

Valuefarm Project Progress Report



The PRIMA programme is supported under Horizon 2020 the European Union's Framework Programme for Research and Innovation



«VALorization of Mediterranean small-scale FARMS by cropping wild
UnExploited species»

ValueFarm

Project Progress Annual Report

Period covered by the report: from 01/09/2020 to 31/08/2021

Annual report: 1st

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Partners:

- University of Thessaly (UTH), **Greece**
- Instituto Politécnico de Bragança (IPB), **Portugal**
- Cyprus University of Technology (CUT), **Cyprus**
- Dokuz Eylul University (DEU), **Turkey**
- Ege University (EGE), **Turkey**
- Consejo Superior de Investigaciones Científicas (CSIC), **Spain**
- Bergische Wuppertal University (BUW), **Germany**
- Greek Fresh Vegetables IKE (GFV), **Greece**
- Benha University (BU), **Egypt**
- University of Mostaganem (UM), **Algeria**

The project started with the Kick-off meeting that took place online on 19-10-2021.

Meeting objectives

The agenda of the meeting included the following:

- Update the status of the agreement of each partner with their National Funding Agencies
- Check the status of the project and examine specific issues raised by the partners
- To finalize the Communication Plan of the project and check the progression of the administration, research and dissemination activities

1. Explanation of the work carried out by the beneficiaries and Overview of the progress

1.1 Objectives

The objectives of VALUEFARM related to the interim report are the following:

- 1) to **propagate and cultivate selected WEPs species**,
- 2) to **describe and evaluate agronomic performance of WEPs** through laboratory-based research and farm experimentation in order to establish best practice guides of plant requirements with respect to mineral nutrition, soil and climate, environmental footprint (low GHG emissions, water and energy use),
- 3) to create **physical labs** through a **network of farmers** for the on-farm demonstration and to implement **living lab platforms** for technological transfer in each zone of the project of the obtained key results, both of which will facilitate the adaptation of Mediterranean small-scale farms to the proposed farming systems.

Each partner made a brief description of the carried out activities related to the project WPs (WP1, WP2, WP5 and WP6) from M6 to M12, as well as the upcoming activities for the next WPs.

The coordinator added all the requested info to MEL platform related to the project. Moreover, all the due deliverables have been uploaded to the PEL platform, while a rescheduling of the original plan was requested and agreed by the PRIMA officer, related to the postponement of specific deliverables and the division of other deliverables to subdeliverables. All the suggested changes are illustrated in the MEL platform.



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1.2 Explanation of the work carried per WP

1.2.1 Work Package 1

Working package 1 is related to the administration of the project, starting in M1 and ending in M36.

All the partners have signed the Grant Agreements with their funding agencies, although great delays were recorded (e.g. Egypt, Germany and Algeria) which needed special attention and the postponement of specific deliverables, since the corresponding partners could not perform on time the scheduled activities. All the suggested changes did not result in the extension of the project; however, the deadline of specific deliverables was extended within the whole project duration.

All the partners have signed most of the contracts with temporary staff (researchers). The initial problems with the COVID pandemic and the restrictions in transportation between countries are now under control.

The kick-off meeting was held online in 19/10/2020 via zoom due to the restrictions in transportation between countries applied due to COVID 19. PRIMA officer Dr. Fabrice Dentressangle participated in the meeting and presented the PRIMA project requirements, the responsibilities of each partner and the whole consortium. During the meeting the progress report was discussed, as well the imminent future activities were planned. The meetings of this online meeting were submitted to PRIMA through deliverable D1.1. The deliverable was submitted on time via email to the PRIMA officer and it will be submitted to the PRIMA MEL platform as soon as it is available online.

The steering group committee (SGC) was decided in the kick-off meeting held online on 19/10/2021. All partners unanimously voted the steering company members and the following partners and team members were assigned as SGC members:

- University of Thessaly (Greece); Prof. Petropoulos Spyridon
- Cyprus University of Technology (CUT); Prof. Nikolaos Tzortzakis
- Ege University (EGE); Prof. Yusuf Kurucu
- Consejo Superior de Investigaciones Científicas (CSIC); Dr. María del Mar Alguacil

The constitution of SGC was submitted to PRIMA through deliverable D2.1. The deliverable was submitted on time via email to the PRIMA officer with the use of the proposed template and the same data will be also submitted to the PRIMA MEL platform as soon as it is available online.

