AgriLink. Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation

Deliverable 2.2: Synthesis Country Report (Version 1.0)
Partner: Agricultural University of Athens

The role of advisory services in farmers' decision making for innovation uptake. Insights from case studies in *Greece*

Part 1

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List of contents

List of Boxes

List of Figures

List of Tables

List of acronyms

AgriLink	Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation
AOS	Advisory Organisation Supplier
AKIS	Agricultural Knowledge and Innovation System
DoA	Description of the Action
EU	European Union
Micro-AKIS	Micro-level Agricultural Knowledge and Innnovation System
NGO	Non-Governmental Organisations
NUTS	Nomenclature of Territorial Units for Statistics
R-FAS	Regional Farming Advisory System
TCM	Trigger-Cycle Model
WP	Work package
OPEGEP- AGROCERT	Organization for the Certification and Supervision of Agricultural Products
MD	Method of mating disruption (sexual confusion) of insects
NRDP	National Rural Development Program
TEI	Technological Educational Institute
ASYST	Agricultural Stevia Cooperative
DDFT	Department of Deciduous Fruit Trees of Naoussa
ELGO DIMITRA	Hellenic Agricultural Organization
Adv. Co.	Advisory company
IACS	Integrated Administration and Control System
MAICH	Mediterranean Agronomic Institutes of Chania
A-Coop	Leading cooperative

Executive Summary

This report is part of the WP2 of the Agrilink project. WP2 aims to understand why, how and from/with whom European farmers and farm managers gather and exchange information which underpins their decision-making process concerning the development and/or implementation of different types of innovation. A second aim of WP2 is to analyse the role played by advisors in such processes, taking into account the range of advisory services available in diverse focus regions across Europe.

In Greece three innovation cases categorized in two of the Agrilink innovation clusters were explored: The Integrated Pest Management and the mating disruption (MD) of insects implemented by peach producers in Imathia (Pest control cluster); the spread of the cultivation of avocado in Chania, which came as a consequence of the volatility of the markets (New crops cluster); and, the cultivation of stevia in Karditsa, which came as a response to the need of replacing traditional cultivations with innovative and more profitable ones (New crops cluster).

Methodology and sampling: The methodological framework used in the three case studies concerns a mixed-method strategy. On one hand quantitative and qualitative data with farmers were collected via structured interviews aiming at the description of their micro-AKIS and, on the other hand, interviews with key advice providers, aiming at the description of the R-FAS in relation with the selected innovations. In total 113 farmers were interviewed, including adopters, non- adopters and droppers, following a snowball sampling approach. Representatives of local cooperatives, advisory companies, public services and local organizations as well the farmers themselves were the key informants who facilitated the research process in each case. In addition, a number of ten (10), seven (7) and six (6) advice providers for the case of MD, avocado and stevia respectively, were interviewed on the basis of farmers' recommendations. Finally, a number of in-depth interviews were carried out with all categories of farmers (adopters, non-adopters and droppers) through which narratives that depict farmers' interrelations with advice providers and support services throughout the innovation processes were obtained.

Highlights: The role of advice suppliers varies among the cases throughout the stages of the innovation process, depending on the specific regional context, the orientation and administrative characteristics of the involved organizations and the specialization and advisory capacity of the involved actors. The case of MD in Imathia corresponds to the classical extension paradigm in which advisors create awareness around a technical innovation, bridging the gap between researchers and farmers. In contrast, the cases of avocado and stevia crops are, at the outset, research driven innovations. Farmers' ability to adopt innovations and the relationships among the different types of farmers and advisors are related to the specificities of the selected innovations, farmers' perceptions and financial standing as well as the regional specificities. In general the landscape of the AKIS actors involved in these innovations appears to be more coherent and structured in Imathia (peach) than in Chania (avocado) and Karditsa (stevia).

1 Introduction

The general goal of WP2 (Innovation case studies in Focus Regions: micro to meso analysis) is twofold. Firstly, WP2 aims at understanding why, how and from whom European farmers and farm managers gather and exchange information to underpin their decision-making on development and /or implementation of different types of innovation. A second aim of WP2 is to analyse the role played by advisors in these processes accounting for the range of advisory services available in a series of focus regions across Europe. The Focus Region is a key concept adopted by AgriLink, and was defined as a farm census region supplying the socio-demographical and farm structural context that might help to explain the farmers' micro-AKIS diversity and its implications to innovation up-take and the role played by advisors.

The conceptual framework (Deliverable D1.1) underlying the implementation of these goals relied on three major assumptions. The first was that the diversity of farmers and farms leads to different decision-making processes and influences the type of advisors and the roles they play on them. Second assumption consisted in assuming that innovation might not be in convergence with the sustainable development purposes, meaning that innovation can affect negatively or be indifferent regarding the sustainability dimension. Hence our willingness to investigate both adoption and non-adoption situations. Finally, a third assumption establishes that the diversity and the transformation in advisory landscape in European countries and regions is a relevant variable explaining the role advisors play (or not) in the farmers' decision-making processes related with the innovation uptake.

