LIFE Project Number  
LIFE13 ENV/ES/000665

FINAL Report  
Covering the project activities from 01/07/2014 to 30/06/2017

Reporting Date  
30/06/2017

LIFE AGROINTEGRA  
Demonstration of sustainable alternatives to chemical products for European crop protection

Project Data

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Beneficiary Data

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<tr>
<td>Contact person</td>
<td>Ms Delia Sola</td>
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</table>
| Postal address                    | Dpto. de Desarrollo Rural, Medio Ambiente y Administración Local  
                                      Servicio de Agricultura  
                                      C/ González Tablas, 9 – 1ª planta |
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1. Executive Summary

Project objectives

The overall objective of LIFE AGROintegra is to minimize environmental risks in crop protection of cereals, vegetables, fruit trees and vineyard, through the demonstration of the feasibility of more sustainable alternatives for pests, diseases and weeds control, and the support to the implementation of Directive 2009/128/EC of the European Parliament and of the Council, establishing a framework for Community action to achieve the sustainable use of pesticides by the targeted stakeholders.

In order to achieve this goal, LIFE AGROintegra has set the following specific objectives:

- Demonstrate the environmental benefits of implementing alternative methods of crop protection.
- Contribute to zero residues in food, thanks to integrated pest management (IPM) techniques.
- Bring innovative IPM techniques closer to farmers via practical demonstrations.
- Develop a specific DST for farmers, proposing methods for pests, diseases and weeds control at the level of specific plot and for each specific situation.
- Raise awareness among farmers and advisors on the advantages of more sustainable crop protection methods, so that the transfer of knowledge, solutions and tools is comprehensive, effective and fast.
- Unify all knowledge generated in a working protocol that facilitates users the transition towards an integrated crop protection model.
- Disseminate the results of the demonstration project at the European level.
- Make achievable the targets set up by the Directive 2009/128/CE.

Project actions and tasks

In LIFE AGROintegra the work is organised in different actions, as illustrated in the diagram below:

- A1 Protocols of action and stakeholder involvement
- B1 Demonstration of the transformation of farms to the new IPM model
- B2 Tools for IPM
- B3 DST on IPM- HAD AGROintegra
- C Monitoring of the impact of the project
- D5 Promoting the new IPM model in Navarra
- E1 Management
Each project action includes different tasks:

- **Protocols of action (Action A1), comprising:**
  - Creation of an **Action Group** to support the project, involving the key players in the implementation of the IPM model in Navarra.
  - Definition of the cooperatives and farmers participating in the project.
  - A study on **biopesticides** for open-air crops in the south of Europe.

- **Transformation of farms to the new IPM model**, with new and innovative techniques that will be validated both technically and economically (Action B1). It has been done at three levels:
  1. Field trials to **test** new IPM techniques.
  2. Real scale IPM demonstrations in agricultural plots to test IPM techniques in different crops in real productive conditions, with the collaboration of farmers.
  3. Transformation of full agricultural experimental **farms** to the new IPM system.

- **IPM tools** (Action B2):
  - Improvement of the pests monitoring and warning system of INTIA-GN, creating a new, collaborative one.
  - Development of IPM Cultivation Guides.

- Development of an **online Advisory System based on a DST (HAD AGROIntegra)** that integrates all the knowledge acquired, which will be technically and economically validated in the farms of collaborating farmers (Action B3).

- Monitoring of the **environmental and socio-economic impacts** of the project (Actions C1 and C2, respectively).

- **Dissemination and communication** actions, including: development of a website (D1), information panels (D2), Layman reports (D3), general dissemination activities (D4) and promotion of the IPM model in Navarra (D5) and collaboration with other projects (E2).

- Management actions, including: Management and monitoring of the project progress (E1), After-LIFE communication plan (E3) and project audit (E4).

**Achieved results**

Regarding project results, LIFE AGROIntegra brings to the agri-food sector the most innovative IPM techniques through practical demonstrations that allow farmers to see first hand their technical and economic feasibility. At the end of the project, results of two full agricultural seasons have been obtained and integrated protection guides of 10 crops have been prepared (wheat, barley, broccoli, spinach, chard, borage, apple, peach, pear and vineyard).

On the whole, some experiences and techniques implemented in several crops have given good expectations for the future in the field of IPM. Very good positives results have been obtained in some crops for which high amounts of pesticides are usually used although, all these techniques require technical support and knowledge to be correctly implemented in each situation:

- **Vineyard:**
  - The use of pheromones for mating disruption of the European grapevine moth (*Lobesia botrana*) brings an improvement in the wine quality, by the reduction of pest density mainly in the third generation, which produces the greatest damages affecting the bunch prior to harvesting and. Moreover, its economic cost is close to
that of conventional pesticides. The use of this IPM technique reduced nearly completely the use of conventional chemical phytosanitary products.

- The use of lower doses of copper is possible in the fight against mildew. Likewise, it is feasible to reduce sulfur by 80% with the implementation of other alternatives, although the cost is higher.

- Inter-vine tillage nowadays is the best alternative to herbicides. The use of cover crops with non-competitive species is a good alternative to conventional tillage. Staggered flowering period species benefit the presence of beneficial insects.

- **Fruit trees**: natural enemies and mating disruption have proven to be feasible and effective alternatives to pesticides in fruit trees.
  - The use of bioinsecticides and the release of beneficial insects have controlled *Psylla pyri*.
  - Red spider mite can be successfully controlled with a great amount of pesticide reduction by applying plant extracts and supported by the release of beneficial insects.
  - Excellent results in the control of *Cydia pomonella* in pome fruit trees have been achieved using mating disruption.

- **Vegetables**:
  - It is possible to maintain the yield and quality of products when using alternative products (pheromone mass trapping, bioinsecticides, beneficial insects and flower strips).
  - There are no direct alternative available methods of diseases control yet. Preventive measures and cultural methods are as relevant as crop and pests monitoring in order to keep an optimal moment of phytosanitary products treatment.
  - An adequate control of weeds can be achieved with mechanical means (using hoeing machines).

- **Cereals**:
  - A satisfactory control of weeds has been achieved by summer tillage, when followed by rains.
  - The use of phytosanitary dose reduction strategies for controlling yellow rust has been a complete success. The classification of breeds according to their tolerance is a preventive measure of great support.
  - *Foot rot (Take-all)* has been reduced up to a 56.6% by including sunflower in the crop rotation (two agricultural seasons’ average).

The hypothesis to be demonstrated in AGROintegra of achieving a reduction of at least 30% in the use of chemical protection, comparing with the current system has been got, because the reduction in 11 crops has reached of 45.26%, higher than expected. On the other hand, the use of biopesticides of low impact in the demostrations has been of more than 40%, higher than the expected, 30%.

The new Pests Monitoring and Warning System offers support to improve treatments and the use of these innovative techniques in crop protection. The expansion and upgrading of the
Pests Monitoring and Warning System (EA AGROintegra) provides a collaborative approach with the addition of diseases modelling and new traps and monitoring points of pests due to the participation of agri-food industries and the agricultural cooperatives. This would have not been possible without the collaboration of farmers and technicians involved in the observation of crops.

A DST (HAD AGROintegra) has also been implemented, which is related to the Pests Monitoring and Warning System, in connection with the advisory system sigAGROasesor (developed in the framework of the project Life + 2011/641), that will help farmers to decide the most suitable and environmentally friendly method for each concrete situation.

Expected impact

In 2020 it is expected that 80% of European farmers have already adopted the IPM model, a challenge that will be supported by LIFE AGROintegra, which will provide its tools and the action protocols as training and advisory tools to facilitate the transition to the new IPM model. The direct impact expected throughout the project is very significant, of about 500 farms. In the future this system is expected to be extensible to other farms in Europe.

The establishment of an IPM platform of Navarra as a stable and permanent entity will ensure the continuity and transfer of the knowledge gained in the project and will also help to annually increase the number of farmers who work according to the new model. The Action Group has set up the bases of the future IPM Platform of Navarra, which has been consolidated at the end of LIFE AGROintegra, assuring the continuity of its findings and achievements beyond the project’s end by establishing thematic breakout groups in the frame of the Consejo Agrario de la Comunidad Foral de Navarra, created in August 2017.

Overall project development

So far, the project has progressed adequately and final milestones and objectives have successfully been achieved, and therefore the project overall objectives and work plan has been viable until the end of the project.

The main problems encountered along the project have been related to actions B2 and B3. The selection of models for disease forecasting has been laborious, and the decision to choose the best method for organizing climatic data to feed these models has also been difficult. In fact, a new database has been created to comply with the needs of the new pests monitoring and warning system, that it is expected to be fulfilled and improved in the After LIFE period. All this has led to some delay within Action B2. The final version was validated with real data obtained in the demonstrations of integrated crop protection in 2014-2015 and 2015-2016 agricultural seasons, and validated at real time along 2017. Currently, this validated pest monitoring and warning system is opened to the general public on project’s webpage.

In Action B3, difficulties have been related to the coordination of the various phases of the programme to be carried out in Actions B2 and B3, which required a process of bid preparation, presentation and resolution, as well as execution time. The initial estimation was that the DST (HAD AGROintegra) would be available at the end of December 2015. However, due to the delay in the programming of the new pests monitoring and warning system, the validation of the tool was done retrospectively using the technical and economic information of the experiences of Action B1 and the observations plots which were part of Action B2.
In addition, in the last months of the project execution, results obtained in the transformation of farms to the new IPM model (actions B1) have been processed and analyzed to obtain reliable conclusions that may be transferable to the agricultural sector. 30 trials, 18 real-scale demonstrations and 3 transformations of experimental fields in a surface of more than 460 hectares of land have been developed, so the great amount of information managed has led to a delay of the final deliverable products of the project. In general, the new techniques have worked properly and very interesting results have been obtained for certain crops, where a substantial reduction of the use of chemical plant protection products has been possible. Therefore, there are currently technical and economical viable alternatives to conventional pest management.

On the other hand, in relation to the monitoring of the impact of the project (actions C) one of the main problems has been the amount of information to collect and process in a short period of time. Another unforeseen difficulty has been the constant changes in regulations regarding pesticides’ classification. This has led to a slight delay of the reports related to the intermediate and final situation (environmental and socioeconomic indicators). However, this delay has not affected the rest of the actions of the project.

In order to assess the environmental and socio-economic impacts of the project, a set of indicators were defined, which have been measured at the beginning, during and at the end of the project, in order to monitor their evolution, which has allowed to evaluate the real impact of the applied IPM techniques.

It is remarkable the significant reduction in the amount of pesticides applied, especially of synthesized pesticides, as well as the great reduction in the use of phytosanitary products with higher riskiness for the environment.

It has been possible to obtain more efficient pest control with a better crop health status. In fact, although economic cost associated to some of the new techniques are higher; it results in a distinctive product with a greater quality.

It has also been observed a positive evolution of social indicators. A significant increase of professionals involved in the project and dissemination activities have contributed greatly to this evolution. The high participation, mainly in training actions carried out, reflects the interest of the sector in Navarre in IPM techniques and makes clear the need for training, advice and the transfer of research and experimentation, and in general the knowledge, both to technicians and farmers.

The generalization of the IPM will bring in the near future the creation of new jobs for quality, due to the greater demand for qualified and specialized technicians.

2. Introduction

Crop protection is one of the aspects that most concerns in relation to the sustainability and viability of agricultural production. Aware of this, and driven by mandatory legislation and the growing environmental awareness, the agri-food sector is developing more environmentally friendly crop protection methods.

LIFE AGROIntegra project has performed innovative practices to ensure the health of crops in Navarra region (Spain), such as the use of flower strips, beneficial insects, pheromones, mechanical hoes, crop rotations and the use of products of lower risk to the environment.
The hypothesis to be demonstrated in AGROintegra was the \textbf{viability of achieving a reduction of at least 30\% in the use of chemical protection, comparing with the current system} evaluated in 2,000 agricultural farms.

LIFE AGROintegra has implemented and validated a \textbf{Decision Support Tool (HAD AGROintegra)} to assist the farmers in the decision of which method is the most appropriate to each specific situation of pest, disease or weed. In the project more than 100 farmers have been considered for the validation of this tool.

Besides, LIFE AGROintegra develops \textbf{protocols of action (training, advice) to provide farmers with the transition to the new model of integrated pest management (IPM)}. A direct impact in 500 farms is expected.

In addition, LIFE AGROintegra will establish an IPM platform in Navarra that will ensure the \textbf{continuity and transfer of the best practices validated and lessons learnt during the project, and the promotion of the new model of pest management} helping to annually increase the number of farmers who work according to the new model. In fact, thematic breakout groups will be established in the different groups of crops.

LIFE AGROintegra \textbf{brings to the agri-food sector the most innovative IPM techniques} through practical demonstrations that allow farmers to see first hand their technical and economic feasibility.

\textbf{In 2020 it is expected that 80\% of European farmers have already adopted the IPM model}, a challenge that will be supported by LIFE AGROintegra, which will provide its tools and the protocols of action.

In this \textbf{Final Report (FR)} the progress of the work carried out in LIFE AGROintegra project, in each of its action and task, as well as the related financial expenditure are described, since the beginning of the project (1\textsuperscript{st} July 2014) to the end of it (30\textsuperscript{th} June 2017). This is the third and final progress report submitted to the European Commission, since an \textbf{Inception Report (IR)} was previously submitted in April 2015, reporting on project activities from July 2014 to January 2015; and a \textbf{Mid Term Report (MTR)} in September 2016, reporting on project activities from July 2014 to April 2016. The feedback received from the EC to the Inception Report was taken into account by the project Consortium. In this Final Report, the feedback to the Mid Term Report has also been considered and several documents and deliverables have been updated accordingly.

\section{3. Administrative part}

\textbf{E.1 PROJECT MANAGEMENT AND FOLLOW UP}

\subsection*{3.1. Description of the management system}

The project is structured in several Actions and each Action is structured in different tasks:

- Action A1- Protocols of action and stakeholders´ involvement:
  - Task A1.1: Action Group with key players to support the project.
  - Task A1.2: Defining cooperatives and farmers participating in the project.
  - Task A1.3: A study on biopesticides for open-air crops in the south of Europe.
- Action B1- Transformation of farms to the new IPM model, at three levels:
- Task B1.1: Field trials with new IPM techniques.
- Task B1.2: Real scale IPM demonstrations, with the collaboration of farmers.
- Task B1.3: Transformation of agricultural farms to the new IPM system.

- Action B2: IPM tools:
  - Task B2.1: Improvement of the Pests Monitoring and Warning system.
  - Task B2.2: Development of IPM cultivation guides.

- Action B3: Development of an online Advisory System (HAD AGROintegra) based on a DST and its viability evaluation.

- Actions C1 and C2: Monitoring of the Environmental and socio-economic impacts of the project (respectively).

- Dissemination and communication actions: website (D1), information panels (D2), Layman report (D3), general dissemination activities (D4), promotion of the IPM model in Navarra (D5) and collaboration with other projects (E2).

- Management actions: Management and monitoring of the project progress (E1), After-LIFE communication plan (E3) and project audit (E4).

The project administrative and financial management and overall coordination corresponds to the Government of Navarra (GN), and more specifically to Ms. Delia Sola, who has counted in her team on the support of one technician with experience on EU project management and dissemination (Ms. Leire Iriarte) and an Agricultural Engineer with experience on crop protection (Ms. Carmen Parrado). The GN has counted on INTIA’s support for the technical coordination and the external assistance of Zabala Innovation Consulting, S.A. for the financial management, allowing partners to be devoted to the technical actions.

