Project Acronym: PLAMINPACK

Project title: PLAnt-based antiMIcrobial aNd circular PACKaging for plant product

Deliverable D7.1: Management Guidelines

Responsible beneficiary : UNIPI

Date of delivery: 30 september 2024 (M3)

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Periodic period: 1st

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Executive Summary

This Project Management Plan describes the management and quality control procedures of the “PLAnt-based antiMIcrobial aNd circular PACKaging for plant products” (PLAMINPACK, hereinafter), which are meant to ensure the quality of the work carried out.

This document sets up the working procedures and rules, defines document templates, means of communication, control and other management procedures.

The recommendations it contains, if used with some discipline, will reduce the project overhead and may, therefore, be considered crucial for the overall success of the project. Also, these rules will ensure compliance with the obligations detailed in the Grant Agreement signed by all the members of the PLAMINPACK consortium, and the granting authorities.

This document aims to give an overview regarding the management and coordination issues from PLAMINPACK Project and is a complement to all other key documents that the coordination team should have read and have accessed while the project is running: the Consortium Agreement (CA) and its Annexes.

In this sense, this document will serve as a support to the project consortium in the proper implementation and monitoring of PLAMINPACK project.

1 INTRODUCTION

1.1 Overview of PLAMINPACK Project

The objective of PLAMINPACK is the development of anti-microbial packaging materials suitable for producing, by conventional industrial methodologies like extrusion and spinning, nets, films, and trays for perishable food, based on biopolymers and plant-derived molecules. Three representative perishable Mediterranean fruits were selected for testing the different packaging: tangerine for net, dates and strawberry for film and tray. The anti-microbial and anti-oxidant molecules (AOM) intended to be included in the packaging will be extracted from the three plants waste residues (PWR). The solid residue (SR) will be used in composites. In addition, these same waste materials will used as a breeding substrate for the insect *Hermetia illucens*, which, through a bioconversion process, will lead to the production of high biological value molecules including chitin, from which antimicrobial Hermetia Illucens chitosan (HIC) can be produced, and insect flour rich in protein which will be used to produce gas barrier coatings for packaging. The anti-microbial properties of the packaging and its ability to increase the shelf-life of tangerines, strawberries, and dates will be tested subsequently. To improve the shelf-life avoiding the loss of food, plasma treatments (applied on fruits or packaging) and liquid treatments applied on fruits will be considered. With this aim two interesting potential tools will be developed: a database to correlate plant waste with extract quality and amount; a digital twin applied to fruit ripening and packaging, in order to develop a predictive machine learning tool. Life Cycle Assessment will be carried out for the new packaging. The behaviour of the packaging at end of life (organic and mechanical recycling), its stability, and potential releases will also be considered. A training and dissemination program based on stakeholders involvement will diffuse interdisciplinary and multicultural knowledge. In this way, the PLAMINPACK project will develop not only an antimicrobial packaging, but also a model based on full circularity for Mediterranean farmers and food companies, useful in accelerating the necessary transition to a green economy, thus contributing to the European Green Deal.

1.2 Purpose and scope of the Project Management

The main objectives of the project management are to set-up the PLAMINPACK management structure, to foresee or predict as many dangers and problems as possible, and to plan, organize, and control activities so that the project is completed as successfully as possible despite all the potential risks.

The PLAMINPACK management structure is designed to reach the following objectives:

➢ Ensuring compliance with Partnership for research and Innovation in the Mediterranean Area (PRIMA) and contractual commitments.

➢ Measuring the objectives of the project within the agreed budget and timeframe.

➢ Coordinating the project partners and activities and ensuring effective communication.

➢ Carrying out the quality control of the work performed and deliverables.

➢ Identifying risks or conflicting situations and resolving them.

➢ Maintaining the required reporting activities towards PRIMA.

The PLAMINPACK management is based on several principles which are important in the internal organizational collaboration within the consortium:

➢ The units of the PLAMINPACK consortium are collaborating to achieve a common objective, share experience and know-how, and develop results with complementary skills.

➢ The work must be organized and planned in a result-driven way. Common planning must hence be a reference for everybody and must always be up to date.

➢ The collaboration inside the project involves different levels of decision-makers in various domains (strategic, technical, financial, and administrative). The rules for such decision making need to be clear.

➢ The effectiveness of meetings is absolutely critical to the progress of the work. An inconclusive meeting can cause serious delays, risks, and costs.

Procedures are defined to facilitate operations and management of the project. Their objectives are not to create management tasks with a heavy structure, but to give simple tools, allowing all activities to be managed properly.

2 PROJECT STRUCTURE

This section shows the structure of the project including the project duration, participants, work packages (effort and budget), deliverables, and milestones.

2.1 Project duration

The effective start date of the PLAMINPACK project is July 1st, 2024. Project duration is 36 months, ending on June 30th, 2027.

2.2 Participants

The PLAMINPACK consortium is formed by 9 beneficiaries as shown below in Table 1:

Table 1: PLAMINPACK project participants.

Nº	Role	Participant name	Short name	Country
1	COO	Università di Pisa	UNIPI	Italy
2	BEN	Université Cadi Ayyad	UCA	Morocco
3	BEN	Next Technology Tecnotessile	NTT	Italy
4	BEN	Università degli Studi della Basilicata	UNIBAS	Italy
5	BEN	AgroParisTech	APT	France
6	BEN	Sfax University	SFAX	Tunisia
7	BEN	University of Ioannina	UOI	Greece
8	BEN	Albstadt-Sigmaringen University	ASU	Germany
9	BEN	Universität Hohenheim	UHOH	Germany

PLAMINPACK consortium consists of 9 partners from 6 different Countries, including 2 North African Countries (Morocco and Tunisia) and 4 European Countries (Italy, Greece, France, and Germany) (Fig. 1).

