



**AGRIMA**

Agri-food Waste Management  
for Sustainable Bio-economy  
through Higher Education  
curricula and upskilling

# Collection of citizen science projects in waste valorisation



## Authors

Stefania Oikonomou,  
Chara Megagianni,  
Katerina Zourou

Web2Learn



Funded by  
the European Union

erasmus+  
PORTUGAL educação e renovação

Erasmus+  
Enriching lives, opening minds.

# Deliverable Factsheet



**AGRIMA**

Project Number:	2024-1-PT01-KA220-HED-000243242
Project Acronym:	AGRIMA
Project Title:	Agri-food Waste Management for Sustainable Bio-economy through Higher Education curricula and upskilling
Title of Document:	Collection of citizen science projects in waste valorisation
Output:	WP4A1
Due date according to contract:	31/12/2025
Graphic designer:	Claire Fragiadaki (Web2Learn)
Editor:	Panagiota Fabrikanou (Web2Learn)
Reviewer(s):	All Partners
Approved by:	All Partners
External reviewers:	Eri Tsouko (National Kapodistrian University of Athens), Petra Benyei (IEGD-CSIC), Alba Piero (Fundación Ibercivis)
Keyword list:	waste valorisation, agri-food chain, citizen engagement, challenges, opportunities, circular economy, bioeconomy
Copyright	Creative Commons License 4.0 International
Please cite as	Oikonomou, S., Megagianni Ch., Zourou, K. (2025). <i>Agri-food Waste Management for Sustainable bio-economy through Higher Education curricula and upskilling</i> , AGRIMA consortium



**AGRIMA**

# Partnership

The consortium governing the project adequately represents a wide range of expertise, as four Higher Education Institutions (Aix-Marseille University, the University of the Aegean, Instituto Politécnico do Porto, and the University of Novi Sad) join forces with a regional viticulture association (AVIPE) and a digital education specialist (Web2Learn). This mix of knowledge, skills, experiences, and networks ensures a comprehensive approach to agri-food waste valorisation, combining scientific research, technological innovation, territorial knowledge, and educational practices. Together, the partners bring the capacity to engage diverse stakeholders, including farmers, citizens, students, local authorities, and bio-based industries, supporting AGRIMA's goal of fostering circular and community-driven solutions in agri-food systems.

Name	Country
Université d'Aix-Marseille (AMU)	France
University of the Aegean (UoA)	Greece
Instituto Politécnico do Porto (IPP)	Portugal
Univerzitet u Novom Sadu (UNS)	Serbia
Associação de Viticultores do Concelho de Palmela (AVIPE)	Portugal
Web2Learn (W2L)	Greece





# Revision History

Version	Date	Revised by	Reason
v0.1	20/11/2025	Katerina Zourou, Stefania Oikonomou (W2L)	First draft
v0.2	01/12/2025	Chara Megagianni (W2L)	Internal review
v0.3	08/12/2025	Project partners	Project partner review
v0.4	8/1/2026	External reviewer	External review
v1.0	9/1/2026	Web2Learn team	Final version

## STATEMENT OF ORIGINALITY:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation, or both.

## DISCLAIMER:



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

# Table of contents

Executive Summary.....	5
Background: citizen science in waste valorisation.....	6
Scope and methodology.....	8
Presentation of the citizen science projects.....	10
#1 Action “ScienceBridge” .....	11
#2 The living technosols project.....	12
#3 WASTE4THINK.....	13
#4 AGRIMAX.....	14
#5 INCREASE.....	15
#6 WAYSTUP!.....	16
#7 ValueWaste.....	17
#8 Scalibur.....	18
#9 FOODRUS.....	19
#10 BW5R.....	20
#11 Les Voisins Composteurs.....	21
#12 Avenir Vert Solidaire’s action for food autonomy.....	22
#13 Transformation of spent grain into biscuit in Lille.....	23
#14 Devolver à Terra.....	24
#15 CompostaMe.....	25
#16 Tropa Verde Portugal.....	26
#17 Agro2Circular.....	27
#18 MOFWaste – The Museum of Food Waste.....	28
#19 URSA.....	29
#20 Nãm mushrooms .....	30
#21 Agriloop.....	31
4. Challenges for citizen science in agri-food waste valorisation.....	32
5. Opportunities for citizen science in agri-food waste valorisation.....	34
6. Conclusions .....	36
Acknowledgements .....	37
References.....	38

This publication aims to showcase a curated collection of citizen science initiatives that support sustainable agri-food waste valorization across Europe.

The objective of the publication is twofold:

- To identify and document citizen-driven practices that contribute to waste valorisation, sustainability, and the circular economy
- To highlight opportunities for the mobilisation of citizens, students, scientists, and local stakeholders in waste valorisation activities.

AGRIMA partners contribute with their expertise in citizen science, bio-based technologies, stakeholder engagement, and education in order to develop a structured approach for integrating circularity into agri-food chains locally, nationally and internationally. Each and every partner collected and analysed relevant citizen science cases from their national or thematic context, providing a diverse evidence base for this report.

This report corresponds to Activity 1 of Work Package 4 (Citizen science and participatory approaches in agri-food waste valorisation) and summarises existing citizen science initiatives relevant to the project's thematic focus. The publication includes a brief background analysis of citizen science actions in waste valorisation, the scope and methodology, the presentation of the citizen science (CS) initiatives collected by all partners, and an overview of opportunities and challenges that emerge for advancing sustainable agri-food systems through citizen science, followed by conclusions.

The AGRIMA project is a 24-month Erasmus+ KA2 initiative that aims to promote social innovation and entrepreneurship in agri-food systems by supporting circular practices and sustainable waste valorisation. In particular, the project focuses on mobilising citizens, students, scientists, and local stakeholders to participate in agri-food waste monitoring and valorisation actions as a means of strengthening environmental awareness and community-driven sustainability practices.



