LIFE baccata, Conservation and restoration of mediterranean Taxus baccata woods (9580*) in the Cantabrian Mountains LIFE15 NAT/ES/000790 | 2016-2020

SEPTEMBER 2021





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Castilla y León











Conservation and restoration of mediterranean Taxus baccata woods (9580*) in the Cantabrian Mountains

LIFE15 NAT/ES/000790

Duration

01/09/2016 - 30/09/2021

Coordinating beneficiary

Instituto de Biodiversidade Agraria e Desenvolvemento Rural (IBADER), Universidad de Santiago de Compostela

Associated beneficiaries

Fundación Centro de Servicios y Promoción Forestal y de su Industria

de Castilla y León, Cesefor.

Junta de Castilla y León

Fundación HAZI Fundazioa

Grupo Tragsa

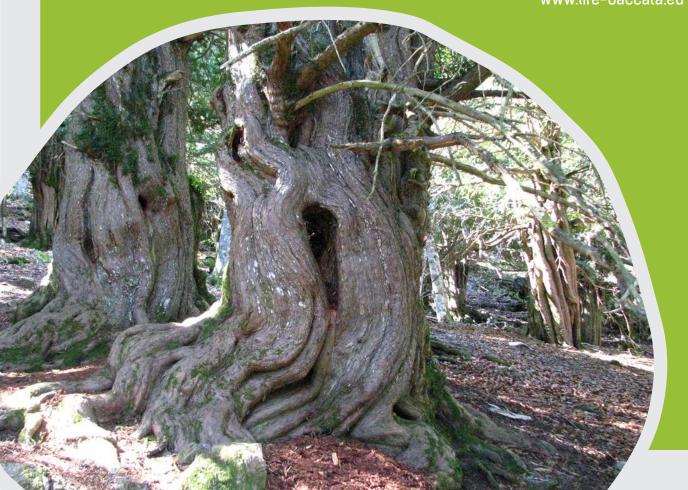
Total budget

1,925,104 €

EU contribution

1,441,649 € (74.89% of total eligible budget)

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LIFE BACCATA

LIFE BACCATA project works for the conservation and restoration of priority habitat priority of Mediterranean yew woods, currently threatened and in regression, in fifteen Natura 2000 areas of the Cantabrian Mountains, belonging to Galicia, Castilla y León, and Basque Country.







2 LIFE BACCATA yew woods

Yew woods are formations dominated by a very unique tree: the European yew (Taxus baccata). Being the yew forests proper habitats, they are frequently inserted within other habitats such as beech forests, mature mixed deciduous forests, birch woods, heathlands, grasslands, or rocky habitats. It is estimated that there are around 1,358 hectares in the study area (956 hectares in Castilla y León, 364 in Euskadi and 38 in Galicia).

European yew (Taxus baccata) is a very long-lived tree with enormous cultural, natural and scientific value. The extraordinary properties of yew wood to make bows and other instruments, as well as its toxicity, have been known since prehistory (the yew is toxic except for the red and fleshy part that surrounds the seed, the aril).

The LIFE BACCATA project covers a wide and rough territory such as the Cantabrian Mountains. To get an idea of their magnitude, it is enough to point out how the distance between the populations characterized and located at both extremes exceeds 400 km. The most natural way to describe the wide area where this habitat extends is by grouping the sampled populations in closely related areas that reflect a certain homogeneity within each of the surveyed provinces.

Starting from west to east, a first group would be the one that surrounds the northwestern mountainous arc of the mountain range, in Ancares, both in Lugo and León, and in O Courel (Lugo). The climatic characteristics, the plasticity of the yew to adapt without problems to different lithologies, the rich existing toponymy related to the species and the known existence of isolated groups in many of the valleys that are present in these mountains lead us to think that the presence of the habitat was much larger than the current one in a not too distant past.







