

NEW FRONTIERS IN BIODEGRADABILITY

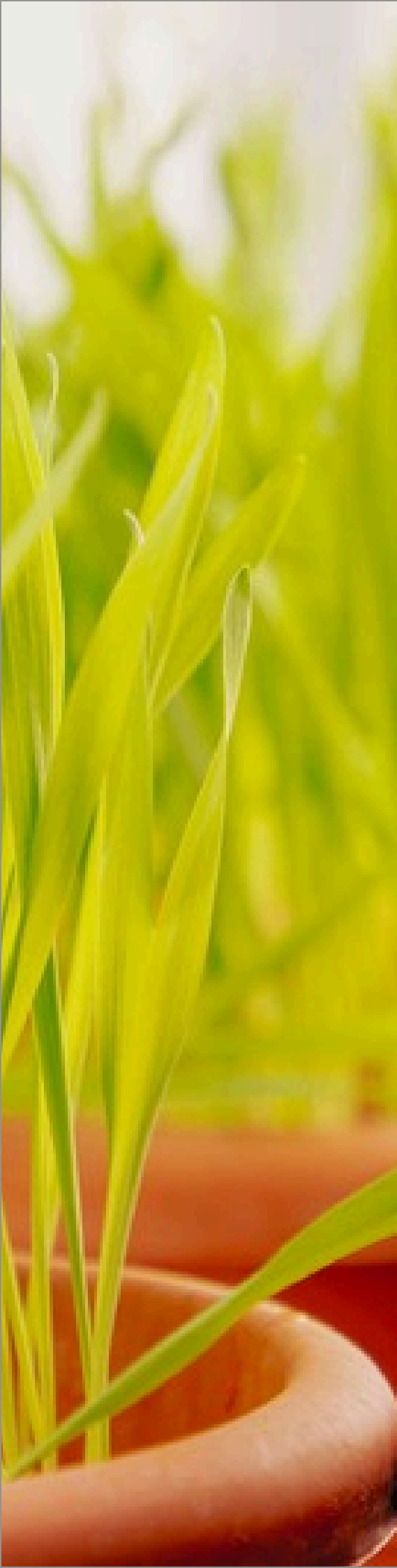
From the laboratory to the future of
materials science

ARCHA's expertise for a sustainable future

2025

Part of viridiusLAB

ARCHA



NEW FRONTIERS IN BIODEGRADABILITY

**From the laboratory to the future of
materials science
ARCHA's expertise for a sustainable future**

*"The mind that embraces a new idea
never reverts to its former dimension."*

ALBERT EINSTEIN





SCIENCE, EXPERIENCE, AND INNOVATION FOR ENVIRONMENTAL SUSTAINABILITY.

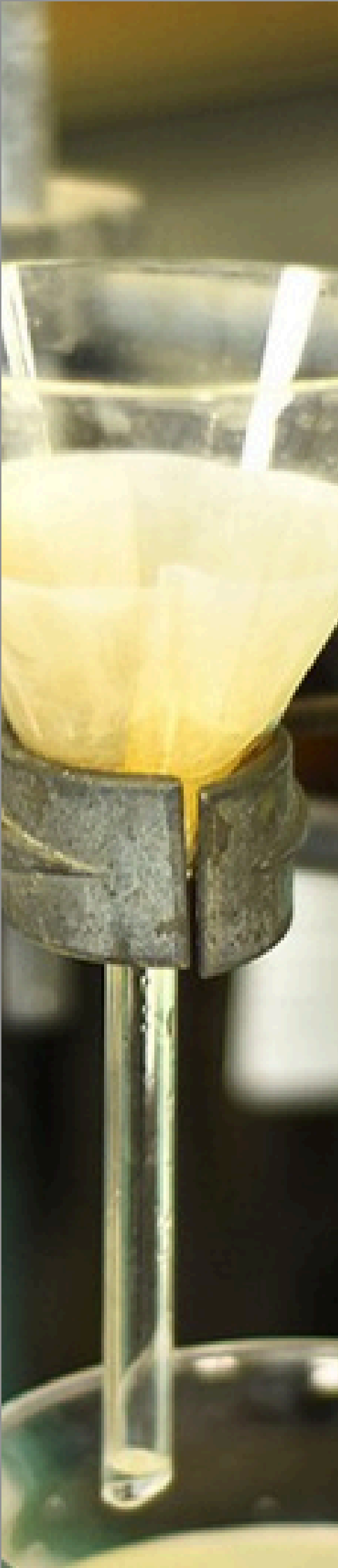
With offices located in Pisa, Valle d'Aosta, Brescia, and Cosenza, ARCHA provides support to businesses, organizations, and institutions through analysis, research, and technological development.

By integrating scientific rigor, continuous learning, and a commitment to excellence, we strive daily to create a safer and more responsible future.

Our strength resides in our scale and technical proficiency, as well as our capacity for evolution: we consistently invest in research, technology, and training, partnering with universities, organizations, and companies to create dependable and sustainable solutions.

We are a substantial laboratory and a research and development center where science transcends mere measurement to foster ideas, processes, and innovation.





Environmental science

Utilizing advanced technologies and a team of highly skilled professionals, we conduct chemical, physical, and microbiological analyses across all primary environmental matrices: water, air, soil, waste, and emissions.

Our tests, accredited in accordance with the UNI CEI EN ISO/IEC 17025 standard, ensure reliable and internationally comparable results.

Quality is not merely a goal; it is a daily commitment.

Every analysis, project, and procedure at ARCHA adheres to certified management systems and stringent internal controls to guarantee optimal precision and transparency.

Our laboratory adheres to key reference standards, including ISO 9001, ISO 14001, ISO 45001, ISO 17025, SA8000, and Gender Equality, to ensure professionalism, safety, and social responsibility.

We assert that trust is founded on facts, and quality represents the most tangible expression of respect for those who depend on us.



**PREMIO NAZIONALE
PER L'INNOVAZIONE**

LABORATORI ARCHA SRL

CATEGORIA

INDUSTRIA E SERVIZI

PICCOLA E MEDIA IMPRESA

Il Premio è istituito presso la Fondazione
per l'Innovazione Tecnologica COTEC
per concessione del
Presidente della Repubblica Italiana

THE REFERENCE FOR COMPANIES COMMITTED TO INNOVATION AND SUSTAINABLE DEVELOPMENT

For more than thirty years, we have integrated research, analysis, and innovation to transform science into a catalyst for sustainable growth for both businesses and the local community.

In ARCHA, research and analysis are seamlessly integrated.