Besides, the project coordinator has been supported by the Management Committee, which has been constituted by the coordinator and representatives from all the partners, taking the strategic decisions of the project, always seeking consensus among partners.

In order to assure a good running and progress of the project and its activities a responsible has been assigned for each Action, as shown in the organizational chart below.
At the beginning of the project the Coordinator produced the Management Plan (Deliverable E1.1 Plan de Gestión submitted with IR), where technical and administrative management structures and procedures are compiled and specified, so that all partners could have a reference document for managerial aspects of the project taking into account both the project proposal and the requirements of LIFE+ programme.

Three periodic reports shall be submitted to the EC during the project lifetime. The IR (Jul 2014 – Jan 2015) was submitted in Spanish as initially previewed. However, taking into consideration an EC demand, the Mid Term (Jul 2014 – Apr 2016) and Final (Jul 2014 – Jun 2017) Reports have been submitted in English. The Coordinator has requested to each partner the technical information (incl. status of implementation of activities, fulfilment of the Work Plan and achievement of project objectives) and financial information (cost statements and related documents). In addition, all the deliverables produced along the project have been uploaded in the intranet, to which access has been provided to the NEEMO Monitor in order to facilitate the monitoring of the project.

Consortium Agreements have been established between the project leader and each of the project partners. These documents were already submitted with the IR.

Concerning the financial management of the project, monitoring of the budget execution of each partner has been performed every six months. The financial information comprising the full duration of the project is included in the financial part of this report.

The Deliverables, as described under each action description in chapter 4, guide the work and its planning. The list of deliverables submitted is provided in section 6.1.

E.2 COLLABORATION WITH OTHER PROJECTS

Through this action, the double objective of exchanging information and learning from the experiences of different initiatives and disseminating the results of the project to ensure its impact at the international level has been achieved. The ultimate goal of this Action has been to promote the exchange of experiences of the developments of the different activities.

During the first months of LIFE AGROIntegra relevant projects and initiatives were identified, which were collected in a presentation at the public launch of LIFE AGROIntegra (February 2015) and complete the initial list of project technical application Form. In Other Dissemination annexes, an updated list of these initiatives is provided.

Besides providing links to the websites of these initiatives in the LIFE AGROIntegra website, they are also followed through the LIFE AGROIntegra social networks when available.

In addition, at the meeting organized by the EC in Madrid on September 9, 2014 for the presentation of the 2013 LIFE projects (LIFE13 Regional Kick-off Meeting) projects relevant to the LIFE AGROIntegra theme were identified and some preliminary contacts with their representatives were established (LIFE FITOVID, LIFE Aquemfree and LIFE PISA). In this action, Deliverable E2.1 Informe de colaboración con otros proyectos (Report on collaboration with other projects) has been prepared in July 2017, giving a vision from the specific collaborations that have been carried out with some of the initiatives, projects and Networks identified. A brief description of the scope of the collaboration is described below.
Collaboration of AGROintegra in several initiatives and Networks:

1) C-IPM (http://c-ipm.org/):
   - Contribution to the IPM Strategic Research Agenda.
   - Participation in two C-IPM workshops with LIFE AGROintegra presentations about
     the pest monitoring and warning system and DSS of Navarra: “Workshop on novel
     IPM tools” (Paris, 15/06/2015) and “Show it don't tell it: The value of demonstration
     farms” (Bonn, 24-25/05/2016).
   - Publication of relevant news on the LIFE AGROintegra website.

2) Red Impulsa residuo 0
   - Contacts and visits to agri-food industries have been made. The need to increase the
     business leadership of the agri-food sector has been identified as a general interest
     through innovation, as well as to increase the supply of agricultural products
     differentiated and adapted to the trends of the demand in markets traditional.
     Increasingly safer products, both from the point of view of public health and from the
     environmental point of view.
   - LIFE AGROintegra information disseminated thorough the website of this network on
     zero residue in crop management.

3) ENDURE
The ENDURE network (http://www.endure-network.eu) contacted researchers and advisors in
order to promote the IPM, so that it allows to compare the methods, results and solutions
between different European countries. Relations with this network have proved of great
interest since it has allowed an exchange of information that will result in mutual benefit and
some project proposals.

Collaboration with other projects:

1) LIFE FITOVID (http://www.fitovid.eu):
   - Joint participation on the Round Table “Claves del éxito de la gestión integrada del
     viñedo y su repercusión en el vino. Demostración de casos prácticos y cooperación en
     el programa LIFE” promoted by LIFE AGROintegra and that took place in the
     framework of the International Symposium Phytoma in Valencia on 1-3 December
     2015 (http://www.phytoma.com/objetivo-del-simposio#).
   - Meeting in Pamplona on 18/01/2016 to liaise on possible cooperation. Some project
     proposals have been arisen.
   - Joint participation on the final presentation of the vineyard results of AGROintegra
     and FITOVID in Olite (2017_06_08) “joining forces for the reduction of phytosanitary
     products in vineyard” https://agrointegra.eu/images/pdfs/2017-06-08
     JornadaViaAGROintegraFITOVID.pdf
   - Participation and LIFE AGROintegra dissemination in the FITOVID results
     dissemination event on 6/04/2016 in Vitoria-Gasteiz.

2) LIFE SAVECROPS (http://ctaex.com/savecrops-life):
   - LIFE AGROintegra presentation at the LIFE SAVECROPS final event in Brussels
     (10/06/2015)
   - LIFE SAVECROPS article at the 3rd LIFE AGROintegra Newsletter
   - Liaising for their participation the Round Table “Claves del éxito de la gestión
     integrada del viñedo y su repercusión en el vino. Demostración de casos prácticos y
Participation of SAVECROPS declined due to Schedule problems.

3) LIFE Viñas Atlánticas (http://vinasatlanticas.depo.es) and LIFE BioDiVine (http://www.biodivine.eu) and LIFE Biodivine (http://www.biodivine.eu)
   - Joint participation on the Round Table “Claves del éxito de la gestión integrada del viñedo y su repercusión en el vino. Demostración de casos prácticos y cooperación en el programa LIFE”.

4) Rural development project in Campo de Borja (Zaragoza) for the common use of sexual confusion for the European grapevine moth (Lobesia botrana) in vineyard
   - Visit to the area of Campo de Borja in Zaragoza (Aragón) in July 2015 with agriculture technicians of the GN, INTIA and a large group of growers.
   - Field technical and winegrowers of Navarre could see first-hand the difficulties to put it into practice, good practices carried out and the success of the experience, as well as details of the extent of support from the Government of Aragón.

5) PURE (http://www.pure-ipm.eu/project)
   - Participation in the Congress of Riba del Garda (Italy), where the project consortium was met.
   - Participation with a LIFE AGROintegra poster on the Final Congress of this project in Poznan (Poland), on January 2015 (http://www.pure-ipm.eu/node/413).

6) BIOCOMES (http://www.biocomes.eu/)
   - Development of biological control products (biopesticides) to support IPM, in order to share information on the main pests affecting the crops of Navarra, identify biopesticides and see if the ones Biocomes develops are applicable for Navarra.

7) LIFE sigAGROasesor (http://agroasesor.es/es/)
   - Working with the regions involved in LIFE sigAGROasesor to coordinate for a pests alert and warning system at national level (meeting with their representatives in Madrid on 26/03/2015, at the headquarter of the Ministry of Agriculture, Food and Environment).
   - Integration of the LIFE AGROintegra DST into sigAGROasesor platform.
   - Participation and active collaboration of LIFE AGROintegra in the following LIFE sigAGROasesor events: Final LIFE sigAGROasesor events in Madrid on 17/11/2015 and in Olite (Navarra) on 16/12/2015, including a LIFE AGROintegra presentation.
   - Coordination to include the LIFE AGROintegra DST within sigAGROasesor platform.

8) AgriSpin (http://agrispin.eu/)
The LIFE AGROintegra Coordinator participated as an expert of the Multiplier Group of this H2020 project, that aims to close the gap between innovation and practice by identifying best practices for innovation and support systems in European agriculture.

9) LIFE Regadiox
Assistance to several technical workshops and dissemination of project results, as well as workshops and working groups on sustainable management of crops and climate change. http://life-regadiox.es/wp-content/uploads/2016/05/Regadiox-abril-2016.pdf
10) INNOVINE (http://www.innovine.eu/home.html)
   - Poster presentation of AGROIntegra Pest Monitoring and Warning System in the final event in Toulouse (16-17 November 2016). Poster title: "Pest monitoring and warning system in Navarra (Spain) establishment of contacts to assess collaboration or sharing experiences in the implementation of the station listings and HAD AGROIntegra."

11) SME ORGANICS
   - Visit to the farm of transformation to IPM model of Sartaguda and reference to LIFE AGROIntegra project in the broadcast (poster, news and press release). Transfer of the results of the experiences in IPM techniques.
   - Part of the GN and INTIA team participating in LIFE AGROIntegra are also involved in SME ORGANICS, so the relationship between the two projects has been assured, transmitting and using the acquired knowledge.

The progress **indicators** previewed for this period have shown a good progress on this Action, as they have both been attained. With a total of 15 networks/initiatives/projects contacted since the beginning of the project and 17 participations in European or international seminars and conferences, the project progress indicators for this action have far surpassed the objectives.

3.2. **Evaluation of the management system**

The above described management system, with clear roles defined among partners (coordinator, technical coordinator, action leaders), and the support of a Management Committee in which all partners are represented and an Action Group with the participation of external key players for the IPM implementation in Navarra, as well as an external support for the financial aspects has ensured a smooth running of the project. The organizational structure has also facilitated a good communication among partners.

The fact of having onboard the Union of Cooperatives of Navarra (UCAN) and the association of agri-food industries (CONSEBRO) has facilitated the involvement of farmers, technicians, agroindustries and cooperatives, allowing at the same time a small consortium of only 4 partners, which facilitated the management.

The Coordinator has kept regular contacts with the NEEMO’s Monitor, who has received communications each time a Deliverable has been finalized and uploaded to the intranet. Contacts were also made with the Commission when the IR and the MTR were submitted (and feedback received) as well as with the LIFE Communication team for requests concerning LIFE programme’s communication materials and publication of LIFE AGROIntegra news on the LIFE Website.

During the whole duration of the LIFE AGROINTEGRA project, the management system **has been effective, and no problems have been detected to be worth mentioning.** The delays on some technical tasks and related deliverables have been due to technical aspects and not to management aspects, and are described in chapter 4.
4. Technical part

4.1. Technical progress, per task

A. PREPARATORY ACTIONS

A.1 PROTOCOLS OF ACTION

The purpose of this action has been to involve the most significant stakeholders in each of the target groups involved in the project (producers, technology transfer agents and technical advisors, and the policy decision makers), agreeing on a methodology of work that allows the development of all the demonstration activities of the project in a uniform way, so that the fundamental objectives could be achieved:

- Generation of valid information that responds to the needs of the project.
- Generation of tools responding to the needs of farmers as well as to the requirements of the public authorities.
- Assure that the knowledge and experience acquired in the project reaches all the key stakeholders and in the appropriate way to each involved target group.

➢ Task A1.1. Action Group of support to the project

The LIFE AGROintegra Action Group was established at the beginning of the project, including project partners and other key actors, mainly those who act as co-funders or collaborators in the project:

- LIFE AGROintegra partners: GN (Agriculture Service), INTIA (Technological Innovation and Management Department), UCAN and Consebro.
- Key stakeholders for the development of the integrated agriculture in Navarra: INTIA (Food Department), big agricultural cooperatives (Sociedad Cooperativa Agraria Orvalaiz, Cooperativa Agrícola Caja Rural de Artajona and AN S. Coop.), wineries (Malón de Echaide and Nekeas) and agri-food industries (Ultracongelados Virto S.A., Gelagri Ibérica S.L., Congelados de Navarra S.A.U), D.O. Pimiento del Piquillo de Lodosa and Conservas Gilvemar.

In January 2016 a brief survey to all participants in the action group was conducted to identify their expectations for the future in the IPM Platform of Navarra as well as their objectives and the specific needs of the participants that this Platform should address. Between January and April 2016 the Action Group worked in a preliminary proposal in which the objectives and the structure of the platform were defined.

In the following meetings, November 2016 and April 2017, the Consortium has advanced in the definition of the functions and possible members of the different breakout groups. One of the conclusions that have been reached is the need to work in smaller groups. In these breakout groups, concrete problems on pests, diseases and weeds on specific crops were attended, in order to combat them with technically effective, economically efficient and environmentally sustainable measures.

In August 2017 a new regulation was published, the Decreto Foral 73/2017, in which the Consejo Agrario de la Comunidad Foral de Navarra was created. In the article 8.2 of the text, the possibility of establishing breakout groups to address specific issues, should integrate the
structure of working of the above-mentioned platform for integrated management of pests and diseases in this organizational framework. So, in this context the future breakout groups will be created in the frame of the Consejo Agrario de la Comunidad Foral de Navarra.

- **Task A1.2 Definition of cooperatives and farmers participating in the project**
  In this preparatory action those cooperatives and farmers who will participate in B1, B2, B3 and C actions of the project were identified and collaboration agreements have been signed with them. In addition, those agents who actively participated in action B2 (collaborative Pests Monitoring and Warning System) and B3 (development and validation of the IPM DST AGROintegra and demonstration of its feasibility) were selected, as well as those who were users of the tools that were developed.

  UCAN engaged the cooperatives to participate in the project to demonstrate the actual implementation of sustainable practices in agriculture. The impact of the project in the agricultural sector through UCAN extended to 145 cooperatives and more than 20,000 farmers. On the other hand, CONSEBRO brought together 130 agri-food companies, of which 75% belong to the sector of processed vegetables.

  Several information sessions were carried out during the first three months of the project. Meetings were held with each of them, after which all committed themselves to actively participate and help to select the most suitable farmers to participate in the project.

  The collaboration has been formalized with the signing of Collaboration Agreements.

- **Task A1.3 Study of biopesticides in Portugal, Italy and France**
  The aim of the study was to identify new active substances "more respectful with the environment", approved and registered in France, Italy and Portugal, that could be used in Navarra. To do this, first of all, the term of "Biopesticide" was defined and its scope in the framework of this study, since there is no official definition for it. After this, the valid DDBB in Europe were identified and the situation of the biopesticides for agricultural use in Europe was analyzed. In addition, an analysis of the active substances authorised in Europe was conducted, as well as the operation of the registry of phytosanitary in each country under review. Finally, the identification of the biopesticides of interest for crops relevant to Navarra in the context of AGROintegra was made.

  The deliverable A1.3 Estudio de “bioplaguicidas” para los cultivos al aire libre en el sur de Europa y su aplicabilidad en Navarra (Study on biopesticides for outdoor crops in southern Europe and its applicability in Navarra) was finalized in December 2015. The regulation that regulates certain means of defence, in force during the drafting of the project (Orden APA 1470/2007), was abrogated on 17th December 2014 with the publication of a new regulation (Real Decreto 951/2014, of 14th November), which affected the categorization of products for pests control initially previewed. For this reason, biopesticide products were again adapted to the new regulations and the updated biopesticides list was submitted with the MTR.