AgriLink developed an integrated research framework (Deliverable D2.1) aimed at gathering empirical data for the micro-scale concept of AKIS (Agricultural Knowledge and Information System), the farmer micro-AKIS, and for the mesoscale concept of R-FAS (Regional Farming Advisory System), in relation with the up-take processes of diverse types of innovation by farmers across the EU. This deliverable (D2.2) prepared by the 13 partners involved in WP2 offers a synthesis of the qualitative insights on the farmers' micro-AKIS and the role played by advisors in the selected case studies. These were delimitated at the census region level and focused on a group of farmers representative of a specific innovation (e.g. biologic pest control), comprising both adopters and non-adopters.

In Greece three innovation cases were selected concerning two innovation clusters:

1. The case of the Integrated Pest Management in Imathia (Northern Greece) and the implementation of a method of mating disruption (sexual confusion) of insects by installing a network of micro sprayers across peach cultivations (Pest control cluster). This innovation encompasses a strong environmental and social dimension and was initiated by peach producers' groups and cooperatives motivated by the willingness (or necessity) to demonstrate their environmental friendly profile to the market. However, its effectiveness at farm level depends on the extent of its adoption in the wider area, a satisfactory pace of which is difficult to be reached in the highly fragmented landscape of numerous smallholders in the area.

2. The case of the widespread of the cultivation of avocado in Chania (Crete), which comes as a consequence of the decreasing or even collapsing prices in the olive oil and orange markets and the increasing demand for avocado globally (New crops cluster). However, the rapid expansion of the

cultivated land with avocado even in marginal areas raises concerns about the impact of the climate change on the cultivation and the adequacy and quality of water resources in the near future.

3. The case of the cultivation of stevia in the area of Karditsa (Central Greece), that came as a response to the abandonment of traditional cultivations, also characterized by high input and water consumption, and the need to replace them with more profitable and environmental friendly ones (New crops cluster).

These innovations evolve in a highly fragmented farm advisory landscape, characterized by complexity as well as by extremely weak linkages and luck of coordination among the AKIS actors (Koutsouris 2014). Within such a fragmented and weak AKIS the isolation of the Ministry of the Rural Development and Food (MRDF) from the regional and sub- regional agricultural services – which are under the Ministry of Interior despite the fact that their tasks derived from MRDF – has to be underlined. In parallel, the consolidation of agricultural research and education organizations into one organization (ELGO DIMITRA) has not generated the expected improvements in terms of collaboration and synergies among them, yet. Furthermore, farm based organizations are often extremely weak to play a decisive role since many of them collapsed during the last decade, because of organizational failures and the "market- and incentive-distorting government interventions" (Iliopoulos and Valentinov 2012).

The gap created due to the weakness of the public sector and farm-based organizations to provide efficient advisory services to farmers is covered locally, by private sector agronomists - consultants and input suppliers. Private consultants mainly support farmers interested in having access to EU programmes so their scope is rather limited. Input suppliers provide advice for free in the framework of their selling of inputs practices. On the other hand, private sector agronomists/companies also support producers groups mainly in the framework of the Integrated Production, thus constituting an exemption to the general "rule" –according to which technical advice is not paid- since in their case the provision of advice is their unique business which is uncoupled from farm input.

In this landscape some advisory challenges emerging from the above mentioned innovations concern:

-What is the role of advisors throughout the innovation processes and what are the most urgent obstacles that may prevent them from successful meeting their challenges? What policy measures would facilitate their role?

-What are the tools/methods most used by advisors in helping farmers to adopt innovations, especially those the social aspect of which define their efficiency at farm level and, (thus) their final outcome results from a mixture of interests, perceptions and values?

-What do the interviewed farmers perceive as advice?

-How advisors and farmers interplay and to what extend and under which preconditions peer-to-peer learning support the adoption of innovations and improve farm and resources sustainability?

This report is structured in 8 sections: The key AgriLink concepts and research questions constitute the first section, concerning the role of advisors and types of farmers and advice providers in relation with the trigger circle model. The second and third sections are dedicated to an overview of the AgriLink wp2 case studies, the metrological approach and the description of the Greek selected cases. In section 5 the results of the farmers' survey are presented as well as the outcome of the interviews with key AKIS actors in the selected regions. These results are discussed in section six, further elaborated by specific farmers'

narratives, which are presented in section 7. The report concludes with key insights be presented in section 8.

2 AgriLink key concepts and research questions

AgriLink key concepts which are relevant for data collection in WP2 comprise the: Focus Region, farmers' micro-level Agricultural Knowledge and Information System (micro-AKIS), mesoscale concept of R-FAS (Regional Farming Advisory System), and the trigger-cycle model (TCM). These concepts were established in the AgriLink DoA and elaborated by the project conceptual framework (see Deliverable D1.1).