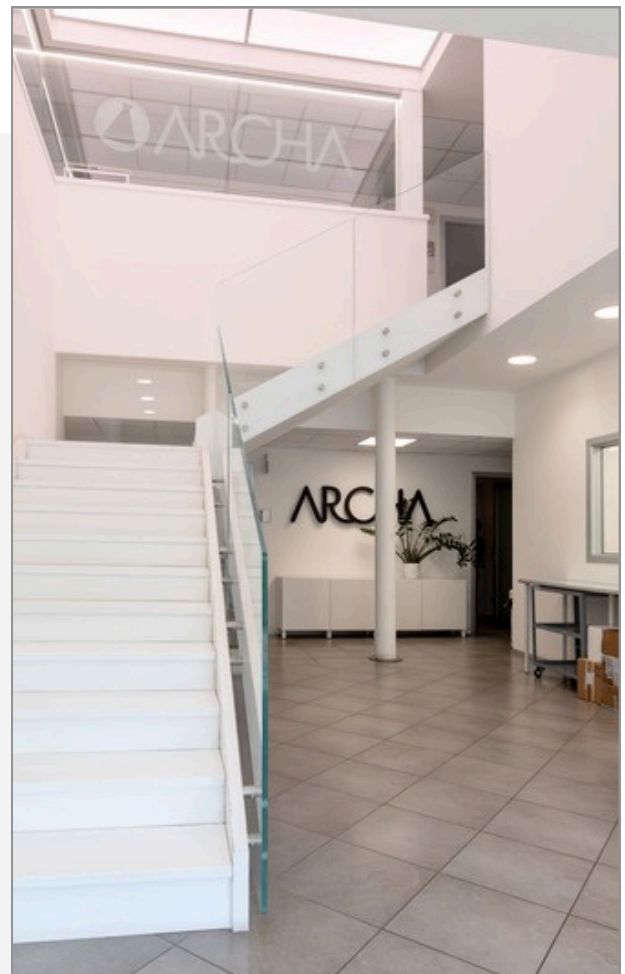
Every laboratory test represents an opportunity to acquire knowledge, enhance processes, and discover more effective solutions for both the environment and industry.

Our strength derives from a synthesis of experience, expertise, and scientific enthusiasm, coupled with a steadfast dedication to quality and sustainability.

At ARCHA, science has consistently served the local community, businesses, and the future.

OUR AIMS AND OBJECTIVES

From this vision arises our most tangible commitment: to investigate and assess the biodegradability of materials in the laboratory to construct a genuinely sustainable future.





**FROM THE LABORATORY
TO THE FUTURE OF
MATERIALS SCIENCE**



A GLOBALLY RECOGNIZED LABORATORY

ARCHA is among the select laboratories globally that are officially accredited for biodegradability and compostability testing, receiving recognition from esteemed international organizations including TÜV Austria, DIN CERTCO, REAL, JBPA, ABA, and BPI.

These accreditations validate the capacity to perform tests in accordance with the principal European and international standards (EN, ISO, OECD) and ensure reliable, reproducible, and globally recognized outcomes.

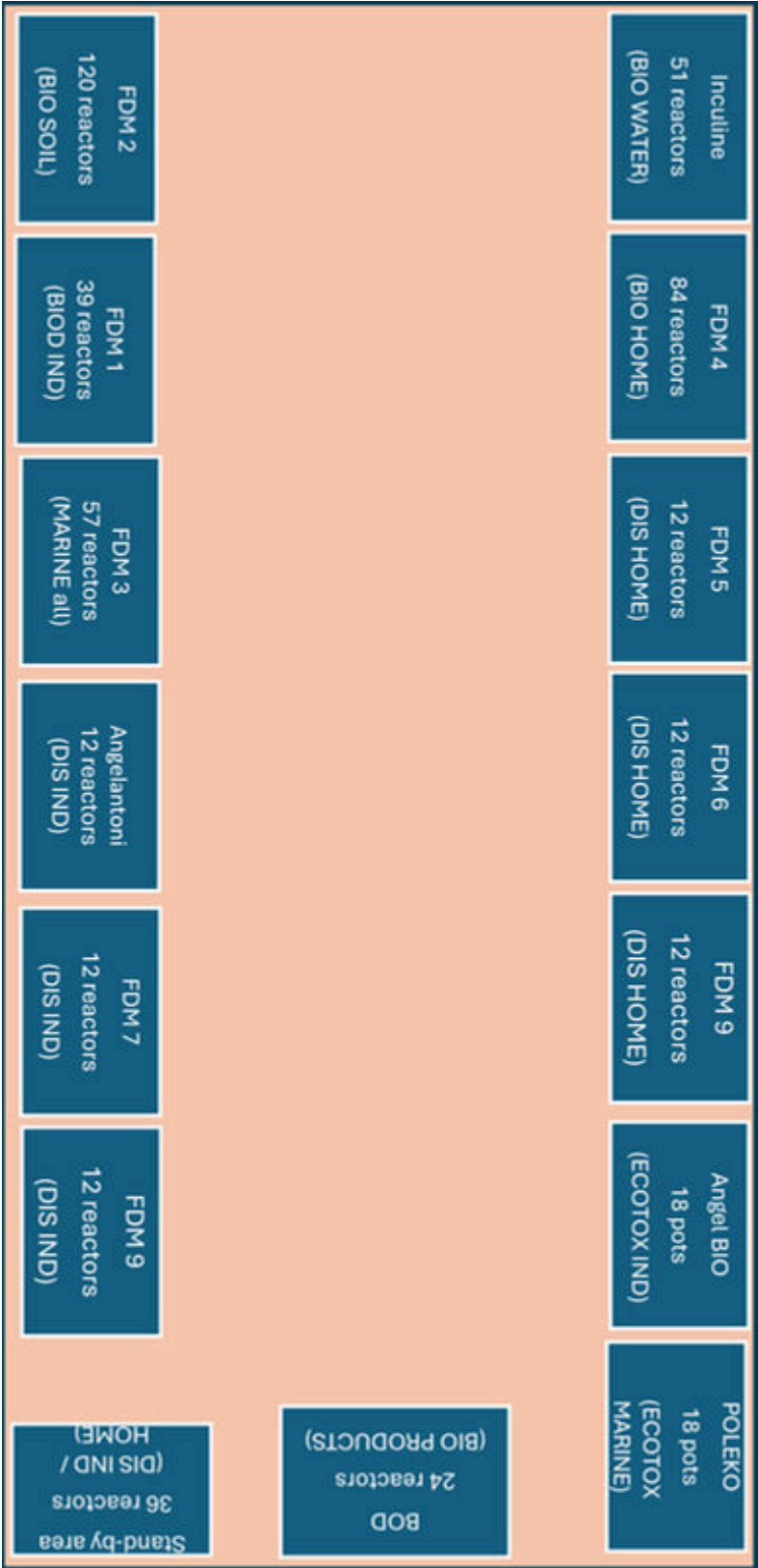
Tests are conducted under regulated and certified conditions, tailored to the specific material type and the environment in which it will be utilized, to assess the rate, extent, and safety of the degradation process.



**OUR LABORATORY IS
DEDICATED TO TESTING.**

11 climate chambers

2 growth chambers





Biodegradability and Compostability

ARCHA's expertise for a sustainable future

The environmental challenge confronting the world today extends beyond merely reducing plastic consumption; it necessitates a fundamental reevaluation of how materials are produced, utilized, and reintegrated into the ecosystem.

In this context, biodegradability serves as a crucial element in fostering a more sustainable future and ensuring that industrial innovation advances in harmony with environmental preservation.

The most effective solutions emerge from the integration of experience and curiosity.

Since 2012, ARCHA has dedicated itself to the study, characterization, and certification of the biodegradability and compostability of materials, establishing itself as a reference point for companies, research centers, and institutions at both the European and international levels.

The expertise acquired in the bioplastics, composite materials, textiles, and leather industries has positioned ARCHA as a premier scientific partner for those aiming to create products that are genuinely aligned with the principles of the circular economy.

Our expertise in this domain represents the intersection of science, sustainability, and innovation; for it is only through a comprehensive understanding of contemporary materials that we can develop those of the future.