# Background: citizen science in waste valorisation

---

Every year, the agri-food system, generates losses and waste at every one of its multiple stages, from production to consumption and disposal. Food loss and waste contribute 8 up to 10% of total global greenhouse gas emissions making waste reduction a key climate mitigation strategy (IPCC, 2022).

Numerous studies and monitoring efforts provide only a partial picture of how, where, and why waste occurs. To complement those, researchers suggest that engaging citizens in data collection, monitoring, and local-level intervention can improve understanding and mitigation of waste (Ammendolia & Walker, 2022; Pierini et al. 2021). Although the term waste is very vast, we can define it as the sum of all the unwanted materials left over as a result of human habitation or manufacturing and production processes. There are many types of waste, but in this report we focus on *food waste*, including used by consumers, such as damaged or obsolete products, overruns, and trimmings (Parfitt, Barthel & Macnaughton, 2010; Kummu et al. 2012).

Many of these residues have clear potential for reuse or valorisation, for example, as compost, animal feed, cultivation substrates, bio-based ingredients, or inputs to other circular processes. The challenge here is dual- not only to reduce avoidable waste, but also to recognise and develop the value of residues, within territorial agri-food systems. Moreover, recent work on material intelligence and adaptive systems (Zhang, Wang & Li 2025) highlights the importance of recognising materials such as organic residues as dynamic components within circular economy systems.

Circular economy systems for food waste have occasionally been advanced through citizen science. Citizen Science (CS) is the active participation of citizens and stakeholders in processes of observation, data gathering, and sometimes design of a solution. Since food is universal and intersects with everyday practices, culture, environment, and economy, everyone can be involved without discrimination, an aspect also emphasized by Varga et al. (2023) in their analysis of inclusive citizen science. This universality makes food an inclusive entry point for participation of a broader audience across the public.

Using a citizen science angle to tackle agri-food waste can lead to two main kinds of benefits: improved data and evidence-based awareness, behavioural change, and societal transformation. However, the literature also warns that for citizen science in agri-food waste there are several conditions that should be met: clear project design, structured communication, support for the participants, inclusivity and sustainability of the project. For instance, Leach and Wilkie (2025) demonstrate how anticipatory and participatory approaches can open new ways of thinking about circularity and resource use, principles that resonate strongly with citizen-driven agri-food initiatives.

Taking all the above into account, the AGRIMA project addresses this challenge by focusing on social innovation and entrepreneurship in agri-food waste valorisation. The project brings together three higher education institutions, a regional viticulture association, and a digital education specialist, to explore how circular practices can be strengthened through collaboration between research, education, farmers, local communities, and other stakeholders. Rather than referring to waste as a technical issue, AGRIMA approaches it as a cross-cutting topic that involves multiple sectors, from consumer behaviour, scientific knowledge, to economic and cultural opportunities. This perspective is closely aligned with participatory design research that approaches food and food-related practices as entry points for participatory inquiry and sustainability transitions.

Within this broader context, the current study focuses on citizen science (CS) and participatory approaches in agri-food waste valorisation. By focusing on existing practices, local conditions and active involvement of people across the agri-food chain, AGRIMA aims to produce grounded evidence, build shared understanding, and identify feasible pathways for residue valorisation.

# Scope and methodology

---

This collection aimed to analyse and provide an overview of existing citizen science initiatives in the field of agri-food waste valorisation worldwide. Throughout this collection, particular attention is placed on the role of citizens, students, farmers, communities, and other local stakeholders in the prevention, monitoring, or transformation of agri-food waste. As such, its purpose is to serve as a key reference point for AGRIMA partners and university students who will be involved in the forthcoming citizen science actions of the project.

Regarding the methodological framework adopted by the AGRIMA partnership, this was based on the steps hereafter:

## Step 1: Desk research

On September 16, 2025, a spreadsheet with 11 categorisation fields was created by the authors and shared with the AGRIMA partnership. That shared spreadsheet included established typologies (e.g., levels of citizen participation by Shirk et al. 2012), as well as project-specific classification schemes (e.g. types of waste).

Specifically, AGRIMA partners identified and categorised 36 initiatives by completing the following fields of the spreadsheet:

- Title of action
- Link (website or online resource, if available)
- Short description (max 20 words)
- Country/ies (in which the project took part)
- Level of citizen participation: It describes the extent and the nature of citizen involvement in the projects. This categorisation was based on the study by Shirk et al. (2012), which identified the following levels:
  - a. **Contractual:** Citizens commission professional researchers to carry out studies that address questions defined by the community.
  - b. **Contributory:** Citizens primarily contribute by collecting or submitting data for projects designed and led by experts.
  - c. **Collaborative:** Citizens work jointly with project organisers to refine methods, analyse results, and support implementation while experts retain overall leadership.
  - d. **Co-created:** Citizens and experts jointly design, conduct, and evaluate the research, sharing decision-making power throughout the entire project lifecycle.
  - e. **Collegial:** Citizens conduct research independently, with professionals acting mainly as peers or advisors rather than leaders.

- Technology used: It indicates the main technological tools and processes used to support waste valorisation, such as composting, fermentation, sustainable extraction methods, aquaponics.
- If more technologies used, please specify
- Types of waste: including food and organic waste, agricultural waste, coffee waste, fish waste, brewing waste.
- If Other type of waste, please specify
- Field of application: It signifies the key area where the valorized products and technologies are applied, such as agriculture, animal feed, fungus cultivation, biomaterials, environmental conservation, food additives, and functional ingredients.
- If Other field of application, please specify

### **Step 2: Screening of the results**

By November 12, 2025, all AGRIMA partners had added their input on the spreadsheet, thus signaling the launch of step 2. During this step, all citizen science actions collected were reviewed carefully by the authors and the external evaluator (Associate Professor Eri Tsouko, National Kapodistrian University of Athens), according to the objectives and the topic of the project, resulting in the identification of 21 actions.