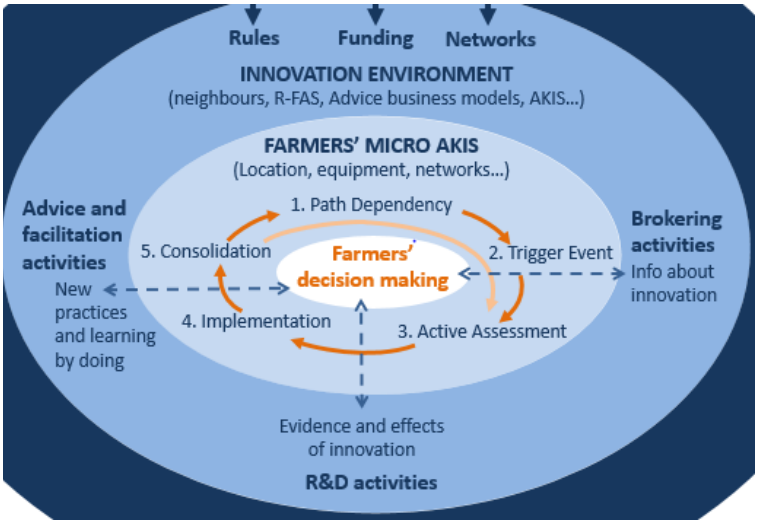
The Focus Region is as a farm census region that establishes the boundaries of the case study for data collection on micro-AKIS and R-FAS. Preferential geographical region is defined at NUTS 3, which is in certain cases replaced by NUTS 2 to achieve a better case study delimitation.

The micro-AKIS describes the micro scale knowledge-system that farmers personally assemble, including the range of individuals and organisations from which they seek service and exchange knowledge with, the processes involved, and how they translate this into innovative activities (or not). Empirical uptake of this concept entails answering two questions: a) who influences farmers (and farm households) in decision-making on adopting or choosing to not adopt innovations; and, b) how, i.e., what are the processes describing the knowledge assemblage by the farmers and role played by the different sources involved (see D2.1)

AgriLink defines the R-FAS as the set of organisations that enable farmers to develop farm-level solutions, enhance skills and coproduce knowledge with advisors. These are envisaged by AgriLink in a pluralist view, including traditional advice providers (chambers of agriculture, public bodies, etc.), farmer-based organisations (unions, associations, cooperatives, etc.), independent consultants, NGOs, upstream or downstream industries, and high-tech sectors. Hence, R-FAS covers the full range of these organisations in a given region, and their connection to wider AKIS organisations, and as well as a range of services, including research, advice and brokering, meaning they can be active at different steps of the farmers' decision-making processes, and use different methods at these different steps.

The trigger-cycle model established that farmers' decision-making regarding the innovation uptake is driven by a triggering event that initiates a path-dependency break cycle composed by three main phases, that can be described to account for the advisors role: a) farmers' awareness of the innovation, encompassing brokering activities developed by advisors to disseminate the innovation and to (co)create trigger events influencing farmers' decision-making processes; b) active assessing innovation entailing advisors assemblage of information on the innovation costs, benefits, and side-effects by developing and involving in R&D activities; c) supporting farmers in innovation implementation by delivering advice and carrying out facilitation activities. The figure 1 offers an integrated view of the TCM and the key concepts that were implemented in WP2 through the case studies delimitation and the data collection at farm micro-level and at the R-FAS meso-level.

Figure 1: Integrated view of the TCM and AgriLink key concepts



Source: AgriLink

The research questions to be answered with the empirical approach of WP2 are synthesised in ***Box 1***. The research questions aim at responding the WP2 goals through the empirical approach delineated in D2.1 build on the AgriLink conceptual framework (presented by the deliverable D1.1).

Box 1: AgriLink empirical research questions for WP2

1. ***What roles do advisory services play in the cycles of farmers' decision making?***
   - The cycles comprising the trigger-cycle model developed by the AgriLink conceptual framework to understand farmers' decision-making processes regarding innovation up-take and to describe respective micro-AKIS; Advisor's role is investigated at three phases of this model: a) Farmers' awareness of the innovation, encompassing brokering activities developed by advisors to disseminate the innovation and to (co)create trigger events influencing farmers' decision-making processes; b) active assessing innovation entailing advisors assemblage of information on the innovation costs, benefits, and side-effects by developing and involving in R&D activities; c) supporting farmers in innovation implementation by delivering advice and carrying out facilitation activities.
2. ***What is the relationship between different types of farmer and advisory suppliers in the decision-making process?***
   - Comprising heterogeneity in farmers profile, farm structural features and farm business models; the nature of the innovation; regional context; R-FAS landscape and business models (including models associated to digitization of agriculture); role of advisory in different stages of farmers' decision making cycles and if these are creating new advisory supply opportunities and /or new functions, and as well as new forms of path dependency
3. ***How does the transformation of advisory suppliers landscape influence farmers' decision-making and uptake of innovation?***
   - Accounting for R-FAS history and on how new configurations of R-FAS (generally depicted as more fragmented and pluralistic) play on the relation between farmers and advice, and respecting this relation: a) allow for more creativity, triggers, and a diversity of knowledge and information channels for farmers; b) influence farmers' access to information and knowledge, and equity on farmers' information access.