PRODUCTS/SECTOR OF APPLICATION

- Flexible films for industrial, residential, and soil certifications
- Food and non-food packaging uses
- Coffee capsules for industrial and residential certifications
- Rigid packaging for pipette tips (Mettler Toledo)
- Used tea bags, materials, and printing inks (Twinings)
- Moist towelettes (industrial and domestic)
- Strings and ribbons for securing plants (ground)
- Laundry bags (commercial and domestic)
- Cat litter (commercial and residential)
- Mussel cultivation lines (marine)
- Toilet Glitter (Freshwater)
- Filling material for soccer fields (industrial, marine, freshwater)
- Sponges for personal hygiene (domestic use)
- Fibers and yarns as intermediary products (industry/marine/freshwater)
- Fabrics and exquisite textiles (industrial and residential)
- Leather and hides
- Completed goods for the fashion industry



PLASTIC AND SUSTAINABLE MATERIALS SECTOR



BIODEGRADABILITY AND COMPOSTABILITY



Global plastic production has increased from 15 million tons in 1964 to over 310 million tons annually today. Since 1950, when the extensive use of plastic commenced, we have produced 8.3 billion tons of plastic. Living without plastic will be IMPOSSIBLE, even in the future. The plastic dilemma cannot be resolved merely by opting to "stop using plastic," but rather through three key behaviors:

1. Promoting awareness of the subject
2. Advanced plastic recycling
3. Developing sustainable plastics

Since 2012, ARCHA has collaborated with Italian and European partners to research innovative systems for the production of bioplastics and plastic materials.

He is engaged in the development of biodegradable active packaging for food, pharmaceuticals, and cosmetics utilizing polylactic acid (PLA), which is coated with a biodegradable nanoparticle layer that possesses antimicrobial properties.

In addition to the production of biodegradable plastics, testing and trials are essential to verify, certify, and grant the necessary approval for the product's market launch.

TESTING AREAS AND REFERENCE STANDARDS

ARCHA certification and recognition programs (TÜV Austria – DIN CERTCO – REAL - JBPA - BPI)



JBPA 日本バイオプラスチック協会
Japan BioPlastics Association

■ JBPA-9 :
ARCHA SRL



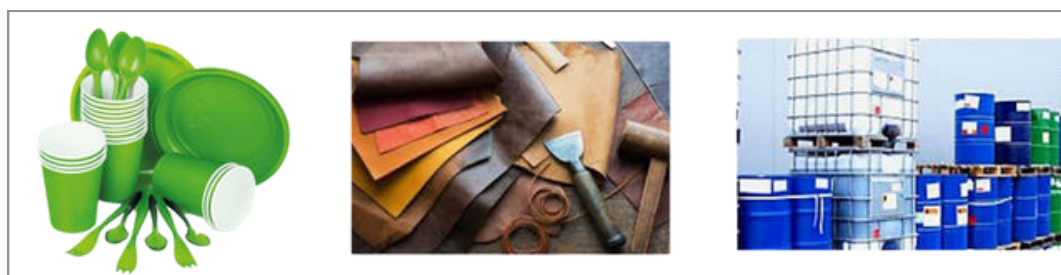
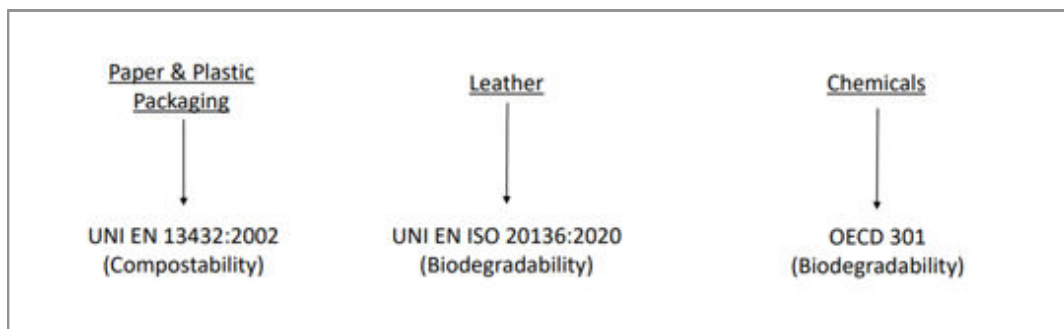
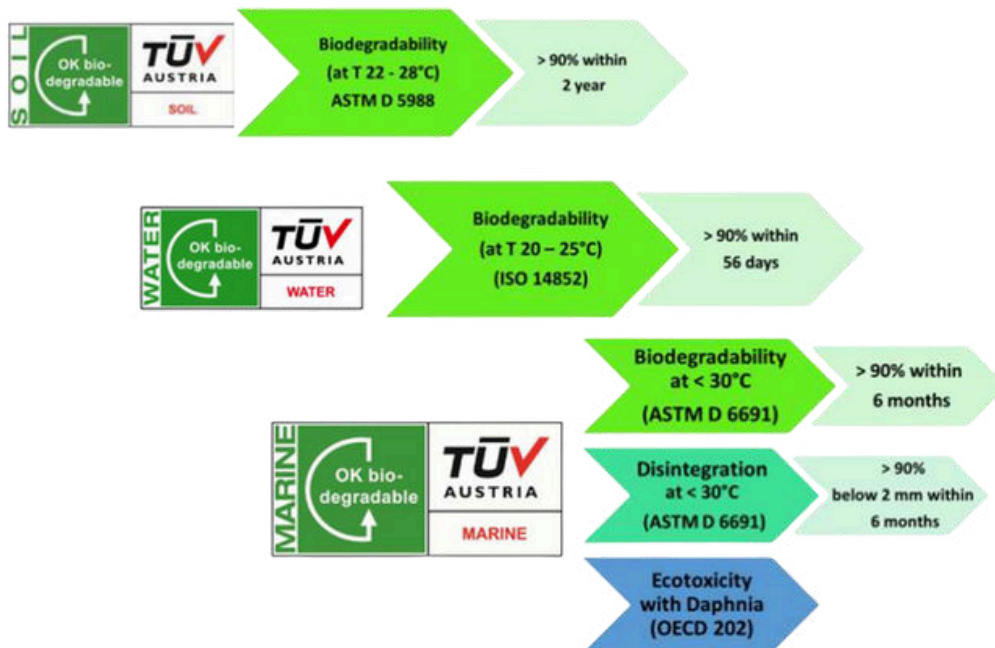
BPI



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TESTING AREAS AND REFERENCE STANDARDS

ARCHA certification and recognition programs (TÜV Austria – DIN CERTCO – REAL – JBPA – BPI)



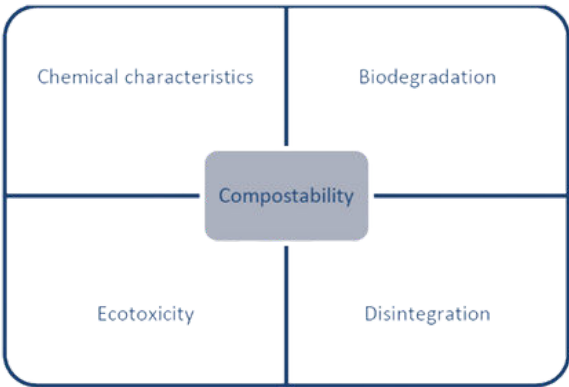
A close-up photograph of a young plant seedling emerging from dark, rich soil. The seedling has a bright yellow stem and a dark, elongated, and textured seed head. The soil is dark brown with visible roots and organic matter.