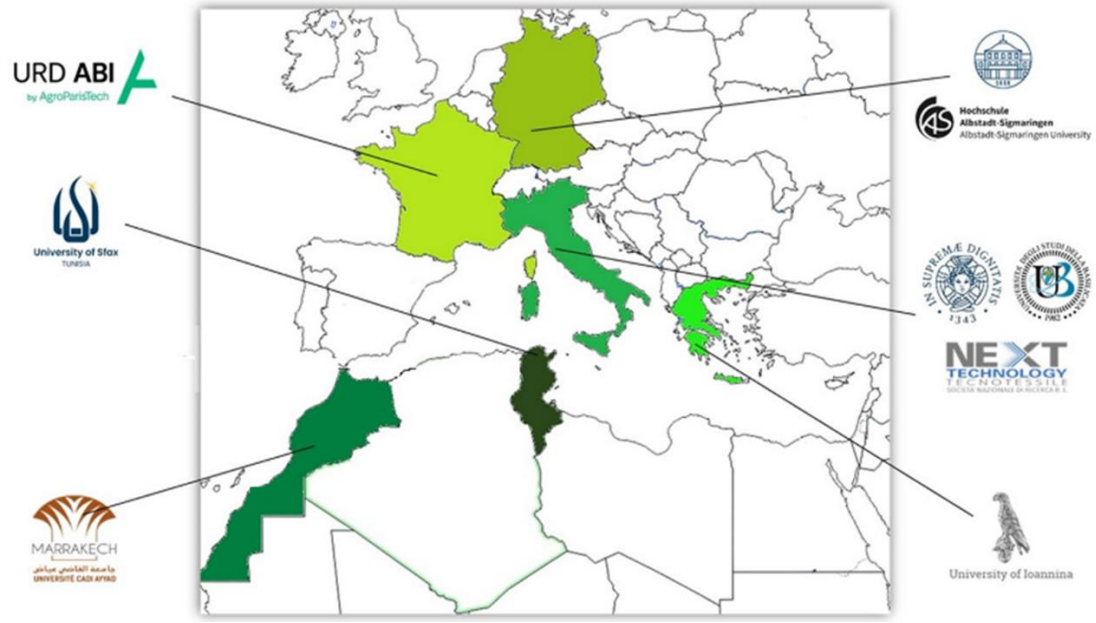

Figure 1. Geographical distribution of PLAMINPACK partners.

The partners are complementary in their expertise and cover the multi-actor value chain of PLAMINPACK (Figure 2), i.e., all relevant functionalities (such as farmers, packaging, and food distribution) are investigated in the project. Through the PLAMINPACK implementation the research partners' expertise will be transformed, in products and services for the different companies involved in the value chain in an equal way in high and low middle-income countries. Each partner has a strategic role in the implementation of the project, as shown in Figure 2.

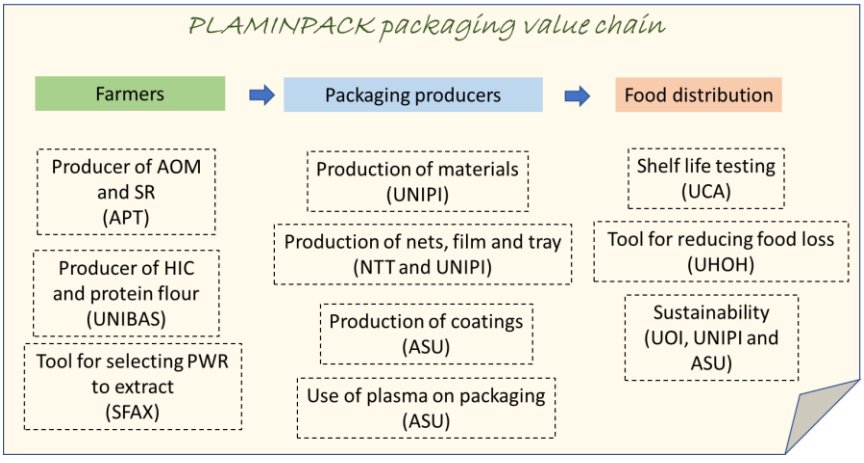

Figure 2. Distribution of partners in the value chain.

2.3 Work Packages

The PLAMINPACK project will be executed in 36 months and is structured in 7 Work Packages (WP), as presented in Table 2:

Table 2: Work Packages

WP Nº	WP Name	Lead Beneficiary	Start	End
1	Production of AOM, SR powder, and HIC from selected plants	APTI	M1	M32
2	Materials and Processes for nets, films, and trays	UNIPI	M1	M24
3	Microbiological, shelf-life, and barrier studies	UCA	M5	M36
4	Physical treatments and ICT technologies integrated in the chain	ASU	M3	M36
5	End of life and environmental implications	UOI	M5	M36
6	Dissemination, Exploitation, Communication & Outreach (DECO) activities	UNIPI	M6	M36
7	Project coordination	UNIPI	M1	M36

2.4 Resources to be committed

2.4.1 Effort

The PMs effort per participant is presented in Table 3.

Table 3: Summary of Person Months (PM) Distribution.

Partner	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total PM
1- UNIPI	1	22.3	0.5	13.9	14	8.7	7	67.4
2- UCA	1		64.5	0.5		1	0.5	67.5
3- NTT		13				2	2	17
4- UNIBAS	6.5					0.7	0.5	7.7
5- APTI	45			4		3	2	54
6- SFAX	1		0.5	6.5		0.5	0.5	9
7- UOI	1	6.23			66	9	2	84.23
8- ASU	5.5	9.5	4	5	6	5	1.5	36.5

9- UHOH			2	39	0.5	1	0.5	43
Total	61	51.03	71.5	68.9	86.5	30.9	16.5	386.33

2.4.2 Budget

As stated in the CA, the project has an overall cost of 2.265.086,00€, of which a maximum of 1.911.816,00 € shall be financed by the granting authorities of the different involved countries.

2.5 Deliverables

The list of project deliverables, according to the CA, is included in Table 4.

Table 4: List of deliverables

Nº	Deliverable Name	WP	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D1.1	Selection of species and samples of tangerine, strawberry, and dates PWR and fruits	WP1	UCA	Report	CO	M3
D1.2	Samples of AOM, SR, and HIC	WP1	APT	DEM	CO	M12
D1.3	Extraction of AOM and production of SR powder	WP1	APT	Report	CO	M24
D1.4	Production and characterization of HIC from PRW	WP1	UNIBAS	Report	CO	M32
D1.5	Production and characterization of protein rich HI larval flour	WP1	UNIBAS	Report	CO	M32
D2.1	Selection of materials and processes for nets	WP2	NTT	Report	CO	M15
D2.2	Selection of materials and processes for films and trays	WP2	UNIPI	Report	CO	M15
D2.3	Selection of biopolymer based functional coatings	WP2	ASU	Report	CO	M18
D2.4	Optimization of materials and final prototypes production	WP2	UNIPI	Report	CO	M24
D3.1	Anti-microbial tests results made onto packaging	WP3	UCA	Report	CO	M33