### **Step 3: Compilation of the collection's report**

The final step of the process includes the delivery of this report reviewed by project partners, that presents the analysis of the 21 actions according to the agreed selection criteria.

The identification of citizen science initiatives was based on desk research conducted by AGRIMA project partners within their national or thematic contexts. While this approach provided valuable context-specific insights, it may also introduce biases related to the consortium's geographical coverage, professional networks, and areas of expertise.

Therefore, this collection should be considered an indicative and exploratory mapping rather than an exhaustive overview. Future work could complement this approach through systematic searches of established European or global citizen science platforms to further expand the evidence base.

## Presentation of the citizen science projects

---



## ACTION #1

# SCIENCEBRIDGE



### Short description

High school students use biotechnology kits to valorise waste through small-scale experiments. During mobility actions, they explore how biological processes can transform organic materials and discuss the potential of circular solutions in agri-food systems.

**Link:** [sites.google.com/biocominstitute.org/sciencebridgetechsites](https://sites.google.com/biocominstitute.org/sciencebridgetechsites)

## Key features



### Country

USA



### Level of citizen participation

Collaborative



### Technology used

Composting



### Types of waste

Food/organic waste



### Field of application

Animal feed

## Results

Through ScienceBridge, high school students gain hands-on experience with experimental procedures related to waste valorisation. By using simple kits and guided protocols, they test how organic residues can be stabilised or transformed, and reflect on their potential applications, such as animal feed. This action is designed to strengthen students' understanding of circularity principles and highlights how laboratory methods can support the development of new bio-based value chains. Moreover, mobility settings encourage peer-learning between participants from different contexts, while the structured format makes the action easy to adapt to new groups and educational environments.

## ACTION #2

# THE LIVING TECHNOSOLS PROJECT



### Short description

Citizens monitor soils and earthworms in areas where organic materials are used with the aim of building or improving soils, thus contributing observations on nutrient recycling and soil life.

**Link:** [tinyurl.com/living-technosols](https://tinyurl.com/living-technosols)

## Key features



### Country

Netherlands



### Level of citizen participation

Contributory



### Technology used

Composting and  
Fermentation/anaerobic digestion



### Types of waste

Organic waste



### Field of application

Environmental (soil, water)  
remediation

## Results

The living technosols project engages citizens in observing how organic inputs influence soil quality and biological activity. Thus, citizen scientists record simple indicators such as earthworm presence, soil texture, and visible changes over time, creating a basic dataset on soil response to organic amendments. This contributes to a better understanding of nutrient cycling and soil restoration in local environments. The project also raises awareness of the role of soils in environmental resilience, while demonstrating how everyday observations can complement scientific assessment in remediation projects.

## ACTION #3

# WASTE4THINK



### Short description

The project develops sustainable solutions to convert food processing residues and leftovers into resources that enhance soil health and promote circular agriculture.

**Link:** [www.waste4think.eu](http://www.waste4think.eu)

## Key features



### Countries

Spain, Greece, Italy, Portugal



### Level of citizen participation

Co-created



### Technology used

Composting



### Types of waste

Food/organic waste



### Field of application

Agricultural use

## Results

WASTE4THINK brings together citizens, local stakeholders, and researchers to explore how food-related residues can be diverted from disposal and returned to the soil. Here, citizen scientists contribute to identifying waste sources, testing composting or related practices, and reflecting on how these can be integrated into local agricultural systems. The initiative supports learning on soil improvement, organic matter management, and the benefits of circular approaches for farming. It also encourages communities to co-design solutions that respond to local needs, demonstrating how citizens' input can inform decisions on sustainable waste handling and agricultural resource use.

## ACTION #4

# AGRIMAX



### Short description

AGRIMAX aimed to produce high-value products from crop and food processing waste to achieve a reduction in food waste and more efficient use of resources.

**Link:** [www.agrimax-project.eu](http://www.agrimax-project.eu)

## Key features



### Countries

Italy, Spain



### Level of citizen participation

Collaborative



### Technology used

Sustainable and/or green extraction methods and Composting



### Types of waste

Food/organic waste



### Field of application

Food additives

## Results

The AGRIMAX project showed how residues from agricultural and food industries can be processed through sustainable extraction methods to generate ingredients for food applications. Additionally, information and outreach activities helped citizens and local stakeholders understand the potential of by-products and the importance of environmentally conscious processing. By presenting concrete examples of recovered fibres, compounds, or other ingredients, the project supported public awareness of bio-based innovation. It also illustrated how advanced technologies can be combined with communication and education to build acceptance for the use of waste-derived inputs in food systems.

## ACTION #5

# INCREASE



### Short description

Citizens plant seeds and record flowering, fruiting, and maintenance processes, thus contributing observations that link agrobiodiversity with residue management and soil care.

**Link:** [www.pulsesincrease.eu/experiment](http://www.pulsesincrease.eu/experiment)

## Key features



### Countries

EU-wide



### Level of citizen participation

Contributory



### Technology used

Composting



### Types of waste

Agricultural waste



### Field of application

Agricultural use

## Results

INCREASE involves citizens in monitoring plant development and associated management practices, such as handling of plant residues or organic matter. By documenting growth stages and maintenance actions, citizen scientists gain insight into how agricultural by-products can be reintroduced into the soil, improving fertility and structure. The project promotes agrobiodiversity awareness and connects it with circular practices at the pilot level. Shared protocols and observation formats enable comparison across participants and locations, thus offering a basis for learning about diversity, resilience, and the role of organic residues in sustainable agriculture.

