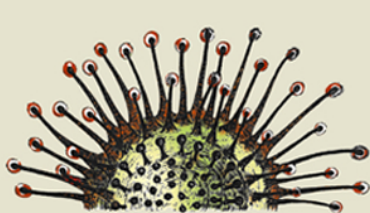


Bulletin No. 2

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LIFE · TREMEDAL11 Nat/Esl/707

**Inland Wetlands North of the Iberian Peninsula:
Management and restoration of peatlands and wet environments.**



Vega de Comeya (Picos de Europa)

COLLECTION OF GERMLASM FOR RESTORATION

Conservation action carried out at the Plant Germplasm Bank at the Atlantic Botanical Gardens in Gijón in order to produce species that live in peatlands and other wet environments to use as part of restoration actions at the sites covered by the project.



Universidad de Oviedo



The **LIFE+TREMEDAL** project aims to enhance the conservation status of peatland and wet habitats of Community interest (included in the Natura 2000 network) at 25 sites in the north of the Iberian Peninsula in Galicia, Asturias, Castile and Leon, the Basque Country and Navarre.



Different bodies and institutions from these Atlantic regions work on site to guarantee the conservation of the habitats and species on which the project focuses through inventories, studies and restoration projects. TREMEDAL also includes a transversal action in which all the partners take part, **“Collection, storage and conservation of germplasm”**.

This off-site conservation action involves collecting the seeds (or cuttings) of peatland plants and plants from other wet environments from different locations within the geographical scope of the project and storing, conserving, germinating and cultivating them in the **Plant Germplasm Bank (BG) at the Atlantic Botanical Garden (JBA) in Gijón**.



The BG works as part of the JBA’s Conservation Programme, developed within the frameworks of the Convention on Biological Diversity, the Global Strategy for Plant Conservation and the European Plant Conservation Strategy.

Through the BG, the Atlantic Botanical Garden carries out research into the biology and conservation of the seeds of species of interest for conservation, mainly endangered plants and structural plants key to endangered habitats, both in Asturias and northern Spain’s entire Atlantic region.

Thanks to this action, plants should be available to **LIFE TREMEDAL** for use as part of its proposed restoration work and any back-up work that may be required in the medium-to-long term to ensure the conservation of the habitats and species it focuses on.

Off-site conservation is one of the chief tools for the conservation of plant diversity as it aims to store and safeguard species in order to prevent their disappearance.



Collection, storage and conservation of germplasm

The collection and conservation of seeds at the Germplasm Bank is a transversal action in the TREMEDAL project related to a number of the specific conservation actions to be implemented at the different sites. It consists of the following stages:

1) **Collection of germplasm**, which is being performed according to the recommendations of the main manuals on collecting wild germplasm (Conservación *ex situ* de flora silvestre, Bacchetta et al 2008).

2) **Seed treatment and conservation**, carefully cleaning and drying the seeds, and refrigerating them in conditions of minimum humidity.

3) **Germination and cultivation**. Germination tests are performed through an experiment based on previous studies of species from wet areas. The germinated seeds are then taken to the nursery for cultivation.



I Assessment prior to seed collection

Prior to these actions and in order to perform them properly, a **CHARACTERISATION OF TAXA** was produced providing morphological, ecological, biological and chorological information on the **20 peatland and wet environment species** from which the project considers it necessary to collect genetic material (seeds and propagules) and proceed to cold storage and conservation



Long-term seed conservation cabinets



Seeds sown in Petri dishes

All the literature on the subject has been **reviewed and compiled**, selecting those documentary sources providing the most detailed, up-to-date information, in order to have access to the most accurate information on the species in question

This LIFE TREMEDAL action is being performed by the University of Oviedo's Institute of Natural Resources and Land-use Planning (INDUROT), some members of which form part of the Atlantic Botanical Garden's Scientific Team.