### B. IMPLEMENTATION ACTIONS

**B1. TRANSFORMATION OF DEVELOPMENTS TO THE NEW IPM MODEL**

The objective of this action has been to demonstrate the viability of the Integrated Pest Management (IPM) model. With its implementation a significant reduction of 30% on the use of chemical pesticides, and therefore a positive environmental impact, could be achieved.
To attain this objective, a number of IPM trials for the control of different specific biotic agents (pests/diseases and weeds) (B1.1.), real scale demonstrations at farmers plots for the control of all biotic agents affecting a crop (B1.2.) and transformations of full experimental farms, with all the crops, into the IPM model (B1.3.) have been carried out during at least two agricultural seasons, to demonstrate the viability of the transition to the new model and its environmental impact.

Furthermore, this action have contributed to bridge the gap between specialists in phytopathology and users, farmers, cooperatives, agri-food industries, business services, etc., facilitating the adoption of IPM techniques and innovative methods proposed in the project.

#### Task B1.1 Integrated control of biotic agent in crop

The objective of this task has been to bring farmers the most innovative practices in crop protection (pheromones, biological control, biopesticides, zero residue products, etc.) for its validation and adaptation to the climatic conditions of Navarra.

The methodology has consisted in experimental field trials to test new IPM techniques in a given crop. A second agricultural season has allowed confirming the results obtained in the first one.

The biological assessment has been done through 37 trials with an experimental design, based on the EPPO PP1-152-3-f Guide design and analysis of trials. They have been evaluated between 4 and 10 different treatments in randomized blocks, with 3-4 repetitions, with a surface of elementary plot of between 10 and 30 m².

A summary of experimental integrated control of biotic agent in crop trials conducted in task B1.1 is shown in the following table:

<table>
<thead>
<tr>
<th>Nº</th>
<th>GROUP OF CROPS</th>
<th>CROP</th>
<th>GROUP OF CONTROL</th>
<th>CONTROL</th>
<th>MEAN OF CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vegetables</td>
<td>Chard</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Bioinsecticides</td>
</tr>
<tr>
<td>2</td>
<td>Vegetables</td>
<td>Chard</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Biological control</td>
</tr>
<tr>
<td>3</td>
<td>Vegetables</td>
<td>Chard</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Biological control</td>
</tr>
<tr>
<td>4</td>
<td>Vegetables</td>
<td>Artichoke</td>
<td>Diseases</td>
<td>Ascochyta</td>
<td>Biofungicide</td>
</tr>
<tr>
<td>5</td>
<td>Vegetables</td>
<td>Artichoke</td>
<td>Plagues</td>
<td>Aphids</td>
<td>Bioinsecticides</td>
</tr>
<tr>
<td>6</td>
<td>Vegetables</td>
<td>Artichoke</td>
<td>Plagues</td>
<td>Aphids</td>
<td>Biological control</td>
</tr>
<tr>
<td>7</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Diseases</td>
<td>Oidium</td>
<td>Biofungicide</td>
</tr>
<tr>
<td>8</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Bioinsecticides</td>
</tr>
<tr>
<td>9</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Biological control</td>
</tr>
<tr>
<td>10</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Plagues</td>
<td>Caterpillars</td>
<td>Biological control</td>
</tr>
<tr>
<td>11</td>
<td>Vegetables</td>
<td>Broccoli</td>
<td>Weeds</td>
<td>Brassicales/Poaceae</td>
<td>Cultivation techniques</td>
</tr>
<tr>
<td>№</td>
<td>GROUP OF CROPS</td>
<td>CROP</td>
<td>GROUP OF CONTROL</td>
<td>CONTROL</td>
<td>MEAN OF CONTROL</td>
</tr>
<tr>
<td>----</td>
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<td>---------------</td>
<td>------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>12</td>
<td>broccoli</td>
<td>diseases</td>
<td>head rot</td>
<td>biofungicide</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>thistle</td>
<td>weeds</td>
<td>brassicales/poaceae</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>thistle</td>
<td>plagues</td>
<td>aphids</td>
<td>bioinsecticides</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>thistle</td>
<td>plagues</td>
<td>aphids and caterpillars</td>
<td>biological control</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>thistle</td>
<td>plagues</td>
<td>aphids and caterpillars</td>
<td>biological control</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>spinach</td>
<td>plagues</td>
<td>caterpillar</td>
<td>bioinsecticides</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>spinach</td>
<td>diseases</td>
<td>downy mildew</td>
<td>biofungicide</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>broad beans</td>
<td>plagues</td>
<td>aphids</td>
<td>bioinsecticides</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>vegetables</td>
<td>plagues</td>
<td>to boost auxiliary fauna in flower strips</td>
<td>flower strips</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>green bean</td>
<td>plagues</td>
<td>caterpillar</td>
<td>bioinsecticides</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>green bean</td>
<td>weeds</td>
<td>brassicales/poaceae</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>fruit trees</td>
<td>pear tree</td>
<td>plague</td>
<td>cacopsylla pyri</td>
<td>bioinsecticides</td>
</tr>
<tr>
<td>24</td>
<td>cereal</td>
<td>weeds</td>
<td>bromus</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>cereal</td>
<td>weeds</td>
<td>lolium rigidum</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>cereal</td>
<td>weeds</td>
<td>avena sterilis</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>cereal</td>
<td>weeds</td>
<td>lolium rigidum</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>cereal</td>
<td>plague</td>
<td>mayetiola's cycle tracking</td>
<td>pests monitoring and warning system</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>cereal</td>
<td>plague</td>
<td>hessian fly (mayetiola sp.) control</td>
<td>cultivation techniques</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>cereal</td>
<td>diseases</td>
<td>yellow rust</td>
<td>fungicides</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>cereal</td>
<td>diseases</td>
<td>yellow rust</td>
<td>fungicides</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>cereal</td>
<td>diseases</td>
<td>yellow rust</td>
<td>fungicides</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>vineyard</td>
<td>diseases</td>
<td>plasmopara viticola</td>
<td>lower doses of copper</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>vineyard</td>
<td>diseases</td>
<td>sulfur reduction in control of uncinula necator</td>
<td>sulfur in spray</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>vineyard</td>
<td>weeds</td>
<td>inter-vine tillage</td>
<td>inter-vine tillage</td>
<td></td>
</tr>
</tbody>
</table>
A working protocol was developed for each trial according to the model set out in the framework of Deliverable A.1.1. Each protocol details the objective and methodology of each experience. In addition, a template was prepared to fill in field data results from trials monitoring, which was included as annex to the protocol. Once the experiences have finished, the statistical analysis and the reports of the results have been developed, evaluating the effectiveness, on the basis of the EPPO-PP1 guides of biological evaluation of plant protection products.

The repetition of experiences during at least two agricultural seasons has produced sound results, so in the final reports of the integrated control of biotic agent trials (B1.1), some new effective IPM strategies have been identified as interesting to be used by the sector.

Task B1.2 Demonstrations of integrated crop protection

The objective of this task has been to demonstrate the integrated pest management at real scale in agricultural plots managed by the agro-industry (Consebro) and the agricultural cooperatives (UCAN). The innovative pest control techniques of a specific pest (B1.1 and others commercially available) have been integrated along with the rest of agronomic measures, to carry out a comprehensive management of all pests, diseases and weeds affecting a specific crop.

Demonstrations have been conducted according to the initial project proposal and have been developed as programmed, except for some adjustments which were necessary.

A summary of these demonstrations of integrated crops is shown in the following table:

<table>
<thead>
<tr>
<th>Nº</th>
<th>GROUP OF CROPS</th>
<th>CROP</th>
<th>OBJECTIVE</th>
<th>MEAN OF CONTROL</th>
<th>SURFACE (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chard (leaf)</td>
<td>Plagues control</td>
<td>Pheromones (massive capture)</td>
<td>19,62</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chard (main rib)</td>
<td>Plagues control</td>
<td>Pheromones (massive capture) and balanced fertilization</td>
<td>15,6</td>
<td></td>
</tr>
<tr>
<td>Nº</td>
<td>GROUP OF CROPS</td>
<td>CROP</td>
<td>OBJECTIVE</td>
<td>MEAN OF CONTROL</td>
<td>SURFACE (hectares)</td>
</tr>
<tr>
<td>----</td>
<td>----------------</td>
<td>-----------------</td>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Chard (main rib)</td>
<td>Plagues control</td>
<td>Pheromones (massive capture), biological control, biopesticides and balanced</td>
<td>6.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fertilization</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Plagues control</td>
<td>Pheromones (massive capture)</td>
<td>12.32</td>
</tr>
<tr>
<td>5</td>
<td>Vegetables</td>
<td>Borage</td>
<td>Plagues control</td>
<td>Pheromones (massive capture), biological control, biopesticides and balanced</td>
<td>5.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fertilization</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Winter’s broccoli</td>
<td>Plagues control</td>
<td>Pheromones (massive capture) and balanced fertilization</td>
<td>8.8</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Autumn’s broccoli</td>
<td>Plagues control</td>
<td>Pheromones (massive capture)</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Autumn’s broccoli</td>
<td>Plagues control</td>
<td>Biological control and flower strips</td>
<td>5.3</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Thistle</td>
<td>Plagues control</td>
<td>Biological control products (biopesticides) and balanced fertilization</td>
<td>63.47</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Spring’s Spinach</td>
<td>Plagues control</td>
<td>Pheromones (massive capture)</td>
<td>58.14</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Spring’s Spinach</td>
<td>Plagues control</td>
<td>Pheromones (sexual confusion)</td>
<td>9.37</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Spring’s Spinach</td>
<td>Plagues control</td>
<td>Biological control products (biopesticides)</td>
<td>9.66</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Green been</td>
<td>Plagues control</td>
<td>Pheromones (massive capture)</td>
<td>14.9</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Pepper</td>
<td>Caterpillars control</td>
<td>Pheromones (sexual confusion), flower strips, biopesticides and another products</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>respectful with the environment</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Tomato</td>
<td>Caterpillars control</td>
<td>Pheromones (sexual confusion), flower strips, biopesticides and another products</td>
<td>8.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>respectful with the environment</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Cereals</td>
<td>Wheat</td>
<td>Reducing dependence on herbicides</td>
<td>Cultivation techniques: type of tilling</td>
<td>9.6</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Wheat and barley</td>
<td>Varietal choice: adapted varieties</td>
<td>Cultivation techniques: seed varieties</td>
<td>23.84</td>
</tr>
<tr>
<td>Nº</td>
<td>GROUP OF CROPS</td>
<td>CROP</td>
<td>OBJECTIVE</td>
<td>MEAN OF CONTROL</td>
<td>SURFACE (hectares)</td>
</tr>
<tr>
<td>----</td>
<td>----------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Wheat</td>
<td>Weeds/disease caused by the fungus <em>Gaeumannomyces graminis</em> var.</td>
<td>Cultivation techniques: crop rotation</td>
<td>54,8</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>Wheat and barley</td>
<td>Reducing dependence on herbicides</td>
<td>Cultivation techniques: delay in the sowing time</td>
<td>20,45</td>
</tr>
<tr>
<td>20</td>
<td>Fruit trees</td>
<td>Apple tree</td>
<td><em>Panonychus ulmi</em> control</td>
<td>Auxiliary fauna, biopesticides and another products</td>
<td>21,38</td>
</tr>
<tr>
<td>21</td>
<td>Fruit trees</td>
<td>Pear tree</td>
<td><em>Cydia pomonella</em> and <em>Psylla piri</em> control</td>
<td>Pheromones, auxiliary fauna, biopesticides and another</td>
<td>8</td>
</tr>
<tr>
<td>22</td>
<td>Vineyard</td>
<td>Peach tree</td>
<td><em>Grapholita molesta</em> and <em>Anarsia lineatella</em> control</td>
<td>Pheromones (sexual confusion), flower strips, biopesti-</td>
<td>17,36</td>
</tr>
<tr>
<td>23</td>
<td>Vineyard</td>
<td>Vineyard</td>
<td>European grapevine moth control</td>
<td>Pheromones (sexual confusion)</td>
<td>43,05</td>
</tr>
<tr>
<td>24</td>
<td>Vineyard</td>
<td>Vineyard</td>
<td>European grapevine moth control</td>
<td>Bioinsecticides (<em>Bacillus thuringiensis</em>)</td>
<td>12</td>
</tr>
</tbody>
</table>

For each demonstration, a protocol has been developed, according to the model set out in the "Protocol model for demonstrations of integrated crop protection" (task B1.2) established in the framework of the preparatory action A1.1 and included in the Deliverable A.1.1 *Protocolos de trabajo para los demostradores*, (Working protocols for the demonstrators) where objectives and methodology are indicated for each demonstration. It also describes the reference plots with similar characteristics to compare the effectiveness of the techniques.

For the tracking of each demonstration in full-scale plots weekly monitoring of pests has been conducted, both in the demonstration plot and in the reference surface (control). Pest captures in traps have been counted and crop damages have been observed in order to trigger, if necessary, the proper treatment.

All interventions carried out on crops during two demonstrative agricultural seasons (2014-2015 and 2015-2016) have been gathered in the “farm management notebook”. In this notebook, filled in by technicians, data of harvest evaluation and assessment of the techniques demonstration are also collected. All this data enabled compiling results reports of the technical and economic evaluation of the demonstrations.

During the development of demonstrations, partners and collaborators of AGROIntegra have made at least 35 field visits, as well as numerous technical follow-up meetings with different actors involved (agri-food industries, wineries and cooperatives) to plan the activity for the agricultural season, know the status of ongoing experiences, establish solutions to emerging...
problems and to analyse data obtained in the monitoring of demonstrations. These meetings have been held at least once every two months during the demonstrations.

At the end of the agricultural seasons (2014-2015 and 2015-2016), meetings per group of crops between technical experts from INTIA/GN and the technical staff responsible for each demonstration (from Consebro and UCAN) have been organised, in order to analyse the results and plan the strategy for demonstrations in the following agricultural season. In the final meeting, according to the obtained results, the best IPM strategy has been established for each crop. Positive results have been obtained in some crops that use high quantities of pesticides, as fruit trees and vineyard. Natural enemies and mating disruption are good alternatives to pesticides in these crops; bioinsecticides are also best alternatives to conventional pesticides. Other innovative IPM techniques, as mass trapping, give solutions to reduce the use of pesticides in mayor crops, as vegetables. However, good knowledge about these techniques and products is necessary to obtain adequate effectiveness.

Results reports of all demonstration experiences of two agricultural seasons have been carried out.

➢ Task B1.3 Transformation of agricultural reference farms to the new IPM model

The objective of this task has been the transformation of agricultural farms into the integrated crop management system, not just by controlling a specific pest (B1.1) or protecting a given crop (B1.2), but by implementing integrated management on the whole farm, with all crops involved.

Transformations have taken place in three reference farms of the GN and INTIA in Navarra (Sartaguda, Ilundain and Olite - Bareton), where crop diversity is a challenge and, at the same time, a tool for integrated crop management. Working on the whole farm to demonstrate alternative techniques to pest management allows the double objective of adapting available pest management techniques and having a full and real scale scenario of demonstration in farms.

Working protocols for the three reference farms were developed. Managers of these farms are INTIA and GN, which enable its use for the transfer and public dissemination.

