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PROJECT DELIVERABLE REPORT

Deliverable 7.2: FF Management Platform fully functional and available to stakeholders

Fruit Flies In-silico Prevention & Management

FF•IPM

Project Title:

In-silico boosted, pest prevention and off-season focused IPM against new and emerging fruit flies ('OFF-Season' FF-IPM)

SFS-2018-2

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1 Summary

This report describes the technologies and services developed which make the FF Management Platform fully functional and available to stakeholders. The FF Management Platform contains archived documentation of the project accomplishments, and structured, dynamic web-based access to novel expert services. The developed FF Management Platform is a work in progress which is constantly updated with new content based on the output coming out of the FF-IPM project.

2 Introduction

2.1 Purpose and Scope

A new web-linked end-user-friendly software infrastructure (FF Management Platform) has been developed at UTH within the framework of the project. Its primary purpose is to ensure broad and lasting stakeholder-access to the new knowledge generated under WP2, and tools, technologies and services developed under WP3, 4, 5 & 6. In addition, the platform supports the technology dissemination and stakeholder training operations conducted under WP8.

The established technical infrastructure of the FF Management Platform serves as one-stop-gateway to provide public access to technical documentation and structured access to user-selected services. It consists of material accessible by the general public, stakeholders and technology end-users, and also all project-generated technology information. In addition, it has material with secure, restricted access, designed for registered end-users.

3 The FF Management Platform architecture

3.1 Structure

The FF Management Platform is a user-friendly interactive web application that provides access to the technical content the FF IPM project has created. Clear and intuitive menus provide a simple view allowing the user to searching and discover the project's available data, and not be overwhelmed by unnecessary information.

The platform was developed by the Network Implementation Testbed Laboratory (NITLAB) of the Department of Electrical and Computer Engineering at the University of Thessaly (https://nitlab.inf.uth.gr/) under the supervision of Professors Thanassis Korakis and Nikos Papadopoulos. Hosting of the platform is done on NITLAB's Cloud infrastructure which is suitable for this purpose as it manages a plethora of cloud and testbed web services. The servers are located in Volos, Greece.

The FF Management Platform is independent of the project's official website (https://fruitflies- ipm.eu) and the project's intranet, which is however, integrated and hooked in the central portal of the project. The look and feel of the FF Management Platform conforms with the official website so that the platform looks integrated and acts as a part of the ecosystem. Users can find a link to the FF Management Platform from the official website menu.

There are three main web-based components created by the project:

1. web portal,
2. intranet and

3. FF-Management Platform.

Each of the three components has a distinct role and objective, and together they comprise FF-IPM's e-presence.

The main functionality of the FF management platform is to facilitate content browsing, helping users accurately find a specific item through descriptions and keywords. A user management system allows control of access to different content according to our data sharing plan. There are user authentication menus with actions such as login, logout & register positioned at a visible spot on the navigation bar, however they are unobtrusive, allowing the main feature of the platform to be searching and navigating through the project's created content.

In general, the FF Management Platform consists of two areas:

a) The Project Accomplishment Archive for storing project accomplishments such as Technical advisory notes, Case-studies, Project publications and Research performed. Data is publicly available and searchable without requiring user login.

b) the Expert Services Catalogue for Tools & Expert services, a client-communication facility with active links to external (e.g. SME-based) expert services. This section is similar to the first one but is restricted to registered users only.

In addition, several specialized services, such as the pan-European Decision-support system alerting about FF-invasion risk (DS-Alert), the On and Off-Season IPM services (DS-VirtualFarm) and rapid taxonomic pest identification (PestID), will be made available through this site in the upcoming months.

3.1.1 Project Accomplishment Archive

The archive consists of four categories:

1. Technical advisory notes,
2. Case-studies,
3. Project publications and
4. Research performed.

The main feature while navigating dissemination data is a powerful search bar that enables the user to perform searches based on keywords and then filter out the results. In general, a keyword is an arbitrary word that represents context that is related to a search. A keyword can represent either general information (Company, Author, Title etc.) or more specific parameters like Geographical Area. It can also be any one of the four categories (Technical advisory notes, Case-studies, Project publications, Research performed). The use of keywords is intuitive when searching for something, allowing for accurate filtering of information in the database. The system automatically generates a list of related keywords each time a new item is added by the admin.

Results are listed in either alphabetical or publication date order, and each entry contains a summary, a few basic keywords related to the results and a related picture. Furthermore, all keywords in each search are listed in a small separate section, so that the user can further filter the results from a query. For example, one can search for all papers in the project publications category and then filter out keywords that are not of interest.