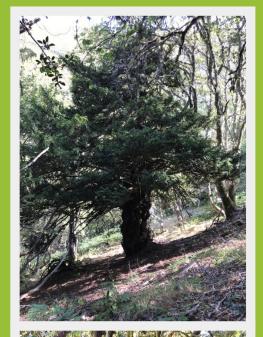




Yew woods in Os Ancares-O Courel SAC (Lugo) on the left, and in Sierra de Ancares SAC (León) on the right

Moving towards the east, the next group would be made up of the formations enclosed in Alto Sil (Palacios del Sil and Laciana). The relief, from El Bierzo to the north, becomes more abrupt, the fluvial modelling is more evident and where yew woods are present, numerous peaks exceed 2,000 m.

Several formations function as corridors where these yew woods of the western Cantabrian mountain range are present, as well as remnant patches formed by extensive and thriving sessile oak and birch groves mixed to different degrees depending on orientation and slope, favoring communication between the different populations. These areas represent one of the most important biodiversity hotspots of the Iberian Peninsula.







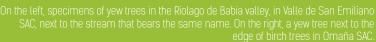


lop pic: view of the Brana de La Selta valley and yew wood embedded in a mixed hardwood forest (oak, birch, holly, rowan, hazel, etc). Below, specimens of yew in Brañarronda, (Rioscuro) and La Seita (Cuevas del Sil), Alto Sil SAC.



Bordering Eastern Laciana the districts of Babia and Luna are present. In spite of their proximity, they present a very different reality from that described so far. Physiography, lithology and uses vary with respect to the previous zones. Secularly, cattle have been the engine of this region; its famous and excellent pastures and its use by native cattle and by huge transhumant herds during the summer, have left their mark on the spatial structure of the territory. Within this matrix certain residual spots of yew are preserved. At Southern Babia and Luna, and at northeastern Bierzo it's possible to find some yew populations within Omaña district, between birch and oak groves.







Opposite the westernmost yew groves, the stands of the central and western mountains of León province are opposed. Here the yew woods usually remain embedded under the canopy of the beech that exhibits its dominance, although there are exceptions such as in Pinar de Lillo, where there is a tiny yew population.

Pictures of Bodón yew wood, in Pontedo, Cármenes, (León), under a canopy of beech trees







The mountains of Palencia show an important representation within the Natural Park of Fuentes Carrionas and Fuente Cobre-Montaña Palentina and the SAC of the same name. The yew woods are, as in the case of the eastern half of León, under beech forests, highlighting the Tosande yew wood, an exceptional formation and surely one of the best in the entire Iberian Peninsula, where numerous unique trees have been identified and catalogued.



éw woods of Tosande (Dehesa de Montejo) and Brañosera Cervera de Pisuerga), Palencia

The province of Burgos, due to its biophysical, biogeographical and ecological conditions, presents great potential for the yew and its habitat. The populations in this part of the Cantabrian Mountains range are abundant, coexisting with beech forests, oak groves, pine forests, masses of lime trees and other broadleaved trees, rocky habitats, etc.



Yew tree on rocky block at Monte Hijedo, Alfoz de Santa Gadea Burgos. Ebro Reservoir – Mount Hijedo SAC.



Yew wood under beech forest in Sarón, Arceo, Burgos. Bosques del Valle de Mena SAC







Yew-lime wood. Montes Obarenes SAC, Burgos

Yews under cluster pine. Sierra de la Tesla-Valdivielso SAC, Burgos

In the yew woods of Gipuzkoa it's possible to distinguish two totally different areas. On one hand, the yew formations in Pagoeta, where the vast majority of habitat manifestations are in the form of groups of young yew trees that are currently expanding. They appear within other native formations or under forest plantations made with exotic species. They are very dynamic yew populations, but with few adult specimens. Their main limitation is competition with other tree species. Some, such as the Lawson cypress or the Douglas fir, notably condition the development of the yew groves.

On the other hand, the Aralar formations have more presence of adult yew trees and some remarkably old ones. But in some areas young or regenerated specimens are missing due to herbivory. These are populations, therefore, less dynamic. They usually appear mixed with beech forest, on limestone areas, although they also form mixed forests of great interest.

The rockiest areas of Aralar, such as Mount Akaitz, are home to the longest-lived specimens.

Probably the scarce land available has prevented competition with other species, and has protected them from recurrent fires.