Source: AgriLink

3 WP2 case studies overview and methodological approach

3.1 WP2 case studies selection

The case study delimitation in AgriLink was built through two dimensions. One of the dimensions was the spatial delimitation of the R-FAS boundaries at the focus region level, and the second the farmers selection in relation to the innovation type. **Table 1** presents the selected innovation according respective innovation type and the sustainability challenge addressed by innovation.

Table 1: Selected innovations and sustainability challenges

Type of innovation	Innovation cluster	Selection focus	Sustainability challenge addressed
Technological	Autonomous vehicles, robots, drones, intelligent sensors/Precision Farming	IT (Information technologies)	Climate change, Eco-efficiency, Pests & diseases
			Growth and jobs – Digitalization
			Food security – Biodiversity, Food provision
Process (farming practices)	Biological Pest Control	Integrated ecological farming	Climate change, Eco-efficiency, Pests & diseases
	Soil Improving cropping systems		Food security – Biodiversity, Food provision
Marketing and financing	Retro-innovation	Diversification	Growth and jobs – Business diversification, Social cohesion
	Introducing new crops		
	Direct marketing		Eco-efficiency
	Developing new activities		
Social and organisational	Natural resources common management	Collaborative organisations	Growth and jobs – Social cohesion, Digitalization
	Labour Innovative arrangements		Food security – Biodiversity
			Eco-efficiency, Pests & diseases

Source: AgriLink

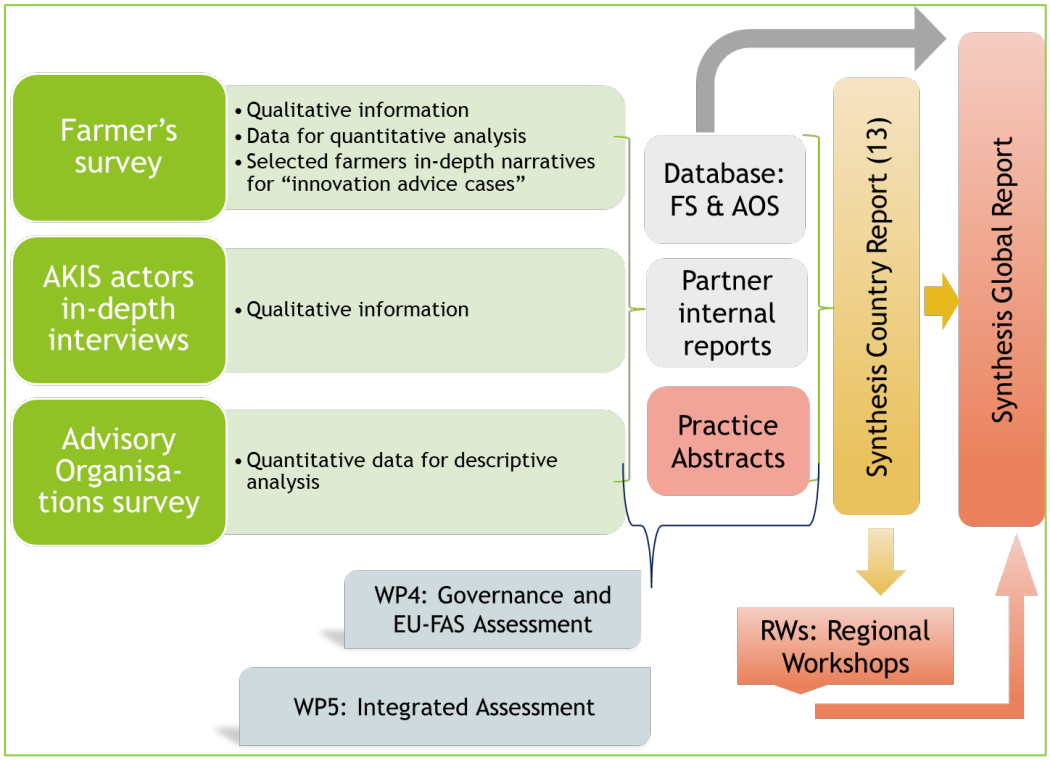
The farmers' selection in each case study built on targeting groups of farmers amongst whom the innovation is already widespread, so that it would be possible to characterise the micro-AKIS supporting innovation up-take of adopters, as well as the micro-AKIS of non-adopters.

3.2 WP2 methodological framework

The methodological framework implemented in WP2 consists on mixed-method strategy (for a detailed description see WP2 research protocol in D2.1), combining case study approach with quantitative survey-type data collection. It is implemented in three steps. Firstly the case studies selection, already described. Second step consisted on delineating and implementing two major surveys: a) to farmers to collect the data for describing the micro-AKIS and the role the advisory providers play on it; and, b) to advisory providers to enable describing R-FAS in relation with the innovation addressed by each case study.

Figure 2 depicts an overview of the WP2 data collection strategy, highlighting the intermediate outputs and the outcomes to be generated from the data analysis, including the inputs to subsequent WPs.