As one of the monitor tools of the project, it was selected the creation of a common folder in Google drive with limited access to all the consortium partners. All the documents will be uploaded to this folder and will be visible to all partners. All partners will be able to work online and the project coordinator and the steering group committee will monitor the project progress through this online tool, among others.

The 1st technical meeting was held online on 3-9-2021



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The agenda of the meeting included the following:

- The presentation of the performed activities during the report period from each partner
- The discussion about issues related to the project progress and alleviation measures
- The reorganization of Communication and Dissemination activities

1.2.2 Work package 2

This working package is related to the evaluation of WEPs under innovative farming systems, starting in M1 and ending in M24. Specific tasks related to this interim report are **Task 2.1: Genetic material collection database**, **Task 2.2: Agronomical characterization of WEPs under various cultivation conditions** and **Task 2.3: Mixed cropping and intercropping systems, and short-term crop rotation systems**.

The progress of the ongoing tasks related to this interim report is the following:

Task 2.1: The partners involved in this Task are UTH, CUT, DEU, EGE, BU and CSIC. The partners located collection sites of the studied wild edible species, since the scheduled through field excursions. In particular, CSIC provided location details for all the studied species. UTH managed to collect seeds of *Portulaca oleracea*, *Cichorium spinosum* and *Crithmum maritimum*. DEU and EGE collected seeds of *Portulaca*. CUT and BU located growing sites of *Portulaca oleracea* in Cyprus and Egypt, respectively. CSIC created the 1st version of the DATABASE which is now available in the project website as an interactive map. The corresponding deliverable (D2.1) was divided in two subdeliverables (D2.1.1 and D2.1.2) in order to submit two versions of the database and all the related information will be presented in the website (WEPs hotspots). The first subdeliverable (D2.1.1) is already prepared and submitted through the MEL platform. The next version of the database will be submitted with subdeliverable D2.2.2. The database and the interactive map will be updated during the project.

Task 2.2: Germination protocols were performed according to the assignments defined in the 1st interim report (see Table 1). The 1st round of experiments is completed; however, a new set of seeds is needed because some species were not available in the 1st round due to COVID. Moreover, several genotypes of the selected species will be tested depending on the availability, while methods (seed priming, cold treatment) to increase the germination percentages in species that showed low percentages will be evaluated.

Table 1. Allocation of the species to each partner for the determination of seed germination.

Species	Partner
<i>Cichorium spinosum</i>	UTH
<i>Crithmum maritimum</i>	EGE
<i>Sonchus oleraceus</i>	CUT

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<i>Scolymus hispanicus</i>	CSIC
<i>Portulaca oleracea</i>	UTH

Seeds of each species (30-50 seeds x 4 replications, depending on the availability and the size) were tested in Petri dishes under different conditions. Germination rate and percentage (%) was evaluated at time intervals for 1 month. Seeds were considered germinated when the radicle has a length of at least 2 mm. The tested temperatures were as follows: 5 °C, 10 °C, 15 °C, 20 °C, 25 °C, 30 °C, while seeds were tested under dark and light conditions (12 h per day).

The preliminary results of germination test are presented in Table 2.

Table 2. Germination percentages of the tested species.

Species	Temperature (°C)					
	5	10	15	20	25	30
<i>Cichorium spinosum</i> (Greek genotype)	16.7% (22 days)	20.0% (22 days)	11.7% (16 days)	0	28.3% (25 days)	26.7% (16 days)
<i>Crithmum maritimum</i> (Greek genotype)	0	3.3% (22 days)	25.0% (25 days)	0	0	0
<i>Crithmum maritimum</i> (Turkish genotype)	-	-	58.0% (15 days)	93.0% (13 days)	-	-
<i>Sonchus oleraceus</i> (Greek genotype)	53.3% (22 days)	55.0% (10 days)	60.0% (22 days)	66.7% (10 days)	63.3% (7 days)	71.7% (10 days)
<i>Sonchus oleraceus</i> (Commercial genotype)	61.67% (30 days)	76.67% (14 days)	78.33% (8 days)	74.14% (7 days)	78.33% (11 days)	50.83% (20 days)