In Pagoeta, "groves" of young yew trees are abundant under plantations of spruce, Lawson cypress and Douglas fir, as well as in beech forests.



In Aralar, yew forests are usually found on rocky habitats, mixed with beech forests



LIFE BACCATA PROJECT OBJECTIVES

The objective of LIFE BACCATA is to improve the conservation status of the yew woods in the Cantabrian Mountains distributed in the regions of Galicia, Castilla y León and the Basque Country, acting on the indicators of the habitat conservation status: area, structure and functions and future prospects.

HOW?

Developing actions aimed at increasing the area of occupation of the yew woods through forestry actions, elimination of exotic species, cultivation of characteristic species of the habitat and their subsequent planting.

Implementing measures aimed at improving the structure and functions of the habitat with silvicultural works to favour the characteristic species of the habitat and control interspecific competition, reinforcement through plantation of characteristic species and creation of infrastructures for the control of herbivory on the habitat.

Applying measures that imply an improvement in the future prospects for survival of the yew woods.

Establishment of Genetic Conservation Units (GCU) for Taxus baccata, creation of germplasm banks and arboretums that represent their habitat, and protection measures against unnatural

Disseminating and transferring the measures developed in the project for their replicability in the EU, through a specific strategy using the results of the project.

Informing and raising awareness among the general public about the importance, values and ecosystem services provided by the yew woods.



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PROJECT DEVELOPMENT

4.1. CHARACTERIZATION AND PRIOR DIAGNOSIS OF THE PRIORITY HABITAT "MEDITERRANEAN TAXUS BACCATA WOODS" IN THE TERRITORIAL SCOPE OF LIFE BACCATA

The study began with a bibliographical search and surveys to clarify the distribution of the species in the territory. Subsequently, 111 representative populations were inventoried in 15 Special Conservation Areas (SAC) and their dasometric, biophysical, forest and ecological dynamics were studied, using conventional sampling techniques, Geographic Information Systems and the use and combination of high-precision photogrammetric surveys. Next, a diagnosis of the conservation status and the existing pressures and threats was made for each of the analysed stands. In parallel, 20 permanent monitoring plots were raised in the medium/long term. With the information obtained, it was decided to i) present a new definition of the concept of yew wood for discussion ii) formulate a proposal for monitoring indicators and iii) establish a set of active conservation forestry measures to direct -according to the Habitats Directive- a good part of the inventoried populations towards a Favourable Conservation Status in the medium term.







Main pressures and threats on the Cantabrian yew woods

Forest fires

One of the main causes of the decline of the species, and especially in the western end of the study area, is the ancestral and repeated use of fire. This has influenced and continues to influence habitat fragmentation.



Pressure from wild and/or domestic herbivory

Ruminant herbivores browse on yew seedlings, and even the branches of adult yew trees within reach.





Interspecific competition

The yew woods that are present in the understorey under the canopy of beech forests are usually subject to strong competition due to the high concurrence and, consequently, the lack of light necessary for their correct development.







Lack of regulation for public use

An indiscriminate influx of visitors to the yew woods can compromise their conservation. Damage such as erosion and emaciated roots in the oldest yew trees are usually seen in the most visited yew groves.



4.2. CONSERVATION ACTIONS

4.2.1. Collection, storage and cultivation of characteristic species of the yew woods

To improve the yew groves by increasing their occupation area and improving their structure, plantations of forest species typical of this habitat have been carried out. For this, plant material was collected in the project area.

With the collected seed and yew material for vegetative reproduction by cutting, nearly 30,300 yew, hazel, birch, rowan, holly and oak plants were produced, among other species.





Material was also collected for the development of the yew genetic diversity conservation action. The project analysed 82 population locations in the north of the Iberian Peninsula, from western areas in the North of Portugal, Galicia, Asturias and Castilla y León, to the easternmost of Euskadi, including 49 natural populations in 30 special conservation areas (SAC), in order to genetically characterize yew populations in the Cantabrian–Atlantic area.