## ACTION #6

# WAYSTUP!



### Short description

The project promoted the circular economy in cities by converting urban bio-waste into food and feed ingredients through citizen engagement and awareness raising activities.

**Link:** [www.waystup.eu](http://www.waystup.eu)

## Key features



### Countries

Spain, Greece, Italy, Czechia, UK



### Level of citizen participation

Collaborative



### Technology used

Fermentation / enzyme-based valorization / anaerobic digestion



### Types of waste

Food/organic waste



### Field of application

Food additives

## Results

WAYSTUP! illustrated how urban bio-waste can be transformed into new ingredients for food and feed value chains. Citizens participated mainly by separating organic fractions correctly and engaging with communication initiatives that explain the subsequent processing steps. This design helped improve the quality of collected bio-waste and built enhanced understanding of the technologies involved, such as fermentation or anaerobic digestion. The project provided cities and service providers with examples of how to link household behaviour with bio-based production, while also supporting broader discussion on safety, quality, and acceptance of products derived from urban waste streams.

## ACTION #7

# VALUEWASTE



### Short description

The project aimed to transform municipal biowaste into high-value products and materials, thus reducing reliance on landfilling and incineration, while involving citizens in awareness raising activities.

**Link:** [www.valuewaste.eu](http://www.valuewaste.eu)

## Key features



### Country

Spain



### Level of citizen participation

Collegial



### Technology used

Fermentation / enzyme-based valorization / anaerobic digestion



### Types of waste

Food/organic waste



### Field of application

Agricultural use

## Results

ValueWaste focused on improving the separate collection and valorisation of municipal biowaste, thus demonstrating how it can serve as a feedstock for new products used in agriculture and other sectors. Citizens contributed by correctly sorting organic waste and participating in engagement activities that explain the value of these streams. As a result, residents gained a clearer idea of what happens to their biowaste and how it supports circular economy objectives. The project also generated experience for municipalities in designing systems that make it easier for citizens to participate effectively and understand the outcomes of their efforts.

## ACTION #8

# SCALIBUR



### Short description

The project focused on transforming food waste and sewage sludge into bio-based products, including bioplastics, hence supporting the shift toward a circular economy.

**Link:** [www.scalibur.eu](http://www.scalibur.eu)

## Key features



### Countries

Italy, Greece, Spain



### Level of citizen participation

Co-created



### Technology used

Fermentation / enzyme-based valorization / anaerobic digestion



### Types of waste

Food/organic waste



### Field of application

Bioplastics

## Results

Scalibur explored advanced valorisation routes for challenging organic waste streams, such as food residues and sewage sludge. Citizens were primarily engaged through awareness activities and collaborative processes that discussed separate collection, treatment options, and new products like bioplastics. This process provided a platform for dialogue on expectations regarding environmental performance and product safety. The project also generated examples of how urban and regional stakeholders can work together to integrate citizen perspectives into the development and communication of innovative waste-derived materials.

## ACTION #9

# FOODRUS



### Short description

The project aimed to prevent food waste along the food supply chain using circular economy strategies and data-driven tools.

**Link:** [www.foodrus.eu](http://www.foodrus.eu)

## Key features



### Countries

Slovakia, Denmark, Spain



### Level of citizen participation

Co-created



### Technology used

AI and machine learning



### Types of waste

Food/organic waste



### Field of application

Agricultural use

## Results

FOODRUS combined citizen engagement with analytical tools to identify and address food waste across different stages of the supply chain. Participants contributed information about surplus food, consumption practices, and local initiatives, which can be complemented by AI and machine learning approaches. This combination supported the identification of hotspots and the design of targeted interventions, such as redistribution schemes or improved planning. Ultimately, the project highlighted the potential of integrating citizen-generated information with digital tools to support more circular and efficient food systems.

## ACTION #10

# BW5R



### Short description

BW5R carries out a systematic classification of bio-waste in five Serbian regions to support better valorisation planning.

**Link:** [BW5R\\_factsheet\\_ENG-1.pdf](#)

## Key features



### Country

Serbia



### Level of citizen participation

Contributory



### Technology used

AI and machine learning



### Types of waste

Food/organic waste



### Field of application

Agricultural use

## Results

BW5R focuses on categorising and quantifying different fractions of agri-food bio-waste to explore valorisation options, including energy production. In this process, citizens and local actors are engaged in training and research-related activities, thus supporting the creation of more accurate regional profiles. These data can then inform assessments of which technologies and scales are most suitable for energy recovery or other uses. Hence, the initiative strengthens the evidence base for circular planning, while involving residents in understanding their role within these systems.

## ACTION #11

# LES VOISINS COMPOSTEURS



### Short description

Compostons creates and runs a network of volunteer citizens who support good practices for individual composting and the recovery of garden waste.

**Link:** [compostons.org/projet-citoyen-voisins-composteurs](https://compostons.org/projet-citoyen-voisins-composteurs)

## Key features



### Country

France



### Level of citizen participation

Collaborative



### Technology used

Composting



### Types of waste

Agri-food waste and Food/organic waste produced at home



### Field of application

Agricultural use

## Results

Les Voisins Composteurs helps households and small-scale users adopt and maintain effective composting practices. Volunteers provide guidance on how to set up and manage compost systems, address common issues, and use the resulting compost in gardens or small plots. This peer-support structure encourages knowledge sharing and builds confidence among new composters. The initiative aims to reduce the amount of organic waste sent to residual streams and contribute to soil improvement at the local scale. It also offers insights into the support structures needed to make individual composting widely accessible.

