

# Proactive Producer and Processor Networks for Troodos Mountains Agriculture 3PRO-TROODOS

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Authors	Christos Zoumides, Adriana Bruggeman (HO), Andreas Savvides, Sotiroula Ioannidou , Constantina Stavridou, Andreas Stylianou (PA1), George Michalis (PA8), Savvas Malliotis (PA2)
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Short description	D6.2: Report with results of the first year of participatory research in all farmer fields

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#### 1. Introduction

The 3PRO-TROODOS project was developed to provide solutions to the problems that impede the prospects for further enhancement and sustainable development of the agro-food industry in the Troodos Mountains. The project was designed to develop ties and synergies based on action research and participatory approaches that aimed to engage multiple stakeholders throughout the project. Farmers, and particularly fruit and vegetable farmers in Troodos Mountains, were therefore the main focus when the project was coined.

Within the project and WP6, a number of climate resilient and eco-friendly farming practices were foreseen. These technologies are:

- Irrigation scheduling for fruit and nut trees with wireless soil moisture sensors and mobile apps (Task 6.1)
- Use of protective nets for sustainable fruit production (Task 6.2)
- Testing the growing and processing potential of two new indigenous medicinal and aromatic plants (Task 6.3)
- Maintenance of dry-stone mountain terraces (Task 6.4).

The successful pilot testing implementation of these technologies required collaboration and frequent interaction and consultation between researchers and farmers. In addition to the technologies, another important aim of 3PRO-TROODOS project was the bottom-up development of a quality certification label for Troodos fruit and vegetable products (WP5), which also included frequent interactions and consultations with farmers.

The aim of this report is to document the participatory research that was undertaken in 3PRO-TROODOS in farmer fields. The report was originally planned to include the participatory processes of the first year. However, due to COVID-19 pandemic and the restrictions in the period 2020-2022, many of these actions were postponed and took place when gatherings were again feasible. Therefore, the report covers the major interactions between researchers and farmers throughout the project. It should be noted that for terraces, the participatory research is reported in D6.6. Therefore, this report covers the other three technologies and the site visits for the development and pilot-testing of the quality certification scheme.













# 2. Cooperative irrigation scheduling with wireless soil moisture sensors

A soil moisture station with 20 soil moisture sensors was installed by the Cyprus Institute at the Saitas experimental farm that is managed by the Agricultural Research Institute, in May 2020 (Figure 1), when the aromatic plant experiment was initiated (see section 4 below, and D6.5). The station was used to monitor soil moisture and support irrigation scheduling. In addition, the data collected and transmitted from this station were used by Sigint Solutions LTD (PA8) to develop and pilot test the online platform, i.e., the Wireless Sensor Network and a Sensor Observation Service (see D6.1). Beyond the experimentation and pilot testing, the station was demonstrated to farmers in two field events that took place in April 2022 (see section 4).



Figure 1: Installation of the soil moisture sensors and data logger in Saitas, May 2020













Three more soil moisture units and two meteorological stations on a terraced cherry, apple and nectarine orchards, which were installed during previous monitoring projects, were maintained. A third meteorological station was installed at the cherry terrace in December 2021. These sites were maintained during the project and irrigation scheduling findings and options for improvement (smaller, more frequent irrigations) were discussed with the farmers (see D6.3).

A final soil moisture and meteorological station was installed at a plum production orchard in Potamitissa community, in May 2022. The orchard is managed by a young professional farmer who showed great interest in collaborating with the researchers. The installation was done by the Cyprus Institute and Sigint Solutions LTD. The station's logger with integrated solar panel was developed by Sigint Solutions LTD.



Figure 2: Installation of soil moisture sensors at different soil depths in Potamitissa plum orchard, May 2022















Figure 3: Installation of meteorological station in Potamitissa plum orchard, May 2022

Once the system was established, the farmer was introduced to the web and mobile applications that were developed by the project. The application provides information on the soil moisture and weather conditions at the field, as well as messages on when and how much irrigation should be applied (see D6.1). The research team also visited the orchard multiple times, to fine-tune the logger settings and interact with the farmer (Figure 4).















Figure 4: Knowledge exchange on irrigation between the Potamitissa farmer and the coordinator of the project, December 2022.

