

ARACNE

ADVOCATING THE ROLE OF SILK ART AND CULTURAL HERITAGE AT NATIONAL AND EUROPEAN SCALE



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Deliverable 5.4

List of scientific and popular publications v1.0

Version 1.0

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	RE:	Restricted to a group specified by the consortium (including the Commission Services)
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Dissemination Level



Abstract

The ARACNE project has planned the production of its deliverables as a collection of scientific and dissemination (or informative) publications. This deliverable is the first version, with the second and final version to be published at the end of the project. Having these deliverables is crucial because they provide a comprehensive record of the project's intellectual output, ensuring that the research and findings are systematically documented and accessible. This not only facilitates knowledge sharing among the project's partners but also enhances transparency and accountability. Additionally, these deliverables help in disseminating the project's results to a wider audience, including the scientific community and the general public, thereby maximizing the impact of the project's work.

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Partners involved in the document

Participant n.	Participant organisation name	Short name	Check if involved
1 Coordinator	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria	CREA	
2	Iniziativa Cube S.r.l.	INI	Х
3	Lepl State Silk Museum	SSM	
4	Nauchen Tsentar Po Bubarstvo Vratsa	SCS	
5	Piraeus Bank Group Cultural Foundation	PIOP	
6	Univerza V Mariboru	UM	
7	Ethniko Kai Kapodistriako Panepistimio Athinon	NKUA	
8	Instituto Murciano de Investigacion y Desarrollo Agrario y Medioambiental (IMIDA)	IMIDA	
9	D'orica S.r.l. Società Benefit	DOR	
10	Chemins De La Soie - Des Cevennes aux Alpujarras	ASSOIE	
11	Sericyne	SER	
12	Universita degli Studi di Padova	UNIPD	
13	Council Of Europe - Conseil de L'europe	COE	
14	Mouseio Technis Metaxiou	ASMS	

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1. Description of the project

ARACNE project focuses on the cultural heritage of the European silk production and its preservation, protection and valorisation; it aims at reinvigorating traditional skills through the adaptive reuse of the common cultural and artistic legacy and at shaping a silk-linked European cultural identity.

The production and the past and present development of the silk sector can be again the common basis for a future European Silk Route intended as a cultural itinerary across Europe. To create a wide and well-connected network that, starting from the historical path followed by Marco Polo in his travels to East, even includes the routes of production and commercialization of silk in Europe in the following centuries, we aim to:

- Bring back silk production in vogue by reconstructing a resilient and innovative silk ecosystem that retraces the concerned European countries and promotes traditions, architecture, and both tangible and intangible heritages. The consolidation of a European Silk Route will encourage links and shared activities among European cities and regions to strengthen the preservation and protection of their culture and promote innovations in production and trade;
- Contribute to improve skills and competitiveness of silk-related European Cultural and Creative Industries through the renewal, co-development and the implementation of human-centred and place-specific silk-based cultural products, processes and service innovations, leveraging on digital applications and cutting-edge technologies, to foster the transition to more sustainable business models, and promote economic and social growth, and strengthen the reputation of European countries abroad.

1.1 ARACNE specific objectives

The overarching goal of ARACNE is to create a wide and well-connected Silk Innovation Ecosystem that, starting from the historical path followed by Marco Polo in his travels to East, also includes the routes of production and commercialization of silk in Europe in the following centuries. An innovation ecosystem is an interconnected network of quadruple helix stakeholders, including academia, industry and different levels of the public sector and civil society. This multi-level approach applies a systemic and bottom-up approach to creating research, innovation and knowledge. Silk Innovation Ecosystem includes every stakeholder and innovator in the cultural silk value chain even if not participating directly in the project activities. The production and, more in general, the past and present development of the silk sector in the ARACNE Consortium countries represent the common thread for the future "European Silk Route" as a cultural itinerary across Europe, to boost the European values in relation to the silk arts and CH for the benefit, prosperity, peace of our societies. To this aim, the project will explore the CCIs' capacities to create a cultural and artistic niche market where silk produced within EU boundaries will be valued as a distinct immaterial asset; on the other hand, the ambition is to contribute to stop the loss of technical, traditional and cultural know-how and skills that accompanied the decline of this fiber production and that

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is detrimental exactly to those CCIs which might be active in fashion, art, design and product communication. In fact, the so-called "Silk Road" is generally associated to its Asian origin; however, its European ramifications were fundamental for the development of Europe as we know it today. More in general, the silk production (silkworm rearing, mulberry cultivation, silk reeling), originated from Asia but subsequently spread to Europe and developed strongly in the Mediterranean and Balkan regions. Bringing back silk production in vogue by reconstructing a resilient and innovative Silk Route that retraces the European countries and enhances traditions, architecture, tangible, and intangible heritage will demonstrate that silk, as a cultural legacy, can contribute to develop the European economy and enrich our society. In this context, ARACNE covers several sectors linked to content creation, conservation, exploitation, management, fruition, diffusion related to the silk historical, artistic and environmental resources and assets. The ambition of ARACNE will be reached through a set of specific, measurable, achievable, realistic and time-constrained (SMART) specific objectives:

Objective 1: Enhancement of knowledge and memory for the renaissance of a European Silk Innovation Ecosystem;

Objective 2: Co-creation of human-centred and place specific creative silk-based solutions leveraging on digital and cutting-edge technologies;

Objective 3: Implementation of innovative strategies and business, governance and financing models for the involved CCIs organisations and SMEs, building on previous research;

Objective 4: Support the establishment of a cultural European Silk Route, based on the tangible and intangible silk cultural heritage and landscapes;

Objective 5: Raise awareness of ARACNE results and impacts among different stakeholders of the territories and CCIs of the silk sector and raise the expectation for the constitution of a European Silk Route in support to the European silk CH and silk CCIs;

Objective 6: Enhance the European cultural identity and strengthen European competitiveness for a more resilient post-crisis society;

Objective 7: Contribution to the European Green Deal, the New European Bauhaus and the Sustainable Development Goals.

2. Introduction

The present document is the first version of the collection of scientific and popular publications related to the ARACNE project. This deliverable is the first, and at the end of the project, a second updated version with the complete list of publications will be published. This document, in listing the publications, follows the same format as the one provided on the project's official website¹, which has a dedicated page for collecting all the publications. The concluding part of this document lists all the publications in the order they are described in this deliverable and in the formats made available online by the various platforms.

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¹ <u>http://www.aracneproject.eu</u>



2.1 Objective of the deliverable

Among the outcomes specified in the grant agreement of the ARACNE project, it is stated that "at least 5 publications per year of project are collectively produced by the scientific team of the project with the aim of raising awareness of the scientific communities on the theme"² These publications are part of work package 5 "Communication, Dissemination and Exploitation of ARACNE solutions for the renaissance of the European Silk Innovation Ecosystem", which aims to communicate and disseminate the activities and results of the ARACNE project.

WP 5 outlines that communication and dissemination activities will combine media-based elements such as a website, newsletter, and social networks, with face-to-face formats like conferences, laboratories, and workshops. Additionally, as stipulated in the GA, ARACNE will publish scientific articles, present at scientific conferences, and contribute articles to popular media.

The objective of this deliverable is to collect and describe the publications that have been produced throughout the course of the project. This document serves as a comprehensive compilation of all scientific and popular publications made under the ARACNE project, showcasing the efforts and achievements in raising awareness and promoting the project's themes within both the scientific community and the general public.

This document represents the first version of the compilation, scheduled for the first half of the project. At the end of the project, deliverable D5.5 – *List of scientific and popular publications v2.0*, will be released, updating this list with all the publications made up to the project's conclusion.

This collection activity is essential for several reasons, as it ensures a systematic documentation and archiving of all scientific and popular publications produced during the ARACNE project, providing a clear and comprehensive record of the project's intellectual output. This documentation not only highlights the contributions of the project to the scientific community but also ensures transparency and accountability in meeting the objectives outlined in the grant agreement.