D3.2	Gas barrier test results related to packaging	WP3	ASU	Report	CO	M36
D3.3	Shelf-life studies onto strawberries, dates, and tangerine	WP3	UCA	Report	CO	M36
D4.1	Plasma modified coating samples and their application	WP4	ASU	Report	CO	M33
D4.2	Report about correlation of data of extractions and PWR	WP4	SFAX	Data/Other	PU	M36
D4.3	Demonstrator for digital twinning of ripening/package	WP4	UHOH	DEM/Other	PU	M36
D5.1	Degradation/ageing/durability of prepared materials	WP5	UOI	Report	CO	M36
D5.2	Organic and mechanical recyclability of packaging	WP5	ASU	Report	CO	M36
D5.3	Life Cycle Assessment of the novel packaging	WP5	ASU	Report	CO	M36
D5.4	Toxicity assessment of prepared materials and precursors	WP5	UOI	Report	CO	M33
D6.1	Plan of training activities of PLAMINPACK	WP6	UOI	Report	PU	M6
D6.2	Market and regulation contest report	WP6	UNIPI	Report	PU	M4, M30
D6.3	Plan for the Dissemination, Exploitation, Communication and Outreach	WP6	UNIPI	Report	CO	M6, M18, M36
D6.4	Report on Training activities of PLAMINPACK	WP6	UOI	Report	PU	M36
D6.5	Annual Reports on dissemination and outreach activities	WP6	ASU	Report	PU	M12, M24, M36
D7.1	Management guidelines	WP7	UNIPI	Report	PU	M3
D7.2	Data Management Plan	WP7	UNIPI	Report	CO	M6
D7.3	Interim reports	WP7	UNIPI	Report	CO	M18, M36

2.6 Milestones

Table 5 below shows the milestones associated with the project:

Table 5: List of milestones

Nº	Milestone	WP Related	Due Date (Month)
MS1	Selection of PWR and fruits samples	WP1	M3
MS2	Selection of materials and coatings for demonstrators	WP2	M15
MS3	Preliminary toxicity assessment	WP5	M18
MS4	Production of prototypes	WP2	M24
MS5	Final definition of KERs	WP6	M24
MS6	Optimized extraction of AOM and production of SR	WP1	M32
MS7	Extraction of insect chitin and production of chitosan	WP1	M32
MS8	Insect flour production and characterization	WP1	M32
MS9	Combination of plasma and coating of HIC	WP4	M33
MS10	Durability assessment regarding packaging	WP5	M33
MS11	Database correlating PWR and extraction results	WP4	M36
MS12	Digital twin for modelling the ripening and package	WP4	M36
MS13	LCA, recycling, and toxicity assessment of the novel packaging	WP4	M36

3 PROJECT GOVERNANCE

3.1 Management Structure

The PLAMINPACK project is based on a management structure able to deal with the consortium internal management and with the complexity of dealing with the different actors involved in the project execution. The project will involve a team with members at different levels of responsibility within the parties' organizations, assisted by the different bodies comprised within the management team.

Detailed functions and responsibilities of Consortium Bodies are described in detail in the PLAMINPACK CA. Further changes in the project organisational structure will be included in updated versions of this document.

As specified in the CA, the organizational structure of the project shall comprise the following Consortium Bodies:

The management structure of PLAMINPACK is schematized in Figure 3, where it is clear that its organization is structured in such a way as to guarantee an efficient and streamlined management of the project. The different components of the project governance are the Project Management Team (**PMT)**, supported by the Steering Committee (**SC**), the Scientific and Technical Committee (**STC**), the Innovation Committee (**IC**), and the Advisory Board (**AB**). The components will be described in the following. The general assembly, represented by the SC, includes all the participants of the partners' staff.

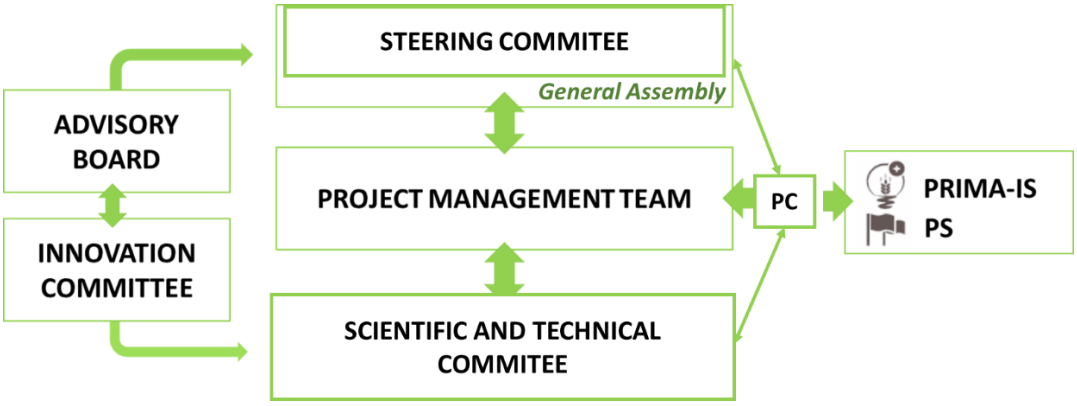

Figure 3: Management structure of PLAMINPACK.

3.1.1 Project Coordinator

The project management will be performed by the Project Coordinator (PC), UNIPI, an institution with extensive experience in EC projects both as participant and as coordinator. UNIPI is familiar with all the modalities and administrative procedures regarding the management of EC research projects, from the negotiation process, preparing and maintaining the Consortium Agreement, monitoring work, reporting requirements, the use of tools for communication with the EC, etc. from previous and currently running EC projects, such as POLYBIOSKIN, BIONTOP and FLEXIZYME.

The PC, UNIPI, is the legal entity acting as the intermediary between the Parties and the Granting Authority: PRIMA Agency. The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Consortium Agreement.

The Project Coordinator is Prof. Maria-Beatrice Coltelli, from UNIPI. She will act as the communication and administrative interface with the PRIMA-IS secretariat/funding bodies (PRIMA-IS/PS) and the consortium partners, to carry out the reporting and overall administrative management of the project. She will implement correct project management procedures and make sure that all deadlines and obligations will be met. She will plan and manage consortium meetings (progress reports of the partners, planning of the next steps and the minutes of the meeting). Further, she will coordinate the in-time provision of the deliverables, reports, and cost statements as well as plan and manage project reviews on PRIMA-IS/PS request.

3.1.2 Project Management Team (PMT)

The Project Management Team (PMT) comprises the Project Coordinator and the UNIPI team. It is responsible for overseeing daily management, ensuring compliance with the work plan, allocated resources, and the time schedule. The PMT follows up with Work Package Leaders (WPL) to oversee deliverable submissions, milestone achievements, and reporting.

Inside the PMT, a Research and Technical manager, Prof. Antonella Castagna, was selected to support the coordinator from the technical point of view and in the evolution of project risks during project implementation.