Other than testing the irrigation scheduling technology in a production farm, the station in Potamitissa was also used for demonstration purposes. In particular, an information and demonstration event was co-organized by the Cyprus Institute, Sigint Solutions and the Agricultural Research Institute in Agros and Potamitissa communities, in January 2023 (Figure 5).

The event was separated in two parts. First, the 3PRO-TROODOS researchers presented the technology in Agros (Figure 6), and then, the farmers attending the event visited the Potamitissa orchard (Figure 7). In the field, they had the chance to see the system, ask questions and discuss with the researchers.













## Πρόσκληση

Στο πλαίσιο του ερευνητικού προγράμματος 3PRO-TROODOS διοργανώνεται επιτόπια εκδήλωση ενημέρωσης με θέμα

«Προγραμματισμός άρδευσης βάσει αισθητήρων με διαδικτυακά εργαλεία»

#### Πέμπτη, 19/01/2023 Κέντρο Πληροφόρησης Νέων, Αγρός

09:00 - 09:30	Εγγραφές – Καφές
09:30 - 09:40	Επισκόπηση έργου 3PRO-TROODOS Δρ. Χρίστος Ζουμίδης, Ινσπτούτο Κύπρου
09:40 — 10:00	Ευφυής καλλιέργεια Αρωματικών & Φαρμακευτικών φυτών Δρ. Ανδρέας Σαββίδης, Κωνσταντίνα Σταυρίδου, Ινσπτούτο Γεωργικών Ερευνών
10:30 - 11:00	Μέθοδοι προγραμματισμού άρδευσης Prof. Adriana Bruggeman, Δρ. Μ. Σιακού, Ι. Σοφοκλέους, Δρ. Χ. Ζουμίδης, Ινστιτούτο Κύπρο
11:30 - 12:00	Παρουσίαση συστήματος ARGUS AGRO Γιώργος Μιχάλης, Sigint Solutions
12:00 - 12:30	Ερωτήσεις – Συζήτηση
12:30 - 13:30	Επίσκεψη σε οπωρώνα στην Ποταμίτισσα και επιτόπια παρουσίαση συστήματος
	Για δηλώσεις συμμετοχής (μέχρι 17/01/23) και περισσότερες πληροφορίες: c.zoumides@cyi.ac.cy, 22208607 ή Λάμπρος Αχιλλέως, 99653566

Το πρόγραμμα 3PRO-TROODOS (INTEGRATED/0609/061) συγχρηματοδοτείται από το Ευρωπαϊκό Ταμείο Περιφεριακής Ανάπτυξης και την Κυπριακή Δημοκρατία μέσω του Ιδρύματος Έρεωνας και Κανοτομίας, και συντονίζεται από το Ινοππούτο Κύπρου.











Figure 5: Invitation to the information and demonstration event on irrigation scheduling with wireless sensors and online tools



















Figure 6: Presentation of irrigation scheduling technologies to farmers in Agros, January 2023















Figure 7: Field visit with farmers during the demonstration event on irrigation scheduling, Potamitissa, January 2023













#### 3. Interaction with farmers regarding the use of protective nets

The interaction with Troodos Mountain farmers who are extensively involved in the production of fruits for the local market began in September 2019, following an event on protective nets that was organized by the Department of Agriculture in Agros, in the presence of the Minister of Agriculture (Figure 8). Farmers were given an overview of the rationale behind the installation of protective nets and how this technology could potentially improve the productivity and functionality of their orchards. In addition to fruit farmers, researchers from the Agricultural Research Institute and the Cyprus Institute visited vegetable farmers in Troodos that began using protective nets, to discuss and share knowledge on this technology (Figure 9). These discussions helped the researchers to review the current situation and to identify potential and commercially-productive orchards for experimentation. The focus was in the communities Dymes, Potamitissa and Agros, where farmers specialize in fruit tree farming (Figure 10).



Figure 8:Demonstration event on protective nets, organized by the Department of Agriculture in Agros (September 2019)















Figure 9: Site-visit and discussion with tomato farmer in Polystipos-Agridia (November 2019)



Figure 10: Newly established apple orchard in Dymes (September 2019)

A cherry orchard in Potamitissa (Figure 11) was considered as suitable case-study, and the farmer/owner of the orchard agreed to cooperate with the Agricultural Research Institute and to install the protective net technology on his plot. Subsequently, interaction with the farmer and guidance for the implementation of protective nets was given by the research team, in accordance to the experimental













design. However, the planned installation was delayed due to the outbreak of the COVID-19 pandemic. As a result, instead of installing the protective nets in Spring 2020, the installation began in the Autumn of 2020 and completed in Spring 2021.