Upon selecting an entry from the list of results, the user is taken to a full page that contains specific information about the selected entry such as all keywords, a full description, important details, user reviews and finally links for further information. A download link is also provided.

3.1.2 Expert Services Catalogue

The catalogue consists of two categories (Tools, Expert Services) and can be protected by user authentication, which means registration and login are required for accessing page content. The same feature of a search bar is also employed here, but the keyword search has been adjusted to specific characteristics of the services being offered and to the SMEs that provide them. For example, a user can search for a specific SME that provides a specific service, or for a list of services provided by various SMEs for a specific area of interest. Clicking on a service loads a new page containing a detailed description, further details such as instructions and an external link to the service provider's URL.

3.2 Technologies used

WordPress (https://wordpress.com/) was used as the underlying content management system (CMS) platform for the FF Management Platform. Further functionality was added by incorporating stable plug-in applications. WordPress and CMSs in general, are mature technologies specifically tailored for showcasing content. They have a rich ecosystem of developers, with plug-ins created to provide system functionality including issues around security, optimization and visual design. They are a perfect match for the FF-IPM platform's functionality, which revolves around user management and displaying created content. Below, a brief explanation of what a CMS and WordPress are.

A CMS is a software application or set of related programs that are used to create and manage digital content. CMSs are typically used web content management (WCM) systems. A WCM facilitates collaborative authoring for websites and has two components: a content management application (CMA)

and a content delivery application (CDA). The CMA is a graphical user interface (GUI) that allows the user to control the design, creation, modification and removal of content from a website without needing to know anything about HTML (most of its use is drag-n-drop). The CDA component provides the back-end services that support management and delivery of the content once it has been created in the CMA.

WordPress is a free and open-source content management system (CMS) written in PHP and paired with a MySQL or MariaDB database. Features include a plugin architecture and a template system, referred to within WordPress as Themes. Areas in which WordPress excels are blogging websites, E-commerce, News, Photography and Membership to name a few. WordPress is one of the most popular content management system solutions in use globally. This popularity has led to the evolution of a rich market place in plug-ins, or supporter applications that extend the basic capabilities of the Wordpress framework.

Taking advantage of WordPress' deep plug-in architecture, further functionality was added such as:

1. **Item showcase/display:** An e-commerce plugin was used, for structured and compact display of items, modified to display documents and reading material to the user. Emphasis was placed on representing text descriptions attractively (such as summary, effects etc.) and the ability to add extra information such as guidance videos and external links. Comments for each item were enabled allowing users to rate and provide feedback. Finally, keyword management was also very important, so when an item is created, searchable keyword tags are added automatically, and can be manually edited.
2. **Search tool:** Powerful searching and filtering options are provided in order to facilitate browsing and locating a specific document fast. Keyword filtering is holistic, so that documents from different categories are grouped with a common keyword.
3. **User management:** User management was implemented to restrict access to specific portions of the site. Furthermore, hash encoding has been used to enhance password security.

4 Detailed description of the FF Management Platform

In this section, the implementation of all aspects described in the system's architecture section are demonstrated.

4.1 Home page

This is the home page (Fig. 1), the main greeting page that the user sees. As mentioned previously, the look & feel of the FF-IPM platform accords with the project's main webpage (https://fruitflies-ipm.eu/) so that the platform looks integrated, and acts as a seamless extension of the main page. Here, the user is presented with all the searchable categories.

The categories are:

1. *Tools*: Technical description of FF-IPM-developed tools
2. *Expert Services:* Technical description of FF-IPM-developed tools services
3. *Technical Advisory Notes*: Technical advisory notes on novel methods, strategies and their implementation
4. *Case Studies*: Case-study examples and generic operational scenarios
5. *Project Publications:* Copies of project publications, all published in open access format
6. *Research Performed:* Copies of project research articles