The Administrative Coordinator (AC) will also be responsible for the administration of the funds. Together with the Research and Technical Manager, the AC will actively steer the evolution of the project by closely monitoring the work performed by each partner and the resources used to carry out the work. The AC will communicate administrative tasks and organizational aspects within the consortium and chair the steering committee.

3.1.2.1 Work Package Leaders (WPL)

The leader for each work package of the project is shown in Table 6.

Table 6: Work Packages Leaders

Work Package Nº	Work Package Name	Lead Beneficiary	Name
WP1	Production of AOM, SR powder, and HIC from selected plants	APT	Morad Chadni
WP2	Materials and Processes for nets, films, and trays	UNIPI	Laura Aliotta
WP3	Microbiological, shelf-life and barrier studies	UCA	Amine Guendouz
WP4	Physical treatments and ICT technologies integrated in the chain	ASU	David Drissner
WP5	End of life and environmental implications	UOI	Ioannis K. Kostantinou
WP6	Dissemination, Exploitation, Communication & Outreach (DECO) activities	UNIPI	Vito Gigante

3.1.3 Steering Committee (SC)

The mission of the SC is the strategic management of the project in line with the needs and requirements of all the project partners. This committee consists of one key representative of each of the beneficiaries. The members of the SC monitor and control the work performed using project milestones (Table 3.2 a) as guiding tool. The SC members support the PMT and the Scientific and Technical Committee (see next paragraph 3.2.2) by ensuring that the work performed within the PLAMINPACK project by their respective institutions fully comply with the Grant Agreement and satisfy to principles such as quality and cost efficiency as well as punctuality. The SC is the main instance concerning decision-making process. The SC will meet every 6 months at each project meeting and when required extraordinary physical and/or virtual meetings will be called by the PMT.

3.1.4 Scientific and Technical Committee (STC)

The mission of this committee is to provide a warranty for the achievement of objectives and activities of the project in due time. The STC consists of the work package leaders working under the supervision of the Scientific Coordinator, supported by the research and technical manager. While WPs leaders are in charge with the management fulfilment of the tasks in their respective WP, the STC is the instance responsible for the coherent integration of the various contributions coming from the various work packages by taking care of interdependencies between the various WPs in an interdisciplinary manner. The STC will play a crucial role in the early identification of any scientific or technical risks or problems that require effective and timely handling measures. The STC will have video conferences and meetings (concurrently to project meetings) every three months.

3.1.5 Innovation Committee (IC)

The Innovation Committee (IC) is the body in charge with the exploitation of PLAMINPACK results of commercial relevance (e.g., new products, patented processes) and those worth communication and further dissemination. The aim is granting the correct implementation of the exploitation strategy of PLAMINPACK, considering the different geographical and economic/industrial contests. Thus, this exploitation committee, that was elected in the kick-off meeting (KOM), consists of at least one representative for each country, headed by the Innovation Manager (IM), Dr. Daniele Spinelli (NTT).

Elected representatives were: for Italy: prof. Patrizia Falabella; For Morocco: Prof. Ahmed TADLAOUI; For Tunisia: Dr. Farah Hajkacem ; For France: Kévin Magnien ; For Greece: I. Konstantinou; for Germany: Prof. Christian Krupitzer.

A Dissemination Manager (DM), Prof. David Drissner (ASU), was elected and it will belong to the IC. The DM will be responsible to agree upon the relevant dissemination strategy, monitor and evaluate the performed dissemination activities and their impact, and adjust the established strategy accordingly.

3.1.6 Advisory Board (AB)

An independent Advisory Board (AB) will be appointed and steered during the project implementation. The AB will support the General Assembly in ensuring independent reviewing of the project results, providing guidance on the market introduction strategy, and giving access to relevant stakeholders in the industry for targeted communication.

This body consists of a voluntary group of stakeholders who will engage with the project on ad hoc basis according to the specific needs of the PLAMINPACK consortium (WP6, Task 6.2). This body has no voting rights and a confidentiality agreement will be signed with all its members. The composition of the AB will be set in order to cover the whole value chain of the conversion of the targeted biomass substrates into the

foreseen value-added products. It will encompass cooperatives, farmers, producers and processors of key feedstocks, packaging industries, food producer, potential end users of the PLAMINPACK intermediates, materials and packaging, association of bio-based industries, policy makers, technology transfer and innovation professionals, investors, and consumer associations.

The AB members shall be allowed to participate in meetings upon invitation but have no voting rights.

3.2 Decision-making and appropriateness of organizational structure.

When strategic decisions need to be taken concerning actions to solve conflicts, mitigate critical risks to project implementation, make amendment to the grant agreement, etc., it will be the responsibility of the PC to seek consensus with the SC, whereby each beneficiary will be assigned one vote. Decisions will be taken by simple majority.

Concerning decision making on technical issues of strategic importance to the project, the Project Coordinator will call for ad hoc meeting (physical or virtual) of the SC in order to take decisions. When a decision related to Intellectual Property Rights (IPR) and exploitation has to be made by the SC, the IM will make recommendation. Decisions on risk-related contingency actions will be taken by the SC on the basis of recommendations made by the IM and/or STC.

The foreseen organizational structure and decision-making processes take into account the geographic distances between the partners of the consortium and their respective competencies and expectations, the size of the consortium as well as the representation of each participating institution. The organizational structure and decision-making processes are properly tailored to achieve the research ambition and expected innovation impact of the project outcomes.

3.3 Innovation management

A key objective of the PLAMINPACK project is the steady translation of exploitable scientific and technological results into market-oriented products and industrially applicable novel processes. The approach of the Innovation Cycle by the PLAMINPACK consortium consists in a very pragmatic Innovation Management essentially driven by commercial end-users from agriculture, food, and packaging stakeholders. Scientists and engineers will closely interact with industrial stakeholders, especially those gathered in the AB, who perfectly know the market needs and volume potential, industrial and technological constraints and opportunities as well as regulatory standards to match the demand of food, feed, packaging and the requests of consumers. The innovation cycle in the PLAMINPACK project is expected to foster the emergence of a series of novel products and processes that are competitive compared to commercially available benchmark products and processes applied for the recovery and upcycling of bioresources.

4 MONITORING AND REPORTING PROCESS

Beneficiaries must deliver to the PC the financial, administrative and technical documentation that is required by PRIMA at any time of the project and respecting the deadlines imposed by PRIMA, with sufficient time so that the PC can ensure its correct quality prior submission.

As described in the CA, there are two different kinds of reporting to the EC:

- **Continuous reporting**: the beneficiaries have to continuously report on the progress of the action (e.g. deliverables, milestones, outputs/outcomes, critical risks, indicators, etc.) in the Continuous Reporting module of the MEL portal and in accordance with the timing and conditions it sets out (as agreed with the granting authority).