Figure 2: Overview of WP2 data collection and reporting



Source: AgriLink

Farmers' survey was conducted through a question-guide comprising both open-ended and closed-ended questions intended to gather quantitative data on whom and how type of questions (who are the advisory services providers and how these are provided), along with qualitative data on the why and how type of questions allowing for in-depth understanding of farmers' micro-AKIS. Quantitative data from farmers' survey (FS) were entered on a database, while qualitative information and narratives descriptions were recorded and analysed in order to provide the descriptive and analytical insights. This deliverable, the synthesis country report, presents the outputs of both, the data analysis and description and the qualitative insights for each case study.

Farmers' survey was implemented through face-to-face interviews, conducted by members of research teams or duly trained students, following a question-guide including open, mixed and closed questions to collect data on the trigger events, the farmers' innovation evaluation, knowledge and information sources, flows and social networks, farmer profile and demographics, business model and farm structure. FS comprised a set of matrixes to gather data to describe farmer micro-AKIS for the three main stages of the TCM (awareness, active assessment and implementation of the innovation), and on the micro-AKIS used by the respondent for farm management in general, and as optional the household micro-AKIS for the family farms when family members show to be influential actors for information and knowledge flows assembled by farm decision-maker(s). Detailed information on the farmer survey and respective question-guide is available at the Deliverable D2.1.

The advisory organisation supplier's (AOS) question-guide builds mainly on closed-ended questions and addressed formal providers of advice (see ***Box 2***), excluding informal providers. Formal advisory suppliers comprise organisations providing advisory services as a secondary activity and /or providing them for free (e.g. associated with the supply of inputs or software). In-depth information on the R-FAS is gathered

through complementary in-depth semi-structured interviews delivered to a small number of regional AKIS actors.

Box 2: Definitions on advisory for R-FAS survey

Advisory services
- A service activity that enable farmers to develop farm-level solutions, enhance skills and coproduce knowledge with advisors.

Advisory suppliers
- Any organisation that delivers advisory services to farmers.

Advisory organisations
- Traditional suppliers specialized in the supply of advisory services to farmers. This corresponds to former 'extension suppliers'

Source: AgriLink

The question-guide for advisory organisations comprised mostly closed questions and addressed data collection to: a) describe the organisation, including its ownership status, action level, advisory services supplied, funding resources and in-house R&D facilities; b) characterise its human resources, their distribution according to front-office and back-office activities, qualifications, certification and training, and on the methods they use for supplying advisory services; c) describe the type of advisory services clients and the main topics of these services; d) identify the national and regional public support to the advisory organisation, including funding and other type of support to back-office activities (training, R&D and networking activities); e) assess organisation benefit from current EU level policy instruments, such as EU-FAS, EIP-AGRI, and rural development programmes; f) describe the organisation advisory services supplied in relation with the innovation at stake in the case study, and the back-office activities undertaken by the organisation to support the supply of these services; and, g) collect the organisation's vision regarding the major challenges to be faced in the next years by the advisory suppliers, in the focus region, regarding the innovation development.

The in-depth interviews to AKIS key actors collected their knowledge on the innovation path in the region, on major innovation triggers, and on their evaluation on the farmers' knowledge and information needs and demands along the various stages of the innovation TCM and to what extent R-FAS is responding to these demands. The target number of interviews to key actors was established as five whereas they can be lesser depending on the number of relevant actors is each case study.

The data analysis and qualitative insights obtained in each case study are also part of this deliverable, the synthesis country report. Detailed information on the advisory organisation supplier survey and respective question-guide is available at the Deliverable D2.1.

In addition, this deliverable comprises the description and the insights gathered from detailed narratives of farmers' decision-making processes regarding the uptake of the innovation build on the TCM and addressing the advisory supplier's role. Three narratives per case study were included in the data collection conducted by the WP2 to generate information for the integrated assessment to be carried on by the WP5.

3.3 WP2 sampling strategy

The target population for sampling purposes was a group of farmers with similar technical-economic orientation amongst whom the innovation is already widespread, enabling to identify adopters and non-adopters that choose to not adopt the innovation. Hence the target population to be sampled is defined by two criteria: a) innovation adopters and (informed) non-adopters; with, b) a similar technical-economic orientation, whilst addressing farm structural heterogeneity among the targeted group of farmers, which might lead to the inclusion of farmers with different farm styles and/or business models. In addition, specific categories of non-adopters, such as droppers, or of adopters, such as partial adopters, were accounted for sampling purposes when found to be relevant in the targeted population.

A sample of 40 to 50 farmers was required by each case study. A snowball-type sampling procedure was adopted relying on the support of key-informants ('gatekeepers') familiar with the targeted group of farmers, which might include farmer associations, researchers, and other AKIS actors and experts. To avoid selection bias, different information sources need to be used and cross-checked (See Deliverable D2.1 for a detailed description of farmers sampling strategy).

The advisory organisations were sampled through a snowball process relying on diverse sources to ensure that the complete spectrum of advisory organisations supplying (or that could supply) advisory or related services is included in the sample. A minimum of 20 organisations was established for the cases were sampling was needed to cover the advisory diversity. In other cases, with little formal suppliers on the ground the strategy was to interview the maximum of existing organisations.