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<i>Scolymus hispanicus</i> (Greek genotype)	6.7% (22 days)	3.3% (16 days)	5.0% (5 days)	23.3% (3 days)	50.0% (16 days)	73.3% (16 days)
<i>Scolymus hispanicus</i> (Spanish genotype)	0	0	0	0	0	0
<i>Scolymus hispanicus</i> (Turkish genotype)	-	-	66.0% (14 days)	87.0% (10 days)	-	-
<i>Portulaca oleracea</i> (Hortus srl)	16.7% (25 days)	88.3% (13 days)	81.7% (5 days)	96.7% (4 days)	98.3% (4 days)	80.0% (3 days)
<i>Portulaca oleracea</i> (Turkish genotype)	-	-	80.0% (9 days)	95.0% (7 days)	-	-

The results of the completed experiments and those that will be performed within the next months will be integrated and included in the electronic handbook (D2.2) which is postponed to M20 of the project.

Task 2.3. The involved partners (UTH, CUT, DEU, EGE, BU and CSIC) performed the first series of experiments related to this task.

In particular:

- University of Thessaly (UTH) has performed the following experiments for the evaluation of the agronomic performance of the selected species:
 - (a) field experiments regarding the use of *Cichorium spinosum*, *Crithmum maritimum*, *Portulaca oleracea*, *Sonchus oleracea* in mixed cropping systems, following the cultivation of *Phaseolus vulgaris*.
 - (b) field experiments regarding the use of manure and zeolite in cultivation of *Cichorium spinosum*, *Crithmum maritimum*, *Portulaca oleracea*, *Sonchus oleracea* within the context of incorporating the selected species in organic farming systems.
 - (c) field experiments regarding the evaluation of irrigation requirements of *Cichorium spinosum* and *Scolymus hispanicus*
 - (d) pot experiments regarding the nutrient requirements of *Cichorium spinosum*, *Crithmum maritimum*, *Portulaca oleracea*, *Scolymus hispanicus*, *Sonchus oleracea*.

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Soil and plant samples were collected for chemical analyses that will be performed within the framework of WP3 and WP4, respectively.

- Greek Fresh Vegetables (GFV) is currently evaluating the use of *Portulaca oleracea* in short-term cropping systems with legumes. Samples will be collected for chemical analyses that will be performed within the framework of WP4.
- Dokuz Eylul University (DEU) and Ege University (EGE) have performed *in situ* collections from 21 locations in order to determinate the climatic characteristics, soil properties and possible pollution sources (heavy metals) for *Portulaca oleracea*. Analyses were performed in soil and plant samples (roots and aerial parts) to identify biocentration and translocation factors for various heavy metals, as well as analyses for physical properties and elemental content in soil samples. Moreover, *in situ* collection of soil samples where *Crithmum maritimum* plants grew in the wild was performed and physical properties and elemental and heavy metal content were analyzed. The results are presented in an internal report that has been already submitted to TUBITAK (see Annex I). Filed trials where the effect of green manuring, crop rotation and intercropping will be performed in the next growing season. Greenhouse pot experiments have been also planned to evaluate the effect of drought stress on the growth of *Crithmum maritimum*, *Portulaca oleracea* and *Scolymus hispanicus* plants, Samples will be also collected for chemical analyses that will be performed within the framework of WP4.
- Cyprus University of Technology (CUT) has performed preliminary hydroponic trials with *Sonchus oleraceus* and *Portulaca oleracea*. They are also preparing their hydroponic infrastructures for relevant experiments with *Sonchus oleraceus* and *Portulaca oleracea* where nutrient requirements of the tested species under soilless cultivation will be evaluated. Regarding the field experiments, local farmers have been contacted in order to evaluate the species under field conditions. Moreover, the selected farms will be used as physical labs for the communication and dissemination activities of the project.
- Consejo Superior de Investigaciones (CSIC) has performed pot experiments with *Portulaca oleracea* and *Scolymus hispanicus* related to the nutrient requirements of both species. The tested treatments included the Control, 100-100-100; 300-100-100; 600-100-100; 300-200-100; 300-300-100; 300-200-200; 300-200-300; organic Compost (equivalent to 300-x-x) and organic Compost + P inorg (equivalent to 300-200-x).