The transformation process that has been achieved is described below:

- **Sartaguda farm (INTIA)**: 50% of its surface (10 ha) are fruit trees and vegetable crops, usually produced in the area, in a similar situation to a real case. The work carried out is described in the final results report. Some practices can be highlighted:
  - Crop rotations to minimize the pressure of pests, weeds and diseases, preventing crops from the same family on the same plots in successive years.
  - Remove previous crop residues by mechanical methods.
  - Setting nest-boxes to boost predatory birds.
  - Planting and maintenance of hedges.
  - Setting flower strips and monitoring natural enemies with technical assistance of the University of Navarra.
  - Mating disruption for pest control (*Cydia pomonella* in apple and pear; *Anarsia lineatella* in peach, nectarine and almond; and *Grapholita molesta* in plum, peach, nectarine and almond.
  - Mass trapping for *Drosophila suzukii* in cherry tree.
  - Release of auxiliary fauna (*Macrolophus* sp.) in tomato greenhouse and autumn horticultural open air crops (chard, thistle and borage).
  - Use of environmental nature-friendly and insects-respectful products.
- In vineyard, the transformation has been taken place in the farm of Bareton-Olite (8 ha), which situation, soil and environmental conditions represent a very frequent typology in vineyards of Navarra. This farm has allowed working with the most common diseases (Plasmopara viticola, Uncinula necator). The use of pheromones for mating disruption of the European grapevine moth (Lobesia botrana) brought an improvement in the wine quality by the reduction of pest density mainly in the third generation, which affected the bunch prior to harvesting and produces the greatest damages.

The following work has been carried out along the execution period of the project:
- Setting mulching and a perimeter hedgerow, chopping vine shoots to incorporate into soil and mechanical tilling.
- Setting nest-boxes to boost predatory birds and natural enemies monitoring.
- Mating disruption for the European grapevine moth control (Lobesia botrana).

- The farm of Ilundain (INTIA) (85 ha) included extensive non-irrigated crops. The following work has been carried out:
  - Crop rotation and increase the surface of alternative crops, increasing legumes surface from 18% to 26%.
  - 2 metres wide fauna corridor to benefit wildlife.
  - Using mouldboard when germination of surface weeds leads to problems.
  - Weeds monitoring.
  - Balanced fertilization (INTIA assessment and promoting leguminous crops).
  - Varietal choice: adapted varieties. During the last campaign (2016/2017), due to problems with yellow rust during the previous campaigns, Camargo variety has been replaced by less sensible varieties, such as Chambo and Marcopolo.
  - Setting nesting boxes to benefit predatory birds.

Protocols have been developed for the three transforming farms, monitoring tasks have been finished and results obtained have been already analysed.

B.2: TOOLS FOR THE INTEGRATED MANAGEMENT OF CROPS

Objective:
In this action, two support tools for the Integrated Pest Management (IPM) have been developed (a Monitoring and Warning System and several Cultivation Guides), which will make possible a wide implementation of the IPM system.

The aim of these tools was to transfer reliable information to farmers so that they could carry out integrated pest management in their crops. Cultivation Guides provide static information for planning strategies of integrated pests, diseases and weeds management. The Pests Monitoring and Warning System (EA AGROintegra), with the periodic monitoring of crops and biotic agents (pests, diseases and weeds), provides dynamic information in space and time on the recommended control actions.

Finally, the AGROintegra Decision Support Tool (HAD AGROintegra), developed in action B3 with inputs from tasks B2.1 and B2.2, allowed going further to customize recommendations of IPM at a specific plot and time during the agricultural season.

To provide this advice the DST (HAD AGROintegra) has integrated knowledge from the Cultivation Guides and the Monitoring and Warning System, as well as the plot history, soil,
climate and meteorological information and risks mapping among other variables, in a dynamic way.

New knowledge and experiences generated during the project implementation have been integrated in the new tools in a dynamic way.

The main problem in the progress of this action was the delay in the development of the new Pests Monitoring and Warning System web application, which implied that its validation could not be performed on time in the first agricultural season. So on, the validation and development of the new tool has extended until the end of the project execution and is continued beyond the project period.

It was intended that this project would serve to prepare the structure of integration of knowledge and provision of advice for the future, so the idea was to build tools, with a perspective that went beyond the own duration of the project. In order to assure this continuity, these tools have been created in connection with the sigAGROasesor service, which has been built thanks to the joint effort of 5 autonomous regions and the support of the Life+2011 programme.

➢ **Task B2.1 Enlargement and improvement of Pests Monitoring and Warning System**

The Pests Monitoring and Warning System INTIA-GN is a tool that already existed before the beginning of the project, designed to be used in conventional agriculture with chemical pest control. It was the result of the pests monitoring from 31 crops, providing for each of them their description, cycle, damage and threshold of treatment, as well as the graphic of flight density and warnings or advices of pests risk appearance.

This task has allowed **expanding the existing Pests Monitoring and Warning System** in several aspects:

- Definition of Areas of homogeneous behaviour (ACH): 313 crop/pest variables have been defined.
- Section 1. Ecophysiology of crops selected in the project (Action B1): indication of the phenological states when the pest has to be monitored, in 46 crops.
- Section 2. Enlargement of the description of pests, diseases and weeds which affect the crops selected for action B1.2. Besides, 27 automatic agroclimatic stations have been included in order to calculate the implemented models.
- Section 3. New alternative and innovative "non-chemical" means of pest control (B1.1, B1.2): 56 preventive and 37 "non-chemical" measures of alternative control have been added. New database with a description of the means of control, its mode of use, control results and economic costs.
- Section 4. Monitoring and observation points. New collaborative approach, with the incorporation of new traps and monitoring points (51) thanks to the participation of 24 agri-food industries and cooperatives collaborators.
- The information produced by the Pests Monitoring and Warning System remains available to users in a Web and allows collaborators to access to information depending on their respective roles, generating directly applicable information for farmers in Navarra with three types of answers:
  - 13 **risk mapping** for selected biotic agents.
  - **Prompts alerts** to point out the most relevant risks.
Visualization of the alerts in the tool

- **Recommended means of control** of the biotic agents according to the effectiveness of each of them in relation to the cycle of crop and pest. The alerts include additional information that can be consulted by the user.

The humidification is a parameter based on climatic data from official automatic weather stations. Leaf wetness is a basic parameter for certain plant disease models, as the one for the mottling of apple and pear. Four leaf wetness sensors have been set in weather stations from INTIA and the GN, located in Cadreita, Sartaguda, Baretón-Olite and Montes de Cierzo.

The technical conditions for the **new Pests Monitoring and Warning System (EA AGROintegra)** were developed during the first quarter of 2015, with the integration of monitoring traps and observation data, which also have been used as a platform to implement diseases and pests modelling, as well as IPM information. Its integrated design has allowed increasing the number of pests and diseases monitored, as well as the variables that assess them.

The **strategy** to reach a consensus for the **EA AGROintegra** model with the rest of the Spanish regions and the possible alignment with the National Action Plan for the sustainable use of pesticides has been established in the context of the project. For this purpose, a meeting was organized in Madrid on 26th March 2015 to present the new tool and discuss about the services currently offered and get further inputs. The experience of other regions in warning systems, mainly targeting pests, such as Andalucía, or diseases, such as Basque Country, has been very useful to design the new **EA AGROintegra**, which will be opened to be implemented in other regions and will allow the link to sigAGROasesor platform.

In May 2016 a first version with the general functionalities was available to be validated at real time. So, the needed tools were enabled in order to carry out this validation in time with real data in the last semester of 2016, with the crops included in the project.

The validation has taken place at two levels:

1) Effectiveness of functions to record and show data of monitoring traps, observations and advices. Collaborators were provided with an Excel to collect data in the 2016 agricultural season as well as a monitoring protocol.

2) Validation of prediction models through the comparison with the monitoring and observations data collected during the agricultural season. Thanks to the built-in functionality of historical queries, the evaluations of modelling variables have been done with real monitoring data (e.g. *Cydia pomonella* in apple and pear).
In addition, after the recommendations received as feedback to the MTR, in order to correct the deviation with the validation planned, data from 2015 and 2016 have been also used for validation retrospectively, simulating the prediction which would have been done by the tool taking the monitor data obtained from the monitoring network. The results of the validation of the tool with the two agricultural seasons included in the B1 Actions are available in the Deliverable B3.4: Informe validación HAD AGROintegra y ajustes realizados.

At the same time of the tool validation, implementations in EA AGROintegra Version 1 were done until February 2017, when the first version was finally completed, stabilized and available for access. Thereafter, the validation has continued along 2017 in several crops. An overview of the validation has already taken place in 2017.

In February 2017 the first version of the application was finalised. This version has been opened since then to the general public with accesses in AGROintegra and INTIA’s websites, with this link:

http://estacionavisos.agrointegra.intiasa.es/ai/accesoVisor.do

View of the map of historical risk of Venturia inaequalis in apple integrated in version 2 of the platform

View of the monitoring points for evaluation of Cydia pomonella in apple trees in the 2017 agricultural season, integrated in version 2 of the platform
During the last months of the project execution period, some training meetings have been carried out with the different profiles of the platform:
- Formation of collaborators of grapevine moth (*Lobesia botrana*) 23/03/2017.
- Formation for technicians of INTIA. 28/04/2017.

To facilitate access to the *EA AGROintegra*, different manuals have been completed depending on the profile of the user and are accessible from the AGROintegra website ([https://agrointegra.eu/es/tecnologia/estacion-de-avisos-y-alertas.html](https://agrointegra.eu/es/tecnologia/estacion-de-avisos-y-alertas.html)):
- Quick Guide to manage *EA AGROintegra*
- General manual for users of *EA AGROintegra*
- User manual for collaborators of *EA AGROintegra*

In June 2017 the **second version** of the tool has been finished. The **mobile application** is also available since then, including all the improvements of the second version and geopositioning systems.

Some improvements of the second version have been included until October 2017. An **example video** has also been developed to show how to manage the tool in a simple way and achieve its full potential. The link is available in the AGROintegra website: [https://www.youtube.com/watch?v=GrKgQ4So2uw&feature=youtu.be](https://www.youtube.com/watch?v=GrKgQ4So2uw&feature=youtu.be)

The expansion and upgrading of *EA AGROintegra* provides a collaborative approach with the addition of new traps and monitoring points of pests due to the participation of agri-food industries and the agricultural cooperatives. This would not have been possible without the collaboration of farmers and technicians involved in the observation of crops and the pests, diseases and weeds monitoring. The Deliverable B2.4_1 *Kit para el observador de la Estación de Avisos* (Kit for observer of the new Pest Monitoring and Warning System) was distributed in order to train farmers and technical partners and, at the same time, offer them an incentive for their effort. This kit, composed of an observation set, a backpack for transporting the material, and a recognition manual for pests, diseases and damages, provides some basic tools for them. The Deliverable, B2.4_2 *Kit para el observador de la Estación de Avisos* (Kit for observer of the Monitoring and Warning System, see Deliverables Annexes), was completed.

In September 2015 (15th month of the project) the Deliverable B2.3_1 *Informe anual de avisos/alertas lanzados vía sms y web* (Annual report of warnings/alerts through SMS and web), was fulfilled. In this deliverable, the annual report of warnings and alerts sent via SMS and Web was summarized, and newsletters and fact sheets published in that period were collected. In September 2016 (27th month of the project) the Deliverable B2.3_2 *Informe anual de avisos/alertas lanzados vía sms y Web and Deliverable B2.1_2 Manual de Usuario VI Nueva Estación de Avisos con acceso a la Web* (User’s Manual of Monitoring and Warning System with web access) were fulfilled.

Finally, the Deliverable B2.6_2 *Análisis de costes y viabilidad económica de las propuestas realizadas para cinco cultivos* has been elaborated at the end of the project using the information obtained in the experiences (Action B1) for the five crops (wheat, barley, vine, spinach and broccoli).
Task B2.2 Development of guidelines of cultivation for the IPM

Cultivation Guides are tools to help farmers and technicians to plan their IPM strategies optimizing the available techniques. They detailed performance measures (preventive, monitoring and non-chemical control of biotic agents) recommended for each pest or disease, as well as the period of monitoring and thresholds of chemical control when other measures have proved insufficient.

The objective of this task has been to implement and updated guides that integrate all the innovative techniques tested in the frame of the project or that could be developed in the frame of other projects. A digital version will be maintained updated in the Project Website, where lasts innovations will be incorporated to keep updated information.

10 Integrated protection guides have been prepared, being representative of the crops named in B.1.2 task (wheat, barley, broccoli, spinach, chard, borage, apple, peach, pear and vineyard). These Guides include a list of pests and diseases that affect each crop, with their description, symptoms and period of surveillance; including possible measures categorized in order of priority: prevention, tracking, alternatives to chemical methods and chemical methods.

These guides constitute the Deliverable B2.5_2 Guías de protección integrada de 10 cultivos (IPM guides for 10 crops) that has been completed in June of 2017 (36th month of the project). This last version has been updated and incorporates photographs that help in the identification of pests and diseases.

B.3: IMPLEMENTATION OF A SYSTEM OF ADVICE AND DEMONSTRATION OF ITS VIABILITY

The objective of this action has been to implement an advice system for the Integrated Pests Management, supported by GIS and web technologies, and the demonstration of its technical and financial viability, as an effective tool for the sustainable use of plant protection techniques.

An IPM Decision Support Tool, AGROintegra DST (HAD AGROintegra), has been performed in this action. This tool has been designed in order to be exportable to other Spanish regions and European regions and countries.

Task B3.1. Integration of knowledge into a Decision Support Tool

In this task a Decision Support Tool (HAD AGROintegra) has been developed in connection with the advisory system sigAGROAseor (developed in the framework of the project Life + 2011/641) which was in use in Navarra and was supported on a GIS model and supplied to users via web.

AGROintegra DST (HAD AGROintegra) has served, initially, for the most common pests and diseases management in our conditions for five crops (wheat, broccoli, spinach, apple and vineyard). The operational process is the following:

1. Risk parameterization module. The integrated pests management must begin before deciding what crop to place in a plot. Preventive practices have to be chosen taking into account:
- Pests risk in a given crop, area or plot. Historical risk maps for Areas of Homogeneous Behaviour (AHB) and the “Parametrization of the historical risk in plot” are used, which takes into account the plot characteristics, crops rotation, soil parameters and history of pests and preventive measures applied.

- An updated database of IPM measures, evaluated and classified according to technical, economic and environmental variables is also available.

- Thus, the user can choose the best preventive IPM measures in relation to the risks previewed in his plots and crops.

Finally, as a result, the system provides a set of indicators:

- technical indicators (effectiveness of pests control with IPM measures),
- economic indicators (profitability expressed as expected gross product increase with the implementation of an IPM measure), and
- environmental indicators (classification of the IPM measures into cultural technical alternatives to the use of pesticides, low impact pesticides and pesticides in general).

2. Warnings and alerts module. Once the crop is established in the plot, the knowledge available on the EA AGROintegra (Action B2), together with the pests’ thresholds observation in a plot, allows proposing actions to manage a specific pest in a given plot, crop and time, using the described IPM measures database. The connection with the sigAGROasesor platform allows the customization of warnings and alerts at agricultural plot level and integrates the information from the on-spot evaluation of pests when thresholds are required.

AGROintegra DST (HAD AGROintegra) offers a personalized response, both in time and in space, being the UGC (unit of crop management) the unit of response (normally cadastral plots or groups of them).

