Award Number:

ICTS-2017-08-CSIC-4; SUMHAL,

Grant/Award Numbers: 418RT0555,

501100011033,

LIFEWATCH-2019-09-CSIC-13, MCIN/

AEI/10.13039, PGC2018-100966-B-I00,

PID2020-113157GB-I00, POPE 2014-2020

**Handling Editor:** William K. Michener

#### Abstract

Plant recruitment interactions (i.e., what recruits under what) shape the composition, diversity, and structure of plant communities. Despite the huge body of knowledge on the mechanisms underlying recruitment interactions among species, we still know little about the structure of the recruitment networks emerging in ecological communities. Modeling and analyzing the community-level structure of plant recruitment interactions as a complex network can provide relevant information on ecological and evolutionary processes acting both at the species and ecosystem levels. We report a data set containing 143 plant recruitment networks in 23 countries across five continents, including temperate and tropical ecosystems. Each network identifies the species under which another species recruits. All networks report the number of recruits (i.e., individuals) per species. The data set includes >850,000 recruiting individuals involved in 118,411 paired interactions among 3318 vascular plant species across the globe. The cover of canopy species and open ground is also provided. Three sampling protocols were used: (1) The Recruitment Network (RN) protocol (106 networks) focuses on interactions among established plants (“canopy species”) and plants in their early stages of recruitment (“recruit species”). A series of plots was delimited within a locality, and all the individuals recruiting and their canopy species were identified; (2) The paired Canopy-Open (pCO) protocol (26 networks) consists in locating a potential canopy plant and identifying recruiting individuals under the canopy and in a nearby open space of the same area; (3) The Georeferenced plot (GP) protocol (11 networks) consists in using information from georeferenced individual plants in large plots to infer canopy-recruit interactions. Some networks incorporate data for both herbs and woody species, whereas others focus exclusively on woody species. The location of each study site, geographical coordinates, country, locality, responsible author, sampling dates, sampling method, and life habits of both canopy and recruit species are provided. This database will allow researchers to test ecological, biogeographical, and evolutionary hypotheses related to plant recruitment interactions. There are no copyright restrictions on the data set; please cite this data paper when using these data in publications.

#### KEYWORDS

ecological networks, facilitation, plant–plant interactions, recruitment, replacement

**AFFILIATIONS**

- <sup>1</sup>Centro de Investigaciones Sobre Desertificación (CIDE, CSIC-UV-GV), Moncada, Spain
- <sup>2</sup>Departamento de Microbiología del Suelo y Sistemas Simbióticos, Estación Experimental del Zaidín (EEZ-CSIC), Granada, Spain
- <sup>3</sup>Estación Biológica de Doñana (EBD-CSIC), Sevilla, Spain
- <sup>4</sup>Departamento de Biología Animal, Biología Vegetal y Ecología, Universidad de Jaén, Jaén, Spain
- <sup>5</sup>Andalusian Institute for Earth System Research (IISTA), Granada, Spain
- <sup>6</sup>Smithsonian Tropical Research Institute (STRI), Panama, Panama
- <sup>7</sup>Instituto de Investigaciones en Biodiversidad y Medioambiente (INIBIOMA), Universidad Nacional del Comahue-CONICET, San Carlos de Bariloche, Argentina
- <sup>8</sup>Life Sciences & Environment Research Institute, King Abdulaziz City for Science and Technology (KACST), Riyadh, Saudi Arabia
- <sup>9</sup>Laboratory of Ecology and Environment, Biology Department, Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco
- <sup>10</sup>Department of Biology, Middlebury College, Middlebury, Vermont, USA
- <sup>11</sup>Center for Conservation Ecology, Smithsonian National Zoo and Conservation Biology Institute, Front Royal, Virginia, USA
- <sup>12</sup>Estación Experimental de Zonas Áridas, Consejo Superior de Investigaciones Científicas (EEZA-CSIC), Almería, Spain
- <sup>13</sup>Estación Experimental del Zaidín, Consejo Superior de Investigaciones Científicas (EEZ-CSIC), Granada, Spain
- <sup>14</sup>Servici Devesa-Albufera, Vivers Municipals de El Saler, Valencia, Spain
- <sup>15</sup>Department of Agricultural Sciences, University of Naples Federico II, Portici, Italy
- <sup>16</sup>Biodiversity, Macroecology & Biogeography, University of Göttingen, Göttingen, Germany
- <sup>17</sup>Departamento de Botânica, Universidade Federal do Paraná, Setor de Ciências Biológicas, Curitiba, Brazil
- <sup>18</sup>Departamento de Biología Funcional (Ecología), Universidade de Santiago de Compostela, Santiago de Compostela, Spain
- <sup>19</sup>University of Bordeaux, UMR CNRS 5805 EPOC, Pessac, France
- <sup>20</sup>State Key Laboratory of Biocontrol, School of Ecology, Sun Yat-sen University, Guangzhou, China
- <sup>21</sup>University of California, Santa Cruz, Santa Cruz, California, USA
- <sup>22</sup>Faculty of Pure & Applied Sciences, Open University of Cyprus, Nicosia, Cyprus
- <sup>23</sup>Division of Ecology, Department of Biology, Hacettepe University, Ankara, Turkey
- <sup>24</sup>CEFE, University of Montpellier, CNRS, EPHE, IRD, Montpellier, France
- <sup>25</sup>Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile
- <sup>26</sup>Jardín Botánico de Villa Clara, Facultad de Ciencias Agropecuarias, Universidad Central 'Marta Abreu' de Las Villas, Santa Clara, Cuba
- <sup>27</sup>Faculty of Arts and Sciences, Department of Molecular Biology and Genetics, Ordu University, Ordu, Turkey
- <sup>28</sup>Bayreuth University (Plant Ecology, University of Bayreuth), Bayreuth, Germany
- <sup>29</sup>Institute of Biology, University of the Philippines, Diliman, Philippines
- <sup>30</sup>Department of Forest Biological Sciences, University of the Philippines, Los Baños, Philippines
- <sup>31</sup>Instituto Potosino de Investigación Científica y Tecnológica, A.C., División de Ciencias Ambientales, San Luis Potosí, Mexico
- <sup>32</sup>Departamento de Botánica, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico
- <sup>33</sup>Faculty of Environmental Protection, Department of Forestry and Forest Engineering, University of Oradea, Oradea, Romania
- <sup>34</sup>Departamento de Ecología, Universidade Federal do Rio Grande do Norte, Natal, Brazil
- <sup>35</sup>Pyrenean Institute of Ecology (CSIC), Zaragoza, Spain
- <sup>36</sup>Department of Environment and Agronomy, Centro Nacional Instituto de Investigación y Tecnología Agraria y Alimentaria (INIA-CSIC), Madrid, Spain
- <sup>37</sup>Instituto de Recursos Naturales y Agrobiología de Sevilla, Consejo Superior de Investigaciones Científicas (IRNAS-CSIC), Sevilla, Spain
- <sup>38</sup>Departamento de Investigaciones Botánicas, Centro de Investigaciones y Servicios Ambientales, ECOVIDA, Pinar del Río, Cuba
- <sup>39</sup>Department of Ecology and Evolutionary Biology, University of California, Los Angeles, California, USA
- <sup>40</sup>Faculty of Agriculture, Ahi Evran University, Kirsehir, Turkey
- <sup>41</sup>Institute of Botany, Ilia State University, Tbilisi, Georgia
- <sup>42</sup>Freelance Scientist, Huesca, Spain
- <sup>43</sup>Department of Ecology, State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-sen University, Guangzhou, China
- <sup>44</sup>CREAF, U. Ecologia, Department of Biología Animal, Biología Vegetal i Ecologia, Universitat Autònoma Barcelona, Cerdanyola del Valles, Spain