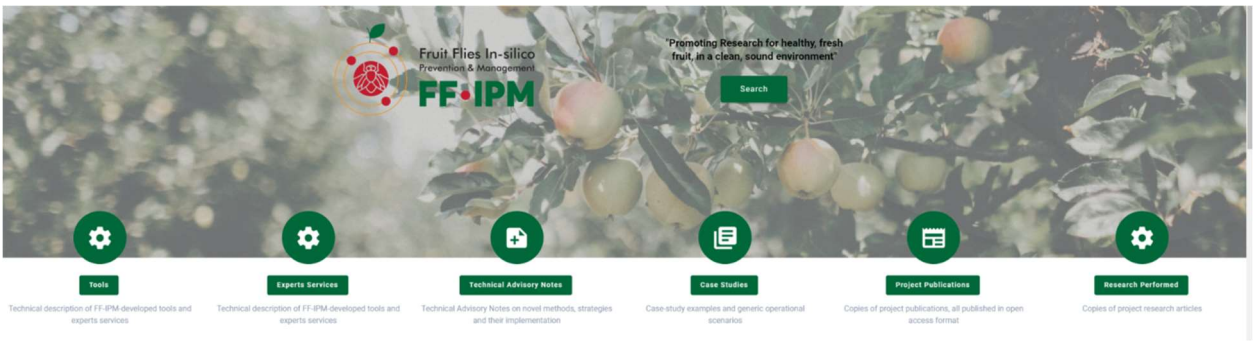

Figure 1: FF Management platform Home Page

4.2 Searching & filtering

The user can search by category or by a keyword:

- When the user selects a category to search (in this example, Project Publications, Fig. 2), they receive a listing of all related entries and a list of all related keywords is created dynamically on the left. The user can further filter the received list by specific keywords.
- A user can also freely browse all available data and filter out content based on keywords of interest (Fig. 3). For example, they can search all categories for a specific or any crop.