## ACTION #12

# AVENIR VERT SOLIDAIRE'S ACTION FOR FOOD AUTONOMY



### Short description

The initiative combines aquaponics and hydroponics to support food autonomy in vulnerable communities by using fishery-derived nutrients for plant production.

**Link:** [www.helloasso.com/associations/avenir-vert-solidaire](http://www.helloasso.com/associations/avenir-vert-solidaire)

## Key features



### Country

France



### Level of citizen participation

Collaborative



### Technology used

Other



### Types of waste

Fishery and Fish Waste



### Field of application

Other

## Results

This initiative demonstrates how integrated systems can reuse nutrients from fish production for plant cultivation. Citizens and community members participate in the setup and maintenance of aquaponic and hydroponic units, gaining practical knowledge of water and nutrient cycles. The approach supports local food provision while showing how by-products from fishery activities can be incorporated into circular production models. The project highlights the social dimension of such systems, especially in contexts where food autonomy and resilience are key concerns.

## ACTION #13

# TRANSFORMATION OF SPENT GRAIN INTO BISCUIT IN LILLE



### Short description

The initiative raises awareness about waste reduction by transforming spent grain from breweries into biscuits in Lille.

**Link:** [website](#)

## Key features



### Country

France



### Level of citizen participation

Collaborative



### Technology used

Other



### Types of waste

Brewing and Food/organic waste



### Field of application

Agricultural use

## Results

This initiative, linked to the Happy Drêche association, illustrates how brewing residues can be upcycled into new food products. Engaging citizens through workshops, demonstrations, or communication activities showcases the potential of spent grain as a resource rather than a waste stream. Hence, participants become familiar with the idea of using by-products in food and better understand the conditions under which such reuse is possible. The initiative fosters connections between local breweries, citizens, and small food initiatives, supporting the development of short circular chains in an urban context.

## ACTION #14

# DEVOLVER À TERRA



### Short description

Devolver à Terra promotes composting in Portuguese schools and communities, thus turning organic waste into nutrient-rich soil and reducing landfill emissions.

**Link:** [www.devolveraterra.zero.org](http://www.devolveraterra.zero.org)

## Key features



### Country

Portugal



### Level of citizen participation

Collegial



### Technology used

Composting



### Types of waste

Agri-food waste and  
Food/organic waste



### Field of application

Agricultural use

## Results

Devolver à Terra combines educational activities with practical composting to help pupils and community members manage organic waste locally. Participants learn to separate food and garden residues, follow basic composting steps, and apply the resulting compost in school gardens or community spaces. This experience enhances environmental literacy and demonstrates the climate benefits of diverting organic material from landfills. The initiative also encourages collaboration between schools, local authorities, and waste operators, contributing to the long-term integration of composting practices into everyday routines.

## ACTION #15

# COMPOSTAME



### Short description

CompostaMe promotes organic waste composting in Mealhada via community islands and public participation, aiming to reduce landfill waste.

**Link:** [www.cm-mealhada.pt/menu/883](http://www.cm-mealhada.pt/menu/883)

## Key features



### Country

Portugal



### Level of citizen participation

Collegial



### Technology used

Composting



### Types of waste

Food/organic waste



### Field of application

Agricultural use

## Results

CompostaMe establishes shared composting points (“community islands”) that allow residents to deposit organic waste and see how it is transformed. Citizens are informed about correct separation and the benefits of compost use, while organisers monitor participation and system performance. The initiative offers a decentralised model for managing bio-waste that can complement municipal services. By fostering public involvement and visibility of the process, it supports behavioural change and provides a basis for scaling up community-based composting approaches.

## ACTION #16

# TROPA VERDE PORTUGAL



### Short description

A reward system for citizens performing sustainable actions like recycling or composting, using gamification to support behaviour change.

**Link:** [www.portugal.tropaverde.org](http://www.portugal.tropaverde.org)

## Key features



### Country

Portugal



### Level of citizen participation

Collegial



### Technology used

Web + QR code + app



### Types of waste

Agri-food waste



### Field of application

Environmental  
education/gamification

## Results

Tropa Verde Portugal uses incentives and digital tools to encourage citizens to engage more actively in recycling and composting. Participants receive recognition or rewards when they demonstrate correct sorting or participation in environmental activities. This approach increases awareness of circular practices and helps normalise them in daily life. Data from the system can also provide insights into participation patterns and the effectiveness of different incentive schemes. The initiative shows how gamification can complement citizen science and educational efforts in promoting sustainable waste behaviour.

## ACTION #17

# AGRO2CIRCULAR



### Short description

Agro2Circular (A2C) implemented pilot actions to upcycle agri-food residues using a systemic circular approach with high potential for replication and scaling.

**Link:** [www.agro2circular.eu](http://www.agro2circular.eu)

## Key features



### Country

Portugal



### Level of citizen participation

Collaborative



### Technology used

Sustainable and/or green extraction methods and Data Integration System



### Types of waste

Agri-food waste and Multilayer plastic films



### Field of application

Food additives (more precisely, cosmetics)

## Results

Agro2Circular (“Territorial circular systemic solution for the upcycling of residues from the agri-food sector”) developed territorial solutions that integrate advanced extraction technologies with participatory processes. Citizens and local actors engaged through pilots, communication activities, and consultations that emphasised the potential of agri-food residues and the characteristics of the products obtained. The project paid particular attention to replicability and scalability, aiming to design models that can be transferred to other regions. By combining technical innovation with stakeholder involvement, Agro2Circular contributed to the emergence of systemic circular chains in the agri-food sector.