Intensive collection campaigns have been organised since the summer of 2013 in collaboration with the TREMEDAL teams from the other territories and most of the reproductive material of the 20 target species has been gathered. This material is being used to produce the germination protocols and perform the relevant germination tests, which may take until early 2015 depending on the results obtained.

This bulletin summarises how this action is being approached and implemented. For more details, see www.lifetremedal.eu



Target species of the “Collection, storage and conservation of germplasm” action.



Carex davalliana Sm.

Distribution on the Iberian Peninsula: mountain systems in the northern half of the peninsula.

Blooming period: June to August



Carex echinata
J.A. Murray

Distribution on the Iberian Peninsula: mountain systems in the northern half of the peninsula and Sierra Nevada.

Blooming period: June to August



Carex hostiana DC.

Distribution on the Iberian Peninsula: isolated places in the north

Blooming period: May to June



Carex lepidocarpa
Tausch

Distribution on the Iberian Peninsula: eastern half of the peninsula and Cantabrian mountains

Blooming period: May to June



Drosera intermedia
Hayne

Distribution on the Iberian Peninsula: Bay of Biscay and Atlantic seaboard to Estremadura in Portugal

Blooming period: July to August



Drosera rotundifolia L.

Distribution on the Iberian Peninsula: north, centre and Sierra Nevada

Blooming period: June to August



Equisetum variegatum
Schleicher

Distribution on the Iberian Peninsula: Cantabrian Mountains and the Pyrenees

Blooming period: July to August



Eriophorum angustifolium Honck.

Distribution on the Iberian Peninsula: north and isolated populations in the Central System

Blooming period: May to June



Eryngium viviparum
J. Gay

Distribution on the Iberian Peninsula: inland areas of Lugo and in Ourense, Sanabria and the centre of the province of Leon

Blooming period: June to September



Juncus balticus subsp.
cantabricus Snogerup

Distribution on the Iberian Peninsula: endemic to the Cantabrian region, present in Somiedo, Peña Ubiña and Vega de Liordes

Blooming period: June to September



Narcissus pseudonarcissus subsp. ***nobilis*** (Haw.) A.Fern.

Distribution on the Iberian Peninsula: north of Portugal, north-western and central-northern Spain

Blooming period: March to May



Rhynchospora fusca (L.) W.T. Aiton

Distribution on the Iberian Peninsula: 6 sites in Alava, Navarre and Asturias

Blooming period: May to August



Narthecium ossifragum (L.) Hudson

Distribution on the Iberian Peninsula: north

Blooming period: July to August



Salix hastata subsp. ***picoeuropeana*** (M.Lainz)

Distribution on the Iberian Peninsula: endemic to the Cantabrian region, originally cited in Vega de Liordes and later in Picos de Europa

Blooming period: June to July



Parnassia palustris L.

Distribution on the Iberian Peninsula: northern half of the peninsula and mountains in the south

Blooming period: July to October



Spiranthes aestivalis (Poir.) Rich.

Distribution on the Iberian Peninsula: disperse, most frequently found in the north and west

Blooming period: June to August



Pedicularis mixta Gren.

Distribution on the Iberian Peninsula: Pyrenees and Cantabrian Mountains

Blooming period: June to August



Swertia perennis L.

Distribution on the Iberian Peninsula: Pyrenees and Cantabrian Mountains, and occasionally in the Central and Iberian Systems

Blooming period: August to September



Potentilla fruticosa L.

Distribution on the Iberian Peninsula: locally in the Pyrenean-Cantabrian system

Blooming period: July to September



Triglochin palustris L.

Distribution on the Iberian Peninsula: north and centre

Blooming period: June to September

See the complete files on these species on the project website.



Collection of germplasm

Once familiar with the characteristics of the species and following the procedures set out in the main manuals on collecting wild germplasm, the sample collection process got under way on the basis of three basic principles:

- 1) the QUALITY of the samples in terms of both quantity of germplasm and viability.
- 2) the genetic and geographical REPRESENTATIVENESS of the germplasm. In order to do this, germplasm is collected from all possible individuals belonging to each population, removing only part of the material from each individual. Material is also collected from the same population in different years.
- 3) In situ CONSERVATION of the donor populations. The sizes of the populations and the possibility of obtaining sufficiently large samples without harming them are taken into consideration.