Crops DST (HAD Cultivos). The sigAGROasesor system offers this same analysis procedure so the user can choose the crop to place in his/her plot, taking into account existing risks and the efficiency, profitability and impact of available IPM measures. This tool is a good IPM instrument to reduce the use of pesticides. To complement the decision-making process other criteria related to climatic area, irrigation system, crop rotations, soil and technical and economic management variables are used.

This module has been developed in Excel file and it will be programmed in a Web tool when possible. It is considered as the beginning of a future development, maybe with the participation of INTIA in other projects with similar objectives, once the functionality of the tool is improved. It seems to be a useful tool to be integrated in the daily advisory role of INTIA. Currently, 5 crops: wheat, apple tree, vineyard, broccoli and spinach, are possible to be managed.

This module has an user manual which is available in the Deliverable B3.2.2: Manual de Usuario de la HAD AGROintegra. It is expected that this module will be available in mobile devices too.

An example video has also been developed to show how to manage with the tool in a simple way and achieve its full potential. The link is available in the AGROintegra website: https://www.youtube.com/watch?v=0z9j_rj_IWY&feature=youtu.be
Task B3.2. Validation of the Decision Support Tool

The validation of the functionality of the DST (HAD AGROintegra) have been done using a large amount of demonstration plots with the objective of showing farmers the feasibility of applying the most innovative IPM methods. In addition, EA AGROintegra observation plots, which are part of Action B2, have also been used for the DST (HAD AGROintegra) validation.

The validation has been done retrospectively using the technical and economic information of the experiences, with data of two agricultural seasons. 219 plots and 108 farmers have been considered for the validation.

In May 2016 the Deliverable B3.1: Protocolo de validación de la HAD AGROintegra was prepared and attached to the MTR.

On the basis of this methodology, two deliverables have been filled out: Deliverable B3.3: Informes preliminares de validación por cultivos and Deliverable B3.4: Informe de resultados de la validación de la HAD AGROintegra y ajustes realizados.

C: MONITORING OF THE ENVIRONMENTAL AND SOCIOECONOMIC IMPACT OF THE PROJECT

The objective of this action has been to monitor the environmental and socioeconomic impact of the project, evaluating the degree of achievement of the main targets. By this action it has been possible to verify that the actions of the project are providing satisfactory results.

C1: MONITORING OF THE ENVIRONMENTAL IMPACT OF THE PROJECT

Action C1 has aimed to measure the environmental impact of the project. With this purpose, to identify some specific indicators to assess the impact thorough the project has been necessary.
Task C1.1 Diagnosis of Environmental Former Situation

To achieve the general objective of this action to know the initial situation regarding the use of pesticides in Navarra was essential.

During the first months of the project activities focused on defining the methodology and on collecting and processing the necessary information to assess the initial environmental situation. For that the following activities were carried out:

- **Review of the indicators proposed in the project proposal** and providing definitions that allow measuring the environmental impact of the use of pesticides in different crops.
- **Search for existing statistics on use of pesticides** in the years 2011, 2012 and 2013.
- **Involvement of collaborating cooperatives and agri-food industries** to carry out the study, related to the crops of interest and the incidence in the area. Collaborating cooperatives are: Cerealista Ezkibel (Allo), Cerealista Litxarra (Oteiza), Agrícola San Esteban (Arguedas), Bodegas Nekeas (Añorbe), Asociación de Labradores (Tudela), Agrícola Santo Cristo (Caparroso) Cooperativa del Campo San Isidro (Cabanillas), Centex (Tudela) and Bodegas Malón de Echaide (Cascante). Collaborating agri-food companies are: Congelados de Navarra, Gelagri Ibérica and Ultracongelados Virto.
- **Identification of data to be requested** to the collaborating cooperatives and agri-food industries for the study: farm management notebooks, records of purchases and sales of the cooperatives, etc. to gather representative information of the initial situation.
- **Data collection and processing**: data review, search for safety data sheets of plant protection products to define active substances, use and toxicity, and process data to achieve final results.
- **Collection of indicators and reporting of initial environmental situation** with the findings and conclusions.

Established environmental indicators are as follows:

1. Number of total chemical pesticides used per crop.
2. Number of biopesticides and pheromones used per crop.
3. Number of cultural techniques and other means of plant defence used per crop.
4. Number of pests controlled per crop.
5. Number of diseases controlled per crop.
6. Amount of chemical products used per hectare and crop.
7. Number of chemical pesticides used per crop and toxicity: damaging, toxic and dangerous for the environment.
8. Number of biopesticides detected in the European market susceptible to be applied in the agricultural production in Navarra as an alternative to chemical products per crop/pest.

The general criteria for this selection have been:

- To calculate the type and the amount of the active substances applied, as well as the endangerment of the plant protection product used.
- To determine the incidence of pests and diseases in different crops.
- Learn about the implementation of cultural techniques, use of biopesticides and other means of plant protection.
Once the environmental indicators were defined, data of pesticide consumption of the 20 main crops of Navarra were collected in the agricultural regions where the various AGROIntegra demonstrations and trials have taken place.

A draft Deliverable C1.1 *Informe de situación medioambiental de partida* (Initial Environmental report, submitted with the MTR) was submitted on 31/12/2014 and was concluded in March 2015, with a three month delay due to different reasons:

- The volume of information to be processed to obtain the values for the indicators, since the work has been done with average data of three agricultural years in a large number of different farms.
- Changes in the regulations about pesticides’ classification (pheromones, other means of plant protection, biopesticides...), which lead to rethink the interpretation and presentation of the information on several indicators.

Subsequently as it was mentioned in the MTR, in accordance with the comments received to the Inception Report (“The study on the use of pesticides is very detailed and the indicators developed are comprehensive. However, I consider of relevance to include a comparative of the results obtained with the values available from other Spanish Regions and European average data. This analysis is of great significance and will allow estimating the potential impact of the project during the After Life period”) the Deliverable C1.1 was reviewed and completed, including statistics on the consumption of pesticides in Navarra in comparison with the rest of regions of Spain and other European countries. Thus, in April 2016 a new version of the Deliverable C1.1 "Report on the initial environmental situation", was submitted (attached to the MTR), including “Chapter 8: General situation of the use of pesticides in Navarra, Spain and Europe”.

The results obtained in the implementation of this task have allowed to better understanding different pest control strategies used in the performance areas of the project. In this way some conclusions on the initial situation for the project can be already highlighted:

- In general, the use of biopesticides, pheromones and other sustainable plant protection means are very little extended in the studied crops.
- There is a high variability of pests and diseases affecting several crops.
- Pests and diseases affecting a specific crop, and therefore the use pesticides, differ significantly in each agricultural season.
- The total quantities of products applied in different crops differ in quantity and toxicity.
- The toxicity and doses of pesticides used differ considerably between applications.

Therefore, the need to establish specific IPM measures for each crop has been confirmed and comparing indicators for each pest-crop combination with results obtained in field demonstrations.

**Task C.1.2 Evaluation of the evolution of the environmental impact indicators**

To analyze the evolution of the environmental impact indicators of the project, data from all the field demonstrators and trials carried out during the first agricultural season (2014-2015) have been collected, and the values for the indicators have been calculated to, subsequently, verify the impact of the actions carried out within the project. All the indicators obtained, both in the demonstration plots and the control plots (managed in a conventional way) were collected and are presented in Deliverable C.1.2 *Informe intermedio de evolución de...*
After reviewing the indicators and their definitions, the project's technical committee agreed to define indicators 1 and 6, excluding biopesticides and pheromones, in order to better identify the use of conventional chemical pesticides.

The delay in the date of completion of Deliverable C1.2 with respect to the initially previewed deadline (31/12/2015) was due to the following circumstances:

- Data were not available until the experiences were completed and their results available. Besides, the high number of demonstrations and trials, as well as of the amount of data to be managed has delayed the availability of the results.
- Due to the change on regulations of pesticides’ classification, equivalences between the previous and current classification systems had to be established to compare results with the initial situation. In addition, different rules of plant protection products classification currently coexist and an equivalence between risk phrases has been established in order to maintain the criteria used in the initial report (Deliverable C1.1).

During the first agricultural season (2014-2015), and after only one year of project, very interesting results were obtained for certain crops, like vineyard, pear, broccoli or spinach, where a substantially reduction of the use of chemical plant protection products has been possible. In the majority of experiences, the new techniques worked properly.

The impact obtained was not very high in some cases; this was quite expected taking into account the timeframe (only one year of experiences) and that it is the beginning of the change in the strategy. Adjustment of the IPM techniques employed in the second agricultural season of demonstrations and trials was expected to improve the environmental impact of the project.

➢ Task C.1.3 Final Assessment

In Deliverable C1.3 Informe final sobre el impacto ambiental del proyecto (Final Environmental report), an assessment of the values obtained for each indicator has been carried out, so the real impact of the project has been assessed. In addition, the final environmental report includes a comparison of the initial situation identified in tasks C1.1 (initial situation) and C1.2 (intermediate situation). In this way it has been possible to evaluate the real impact of the project after two years of use of the proposed IPM techniques.

The enormous volume of data and the difficulties of comparing data from different resources have increased the time to analyse the results. Some data from the initial report had to be recalculated to be comparable (Number of total chemical pesticides used per crop (excluding biopesticides and pheromones). They are included in the final report.

The value of the indicators obtained in the two agricultural seasons, compared to its value at the initial situation (C1.1), have demonstrated how IPM's techniques can reduce the number of conventional chemical phytosanitary products used in crop protection, in terms of the number of products, quantity of active matter and number of dangerous to the environment products.
Impact achieved has widely overcomes the objective of reducing environmental risks by reducing the use of phytosanitary products in the protection of vegetables, fruit trees and vineyard. In fact, significant reductions in the amount of active substances applied, especially of synthesized pesticides, as well as a great reduction in the use of conventional chemical phytosanitary products have been achieved. In cereals, the quantity of pesticides has not been reduced, but its toxicity and weeds density.

- A reduction of 45.26% in the number of chemical phytosanitary products in kilos of active matter per hectare, in fruit trees, vineyard and vegetables. A reduction in the use of 7.96 kg of chemical phytosanitary products per hectare. The reduction reached of 86.83% in the number of chemical insecticides in kilos.
- A reduction of 54% in the number of phytosanitary products dangerous to the environment, from 208 to 95.
- An average reduction of 44.36% in the use of pesticides as a pest or disease control technique in fruit trees, vineyard and vegetables, from 94% to 17%.
- An increase of 92% of the number of biopesticides, pheromones, cultural techniques and other means of defense in the crop protection strategy, in cereals, fruit trees, vineyard and vegetables, from 8 to 102.

It is remarkable the generalized reductions in the use of insecticides in vine, vegetables and fruit crops. Nevertheless, in the case of extensive crops, with demonstrations focused on herbicide reduction; no reduction in the quantity of pesticides has been obtained but several cultural techniques have been introduced which can be used in situations to control specific weeds or reduce its density.

The analysis of the results obtained within this task will allow assessing the potential impact of the activities to be carried out in the IPM strategy of Navarra, to its subsequent transfer to the agricultural sector of Navarra.

C2: MONITORING OF THE SOCIOECONOMIC IMPACT OF THE PROJECT

Agricultural and agro-industry activities have a great socio-economic impact, being this impact especially relevant in rural areas where these activities mainly take place. LIFE AGROIntegra allows providing farmers with the tools as well as the knowledge necessary to carry out the activities on pests, diseases and weeds management in a sustainable, efficient and cost-effective way. In addition, dissemination, training and awareness raising actions have been organized within the project activities. Therefore, it was expected that the project would produce a significant economic and social impact and a boost to rural development.

➢ Task C2.1 Diagnosis of the initial situation

During the first months of the project activities were focused on defining the methodology and collecting and treating the needed information to assess the initial socio-economic situation.

For this purpose, the following tasks were undertaken:
- Identify and validate socio-economic indicators allowing the impact of the project on the society and the economy to be assessed.
- Establish the methodology for data collection.
- Collect data on the cost of the conventional production system on crops, as well as other socio-economic indicators. These real data were collected with collaborating companies.
- Draft report on the initial socio-economic situation (Deliverable C2.1, submitted with the IR).

In this task an analysis of data from different sources was carried out, in order to know the theoretical impact of the initial situation of the project. Previously socio-economic indicators to assess the impact of the project on society and the economy were defined, and a diagnosis of the initial situation was carried out. These socio-economic indicators were as follows:

1. Number of farmers that use low pesticide input systems.
2. Number of farmers that participate in the real scale demonstrations.
3. Number of technicians that participate in the real scale demonstrations.
4. Yield of conventional crops per agricultural season.
5. Yield of IPM crops per agricultural season.
6. Cost per production and crop unit, in conventional production.
7. Economic resources used to the production of conventional agriculture, per ha and crop.
8. Economic resources used for the IPM, per ha and crop.
9. Percentage of the budget spent on regional or national providers for purchases of materials and subcontracting for IPM and conventional production.
10. Number of professionals involved in the project.
11. Number of employments created for the development of the project.
12. Number of organizations contacted to disseminate and develop the project at national level.
13. Number of organizations contacted to disseminate and develop the project at European and international level.
14. Number of training activities developed in the Framework of the project.
15. Number of assistants to the dissemination activities.
16. Number of successful experiences shown to professionals.
17. Number of appearances in media and specialized magazines publicizing the project.

The collected information was then analysed and Deliverable C2.1 Informe de situación socioeconómica de partida (Initial socioeconomic situation report) was prepared. The final version was ready (31/1/2015) and submitted with the IR.

➢ Task C2.2 Assessment of the evolution of the indicators

The objective of this task C2.2 has been to evaluate the evolution of the socio-economic impact of the project through the monitoring of the indicators set out in task C2.1.

For the annual review of the socio-economic indicators the following steps were followed:
- Analyze and redefine the indicators proposed initially and monitor them.
- Data collection to calculate indicators. Analysis of data obtained from socio-economic indicators.
- Compare intermediate results with those in the initial report (Deliverable C2.1).
- Elaboration of a report on the results obtained (Deliverable C2.2).
In this task, Deliverable C2.2 *Informe intermedio de evolución de indicadores socioeconómicos* (Intermediate socioeconomic report) was prepared and submitted with the MTR, in which the analysis of socio-economic indicators was made from the beginning of the project.

After analysing the obtained results, the calculation of some of the indicators proposed initially was redefined in order to show the real socioeconomic impact of the project in 2015. A meeting was held with AGROIntegra partners on 22nd October 2015 to define this.

Deliverable C2.2 *Informe intermedio de evolución indicadores socioeconómicos* (Intermediate report on the progress of socio-economic indicators) was completed in April 2016 and submitted with the MTR.

In the course of the first year of the project a **positive evolution of social indicators** was observed. A significant increase of professionals involved in the project and dissemination activities contributed greatly to this evolution.

The global evaluation of the data obtained in the economic indicators showed that innovative IPM techniques can represent additional costs on crops, but do not always lead to a higher unit production cost. In some cases, these higher costs are not excessive and the increase on the quality of the products can compensate it sufficiently.

The conclusion of this task was that an in-depth analysis of the results on field demonstrations per crop and technique, individually, was needed, since, at least for some crops, a new model of IPM may be viable from an economic point of view. So, it was highlighted the need to continue working on the second agricultural season of the project, setting and refining techniques for each crop.