## ACTION #18

# MOFWASTE – THE MUSEUM OF FOOD WASTE



### Short description

MOFWaste engaged students in actively monitoring various forms of food waste and co-creating recommendations for interventions that can address this issue.

**Link:** [www.impetus4cs.eu/the-museum-of-food-waste](http://www.impetus4cs.eu/the-museum-of-food-waste)

## Key features



### Country

Portugal



### Level of citizen participation

Co-created



### Technology used

Composting



### Types of waste

Agri-food waste



### Field of application

Animal feed

## Results

Agro2Circular (“Territorial circular systemic solution for the upcycling of residues from the agri-food sector”) developed territorial solutions that integrate advanced extraction technologies with participatory processes. Citizens and local actors engaged through pilots, communication activities, and consultations that emphasised the potential of agri-food residues and the characteristics of the products obtained. The project paid particular attention to replicability and scalability, aiming to design models that can be transferred to other regions. By combining technical innovation with stakeholder involvement, Agro2Circular contributed to the emergence of systemic circular chains in the agri-food sector.

## ACTION #19

# URSA



### Short description

URSA develops units for the reuse of waste from vineyards, olive groves, almond groves, and cereals in the perimeter surrounding the Alqueva dam.

**Link:** [www.edia.pt/ursa](http://www.edia.pt/ursa)

## Key features



### Country

Portugal



### Level of citizen participation

Collaborative



### Technology used

Composting



### Types of waste

Agri-food waste (Olive, vineyard, almond, and corn waste)



### Field of application

Agricultural use

## Results

URSA focuses on coordinated management of diverse agricultural residues in a specific region. By collecting and processing prunings and other biomass from vineyards, olive groves, almond orchards, and cereal fields, the initiative aims to create valuable soil amendments and reduce burning or disposal. Local actors participate in organising residue flows and applying the resulting products, thus gaining insight into both logistical and agronomic aspects. The project illustrates the potential of territorial approaches to agricultural waste and contributes to more integrated resource management.

## ACTION #20

# NÂM MUSHROOMS



### Short description

The Nâm mushrooms action transforms coffee grounds into substrate for mushroom cultivation, thus linking urban waste with local food production.

**Link:** [www.nammushroom.com](http://www.nammushroom.com)

## Key features



### Country

Portugal



### Level of citizen participation

Collegial



### Technology used

Composting



### Types of waste

Coffee



### Field of application

Fungal cultivation

## Results

Nâm mushrooms provide a simple and communicable example of waste valorisation by using coffee grounds as a growth medium for fungi. Citizens are involved by collecting used coffee and -in some cases- participating in cultivation activities. This allows them to observe a complete loop from waste generation to food production. The initiative helps raise awareness about the potential of everyday residues and supports the development of short local value chains that connect cafés, households, and mushroom producers.

## ACTION #21

# AGRILOOP



### Short description

Agriloop develops high-value products from agricultural residues through sustainable value chains.

**Link:** [www.nammushroom.com](http://www.nammushroom.com)

## Key features



### Countries

EU countries, UK, China



### Level of citizen participation

Co-created



### Technology used

Fermentation / enzyme-based valorization / anaerobic digestion and Bioconversion



### Types of waste

Tomato, Peanut, Apple, Potato, Grapes



### Field of application

Fungal cultivation

## Results

Agriloop investigates how different agricultural residues, including tomato by-products, can be transformed into ingredients and materials through sustainable processing chains. Citizens and stakeholders are engaged in communication and co-creation activities that present the possibilities of these residues and invite feedback on applications. The project highlights how multiple crops can be integrated into circular value chains, thus emphasising both technical feasibility and social acceptability.

# Challenges for citizen science in agri-food waste valorisation

The analysis of the collection of the citizen science initiatives highlights a number of challenges that influence the design, implementation, and long-term sustainability of participatory actions in agri-food waste valorisation. Specifically, these are thematically grouped below to ease understanding of the areas where further support and capacity building is needed. Precisely:

## 1. Engagement and participation challenges

The most common challenge observed in the majority of the initiatives is to keep active participation of the public over time. Many citizen science initiatives require repetitive actions, like sorting organic waste, managing composting systems, or recording observations. Consequently, participation might falter when activities become repetitive, immediate results are not visible, or participants do not prioritise their engagement in the project among other commitments in their everyday life. Some projects also depend on volunteers who may be limited by factors such as time, capacity, or resources.

Additionally, age groups, motivational availability, and familiarity with the circular model is diverse within society, thus participation may vary. Younger participants often exhibit enthusiasm, while engagement in the long term requires effective and ongoing communication and support.

## 2. Technical and resource-related challenges

Some valorisation processes, such as fermentation, sustainable extraction, or integrated aquaponic systems, require certain technologies or materials that are not accessible to all participants. Limited access to equipment, laboratory facilities, or specialised expertise can restrict the depth or scale of citizen involvement.

Some waste streams also necessitate strict handling practices, either for safety or quality reasons, which are difficult to enforce in uncontrolled environments. This could therefore limit the nature of experiments that might be carried out directly by citizens or reduce their capacity to participate in more advanced stages of processing. Ensuring the necessary guidance and risk management is in place is important, but can be resource-intensive for organisers.



### **3. Behavioural and organisational challenges**

Many citizen science projects in waste valorisation require behavioural changes, such as new sorting routines, altered food consumption habits, or learning new and unfamiliar composting practices. Likewise, there are organisational challenges, such as: coordinating collection points, managing dispersed groups of participants, or simply assuring constant waste quality can put a burden on project teams. Clear instructions are fundamental, yet their maintenance is difficult without adequate support structures. In the absence of strong organisational frameworks, citizen contributions may turn out to be less effective.