INDUSTRIAL COMPOSTING PROGRAMS

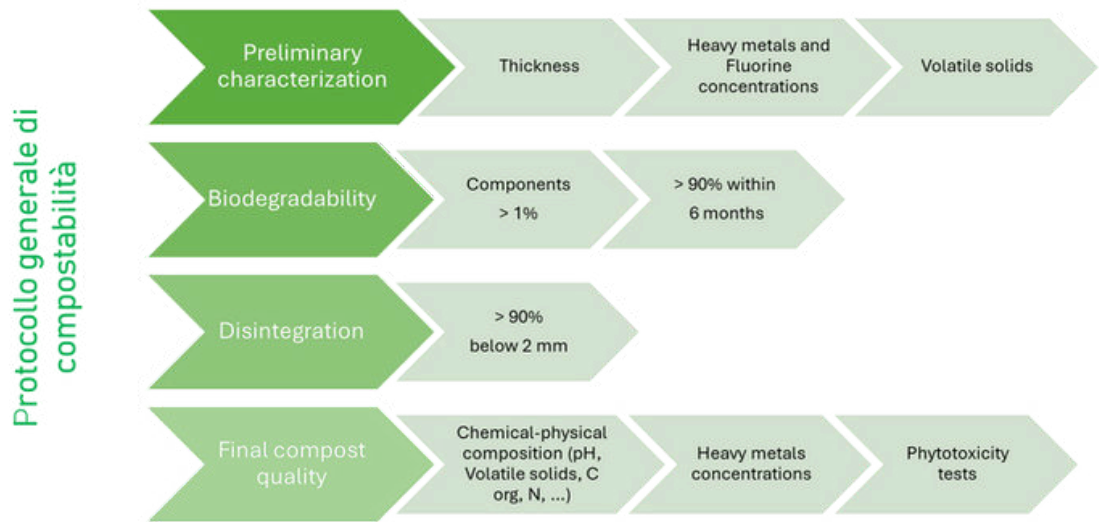
TESTING AREAS AND REFERENCE STANDARDS

Regulation EN 13432:2000

Requirements for packaging derived from composting and biodegradation: Test protocol and assessment criteria for final approval of packaging.



EN 13432:2000 – Requisiti



TESTING AREAS AND REFERENCE STANDARDS

Regulation EN 13432:2000



MU		EN 13432:2000
As	mg/kg dm	5
Cd	mg/kg dm	0,5
Cr tot	mg/kg dm	50
Cu	mg/kg dm	50
Hg	mg/kg dm	0,5
Mo	mg/kg dm	1
Ni	mg/kg dm	25
Pb	mg/kg dm	50
Se	mg/kg dm	0,75
Zn	mg/kg dm	150
F	mg/kg dm	100
VS	% w/w dm	> 50



TESTING AREAS AND REFERENCE STANDARDS

Biodegradability assessments: ISO 14855-1 methodology.

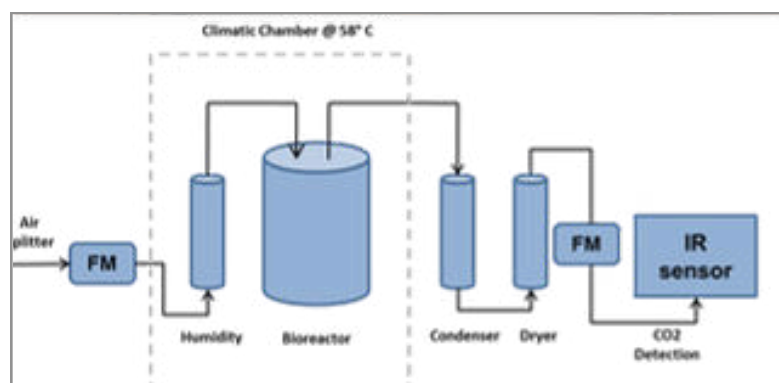


The testing method measures the extent and rate of aerobic biodegradation of plastic materials in a regulated composting environment.

DESCRIPTION:

The test is conducted on three replicates for each sample and employs cellulose as a positive biodegradability control, alongside a blank control that consists solely of the inoculum and the test material.

The test material may be classified as "biodegradable under composting conditions" if its degradation reaches a minimum of 90% within a period of less than six months.





TESTING AREAS AND REFERENCE STANDARDS

ISO 16929 - "Plastics - Assessment of the degree of disintegration of plastics under specified composting conditions in a pilot-scale test"



DESCRIPTION:

The test plastic components are combined with a prepared solid matrix consisting of synthetic solid waste and mature compost. The test is conducted on two replicates for each sample.

Each reactor is positioned in an air-circulating oven for a duration of 12 weeks.

The degree of disintegration is assessed following a composting cycle by passing the final matrix through a 2 mm sieve to retrieve the undisintegrated residues.

The disintegration test is deemed effective if fewer than 10% of the original mass of the loaded samples passes through the 2 mm sieve after a duration of 12 weeks.



TESTING AREAS AND REFERENCE STANDARDS



	Blank final compost	Test material final compost	Optimal values for agronomic application
Dry matter (105°C) (%)	55,0	57,1	≥ 50%
pH	7,32	7,61	6 - 8,5
Organic Carbon % dm	27,2	32,4	≥ 20% dm
C/N ratio	9,7	11,0	≤ 25

	UM	Blank final compost	Test material final compost	EU Limits for Fertilisers
Cd	mg/kg dm	0,221	0,300	1,5
Cr VI	mg/kg dm	< 1	< 1	absent
Cr tot	mg/kg dm	6,29	7,8	-
Cu	mg/kg dm	26,4	39,1	230
Hg	mg/kg dm	< 0,1	< 0,1	1,5
Ni	mg/kg dm	5,87	7,3	100
Pb	mg/kg dm	3,20	6,33	140
Zn	mg/kg dm	132	224	500

TESTING AREAS AND REFERENCE STANDARDS

OECD 208 (2006) “Terrestrial Plant Test: Seedling Emergence and Growth Assessment”

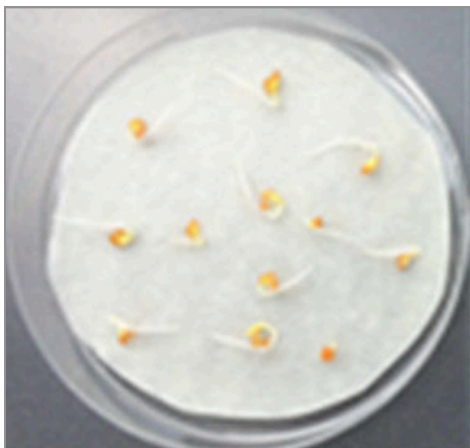


DESCRIPTION:

The tests assess the variations in toxic or phytotoxic potency between the control compost (blank sample) and the final compost produced from the degradation of the developed materials, at two concentration levels.

According to the EN 13432 standard, the assessment of any toxic effects may be conducted through:

- germination assessment
- plant development assessments



The germination rate and plant biomass of both species must meet or exceed 90% of the control test values at each dilution tested.