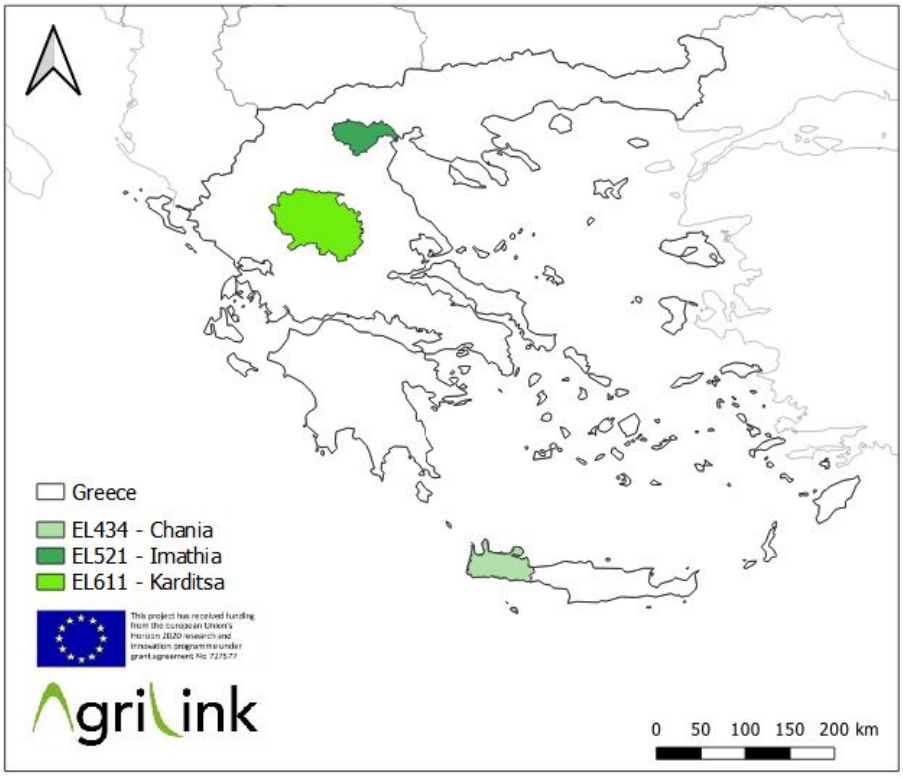
4 Country case-studies, farmers groups and advisory suppliers

4.1 The case studies and focus regions

In the framework of the AgriLink project three case studies were examined:

1. The implementation of Integrated Pest Management by Peach Producers' Groups in Imathia
2. The dissemination process of avocado in Chania, Crete
3. The introduction of the cultivation of stevia in Karditsa

Figure 3: Geographical location of the focus regions in Greece



4.1.1 The implementation of Integrated Pest Management by Peach Producers' Groups in Imathia

Imathia is an area of highly intensive agriculture, located in Central Macedonia in Northern Greece (Figure 4). It is a half plane- half mountainous area, corresponding to the 1.3% of the territory and the 1.45% of the total agricultural land of the country. Tree crops cover 41% of its overall cultivated lands; peach (and nectarine) crops corresponds to the 74% of its land covered with tree plantations corresponding to the 36% of the peach crops' area in the country (own calculations based on data of the Hellenic Statistical Authority in 2016).

Figure 4: Geographical location – Imathia Prefecture

Source: https://en.wikipedia.org

Therefore, the importance of peach cultivation at local and national level is indisputable; the cultivation was expanded significantly after the accession of Greece in the European Economic Community in 1981, due to the adoption of an intensive production system and the increased support for the product. This system reached its limits in 1990s since the implementation of the Common Market Organization of fruit and vegetables provoked distortion in the markets of canned peaches: given the significant share of Greece in the global market of canned peaches, the pressure of the international competitors for changes in the European policy resulted in the dramatic decrease of the subsidized withdrawals of peaches; additionally, a number of importing Greek peaches countries, and especially the USA, limited the permitted amounts of pesticide residuals in fruits. In 1999 the USA totally abandoned the use of methamidophos, a pesticide broadly used, at the time, in Greece. This measure resembles the imposition of non- tariff obstacles to their imports of canned peaches from Greece and severely affected the peach producers in Imathia (Vlahos and Karanikolas, 2013).

The situation called for action, and, when in 1999 the newly established Organization for the Certification and Supervision of Agricultural Products (OPEGEP- AGROCERT) introduced the optional certification AGRO2 based on the Integrated Pest Management principles, 29 peach-growers' cooperatives rushed to adopt it. Their choice marked a turning point from quantity to quality, emphasizing their willingness to retain their leading position in global markets and responding to consumers' increasing demand for protecting the environment and public health.

Acting within this framework, in 2004 a leading local cooperative in collaboration with a private advisory company introduced the innovative method of mating disruption (sexual confusion) of insects (MD) by installing a network of micro sprayers across the fields. In 2009 more cooperatives started supporting the implementation of the method; in 2016, after a proposal initiated locally, MD was included in the agri-environmental measures of the national RDP 2014-2020.MD is implemented by more than 2,000 peach growers, covering 2,800 and 5,500 Ha in 2017 and 2018 respectively.