During the installation of protective nets in Potamitissa (Figures 12-15), other than the farmer that was directly involved in the process, farmers from nearby communities visited the field and observed the establishment of the system. The farmers had the chance to ask questions about the technology and gained new knowledge and experience. These farmers also sought the opinion and knowledge of the research team for their fields. Therefore, a series of face-to-face discussions and on-site visits to their mountain orchards was organized in the period 2020-2022, in the communities Pelendri, Potamitissa and Amiantos.



Figure 11: The selected cherry orchard in Potamitissa (January, 20202)















Figure 12: Installation of protective nets technology, Potamistissa (December 2020)



Figure 13: Installation of microclimate stations, Potamitissa (December 2020)



Figure 14: Hanging of protective nets, Potamitissa (Spring 2021)



Figure 15: Spreading the nets for installation, Potamitissa (Spring 2021)













In accordance to the original plan of the project, and despite the delays caused due to COVID-19, a second suitable orchard was identified to install and pilot-test the effectiveness of the protective nets. The second farmer also owned a cherry orchard, located in the Kannavia community. The contacts were initiated in late 2021. The farmer showed great interest in participating to the pilot test and to collaborate the research team. The installation of the protective nets began in January 2022 (Figure 16) and were completed in Spring 2022 (Figure 17).



Figure 16: Cherry orchard in Kannavia (January 2022)



Figure 17: The pilot cherry orchard in Kannavia covered with protective nets (April 2022)













In March 2022, an on-site information event and a demonstration visit to the experimental orchard was planned in Agros (in collaboration with the Pitsilia regional office of the Department of Agriculture) and Potamitissa, respectively. This event was cancelled due to COVID-19 illness of the Agricultural Research Institute team. Interested farmers were notified via a <u>post</u> on the project's Facebook page (Figure 18).



Figure 18: Cancellation of information/demonstration event due to COVID-19 illness of the research team

In February 2023, a matching event was organized in the second orchard in Kannavia, with great success (Figure 19). The event was attended by about 30 people that are active in fruit tree farming. The farmers showed great interest in the technology and research results (Figures 20 - 22). Other than discussing and responding to the questions of farmers, all participants received the informative brochure that was released by the project regarding the benefits of protective nets.















Figure 19: Invitation to the information/demonstration event in Kannavia, February 2023



Figure 20: Welcoming address of the event by the Kannavia community leader, February 2023















Figure 21: Presentation of results from pilot-testing the protective nets in Troodos to farmers in Kannavia, February 2023



Figure 22: Visit to the Kannavia orchard for discussion and demonstration of the protective nets' technology with farmers, February 2023













### 4. Interaction with farmers regarding aromatic and medicinal plants

There have been multiple interactions with Troodos farmers and aromatic plant experts, during the ethnobotanical survey that took place during the 2019-2020 period (Figure 23). In particular, 57 respondents from 31 communities participated in face-to-face interviews, and data on medicinal and aromatic plants (MAPs) and their traditional uses were collected. The outcomes of this survey resulted in two publications:

- a scientific paper in the Journal *Plants* (as part of Task 2.2). The full citation of the paper is:
   Savvides, A.M., Stavridou, C., Ioannidou, S., Zoumides, C. and Stylianou, A., 2023. An
   Ethnobotanical Investigation into the Traditional Uses of Mediterranean Medicinal and Aromatic
   Plants: The Case of Troodos Mountains in Cyprus. *Plants*, 12(5), p.1119. DOI:
   <a href="https://doi.org/10.3390/plants12051119">https://doi.org/10.3390/plants12051119</a>
- A comprehensive and colorful 150-page booklet entitled "Traditional uses of aromatic and medicinal plants in Troodos Mountain communities (ISBN: 978-9925-1-6011-2), written in Greek. The booklet contains 30 most popular plants and was part of D2.3.