HOME COMPOSTING INITIATIVES

TESTING AREAS AND REFERENCE STANDARDS

ACCORDING TO NF T 51-800 AND AS 5810



Biodegradability
(at $T < 30^{\circ}\text{C}$)
ISO 14855

> 90% within
1 year



Disintegration
(at $T < 30^{\circ}\text{C}$)
ISO 16929 or ISO 20200

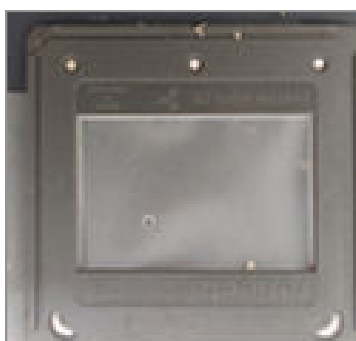
> 90%
(quantitative)
> 81%
(qualitative)
after 6 months





TESTING AREAS AND REFERENCE STANDARDS

QUALITATIVE DISINTEGRATION TEST (ISO 20200)



TIME ZERO



2 MONTHS



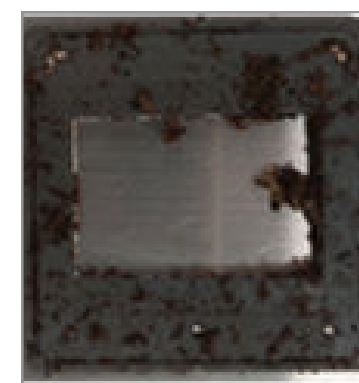
15 DAYS



3 MONTHS



1 MONTH



4 MONTHS

A photograph showing several young corn seedlings growing in a field. The plants are small, with green leaves and yellowish-green stems, and are spaced out in rows. They are growing through a layer of clear plastic mulch that has been laid over the soil. The background is dark and out of focus, suggesting a field setting. The text "SOIL BIODEGRADABILITY PROGRAMS" is overlaid in white, bold, sans-serif capital letters in the lower-left quadrant of the image.

SOIL BIODEGRADABILITY PROGRAMS

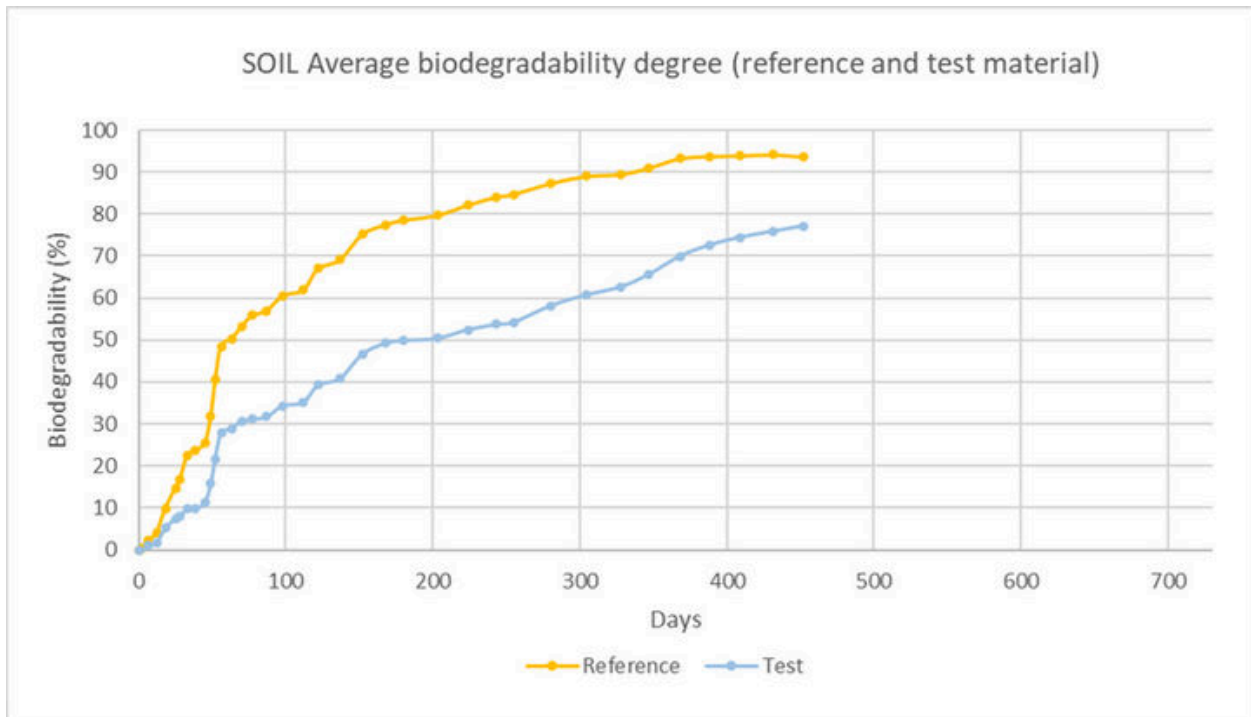
TESTING AREAS AND REFERENCE STANDARDS

ACCORDING TO EN 17033 AND EN 13432



Biodegradability
(at T 22 - 28°C)
ASTM D 5988

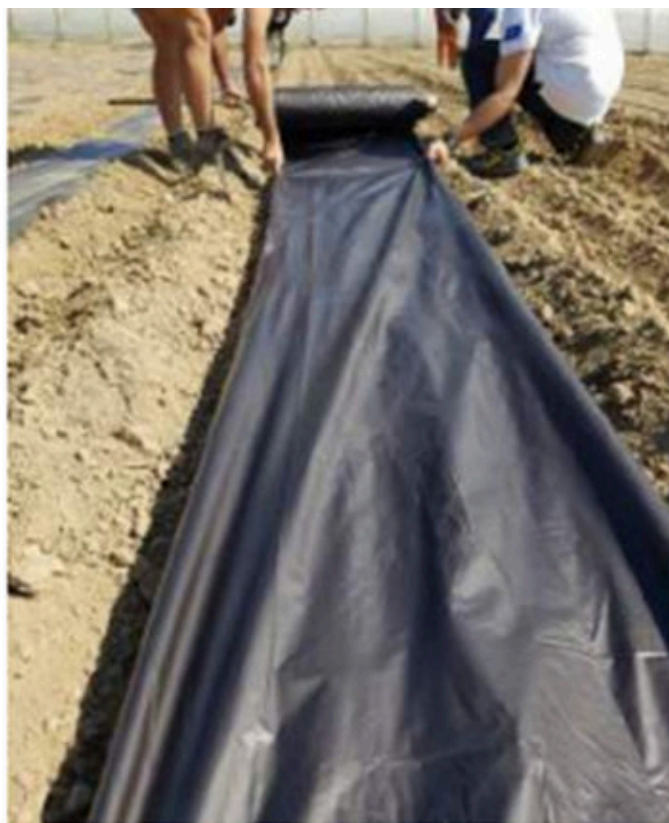
**> 90% within
2 year**





TESTING AREAS AND REFERENCE STANDARDS

ACCORDING TO EN 17033 AND EN 13432





MARINE BIODEGRADABILITY PROGRAMS

TESTING AREAS AND REFERENCE STANDARDS

ACCORDING TO "OK biodegradable MARINE" or ISO 22403



Biodegradability
 $T < 30^{\circ}\text{C}$
(ASTM D6691)

> 90%
within 6
months



Disintegration
at $T < 30^{\circ}\text{C}$
(ASTM D6691)

> 90% below 2 mm
after 12 weeks

Ecotoxicity with
Daphnia
(OECD 202)

> 90% of
organisms is
mobile after 48
hours.