<sup>45</sup>Carrera de Biología, Facultad de Ciencias Puras y Naturales, Universidad Mayor de San Andrés (UMSA), La Paz, Bolivia

<sup>46</sup>Department of Biology, York University, Toronto, Ontario, Canada

<sup>47</sup>Institute of Earth Surface Dynamics, University of Lausanne, Lausanne, Switzerland

<sup>48</sup>Utah State University, Wildland Resources, Logan, Utah, USA

<sup>49</sup>Department of Biology and Geology, Rey Juan Carlos University, Móstoles, Spain

<sup>50</sup>Faculty of Forestry, Technical University in Zvolen, Zvolen, Slovakia

<sup>51</sup>Real Jardín Botánico, CSIC, Madrid, Spain

<sup>52</sup>Department of Ecology, Evolution and Behavior, University of Minnesota, Saint Paul, Minnesota, USA

<sup>53</sup>Department of Life Sciences, Universidad de Alcalá, GLOCEE - Global Change Ecology and Evolution Group, Alcalá de Henares, Spain

<sup>54</sup>Department of Ecology and Conservation Biology, Czech Academy of Sciences, Prague, Czech Republic

<sup>55</sup>Department of Biology, Aarhus University, Aarhus, Denmark

<sup>56</sup>Departamento de Botánica y Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara, Zapopan, Mexico

<sup>57</sup>Department of Agricultural Development, Management of Plant Production, Plant Protection and Environment, Democritus University of Thrace, Orestiada, Greece

<sup>58</sup>Smithsonian Environmental Research Center, Edgewater, Maryland, USA

<sup>59</sup>Programa de Pós-graduação em Ecologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

<sup>60</sup>Asociación Aprisco, Torrejón el Rubio, Spain

<sup>61</sup>Department of Biodiversity and Environmental Management, Ecology Area, Faculty of Biological and Environmental Sciences, University of León, León, Spain

<sup>62</sup>Universidad Central de Venezuela, Facultad de Ciencias, Instituto Biología Experimental, Centro Botánica Tropical, Caracas, Venezuela

<sup>63</sup>Posgrado en Ciencias Biológicas, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico

<sup>64</sup>Institute of Agricultural Sciences, ETH, Zurich, Switzerland

<sup>65</sup>Department of Plant Systematics and Geography, Institute of Botany, Ilia State University, Tbilisi, Georgia

<sup>66</sup>University of Tübingen, Institute of Evolution and Ecology, Plant Ecology Group, Tübingen, Germany

<sup>67</sup>Faculty of Education, Department of Mathematics and Science Education, Ordu University, Ordu, Turkey

<sup>68</sup>Departamento de Ecología de la Biodiversidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City, Mexico

<sup>69</sup>Centro de Ciencias de la Complejidad, Universidad Nacional Autónoma de México, México City, Mexico

<sup>70</sup>Department of Ecology, University of Granada, Granada, Spain

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The complete data set is available as Supporting Information and is also available in Zenodo at <https://doi.org/10.5281/zenodo.6567608>.