Collecting *Narcissus pseudonarcissus* subsp. *nobilis* seeds at the SCI Parga-Ladra-Támoga (Lugo).

Field visits need to be well planned in order to decide when and where to collect material; when finding mature seeds or suitable vegetative material is more likely, always guaranteeing the conservation of the donor population.

Cuttings have been collected for 3 of the 20 species: *Equisetum variegatum* and *Salix hastatella* subsp. *picoeuropeana*, as planned, and *Potentilla fruticosa*, the decision to take cuttings being made as the project developed.

Juncus balticus subsp. *cantabricus* rhizome samples have been taken for reproduction (photo on the right) and, given the difficulty of reproducing *Rhynchospora fusca* from seed, turf samples have been taken for this species for reproduction purposes.



The details of each collection are recorded on a standard form used by the JBA, listing the names of the collectors, date, name and coordinates of the locality, description of the habitat and the material collected.

Colect.	Adm.	Colect. Reg.	UB	Autonomía	Localidad	Profundidad	UB	Localización
17983-01	1	17983-01	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-02	1	17983-02	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-03	1	17983-03	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-04	1	17983-04	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-05	1	17983-05	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-06	1	17983-06	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-07	1	17983-07	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-08	1	17983-08	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-09	1	17983-09	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04
17983-10	1	17983-10	000000	00	Sierra de Guadalupe (Pinar del Río)	0,2-0,5	0078	04

The information on collection is also registered in the input section of the Iberian-Macaronesian Association of Botanical Gardens' online data base, Babilonia (<http://www.aimjb.net/index.php>).

Seed treatment and conservation

It is essential to carefully dry and clean the seeds in order to continue with the germination and cultivation tests for the different species whose seeds have been collected.

High humidity (typical of this project's collection areas) drastically reduces the viability of the seeds, so the material collected is first **PRE-DRIED**.

The germplasm is dry-stored immediately after collection. This consists of inserting it in airtight containers with silica gel as soon as it arrives at the JBA, maintaining pre-drying conditions of c. 20% RH before it is cleaned, which is always carried out as soon as possible.



Hermetic pre-drying container



Hygrometer to monitor the humidity of the samples

The seeds remain in the pre-drying containers for an average of 21 days and then move on to the **CLEANING** stage, in which plant debris and other impurities are removed.

The cleaning method depends on the characteristics of each species. It starts with a visual inspection to remove larger debris and then, depending on each case, sieves, magnetic stirrers, seed blowers or other systems are used.



Drying airtight container

The clean seeds are then **PACKED and CONSERVED**. They are inserted in envelopes marked with the relevant code and stored in an airtight drying cabinet at 21° C and 15% RH. They remain there for an average of 15 weeks until their relative humidity (RH) stabilises at 15 %.

The seeds are then packed and inserted in duly identified, glass, screw-top tubes. These are considered collected germplasm specimens and are included in the Babilonia data base as such.

The tubes are inserted in glass jars with hermetic seals, together with a quantity of silica gel, and are placed in the JBA's freezer cabinets in order to ensure their long-term conservation (at -13°C).



Long-term seed conservation cabinets (-13°C, 15% RH)

Germination and cultivation

A general experiment based on previous studies on the germination of species from wet environments has been designed for the **GERMINATION** stage.

According to these studies, these species need both light and alternating day/night temperatures. Physiological dormancy has also been observed, so it was decided that the seeds should be pre-treated by means of cold moist stratification in the dark.

In order to determine the germination temperature, a wide range was chosen on the basis of the literature and field temperatures in spring and summer, together with a period of extreme heat which would seem to encourage germination in many wetland species.