In addition, by compiling these publications, it is possible to effectively measure the impact and reach of the ARACNE project's dissemination efforts, evaluating the success of the communication strategies employed and in identifying areas for improvement. Furthermore, showcasing these publications reinforces the project's commitment to fostering knowledge exchange and collaboration among stakeholders.

This collection aims to serve as a valuable resource for future research and projects, because it provides a repository of knowledge and insights that can inform and inspire subsequent initiatives in the field of cultural heritage and silk production. By preserving and sharing the results of ARACNE's work, it will contribute to the ongoing dialogue and development within the scientific and cultural communities, thereby ensuring the project's legacy and long-term impact.

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² Page 132 of the Grant Agreement, "Outcomes" section.

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2.2 Document structure

The present deliverable can be divided into three parts:

- The first part is of a general nature and includes a description of the project, the deliverable, and the dedicated section of the project's official website that contains all the publications.
- The second part collects and describes all scientific publications that are relevant and pertinent to the ARACNE project.
- The third part collects publications of a dissemination nature.

Additionally, to each publication a descriptive chapter is dedicated, which in turn can be divided as follows:

- A first part of a general nature with information on the platform/support used for the publication and the authors.
- A second part summarizing the content.
- A third and final part containing the link to view the entire publication.

3. Some general information

The various publications reported in this document are the result of the efforts of the members of the different partners of the ARACNE project. Sometimes, the publications involve the participation of multiple partners simultaneously, while other times they are made by individual partners. The participation of many European countries is reflected in the publications themselves: not all of them are in English, but in the local languages of the respective countries. This difference is also evident in the platforms/journals used, which are sometimes of a national nature.

The document is divided into three parts. This type of division is influenced by the structure provided by the website.

Indeed, on the website, by going to the "Resources" section in the main navigation bar, there is a "Publications" section that can be consulted to view all the publications present in this deliverable, as shown in the figures of this chapter.



Figure 1 - Section dedicated to the publications on the website

By entering this page, you will find the complete list of publications.

The first part collects the popular publications in this order:

• Agrarian Biodiversity: The Vivaro's centuries-old mulberry trees to be saved

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- <u>A machine has been designed to facilitate silkworm farming</u>
- The "Italian Silk Road" narrated by municipal emblems
- Svilarska tradicija Silk-Weaving Tradition
- <u>Centuries-old Mulberries: A Living Monument to Sericulture in Slovenia</u>
- <u>Silk Unveiled: First Narrative Catalogue</u>
- <u>Sericulture Σηροτροφία</u>



Figure 2 - First part of the publications section dedicated to those of a divulgative nature

The second part gathers the scientific publications in the following order:

- <u>The Darker the Better: Identification of Chemotype Profile in Soroses of Local and</u> <u>Introduced Mulberry Varieties with Respect to the Colour Type</u>
- <u>Population Genetic Studies of Silkworm (Bombyx mori L.) and Phylogenetic</u> <u>Relationships</u>
- <u>Composition of Proteins and Phenolics in the Leaves of Different Mulberry Species</u> (Morus alba L., M. alba × rubra, M. australis Poir., M. nigra L.)
- <u>Phytochemical characterisation of the soroses of the old local mulberry genotypes</u> and reintroduction of moriculture in Slovenia with the aim of different uses in <u>agriculture</u>

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- The Silkworm History, Culture, Traditions and Science
- <u>Development of a textile sheet mask design for facial care based on a 3D face model</u> of an average woman
- <u>Plant Genetic Resources for Food and Agriculture: The Role and Contribution of CREA</u> (Italy) within the National Program RGV-FAO
- The role of BACSA in sericulture regeneration in Europe and Central Asia
- <u>The ARACNE project: Advocating the Role of silk Art and Cultural heritage at National</u> <u>and European level</u>
- The silk niche production in Italy
- Labor Saving Technology for Silkworm Rearing in Bulgaria.



Figure 3 - Second part of the publications section dedicated to those of a scientific nature

The third part is an annex with the links for the various publications assembled together.

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DISSEMINATIONS

The ARACNE project aims to revitalize the sericulture sector in Europe, focusing on preserving the cultural heritage and promoting sustainable practices associated with silk production. Dissemination activities are crucial for the project's success, as they help raise awareness, share knowledge, and foster collaborations among various stakeholders. This collection of publications highlights the project's efforts to communicate its objectives and achievements to a broader audience, demonstrating the importance of preserving the rich history and potential of sericulture.

4. Agrarian Biodiversity: The Vivaro's centuries-old mulberry trees to be saved³

The following publications has been published on "Vita in Campagna", an Italian monthly magazine that focuses on agriculture, gardening, livestock breeding, food and wine, and rural life. Founded in 1984, the magazine is published by *Edizioni L'Informatore Agrario* and caters to both professionals in the agricultural sector and enthusiasts.

"Vita in Campagna" is a valuable resource for anyone looking to deepen their knowledge of the rural world and improve their agricultural and gardening skills.

To view the publication, a subscription is required; therefore, the complete publication will not be included in the attachments section of this document.

The article, which is part of the April 2023 issue of the magazine, was written by Mattia Benedetti (a student in the master's program in Scientific Communication at the International School for Advanced Studies in Trieste) and Gianni Fila (Senior Researcher at CREA-AA – Research Centre for Agriculture and Environment, sericulture laboratory in Padua, coordinator of the ARACNE project). The article appears in the "Environment and Biodiversity" section of the magazine and describes a grove of impressive mulberry trees in Vivaro, in the province of Pordenone, Friuli. These twisted trees have been shaped over the centuries by the combined efforts of man and nature and are now lovingly maintained by their caretaker: Mauro Rizzotti, an agricultural entrepreneur who has been passionate about these plants since he was a boy and transplanted them to his land to protect them from neglect and destruction.

Mauro is driven by a true sacred fire to save the mulberry trees; he does not question why he does it, as it is an inner force that sustains him: the impulse to preserve beauty. These silent giants, each unique, tell stories of people and places, of work and toil. They stretch their dark, bare branches towards the sky in winter and cover them with green every spring, with roots firmly anchored in the earth, living for hundreds of years.

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³ Original Italian title: Biodiversità agraria da salvare: i gelsi secolari di Vivaro



The article describes Mr. Rizzotti's long journey, from his passion for preserving agricultural biodiversity to the challenges he faced due to the lack of laws supporting his "green" mission. It provides an overview of the complexity involved in replanting a mulberry tree, highlighting that it is a tree with multiple uses, capable of providing shelter for animals and protecting the environment. His ultimate goal is to create a park of ancient mulberries for future generations.

Additionally, the article offers insights into the ARACNE project, which shares the same objective of preserving the genetic heritage of ancient mulberry trees.

An overview of the article can be viewed at this link.

5. A machine has been designed to facilitate silkworm farming⁴

The present publication has also been featured in the Italian monthly magazine "Vita in Campagna" in the December 2023 issue, under the "multifunctionality" section. The article was written by Rino Gubiani from the University of Udine, Department of Agricultural and Environmental Sciences, and Silvia Cappellozza from CREA-AA, the coordinator of the ARACNE project.

The article describes how sericulture was a vibrant activity in Friuli-Venezia Giulia until the 1960s, although it gradually declined over time. Despite this, the tradition has remained a part of the region's cultural, historical, and environmental heritage. The region of Friuli-Venezia Giulia has never fully abandoned efforts to revive silkworm farming on a renewed basis, primarily through its technical arm in agriculture, ERSA, the Regional Agency for Rural Development.

A few years ago, the Thiel Cooperative of Fiumicello (Udine) and agronomist Andrea Fabris established an Operational Group on sericulture, presenting the Silk project⁵ under the Rural Development Program (RDP). The aim was to implement a strategy of targeted marketing actions, training courses, technological innovation, monitoring, research, and the structuring of synergistic networks to reactivate local demand and supply while ensuring environmental protection and conservation.

