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Data Paper

More than half of the alien plants naturalised in the arid southeast of the Iberian Peninsula could be invasive

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Abstract

Having a list of alien plant species naturalised in an area and knowing their invasive potential (i.e. a post-border species risk assessment framework) and the precise locations where they are found, are now a priority as a management strategy to curb their spread, avoiding damage to ecosystems and saving management costs. This is especially important in arid ecosystems, which are particularly vulnerable to impacts due to their limited resources. Weed Risk Assessment systems (WRAs) analyse plant traits that influence their invasive potential through a set of questions whose answers score taxa according to their invasive potential. In this work, we identify potentially invasive plants inhabiting the arid southeast of the Iberian Peninsula, the driest region in Europe, by compiling alien plant species recorded in the wild and applying the Australian and New Zealand Weed Risk Assessment (AWRA) system. The AWRA applies scores that evaluate species characteristics related to biography, undesirable attributes and biology/ecology for establishment elsewhere. We provide the dataset obtained in the application of the AWRA test: a list of the alien plant species naturalised in the study area and their geographical distribution; the answers, scores and results of the test, as well as the scientific sources that support the existence of such characteristics in these species. We found that 64.4% of the 177 taxa assessed can be considered potential invaders. This database represents a useful and transparent tool for environmental managers to deal with the problem of plant invasions effectively. It can also be confronted with data from other areas of the world where these species are naturalised.

Key words: Mediterranean dryland, plant invasive species, post-border analyses, Weed Risk Assessment (WRA)

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Introduction

Plant invasions compromise all types of ecosystem services through changes in components, structure and functions of the ecosystems (Charles and Dukes 2008). Apart from the loss of nature contributions to humans, these alterations usually lead to great economic costs for governments (e.g. Haubrock et al. (2021a, b)), with management costs an important part of them (e.g. Angulo et al. (2021)). Several studies point out that arid ecosystems are more resistant to plant invasion, as native plant species seem to be better adapted to their critical conditions: resources-limited environments with a variable and unpredictable precipitation regime (Drake 1988; Loope et al. 1988; Chytrý et al. 2008). Despite this, invasive plant species have largely increased in arid regions over the last decades, even in those areas where management and monitoring strategies are in place (Shackleton et al. 2020). Some alien plants have the potential for overcoming ecosystem-poor conditions (Ozaslan et al. 2016) and the ability to use limiting resources more effectively than native plants during critical periods of the life cycle (Funk and Vitousek 2007; González-Rodríguez et al. 2010; Salinas-Bonillo et al. 2023). This behaviour would be exacerbated under future climate change scenarios (Ali and Bucher 2022). In addition, the highly productive and resource-rich areas of arid regions (e.g. river basins) are often overexploited by human activities, making them particularly sensitive to plant invasions (Milton and Dean 2010). Therefore, plant invasions occur in arid areas, causing severe disturbances in very vulnerable ecosystems, which are often simultaneously subject to other drivers of global change (Tylianakis et al. 2008; D'Odorico et al. 2013). Consequently, there is a need to identify potential plant invaders to prevent their introduction (i.e. pre-border weed risk assessment framework) and make more efficient management decisions (Seebens et al. 2017). In addition, once alien plants have already been introduced into the wild (i.e. post-border species risk assessment framework), managers need tools to prioritise management actions to eradicate, prevent the spread and control those most damaging to ecosystems (Early et al. 2016; McGeoch et al. 2016).