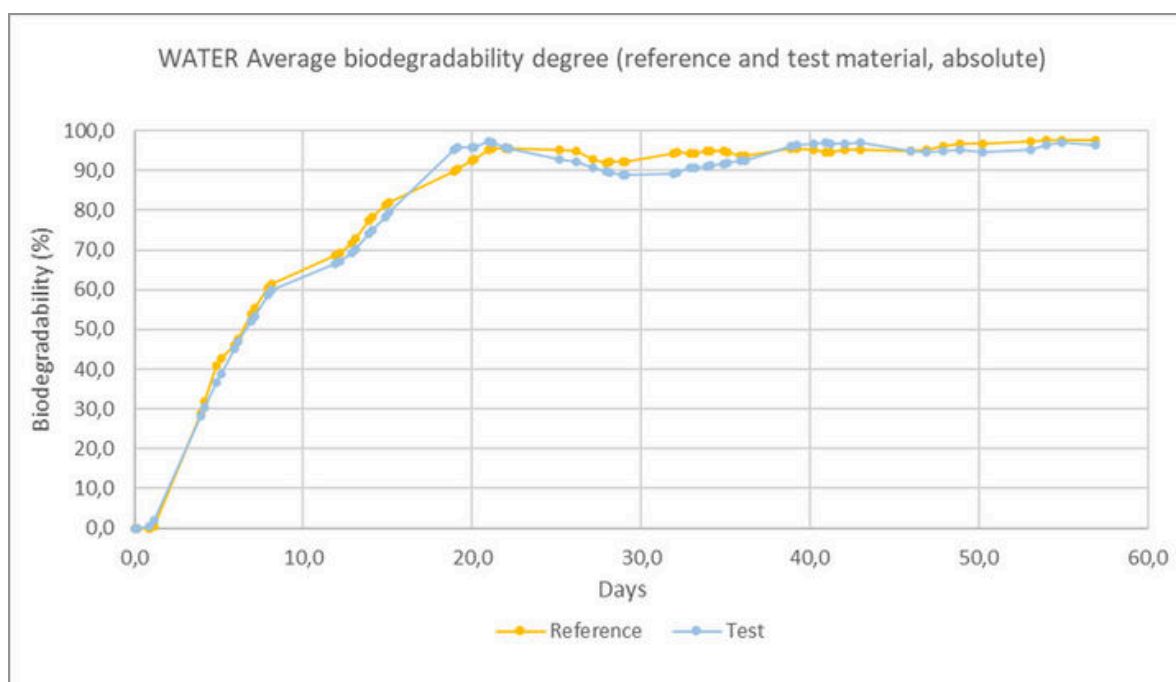


A clear plastic bottle with a blue cap is floating in dark, rippling water. The bottle is partially submerged, with its top and middle sections visible above the surface. It is surrounded by long, green blades of grass that are partially submerged and some are floating on the water's surface. The scene is dimly lit, with the water reflecting some light, creating a somber and environmental atmosphere.

WATER BIODEGRADABILITY PROGRAM

TESTING AREAS AND REFERENCE STANDARDS

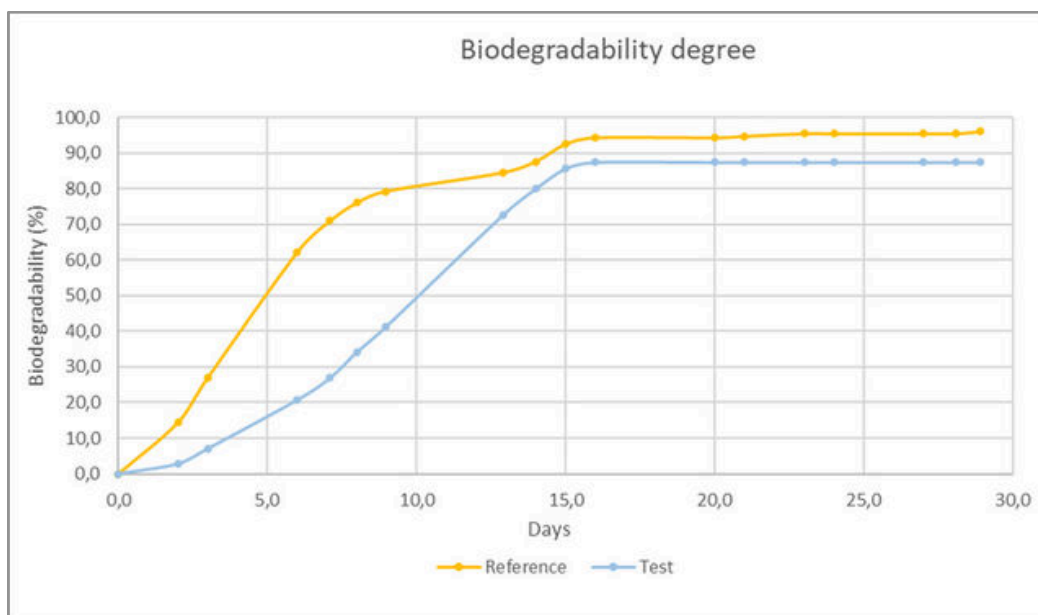
SECOND «OK Biodegradable WATER»





TESTING AREAS AND REFERENCE STANDARDS

BIODEGRADABILITY TEST IN ACCORDANCE WITH OECD 301B (1992)



LEATHER AND SKIN INDUSTRY



A man in a dark suit is walking from left to right in the foreground. In the background, there is a large, industrial wooden tanning machine with metal rollers and a man in a white shirt standing near it. The setting appears to be a tannery or leather processing facility.

Biodegradability and Compostability

The tanning industry

The Italian tanning industry stands as a significant emblem of "Made in Italy" fashion, boasting a typical production value (pre-COVID-19) of around 4 billion euros in 2024.

This sector exemplifies a circular economy, as it transforms waste generated by the food industry during animal slaughter into high-quality leathers utilized in footwear, leather goods, automobiles, and furniture.

In conjunction with the United Nations 2030 Agenda for Sustainable Development, the European Green New Deal articulates a definitive strategy for transitioning to an economic development model that prioritizes not only profitability but also social advancement and environmental stewardship. Consequently, the market has necessitated a protocol to evaluate the compostability of leather, aiming to provide an alternative to the disposal or incineration of finished products, such as footwear, as well as the residual flakes generated during production.

LEATHER AND HIDE INDUSTRY

Biodegradable Leather



As a recognized laboratory with extensive experience in the field of bioplastics, ARCHA initiated a study on the composting behavior of outerwear and soles, culminating in the development of an official technical regulation (EU RoU) that outlines the entire process.

The "Biodegradable Leather" certification was established to elucidate the extensive information present in the market concerning a product's attributes and environmental efficacy.

Consumers indeed require the ability to compare similar products and seek to enhance their capacity for selection, with the objective of continually advancing products from an environmental standpoint.

Through the "Biodegradable Leather" certification, manufacturers can showcase their dedication to environmental protection, furnish consumers with comprehensive details regarding the product's sustainability attributes, and effectively convey their environmental policies to the public through clear, transparent, and easily comprehensible information.

LEATHER AND HIDE INDUSTRY

Biodegradable Leather

To this end, ARCHA, which has been supporting companies across various sectors in environmental enhancement and sustainability initiatives for over 30 years, has established a Technical Specification, a procedure that delineates the technical requirements for leather products and their associated production processes.