**Task C2.3 Final assessment**

The purpose of this task C2.3 has been to evaluate the socio-economic impact that could imply the transition from a conventional system to an IPM model in different crops and to demonstrate its economic viability. In this way, the impact of the project and its evolution in relation to the initial (task C2.1) and intermediate (task C2.2) situations have been analysed.

For the Final assessment of the socio-economic indicators the following steps have been followed:

- Analyse the indicators proposed initially (in tasks C2.1 and C2.2).
- Collection of data to obtain the values for these indicators.
- Analysis of the data obtained from socio-economic indicators.
- Compare the results of the final indicators with the values presented in reports of the initial (Deliverable C2.1) and intermediate situation (Deliverable C2.2). Thus, the comparison has been made from the following points of view:
  - Economic comparison with second agricultural season (2016).
  - Economic comparison between agricultural seasons (2015 and 2016).
- Elaboration of a report on the results obtained (Deliverable C2.3).

In this task, **Deliverable C2.3 Informe final sobre el impacto socioeconómico del proyecto** (Final report on the evolution of socio-economic indicators) has been prepared in June 2017, giving a vision from the social and economic point of view of the overall project.
Final report on the evolution of socio-economic indicators has concluded that a **positive evolution of social indicators** has been seen along the project execution. An increased number of professionals involved in the project (from 69 to 170) and dissemination activities (from 220 to 736) have been obtained. This participation shows the interest of the sector in changing the production model to the IPM and reinforces the importance of this project and the transference of the results achieved. Both the agro industry and the cooperatives themselves are very sensitive to obtaining healthier food, which has led them to participate actively in training and dissemination of IPM techniques. In this manner, LIFE AGROIntegra has highlighted the importance of making aware farmers and technical advisers about the reduction of the environmental risk in crop protection with sustainable IPM alternatives, instead the only use of chemical struggle in the strategies of crop protection.

The clear need for training and knowledge that has been manifested in the LIFE AGROIntegra project carried out in Navarra also emerges at the national and European level, since the change to the IPM will make essential the training of professionals and a constant transfer of knowledge. This will lead to an increase in jobs and companies linked to IPM advice. The corresponding governments should support through their policies (research, experimentation, training, transfer and advice) the collaboration, increase of the knowledge and its transfer to the sector to facilitate and improve the use of these techniques and make available support tools.

According to **economic indicators**, the innovative techniques of integrated pest management (IPM systems) are technically feasible, since the yields obtained were generally similar to the conventional ones, obtaining also a higher quality harvest, although can represent additional costs on crops. Nevertheless, these costs can be reduced by means of additional training, to improve knowledge in order to optimize this innovative IPM techniques efficiency and adjust them to the required needs. Each technique depends on a great variety of factors, such as crop, disease, plague, agrosystem, etc. Therefore, more professional and specific knowledge is key to establish the most efficient and sustainable method of control in every situation. In this way, it is necessary that growers adopt new practices and take into account more sustainable alternatives in their crop protection strategies. Moreover, professionals and advisers should learn how these good practices can be transferred to other situations to benefit the wider sector. With the increase in the area dedicated to IPM cultivation and a better and broader knowledge of each technique and the combination of them, in order to improve its efficiency, it is expected to lower the production costs of the IPM. This, together with the higher quality of the products obtained and compliance with the regulations on the sustainable use of pesticides, as well as the support and promotion of the use of these techniques and tools by regional, national and European governments, make that in the short and medium term increase their use and as a consequence, the quality and safety of food. Likewise, the business models of companies producing and marketing business products is evolving with the entry of IPM techniques in terms of products and services offered, increasing in turn the need for trained technical advisors.

### 4.2. Dissemination actions

The aim of dissemination actions has been to **disseminate, communicate and report on the project and its results at regional, national and European level**. This action also deals with the **awareness raising, advice and training to farmers on the new IPM model at the regional level** in order to facilitate the transfer to a more sustainable agriculture system.
D.1 WEBSITE

The objective of this action has been to disseminate the LIFE AGROintegra project and its results, as well as being the virtual meeting point of all stakeholders. The expected result is to get a “complete, open and alive” project website.

The progress indicator defined for this action is “100 visits to the web per year” (300 visits in total).

During the initial months of the project INTIA and the GN worked on the structure, contents and design of the website and the domain was chosen and reserved (www.agrointegra.eu). In addition, it was fully translated into English. Since then it has been regularly updated, with information directly related to the project and its results as well as with information regarding IPM (regulatory changes, information on other relevant projects, events etc.), since one of the objectives of the project is to support the implementation of Directive 2009/128/EC on the sustainable use of pesticides by the targeted stakeholders. To assure that the target audience returns to the website, it has been regularly updated with new information on the progress of the project, and this has been done using graphical information to show these updates at first glance.

The website includes information on the activities of the project, its progress, events, related news and general communication materials (e.g. LIFE AGROintegra brochure and Newsletters), as well as publications, information on regulatory and legal documentation, and links to sites related to IPM. Specific pages are dedicated to the main LIFE AGROintegra outcomes, i.e. Pests monitoring and alert system, DST, IPM Cultivation Guides and on New IPM techniques, which was completed with a description on the main available techniques and information on the specific field trials and demonstrations in LIFE AGROintegra using the “IPM pyramid” to make it intuitive (http://www.agrointegra.eu/es/tecnologia/nuevas-tecnicas.html) and it is expected to be regularly updated, even beyond the completion of the project’s execution period. An access to the LIFE programme website is also provided. Finally, there is also a private area, with differentiated sections for partners, collaborators (co funders, cooperatives, etc) and the Action Group, and to which the LIFE AGROintegra monitor from NEEMO has access.

Until June 2017 the website has received more than 15,100 visits, as shown in the figure below from Google Statistics.
The LIFE AGROintegra website’s link is included in the templates of the project reports, as well as in all the communication materials, and it is available from the website of all project partners:

- GN: http://www.navarra.es/home_es/Temas/Ambito+rural/Vida+rural/Observatorio+a
grario/Agricola/Divulgacion+a
gricola/Innovacion+y+tecnologia.htm
- INTIA: https://intiasa.es/es/proyectos-i-d.html
- Consebro: http://www.consebro.net/vIE/menu.asp?xsec=EN

In addition, the visibility of LIFE AGROintegra in internet has been complemented with the presence in several social networks, where LIFE AGROintegra profiles were generated, all of them accessible from the website; concretely:

- Twitter (https://twitter.com/LifeAGROintegra)
- Facebook (https://www.facebook.com/LifeAGROintegra)
- Youtube (https://www.youtube.com/user/LifeAGROintegra)
- LinkedIn (https://www.linkedin.com/grps?home=&gid=8472822&trk=eml-
group_invt-b-button-viewgroup&fromEmail=fromEmail&ut=0o6bRpatsT1T81)

In order to reach a broader community, a project website has recently been created in the AGRIPA portal of the National Institute of Agri-food Research and Technologies of Spain-INIA (http://life-agrointegra.agripa.org). The general information of the project was provided, with the aim of making visitors access the regularly updated LIFE AGROintegra website, to which a link is provided.

It is considered that the objectives in Action D1 have been successfully achieved (publication and continuous updates, contents and translation, number of visits).

In this Action there has not been any significant problem, since it has been technically implemented by a company specialized in communication in the agricultural sector with more than 20 years of experience, and supervised by INTIA and GN. The main deviation has been a greater involvement of the GN on the content provision (both in English and Spanish languages) and daily updates. The progress indicator (100 visits to the web per year, 300 visits in total) has been widely attained.

D.2 ON-SITE PANELS

The objective of this action has been to inform on the realization of the LIFE AGROintegra project in the environment closest to the sites where it takes place.

The progress indicator defined for this action is “50 on-site panels displayed”.

The display of on-site panels allows showing to locals as well as to visitors the activities being carried out in a quick and visual way. In the case of a project like LIFE AGROintegra, with high presence of persons of advanced age in the agricultural sector as target audience and not used to the new technologies, this type of media is of great interest and utility.

During the initial months of the project the panels were designed and produced in two formats, a smaller one (0.75 x 0.75 m) to be displayed at plots where trials are being undertaken; and a bigger one (1x1 m) for plots of real-scale demonstrations, with the aim of optimizing the available resources and select the type of panel that best adapts to each type of
agricultural plot. An initial report on the progress of the panels’ production and display was submitted together with the IR (Deliverable D2.1_1) which was updated at the end of 2015 as previewed. Deliverable D2.1_2 was attached to the MTR, where all details on the panels’ distribution and location were already provided.

50 panels were produced and they were all displayed in selected agricultural plots, where the LIFE AGROIntegra field trials, real-scale demonstrations and transformation of farms to the IPM model have taken place, accomplishing with the established progress indicator for this action.

**D.3 LAYMAN’S REPORT**

The objective of this action is to widely disseminate the results of the project and will be especially targeted at a non-specialized audience.

Layman’s report was published in January 2018 and 100 paper copies were distributed

Layman’s report is also available in the project website:

https://www.agrointegra.eu/es/publicaciones/articulos.html

In this task, **Deliverable D3.1 Informe Layman** has been prepared in December 2017, giving a general vision of the project and its results in an easy way for non-specialized audience.

**D.4 DISSEMINATION ACTIONS**

The main objective of this action has been to disseminate the project at regional, national and European level. The specific objectives have been:

1. To report in depth on the scope and motivations of the project at local level to the population of the area where it takes place, so that they can contribute with their vision, ideas and motivations.
2. Inform the society in general at regional, national, European and international level on the development of the project so that its value is communicated as a model or strategy applicable to other contexts.
3. Disseminate the results of the project at national and European/international forums in which members of the Action Group participate, be they national or European and international (seminars, conferences, congresses, etc.).
4. Feel identified with the project by a corporate image.

➢ **Task D4.1. Dissemination Plan**

The LIFE AGROIntegra Dissemination Plan was defined during the first month of the project and was revised and validated by all Partners by August 2014, Deliverable D4.1_1 Plan de Difusión AGROIntegra (Dissemination Plan) submitted with the IR. The Plan was reviewed and updated in June 2015 and in June 2016 and it is provided with this report, **Deliverable D4.1_3 Plan de difusión del proyecto** (Dissemination Plan). This plan defines all necessary aspects to guarantee messages to be disseminated arrive to all the targeted audiences.
Task D4.2. LIFE AGROintegra Corporate image

The corporate image of LIFE AGROintegra was developed during the first month of the project. For this purpose, different logos were drawn up that were unveiled to the project partners, who finally chose the logo that found more attractive. The manual of style of LIFE AGROintegra offers information on the logo (style of font and colours) and its use (greyscale and coloured backgrounds, and photographs). It also details the typography for the reports and promotional documents of the project, and defines the templates for presentations, press releases and deliverables.

The manual of style of LIFE AGROintegra was submitted with the IR, Deliverable D4.2 Imagen corporativa de AGROintegra (Corporate image of AGROintegra).

Task D4.3. Dissemination materials and publications

At the beginning of the project the following materials for general dissemination of the project were developed, taking into account the corporate image, and were made available to the partners:

- General project flyer, in Spanish and English. Initially 400 copies were printed in Spanish and 100 in English. Then, at the beginning of 2016 extra copies were printed in Spanish (400) and English (100). Therefore, in total 1000 copies of the first version of the general project flyer were printed. This Deliverable D4.3_1 Folleto general del proyecto – versiones ES y EN (General project leaflet – ES & EN versions) was submitted together with the IR. In addition, an updated version of the flyer, including project results, has been developed at the end of the project, in June 2017, Deliverable D4.3_2 Folleto general del proyecto – versiones ES y EN (General leaflet of the project – ES & EN versions) attached in Deliverable annexes. Initially 400 copies of the final version of the project flyer have been printed. So, 1.400 copies of the general project flyer have been finally printed in total and both versions are also electronically available for the general public in the project website, in Spanish and English.

- General project poster. A DIN-A1 poster was developed at the beginning of the project, taking into account the corporate image and with the aim of communicating in a clear and precise way on the objectives of the project in the headquarters of the partners, cofinancers and collaborators (cooperatives and agroindustries) involved in the project, but also in other possible locations. Even if initially 50 posters were previewed, it was finally decided to print only 25 copies (with frame and pane), as this number was sufficient for the indicated locations and allowed to create in addition a Roll-up, that, even if not initially previewed, is a more appropriate tool to use in dissemination events. The Deliverable D4.5 Póster general del proyecto (General project poster) was submitted with the IR.

- In addition, thorough the project, different publications on the project, its progress and items related to IPM, that also allow supporting the implementation of the Directive on sustainable use of pesticides, have been published by different means and disseminated to the diverse range of target groups. These include:

  - Newsletter: The LIFE AGROintegra Newsletter is a biannual publication, and the first number was issued in December 2014. Since then a new issue has been published in the LIFE AGROintegra website and sent to the DDBB contacts every December and June. The first issue (Deliverable D4.4_1 Boletín AGROintegra I) was submitted together with
the IR, and issues 2 and 3 were submitted with the MTR (Deliverables D4.4_2 Boletín AGROIntegra 2 and D4.4_3 Boletín AGROIntegra 3). Last Newsletters of the project, Deliverables D4.4_4 Boletín AGROIntegra 4, D4.4_5 Boletín AGROIntegra 5 and D4.4_6 Boletín AGROIntegra 6 have been completed in the last year of the project and are provided with this Final report.

- **Press releases**: five press releases have been issued throughout the project in different occasions and are available in the project website (https://www.agrointegra.eu/es/actualidad/notas-de-prensa.html):
  - The public presentation of the project (February 2015).
  - The Round table of the LIFE Projects at the International Symposium on viticulture in Valencia (December 2015), fostered by LIFE AGROIntegra, and also communicated through the website of LIFE Programme.
  - The participation of LIFE AGROIntegra in the C-IPM Workshop on May 2016 that took place in Bonn (Germany) (June 2016).
  - The participation of LIFE AGROIntegra in the VI Agro-meteorology National Meeting (November 2016).
  - The participation of LIFE AGROIntegra in the INTIA’s workshop in Sartaguda (February 2017).

- **News**: The project website has regularly been updated with relevant news on the progress of the project and related issues.

- **Interviews**: Eleven interviews have been published so far.

- **Other publications**: project partners have actively cooperated in the publication of different types of articles related to the project and its progress. 61 publications have been published so far throughout the project, including articles, press releases, poster presentations, etc. which details are provided in Dissemination annex 1: Lists of publications.

- **Appearances in media (film produced)**: initially the progress indicators included in the proposal considered the number of appearances in radio or TV regional programmes. However, trying to address the target audiences of the project it was finally considered that it was a better option to create own videos, instead of reports in which the total content of the message that is transmitted is not controlled.

- Finally, two films have been produced to disseminate project results:
  - **Project results in IPM on vegetable crops**. Edited by CONSEBRO. It has been disseminated through AGROIntegra’s social networks and website and also by the youtube website (https://www.youtube.com/watch?v=vnxUSo779hg), for the dissemination in the agri-food industries sector and the general public.
  - **Project results in IPM in vegetables, fruit trees, cereals and vineyard**. Edited INTIA-GN, with the participation of all the partners. It has been disseminated through the AGROIntegra and youtube websites. (https://www.youtube.com/watch?v=T6YJl9yP5Jw)

➢ **Task D4.4 Participation at seminars and conferences**

During the project, partners have participated in different events of interest, with an active promotion of LIFE AGROIntegra. A table provided details events and activities in which AGROIntegra have participated.
D.5 PROMOTION OF THE IPM MODEL IN NAVARRA

This Action of transfer to producers and the agribusiness of Navarra on the IPM model has been of special importance for the success of the project. Its objective has been to promote the IPM model at regional level, in order to facilitate the transition to the use of the new model of crop protection to farmers.