Figure 23: Meeting with aromatic plant experts in Treis Elies, July 2020













The cultivation of indigenous medicinal and aromatic plants offers another sustainable option in the Troodos mountains. In the framework of 3PRO-TROODOS, two plant species namely *Origanum dubium* and *Origanum majorana* var. *tenuifolium* were tested for cultivation at ARI's experimental station in Saittas between 2020-2022. Prior to the implementation of the testing of the two plants, seeds of the two Origanum species were collected in September 2019 from Lofou and Kampos communities, where they grow naturally, having acquired the necessary permission from the Department of Forests. The seeds were used to produce plant material; sowing was done on October 2019, and germination of seeds started after approximately 10 days. The seedling trays remained in the nursery (greenhouse) until the time of planting at Saitas experimental station, in May 2020 (Figure 24). A soil moisture station for irrigation scheduling was established at the day of planting, in collaboration with the Cyprus Institute, as noted above.



Figure 24: Origanum seedlings before plantation, May 2020













In August and September of 2020, seeds of the two species under experimentation were collected for the production of additional seedlings. Sowing was done in September. In the framework of the project, the seedlings produced were given to aromatic plant farmers from Kampos (Figure 25) and Lazania - Machairas Monastery (Figure 26) who expressed the desire to try the cultivation of these species in their area.



Figure 25: Seedlings given to Kampos farmers for trial, March 2021



Figure 26: Seedlings given to Lazania farmers for trial, December 2021

As part of the dissemination activities of the project (WP2), two information and demonstration events on "Smart cultivation of aromatic and medicinal plants in the Troodos mountainous areas" were organized by the Agricultural Research Institute in collaboration with The Cyprus Institute and Sigint Solutions LTD (Figure 27 - 30). The first event (06/04/2022) was targeting organic farmers. The Cyprus Organic Farmers Association (partner to the project) was responsible for inviting members of the association (Figure 28). The second event (07/04/2022) was open to aromatic plant farmers in Troodos and was attended by officers of the Department of Agriculture, as well as responders to the Ethnobotanical survey that was done in WP6 (Figures 30). In both events, the organizing partners presented their work. The participating farmers could then visit the experimental plantation to ask question and discuss with researchers.















Figure 27: Presenting the project findings to aromatic plant farmers in Saitas station, April 2022



Figure 28: Demonstration event for organic farmers at Saitas experimental station, April 2022





















#### ΠΡΟΣΚΛΗΣΗ

Το Ινστιτούτο Γεωργικών Ερευνών, στο πλαίσιο του έργου 3PRO-TROODOS, διοργανώνει επιτόπια εκδήλωση ενημέρωσης με θέμα:

> «Ευφυής Καλλιέργεια Αρωματικών & Φαρμακευτικών Φυτών στις Ορεινές Περιοχές Τροόδους»

Πειραματικός Σταθμός Σαϊττά (ΙΓΕ) 07/04/2022

#### Πρόγραμμα

09:30-10:0	Ο Προσέλευση - Εγγραφές
10:00-10:10	Ο Χαιρετισμός (Ανδρέας Στυλιανού, ΙΓΕ)
10:10-10:2	5 Το έργο 3PRO-TROODOS (Δρ. Χρίστος Ζουμίδης, Ινστιτούτο Κύπρου)
10:25-10:50	<ul> <li>Εθνοβοτανική μελέτη για τις παραδοσιακές χρήσεις των Αρωματικών</li> <li>Φαρμακευτικών φυτών στις ορεινές περιοχές του Τροόδους (Δρ. Ανδρέας Σαββίδης, Κωνσταντίνα Σταυρίδου, ΙΓΕ)</li> </ul>
10:50-11:1	5 Ευφυής καλλιέργεια Αρωματικών & Φαρμακευτικών φυτών (Δρ. Ανδρέας Σαββίδης, Κωνσταντίνα Σταυρίδου, ΙΓΕ)
11:15-11:30	Ο Ολοκληρωμένο σύστημα παρακολούθησης περιβαλλοντικών συνθηκών - υλοποίηση συστημάτων γεωργίας ακριβείας (Γιώργος Μιχάλης, Sigint Solutions Ltd)
11:30-12:0	Ο Ερωτήσεις-Συζήτηση
√ Γιαδ	ολώσεις συμμετοχής (μέχοι 31/03/22) στο https://bit.lv/3III8ni και περισσότερες

- πληροφορίες (OnstantinaStardou@ari.gov.cy, 22403132) andreas-savvides@ari.gov.cy, 22403128 Στην εκδήλωση θα τηρούνται όλα τα ισχύοντα μέτρα προστασίας για περιορισμό της εξάπλωσης της πανδημίας της COVID-19, βάσει της τελευταίας εγκικλίου του Υπουργείου Υγείας.