As part of the Silk project, Rino Gubiani, in collaboration with CREA-AA, developed a small prototype for rearing moderate quantities of silkworms up to the third instar, to facilitate feeding and cleaning operations. This prototype is primarily intended for didactic-demonstrative farms and features a relatively low level of mechanization, making it feasible to construct with modest metal carpentry work and relative expense. The prototype can also be adapted to rear older instar larvae, though it would accommodate an even smaller number of silkworms in that case.

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 ⁴ Original Italian title: Ideata una macchina per agevolare l'allevamento dei bachi da seta
⁵ https://www.silkfvg.it/



Thanks to the smoothness of operational movements, the machine, when fully operational, allows the management of 7-8 frames simultaneously during the first three developmental stages of the silkworms. Besides speeding up the handling and cleaning times for the operator, the prototype enables working in a comfortable and ergonomic position, even for those with limited mobility. Various control systems for mechanical movements ensure absolute safety during operation.

This prototype can also contribute to the dissemination of educational activities envisaged in the ARACNE project, potentially creating interesting synergies between the two projects. The prototype can be seen at the didactic farm 'Piccola fattoria Cumugnai' in Aquileia (UD), owned by Alessio Sverzut.

An overview of the article can be viewed at this link.

6. The "Italian Silk Road" narrated by municipal emblems⁶

This article is the third one published in the Italian monthly magazine "Vita in Campagna" in the January 2024 issue, under the "History and Culture" section. The authors, Gianni Fila, Alessio Saviane, and Silvia Cappellozza from CREA-AA, highlight how the European project ARACNE has used civic heraldry to uncover the traces left by sericulture in the historical memory of Italian municipalities. Among the symbols depicted in the coats of arms are the mulberry tree, the cocoon, and the silkworm.

The authors guide us in rediscovering the traces that silkworm cultivation has left in the cultural heritage of populations, as one of the objectives of ARACNE. They set out to uncover the 'living' traces of the silk tradition, searching for them in the 'business cards' of each municipality, i.e., their coats of arms, and analysing their symbolic elements.

The research identified 47 municipalities that have depicted images and symbols in their coats of arms that can be traced back to silk production activity. Almost all the municipalities that have proudly maintained their silk heritage in their emblems are located in central-northern Italy, particularly in Lombardy, with 29 municipalities (10 in the province of Como alone), while in the south only the municipality of Villa San Giovanni (Reggio Calabria) stands out.

The most represented symbol in the coats of arms is the mulberry tree (43 municipalities), followed by the cocoon (4 municipalities), the silkworm larva (2 municipalities), and silk processing tools (2 municipalities). Often, these symbols are associated with each other or with others not related to sericulture.

The idea is to extend this investigation to other countries participating in the ARACNE project to compare what was discovered in Italy with the European heraldic tradition.

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An overview of the article can be viewed at this link.

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⁶ Original Italian title: La "via della seta" italiana raccontata dagli stemmi comunali



7. Svilarska tradicija – Silk-Weaving Tradition

In the first part of the text, an overview of the history of silk production and its usage is provided, highlighting how these traditions evolved and eventually disappeared. The text discusses the historical use of silk for making umbrellas and parasols, and the ancient art of sericulture in Slovenia, indicating that these items were made from a fabric with a long history in China, and that the secret of silk production had spread as far as the Byzantine Empire.

The text then discusses how silk is no longer used to make modern umbrellas, even though they were a fashion accessory in the 18th century for European city ladies. However, silk production in Slovenia, particularly in the Goriška region, has ancient roots dating back at least 200 years before the European use of silk parasols. This agricultural practice experienced various fluctuations but was only truly abandoned in the 1960s.

The discusses text the development of the domestic silkworm (Bombyx mori) and the history of sericulture. lt describes how the silkworm was domesticated from its wild ancestor (Bombyx mandarina) over more than 4,000 years, and how there are now over 1,000 lines of this species. It highlights that the white velvet moths can no longer survive in the wild and have not developed resistance or diseases in response to humaninduced stress.



Figure 4 - Illustration present in the article about some life stages of the silkworm, from cocoon production to egg-laying

Modern sericulture is being revived mainly in the Štajerska region, although it was historically centred in the Goriška region. Silkworms are still raised traditionally, but with the support of modern science. The text also explores the expansion of mulberry cultivation and silkworm rearing in the present-day territory of Slovenia, highlighting the roles of historical figures and the economic fluctuations related to silk production.

Vesna Mia Ipavec and David Petelin are cited for their work on the history of sericulture in Slovenia, mentioning how this practice involved various regions and peaked in the 18th century, experiencing many ups and downs until its decline in the 20th century.

Vesna Mia Ipavec is from the University of Maribor, one of the partners of the ARACNE project from Slovenia.

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The article can be viewed at the <u>following link</u>.

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8. Centuries-old Mulberries: A Living Monument to Sericulture in Slovenia⁷

This publication, written by A. Urbanek Krajnc from the University of Maribor in Slovenia, one of the partners of the ARACNE project, was featured in the September 2023 issue (#20) of UMniverzum, an internal journal of the University of Maribor. This publication covers a wide range of university-related topics, including the achievements of researchers, the scientific and educational work of the staff, student successes, and various interviews and reports. The journal is a crucial source of information on recent developments and ongoing projects within the university.

In addition to scientific articles, UMniverzum covers topics such as innovation, education, and interdisciplinary research. Recently, it has included discussions on emerging themes like human-machine neural interfaces and national research infrastructure upgrade projects.

The text analysed in this chapter can be found on pages 14 to 17 of the journal.

The text discusses the heritage and history of sericulture (silk farming) in Slovenia, highlighting the significance of centuries-old mulberry trees as living monuments of this practice. Mulberry trees, essential for silkworm farming, have been preserved in Slovenia and hold historical significance. Older generations remember their role in providing food for silkworms and being central to family stories and traditions. Silk production was a valued industry in the Austro-Hungarian Monarchy, with significant cocoon harvesting activities. Efforts to promote this industry included planting mulberry trees across crown lands and providing incentives to silk farmers, with the peak of silk production occurring during the 18th and 19th centuries.



Figure 5 - Cover of the issue n. 20 of UMniverzum

The decline in silk farming was due to factors such as diseases affecting silkworms and mulberry trees, and the rise of artificial fibers in the early 20th century. In March, a European project titled ARACNE was initiated to revive the cultural heritage associated with silk across Europe. This project involves multiple universities and research centres, aiming to reintroduce mulberry trees into the cultural landscape and promote the ecological benefits of these trees. The project also focuses on technological innovations in silk production and the use of mulberry by-products. Efforts include genetic research on local mulberry varieties, promoting the reintroduction of mulberry trees, and raising public awareness about their ecological importance.

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⁷ Original Slovenian title: Večstoletne murve živi spomenik svilogojstva na Slovenskem



Maribor, once known as "Yugoslav Manchester", had a significant textile industry, including the renowned textile factory "Svila". The historical importance of this industry is documented, and recent publications have explored its contributions to the region's industrial heritage. The text emphasizes the importance of preserving and reviving the sericulture heritage, combining historical research with modern technological advancements to promote sustainable practices and cultural identity linked to silk production in Europe.

The publication can be viewed at this link.

9. Silk Unveiled: First Narrative Catalogue

This publication represents the first edition of the Silk Narrative Catalogue, as envisioned by the ARACNE project. It is an output of the activities under WP1: Development of the Knowledge Bank for the Benefit of the European Silk Innovation Ecosystem. The catalogue is part of <u>Deliverable D1.7</u>, which can be accessed on the official ARACNE project website in the designated deliverables section or by clicking on this link.

At the end of the project, a second and final version of the catalogue will be published as Deliverable D1.8.