Weed Risk Assessment (WRAs) systems have proven to be a cost-effective and successfully tested pre-border tool for predicting the invasiveness of alien plants in various parts of the world (Tucker and Richardson 1995; Reichard and Hamilton 1997; Pheloung et al. 1999; Weber and Gut 2004; Parker et al. 2007; Gassó et al. 2010). Such assessments are also very useful for setting management priorities of plant species in a post-border scenario (Randall et al. 2008; Crosti et al. 2010; Gassó et al. 2010). In particular, the Australian and New Zealand Weed Risk Assessment (AWRA) system (Pheloung et al. 1999) has shown high applicability and predictive power in many regions (Gordon et al. 2008; Nishida et al. 2009; Crosti et al. 2010; Gassó et al. 2010; McClay et al. 2010; Koop et al. 2012), including arid areas. Despite WRAs having been questioned for being time-consuming and eventually lacking predictive value for some species (Hulme 2012; Kumschick and Richardson 2013), they have been useful for rejecting invasive species (Gassó et al. 2010), showing they are a suitable tool for managers to obtain blacklists, for instance. In this work, we aimed to identify and classify potential plant invaders amongst the naturalised alien plant species in the arid south-eastern region of the Iberian Peninsula, the driest region in Europe (Alcaraz 2017), applying the AWRA test. Our specific objectives were: i) to define a list of naturalised alien taxa in the study area, ii) to identify and classify species according to their invasive potential, iii) to document traits that contribute to their invasiveness and iv) to provide their known geographical coordinates to contribute to global and local information on hotspots expansion. To ensure transparency and allow for verification of the information obtained, we provide the references consulted to answer the test questions. We believe that this database of naturalised alien plant species in an arid zone is a useful tool for researchers on biological invasions and also for managers engaged in the monitoring and management of this environmental problem in these areas.

Metadata

I. Dataset descriptors

A. Dataset identity

Scores of the Australian and New Zealand Weed Risk Assessment (AWRA) (Pheloung et al. 1999) for 144 alien plant species naturalised in the arid southeast of the Iberian Peninsula, the geographical coordinates where they are recorded in the wild and the bibliographic sources from which the information was obtained to answer the AWRA questions.

B. Dataset identification code

AWRAridSpain_*.csv.

C. Dataset description

The dataset consists of five semicolon-separated values (.csv) files (Table 1).

Table 1. Description of the five files that include the dataset AWRAridSpain_*.csv.

File name	# Rows (excluding the header)	# Columns
AWRAridSpain_dic_taxa.csv	177	8
AWRAridSpain_dic_questions.csv	49	4
AWRAridSpain_dic_references.csv	217	2
AWRAridSpain_answers	8,673	5
AWRAridSpain_species_location	512	6

1. Principal investigators

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II. Research origin descriptors

A. Overall project description

1. Identity

We compiled data on the alien plant species naturalised in the arid southeast of the Iberian Peninsula and conducted the Australian and New Zealand Weed Risk Assessment (AWRA) (Pheloung et al. 1999) for each one of them. We also provide data on their botanical family and their time of entry (archaeophytes or neophytes *sensu* Richardson et al. (2000)), the known geographical coordinates where they are recorded in the wild and the bibliographic sources from which the information was obtained to answer the AWRA questions.

2. Originators

Javier Cabello and María J. Salinas-Bonillo conceived the idea, Miguel Cueto led the development of the plant species distribution database, Javier Cabello, Alba Rodríguez-Rodríguez, María J. Salinas-Bonillo and M. Trinidad Torres-García carried out the analyses. Alba Rodríguez-Rodríguez and María J. Salinas-Bonillo reviewed and organised all the databases. Javier Cabello obtained funding. All authors contributed to the writing of the manuscript.

3. Period of study

Data collection and analysis were conducted over the duration of the two projects within which this work was carried out (2021–2023) (See Sources of funding section).

4. Objectives

We mainly aimed to identify and classify potential plant invaders amongst the naturalised alien plant species in the arid south-eastern of the Iberian Peninsula by applying the AWRA test. The specific objectives were: i) to list naturalised alien taxa in the study area, ii) to identify and classify species according to their invasive potential, iii) to document traits that contributing to their invasiveness and iv) to provide their known geographical coordinates to contribute to global and local information on hotspots expansion. To ensure transparency and allow verification of the information obtained, we provide the references consulted to answer the test questions. This database of naturalised alien plant species in an arid zone is a useful tool for researchers on biological invasions and for managers engaged in monitoring and managing this environmental problem in these areas.

5. Sources of funding

This work has been performed within the projects “Scientific infrastructures for global change monitoring and adaptation in Andalusia (LIFEWATCH-INDALO)” (LIFEWATCH-2019-04-AMA-01) and “Indicators for monitoring the supply and demand of ecosystem functions and services of the Complementary Research & Development & Innovation Plan of the Biodiversity area (SP4-LiA3)”, both funded by the European Union. This research was also done within the LTSER platform “The Arid Iberian South East LTSER Platform,” Spain (LTER_EU_ES_027).