Figure 29: Invitation to the demonstration event



Figure 30: Demonstration event for Troodos aromantic plant farmers at Saitas experimental station, April 2022













# 5. Farmer meetings for the development of the quality certification scheme

An important output of the project is the quality certification label that was developed in a participatory, bottom-up approach with Troodos farmers. As reported in WP5, the following group meetings were organized:

- 24/09/2020 Agros
- 27/10/2020 Galata
- 08/06/2021 Kyperounta
- 12/06/2021 Agros (SEDIGEP farmers)

The focus of these group meetings was the development and discussion of the criteria for certification. Beside these meetings that are reported in WP5 deliverables, several site visits and meetings with farmers were organized during the development of the list of criteria (Figure 31). These informal meetings helped the research team to have a better understanding of the current situation, and discuss with farmers on the sustainable practices that are or could be implemented by farmers, and therefor to include them as criteria for certifying the quality of the produced fruits and vegetables.





Figure 31: One of the several meetings with individual Troodos farmers to discuss the certification criteria and visit their fields.

Galata, October 2020

After the initial certification criteria were developed, the A.M. Filagrotiki Symvouleftiki LTD and the Cyprus Institute researchers, visited farmers and went through the criteria one-by-one. This processes and the discussion with farmers helped in finalizing the list of criteria. Based on the agreed criteria, the first pilot-group of farmers received the certification (see <a href="project website">project website</a>), after a formal visit and inspection of fields by the research team.















Figure 32: Discussing the criteria with Pitsilia farmers in Agros, February 2022



Figure 33: One-to-one discussion of certification criteria with a Kyperounta farmer, March 2022

The project and Troodos quality certification label were also presented to the general assembly of the Cyprus Organic Association Farmers (COFA, PA6), in June 2022, as part of the dissemination activities (WP2). As explained to this group of farmers, there are specific certification criteria that promote environmentally-friendly practices, therefore organic farmers in Troodos have a very good incentives to be certified and receive the Troodos Mountain Agriculture label.















# ΠΡΟΣΚΛΗΣΗ

Ο Σύνδεσμος Βιοκαλλιεργητών Κύπρου, σας προσκαλεί στην ετήσια Γενική Συνέλευση, την Τετάρτη 15 Ιουνίου 2022, 18:00μμ. στο Κέντρο Περιβαλλοντικής Εκπαίδευσης Σκαρίνου.

- 18:00μμ. Προσέλευση και εγγραφές.
- 18:15μμ. Απολογισμός Δράσεων Χρονιάς και Οικονομικές Καταστάσεις
- 18:30μμ. Δράσεις του έργου 3PRO-TROODOS\* και σήμα ποιότητας προϊόντων ορεινής γεωργίας. Δρ. Χρίστος Ζουμίδης (Ινστιτούτο Κύπρου) και Σάββας Μαλιώτης (Φιλαγροτική Συμβουλευτική)
- 18:50μμ. Παρουσίαση της Κυπριακής Εταιρείας Αγροτουρισμού.
- 19:10μμ. Ανάλυση και Συζήτηση των κυριότερων προβλημάτων που αφορούν τους Κύπριους Βιοκαλλιεργητές. Σχεδιασμός δράσεις για αντιμετώπιση τους.
- \* Το πρόγραμμα 3PRO-TROODOS (INTEGRATED/0609/061) συγχρηματοδοτείται από το Ευρωπαϊκό Ταμείο Περιφερειακής Ανάπτυξης και την Κυπριακή Δημοκρατία μέσω του Ιδρύματος Έρευνας και Καινοτομίας και συντονίζεται από το Ινστιτούτο Κύπρου

Figure 34: Invitation to COFA members



Figure 35: Presenting the Troodos Mountain Agriculture label to organic farmers in Skarinou, June 2022