The primary objectives of the visual catalogue of silk history and culture are to showcase the rich historical significance and cultural heritage of silk, provide a comprehensive overview of its evolution and impact across different civilizations, and promote appreciation and understanding of this luxurious fabric through visually engaging content. This task (v1.0 and v2.0) is supported by ARACNE countries to valorise the wealth of historical tools and instruments for silk production, preserved and valued as common heritage, and to inspire technological innovation in silk manufacturing.

The catalogue is the result of the efforts of the following project partners:

- Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA) (Italy) (the Coordinator)
- Lepl State Silk Museum (SSM) (Georgia)
- Nauchen Tsentar Po Bubarstvo Vratsa (SCS) (Bulgaria)
- Piraeus Bank Group Cultural Foundation (PIOP) (Greece)
- University of Maribor (UM) (Slovenia)
- Ethniko Kai Kapodistriako Panepistimio Athinon (NKUA) (Greece)
- Instituto Murciano de Investigacion y Desarrollo Agrario y Medioambiental Alimentario (IMIDA) (Spain)
- Università degli Studi di Padova (UNIP) (Italy)
- Association Chemin de la Soie des Cévennes aux Alpujarras (ASSOIE) (France)
- Mouseio Technis Metaxiou (ASMS) (Associated partner) (Greece)

In particular, it should be noted that the design and editing work was carried out by Vesna Mia Ipavec and Katja Udir Mišič, members of the University of Maribor.

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The catalogue is structured into six chapters, beginning with an introduction to the ARACNE project objectives. It then describes the history of sericulture in Europe and the traditional rearing and sericultural equipment. The catalogue also dedicates a section to mulberries, described as living monuments of sericulture, along with the traditional equipment used for mulberry cultivation. Following this, it outlines silk processing with brief historical notes provided by CREA and offers a splendid overview of the history of sericulture in all the participating ARACNE countries (Italy, Bulgaria, Greece, Georgia, France, Spain, Slovenia). The catalogue beautifully alternates between carefully collected images from the partners and texts, all elegantly organized to guide the reader through the world of sericulture and its rich history across the diverse and culturally rich paths of the involved countries.

For more information about the development of the catalogue, please refer to the relevant <u>deliverable</u>. The catalogue can be accessed through the following link.



Figure 6 - First cover of the Silk Narrative Catalogue

10. Sericulture - Σηροτροφία

This is an extensive and highly detailed scientific publication written entirely in Greek on sericulture. The author is mainly Skarlatos G. Dedos, from the National and Kapodistrian University of Athens, one of the partners in the ARACNE project.

This scientific publication on sericulture is a comprehensive and detailed guide covering all aspects of mulberry cultivation and silkworm farming. In the initial chapters, propagation and production methods of mulberry are described, including propagation techniques such as the use of catabolites, leafy and lignified cuttings, and grafting. Following this, the installation and management of mulberry trees are examined, considering soil quality, accessibility, variety selection, planting density, pruning and harvesting methods for leaves, as well as tree fertilization and watering. The management of mulberry diseases and pests, with particular attention to fungal infections and insect attacks, is also addressed.

Moving on to the biology of the silkworm, the text analyses the anatomy and physiology of the silkworm, covering various organ systems such as the nervous, endocrine, digestive, excretory, immune, circulatory, respiratory, reproductive, and muscular systems, in addition to the silk glands. An overview of the silkworm genome is also included. The biological

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mechanisms of silkworm development are then discussed, from gametogenesis to embryogenesis, diapause, and post-embryonic development, with detailed information on nutrition and dietary requirements.

Another central topic is the production and management of with detailed silkworm eggs, descriptions of production methods. low-temperature preservation techniques, artificial hatching, and egg incubation. The process of sex segregation and the management of moths during mating are also discussed. Silkworm rearing covers all stages, from the preparation of facilities and materials to the selection of the right hybrid, egg hatching, and larval rearing, with particular attention to disease prevention and rearing mechanization.



Figure 7 - Enlargement of a section of a painting used as the cover of the publication $\Sigma\eta\rho\sigma\tau\rhoo\varphi i\alpha$

Regarding cocoon production, the text examines the materials and methods for cocooning, larval protection, cocoon collection, drying, and post-drying preservation. Silkworm diseases are thoroughly covered, including viral, bacterial, and fungal diseases, as well as parasites and the effects of chemical poisoning.

The section on silk production describes the structural and physicochemical characteristics of silk fibers, cocoon quality, and the process of reeling and finishing raw silk, including the use of by-products and raw silk inspection. The uses of silk are explored in various fields, including clothing, edible materials, biomaterials in medical and biotechnological applications, with particular attention to sericin and the ecological dimension of sericulture.

Finally, the publication provides a list of data sources, organizations, periodicals, companies, museums, and videos related to sericulture, offering useful resources for further study. This publication represents an exhaustive work covering every aspect of sericulture, from mulberry cultivation to silkworm farming, silk production, and its uses.

The publication can be viewed at this link.

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SCIENTIFIC PUBLICATIONS

The following chapter compiles the scientific publications released during the initial phase of the European project. The following publications are included:

- 1. <u>The Darker the Better: Identification of Chemotype Profile in Soroses of Local and</u> <u>Introduced Mulberry Varieties with Respect to the Colour Type</u>
- 2. Population Genetic Studies of Silkworm (*Bombyx mori* L.) and Phylogenetic Relationships
- 3. Composition of Proteins and Phenolics in the Leaves of Different Mulberry Species (*Morus alba* L., *M. alba* × *rubra*, *M. australis* Poir., *M. nigra* L.)
- 4. Phytochemical characterisation of the soroses of the old local mulberry genotypes and reintroduction of moriculture in Slovenia with the aim of different uses in agriculture
- 5. The Silkworm History, Culture, Traditions and Science
- 6. Development of a textile sheet mask design for facial care based on a 3D face model of an average woman
- 7. Plant Genetic Resources for Food and Agriculture: The Role and Contribution of CREA (Italy) within the National Program RGV-FAO
- 8. The role of BACSA in sericulture regeneration in Europe and Central Asia
- 9. The ARACNE project: Advocating the Role of silk Art and Cultural heritage at National and European level
- 10. The silk niche production in Italy
- 11. Labor Saving Technology for Silkworm Rearing in Bulgaria

Each publication begins with an introductory section providing general information such as the publishing platform and the authors, followed by a summary of its contents.

11. The Darker the Better: Identification of Chemotype Profile in Soroses of Local and Introduced Mulberry Varieties with Respect to the Colour Type

11.1 General overview

The article has been published on *Foods* is an international, peer-reviewed, open access journal on food science published semi-monthly online by MDPI (Multidisciplinary Digital Publishing Institute).

MDPI is an academic publishing house that publishes open-access scientific journals. Founded in 1996, MDPI is known for its wide range of specialized journals in various fields such as science, technology, engineering, medicine, and social sciences.

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One of the main features of MDPI is that all the articles published are freely available online, allowing anyone to read, download, and share the content without restrictions. Articles submitted to MDPI undergo a peer review process to ensure the quality and integrity of the research. MDPI is also known for its rapid review and publication times, which are often shorter than those of many other academic publishers.

The institute publishes hundreds of journals, each focused on a specific research area. Some of the best-known journals include Sensors, Molecules, Nutrients, and Sustainability. While MDPI has been a topic of discussion within the scientific community regarding the quality of its review process and the proliferation of specialized journals, it remains a significant player in the landscape of open-access academic publishing.

The article was written by A. Urbanek Krajnc, J. Senekovič, S. Cappellozza, and M. Mikulic-Petkovsek. Urbanek Krajnc and J. Senekovič are from the Faculty of Agriculture and Life Sciences, University of Maribor. Cappellozza is from the Council for Agricultural Research and Analysis of Agricultural Economics, Research Centre for Agriculture and Environment (CREA-AA), respectively partner and coordinator of the ARACNE project.

The publication can be viewed at this link.