The **germination experiment**, therefore, involves two factors:

- Pre-treatment (2 levels): with fresh, recently collected seeds and with seeds stratified for 12 weeks.
- Germination thermoperiod (3 levels): 30/20°C; 22/12°C; 14/4°C.

Incubation lasts 4 weeks and, once germinated, growing tests are performed on the seeds.

Finally, in order to determine the optimum germination conditions for each species, the final germination percentages are analysed using different models.

For the final **CULTIVATION** stage, the fact that the plants to produce come from 3 distinct origins needs to be taken into account: seeds germinated in the tests and taken to the nursery, seeds germinated in seedbeds and material collected in the field for vegetative reproduction.

The seedlings from seeds stay in the seedbeds for 1 to 2 months and, when they reach a suitable size, are planted out in individual containers and are then grown on terraces.

The vegetatively reproduced species go straight from the field to the terraces.



Germination incubation is conducted in growth chambers like those shown in the picture



Petri dishes with 1% agar and sealed with paraffin, used as substratum



Germinated *Drosera rotundifolia* seeds



The terraces collect rain water and allow the species to grow in conditions similar to those found in nature



JBA's seedbeds

Rhynchospora fusca plants growing in a chamber

To find out more...

about how the project is coming along, the news in brief from each territory...

In Navarre

The Arxuri (Baztan) and Jauregiaroztegi (Auritz-Burguete) sites, included in LIFE TREMEDAL, now form part of the **Natura 2000 network**.

The peatland of Arxuri forms part of the Special Area of Conservation (SAC) *Orabidea Brook* and both the peatland of Arxuri and Jauregiaroztegi form part of the SAC *River system of the Rivers Irati, Urrobi and Erro*.

They were designated in June and July by Navarrese Decree and the relevant Management Plans have been approved.

Navarre has declared 19 SACs to date, covering a total surface area of 93,313 hectares.



On the 30th of May, some thirty people, project technical officers and local residents alike, visited the peatland of Anue.

Within the framework of the COLLECTION, STORAGE AND CONSERVATION OF GERMPLASM action, the seeds of the following three species have been collected:

- *Rhynchospora fusca*
- *Spiranthes aestivalis*
- *Carex hostiana*

This work was performed in collaboration with the Ronda del Bidasoa rangers and the Botanical Garden of Gijón.

The characterisation studies of the peat deposits included in the TREMEDAL project are coming up with new, surprising information on their depths and dimensions.

We will let you know in the next Bulletin.

In the Basque Country

Actions to control exotic species in the Lake of Arreo – Caicedo de Yuso get under way. The monitoring of signal crayfish and allochthonous fish started in spring 2014. These populations are expected to grow until autumn 2014 and again throughout 2015. 50 pots have been laid and baited to catch crayfish; these are checked every day. Different techniques are used for the fish, the most effective of which is electro-fishing, although longlines, demersal towed gear and trammel nets are also used.

Until the 5th of September, slightly more than 25,000 red swamp crayfish, some 760 kilograms, were removed from the lake over 61 days. As for fish, four 3-day fishing sessions have been held to date and 5,545 fish belonging to four different species have been removed from the lake: Common carp (*Cyprinus carpio*), Mirror carp (*Cyprinus carpio specularis*), Common sunfish (*Lepomis gibbosus*) and Largemouth-bass (*Micropterus salmoides*), weighing a total of 550 kg.





The Institute of Agricultural Biodiversity and Rural Development (Ibader) continues to perform LIFE TREMEDAL project actions in Galicia. Work to install the project information panels at all the Galician sites was completed in May. The design was agreed on by all the members of the TREMEDAL project and the contents were produced by IBADER staff.

Grupo Tragsa erected the panels, which can be found in the following Terra Chá wetlands: the Wetland of Cospeito, Ollos de Begonte and the Island of San Roque.