B. Specific subproject description

1. Site description

The area of study comprises the arid regions of Andalusia, southeast of Spain (36°46'N, 1°40'W to 37°29'N, 3°07'W; 1,220.7 ha, Fig. 1), delimited according

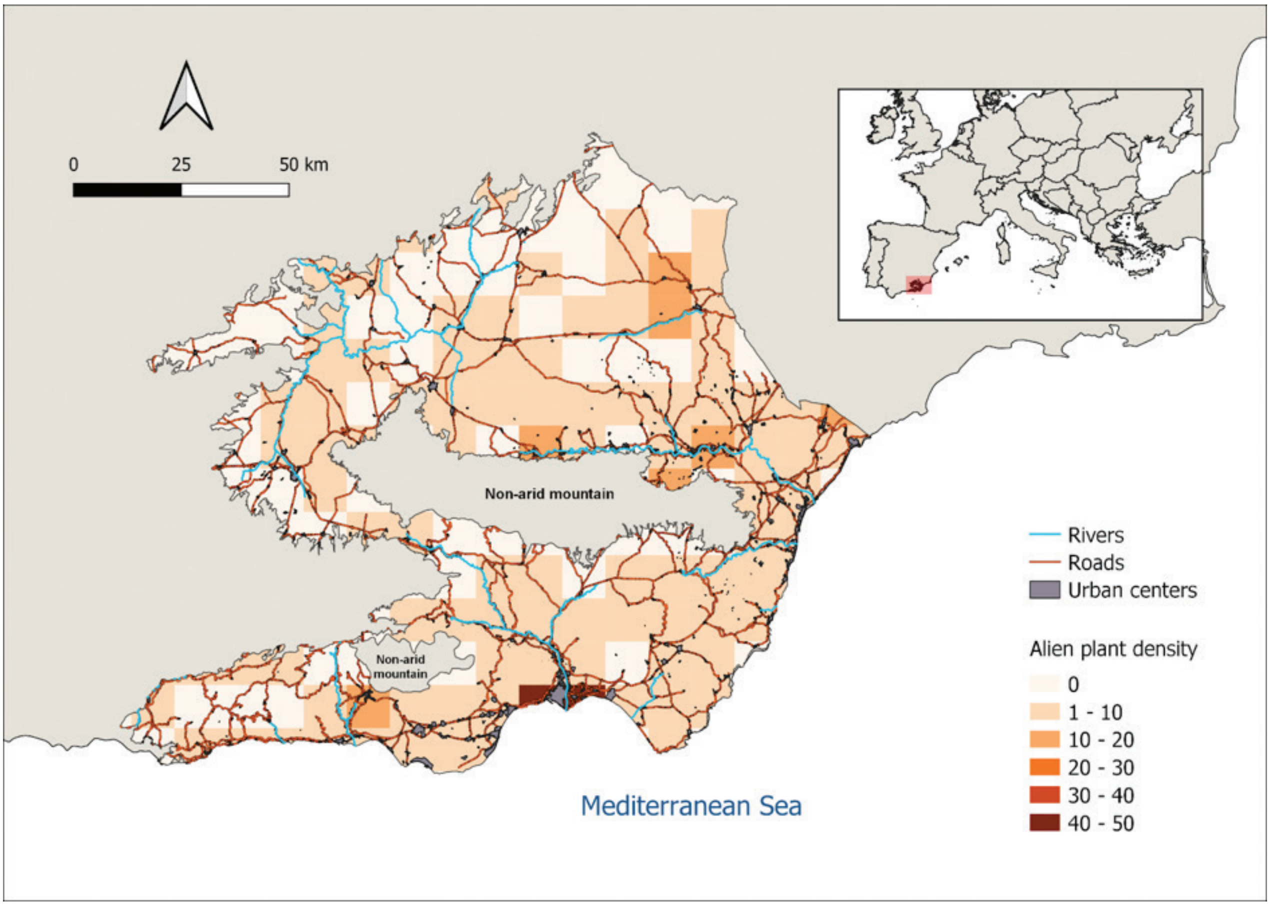

Figure 1. Map of the study area (arid regions of Andalusia, southeast of the Iberian Peninsula) showing the density of alien plant species records.