11.2 About the publication

This text is about the study of the chemical composition and properties of mulberry fruits (soroses) in different varieties, focusing on their colour and taste.

According to the article, mulberries evoke the "essence of the past", much like the Proust effect, for inhabitants of sericultural regions who fondly remember feeding silkworms with mulberry leaves and picking the vibrantly coloured fruits that were their childhood delicacies.

It describes how the principal metabolites of local and introduced varieties were meticulously analysed to uncover the chemistry behind the vibrant hues and flavours of mulberry soroses.

The soroses were classified into five distinct colour types, and their size parameters were precisely measured. The dominant sugars identified were glucose and fructose, while the key organic acids were citric and malic acids, which were most concentrated in the darker varieties, and fumaric and tartaric acids, which were most abundant in the lighter varieties. An impressive total of 42 phenolic compounds were identified.

The predominant phenolic acid was chlorogenic acid, followed by other caffeoylquinic acids and coumaroylquinic acids. The primary anthocyanins were cyanidin-3-glucoside and cyanidin-3-rutinoside. According to PCA analysis, the colour types displayed a distinct chemotype character. The sweet taste of the yellowish white soroses was defined by 49% fructose, 45% glucose, and 6% organic acids. The tangy profile of the black varieties was marked by a lower sugar content and a higher organic acid content (11%). The colour and species-dependent effect was noticeable in the proportion of caffeoylquinic acids and quercetin glycosides, which decreased with increasing colour intensity from 60% of the total to 7%, and from 17% to 1%, respectively. An upward trend was observed for flavanols (5% to 29%) and anthocyanins, which constituted 62% of the total phenolics in black varieties. This article offers a detailed insight into the metabolite composition of mulberry soroses,

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showcasing them as the preferred confections, ranging from light and sweet to dark and tangy.

12. Population Genetic Studies of Silkworm (*Bombyx mori* L.) and Phylogenetic Relationships

12.1 General overview

The article has been published using IntechOpen, a leading publisher of open access books and journals, aiming to make scientific research freely available to everyone. It publishes a wide range of topics in physical sciences, engineering, life sciences, health sciences, and social sciences. The platform supports researchers by offering peer-reviewed content, rapid publication, and high visibility for their work. IntechOpen's mission focuses on democratizing knowledge and advancing scientific progress through open access.

It has been published on *Biodiversity and Ecology of Lepidoptera - Insights and Advances,* which offers a detailed exploration of Lepidoptera, split into two sections.



Figure 8 - Cover of the issue Biodiversity and Ecology of Lepidoptera - Insights and Advances

Section 1 covers behavioral diversity, highlighting biodiversity decline, camouflage, mimicry, gynandromorphy, and non-coding RNAs. Section 2 focuses on the bioecology and genetics of moths, detailing hawkmoth flight paths, invasive leafminer moth species, and genetic variability in mulberry silkworm breeds.

The publication was written by Teodora Atanasova Staykova and Panomir Ivanov Tzenov and was published in August 2023.

Panomir Ivanov Tzenov belongs to Nauchen Tsentar Po Bubarstvo Vratsa, one of the project partners from Bulgaria.

The publication can be viewed at this link.

12.2 Summary of the publication

The publication is about research that aimed to assess the extent of genetic diversity and phylogenetic relationships among 13 breeds of mulberry silkworm (*Bombyx mori* L.) from

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Bulgaria's genetic resources using isozyme polymorphism. Polyacrylamide gel electrophoresis (PAGE) was utilized. Among the nine examined isoenzyme loci, eight loci (Bes A, Bes B, Bes D, Bes E, Pgm A, Mdh A, Bph, and Alp A) exhibited both intra-breed and interbreed polymorphism. At the Hk locus, only inter-breed polymorphism was detected. The number of alleles per polymorphic locus ranged from one to two. The level of polymorphism varied from 0% to 77.80%. All breeds demonstrated low levels of observed heterozygosity compared to the expected levels. The combined FIS value across all polymorphic loci was 0.3205, indicating a significant deficit of heterozygotes. The FST value revealed that 49.21% of the total genetic variation observed was among breeds. The constructed dendrogram showed that the two breeds of Japanese origin (Daizo and Japanese 106) were genetically the most distant from the other breeds. The data on isoenzyme polymorphism and genetic structure of the evaluated breeds can be used for genetic enhancement and the development of new hybrids for silk production.

13. Composition of Proteins and Phenolics in the Leaves of Different Mulberry Species (*Morus alba* L., *M. alba* × *rubra*, *M. australis* Poir., *M. nigra* L.)

13.1 General overview

Agricultura Scientia is an academic journal published by the University of Maribor, specifically by its Faculty of Agriculture and Life Sciences. The journal, published twice a year, is freely accessible online and includes articles on a wide range of topics related to agriculture and life sciences.

The journal covers subjects ranging from the analysis of food supply chains to crop genetic improvement, the use of advanced technologies in agriculture, and the social. economic. and environmental sustainability of agricultural practices. For example, a recent article discusses adding value in food supply chains, examining how specific indicators can measure changes and performance in the livestock sector in Slovenia.



Figure 9 - Cover of Agricultura Scientia Vol 20 No 1 (2023)

Agricultura Scientia is indexed in various databases and offers articles in PDF format, making them easily accessible to the scientific community and anyone interested. The publication

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process follows strict ethical and quality guidelines, ensuring the integrity of the research presented.

An article was published in Agricultura Scientia Vol 20 No 1 (2023) by J. Špela and A. Urbanek Krajnc from the Faculty of Agriculture and Life Sciences of the University of Maribor in Slovenia, one of the partners of the ARACNE project.

The publication can be viewed at the following link.

13.2 About the publication

The publication is a study on the composition of proteins and phenolic compounds in the leaves of different mulberry species (*Morus alba* L., *M. alba* × *rubra*, *M. australis* Poir., *M. nigra* L.). The authors, Špela Jelen and Andreja Urbanek Krajnc from the University of Maribor, compared the protein and phenolic contents of various mulberry species to determine species-specific differences. The study explores the potential use of mulberry leaves as animal feed and for pharmacological purposes.

The research utilized methods such as the Folin-Ciocalteu method for analysing total phenols and the Lowry method for determining total protein content. Additionally, individual phenols were analysed using high-performance liquid chromatography with UV/VIS detection.

The results show that the leaves of white mulberry (*Morus alba*) have a significantly higher protein content compared to the other species studied, making them more suitable as animal feed. On the other hand, black mulberry (*M. nigra*) and the hybrid *M. alba* × *rubra* exhibited the highest phenolic contents, indicating potential pharmacological applications.

The study identifies the leaves of *M. alba* as most suitable for animal feed due to their high protein content, while *M. nigra* and *M. alba* × *rubra* are more promising for pharmacological applications due to their high phenolic content.

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14. Phytochemical characterisation of the soroses of the old local mulberry genotypes and reintroduction of moriculture in Slovenia with the aim of different uses in agriculture

14.1 About the 5th Slovenian Horticultural Congress

The Slovenian Horticultural Society hosted the 5th Slovenian Horticultural Congress with international participation in Krško on January 17-18, 2024. The theme was "New Challenges Fruit Growing". in The Slovenian horticulture sector faces significant issues such as late frosts, droughts, and adverse economic conditions, necessitating fresh ideas and innovative approaches.



The congress provided a platform for researchers and producers to showcase advancements in fruit production and processing.

Key topics included:

- Economics and market aspects
- Fruit production technologies (including arboriculture and organic methods)
- Fruit quality
- Storage solutions
- Processing techniques

During the congress Members from the University of Maribor (partners of the ARACNE project), in collaboration with colleagues from the Department of Agriculture at the Biotechnical Faculty, University of Ljubljana, and the Institute of Biology at the University of Graz, presented a lecture titled "Phytochemical Characterisation of the Soroses of Old Local Mulberry Genotypes and Reintroduction of Moriculture in Slovenia for Various Agricultural Uses".