However, the dissemination of the innovation has not been uncomplicated, since its effectiveness depends upon the extent of its adoption in the wider area and consensus is difficult to be reached in the highly fragmented landscape of numerous smallholders in the area. Some growers recognize MD's potential, but are reluctant to adopt the method, since they do not trust that their neighbours will be also involved to the extent necessary for its success. In parallel, the implementation of the method at an area lesser than the appropriate intensifies mistrust as far as the effectiveness and, even, the feasibility of the method is

concerned. The situation poses challenges for the elected leaders of the producers' groups and the co-operatives who have to take action and support their strategy.

Concerning the regional AKIS- actors involved in the innovation and their challenges, it is worth mentioning that, from the beginning, AGROCERT based the success of the IPM system on the involvement of local, private sector, independent advisors – instead of the public agricultural services organizing fast-paced specialized seminars for them. However, in the case of MD the cooperating independent advisors have to deal not only with challenges at a technical level but to enhance trust and collaboration among producers in order to facilitate the technological transition as well. Additionally, the local input suppliers comprising an integral part of the local AKIS are confronted with the challenge to adapt their approach and services to the needs of peach producers' groups. Input companies, a public research institute and the regional and local authorities complete the landscape of the regional AKIS in Imathia albeit without playing a major role in the innovation process.

These challenges made the case study worth to be explored in the light of the methodological framework of AgriLink, which along with the importance of peach cultivation for the region and the country comprised the criteria for its selection.

4.1.2 The dissemination process of avocado in Chania, Crete

The Prefecture of Chania is located in Crete (Figure 5), corresponding to 1.8% of the territory and 1.7% of the agricultural land of the country. Tree crops cover almost 85% of the agricultural land with olive trees corresponding to 90% and citrus to 7% of the total tree crops in the area. (Hellenic Statistical Authority, 2016). The cultivation of avocado covers only a small area not exceeding 1.3% of the total land cultivating with tree crops.

Figure 5: Geographical location -Chania- Prefecture

Source: https://en.wikipedia.org

The cultivation of avocado in Chania, in the first place attracted the scientific interest in 1968, when the Institute of Olive tree, Subtropical Plants and Viticulture established an experimental plantation. In 1974 the first commercial plantations were established in the area and in the decade 1985-1995 a project aiming at the wide-spreading of avocado took place in the framework of the Integrated Mediterranean Programmes. The project did not bear fruits; only 11% of its original target was reached, since olive and

citrus growers were reluctant to abandon traditional and profitable cultivations to adopt a new one whose demand was low.

This situation started changing in 2008 due to decreasing or even collapsing prices in the olive oil and oranges markets and, in parallel, the increasing demand for avocado globally. This triggered an explosion in the demand for locally well-adapted varieties of high marketability and healthy propagation material. Estimations refer to a rapid expansion of cultivated with avocado areas - especially over the last 3-4 years (80,000-100,000 new trees per year) - expected to cover more than 1,000ha (more than double in comparison to 450 ha in 2000).

Therefore, farmers actively seek guidance and advice from the local public services, the regional educational and research institutes and the private sector agronomists (input suppliers). The local Cooperative of Organic Producers Central plays central role in the dissemination of the cultivation, as also does a non-formal network consisting of public and private sector agronomists.

During the innovation process, the main challenge that avocado growers have to overcome concerns the poor organization and coordination of actions related to the production and dissemination of reliable knowledge tailored to their needs. Nevertheless, farmers massively adopt the new cultivation even in marginal areas, thus challenging the established AKIS actors as far as their adaptability and responsiveness to such needs is concerned. These element in combination with the increasing financial importance of the cultivation of the avocado crop globally and the challenge of the climate change locally made the exploration of this innovation, in the framework of the Agrilink project, interesting and worthwhile.

4.1.3 The introduction of the cultivation of stevia in Karditsa

The Prefecture of Karditsa, located in Central Greece, is a half mountainous-half plane area covering the 2% of the territory and the 3% of the total agricultural lands of the country (Figure 6). Arable land corresponds to the 90% of its total cultivated lands with cotton crops covering 45% of the cultivated areas and 66% of the irrigated ones (own calculations based on data of the Hellenic Statistical Authority, 2016).

At organizational level the primary sector in Karditsa is organized around small- and medium-sized farms. It is also characterized by the absence of a structured support service system and the collapse of the traditional cooperatives. Input suppliers, collaborating with input industries, provide farmers with advice integrated into their inputs sales' practices (advice is provided for 'free'). Regional and local public services and authorities, the University of Thessaly and the Development Agency of Karditsa are also essential parts of the local and regional AKIS.

Within such an institutional framework, the outbreak of the financial crisis in 2010 found the traditional arable crops farmers - such as tobacco, cotton and sugar beet cultivators- facing severe competitiveness problems due to market pressure, changes in the CAP and the weakness of the Greek primary sector vis-à-vis quick adaptation. Given the prevailing importance mainly of cotton – and tobacco as well – in Karditsa, such problems threatened the financial viability of farmers and the coherence of the local communities.