### **4. Alignment with local systems and policies**

Citizen science projects often interface with municipal waste services, agricultural practices, or local environmental regulations. Ensuring that citizen-generated insights and activities are recognised by local authorities also continues to be a challenge. Even successful small-scale projects may have little impact on the wider waste strategies or circular economy planning in the absence of institutional uptake.

### **5. Transferability and long-term sustainability**

While many initiatives lead to valuable learning at the local level, scaling up these practices at national or international levels can often be challenging. Various contextual factors, such as climate, waste composition, farming systems, cultural habits, and municipal infrastructure, limit the degree to which methods can be replicated elsewhere. Another challenge is sustaining motivation beyond the project period. The maintenance of composting sites, demonstration units, or educational programmes becomes challenging when the initial enthusiasm or funding for the project stops. To tackle such challenges, ownership of the activity, resources, and institutional support should be planned at the beginning for long-term continuity.

Summing up, the challenges outlined above highlight the complex environment within which citizen science projects are called to operate. Effective planning, rigorous execution of processes, and provision of easily accessible tools are essential prerequisites. Equally important is the presence of well-trained staff capable of guiding participants and building trust through transparent communication and collaboration. Addressing these critical areas will not only address barriers as a transformative approach to water management and community empowerment.



# Opportunities for citizen science in agri-food waste valorisation

---

Despite the challenges, the analysis of the collection of citizen science projects brings to the fore several opportunities emerging for educational enrichment, innovation, stakeholder collaboration, and community engagement. These opportunities cut across different contexts, waste streams, and technologies, and are summarised below.

## 1. Educational opportunities

Citizen science is an empowering means for integrating agri-food waste valorisation into teaching and learning processes at different levels of education. School projects, higher education activities, and non-formal learning settings can cover practical topics such as composting, soil improvement, reuse of residues, circular value chains, and basic principles of bio-based processing. Hands-on experiences - from household composting and garden experiments to relevant small-scale demonstration units - further help students understand how waste can become a resource. They also make abstract concepts, like "circular economy" or "bioeconomy," more concrete and relevant. Given the embedding in local realities, activities in citizen science could be integrated into curricular or extracurricular programs and set the basis for longer-term educational pathways regarding sustainability, agriculture, and food systems.

## 2. Stakeholder collaboration

Citizen science initiatives also create important opportunities for multi-stakeholder collaboration. The cases collected clearly show how higher education institutions, schools, farmers, cooperatives, municipalities, associations, companies, and digital education providers are able to collaborate around shared circular objectives. Many of these collaborations integrate technical knowledge on waste management and valorisation with local experience of how food is produced, processed and consumed. Working together on monitoring, pilot actions, or awareness campaigns reinforces mutual understanding among actors who do not always interact in traditional settings. It allows for the collaborative development of pragmatic approaches to manage particular waste streams-agricultural residues, food leftovers, coffee grounds, or processing by-products-adapting solutions to local conditions and capacities. In this respect, citizen science emerges as a platform to test and discuss novel practices, to inform decision-making, and to establish trust among various stakeholders involved within agri-food systems.

### 3. Community engagement

Citizen science projects also represent great opportunities for enhancing community involvement in agri-food waste issues. In particular, by inviting the citizens to measure, sort, document, or transform the waste itself, these activities make visible the type and quantity of residues produced at household, school, and neighbourhood levels, or within farming communities, for instance. This may trigger reflections about consumption patterns, storage behaviour, and current disposal practices, and encourage more responsible choices. Engagement is particularly important in contexts where communities are directly affected by environmental impacts of waste or where there is a strong need to improve local soil quality, reduce landfill dependence, or support food autonomy. Community visibility is also enhanced when results are communicated publicly, such as through exhibitions, local events, or online storytelling, making sure that a variety of voices are part of the dialogue on more sustainable and circular agri-food systems.



# Conclusions

---

The present report serves to increase understanding of citizen science for agri-food waste valorisation and its value for academia and communities involved. By the integration of educational tools, experimental methods, and co-operative practice, citizen science offers a mechanism through which local communities, businesses, public institutions, universities, and schools can collaborate in addressing a significant global environmental challenge. The educational activities were designed by higher education institutions, particularly to be integrated into secondary education and local communities, providing simple applications of the scientific process and acquainting students and citizens with state-of-the-art methodologies. Hence, these initiatives not only increased public literacy and awareness on circular practices but also fostered communication linkages between research, waste management, and policy-making communities.

At the same time, the report highlights shared challenges encountered across citizen science initiatives. These include diverse levels of citizen participation, conflicts over scheduling, limited human and financial resources, mixed skill levels among teams, high cost and complexity of laboratory analysis, and technological impediments. These challenges confirm the necessity for systematic planning, strategic resource allocation, and adaptive management.

The report also outlines a set of pragmatic opportunities aimed at enhancing the effectiveness and sustainability of citizen science initiatives. Key among these is the organisation of extra-curricular activities which can provide greater flexibility and inclusivity for participants. Engaging small, already established groups, is further emphasised as a strategy to maintain continuity and foster a sense of community commitment. Simplification of procedures is identified as crucial to lowering barriers to participation, while the provision of brief training sessions and micro-incentives serves to motivate and support participants through manageable learning and reward mechanisms. The selection of user-friendly devices and the facilitation of digital tool adoption are highlighted as necessary to ensure broad accessibility and ease of use. Furthermore, the allocation of designated funds for priority analyses is emphasized to guarantee that critical areas receive adequate attention and resources. Finally, the inclusion of volunteers from the earliest stages of project design is considered essential to strengthen the impact of the outcomes.