4.2.2. Silvicultural actions to reduce interspecific competition and facilitate regeneration

Treatments in the yew woods and their closest surroundings (selective clearings, thinnings, girdlings, etc.) to reduce the density and avoid the high competency that the yews are suffering in stands where they are immersed, such as beech forests or plantations made by spruce, Lawson cypress or Douglas fir.

These actions have led to an improvement of 288 hectares of yew woods, expanding their habitat by nearly 68 hectares.











around a female yew.
Defoliation of crown,
presence of dead
branches and signs
of lack of light can be
seen.

Tree girdling and selective cuttings of beech around a year

Abundant regenerated yew and holly in a beech forest cleared two years and





4.2.3. Plantation of characteristic species of the yew woods

Connectivity and enrichment plantations with yew and accompanying species have been carried out in several yew stands with the aim of expanding their area and improving their structure. This action has been carried out in more than 40 hectares distributed in the area of the project.





4.2.4. Herbivory control measures

In a large part of the yew woods, especially in the eastern half of León, Palencia, Burgos and Aralar (Gipuzkoa), the regenerated yew suffers strong pressure from wild and/or domestic ruminant herbivores.

For the regenerated to prosper, 15,600 meters of exclusion fence have been built and 800 individual protectors have been placed. In this way, the small yews remain out of reach of deer, roe deer or cattle in a total of 131 hectares of this habitat.









4.2.5. Protective measures against unnatural conditions

Fires are a common threat to all forest habitats, especially damaging in the case of forests whose regeneration capacity covers wide temporal intervals. This is the case of the Taxus baccata woods, whose conservation has been conditioned by this type of disturbance, especially in the western area of the project area (Galicia and western León).

In order to adapt the structures of the yew woods and surrounding habitats, avoiding fuel continuity that favours the spread of fires and pests and diseases, treatments have been carried out on the vegetation of the areas adjoining the yew stands consisting of coppicing in Quercus pyrenaica stands or scrub clearing. The action has involved action on 116 hectares, with the aim of improving 95 hectares of existing yew groves and increasing this habitat by 21 hectares.

16.9 kilometers of tracks have also been improved in the yew plantation carried out on 15.4 hectares in Os Ancares – O Courel SAC (Galicia).



Clearing of scrub between the track and the stand of yew and holly in Los Ancares Leoneses. With this clearing, in addition to contributing to the prevention of the spread of possible fires, it wil favour the implantation and natural evolution of habitat species.



Clearing and perimeter cutting in a Quercus pyrenaica stand that adjoins a yew stand in Los Ancares Leoneses. The main objective is to break the vertical and horizontal continuity of the fuel, and also favouring the expansion of the yearly facilitating receneration.





4.2.6. Conservation of the genetic diversity of the yew (Taxus baccata).

With the aim of conserving the genetic variability of the Cantabrian populations of Taxus baccata and improving the future prospects of its habitat, several actions have been carried out:

Germplasm banks or seed banks in

Galicia and Castilla y León, aimed at conservation of the genetic diversity of the yew tree in the Cantabrian mountain range:



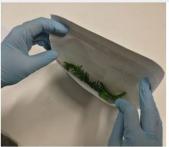
The germplasm bank in Galicia is made up of 1,151 DNA tissue samples from the 82 localities (Galicia, Asturias, Cantabria, Euskadi, Castilla y León, North of Portugal) sampled by the project, as well as 920 seeds from 7 locations in Galicia and Asturias.

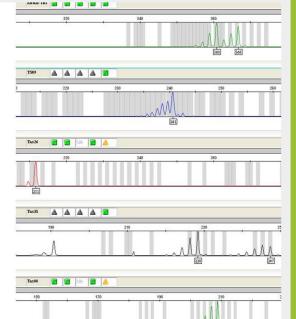
In Castilla y León, the seed conservation bank of the Central Forest Nursery in Valladolid has been reinforced with 54 batches of 20 kg seeds from the project area.

Genotyping of 82 localities (Galicia, Asturias, Cantabria, Euskadi, Castilla y León, Northern Portugal), collected in the first conservation action mentioned: "Collection, storage and cultivation of species characteristic of the yew woods", from which has carried out a genetic-population analysis of 1,151 sampled yew trees, divided into 49 natural populations and 37 monumental yew trees. The results of the extensive sampling carried out confirm a high diversity of yew genetic resources in the Iberian Atlantic Region, representing an important source of genetic variation for the species.