to the ecoregionalisation map of the Network of Protected Natural Spaces of Andalusia (Montes et al. 1998; Requena-Mullor et al. 2018). The altitudinal gradient ranges from 0 to 2,040 m a.s.l. The predominant climate is warm and dry Mediterranean, with average annual temperatures between 12 and 18 °C and annual rainfall between 200 and 350 mm, although in some areas it can be lower (Armas et al. 2011). The geology is diverse, with many rock types such as gypsum, limestone, marl, phyllite, quartzite, schist and volcanic rocks (Armas et al. 2011; Alcaraz 2017). The climate favours soils with high $CaCO_3$ concentrations, low organic matter and nutrient contents, reduced aggregate stability and low water retention capacity (Armas et al. 2011; Alcaraz 2017). The most frequent vegetation types are high scrublands and scattered low scrublands and perennial grasslands with *Macrochloa tenacissima* (L.) Kunth as a common species (Cabello et al. 2012; Alcaraz 2017). In addition, the mountainous areas in arid Andalusia host evergreen forests of *Quercus* spp. and reforestations of *Pinus* spp. There is a contrasting riparian vegetation, from the source of the watercourses (mainly deciduous trees) to their mouths (with evergreen shrubs and tall halophytes as dominant species) (Salinas et al. 2000a, b; Salinas and Casas 2007; Alcaraz 2017). Despite its arid nature, this region harbours high levels of biodiversity, with numerous endemic species and habitats of conservation concern at European levels (Armas et al. 2011; Sánchez-Piñero et al. 2011; Mendoza-Fernández et al. 2014). Most of the economic activities are related to greenhouse horticulture and its parallel industries such as packaging and transport, seed and seedling production or biological control and the tourism and service sectors (Sánchez-Picón et al. 2011; Piquer-Rodríguez et al. 2012;

Requena-Mullor et al. 2018). In particular, the intensification and mechanisation of agriculture contributed greatly to the increase in population (Aznar-Sánchez et al. 2011; Quintas-Soriano et al. 2016), which, together with urban development, especially in coastal zones, made this area one of the most transformed in Spain (Quintas-Soriano et al. 2016). Parallel to these extensive land transformations of the territory, a simultaneous effort has been made to protect natural areas with remarkable biodiversity, with more than 30 protected areas having been declared in the last decades, with the current percentage of conserved land area standing at 20% (Quintas-Soriano et al. 2016).

2. Research methods

AWRA test

We created the list of alien species naturalised in the study area using the most updated plant database for eastern Andalusia compiled in the Florandor project (Blanca et al. 2009). Florandor involved intensive field plant collection, institutional herbarium data collection and species identification in which botanists from four Spanish universities in south-eastern Andalusia worked. Then we implemented the AWRA test (Pheloung et al. 1999) to all taxa in the list, consisting of 49 questions divided into three sections related to biography, undesirable attributes and biology/ecology. To answer the questions, we followed the Gordon et al. (2010) guidelines and used references about regional flora and invaders and several online resources (see AWRAridSpain_dic_references.csv). We classified each taxon according to its AWRA score. The scoring system classifies the analysed taxa in three groups according to recommendations for the entrance of the alien plant to the country (Pheloung et al. 1999): “reject” for taxa with a score higher than 6, “accept” for taxa with scores lower than 1 and “evaluate” for taxa with a score between 1 and 6, as they would require further evaluation. According to our objective, we considered the “reject” taxa as the “potential invaders”. Given that the time elapsed since the arrival of a species in a territory (i.e. residence time status, Pyšek et al. (2012)) influences the expansion and invasive behaviour (Pyšek et al. 2004, 2005), we differentiated allochthonous plants introduced by humans in prehistoric times (i.e. archaeophytes) from those that arrived recently (i.e. neophytes). In Europe, these terms refer to taxa introduced before or after 1492, respectively (Richardson et al. 2000).

Despite the fact that we could have answered the minimum questions required by Pheloung et al. (1999) for each species, we tried to answer as many as possible if enough information were available (Table 2). However, when we had insufficient information, we introduced “NA” (not answered, see section IV, A, 6. Special characters/fields). We answered a minimum of 20 questions for each taxon and a maximum of 42, with 33.2 ± 6.0 responses on average (± standard deviation). For all taxa, we answered more than the minimum number of questions required for each section: 4 from sections A (Biogeography) and B (Undesirable attributes) and 8 from section C (Biology/ecology). Regarding the topic, the mean number of questions answered per taxon was: 5.4 ± 1.5 (out of 8), 7.6 ± 1.8 (out of 10) and 17.7 ± 3.3 (out of 28) for the Agricultural, Environmental and Combined questions, respectively.