For each selected species the plant physiology parameters (fresh and dry weight and SPAD index) were evaluated. The nutrients use efficiency will be also analysed. Samples of soil and plant tissues are stored at -18 °C for further chemical and molecular analysis in WP4.

Field trials for the evaluation of integrating *Portulaca oleracea* in mixed cropping, intercropping, and short-term crop rotation systems (Task 2.3) have been planned for the upcoming growing season. During this task: (a) mixed-cropping of *Vicia faba* x *Portulaca oleracea*, and (b) short-term crop rotation systems with *Portulaca oleracea*

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and *Vicia faba* with the better fertilization treatments obtained in the previous task for this plant species will be evaluated. Plant physiology and soil quality parameters will be monitored to evaluate soil and plant quality.

- Benha University (BU) has performed field trails with *Portulaca oleracea* in mixed cropping, intercropping and short-term crop rotation systems with legumes and other crops, while soil quality was also assessed prior to the experiments. During and at the end of cultivation physicochemical soil parameters with in situ measurements and lab analyses of collected samples were also assessed.

1.2.3 Work packages 3 and 4

These work packages have just started (starting month M13 for both). All the related activities were discussed and defined in the 1st Technical meeting that was held on September 3, 2021. The progress of the related Tasks will be reported in the 2nd semestrial report which is due on 28-02-2022.

- Bergische Wuppertal University (BUW) which is the leading partner of WP has collected six different soils include 1) one artificial soil, 2) two arable soils, 3) one forest soil, 4) one garden soil, and 5) one grassland floodplain soil. The collected soils will be used in the activities of WP3 (Tasks 3.2, 3.3 and 3.4). Moreover, the soil samples were characterized for the basic soil physic-chemical properties (e.g., EC, pH, SOC) according to the standard method of soil analyses. Moreover, BUW conducted a greenhouse pot experiment to study the influence of soil types and properties on the plant growth of *Portulaca oleracea*, *Sonchus oleraceus*, and *Crithmum maritimum*. Finally, a field experiment in arable soil was performed to compare the growth of *Portulaca oleracea* under the open field and greenhouse conditions. Samples of rhizosphere and bulk soil were collected for the needs of WP3 and Tasks 3.2, 3.3 and 3.4. Plant samples will be prepared for extraction and analyses of nutrients and trace elements, while bulk soil samples will be used for the extraction and analyses of nutrients and trace elements, as well as for microbial analyses.
- Consejo Superior de Investigaciones Científicas (CSIC) is growing soil beneficial microorganisms (PGPR, AMF, PGPF) to be provided to the rest of partners of VALUEFARM in order to test their effect on plant development and soil quality under both greenhouse and field conditions according to the further tasks proposed in WP3.
- Instituto Politécnico de Bragança (IPB), as lead beneficiary of WP4 has begun the assessment of the nutritional value and chemical composition, as foreseen in task 4.3., of the samples *Scolymus hispanicus* and *Cichorium spinosum* with different fertilization treatments provided by the project coordinator (UTH). In due time the evaluation of the nutritional value and chemical composition of samples provided by the partners involved in WP2 will be performed within the next months.

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1.2.4 Work package 5

This working package is related to the communication activities of the project.

The logo of the project (Figure 1) was designed by the project coordinator and accepted by all the partners in the kick-off meeting. This logo will be used in the communication and dissemination activities by all partners, along with PRIMA and the corresponding national funding agencies logos, according to PRIMA rules.



Figure 1. Valuefarm logo

All the communication channels (Instagram, Facebook, Youtube channel) were defined and submitted to the PRIMA officer.