- **Periodic reporting**: the beneficiaries have to provide reports have to provide reports to PRIMA and the respective national funding bodies. The periodic reports include a technical and financial part, as explained below.

Moreover, Beneficiaries will internally report their costs every six (6) months to the PC to properly monitor the economic progress of the project.

4.1. Continuous reporting to PRIMA

4.1.1 Deliverables

Deliverables to report are included in Table 4 of this document. Deliverables shall be submitted via MEL Portal Continuous Reporting tool on their due date.

The WPLs are responsible for collecting all involved parties' information and drafting the deliverable in time. Furthermore, to ensure proper quality of all project deliverables and to verify consistency, the PC will finally review the deliverables.

The PC has to review and approve each deliverable before its submission to the EC on time via the F&T Portal. Thus, completed deliverables need to be submitted to the PC at least 15 days before the deadline.

4.1.2 Milestones, Outputs/Outcomes, Critical Risks, Indicators

The PC will gather the information from the Beneficiaries in order to complete the Continuous Reporting module in the F&T Portal. Beneficiaries have to send their contributions in due time to the PC.

4.2. Periodic reporting to PRIMA

The Project consortium must submit to PRIMA official reports, following the schedule set out in the CA (Table 7). These reports will be directly submitted via the Periodic Reporting Module on the MEL portal.

Table 7: Schedule of project periodic reporting

Reporting periods	Type of report	Deadline to submit the Periodic Reports
RP1 (M1-M18)	Additional prefinancing report	60 days after end of reporting period (Max: 28/02/2026)

RP2 (M19-M36)	Periodic report	60 days after end of reporting period (Max: 30/09/2027)

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3.3.1 Technical Part

The technical part of the periodic reports will be elaborated by the PC based on the information provided by WPL and reviewed by the PC. The technical part includes an overview of the action implementation. It must be prepared using the template available in the MEL portal.

The technical report is composed by:

- Part A: generated by the IT system, based on the information entered into the MEL Portal during the continuous reporting. It contains information on publishable summary, project implementation (WPs, Deliverables, Milestones and Critical Risks) and dissemination and communication activities carried out.

- Part B: narrative part that includes explanations of the work carried out by the beneficiaries during the reporting period.

Technical reporting creation and revision procedure is described in Table 8.

Table 8: Creation and revision procedure for periodic reports.

Who	What	Deadline
WPL	Send all information to the PMT.	At least 30 days before report deadline set out in the CA.
PMT	Collect information from WPL, draft report and send completed report to PC.	At least 15 days before report deadline set out in the CA.
PC	Review report to verify consistency and submit report via MEL Portal	Report deadline set out in the CA.

4.2.1 Financial Part

Each beneficiary must report its own financial data directly in the MEL Portal to be reviewed by the PC.

- The financial part of the additional prefinancing report includes a statement on the use of the previous prefinancing payment.

- The financial part of the periodic report includes:

    - The financial statements (individual and consolidated; for all beneficiaries/affiliated entities).

    - An explanation on the use of resources (or detailed cost reporting table, if required).

- The certificates on the financial statements (CFS) (if required).

In order to be eligible, costs and contributions have to meet the eligibility conditions set out in the CA. Each budget category has to follow its specific eligibility rules described in Article 6 of the CA.

4.3. Internal financial reporting

The PC has to monitor that the action is implemented properly, as described in Annex 1 of the CA and in compliance with all CA provisions. Thus, beneficiaries will report their project costs to the PC in order to monitor project implementation.

Partners will be provided with an internal financial reporting template to be filled out and sent to the PC every six months.

The internal reporting will consist of an Excel template for financial reporting. Beneficiaries will not send any supporting documents (contracts, pay slips, invoices, etc.), although each beneficiary has to keep their records and other supporting documents, according to Article 20 of CA.

4 RISK ASSESSMENT

The PLAMINPACK consortium will address potential risks related to technologies, market, environment, and organization during the activities of the project. Market-related risks and environment related risks will be assessed by the IM, and organizational-related risks will be analyzed by the Administrative Coordinator and the Scientific Coordinator with the support of the SC by monitoring the evolution of the work and the mobilization of the project resources. Technological risks will be managed by the Scientific Coordinator and the STC. Whenever possible, critical risks will be identified at an early stage of the project and swiftly eliminated. Some risks have already been identified at the proposal preparation stage. These risks, their likelihood (low, medium, high) and severity (low, medium, high) as well as the proposed risk-mitigation measures are described in Table 9.

Table 9: Risks related to the different WPs

Low purity of the extracts and the presence of contaminants (medium/medium)	1	Membrane contactor assisted liquid-liquid extraction, membrane filtration and adsorption are well established at APTI. The principle and mechanism of each technique are different, which increases the ability to purify different types of compounds. However, in case the purity of the obtained fraction is not satisfactory, we can combine two or more techniques, we can also use puriFlash if necessary to achieve high purity and further fractionate the extracts.
Not obtaining in the up-scaling the same performance for reactors as in the Erlenmeyer's flasks and balloons in terms of yield and purity (low/ high)	1	To mitigate this risk, we would need to conduct a thorough root cause analysis to identify and assess the key parameters of the reactor system. This analysis would help us to understand any deviations and refine the process to achieve the expected results.

Low palatability of substrates of the projects for H. illucens larvae, that could negatively influence the bioconversion process and the quantity of raw material to extract chitosan (medium/low).	1	Mix the substrates of the projects with other by-products resulting more attractive and palatable, that will improve the bioconversion process, their disposal and the quantity of larvae from which pupal exuviae and dead adult will be obtained
The composites containing HIC are not sufficiently anti-microbial (low/medium)	2-3	The solution can be to integrate a suitable application of functional coatings incorporating HIC, yet considered in WP2, to increase the surface concentration of HIC.
The use of SR in biopolyester formulations can induce biopolyester chain scission (medium/medium)	2	The use of biobased chain extenders or fillers in low amounts can allow to regulate the melt fluidity of the composite.
Barrier properties are not suitable for the packaging for fruits (medium/high)	2-3	The solution can be to integrate a suitable application of more functional coatings,but minimizing treatment steps and costs.
Nets produced by developed compounds do not meet necessary technical requirements (medium/low)	2	Close monitoring of developed compound properties. A portfolio of compounds will be produced in order to better target the necessary requirements. Incorporation of specific additives that will improve the lacking properties.
Unexpected (uncontrollable) climatic events (medium/low)	1-3	Sampling will include all possible measurements/variables to be included in the global analysis. If necessary, sampling may be postponed or anticipated a few weeks, and/or if possible, the experiment repeated in the same or other plot and prolonged for the following months/year. Strict monitoring of the experimental trials and the prompt use of corrective measurements, such as changes in the irrigation regimen, use of shading nets, chemical treatments against insects and pests.
Low performance of machine learning algorithms (low/medium)	4	Finding a high performing algorithm for machine learning is a challenge highly influenced by data quality/quantity. We mitigate this risk by starting early with the first trials and investigating various algorithms/machine learning techniques.
Failure of technical instrumentation (medium/high)	1-5	Delaying of some investigations when possible; support from partners owning similar facilities/expertise; external services.
The lack of consistency or the overfitting of the models can give the wrong idea that the model can predict the properties of interest better than it does (low/low)	4	The solution can be to apply a set of modelling models to the specific dataset and select the one that gives the better performance in addition to the use of different techniques for the assessment of the model quality.
Toxicity of the AOM of one selected plant (low/low)	5	The elimination of the toxic substance will be considered. In case it is not sustainable, the AOM of the other selected plants will be used.