Table 2. The minimum, maximum and mean number of questions answered for each taxon according to section, topic and total. SD: Standard deviation.

	Section			Topic			Total
	A	B	C	Agricultural	Environmental	Combined	
Minimum	4	4	8	2	3	10	20
Maximum	13	12	21	8	10	24	42
Mean ± SD	9.4 ± 2.2	8.3 ± 1.8	15.4 ± 3.1	5.4 ± 1.5	7.6 ± 1.8	17.7 ± 3.3	33.2 ± 6.0

For questions 2.01 and 2.02, we scored "2", as Gordon et al. (2010) recommended when no climate analysis is performed. This explains why we did not add a reference for these questions ("NR", not reference, see section IV, A, 6. Special characters/fields).

We added "not evidenced" in the reference field for questions answered with "no" when there is no evidence for the affirmative ("yes") answer in the literature, for example, Question 5.01 (Aquatic) for terrestrial species and that fact is not specified in the literature.

We registered and evaluated 177 taxa of alien naturalised species in the study area. Some 64.4% of the taxa could be considered potential invaders, 9.6% could be regarded as harmless taxa, and 26.0% would need further evaluation (Table 3).

Table 3. Total number and percentage of the outcomes obtained for the 177 taxa analysed.

Outcome	Accept (<1)	Evaluate (1–6)	Reject (>6)
Total number	17	46	114
%	9.6	26.0	64.4

Spatial distribution of alien species

We used the geographic coordinate data from the Florandor project (Blanca et al. 2009) to construct a geographical coordinate database and a density map of the records of alien species in the study area (Fig. 1). We made this map from the vector layer of record points using the "Density Analysis" plugin (ID 2717) in QGIS 3.22.7. We used a cell size of 10 × 10 km and divided the cells into six classes of equal intervals (except for the zero class).

3. Project personnel

María J. Salinas-Bonillo[1,2], Alba Rodríguez-Rodríguez[2], M. Trinidad Torres-García[1,2], Miguel Cueto[1,3], Javier Cabello[1,2]

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III. Data-set status and accessibility

A. Status

1. Latest update

02/04/2024.

2. Metadata status

The metadata were last revised and updated on 2 April 2024.

3. Data verification

We checked exhaustively the data before publication. The plant species names were cross-checked with the Blanca et al. (2009) flora guide. We have also corrected some of coordinates and descriptions of the species locations and converted UTM coordinates to geographic coordinates.

B. Accessibility

1. Storage location and medium

The data-set is available on the Zenodo repository (DOI: 10.5281/zenodo.10790372) under a Creative Commons Attribution 4.0 International Licence (CC-BY 4.0).

2. Contact persons

María J. Salinas-Bonillo: mjsalina@ual.es
Javier Cabello: jcabello@ual.es

3. Copyright restrictions

This data-set can be freely used for non-commercial purposes.

4. Proprietary restrictions

This data-set is licensed under a Creative Commons Attribution 4.0 International Licence (CC-BY 4.0). We request that users of these data cite this data paper in any publications resulting from its use. The authors are available for consultations about and collaborations involving the data.

IV. Data structural descriptors

A. Data-set file

1. Identity

Since we provided data from different entities with the application of the AWRA test, we structured the dataset in a relational database consisting of five linked tables (Fig. 2).

a. AWRAridSpain_dic_taxa
b. AWRAridSpain_dic_questions
c. AWRAridSpain_dic_references
d. AWRAridSpain_answers
e. AWRAridSpain_species_location

2. Size

a. AWRAridSpain_dic_taxa: 177 rows (excluding the header), 8 columns, 15.9 kbytes.
b. AWRAridSpain_dic_questions: 49 rows (excluding the header), 4 columns, 2.3 kbytes.
c. AWRAridSpain_dic_references: 217 rows (excluding the header), 2 columns, 48.4 kbytes.
d. AWRAridSpain_answers: 8,673 rows (excluding the header), 5 columns, 233.9 kbytes.
e. AWRAridSpain_species_location: 512 rows (excluding the header), 6 columns, 69.34 kbytes.