The details of the communication channels have been provided to PRIMA officer through Google Sheets

(<https://docs.google.com/spreadsheets/d/1nFXLaXMNm1ft2HwILGfJU243h3aJw98cmJopi9d0nSI/edit#gid=0>) and they are as follows:

- Website: <http://valuefarm-prima.agr.uth.gr/>
- Facebook: <https://www.facebook.com/Valuefarm-PRIMA-113138597266783>
- Instagram: https://www.instagram.com/valuefarm_prima/
- Twitter: <https://twitter.com/ValuefarmP>
- Youtube:
https://www.youtube.com/channel/UCXWiPYDw5kPeUfwhj_bsY_Q/?guided_help_flow=5
- Researchgate: <https://www.researchgate.net/project/VALUEFARM>
- Contact person: Petropoulos Spyridon (spetropoulos@uth.gr)

The task of managing the website of the project (Valuefarm-prima) was decided to be allocated to UTH in the kick-off meeting.

The Communication Plan of the project was finalized through the online meeting held on 23/02/2021. Each partner was assigned with specific tasks and this plan has been distributed among the partners. The Communication manager and WP leader (Cyprus University of

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Technology) in collaboration with the project coordinator will monitor all the activities throughout the project and ensure the regular progress of the project and the proper communication and dissemination of project results.

The communication activities are taking place according to the communication Plan which was finalized through the online meeting held on 23/02/2021. Considering that specific deliverables related to Communication activities include several delivery months e.g. D5.1 and D5.3 it was requested and accepted by the PRIMA officer to divide them in subdeliverables according to the delivery month. Therefore, D5.1 was divided to D5.1.1, D5.1.2 and D5.1.3 and each one could be submitted on the corresponding deadlines e.g. M12, M24 and M36. Similarly, D5.3 was divided to D5.3.1, and D5.3.2 and each one could be submitted on the corresponding deadlines e.g. M6 and M33. The related tasks that are already completed are the following.

The establishment of physical labs (deliverable D5.4) was postponed due to problems with setting up the experimental and demonstration fields. The request was accepted by the PRIMA officer and the deliverable will be submitted at the end of the second growing period (e.g. M24). Meanwhile, all the demonstrated activities will take place according to plan and depending on the restrictions of the pandemic.

Regarding the completed activities:

- Cyprus University of Technology (CUT) as WP5 leader has prepared the 1st newsletter and the project leaflet, which are translated to all the partners' language. Both newsletter and leaflet are circulated through the project website.
- The 1st newsletter which refers to deliverable 5.3.1 is completed and submitted to the MEL platform. Moreover, the newsletter is available online at the project website.
- UTH in collaboration with IPB has presented one poster in the proceedings of Natural Products Application conference that was held on-line on 4-5 February, 2021. The details of the presentation are the following:

Nikolaos Polyzos, Ângela Fernandes, Maria Inês Dias, Spyridon A. Petropoulos, Isabel C.F.R. Ferreira, Lillian Barros. Nutritional value and chemical composition of purslane leaves in relation to harvesting stage. Natural products application: Health, Cosmetic and Food (on-line edition). Braganca, Portugal, 4-5 February, 2021.

- UTH has presented one poster in the proceedings of III International Symposium on Soilless Culture and Hydroponics: Innovation and Advanced Technology for Circular Horticulture conference that was held on-line on 19-21 March, 2021. The details of the presentation are the following:

Elina Nastou, Georgios Thalassinou, Nikolaos Polyzos, Vasileios Antoniadis, Spyridon A. Petropoulos. The effect of nitrogen fertilization rate on growth and physiological parameters of three purslane genotypes grown in a soilless cultivation system. III International Symposium on Soilless Culture and Hydroponics: Innovation and Advanced Technology for Circular Horticulture, Lemesos, Cyprus, 19-21 March 2021. Acta Horticulturae 1321: 125-132. <https://doi.org/10.17660/ActaHortic.2021.1321.16>



1.2.5 Work package 6

Regarding the dissemination activities of the project:

The publicity material related to D-6.4 divided in 6 subdeliverables (e.g. D6.4.1, D6.4.2, D6.4.3, D6.4.4, D6.4.5 and D6.4.6) and each one should be submitted on the corresponding dates e.g. M6, M12, M18, M24, M30 and M36. The first deliverable (D6.4.1) is already completed and the prepared material is uploaded on the project website. In particular, D6.4.1 includes the following dissemination material:

- The official presentation of the project is available online at the project website.
- UTH as part of Task 6.4.1 has published an informative material to the Greek magazine Γεωργία και Κτηνοτροφία (<https://www.agrotypos.gr/>) which is addressed to Greek farming stakeholders such farmers, farming industry, agrofood industry, agronomists. The material is published in Greek. The publication is available online at the project website.
- The Polytechnic Institute of Bragança (IPB) as part of Task 6.4.1 has published a press release in the national newspaper Revista TecnoAlimentar, entitled “Valorização de pequenas empresas agrícolas da região Mediterrânica através do cultivo de plantas silvestres não convencionais - Valorization of small agricultural farms in the Mediterranean region through the cultivation of unconventional wild plants” (<http://www.tecnoalimentar.pt/noticias/valorizacao-de-pequenas-empresas-agricolas-da-regiao-mediterranica-atraves-do-cultivo-de-plantas-silvestres-nao-convencionais/>).
- A review paper regarding the use of WEPs in the Mediterranean diet has been published in Applied Sciences, MDPI. The paper is published open access and free for download at the publisher website. It is also available at the project website. The details of the paper are the following:

Elena Chatzopoulou, Marcio Caroch, Francesco Di Gioia, Spyridon A. Petropoulos. 2020. The Beneficial Health Effects of Vegetables and Wild Edible Greens: The Case of the Mediterranean Diet and Its Sustainability. Applied Sciences 10(9144): 1-27. <https://doi.org/10.3390/app10249144>

1.3 Impact

The information on section 2.1 of the proposal submitted is still relevant and according to schedule.

2. Deviations from the proposal submitted (if applicable)

2.1 Tasks

Tasks of WP2 were affected by the COVID pandemic and specific deliverables are behind schedule (D2.2, D5.1 and D5.4). Therefore, a postponement has been asked and granted by the PRIMA officer for the better administration of the whole project and the harmonization of activities among the partners. This delay is not going to severely affect the research activities

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of the rest of the WPs (WP3 and WP4) as soon as the situation comes back to normal within the next months.

Other deviations from the proposal submitted include the division of deliverables D2.1, D5.1, D5.3 and D6.4 in subdeliverables in order to submit the corresponding deliverables according to the schedule mentioned in the proposal submitted. In particular:

Deliverable D2.1 is divided in two subdeliverables (e.g. D2.1.1 and D2.1.2). The first one is already completed and available online via the project website. The second will be completed in due time (M24).

Deliverable 5.1. is divided in three subdeliverables (e.g. D5.1.1, D5.1.2 and D5.1.3 and each one could be submitted on the corresponding deadlines e.g M12, M24 and M36), according to the proposal submitted. The first subdeliverable (D5.1.1) is already completed and the publicity material has been uploaded on the project website and on the MEL platform.

Deliverable D5.3 is divided in three subdeliverables (e.g. D5.3.1, and D5.3.2 and each one could be submitted on the corresponding deadlines e.g M6 and M33), according to the proposal submitted. The first subdeliverable (D5.3.1) is already completed and the publicity material has been uploaded on the project website and on the MEL platform.

Deliverable D6.4 is divided in 6 subdeliverables (e.g. D6.4.1, D6.4.2, D6.4.3, D6.4.4, D6.4.5 and D6.4.6) and each one should be submitted on the corresponding dates e.g. M6, M12, M18, M24, M30 and M36, according to the proposal submitted. The first deliverable (D6.4.1) is already completed and the prepared material is uploaded on the project website. Deliverable D6.4.2. which is due on 31-08-2021 was postponed to 31-12-2021.

There are two more issues to be mentioned that were mentioned by the partners in the technical meeting that was held on September, 2021. First of all, the Egyptian partner (Benha University) signed very late the Grant Agreement with its national funding agency (10 May 2021); therefore, the planned tasks are behind the schedule due to lack of funds. Moreover, for some reason the German partner (Bergische Wuppertal University) has signed a Grant Agreement with its national funding agency which started on May 2021 and ends after 24 months (April 2023). Therefore, funding does not cover the project throughout its duration (until August 2023).

2.2 Use of resources

The allocation of person-months is according to schedule so far. However, the delays in contracting do not allow the alignment of the allocation of the scheduled person-months to specific WPs. The postponement of the deliverables and the hiring of temporary personnel is expected to solve this issue.

The proposed equipment has been obtained by the corresponding partners.