- **Task D5.1 Awareness raising**

This task has intended to raise awareness about the current problem that exists related to the high use of chemical pesticides. This activity has aimed at all the key actors: users (farmers, agricultural cooperatives and agro-industries), public administration (regional, national, European), marketers of plant protection products, marketers of food and consumers.

The progress indicator included in the proposal for this task was one awareness raising event per year but this objective has been already been exceeded, with 17 events throughout the project and more than 730 assistants.

It is remarkable that LIFE AGROintegra has actively supported in celebrating the 25th Anniversary of the LIFE Programme (21 May 2017). Two Project Open Days were held in June with the occasion of communicating to relevant stakeholders and general public: the final results of AGROintegra in vineyard (Olite, 6 June 2017), with the collaboration of LIFE FITOVID; and vegetables and fruits (Cadreita, 20 June 2017). These events also helped to inform people about the 25th Anniversary and the considerable achievements of the LIFE Programme. The links of the two events programme were available on the website of the project:

https://agrointegra.eu/images/pdfs/2017_06_08_JornadaViaAGROintegraFITOVID.pdf

The events were also registered on the dedicated website for the 25th Anniversary of LIFE (www.life-25.eu).

In June 2015 the Deliverable D5.1 Instrumentos promocionales AGROintegra (Promotion Materials AGROintegra) was delivered and it was attached to the MTR, consisting of 300 pens with USB. The distribution has been done mostly at the final events, with results and key information included in its USB.

Another promotional/awareness raising tool has been the Professionalization kits for collaborating farmers, Deliverable D5.4 Kit de profesionalización de los agricultores (Professionalisation kit for farmers), produced at the beginning of the project and submitted with the IR. So far 50 kits have been distributed.

- **Task D5.2 Advice**

This task has comprised the IPM advice to farmers, agricultural cooperatives and agro-industry. In addition, advice has been also provided to decision makers on the implementation of the National Action Plan on sustainable use of pesticides and its updating and continuous improvement will be promoted.

The advice provided has included the following means:

- Online, through the website.
- Via phone or email.
- In person, through on-site visits.

In April 2015 Deliverable D5.2 *Protocolo de asesoramiento (Advice protocol)* was released and submitted with the MTR. However, INTIA provides IPM advice to farmers since the beginning of the project through its Technical Assistance to Farms service, in its role of IPM advisor entity, designated by the GN. The attention to requests of this service includes specific advice on plant protection - biological control, as well as in other fields directly related to the IPM, such as the establishment of the crop - choice of seeds and plant material, fertilization, irrigation, techniques of cultivation (padding etc.) or mechanization and tilling, as well as removing crop residues.

In addition, the control of voles (*Microtus arvalis*) began in 2014, with the idea of developing a specific warning system that would in the future be integrated in the AGROintegra DST. The total number of IPM advice request since the beginning of the project has been of 24,009. IPM advice is essential to broaden the IPM use by farmers. The regional government support this action to promote the new production model towards IPM. *Technical annex 28* includes a policy brief with recommendations for policy makers on measures to increase the application of the techniques evaluated by the project and their potential impact.

**Task D5.3 Training**

Activities framed in this task were addressed to those agents who had to acquire and update their knowledge in relation to the sustainable use of plant protection products (farmers, technical advisors and distributors of pesticides), and has included face-to-face and online courses, through the training platform of INTIA.

Since both the GN and INTIA usually perform training courses which allow users, distributors and advisors acquire and update their knowledge in relation to the sustainable use of pesticides and IPM, Deliverable D5.3_1 *Programa de Formación* (Training program), was developed on-time and submitted with the IR, containing all the information on IPM related courses. In addition, a specific training programme for the LIFE AGROintegra EA and DST will be developed in the After LIFE period and new training and dissemination sessions will be done once new versions are available.

On the other hand, the training activities carried out and the number of attendants per target group shows that at least 6,466 participants have attended the different training events, including at least 1,323 farmers, 1,053 technicians and 25 students.

In addition, as a transversal activity to all Dissemination Actions of the project, a database of key stakeholders and target groups has been built, which is being regularly updated. It currently has 406 contacts, including persons that have been registered for the Newsletter or that have attended LIFE AGROintegra events, although LIFE AGROintegra communications reach a much higher target group since partners disseminate to their own contact DDBBs (over 4,000 contacts), which have not been integrated to the LIFE AGROintegra DDBB due to personal data protection issues.

### 4.3. Evaluation of Project Implementation

The following table comprises a summary of the project progress indicators and their level of achievement by the Final Report:
<table>
<thead>
<tr>
<th>Action (Tasks)</th>
<th>Foreseen in the revised proposal</th>
<th>Achieved by 30/06/2017</th>
<th>Evaluation</th>
</tr>
</thead>
</table>
| A.1 | Number of actors included in the Action Group: 6  
- Number of informative sessions organized: 1  
- Number of biopesticides identified: 5 | Number of actors included in the Action Group: 14  
- Number of informative sessions organized: 15  
- Number of biopesticides identified: 63 | Planning surpassed |
| B.1 | Demonstrations carried out correctly on the planned each season: 90%  
Agricultural farms transformed Explotaciones: 3 (Sartaguda, Ilundain and Baretón)  
Reducing the use of pesticides in the demonstrators: 30%. | Demonstrations carried out correctly on the planned each season: 94.74% (first season); 100% (second season)  
Agricultural farms transformed Explotaciones: 3 (Sartaguda, Ilundain and Baretón)  
Reducing the use of pesticides in the demonstrators: 45% chemical phytosanitary products in kilos | Planning surpassed |
| B.2 | Number of risk maps on pests/diseases/weeds: 5  
Number of pests/diseases/weeds for which the risk have been defined parameters: 10  
Number of crops for which available IPM control measures have been gathered: 5  
Number of cultivation guides developed: 10 | Number of risk maps on pests/diseases/weeds: 12  
Number of pests/diseases/weeds for which the risk have been defined parameters: 56  
Number of crops for which available IPM control measures have been gathered: 64  
Number of cultivation guides developed: 10 | Planning surpassed |
| B.3 | Farmers participating in the validation: 20  
Plots participating in the validation: 100  
Preliminary validation reports per crop drafted: 5 | Farmers participating in the validation: 90 (44 in the first season and 46 in the second season)  
Plots participating in the validation: 483 (203 in the first season and 280 in the second season)  
Preliminary validation reports per crop drafted: 5 | Planning surpassed |
| C.1 | Number of environmental indicators measured in M6: 8  
Number of environmental indicators measured in M36: 8 | Number of environmental indicators measured in M6: 8  
Number of environmental indicators measured in M36: 8 | Progress according to plan |
| C.2 | Number of socio-economic indicators measured in M6: 16  
Number of socio-economic indicators measured in M36: 16 | Number of socio-economic indicators measured in M6: 18  
Number of socio-economic indicators measured in M36: 18 | Planing surpassed |
| D.1 | Number of visits to AGROIntegra website: 100 visits/year | Number of visits to AGROIntegra website: 15,116 visits since the beginning of the project | Planning surpassed |
| D.2 | Number of information panels displayed: 50 | Number of information panels displayed: 50 | Progress according to plan |
| D.3 | Number of Layman reports distributed (incl. downloads via web): 50 | Number of Layman reports distributed (incl. downloads via web): 100 | Planning surpassed |
| D.4 | Number of flyers distributed at the end of the project (incl. downloads via web): 500  
Number of publications: 2 per year  
Number of interviews: 1 per year  
Number of articles/appearances in media: 1 per year  
Participation in seminars and conferences: 1 per year | Number of flyers distributed at the end of the project (incl. downloads via web): 1.400  
Number of publications: 61 since the beginning of the project  
Number of interviews: 11 since the beginning of the project  
Number of articles/appearances in media: 2  
Participation in seminars and conferences: 43 since the beginning of the project | Planning surpassed, except for the number of articles/appearances in media, which were replaced by the creation of own videos (two films have been produced so far). |
4.4. Analysis of long-term benefits

4.4.1. Environmental benefits

The current model of crop protection used in Europe, based on the chemical control for the control of pests, diseases and weeds entails a high environmental risk. Bad practices in the application of chemicals on crops, highlighting the high use of chemical products applied to great pressure, causes the contamination with residues of these pesticides on soils, air and waters, both surface and groundwater, and causes harmful effects on wild fauna and flora.

The reasons causing the chemical control to be the most used model are of different nature and are exposed below:

The fundamental reason is due to technology: the application of pesticides is, today, the technologically simplest solution to be applied on crops. As a consequence, widespread and preventive treatments of pests, diseases and weeds are still the most common choice. Besides, in recent decades the chemical industry has responded this demand of the farmers by delivering very effective plant protection products to the market at a reasonable price. The fact of the matter is that the use of chemical protection products among farmers has widespread, sometimes being excessively used.

There are also social reasons: 1) The lack of awareness of the farmer of the high degree of environmental and human risk associated with these products, 2) the general ignorance of the existence and viability of other more sustainable alternative pest control techniques and 3) the inertia of the market, are the reasons that have led to chemical products to be the most commonly choice for crop protection. Moreover, the increasing use of these chemical products causes that the environmental problem is attaining a greater magnitude in Europe. Finally, there is an additional reason related to the legislation on the use of pesticides on crops. The Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 (DUS) specifically regulates the use of these chemical products, to be precise.

The DUS establishes a framework to achieve a sustainable use of pesticides by reducing the risks and effects on human health and the environment, and the promotion of the integrated management of pests and alternative approaches or techniques such as non-chemical alternatives to pesticides. This DUS adopts all necessary measures to promote low pesticide pests management, giving priority, whenever possible, to non-chemical methods, allowing professional pesticide users to choose practices and products, from among all those available to treat the same pest problem, that pose minimal risks to human health and the environment.

However, the DUS leaves upon each Member State the responsibility for the development of National Action Plans (PAN) explaining how to implement different techniques to achieve the sustainable use of pesticides. At the same time, regional administrations (Autonomous Communities in the case of Spain) must provide the ways and means for the implementation of the action plans within its area of operation.

Regarding the Spanish Action Plan, the main problem is that alternative procedures are not being promoted enough to achieve more sustainable use of pesticides. In this context, the LIFE AGROIntegra project has been clearly focused on achieving the objectives 1, 2, 3, 4 and 5 of the Spanish Plan of Action, through 1) the creation of appropriate tools for the compliance of the DUS, 2) demonstration of the effectiveness of other pests management
techniques and 3) approach of these techniques to farmers and other stakeholders involved in the crop protection.

The LIFE AGROIntegra project addresses the following environmental problems associated with the use of plant protection chemical products:

- The misuse of pesticides, as well as its overuse can cause water, soil and air pollution due to chemical substances, with the consequent adverse effects on wild fauna and flora, and in general a loss of biodiversity. Environmental pollution can also occur both during the application of the chemical products or after it, during the cleaning of the equipment or due the uncontrolled or illegal disposal of pesticides or their containers.

- According to the European Organization of distributors of water, the pollution by pesticides of the water not treated is very high in land low rivers. In fact, a high percentage of that pollution exceeds the threshold value of 0,1 µg/l, in which case the water has to be treated to remove excess pesticide before it can be distributed as drinking water. The risk of pollution of surface water and groundwater requires from the competent authorities continuing efforts of control and a high understanding of the process, taking into account the time scale of the polluting and the long process of recovery. Therefore, strict monitoring of compliance with the legislation developed to minimize such risks is essential.

- In addition to this, a very important effect of misuse of these products is the risk to human health, especially for the applicator of these chemical products (farmers).

The main conclusion derived from this problem is that currently chemical pesticides are used regularly on a non-sustainable way in European agriculture, while more sustainable alternatives exist. Specifically, reducing the use of pesticides through IPM is regarded by the Commission as the only existing means to achieve a reduction of the environmental risk derived from chemical product based plant protection.

On the basis of the existence of research studies that guarantee that these technical alternatives, corresponding to the integrated pests management are viable, the present AGROIntegra project was envisaged to demonstrate its viability from the technical and economic point of view for different biotic agents and crops.

Once the technical and economic feasibility of IPM is demonstrated, LIFE AGROIntegra project final results have contributed to promote the use of this strategy to maintain a prosperous, competitive, profitable and safe agricultural sector that guarantees respect for the environment through a sustainable production model compatible with the use of plant protection.

The expected impact for the LIFE AGROIntegra project, at demonstration level in 2,000 farmers in Navarra, has been a 45% reduction of the tons of chemical pesticides in fruit trees, vineyard and vegetables used, against the conventional system prior to the beginning of the project. The reduction of the tons of chemical insecticides has been of 87%. In addition LIFE AGROIntegra envisages that 44% of the plant protection products used will be of low impact.

4.4.2. Long-term benefits and sustainability

a. Long-term / qualitative environmental benefits:

LIFE AGROIntegra project provides huge direct environmental benefits on the long term in the agriculture sector and indirect environmental benefits in the agri-food industries that depend on the agricultural production, both at local as global level, since it has allowed to
demonstrate the technical and economic feasibility of the IPM minimizing the environmental impact derived from phytosanitary treatments employed in the conventional agriculture.

The main potential of the AGROintegra project on the long term is based on the design of advisory tools and the development of dynamic IPM strategies that integrate the technical knowledge and technological innovation, involving at pilot level in Navarra different key stakeholders along the value chain (farmers, cooperatives, agro-industry and public administrations).

The final results of the project will allow to directly promoting the objectives of the Environment Action Programme of the European Community, that foresees the adoption of seven thematic strategies, one of them being the sustainable use of pesticides, which subsequently has been developed at Community level, through Directive 2009/128/EC, on the promotion of the sustainable use of pesticides.

In addition, thanks to the AGROintegra DST (HAD AGROintegra), the objectives of the European Common Agricultural Policy of cross-compliance in agricultural holdings, incorporates good agricultural and environmental practices and legal and management requirements, as well the ones of the policy of integrated production products (PIP), which encourages the various actors involved in all phases of the product’s life cycle to achieve the reduction of the environmental impact of agricultural activity.

In the light of the results obtained and provided to medium and long term, it is possible to say that LIFE AGROintegra project has contributed and will contribute in the future to improve environmental problems (pollution of water, soil and air by chemicals, and risk to human health), through the efficient and proper use of the available resources helping to reduce the use of pesticides, optimize and improve their application as well as promoting their substitution by more environmentally friendly alternatives to the environment.

b. Long-term / qualitative economic benefits:

The main long-term benefit derived from AGROintegra will be to verify that alternatives to chemical pesticides for crop protection (biopesticides, natural enemies, pheromones for mass trapping and mating disruption, etc.) are viable, not only technically but also economically, which will boost their implementation by the sector. To do this, the transfer of the results at real scale field demonstrations is essential, since the required initial investment in these new IPM techniques and the initial uncertainty of their effectiveness compared to the conventional system, highlight the difficulties associated with its introduction in the agricultural sector. However, the widespread use of products and materials required for the implementation of the technical proposals can do that its price will be reduced in the medium term, while ways of financing these materials can be considered, as well as strategies to optimize their use, that may facilitate its implementation. In addition, greater knowledge of the implementation of these techniques by farmers will reduce the initial costs and the reluctance of the implementation of the most innovative techniques.