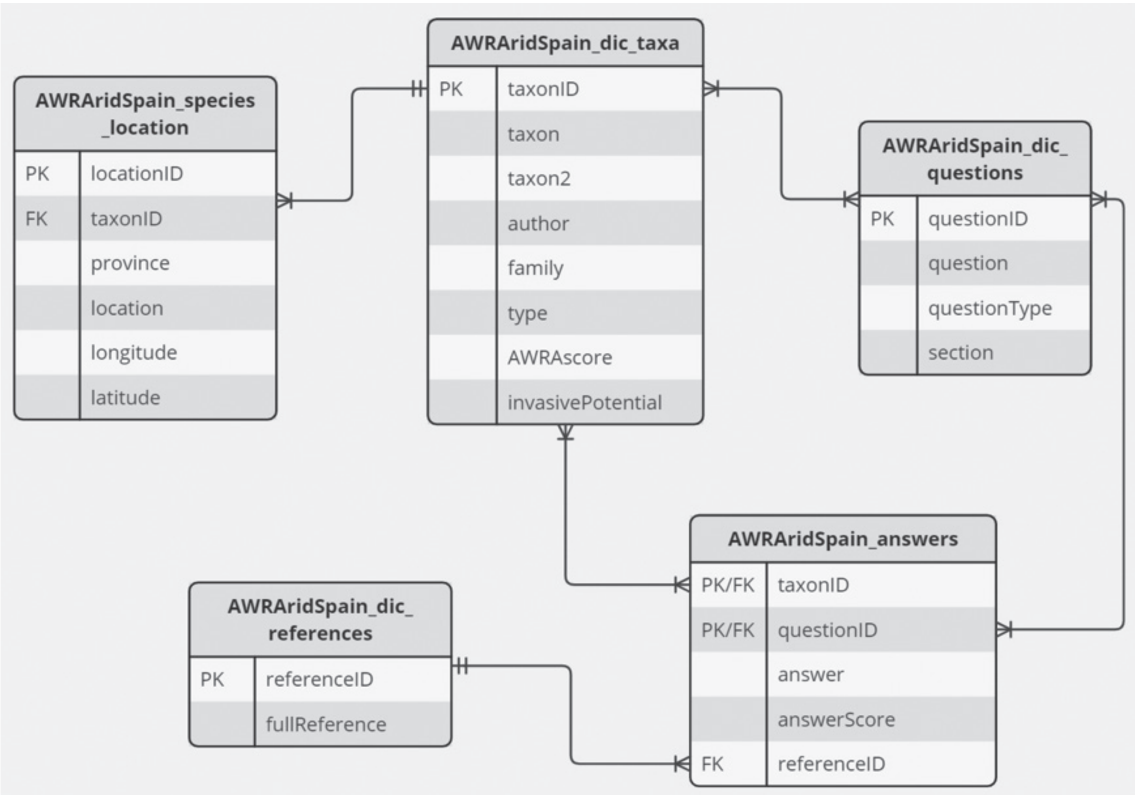

Figure 2. Scheme showing the structure of the AWRAridSpain database model. PK and FK stand for primary key and foreign key, respectively. PK is the unique identifier of each table and the FK refers to the primary key of a different table, which links the two tables.

3. Format and storage mode

The five tables are available as semicolon-separated values (.csv) files and the vector layer including the geographical location of the species in the study area (see Related materials below) as shapefile format (.shp). All the files are compressed as a one zip Archive (.zip).

We created the semicolon-separated values (.csv) files with UTF-8 code as follows:

1. First, we saved our excel (.xlsx) files as unicode plain text (.txt) files.
2. Then, we replaced "tabs" with "semicolon".
3. Finally, we saved the unicode plain text (.txt) files as semicolon-separated values (.csv) with UTF-8 code.

4. Header information

a. AWRAridSpain_dic_taxa: See Table 4.
b. AWRAridSpain_dic_questions: See Table 5.
c. AWRAridSpain_dic_references: See Table 6.
d. AWRAridSpain_answers: See Table 7.
e. AWRAridSpain_species_location: See Table 8.