Genotipos multilocus

"DNA barcoding": "Código Barras genético"

ID	Tax23	Tax23	Tax36	Tax36	Tax60	Tax60	Tax92	Tax92	ABRII-TB1	ABRII-TB1	TS09	TS09	Tax26	Tax26	Tax31	Tax31	Tax86	Tax86
AR001_001	176	176	176	186	103	130	217	217	349	351	240	240	239	239	203	228	154	207
AR001_002	176	176	159	159	130	154	166	217	366	368	244	254	239	280	228	257	154	209
GI001_006	155	176	176	186	159	159	166	209	353	366	234	240	233	284	203	232	154	186
GI001_007	155	176	164	176	103	103	205	275	349	349	223	248	265	290	203	255	211	211
LE_014_011	155	155	204	231	103	103	166	205	338	360	216	222	211	284	228	228	154	154

Establishment of forest genetic conservation units.

based on the requirements of the European program EUFORGEN (EUFGIS): Information on the 49 natural populations sampled by the project has been shared with EUFORGEN, greatly updating and improving the information regarding Taxus baccata in the Iberian Peninsula. In this way, in the EUFORGEN core network, a new Genetic Conservation Unit (GCU) has been generated in EUFGIS in accordance with the criteria of the platform and the EUFORGEN program, and one of the existing ones will be redistributed thanks to information from LIFE BACCATA.

In addition, the information available for the rest of the units in the North of the Iberian Peninsula will be improved. The project has exceeded the objectives set at the beginning with respect to the platforms and entities with whom the generated information will be shared. Derived from the transfer of genetic information to EUFORGEN and EUFGIS, and thanks to the important role played by INIA-CSIC, CITA and MITECO in this process, the information of the 49 localities has also become part of the National Network of Genetic Conservation Units, whose regulatory scope is currently being developed as a Royal Decree. This will make it possible that upon approval of this provision, their information is supplied to the corresponding regions to their approval and incorporation into the regulatory framework.



Creation of 4 arboretums and improvement of an existing one

2 new ones arboretums and adaptation of an existing one in Castilla y León, 1 in Galicia and 1 in the Basque Country. Plantings have been carried out in areas of special interest, to promote knowledge about the characteristic species of the yew forests and disseminate the challenges that the yew has faced in recent years regarding its conservation, in addition to contributing to the perpetuation of genetic resources. Thus, for example, the arboretum created in Galicia is made up of 20 yew trees that are representative of the genetic heritage of the species in Os Ancares – O Courel SAC, where habitat 9580* is present. A yew hedge with multiple origins from SACs of Gipuzkoa has also been created, aimed at facilitating the production of cuttings for After LIFE.

Plantation of the LIFE BACCATA arboretum in Galicia. A total of 20 representative yews of the species' gene pool have been planted in Os Ancares – D. Courel SAC.

Replacement of various tree species that are typical of the habitat (in the photo, yew trees) in the Tejeda de Tosande arboretum, Fuentes Carrinnas and Fuente Cobre SAC









MONITORING OF PROJECT ACTIONS

For the evaluation of the repercussions that the project measures have caused on the conservation status of the habitat, a methodology has been adopted through indicators developed from the characterization and assessment that has been previously made. The selected indicators are related to seed production, the existence of various types of regeneration (in different growth phases), estimation of the herbivore load, the variability of tree species other than the yew, or the structural diversity of the yew population.

Measurements have been made again in the 20 permanent monitoring plots established during the characterization and previous diagnosis of the Habitat.



On the other hand, during the estimation of the project impact on the ecosystem services in the 15 SACs subject to actions, both individually and jointly, patterns common to all of them have been identified. For the analysis, the TESSA methodology has been applied, a rapid evaluation due to its simplicity and applicability to local situations.

Through surveys of representative agents, supply and cultural ecoservices were identified as those that are currently most relevant, but which, however, should be promoted.