The publication included contributions from A. Urbanek Krajnc, J. Senekovič, Š. Jelen, M. Kozmos, J. Rabensteiner, M. Mikulič Petkovšek, and G. Osterc.

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The publication can be viewed at this link.

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14.2 Summary of the document contents

The text discusses the origins and uses of the white mulberry (*Morus alba* L.), a plant native to south and south-western China, primarily cultivated for its leaves used in sericulture. It traces its introduction to Europe in the 11th century and highlights its role in the landscape and sericulture history. The article emphasizes the value of old local cultivars as genetic resources for sustainable cultivation. It covers the various uses of mulberry, including fruit production, livestock feed, medicinal purposes, and materials like paper and textiles. It also reviews current research on mulberry genotypes, metabolite screening, and organoleptic properties. The final chapter emphasizes the objective to rejuvenate the silk industry of the Horizon Europe project ARACNE.

15. The Silkworm – History, Culture, Traditions and Science

The catalogue titled "The Silkworm: History, Culture, Traditions, and Science", authored by E. Moretto, S. Cappellozza, L. Salandin, and A. Saviane, commemorates the centenary of the Experiment Sericulture Station of Padua also giving an overview about important aspects related to the silk world.

publication This offers а detailed exploration of sericulture, encompassing historical evolution, its cultural significance, and scientific advancements. It provides an overview of the ARACNE Project, which focuses on preserving and promoting Europe's silk heritage by creating a European Silk Route. The catalogue traces the story of the Station and discusses the prospects of sericulture at the beginning of the new millennium, highlighting the roles of the Council for Agricultural Research and Economics (CREA) and the establishment of the CREA/Province of Padua Research and Museum Hub.



Figure 11 - Cover of The Silkworm

The Silk Road section delves into the origins of the silkworm, the historical journey of silk, and its significance in various cultures, including the Roman Empire, the Eastern Roman Empire, the Arab world, and Italy. Traditional rearing practices are examined in detail, describing the rearing rooms, egg incubation, and methods such as the "cavallone friulano" method. The process of cocoon harvest and initial processing steps is also covered. The section on egg production outlines the operations at the facilities and the management of

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hatching until the laying of eggs. The catalogue identifies the most dangerous diseases affecting silkworms and their impact on sericulture.

The "Padova" sericultural collection (1871-1960) and the "Ascoli Piceno" collection (1916-1958) are detailed, showcasing their organization and unique aspects. The relevance of these collections in understanding the development of sericulture is emphasized. The catalogue also discusses other silk-producing animals, highlighting the ancient collection of Quajat, important "wild silks", and different types of silk used in antiquity. The "Sea Fashion" section showcases rare specimens like byssus from *Pinna nobilis*, its processing, and items made from byssus.

Finally, the catalogue addresses quality assessment, explaining the commercial characteristics of cocoons and raw silk, assessment methods both visually and through laboratory tests, and the control and quality assessment processes for raw silk. This comprehensive resource enriches the understanding of sericulture for scholars, researchers, and enthusiasts by offering a detailed account of its history, practices, and cultural significance.

The catalogue can be viewed at the <u>following link</u>.

16. Development of a textile sheet mask design for facial care based on a 3D face model of an average woman

16.1 Overview of some aspects related to the document

The publication was published by The Journal of Engineered Fibers and Fabrics, Volume 19, January-December 2024. This is a peer-reviewed, completely open access periodical dedicated to publishing and promoting research on the application of engineering methodologies for designing fibrous structures (such as textiles, garments, composites) and fiber-based materials (like paper, flexible membranes, shells, plates, 3D printed materials, foams). It encompasses the entire lifecycle of textiles, from manufacturing to disposal, and covers facets including chemistry, engineering, design, administration, logistics, recycling, and education.

This journal welcomes original research and review articles that explore both foundational and applied research domains. Each manuscript submitted to the Journal of Engineered Fibers and Fabrics undergoes a rigorous peer review process to ensure the publication of high-caliber articles.

Topics within the scope of the journal include fiber chemistry, treatment, and environmental impact, as well as mechanical technology, physical characteristics, business administration, marketing, textile and apparel design, pattern creation, various applications, mathematical methodologies, modelling, automation, and educational practices.

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The publication saw the participation of three authors: A. Rudolf, S. Šterman and A. Cupar. The publication can be viewed at the <u>following link</u>.

16.2 Summary of the document contents

The document "Development of a Textile Sheet Mask Design for Facial Care Based on a 3D Face Model of an Average Woman" focuses on designing a facial textile sheet mask using a 3D model of an average woman's face obtained through 3D scanning technology. This study aims to enhance the effectiveness and comfort of facial sheet masks by optimizing their fit based on average facial measurements.

The research employed Poisson surface reconstruction to create a 3D face model that accurately represents the average dimensions of scanned female faces. By comparing these average facial measurements with those of existing masks on the market, the study identified significant discrepancies. Consequently, a new design for a textile sheet mask was developed, utilizing virtual prototyping to ensure a precise fit.

The use of software for virtual prototyping proved effective in developing the mask, allowing for simulations of its appearance and functionality. The final design adapts well to the contours of an average woman's face, particularly around the eyes, nose, and lips, ensuring comfort and efficient serum transfer from the mask to the skin. This approach not only enhances skincare benefits but also promotes sustainability using biocompatible materials and advanced technology.

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17. Plant Genetic Resources for Food and Agriculture: The Role and Contribution of CREA (Italy) within the National Program RGV-FAO

17.1 Overview of some aspects related to the document

The publication was published by MDPI -Multidisciplinary Digital Publishing Institute, an open access scientific journal publisher. Founded by Shu-Kun Lin initially as a repository for chemical samples, MDPI now publishes over 390 open access journals that undergo peer review. Today, it is among the largest publishers in the world by the number of articles published in open access journals. As of September 2022, MDPI publishes 399 peer-reviewed academic journals and nine conference journals. The publication described in this chapter is featured in Agronomy, which focuses on agriculture, Volume 14, Issue 6 (June 2024) which consists of 253 articles. The publication saw the participation of 31 authors, each from different research centres of CREA in Italy, each specialized in specific sectors of agriculture and agrarian research.



Figure 12 - Cover of the Volume 14, Issue 6 published by MDPI

In particular, the participation of Silvia Cappellozza from Council for Agricultural Research and Analysis of Agricultural Economics, Research Centre for Agriculture and Environment (CREA-AA), coordinator of the ARACNE project, should be highlighted.

The publication can be viewed at the following link.

17.2 Summary of the document contents

The document provides a comprehensive overview of the activities and contributions of CREA within Italy's National Program RGV/FAO.

The document begins by highlighting the importance of plant genetic resources for ensuring food security and addressing future challenges like climate change.

It mentions international agreements like the Convention of Biological Diversity, the Nagoya Protocol, and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Then it goes through the history of agricultural plant genetic resources

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conservation which is traced back to the early 20th century, emphasizing the contributions of Russian scientist Nikolai Vavilov.

The document outlines key milestones leading to the adoption of the ITPGRFA, including the establishment of the FAO Commission on Plant Genetic Resources and various FAO resolutions recognizing farmers' rights and national sovereignty over genetic resources.

CREA is one of the main organizations involved in Italy's RGV-FAO program, along with the National Research Council (CNR) and Reti Semi Rurali. CREA maintains a diverse collection of 40,186 accessions, including cereals, vegetables, fruits, forages, industrial crops, forest and woody crops, medicinal and aromatic plants, and their wild relatives. The document describes the *ex-situ* conservation methods used by CREA, including seeds, in vivo plants, vegetative organs, and in vitro plantlets, providing detailed descriptions of examples of Breeding Programs and Molecular Approaches, also outlying some specific crop collections.