5. Special characters/fields

"NA (not answered)" indicates that the question was not answered in the AWRAridSpain_answers table.

"NR (no reference)" indicates that the question does not need a source, in the AWRAridSpain_answers table.

"NT (no questionType)" indicates that the question does not belong to any type, in the AWRAridSpain_dic_questions table.

B. Variable information

Table 4. Header information of "AWRAridSpain_dic_taxa.csv".

Field name	Definition	Values range (minimum, maximum)
taxonID	Unique identifier of the taxon	1–177
taxon	Taxon name with author names	–
taxon2	Parts of the taxon name separated by an underscore and without authors' names	–
author	Authorship information for the taxon name	–
family	Scientific name of the family in which the taxon is classified	–
type	Neophyte vs. Archaeophyte	–
AWRAscore	Score obtained for the taxon in the AWRA test	-6–31
invasivePotential	Invasive potential of the taxon based on the recommendation given by the score: Reject vs. Evaluate vs. Accept (see the Research Methods section)	–

Table 5. Header information of "AWRAridSpain_dic_questions.csv".

Field name	Definition	Values range (minimum, maximum)
questionID	Unique identifier of the question. We used the same number as in Pheloung et al. (1999)	1.01–8.05
question	The full question as in Pheloung et al. (1999)	–
questionType	Question type according to Pheloung et al. (1999): A (Agricultural) vs. E (Environmental) vs. C (Combined). NT = no questionType	–
section	Section to which question belongs according to Pheloung et al. (1999): A (Biogeography) vs. B (Undesirable attributes) vs. C (Biology/ecology)	–

Table 6. Header information of "AWRAridSpain_dic_references.csv".

Field name	Definition
referenceID	Unique identifier of the reference consisting of the short name of the resource (paper or website) where the answer to the question was found.
fullReference	Full name of the resource (paper or website) where the answer to the question was found.

Table 7. Header information of "AWRAridSpain_answers.csv".

Field name	Definition	Values range (minimum, maximum)
taxonID	Unique identifier of the taxon	1–177
questionID	Unique identifier of the question. We used the same number as in Pheloung et al. (1999)	1.01–8.05
answer	The answer given to the question: N (No) vs. Y (Yes). NA = Not answered.	–
answerScore	Score given to each answer. NA = Not answered.	-3–4
referenceID	Unique identifier of the reference consisting of the bibliographic source consulted to provide the answer. NA = Not answered.	–

Table 8. Header information of "AWRAridSpain_species_location.csv".

Field name	Definition	Values range (minimum, maximum)
locationID	Unique identifier of the species location point	1–512
taxonID	Unique identifier of the taxon	1–177
province	Province of the location point	–
location	Description of the location point place	–
longitude	Longitude of the species location point (EPSG:4326 - WGS 84) in degrees, minutes and seconds (DMS)	–
latitude	Latitude of the species location point (EPSG:4326 - WGS 84) in degrees, minutes and seconds (DMS)	–

V. Supplemental descriptors

A. Data acquisition

1. Data forms or acquisition methods

All the fields were taken directly on Excel sheets.

2. Data entry verification procedures

We revised our list of taxa so that the names matched those in the Florandor project (Blanca et al. 2009). We also revised the coordinates of the species location.

B. Related materials

We accompanied the dataset with a vector layer containing the georeferenced location points of the alien plant species, in shapefile format (.shp).

C. Computer programmes and data-processing algorithms

We used the Free and Open Source Software QGIS 3.22.7 to create the vector layer of the alien species record points, obtain the geographic coordinates in degrees, minutes and seconds and create the map in Fig. 1.

We employed the online app MIRO (https://miro.com/) to create the database model schema in Fig. 2.

D. Archiving

1. Archival procedures

The data-set will be permanently archived in the ZENODO repository specified above.

E. Publications and results

These data have helped the team to prioritise some studies on harmful invasive plant species in the southeast Iberian Peninsula.