Ibader gives a course on the management and conservation of inland wetlands

On the 14th, 15th and 16th of July, the Institute of Agricultural Biodiversity and Rural Development (Ibader) held a University of Santiago de Compostela summer course on “Management and Conservation of Inland Wetlands in the Framework of the EU’s Strategy on Biodiversity”.

The course formed part of the LIFE+ TREMEDAL project’s dissemination, educational and technical training actions, and focused on the conservation of inland wetlands, mainly in the north of the Iberian Peninsula. The aim of the course was to familiarise the public with a diagnosis of the current state of habitats of this kind, centring on those at greater risk of disappearing or deteriorating, peatlands and wet environments, and to present specific conservation actions to guarantee their ecological worth and make their importance more widely known.



The LIFE TREMEDAL project works with the Conservatoire Brest to help conserve *Eryngium viviparum*

The Conservatoire Botanique National de Brest (Brittany, France) is implementing the 2012-2017 National Action Plan to help conserve *Eryngium viviparum* J. Gay, which includes a comparative study of the only known population in France and all the other populations found in Europe, characterisation of the genetic makeup of the population of the species and studies on *Eryngium viviparum*’s methods of reproduction and dispersion.



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Improvement of the wet habitats at the Galician sites in August

LIFE TREMEDAL project actions were carried out at two Galician sites, the Island of San Roque (Rábade and Outeiro de Rei) and Ollos de Begonte (Begonte), in August and September. Work was performed on different habitats of Community interest at these important inland wetlands.



The LIFE TREMEDAL project on Radio CERNA

Radio CERNA devoted a programme to the LIFE TREMEDAL project, which is coordinated in Galicia by IBADER. Radio CERNA is the only Galician radio programme which specialises in the environment and environmentalism. A pioneering radio project, it addresses the environment and culture from a local viewpoint.



Action C5 of the LIFE TREMEDAL project (Infrastructure for livestock management compatible with the habitats) at Vega de Liordes (Posada de Valdeón, Leon) was completed between the end of August and the beginning of September 2014.

Carrying out the project was complicated because Vega de Liordes is located on a high-altitude plane (1840 m) which can only be reached on foot. The material for the work was transported by helicopter and so transportation had to be coordinated with other deliveries in Picos de Europa and it was necessary to wait for favourable weather conditions. The work was finally performed efficiently and without setbacks by the contractor (Diego Díaz-Caneja, Servicios Forestales) between the 17th of August and the 4th of September.

The action consisted of erecting two fences to keep herbivores out and restoring a communal livestock cabin belonging to the Neighbourhood Council of Valdeón as compensation for the loss of pastures due to the fences. The cabin was re-roofed, its interior walls restored and a wooden board was installed for sleeping.

The fences were erected to protect two small areas of alkaline fen (habitat 7230), home to *Salix hastata* subsp *picoeuropeana* (endemic to Picos de Europa, IUCN category Vulnerable) and *Juncus balticus* subsp *cantabricus* (endemic to the Cantabrian region, IUCN category Endangered). A total area covering 1455 m² has been protected.

The development of these fenced-off areas, free from the action of herbivores, compared to adjoining areas where animals still graze is being monitored as part of the LIFE project. The plan is to continue this monitoring work following completion of the project in order to find out more about the relationship between livestock farming and the development of the peatland at this specific location so that suitable management measures can be adopted in order to conserve it better. The areas now fenced off were protected by rudimentary electric fences since the snow thawed in May in order to guarantee relevant data collection in 2014.



To round off the action, an information panel has been erected at the point most usually used to access Vega de Liordes, the Fuente Dé area, from which the signposted path to Vega, the PR-PNPE 25, branches off.

This site receives some 600,000 visitors a year, most of whom go to use the Fuente Dé cable car, one of the National Park's chief tourist attractions, so a lot of people should read the contents of the panel.



Vega de Liordes



The Liordes cabin with its new roof



Fence around the population of *Salix hastata* subsp *picoeuropeana* with information panel



Fencing *Juncus balticus* subsp. *cantabricus*





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