The second part of this document describes the Italian strategy for the conservation, characterization, and valorisation of Plant Genetic Resources for Food and Agriculture (PGRFA), which faces challenges due to the fragmentation of management across three Italian ministries: the Ministry of Agriculture, Food Sovereignty and Forests (MASAF), the Ministry of University and Research (MUR), and the Ministry of the Environment and Energy Security (MITE). MASAF oversees PGRFA management and international reporting, MUR manages plant collections at the National Research Council and universities, and MITE handles biodiversity management, representing Italy in international bodies like the CBD and Nagoya Protocol. Additionally, Italian Regions and Autonomous Provinces play a role in implementing and enforcing the Treaty, supervised by MASAF.

The fragmentation leads to inefficiencies and resource wastage, as different entities often use varying molecular markers, complicating comparisons and evaluations of redundancies, synonymies, homonymies, and labelling errors. A centralized coordination would improve system rationalization.

In 2008, MASAF, in collaboration with Regions and Autonomous Provinces, implemented the National Plan on Biodiversity of Agricultural Interest (PNBA) to coordinate biodiversity initiatives and address arising issues. The aim was to establish a national system to protect agrobiodiversity, leading to the publication of National Guidelines in 2012. In 2015, Italy adopted Law No. 194 to protect and enhance food and agriculture biodiversity, establishing a National System for the Protection and Enhancement of Food and Agriculture Biodiversity. This system includes a national registry, network, portal, and a standing committee for coordination.

Custodian farmers and breeders play an active role in conserving local genetic resources. The Nagoya Protocol (NP) on Access and Benefit Sharing (ABS), part of the Convention on Biological Diversity (CBD), focuses on fair and equitable benefit-sharing of genetic resources. Italy has not ratified NP, leading to uncertainty. The bilateral ABS system of NP is seen as a potential obstacle to agricultural innovation.

Digital Sequence Information (DSI), derived from genetic resources, is another complex issue. Developing countries argue that ABS rules should apply to DSI. Currently, DSI lacks a precise definition and includes DNA, RNA, proteins, and phenotypic traits. Changing access rules for DSI could hinder scientific progress and global food security. The Kunming-Montreal Global

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Biodiversity Framework agreement at CBD COP15 recognized a multilateral mechanism for open access and benefit-sharing.

DSI impacts ITPGRFA negotiations, with major issues including the expansion of an annex to include all PGRFA, mandatory payments, and benefit-sharing from DSI/GSD. The next GB 11 meeting in 2025 aims to resolve these issues.

It should be noted that in the document, in the paragraph "Fruit", regarding fruit trees, there is a section about the ARACNE project which highlights that "Within the Horizon ARACNE project (2023–2026), the CREA mulberry collection is being genetically compared to other European and Asian mulberry collections (up to 500 accessions analyzed via ddRADseq) to infer very precisely the genetic diversity and the population structure of the germplasm and reconstruct the possible route of mulberry introduction in Europe".

18. The role of BACSA in sericulture regeneration in Europe and Central Asia

18.1 General overview

The present text describes a publication which, along with the three that immediately follow in this section of the Proceedings, is among those that are part of the collection characterizing the 10th BACSA International Conference titled "Regeneration of Sericultural Industries in the 21st Century", held in Soufli, Greece, from April 24th to 27th, 2023.

The text was written by P. Tzenov from Nauchen Tsentar Po Bubarstvo Vratsa, one of the project partners from Bulgaria, and S. Cappellozza and A. Saviane from the Council for Agricultural Research and Analysis of Agricultural Economics, Research Centre for Agriculture and Environment (CREA-AA), coordinator of



10th BACSA INTERNATIONAL CONFERENCE

"Regeneration of sericultural industries in 21st century"

"REGESERI" 2023



Soufli, Greece

April 24th – 27th 2023 Figure 13 - Cover of the collection of publications from BACSA

These texts have been selected from all those presented at the conference because their content contains elements that connect them to the ARACNE project.

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The publication can be viewed at the <u>following link</u>.

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the ARACNE project.



18.2 About the document

The text discusses the creation and activities of BACSA (Black, Caspian Seas and Central Asia Silk Association), an international association founded in 2005 to promote sericulture and small enterprise development in the Black Sea, Caspian Sea, and Central Asia regions. BACSA was established following a workshop organized by FAO and the government of Uzbekistan to address the challenges facing the silk industry in Eastern Europe, the Caucasus, and Central Asia, regions with a long tradition of sericulture and high income-generating potential.

The association, initially comprising 9 countries, has grown to include 22 countries and over 70 individual members and 4 institutional members. BACSA has organized several international conferences and prepared projects to promote sericulture, although only a few of these have been funded.

The text also discusses common problems of global sericulture, such as the concentration of silk production in China and India, and the difficulties faced by BACSA member countries in preserving genetic resources and developing a sustainable silk industry. The need for funding and technological innovations to bridge the technological gap with other agricultural crops is emphasized.

Additionally, the text highlights the growing interest of the European silk industry, particularly in Italy and Switzerland, in establishing part of the cocoon production in Europe, the Caucasus, and Central Asia. A cultural project, "The European Silk Route", is mentioned, which aims to create a cultural and tourism network in Europe linked to the sericulture tradition.

In the final part, the text explores the future prospects of sericulture, including the increasing demand for non-textile silk for biomedical and cosmetic applications, and the potential of biotechnological innovations in producing functional silk. The role of the European Green Deal in promoting sericulture as a sustainable agricultural practice and part of circular economies is also discussed.

19. The ARACNE project: Advocating the Role of silk Art and Cultural heritage at National and European level

19.1 About the publication

The present text describes the second publication linked to the ARACNE project which, along with other three, is among those that are part of the collection characterizing the 10th BACSA International Conference titled "Regeneration of Sericultural Industries in the 21st Century", held in Soufli, Greece, from April 24th to 27th, 2023.

The text was written by A. Saviane, G. Fila, and S. Cappellozza from the Council for Agricultural Research and Analysis of Agricultural Economics, Research Centre for Agriculture and Environment (CREA-AA), coordinator of the ARACNE project.

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The text describes two projects related to silk and its associated cultural heritage, funded by the European Union, and aimed at preserving and promoting the traditions linked to silk production.

The ARACNE project, named after the Greek myth of Arachne, who was turned into a spider after challenging the goddess Athena to a weaving contest, stands for "Advocating the Role of silk Art and Cultural heritage at National and European level". This project aims to preserve and valorise cultural values and traditional skills associated with the silk world. Historically, silk has significantly contributed to the development of the European economy and arts. The ARACNE project envisions the silk sector as a foundation for a future European silk route, intended as a cultural itinerary across Europe.

The project is divided into six work packages. WP1 focuses on collecting local data about silk's cultural heritage and recreating a European heritage of silkworms and mulberries through the identification and selection of old mulberry varieties and Bombyx mori strains to build the base for typical/local productions. The WP2 leader group will use the information collected through WP1 to create virtual maps of silk museums and points of interest connected to the silk cultural heritage. Concurrently, other partners will develop new production chains based on non-woven silk, "zero km" silk, and silk as a raw material for biotech applications. WP3 addresses business, governance, and financing models to improve the built cultural heritage of silk and includes strategies to support companies and start-ups involved in the project. In WP4, all partners will leverage the experience of a local French silk route to develop their own itineraries, which will then be unified under a unique European silk route. WP5 covers communication, dissemination, and exploitation topics, engaging partners, local communities, and stakeholders for medium- to long-term impact. WP6 concerns the management of the ARACNE project. Overall, the project aims to build a resilient silk innovation ecosystem based on traditions, architecture, and both tangible and intangible heritage by involving museums, local communities, and general stakeholders. Additionally, the project aligns with the objectives of the New Green Deal and the New Bauhaus.

The publication can be viewed at this link.

20. The silk niche production in Italy

20.1 About the publication

The present text describes the third chosen publication linked to the ARACNE project which, and this too is among those that are part of the collection characterizing the 10th BACSA International Conference titled "Regeneration of Sericultural Industries in the 21st Century", held in Soufli, Greece, from April 24th to 27th, 2023.