For some life cycle stages there are no or only limited data available for the LCA, LCC, sLCA (medium/low)	5	The required data will be collected through surveys, interviews with project partners and/or by obtaining secondary data from eco inventories and/or scientific literature might be needed.
Low mechanical recyclability of composites (medium/low)	5	Use of chain extenders to allow the recycling in the same chain; in case this is not possible, identification of a different application for the recycled composites, with the support of AB.
Materials are still expensive to grant an easy exploitation of the project (medium/ high)	6	Involvement of selected biopolyesters producers in the AB, to consider suggestions for further reduction of materials costs.
Difficulties to maintain the participation of the involved stakeholders during the project lifetime (low/medium)	6	The project highly depends on the participant involvement, which is reassuring for achieving results. The use of partners' contacts and the confident communication and dissemination of the project will minimize this risk. Innovation management will ensure continuous checks with the market and project adjustments to maximize stakeholders' interest.
A WP leader is not able to fulfil his duties (e.g., due to illness) (low/low).	7	Replacement by another senior researcher from the same Partner team for the duration of the inability of the WP leader and immediate communication to the PC.
Low efficiency in management, problems with project administration (medium/high)	7	Discussions about important administrative issues will be included in the first KOM and in all the technical meetings. Suitable videoconferences can be arranged to clarify deficient issues.

5 COMMUNICATION AND DISSEMINATION

6.1 Internal communication

Internal communication refers to the process of information exchange among PLAMINPACK key staff members on one hand, and with project third parties (i.e., suppliers) in the framework of the project, on the other.

Although the main decisions should be taken within project team meetings, through daily internal communication a high amount of project tracking is done. Therefore, procedures for the "registration" of the communications are defined.

Table 10. Plaminpack member contacts for internal communication and administrative, technical issues.

Issues	Responsible	Main contacts
Administrative, financial and/or legal	Coordinator	Maria-Beatrice Coltelli
Technical	WP Leaders	Morad Chadni (WP1) Laura Aliotta (WP2) Amine Guendouz (WP3) David Drissner (WP4) Ioannis Kostantinou (WP5) Vito Gigante (WP6) Maria-Beatrice Coltelli (WP7)

6.1.1 Communication channels

The PC will oversee coordinating with the rest of the consortium members the necessary actions for the correct execution of the project.

Informal day-to-day communication will be conducted by:

- E-mail (please use "**PLAMINPACK**" as a reference on subject field).
- Videoconference to discuss particular issues, via Microsoft Teams. The PC will have periodic meetings to make the correct follow-up of the progress of the project and cover the needs at each moment, communication with leaders of each WP to take the necessary actions.
- To upload all documentation in the Microsoft Teams Repository. COORDINATOR team has set up a Microsoft Teams Repository where all the project documents will be collected.

Since other communication channels keep no evidence of the communication, communications through the above-mentioned channels will be encouraged.

6.2 External communication

UNIPI, as leader of WP6 (Dissemination and communication), will be in charge of producing D6.3: Plan for the Dissemination, Exploitation, Communication and Outreach (DECO) activities.

UNIPI will also be in charge of developing the following communication activities:

- Create the project identity and corporate materials
- Build a project website and social media
- Develop brochures, posters, video, roll up banners and print materials to inform about
- Project activities
- Issue newsletters
- Organizing an awareness raising campaign
- Organizing networking activities

All the external communication must be approved by the PC, in particular:

- Linkedin posts
- General communications of the project

Also, presentations of a technical nature (e.g. posters, presentations at conferences, etc.) will have to be authorised by the PC and the rest of beneficiaries.

All communication and dissemination activities of the parties related to the project have to follow the PRIMA instructions included in the CA and its Annexes.

In all the communications all the partners should mention that ”financial support has been provided by PRIMA, a program supported by the European Union”, followed by the National Grant Number.

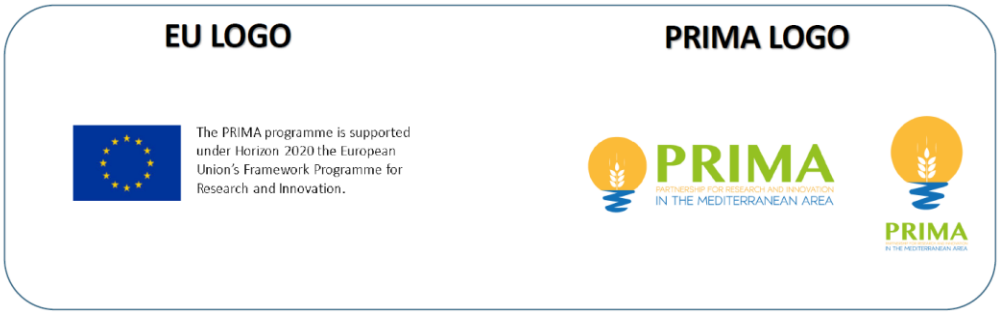

Figure 4 : Logos to be used for presentations, posters, leaflets, etc....

Any communication or dissemination activity related to the action has to use factually accurate information.

Moreover, the following logos has been created in order to be used in all different communication activities and documents of the project:

Figure 5 PLAMINPACK logos

Actions involving equipment, infrastructure or works, will display, as soon as the work on the action starts, a printed or electronic sign of appropriate size, with European and PRIMA flag and funding statement.

6.3 Communication with the Granting Authority

The Project Coordinator is the only person allowed to act as a link between the consortium and the Project Officer, with the only exception of specific claims on the Project Coordinator.

The channels are:

- In the MEL portal:
  - Participants Register: to update online information about participating organizations
  - Grant Management System:
- "Traditional" email & phone communications.