On the other hand, from an economic point of view, relying on an advanced and comprehensive pests management and plant protection tool, which also serves as an adaptation tool to possible changes that may occur in the environment, is a technological breakthrough that will undoubtedly cause an important economic impact on the agricultural sector. At this point it is important to highlight that the reduction of pesticides use in itself, without alternatives to their use, would represent a problem that could lead to the decrease of
between 30 and 50 per cent of the production of wheat, cereals, fruits and vegetables. Furthermore, incomes of farmers and the food sector of the European Union would be reduced by 10,000 million euro and total loss of welfare in the EU would reach 45,000 million euro. It is therefore essential to put at the disposal of farmers both alternative measures and information necessary for a transition to an IPM model.

c. Long-term / qualitative social benefits:

From the social point of view, it should be noted that without socially equitable and economically viable agriculture, the maintenance of the environment and the rural population is not possible, with the consequent impact that this entails for the environment and the society. It is also noteworthy that following the completion of the project, the health of farmers will be better protected, since AGROintegra has helped to reduce the risks associated with the use of pesticides on crops. This fact will be of particular relevance to farmers who directly apply plant protection products. It also should be noted the greater protection of consumers of agricultural products of zero residue in food thanks to the IPM aimed at the sustainable use of pesticides on crops.

AGROintegra, through field demonstrations, has made a key awareness raising effort, addressed both to farmers and to technical advisors, on the feasibility of performing a transition towards more environment-friendly and sustainable agricultural production systems. In this sense it has been verified that there is a high interest in acquiring knowledge on new crop protection techniques aligned with the DUS and its application; because of the higher awareness is expected in the medium-long term in the agriculture sector, which should contribute to increase the benefits to be achieved in the After LIFE period of the project.

Finally, this project will promote the creation of specialized jobs in the rural environment, as well as the professionalization of the farmers, since it will be necessary to have the knowledge and the necessary technical advice for the implementation of the new model of integrated crop management.

d. Continuation of the project actions by the beneficiary or by other stakeholders:

In relation to the continuity of the project actions beyond its end, thanks to the existing cooperation among the different actors of the project, a platform or dynamic of working groups to coordinate the activity of experimentation and advice in the integrated management of pests in Navarra has been proposed that therefore intends to give continuity to the structure of the work in the LIFE AGROintegra project, enriching it with the option to participate in other agents such as the university, producers, etc. (See Plan de comunicación after LIFE – After LIFE communication Plan).

In addition, IPM tools that are available at the end of the project, i.e. the collaborative EA AGROintegra and IPM Cultivation Guides will make possible a wide deployment to the new model. These tools will transmit reliable information to farmers, which will be dynamic in space and time, so that they can carry out integrated management of their crops with recommended control actions.

Finally, the advisory system based on the Decision Support Tool (HAD AGROintegra) will facilitate the decision-making to the farmer, as it offers personalized recommendations on integrated pests management for a specific plot and a specific moment of the agricultural season.
4.4.3. Replicability, demonstration, transferability, cooperation

AGROintegra project has had a clear demonstrative character since its main objective has been to foster in a practical way the transition of agricultural and agro-industrial production from the current pesticides based crops protection towards an integrated pests management.

Within this project two different aspects of the real scale demonstrations have taken place:
- Alternative techniques of crop protection with IPM techniques.
- Operation of the EA and DST AGROintegra.

**Alternative crop protection techniques**

The first action of implementation of the project (B1) has carried out a series of experiences (trials, demonstrations and farms transformations) using alternative means of protection and integrated management, for the reduction of the use of pesticides in crops.

**Full-scale field demonstrations** have allowed demonstrating the viability of alternatives to conventional chemical pests control means, proposing solutions to the most important problems and evaluating its technical and economic efficiency.

Thus, this action has allowed the rapprochement between the specialists in the development of new means of pest management and the users (farmers, cooperatives, food industries, services, etc). At the same time this action has fed with practical references, in a dynamic way, the EA AGROintegra and the advisory system (DST).

In addition, LIFE AGROintegra has begun transforming to the IPM model three experimental farms of reference in Navarra region to show the feasibility of the transformation of agricultural holdings as a whole towards the proposed IPM model, as representative of the most significant European agro-ecosystems.

This action has been carried out at real scale in order to get representative information for the selected crops, with the collaboration of farmers and technicians. Thus, depending on the crop demonstrations, they have been held on the scale considered representative, allowing determining if the process is technically and economically feasible, as well as establishing the optimum operation parameters. **The conclusions derived from these pilot experiences have been valid on an industrial scale in European crops**, based on data collected in plots where the demonstrations have been carried out. **Environmental indicators** that have been measured in the demonstration to verify that the IPM model was effective and make reference to the use of biopesticides, plant protection products and preventative measures used for each crop / pest / agricultural season, as well as the pests and diseases controlled, as it is detailed in Action C1.

**Functioning of the Decision Support Tool (HAD AGROintegra)**

To ensure the demonstration character of the project and its impact on agricultural activity, within AGROintegra a number of collaborating farmers have played a key role. Specifically, as defined in action B3, a total of 483 plots of at least 5 different crops and with the participation of at least 90 farmers from cooperatives and agro-industries have validated the tool.

**This validation guarantees the transfer and replicability of the use of the DST (HAD AGROintegra)**. This implementation and its use as a pilot has allowed validating the tool and
improving it thanks to the tests performed along the project. In this way, it has become a tool available to the sector at the end of the project, which in turn will evolve and respond to future requirements that take into account the progress of the technologies.

From the demonstrative experiences that are underway in the project it is expected to obtain solid data in terms of the viability of the generated tools, ensuring also their use in the future.

Despite the innovative character of the DST and the ambitious objectives, it should be taken into account that the experience and complementarity of the partners has ensured their attainment, as well as developments of the last years in different technologies and methodologies necessary to carry out the implementation of the tool. Also, the configuration of the DST will allow integrating possible (technological) advances that may arise in the coming years.

Therefore, once the project is closed new paths to continue with the work started will remain open, such as:

- **Mass implementation of the EA-DST (HAD AGROintegra) among farmers in Navarra and making it available for a broader scope.**
- **Direct replication in other European regions.** Although the project has conducted all studies and tests in Spain, more specifically in the region of Navarra, the results will be broaden and transferable to other regions of Spain and the EU, since, despite the differences in the type of crops and soil, a common need remains at European level on the aforementioned problem of chemical crops control. Thanks to the new skills acquired within AGROintegra project, **innovative crops protection protocols have been developed.** These protocols are available to be used at European level by other agro-industrial systems, i.e. the results of this project will be replicable in Europe.

### 4.4.4. Best Practice lessons

AGROintegra envisages that the developed pest management EA-DST (HAD AGROintegra) is a dynamic manual of a compendium of good agricultural practices in integrated pest management.

As initially planned, the aim of incorporating 200 farmers as scope of use of this tool remains. To date, users participating in demonstrations have learned significant lessons for the future:

- Need to simplify the traceability so that it is really used by stakeholders either directly or through their advisors or managers.
- Need to strengthen the alignment of AGROintegra services with the administrative requirements of agricultural policies (CAP, RDP, etc).
- Need to strengthen training, both for farmers and technical advisors, on the new IPM techniques.
- Need to enhance collaboration to share information for early detection of emerging pests.
- Need to establish protocols for validating the quality of the information obtained.

### 4.4.5. Innovation and demonstration value

This project brings innovative IPM techniques closer to farmers via practical demonstrations allowing seeing first hand their technical and economic feasibility.

The innovative character of AGROintegra is mainly based on **using new techniques and technologies available on the market for the agricultural management.** The different
available techniques and technologies have evolved and developed greatly along the last years and are fundamental to ensure the quality of the information required:

- **Geographic Information Systems (GIS).** They are a set of programs and applications that enable the management of spatially referenced data organized in a database, and that can be usually displayed in the form of maps. The EA AGROintegra is an advanced application, leading-edge on the incorporation of GIS editing at web level, which allows associating at agricultural plot level accurate and varied information from maps or images.

- **Models and decision support tools and management systems.** Recently emerging software applications capable of simulating the development of the crop, the need for fertilizers, the potential yield, the risk of damages etc. taking into account the particularities of each specific situation. The EA-DST AGROintegra allows the link with the sigAGROasesor platform which manages risks information at plot level.

- **Management of Big Data.** Traceability enables management of not individualized data for statistical analysis and collective data management.

- **Internet of Things.** The mobile geolocalization of the information at agricultural plot level and the interoperability of data and sources of information allow the incorporation of the agricultural sector to the new trends of augmented reality.

### 4.4.6. Long term indicators of the project success

To demonstrate that alternative IPM crop protection techniques are technically viable, a series of demonstrations have been run with different pests/diseases/weeds, crops and farms that allow to show the technical and economic viability of the IPM. The technical feasibility has been demonstrated through the comparison of control plots, with a conventional handling (treated with chemical pesticides) and plots with an IPM system. Indicators have been monitored and measured at the beginning and at the end of the demonstration, which reflect the results obtained with IPM implementation. Thus, monitoring of the environmental impact of the project covers the **ENVIRONMENTAL INDICATORS** listed in the description of action C1 (cf. chapter 5.1).

The economic viability of the IPM has also been demonstrated in the project. AGROintegra has shown that, while the introduction of more sustainable techniques for crop protection may have a higher cost than conventional techniques, it is the only way out to reduce the use of chemical plant protection products, since the existing chemical alternatives will decrease. In this way, the monitoring of the socio-economic impact of the project comprises the **SOCIO-ECONOMIC IMPACT INDICATORS** listed in the description of action C2 (cf. chapter 5.1).

### 5. Comments on the financial report

#### 5.1. Summary of Costs Incurred

The total costs incurred by the project partners of AGROintegra from start date to final date reaches **1.714.631 €**, being **1.712.372 €** of them eligible costs.
<table>
<thead>
<tr>
<th>Budget breakdown categories</th>
<th>Total cost in €</th>
<th>Total Eligible cost in €</th>
<th>Eligible Costs incurred from the start date to 30/06/2017 in €</th>
<th>% of total costs</th>
<th>% of eligible costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personnel</td>
<td>834,329</td>
<td>1,013,727</td>
<td>121,50%</td>
<td>121,50%</td>
<td>121,50%</td>
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<tr>
<td>2. Travel and subsistence</td>
<td>36,139</td>
<td>21,204</td>
<td>58,67%</td>
<td>58,67%</td>
<td>58,67%</td>
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<tr>
<td>3. External assistance</td>
<td>281,668</td>
<td>284,160</td>
<td>100,88%</td>
<td>100,88%</td>
<td>100,88%</td>
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<tr>
<td>4. Durable goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>21,500</td>
<td>9,020</td>
<td>5,649</td>
<td>26,27%</td>
<td>37,57%</td>
</tr>
<tr>
<td>Equipment</td>
<td>21,500</td>
<td>9,020</td>
<td>5,649</td>
<td>26,27%</td>
<td>26,27%</td>
</tr>
<tr>
<td>Prototype</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
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<tr>
<td>5. Land purchase/long-term lease</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>6. Consumables</td>
<td>275,776</td>
<td>265,995</td>
<td>96,45%</td>
<td>96,45%</td>
<td>96,45%</td>
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<tr>
<td>7. Other Costs</td>
<td>11,000</td>
<td>11,872</td>
<td>107,92%</td>
<td>107,92%</td>
<td>107,92%</td>
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<tr>
<td>8. Overheads</td>
<td>101,354</td>
<td>112,024</td>
<td>110,53%</td>
<td>110,53%</td>
<td>110,53%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,561,766</td>
<td>1,549,206</td>
<td>1,714,631</td>
<td>109,79%</td>
<td>110,53%</td>
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</tbody>
</table>

Regarding the 2% regulation, the amount of the contributions of the public organisations for the public body partners (GN and INTIA) has reached 640,470 € and is higher than 2% of the quantity related to permanent staff expenses assigned to the project that is 545,995 €. Therefore, the 2% regulation is fulfilled by the public body partners involved in the project.
## 5.2. Summary of costs per action

A summary of expenses by action from start date to final date is shown in the following table:

<table>
<thead>
<tr>
<th>Action number</th>
<th>Short name of action</th>
<th>Personnel</th>
<th>Travel and subsistence</th>
<th>External assistance</th>
<th>Infrastructure</th>
<th>Equipment</th>
<th>Prototype</th>
<th>Purchase or lease of land</th>
<th>Consumables</th>
<th>Other costs</th>
<th>Overheads</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>Preparación de protocolos</td>
<td>42.640</td>
<td>1.085</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>43.725</td>
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<td>B.1</td>
<td>Transformación a nuevo modelo GIP</td>
<td>399.553</td>
<td>7.774</td>
<td>116.368</td>
<td>0</td>
<td>21.500</td>
<td>0</td>
<td>0</td>
<td>245.826</td>
<td>11.000</td>
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<td>802.021</td>
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<tr>
<td>B.2</td>
<td>Herramientas para GIP</td>
<td>33.100</td>
<td>1.450</td>
<td>69.500</td>
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<td>0</td>
<td>17.950</td>
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<td>0</td>
<td>122.000</td>
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<tr>
<td>B.3</td>
<td>Implementación asesoramiento HAD y demostración viabilidad</td>
<td>9.000</td>
<td>0</td>
<td>25.000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>34.000</td>
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<td>C.1</td>
<td>Monitorización del impacto ambiental</td>
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<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>51.550</td>
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<tr>
<td>C.2</td>
<td>Evaluación del impacto socioeconómico</td>
<td>31.950</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>31.950</td>
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<tr>
<td>D.1</td>
<td>Página web</td>
<td>8.025</td>
<td>0</td>
<td>14.600</td>
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<tr>
<td>D.2</td>
<td>Paneles informativos</td>
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<td>4.000</td>
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<tr>
<td>D.3</td>
<td>Informes Layman</td>
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<td>0</td>
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<td>0</td>
<td>12.780</td>
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<tr>
<td>D.4</td>
<td>Acciones generales de difusión</td>
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<td>D.5</td>
<td>Promoción en Navarra del modelo GIP</td>
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<td>540</td>
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<tr>
<td>E.1</td>
<td>Gestión y seguimiento</td>
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<tr>
<td>E.3</td>
<td>Plan de Comunicación After Life</td>
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<td>E.4</td>
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<tr>
<td>TOTAL (sin overheads)</td>
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<td>36.139</td>
<td>281.668</td>
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<td>0</td>
<td>275.776</td>
<td>11.000</td>
<td>-</td>
<td>1.460.412</td>
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<tr>
<td>TOTAL</td>
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<td>834.329</td>
<td>36.139</td>
<td>281.668</td>
<td>0</td>
<td>21.500</td>
<td>0</td>
<td>0</td>
<td>275.776</td>
<td>11.000</td>
<td>101.354</td>
<td>1.561.766</td>
</tr>
</tbody>
</table>

Note: All costs are in Euro (excluding overhead costs).
### 6. Annexes

#### 6.1. Deliverables (not included)

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