Together, these actionable steps provide a comprehensive approach that addresses logistical, motivational, technological, financial, and governance dimensions to optimise project implementation and long-term success.

# Acknowledgements

---

This publication was produced as part of Work Package 4 of the EU-funded project AGRIMA: “Agri-food Waste Management for Sustainable Bio-economy through Higher Education curricula and upskilling” (<https://agrimarepository.web2learn.eu/>), Project number: (2024-1-PT01-KA220-HED-000243242). The authors of this study would like to thank all AGRIMA partner organisations for their input into the research and resource gathering stage of this activity, as well as peer review. Authors would like to especially thank Dr. Eri Tsouko (Assistant Professor, National and Kapodistrian University of Athens) for her careful review of the WP4A1 inventory, as well as Petra Benyei (Ramón y Cajal Postdoctoral Fellow at IEGD-CSIC) and Alba Piero (Researcher, Ibercivis) for their thorough review of the report. Images in this report were sourced from Canva.com.

Funded by the European Union. Views and opinions expressed are, however, those of the authors only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

# References

---

Ammendolia, J. & Walker, T.R. (2022). Citizen science: A way forward in tackling the plastic pollution crisis during and beyond the COVID-19 pandemic. *Science of the Total Environment*, 805. DOI: [10.1016/j.scitotenv.2021.149957](https://doi.org/10.1016/j.scitotenv.2021.149957)

Kim, S. & Cho, J. (2023). Understanding dynamic affordances in everyday object interactions', *Human-Computer Interaction*, 38(5-6), 485-510. <https://doi.org/10.1080/07370024.2023.2276527>

Kummu, M., de Moel, H., Porkka, M., Siebert, S., Varis, O. & Ward, P. J. (2012). Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. *Science of the Total Environment*, 438, 477-489. DOI: [10.1016/j.scitotenv.2012.08.092](https://doi.org/10.1016/j.scitotenv.2012.08.092)

Leach, A. & Wilkie, A. (2025). Design for Anticipatory Repair: Experimenting with Repair as a Design Approach. In *Nordes 2025: Research Papers (Vol. 1, No. 1)*. DOI: <https://doi.org/10.21606/nordes.2025.38>

Parfitt, J., Barthel, M. & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3065-3081. DOI: [10.1098/rstb.2010.0126](https://doi.org/10.1098/rstb.2010.0126)

Pierini, V.I., Mazzeo, N., Cazenave, M., & Semmartin, M. (2021). Waste generation and pro-environmental behaviors at the household level: evidence from a citizen science project. *Resources, Conservation and Recycling*, 170. <https://doi.org/10.1016/j.resconrec.2021.105560>

Varga, D., Doran, C., Ortega, B. & Segú Odriozola, M. (2023). How can Inclusive Citizen Science Transform the Sustainable Development Agenda? Recommendations for a Wider and More Meaningful Inclusion in the Design of Citizen Science Initiatives. *Citizen Science: Theory and Practice*, 8(1), 29. <https://doi.org/10.5334/cstp.572>

Zhang, Y., Wang, M. & Li, H. (2025). 'Designing with Material Intelligence: A Framework for Adaptive Product Systems'. *She Ji: The Journal of Design, Economics, and Innovation*, 11(3), 321-340. <https://doi.org/10.1016/j.sheji.2025.07.002>



**AGRIMA**

# AGRIMA

Agri-food Waste Management for Sustainable Bio-economy through Higher Education curricula and upskilling



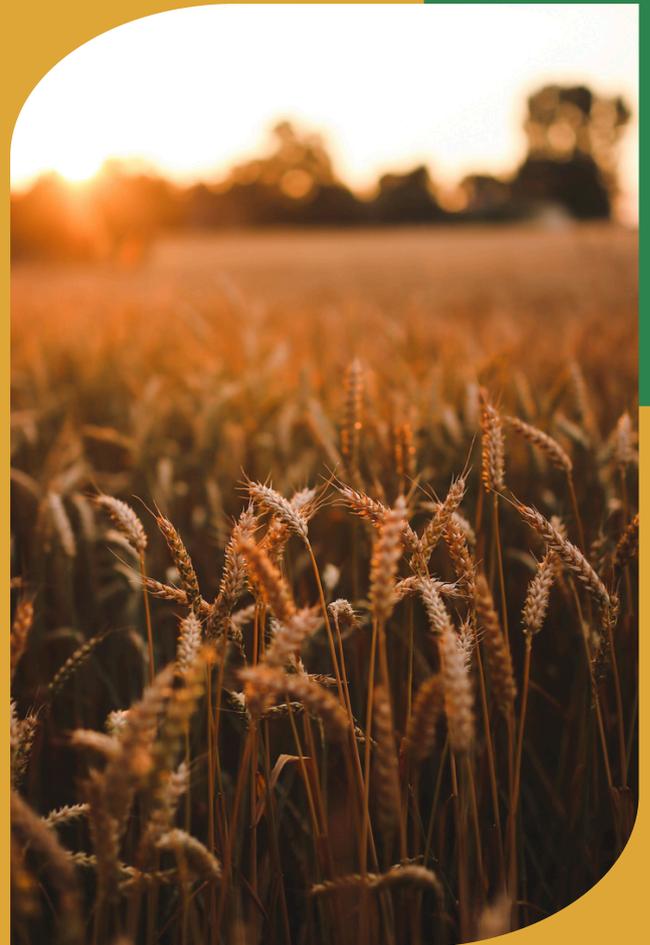
[www2.isep.ipp.pt/agrima](http://www2.isep.ipp.pt/agrima)



@AGRIMA Erasmus + project



@AGRIMA-Erasmus



Funded by  
the European Union



**Erasmus+**  
Enriching lives, opening minds.