Figure 6: Geographical location – Karditsa Prefecture

Source: https://en.wikipedia.org

The introduction of stevia in Karditsa aimed at alleviating these problems and it was based on the results of research programs co-funded by the EU. Two public research institutes, the Tobacco Research Centre and the University of Thessaly, while searching for alternative crops, established experimental fields with stevia. Their conclusion was that stevia is well adapted in the soil and weather conditions of several areas throughout the country, including the Prefecture of Karditsa. The outcomes of these projects were disseminated through the press while several seminars targeting specific groups of farmers took place.

In 2012, a local group of citizens took the initiative to organize such an information seminar about stevia in Karditsa. They invited two researchers from the University of Thessaly and the Technological Educational Institute (TEI) of Larissa as key speakers, who provided information on stevia cultivation practices and a new experimental method for the production of steviol glucosides, respectively. During the seminar participants became also aware of a preliminary market research depicting a growing interest for stevia products in the international markets. The fact that the academic from TEI offered to make the processing method available to interested farmers convinced some of them to get immediately engaged in the endeavour, aiming at the vertical integration of the whole production chain in order to produce high added value (final) product (through the establishment of a processing unit).

Following, a cluster of farmers decided to establish a new generation cooperative (ASYST) engaged in the cultivation, processing and trading of stevia. The cooperative, in the next cultivation period, run a number of pilot fields, under the guidance of the University professor; seeds were provided by a retired researcher previously employed in the Tobacco Research Centre. The following cultivation period the farmers imported seeds from Paraguay and Spain and started establishing their stevia plantations; however, they had to overcome many difficulties mainly related to seeds' quality and the lack of technical support. The cooperative was established by 21 professional farmers and its membership increased over time to 64.

The main challenges farmers face concerning the cultivation of stevia are related to the supply and the treatment of seeds and planting material as well as to the process of drying the plant material (leaves), which demands special and very expensive drying facilities. ASYST dealt with the cultivation challenges through self-organizing processes of experimentation and dissemination of knowledge thus strengthening collegiality among its membership.

The successful cultivation of stevia has been of paramount importance for the farmers and thus local actors supported the initiative. The case study attracted the scientific interest and was examined at first in the framework of the Horizon 2020 AgriSpin project (https://agrispin.eu/). The research focused on the support services and the resources mobilized by adopters in order to realize especially the part of the innovation related with the stevia-processing unit. In the framework of Agrilink research re-focuses on the cultivation of stevia and re-examines the case in the light of the project's conceptual framework, especially the concept of farmers' micro-AKIS.

4.2 Group of farmers target and sampling strategy

The selection of interviewed farmers follows the general methodological guide of the project.

In the case of Integrated Pest Management by Peach Producers' Groups in Imathia 3 cooperatives, one advisory company, one input supply store and one farmer were the key informants used in approaching farmers. Al interviewed farmers are integrated peach producers.

In the case of avocado two cooperatives, a public service and an agronomist employed in a local organization were the key informants that facilitated the process of interviews.

In the case of stevia the stevia cooperative, a local organization and a local agronomist helped in approaching a number of farmers who subsequently suggested some of their colleagues for interviews. The identification of non-adopters was a major difficulty in this case.
An overview of the interviewed farmers is depicted in table 2

Table 2: Farmers surveyed per case study

Innovation case study	Adopters	Non-adopters	Droppers	Total
The implementation of Integrated Pest Management by Peach Producers' Groups in Imathia	25	17	0	42
The dissemination process of avocado in Chania, Crete	27	9	1	37
The introduction of the cultivation of stevia in Karditsa	16	18	2	34

Source: AgriLink – Country

4.3 AKIS experts and advisory organisations

All the advisory suppliers involved in the innovations under study were approached and all the key actors were interviewed. All actors were also asked to suggest other suppliers/ organizations in their area or other individual actors engaged in the innovations. Some input suppliers who were mentioned repeatedly by the interviewed farmers were also interviewed.

In the case of the implementation of Integrated Pest Management by Peach Producers' Groups in Imathia representatives of 3 private independent advisory organizations (which comprise all the advisory services engaged with the innovation), one public research institute, two cooperatives and 4 input supply shops were interviewed.

For the case of avocado in Chania key actors employed in a public service, one public research institute, a nursery, two cooperatives, an input supply shop and a pensioner academic (with significant contribution and continued presence in the innovation process) were contacted and interviewed.

As far as the case of stevia is concerned, two key researchers as well as representatives of the local development agency, and the cooperative of stevia were approached and interviewed. Additionally, a number of actors/organizations that were mentioned by the interviewed farmers (a coop/limited company, an input store and a private consultant) were interviewed aiming at providing insights on the innovation.

4.4 Farmers selected for in-depth narrative interviews

The selection criteria of farmers for in depth narrative interviews derived from the need to produce a rich picture that depicts farmers' interrelations with advice providers and support services throughout the innovation processes. They are specific for each case and are described in details in the narratives.