## ORCID

*Miguel Verdú*  <https://orcid.org/0000-0002-9778-7692>

*Jose L. Garrido*  <https://orcid.org/0000-0002-6859-4234>

*Julio M. Alcántara*  <https://orcid.org/0000-0002-8003-7844>

*Alicia Montesinos-Navarro*  <https://orcid.org/0000-0003-4656-0321>

*Ali A. Al-Namazi*  <https://orcid.org/0000-0003-2767-4366>

*David Allen*  <https://orcid.org/0000-0002-0712-9603>

*Kristina J. Anderson-Teixeira*  <https://orcid.org/0000-0001-8461-9713>

*Cristina Armas*  <https://orcid.org/0000-0003-0356-8075>

*Jesús M. Bastida*  <https://orcid.org/0000-0002-8680-1401>

*Gustavo B. Paterno*  <https://orcid.org/0000-0001-9719-3037>

*Josefina G. Campoy*  <https://orcid.org/0000-0002-7300-1173>

*Richard Condit*  <https://orcid.org/0000-0003-4191-1495>

*Leo Delalandre*  <https://orcid.org/0000-0003-2875-4587>

*Milen Duarte*  <https://orcid.org/0000-0003-4784-9880>

*Fatih Fazlioglu*  <https://orcid.org/0000-0002-4723-3640>

*Hilda Flores-Olvera*  <https://orcid.org/0000-0002-3262-9570>

*María Begoña García*  <https://orcid.org/0000-0003-4231-6006>

*Patricio García-Fayos*  <https://orcid.org/0000-0003-3449-5075>







*Sabrina S. Gavini*  <https://orcid.org/0000-0001-8138-8155>

*Lorena Gómez-Aparicio*  <https://orcid.org/0000-0001-5122-3579>

*Enrique González-Pendás*  <https://orcid.org/0000-0001-5058-7733>

*Kahraman İpekdal*  <https://orcid.org/0000-0001-9968-3013>

Zaal Kikvidze  <https://orcid.org/0000-0002-5007-4484>  
Alicia Ledo  <https://orcid.org/0000-0002-3967-6994>  
Hanlun Liu  <https://orcid.org/0000-0002-9424-4940>  
Álvaro López-García  <https://orcid.org/0000-0001-8267-3572>  
Christopher J. Lortie  <https://orcid.org/0000-0002-4291-7023>  
Gianalberto Losapio  <https://orcid.org/0000-0001-7589-8706>  
James A. Lutz  <https://orcid.org/0000-0002-2560-0710>  
Arantzazu L. Luzuriaga  <https://orcid.org/0000-0001-5023-7813>  
František Máliš  <https://orcid.org/0000-0003-2760-6988>  
Richard Michalet  <https://orcid.org/0000-0002-6617-4789>  
Rafael Molina-Venegas  <https://orcid.org/0000-0001-5801-0736>  
José Antonio Navarro-Cano  <https://orcid.org/0000-0001-8091-1063>  
Juan P. Ortiz-Brunel  <https://orcid.org/0000-0002-0695-8143>  
Vidal Pérez-Hernández  <https://orcid.org/0000-0001-6793-296X>  
Nuria Pistón  <https://orcid.org/0000-0003-4946-9945>  
Iván Prieto  <https://orcid.org/0000-0001-5549-1132>  
Jorge Prieto-Rubio  <https://orcid.org/0000-0002-5600-5113>

Francisco I. Pugnaire  <https://orcid.org/0000-0002-1227-6827>  
Nelson Ramírez  <https://orcid.org/0000-0002-6385-3866>  
Pedro J. Rey  <https://orcid.org/0000-0001-5550-0393>  
Ricardo Sánchez-Martín  <https://orcid.org/0000-0001-5272-3276>  
Christian Schöb  <https://orcid.org/0000-0003-4472-2286>  
Amanda Tercero-Araque  <https://orcid.org/0000-0002-7255-5844>  
Francisco M. Usero  <https://orcid.org/0000-0002-4648-4202>  
Nurbahar Usta  <https://orcid.org/0000-0002-9265-2780>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Verdú, Miguel, Jose L. Garrido, Julio M. Alcántara, Alicia Montesinos-Navarro, Salomón Aguilar, Marcelo A. Aizen, Ali A. Al-Namazi, et al. 2023. “RecruitNet: A Global Database of Plant Recruitment Networks.” *Ecology* 104(2): e3923. <https://doi.org/10.1002/ecy.3923>