NASCONO I MARCHI DI CERTIFICAZIONE PER IDENTIFICARE
PELLE E CUIOIO BIODEGRADABILE
IN ACQUE REFLUE E COMPOST



Disciplinare Tecnico validato
dall'Università di Pisa nell'ambito della
collaborazione scientifica con il Dipartimento
di Chimica e Chimica Industriale

OTECHA

Verificato dall'ente
di certificazione
CQY
CERTIQUALITY

LEATHER AND HIDE INDUSTRY

Biodegradable Leather



If a leather product meets the criteria outlined in the Technical Specifications and the associated production process exhibits specific sustainability attributes, that product will be identifiable in the market by the “Biodegradable Leather” trademarks.

Specifically, the Green Label brand certifies the biodegradability of leather or hide in industrial composting facilities, whereas the Blue Label certifies its biodegradability in wastewater intended for treatment plants.

These brands aim to convey the sustainability attributes of the product and its production process promptly and effectively.

Adherence to the “Biodegradable Leather” Technical Specifications consequently permits:

Certify the biodegradability and compostability of the assessed items.

Verify the sustainability of the production process in accordance with the criteria outlined in the “Biodegradable Leather” Technical Specifications.

Facilitate the immediate identification of certified products via a distinct brand.

Ensure consistent quality over time through a systematic program of inspections and controls.

FINISHED GOODS SECTOR





iVirty

The brand that ensures the biodegradability of a completed product.

iVirty is a brand awarded to articles and finished products that can be entirely classified as "biodegradable" in accordance with specifications established by TECHA SRL, a company within the ARCHA group.

Due to their commitment to environmental sustainability, articles or products can proudly display the iVirty recognition, signifying "Item Virty = Virtuous Item," as well as "I Virty = I am virtuous."

The iVirty brand represents the systematic consolidation of the expertise that ARCHA has garnered in its laboratories through biodegradability assessments of individual materials. Since 2018, the Tuscan company has been one of only eight laboratories globally (the first in Italy and the second in Europe) to hold the TÜV Austria certification for evaluating the compostability of plastics.

A domain of analysis that ARCHA has expanded in recent years to include leather and hide, formulating a specification to certify their biodegradability in wastewater or industrial compost.

By integrating the standards and protocols established for testing individual components, ARCHA has formulated a new specification to assess the biodegradability of an entire item.

ivirty

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ARCHA

FINISHED GOODS SECTOR

iVirty applies to all items or finished products, particularly within the fashion sector, enabling them to be classified as eco-sustainable and assessed for biodegradability. Shoes, bags, belts, and clothing can bear the iVirty label, effectively conveying their environmental integrity to the market.

Companies and fashion houses seeking to affix their trademarks to products must submit an application to ARCHA, which will oversee the complete examination and laboratory testing process.

The shoe, bag, or article of clothing designated for testing will be shredded and combined with industrial compost, mirroring the processes employed in a waste treatment facility, to evaluate its biodegradability, disintegrability, and phytotoxicity. To adhere to the specifications outlined, the item must be constructed with minimal or no metal, incorporate leather, hide, rubber, or biodegradable plastics, and utilize adhesives and surface treatments that do not compromise its ability to pass the tests.

In this manner, the iVirty label not only certifies a completed product but also provides the means to create new items that are entirely biodegradable. This ecodesign element is thus essential in motivating designers and companies to select specific materials over others, crafting products that can be discarded without causing environmental harm.





ivirty



ivirty



TOTAL ORGANIC RECYCLABLE CERTIFIED PRODUCT PROCESS

Il processo di certificazione **ivirty** si basa su test di disintegrazione, biodegradabilità e fitotossicità del prodotto finito.

Solo superando questi test, il prodotto potrà ottenere il bollino di certificazione **ivirty** rilasciato da **TECHA**.



IVIRTY.IT

FINISHED GOODS SECTOR

How to embody "iVirty"

The article, product, or manufactured item designated as iVirty must adhere to the specifications and undergo biodegradability testing under composting conditions, thereby conforming to the limits outlined in the specifications concerning biodegradability, disintegrability, and phytotoxicity.

Consequently, the item must be designed and produced with consideration for the tests it must pass, thus minimizing or entirely eliminating the presence of metals, utilizing biodegradable leather and hides that remain in composting conditions (for further information, refer to www.biodegradableleather.it), incorporating rubber and plastic materials that are inherently biodegradable, and employing adhesives or surface treatments that do not hinder the successful completion of the tests.

To become an iVirty, one must submit an application to ARCHA SRL, which will oversee the complete testing process, from laboratory evaluations to the issuance of the mark to be affixed to the item.

The certification process

The specifications necessary for affixing the iVirty label are derived from the biodegradability, disintegrability, and phytotoxicity tests outlined in the UNI EN 13432:2002, UNI EN ISO 14855-1:2013, ISO 16929:2021, and OECD 208:2006 standards, suitably modified in certain phases and evaluations for a complete article composed of multiple elements.

Similar to the established standards or protocols for evaluating the biodegradability of individual components—particularly plastic materials, adhesives, and the like—the iVirty specification delineates a protocol that must be adhered to in order to classify the entire article, comprised of multiple components, as biodegradable under composting conditions.



The background of the image is the European Union flag, featuring a blue field with twelve yellow five-pointed stars arranged in a circle. The flag is shown from a low angle, curving upwards from the bottom left towards the top right, creating a sense of movement and depth. The stars are a bright yellow, and the blue is a deep, slightly darker shade towards the top.

EUROPEAN RESEARCH INITIATIVES



GRECO

INNOVATIVE BIO-BASED BIODEGRADABLE RECYCLABLE SAFE AND CIRCULAR FOOD PACKAGING

1

**Next Generation Biobased,
Biodegradable and Recyclable Food
Packaging**

2

**Versatile Applications Across Food
Packaging Sectors and beyond**

3

**Advancing Certification, Labelling
and Consumer Engagement**

4

**Technically feasible, economically
viable, and socially acceptable.
Driving the Scale-up**

5

**From data to integration: AI-powered
solutions in GRECO**

20 partners

Start date: 01/05/2025

End date: 30/04/2029

EU Contribution: 4.984.163,75€

Programme: Horizon Europe



**Funded by
the European Union**



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INSPIRE

Innovative Solutions for Plastic Free European Rivers

26 partners from 15 countries
with a **common mindset**:

Find innovative solutions, try them out, measure results with data-driven KPIs, optimize, replicate, scale and engage new users.

In other words, "INSPIRE" people for the reduction of litter, macro and microplastics in European rivers and ultimately the ocean.



www.inspire-europe.org / Inspire Europe (LinkedIn) / Inspire Europe (Facebook) / inspire_eu (Instagram) / INSPIRE_EUROPE (X)



2021
2030
United Nations Decade
of Ocean Science
for Sustainable Development

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PART OF THE
EU MISSIONS
RESTORE OUR OCEAN & WATERS

Co-funded by
the European Union



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RAINS

RESILIENT IRRIGATION SOLUTIONS

Improved water efficiency and support farmers in transitioning to more sustainable irrigation systems.

Discover RAINS

The RAINS project is tackling water scarcity and extreme weather conditions in EU agriculture by testing practical solutions like biofertilizers, improved soil water retention, and smart tools such as Optifangs-IA and WaterIQ. Working across demo farms in Greece and Spain, it aims to improve water efficiency by 50% on 12,700 hectares, support over 500 farmers, and save €6.1 billion, 244 million liters of water, and 35 tons of CO2 emissions by 2050.