Rubio-Ríos J, Pérez J, Fenoy E, Salinas-Bonillo, MJ Casas, JJ (2023) Cross-species coprophagy in small stream detritivores counteracts low-quality litter: native versus invasive plant litter. Aquatic Sciences 85: 8. https://doi.org/10.1007/s00027-022-00905-z

Salinas-Bonillo MJ, López-Escoriza A, Cabello-Piñar J (2012) Expansion of the invasive plant species *Pennisetum setaceum* (Forssk.) Chiov in arid and semi-arid areas of eastern Andalusia (province of Almería). Technical report of the Programme for monitoring the effects of global change in arid and semi-arid areas of eastern Andalusia (GLOCHARID) 852/09/M/00 (2012). Natural Heritage, Biodiversity and Global Change Foundation, Almeria, Spain.

Salinas-Bonillo MJ, Torres-García MT, Paniagua MM, Sánchez MM, Cabello J (2023) Clonal mechanisms that matter in *Agave fourcroydes* and *A. sisalana* invasions in drylands: implications for their management. Management of Biological Invasions 14(1): 80–97. https://doi.org/10.3391/mbi.2023.14.1

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Funding

This work has been performed within the projects “Scientific infrastructures for global change monitoring and adaptation in Andalusia (LIFEWATCH-INDALO)” (LIFEWATCH-2019-04-AMA-01), and “Indicators for monitoring the supply and demand of ecosystem functions and services of the Complementary Research & Development & Innovation Plan of the Biodiversity area (SP4-LiA3)”, both funded by the European Union.

Author contributions

Javier Cabello and María J. Salinas-Bonillo conceived the idea, Miguel Cueto led the development of the plant species distribution database, Javier Cabello, Alba Rodríguez-Rodríguez, María J. Salinas-Bonillo, and M. Trinidad Torres-García carried out the analyses. Alba Rodríguez-Rodríguez and

María J. Salinas-Bonillo reviewed and organised all the databases. Javier Cabello obtained funding. All authors contributed to the writing of the manuscript.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

AWRAridSpain_dic_taxa

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: csv

Explanation note: Semicolon-separated values (CSV) text file containing the record of the 177 species of alien plants naturalized in the study area indicating: scientific name, authorship, family and time of entry (archaeophytes or neophytes sensu Richardson et al. 2000, see main text file for complete bibliographic reference), the score obtained by each taxon in the AWRA test and the invasive potential of each taxon according to the recommendation given by the score: Reject vs Evaluate vs Accept (see Research Methods section in the main text file).

Link: https://doi.org/10.3897/neobiota.96.136154.suppl1

Supplementary material 2

AWRAridSpain_dic_questions

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: csv

Explanation note: Semicolon-separated values (CSV) text file containing the AWRA test questions indicating: the complete question according to Pheloung et al. (1999), see main text file for full bibliographic reference), the type of question (A, Agricultural, E, Environmental, C, Combined) or NT (no type) and the Section to which the question belongs according to Pheloung et al. (1999): (A, Biogeography, B, Undesirable attributes, C, Biology/ecology).

Link: https://doi.org/10.3897/neobiota.96.136154.suppl2

Supplementary material 3

AWRAridSpain_dic_references

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: csv

Explanation note: Semicolon-separated values (CSV) text file containing the resources (articles or websites) in which each answer to the question has been found for each species, indicating a unique reference identifier consisting of an abbreviated name, in addition to the full reference.

Link: https://doi.org/10.3897/neobiota.96.136154.suppl3

Supplementary material 4

AWRAridSpain_answers

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: csv

Explanation note: Semicolon-separated values (CSV) text file containing the scores of the questions answered by each species and the bibliographic sources consulted to provide the answer.

Link: https://doi.org/10.3897/neobiota.96.136154.suppl4

Supplementary material 5

AWRAridSpain_species_location

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: csv

Explanation note: Semicolon-separated values (CSV) text file containing the geographic location where the alien plant species have been recorded in the study area, indicating the province, the location point and the geographic coordinates (longitude and latitude in the spatial reference system EPSG:4326-WGS 84) in degrees, minutes and seconds.

Link: https://doi.org/10.3897/neobiota.96.136154.suppl5

Supplementary material 6

Shapefile location

Authors: María J. Salinas-Bonillo, Alba Rodríguez-Rodríguez, M. Trinidad Torres-García, Miguel Cueto, Javier Cabello

Data type: zip

Explanation note: Dataset with a vector layer containing the georeferenced location points of the alien plant species, in shapefile format (.shp).

Link: https://doi.org/10.3897/neobiota.96.136154.suppl6