Nearly three-quarters of those surveyed were aware of the project and all respondents considered their actions to be positive. Most of those who were unaware of the project were users and neighbors





residing in the action areas. This could indicate a good diffusion This could indicate good diffusion among the technical-scientific and administrative levels, but less penetration in the rural world and in non-management sectors.

The most mentioned pressures have been fires, livestock activity -both due to overpressure and abandonment-, forest management (exotic plantations) and climate change as predominant conditions. Regarding the impact of these pressures, the first two stood out.

Finally, it is valued that the ecoservices "Conservation of biodiversity" and "Scientific knowledge and education" will mainly improve.

The impact on the local population, both economically and socially, has also been evaluated.

Economically, it should be noted that 45% (more than €670,000) of the expenses incurred have been made locally. Personnel expenses stand out, in which the project has generated the equivalent of 8 FTEs. In addition to analysing the expenses of the project, surveys were carried out with relevant local agents. In total, 47 surveys were received, of which 62% carry out some type of economic activity in the project SACs. 43% of the respondents stated that nature conservation initiatives have a very positive effect on their economic activity and only 4% considered that it has a negative effect. Most of the respondents, 29 out of 47, stated that they did consider that the project would affect their economic activity. 55.17% of these had already noticed a certain effect, 34.48% had not yet and 10.34% did not answer the question.

In conclusion, the value of protected areas transcends the mere conservation of biodiversity and their socioeconomic influence goes beyond what most of society assumes. They not only act on the income of primary producers in the SACs, but also aspire to become socioeconomic promoters, capable of revitalizing very depressed rural areas. After the study carried out, it has been verified that initiatives such as LIFE BACCATA generate positive economic impacts in the environment where it operates and, in addition, are well valued by a majority group of people.







DISSEMINATION ACTIONS

LIFE BACCATA project has carried out various actions with the aim of publicizing the environmental values of the yew tree and yew woods and raising awareness in society about the need to conserve habitats of community interest and disseminating the conservation tools of the European Union.

Environmental education activities



Throughout the development of the project, various workshops have been held in primary and secondary schools located in the territorial scope of the project. Interpreted routes were also organized in emblematic yew groves such as Tejeda de Tosande, in Palencia. Among the students of the educational centres and the assistants to the routes, these activities reached a total of 1,714 people.

In the Basque Country, in addition to the presentations of the project (city councils, Boards of Trustees of protected areas, forest rangers...), a dissemination strategy focused on the Interpretation Centers of the involved SACs, especially in Pagoeta, was developed. For this, a series of contents were prepared to be transferred to the environmental education monitors of this SAC, in order to incorporate them into their activities. In addition, a 7 km informative trail focused on the yew woods was prepared, with an information panel, several boundary posts with brief explanations of the environment and a brochure for self-guided tours.



Communication products

Traveling exhibition

The aim of LIFE BACCATA traveling exhibition was to introduce the values and problems of the yew tree and yew woods to the whole of society, covering a large part of the territorial scope of the project, and it will continue to be exhibited in other places at the end of the project. There are three versions of the exhibition: in Spanish, Galician and Basque.



Other products

In addition to the traveling exhibition, 5 information panels and 400 posters, an informative brochure, both in digital and paper versions, 2,988 T-shirts distributed in the workshops and other informative actions, 5,000 stickers, 100 units of USB pendrives, 300 umbrellas, 50 mountain backpacks, 100 field notebooks and 186 jackets.















Technical seminars and conferences

During the project, 5 seminars have been held, where LIFE BACCATA has been presented, attended by 50 people in the initial seminar in León (June 2017), 40 people in the second technical seminar in Lugo (November 2018), 39 people in the yew plant production seminar (May 2021), 63 people at the yew genetics and conservation seminar in the Iberian Peninsula (May 2021), 124 people at the Mediterranean biogeographical seminar (May 2021), 28 people Networking seminar with Forestas (Sardinia, Italy) (July 2021), where experiences were exchanged for the purposes of communication and habitat management, as well as results on plant production and genetic diversity of the yew.