17

partners from
6 countries.



48

months is the
duration of
the project.



10

demo-sites
covering several
types of agriculture
replicated.



17 partners
6 countries
4-year project
(2024-28)
€4.8 million
Horizon project



Funded by
the European Union

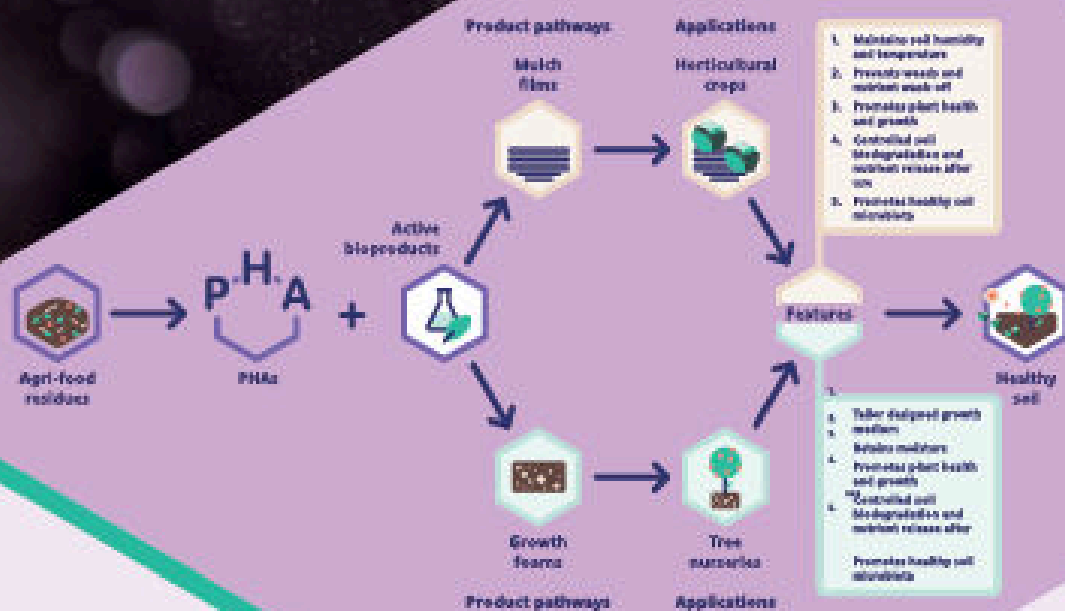
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P^H.Antastic

Bioactive Polymers for Healthier Soil





ReBioCycle

A new European Blueprint for Circular Bioplastics Upcycling Solutions

The Objectives

- 🔄 Improve circularity and resource efficiency via practical application of the circular bioeconomy concept in the biobased and biodegradable plastics value chain.
- 🔄 Scale up effective sorting and recycling schemes for biobased and biodegradable plastic materials.
- 🔄 Increase the recycled content in new products from biobased and biodegradable plastics.
- 🔄 Improve the environmental performance across the value chain against fossil or bio-based benchmarks.
- 🔄 Achieve better social acceptance of circular biobased solutions and products.

The Approach

ReBioCycle provides a portfolio of bioplastic sorting and recycling technologies within three complementary waste-processor-centric hubs at a demonstration scale and in the real operational environment the effective and efficient recycling of three types of bioplastics (PLA, PHA, composites) to demonstrate higher impact of obtaining the same or superior grade recycled polymers and other higher-value applications.

Three Recycling technologies: Mechanical, chemical and biological.



Three complementary waste-processor-centric hubs

The Dutch Hub – Leader: TORWASH

Focus on: Chemical technology, upscaling it to TRL6, using TORWASH technology to recycle PLA and PHA polymers (300 kg each) and transform them into rPLA, and PBM to make PHBV from hydrolysed PHA and PLA. Other partners are the Dutch waste sorting, NTCF, the site owner and sorter, TotalEnergies Corbion, Peques Biomaterials, and Corbion. Kaneka Belgium is also supporting this hub.

The Italian Hub - Leader: NOVAMONT

Focus on: Chemical technology, upscaling it to TRL7. NOVAMONT technology will be used to recycle 600 kg of mixed composites to achieve rComposites (*) for flexible and rigid packaging with a 15% recycled content. rPHA from the Dutch and Spanish Hub will be tested in the Italian hub to blend into bioplastic formulations. The IREN Group waste sorting site of Borgaro Torinese (Piedmont, Italy) and NOVAMONT's new dedicated bioplastics recycling section within its Terni (IT) plant will be involved, together with AMBAT and BLU.

(*) Composites are mixed bio-based biodegradable plastics, including blends of different biopolymers.

The Spanish Hub - Leader: AIMPLAS

Focus on:

- Enzymatic recycling technology, upscaling it to TRL6. The microbial recycling technology will be brought to TRL7 with expected outcomes of up to 100kg rPHA.
- Mechanical recycling technology, upscaling it to TRL7 to achieve 250 kg of rPLA and

250kg of rPHA.

The partners involved are the Trinity College Dublin, GlasPort Bio, University of Galway O'Flaherty Lab, CSIC CIB Biological Research Center, and TotalEnergies Corbion. The hub activities will be implemented at the waste sorting site of Manises (Valencia, Spain) run by the S.A. Agricultores de la Vega de Valencia. Kaneka Belgium is also supporting this hub with the provision of rPHA.

Key figures

Project coordinator: Kevin O'Connor-University College Dublin, BioCircular Bioeconomy SPI Research Centre

Project duration: 1 October 2024-30 September 2028

Total costs: € 30 416 832 CBBE JU funding: € 7 497 000

Innovation Action - Demonstration

Contribution to the European Policy Framework

ReBioCycle contributes to the objectives of the Circular Economy Action Plan, Plastics Strategy and Waste Framework Directive.

ReBioCycle will make effective recycling technologies available for biobased plastics and contribute to the Zero Pollution Action Plan and the EU Bioeconomy Strategy.

www.rebiocycle.eu

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Best Practices for Retailers: Transforming Waste into Value



Food waste is not a new problem. Throughout Europe, retailers are demonstrating that change is achievable through innovative packaging, improved logistics, and enhanced consumer engagement. SISTERS consolidates these practices to amplify their impact.

How can retailers contribute to the reduction of food waste?

- 1** Food donations to NGOs and social organizations: Redirect surplus food to assist communities and minimize waste.
- 2** Embracing sustainable and reusable packaging solutions: Eliminate single-use plastics in favor of sustainable, reusable alternatives.
- 3** Cold chain monitoring to prolong shelf life: Maintain freshness by implementing continuous temperature regulation.
- 4** Digital systems for managing expiration dates: Utilize technology to manage inventory effectively and prevent premature disposal.
- 5** Campaigns to advocate for high-quality products that may exhibit aesthetic imperfections.
- 6** Consumer and educational initiatives: Promote awareness regarding food waste reduction and sustainability.
- 7** AI-driven inventory optimization: Anticipate demand and modify stock levels to minimize over-ordering.
- 8** Return logistics for reusable crates: Establish systems for the collection, cleaning, and reuse of packaging.
- 9** Transparency via dynamic labeling: Deliver real-time insights regarding freshness and shelf life.
- 10** Collaboration throughout the supply chain: Collaborate with partners to exchange data and synchronize waste-reduction strategies.

Why is it significant?

Embracing SISTERS best practices results in reduced waste, decreased costs, and enhanced consumer trust.



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