The text was written by A. Saviane, G. Paglia, A. Dalla Montà, S. Cappellozza, from the Council for Agricultural Research and Analysis of Agricultural Economics, Research Centre for Agriculture and Environment (CREA-AA), coordinator of the ARACNE project.

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silk industry is highlighted. Additionally, experimental procedures for preparing the pupae for chemical analysis, including drying, grinding, and measuring various biochemical components such as proteins, fats, vitamin E, and minerals, are described.

The results indicate that Saturnia pyri pupae are a rich source of proteins, fats, and essential minerals, with potential applications in nutrition, cosmetics, and medicine. The article concludes that further research could expand the applications of Saturnia pyri pupae, contributing to the development of nutritional science and biomedicine.

The publication can be viewed at the following link.

21. Labor Saving Technology for Silkworm Rearing in Bulgaria

21.1 About the text

The present text describes the fourth and last chosen publication linked to the ARACNE project which, and this too is among those that are part of the collection characterizing the 10th BACSA International Conference titled "Regeneration of Sericultural Industries in the 21st Century", held in Soufli, Greece, from April 24th to 27th, 2023.

The publication was written by P. Tzenov, who belongs to Nauchen Tsentar Po Bubarstvo Vratsa, one of the project partners from Bulgaria, and K. Avramova and D. Grekov both from the Agricultural University of Plovdiv in Bulgaria.

The text is a scientific report on a four-year study (2019-2022) conducted at the Scientific Centre on Sericulture in Vratsa, Bulgaria, to test a labour-saving technology for silkworm rearing using three Bulgarian hybrids tolerant to adverse conditions. The study aimed to reduce cocoon production costs and make sericulture more profitable for farmers.

The experiment was designed to take place during the spring season, using 9 boxes of silkworm eggs per year. The larvae were initially reared in cardboard boxes and later transferred to constructions with movable trays. Feeding schedules varied by larval stage, and the rearing environment was adjusted to minimize labour and energy costs.

The technology employed included methods to save labour, such as feeding larvae once or twice daily and using whole mulberry branches for feeding from the third instar onward. The rearing room was not heated or cooled, leveraging the hybrids' tolerance to adverse conditions. The study measured various performance metrics, including cocoon yield, percentage of cocoons with live pupae, cocoon weight, silk shell weight, and silkiness. Data were collected and processed mathematically. The results showed higher cocoon yield and a high percentage of cocoons with live pupae, while reducing labour expenditures (1.8 hours per kg of fresh cocoons compared to 3.7 hours with standard technology). There were variations in cocoon weight, silk shell weight, and silkiness across different hybrids and years.

Each hybrid exhibited different performance trends. The Nova 2 x HB2 hybrid showed an increase in cocoon yield over the years with high survival rates but a decrease in cocoon weight and silk shell weight. The SN1 x Iva1 hybrid had lower yields and significant variations in cocoon weight and silk shell weight, particularly in 2021 due to poor mulberry leaf quality.

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The Iva1 x VB1 hybrid maintained consistently high yields, increased cocoon weight, and stable silk shell weight, making it the best-performing hybrid in terms of cocoon yield and silk shell weight.

In conclusion, the labour-saving technology was effective in producing high cocoon yields and a high percentage of live pupae while reducing labour and energy costs, making it a viable alternative to traditional rearing methods. Overall, the study demonstrates the potential for improving sericulture efficiency and profitability through innovative rearing technologies.

The publication can be viewed at this link.

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Conclusions

Having a list of scientific and dissemination publications in a European project is crucial for several reasons, as it ensures transparency and traceability, providing clear and precise documentation of the project's activities and results. This is essential for demonstrating the project's effectiveness and impact to funders and collaborators.

Scientific publications also help assess the project's impact: the originality and quality of the research can be measured through citations and the impact factor of the journals in which the research is published. Additionally, these publications are key for sharing the project's results with the scientific community and the public, facilitating the dissemination of discoveries and potential further collaborations.

Another important reason is that, in many European research funding programs, the production of scientific and dissemination publications is a criterion for evaluation. Having a complete and up-to-date list can positively influence the project's evaluation and future funding opportunities. Finally, maintaining a detailed list of publications helps ensure that all participants' contributions are adequately recognized and demonstrates compliance with reporting and data publication obligations, which are often required for EU-funded projects.

This compilation, which will be updated at the project's conclusion with a second and definitive version, has been prepared with these objectives in mind. It is intended to serve as both a guide and a repository for the consultation of the various publications envisaged by the ARACNE project throughout its duration.

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ACRONYMS

[ACR]	ACRONYM
[ABS]	Access and Benefit Sharing
[CBD]	Convention on Biological Diversity
[CNR]	National Research Council
[DSI]	Digital Sequence Information
[DSI/GSD]	Digital Sequence Information / Genetic Sequence Data
[DNA]	DeoxyriboNucleic Acid
[FST]	Fixation Index
[GA]	Grant Agreement
[ITPGRFA]	International Treaty on Plant Genetic Resources for Food and Agriculture
[MASAF]	Ministry of Agriculture, Food Sovereignty and Forests
[MDPI]	Multidisciplinary Digital Publishing
[MITE]	Ministry of the Environment and Energy Security
[MUR]	Ministry of University and Research
[NP]	Nagoya Protocol
[PGRFA]	Plant Genetic Resources for Food and Agriculture
[PNBA]	National Plan on Biodiversity of Agricultural Interest
[RGV/FAO]	Risorse Genetiche Vegetali/Food and Agriculture Organization
[RNA]	RiboNucleic Acid
[UV–VIS]	Ultraviolet–Visible Spectrophotometry
[WP]	Work package

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Annex I

The present annex provides a collection of links to the various publications cited in this deliverable in the order in which they were mentioned.

List of the publication in the DISSEMINATION section

- 1. Agrarian Biodiversity: The Vivaro's centuries-old mulberry trees to be saved
- 2. <u>A machine has been designed to facilitate silkworm farming</u>
- 3. <u>The "Italian Silk Road" narrated by municipal emblems</u>
- 4. Svilarska tradicija Silk-Weaving Tradition
- 5. <u>Centuries-old Mulberries: A Living Monument to Sericulture in Slovenia</u>
- 6. <u>Silk Unveiled: First Narrative Catalogue</u>
- 7. <u>Sericulture Σηροτροφία</u>

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List of the publication in the SCIENTIFIC PUBLICATIONS section

- 1. <u>The Darker the Better: Identification of Chemotype Profile in Soroses of Local and</u> <u>Introduced Mulberry Varieties with Respect to the Colour Type</u>
- 2. <u>Population Genetic Studies of Silkworm (Bombyx mori L.)</u> and Phylogenetic <u>Relationships</u>
- 3. <u>Composition of Proteins and Phenolics in the Leaves of Different Mulberry Species</u> (*Morus alba* L., *M. alba* × *rubra*, *M. australis* Poir., *M. nigra* L.)
- 4. <u>Phytochemical characterisation of the soroses of the old local mulberry genotypes</u> <u>and reintroduction of moriculture in Slovenia with the aim of different uses in</u> <u>agriculture</u>
- 5. <u>The Silkworm History, Culture, Traditions and Science</u>
- 6. <u>Development of a textile sheet mask design for facial care based on a 3D face model</u> <u>of an average woman</u>
- 7. <u>Plant Genetic Resources for Food and Agriculture: The Role and Contribution of CREA</u> (Italy) within the National Program RGV-FAO
- 8. The role of BACSA in sericulture regeneration in Europe and Central Asia
- 9. <u>The ARACNE project: Advocating the Role of silk Art and Cultural heritage at National</u> <u>and European level</u>
- 10. The silk niche production in Italy
- 11. Labor Saving Technology for Silkworm Rearing in Bulgaria

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