Other technical conferences have been organized and/or attended, involving 50 people Natura 2000 Day in Lugo (June 9, 2017), 50 people in the presentation of LIFE BACCATA in Ribadeo (March 23, 2018), 15 people in Course of Summer USC 2018 in Piornedo (July 13, 2018), 50 people in Natura 2000 Day in Lugo (May 22, 2018).

The LIFE BACCATA partners have also established contacts and visited other projects such as 30 people from the Conservatoire National du Brest, 87 people/entities invited to Working Groups, 5 people from the owner community of Riocereixa (Lugo), 6 researchers from Uvigo, 5 people Viveros Braña, 20 people ICNF, 10 people CTFC, LIFE TAXUS Catalonia (LIFE11 NAT/ES/000711) or LIFE TAXUS Portugal (LIFE12 NAT/PT/000950) to transfer and replicate their results.







News generated by the project

From the month of September 2016 to the month of September 2021, 91 news about actions, news, progress and results of the project have been prepared and published on the website. All of them have served to disseminate LIFE BACCATA advances, with 2019 being the busiest year.

Social networks and website

Visits to the website http://www.life-baccata.eu/es have been increasing as the project has progressed, going from 7,113 visits in 2017 (1,090 users) to 13,241 (5,020 users) in 2021.

As for social networks, a total of 267 tweets were published and 28 posts were generated on Facebook.

Newsletters

A total of 7 ordinary newsletters have been generated including the main milestones of the project, and news of interest, and another 5 special newsletters dedicated to particular topics (ethnography, paleocology of the yew, genetics, toponymy, plant production and restoration of yew woods).

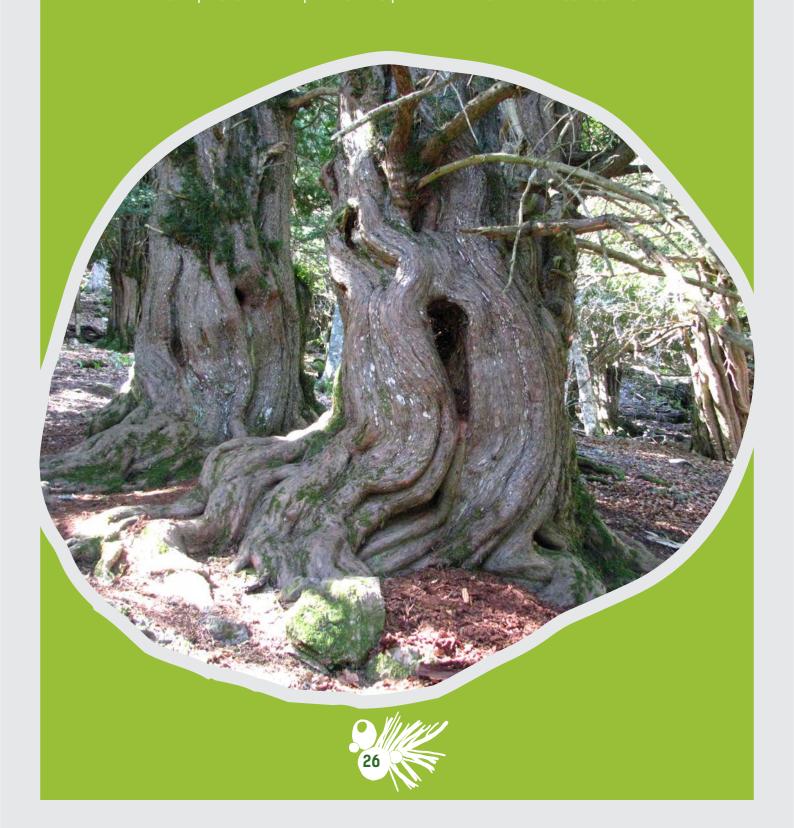






T LINES OF THE FUTURE

Future measures have been established in the After-LIFE BACCATA Conservation Plan to continue the work carried out during the project. This plan aims to become an important tool for the transferability and replicability of the actions carried out during the project. It should serve to disseminate best practices and experiences acquired and establish future collaborations.



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