7 CHANGES MANAGEMENT

If any changes to the project should occur, suitable actions and/or procedures are necessary. In case adjustments are needed on the project, members will inform and advise the PC, about any operational, financial or administrative matters to be discussed in a General Assembly meeting.

If the changes are approved by the General Assembly, the PC will then inform the granting authority about the adjustments they wish to make, to officially know if undertaking the simplified procedure to get the approval of the changes proposed or submit an official amendment request via the Funding & Tender Opportunities Portal.

When the intended changes differ substantially from the initial plans, the CA will need to be updated by means of an amendment.

7.1 Amendments

An amendment to the agreement represents a substantial change to the CA originally approved by the granting authority. The amendment can neither modify the general objective of a project nor increase the maximum contribution.

Only the non-substantial changes can be accepted by simplified procedure.

The following are considered as substantial changes:

- extension of the project duration
- change of reporting periods
- changes in the work plan (change of Annex 1, e.g. work packages, tasks, deliverables)
- transfer of tasks between beneficiaries
- new/additional activities to be subcontracted
- adding or removing beneficiaries, affiliated entities or associated partners.

The budget breakdown may be adjusted — without an amendment — by transfers between budget categories, as long as this does not imply any substantive or important change to the Description of the Action.

The procedure to request an amendment is as follows:

The PC will launch the amendment preparation via the MEL portal. After the necessary steps, the preparation of the amendment will be ready to be submitted to the granting authority officer for informal review. After any necessary adjustment, finally, if the PO accepts the amendment request, the PLAMINPACK Project Legal Signatory (PLSIGN) must e-sign.

The EU services have 45 calendar days to access the request and the possibility to extend this deadline. If the amendment is accepted, the document will be signed by the granting authority, and the Grant Agreement data updated in the system accordingly.

If an amendment is started at the same time as a payment is requested, the payment will be suspended until the amendment is solved.

7.1.1 Amendments to the CA

Partners requesting an amendment to the CA must inform the PC by email about their interest in proposing an amendment to the CA. Amendments can be related to a change in their legal status or to request an update in their background section. The partner request will be forwarded to the General Assembly, who will decide on the approval or not of such change. Other articles referred to payment distribution and rules can be amended also, if a justified situation applies. In any case, the PC will always forward the request to the General Assembly for acceptance. Once the amendment has been approved, the PC will prepare the new version and distribute it among the partners for signature. The PC will retain the full original copy of the amended version and will distribute the full electronic copy to the partners. Each amended version will contain a list of track changes indicating place within the document and date of the change.

The conditions that apply to an amendment to the CA are described in Article 39 of the CA. If a partner needs to propose an amendment, it must be formally requested to the PC by e-mail. A short description of

the amendment request together with a detailed justification will be provided by the partner. If the amendment affects the partner individually, the PC will proceed with the amendment. If the request applies or affects other partners of the project, the PC will forward the request to the General Assembly for approval. Once accepted, the PC will proceed with the amendment.

8 AUDITS

Beneficiaries have to provide Certificates on their Financial Statements (CFS), in accordance with the schedule, threshold and conditions set out in the Data Sheet of the CA.

CFS are required for those PLAMINPACK beneficiaries requesting an EU contribution higher than € 430.000. The CFS will be submitted at interim/final payment, if threshold is reached. The PC will submit the CFS as part of the corresponding report. The audit should verify the respect of national legislation and accounting rules and certify that all costs incurred respect the PLAMINPACK project CA.

Moreover, the granting authority may — during the action or afterwards — check the proper implementation of the action and compliance with the obligations under the agreement, including assessing costs and contributions, deliverables, and reports.

The granting authority may carry out reviews and audits on the proper implementation of the action and compliance with the obligations under the Consortium Agreement (general project reviews or specific issues reviews). Such project reviews and audits may be started during the implementation of the action and up to five years after final payment.

They will be formally notified to the PC or beneficiary concerned and will be considered to start on the date of the notification.

The beneficiaries and affiliated entities have to keep records and other supporting documents to prove the proper implementation of the action in line with the accepted standards in the respective field.

According to Article 20 of the CA, beneficiaries have to keep for five (5) years after the final payment the following documents to justify the amounts declared:

- For actual costs: adequate records and supporting documents to prove the costs declared (such as contracts, subcontracts, invoices, and accounting records); in addition, the beneficiaries' usual accounting and internal control procedures have to enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documents.

- Moreover, the following is needed: For personnel costs: time worked for the beneficiary under the action has to be supported by declarations monthly signed by the person and their supervisor, unless another reliable time-record system is in place; the granting authority may accept alternative evidence supporting the time worked for the action declared, if it considers that it offers an adequate level of assurance. The partners will be provided with time sheets templates.

The records and supporting documents have to be made available upon request or in the context of checks, reviews, audits or investigations.

The beneficiaries must keep the original documents. Digital and digitalized documents are considered originals if they are authorized by the applicable national law. The granting authority may accept non-original documents if they offer a comparable level of assurance.

8.1 Ex-ante checks

Beneficiaries will be requested to submit documentation and data on the costs incurred within the reporting period so that the granting authority can perform some ex-ante checks. The purpose of these checks is to take the feedback into account for subsequent reporting purposes (increasing the quality of reporting and therefore decreasing the possibilities of ineligibility of costs).

A “use of resources table” will need to be completed and submitted together with information and documents on personnel costs, as well as subcontracting and purchase costs.

9 PAYMENT PROCEDURES

The Coordinator will not be responsible for the financial management of PRIMA research funding, which will be handled directly between parties and their National Funding Bodies in each participating country. Each Party will be funded directly by its own National Funding Body, therefore a grant agreement is concluded between each Party and its National Funding Body. The rules applying for this agreement are the national rules set in the national regulations. Each Funding Body establishes its own national regulations that provide to the Parties the list of criteria to check for the eligibility of costs.

10 DOCUMENT HANDLING

The documentation is intended to be used internally to the consortium and following the dissemination rules stated by the CA with the granting authority.

10.1 Format

Documentation will be circulated in formats compatible with: MS Office 365.

The overall project language is English, language that shall govern all documents, notices, meetings, proceedings, and processes relative thereto.

10.2 Codification of documents

The codification of documents tries to clearly identify a relevant set of information: the type of documentation, the deliverable it contributes to, author/responsible and version.

Files will be identified according to the following structure:

Document type_ filename_version.extension

Where:

Document type: A code that will identify the direct destination of the information included. Below are shown the considered codes.

AGENDA	Agendas of the different project meetings
MINUTES	Minutes of the different project meetings
DX.X	Deliverable number according to the Grant Agreement
PRX	Contributions to Periodic Report x (including financial statements)
PUB	Documentation addressed to direct dissemination/publication
PLAMINPACK	General documentation not specifically linked to any D or WP, but in the framework of the project.

Table 11 : Document identification

File name: Non-restricted name. Just what the author considers a logical name. In the case of the Deliverables it is not essential to add the file name, because the Document type (DX.X) and Version nº (def or VYY) are enough.

Version: Two-digit code identification the document version:

Intermediate versions	V01 to 09

Final versions	def
Further modifications to final versions	def 01 to 99

Table 12 Versions identification

Examples:

Final version of Deliverable 1.1	D1.1_def.pdf
Intermediate version of Deliverable 2.2	D2.2_V04.doc
Periodic Report 1(first version)	PR2_ PLAMINPACK _V01.doc
Periodic Report 1 (final version)	PR2_ PLAMINPACK _def.doc
Consolidated PR2	PR2_PLAMINPACK_def.pdf

Table 13 Examples of document identification

10.3 Documental archive

All PLAMINPACK Project related documentation will be archived in the repository created by the PC, accessible only by project partners.

10.4 Documental templates

It is compulsory to use the templates available on the MEL Portal to prepare PLAMINPACK project Periodic Reports.

Moreover, further document templates will be created for the project in order to obtain a visual identity and make the project more recognizable, as well as to improve the overall organization of work, such as deliverables, internal financial reports, PowerPoint presentations and meeting minutes and agenda templates.

11 ANNEXES

ANNEX I: Contact details

Name	Surname	E-mail address	Organization Acronym	Organization Country
Maria-Beatrice	**Coltelli**		**UNIPI**	**Italy**
Antonella	Castagna		UNIPI	Italy

Laura	Aliotta		UNIPI	Italy
Vito	Gigante		UNIPI	Italy
Andrea	Lazzeri		UNIPI	Italy
Patrizia	**Falabella**		**UNIBAS**	**Italy**
Antonio	Guerrieri		UNIBAS	Italy
Angela	De Bonis		UNIBAS	Italy
Paolo	Fanti		UNIBAS	Italy
Rosanna	Salvia		UNIBAS	Italy
Carmen	Scieuzo		UNIBAS	Italy
Daniele	**Spinelli**		**NTT**	**Italy**
Ilaria	Canesi		NTT	Italy
Noemi	Cei		NTT	Italy
Markus	**Schmid**		**ASU**	**Germany**
David	Drissner		ASU	Germany
Christian	**Krupitzer**		**UHOH**	**Germany**
Florent	**Allais**		**APT**	**France**
Morad	Chadni		APT	France
Christian	Cravotto		APT	France
Ioannis	**Kostantinou**		**UOI**	**Greece**
Maria-Eleni	Lekka		UOI	Greece
Triantafyllos	Albanis		UOI	Greece
Dimitra	Hela		UOI	Greece
Vasiliki	Boti		UOI	Greece
Paraskevi	Yfanti		UOI	Greece
Amine	**Guendouz**		**UCA**	**Morocco**
Naïma	EL GHACHTOULI		UCA	Morocco
Saad	Ibnsouda Koraichi		UCA	Morocco
Soumya	Elabed		UCA	Morocco
Cherkaoui	El Modafar		UCA	Morocco
Zainab	El Alaoui Talibi		UCA	Morocco
Aouatif	Aboudia		UCA	Morocco
Hajer	**Ben Hlima**		**SFAX**	**Tunisia**
slim	smaoui		SFAX	Tunisia
SLIM	ABDELKAFI		SFAX	Tunisia

Fadoua	Drira		SFAX	Tunisia
Julia	Matthes		ASU	Germany
Elisa	Falaschi		UNIPI	Italy
Julia	Senge		UHOH	Germany
Noemi	Cei		NTT	Italy
Farah	Hadj Kacem		SFAX	Tunisia
Anna	Sadzik		ASU	Germany

Contacts in bold are the responsible for each beneficiary.

ANNEX II: project schedule

WP	Description	Y1												Y2												Y3											
		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36
WP1	**Production of AOM, SR and HIC from selected plants (APT)**	M1																														M 6-8					
1.1	Selection of PWR and fruits samples (UCA)		✔																																		
1.2	Extraction of AOM and production of SR powder (APT)											✔												✔													
1.3	Production of HIC from PWR (UNIBAS)											✔																				✔					
1.4	Production of HI larval flour (UNIBAS)										✔																					✔					
WP2	**Materials and Processes for nets, films and trays (UNIPI)**													M2										M4													
2.1	Materials and processes for nets (NTT)													✔																							
2.2	Materials and processes for films (UNIPI)													✔																							
2.3	Materials and processes for trays (UNIPI)													✔																							
2.4	Biopolymer based coatings (ASU)														✔																						
2.5	Prototypes of anti-microbial nets, films and trays (UNIPI)																							✔													
WP3	**Microbiological, shelf-life and barrier studies (UCA)**																																				
3.1	Anti-microbial tests onto packaging (UCA)																																				
3.2	Gas barrier tests onto packaging (ASU)																																				
3.3	Shelf life studies onto strawberries, dates and tangerines (UCA)																																				
WP4	**Physical treatments and ICT technologies integrated in the chain (ASU)**																															M9			M11,12		
4.1	Plasma treatments and their combination with coating (ASU)																																✔				
4.2	Correlation between data coming from extractions and the different PWR (SFAX)																																✔		✔		
4.3	Digital twinning of the ripening and the package (UHOH)																																		✔		
WP5	**End of life and environmental implications (UOI)**																																				
5.1	Degradation/ageing/durability of prepared materials (UOI)													M3																						M10	M13
5.2	Organic and mechanical recyclability of packaging (ASU)																																				✔
5.3	Life Cycle assessment of the novel packaging (ASU)																																				✔
5.4	Potential toxicity assessment (UOI)													✔																							✔
WP6	**Dissemination, Exploitation, Communication & Outreach (DECO) activities (UNIPI)**																																				
6.1	Training/information activities related to the different project knowledge (UOI)																																				✔
6.2	Exploitation of project results in market&regulation contest (UNIPI)																																				
6.3	Dissemination of project results (ASU)											✔																									✔
6.4	Communication and outreach activities, including WEFE NEXUS (UNIPI)																																				✔
WP7	**Project coordination (UNIPI)**																																				
7.1	Technical and financial coordination and management of risks (UNIPI)	TM												TM, v																							TM, v
7.2	Data management (UNIPI)		✔		TM						TM													TM						TM						
		Laboratory phase				✔			Prototyping					Life Cycle Assessment & Environment						Other activities & Management																	

M milestone, ✔ deliverable v periodic reporting
TM technical meeting