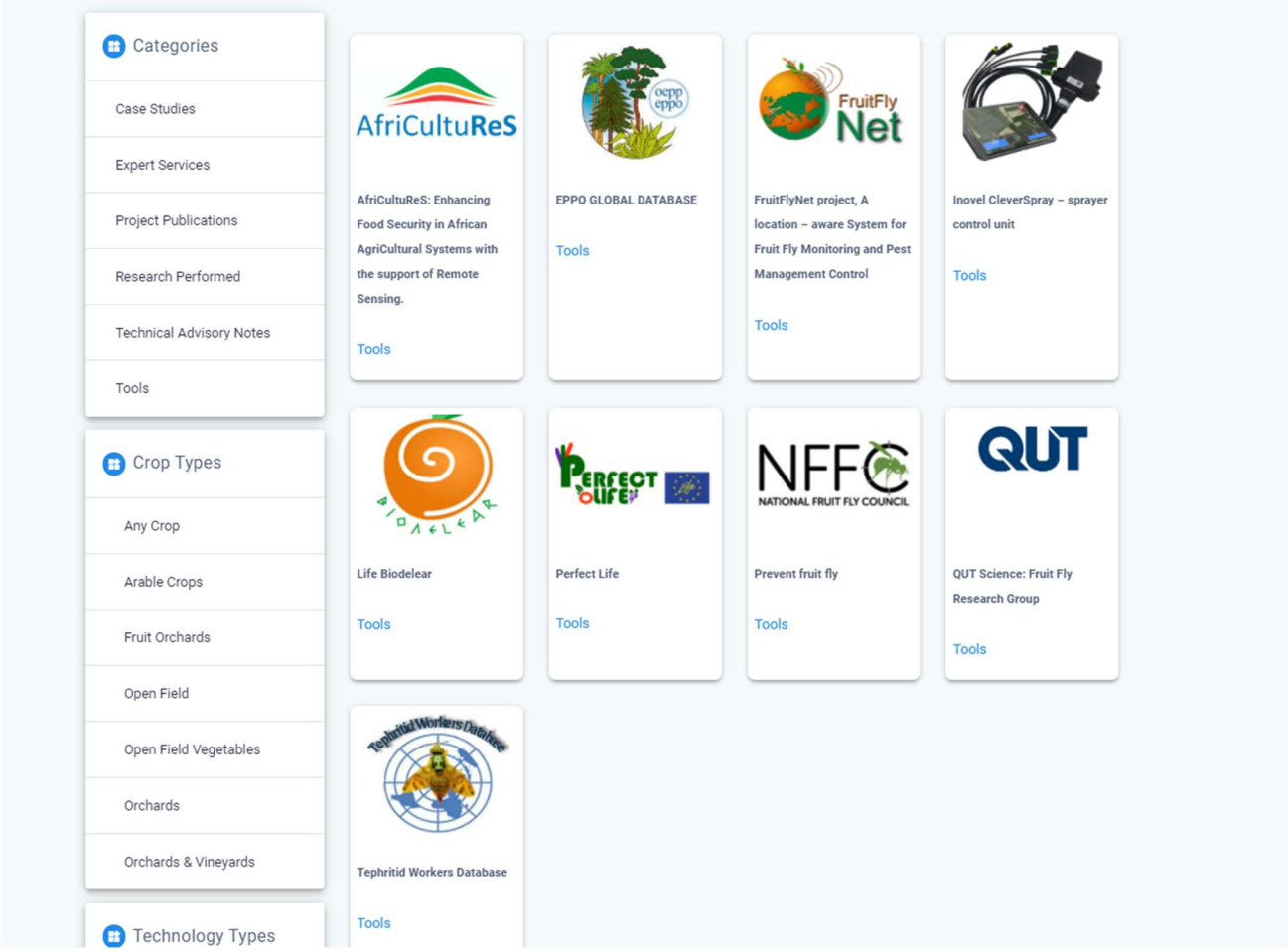

Figure 2: FF Management platform filtering results by category

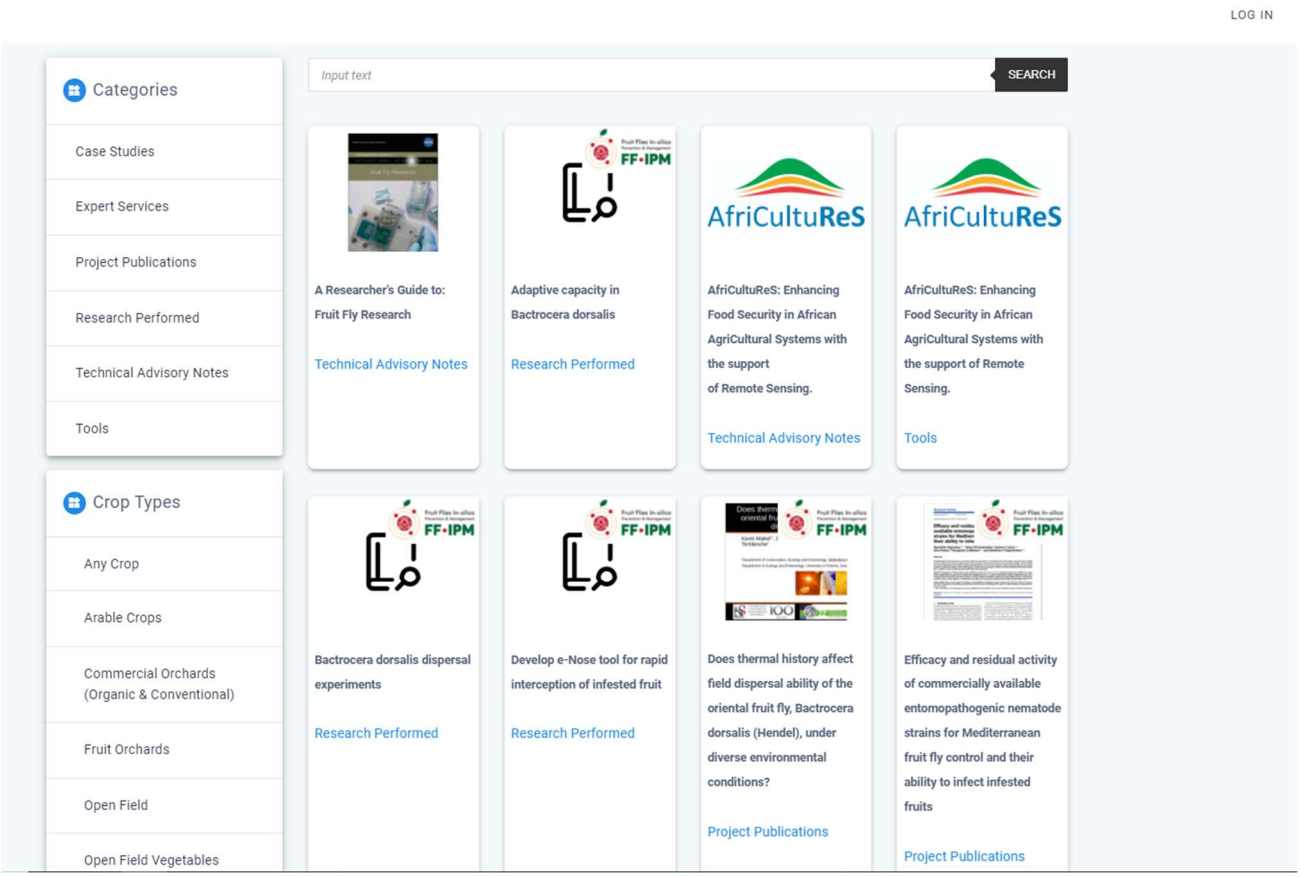

Figure 3: FF Management platform free browsing with filters on the left

Finally, after finding the document of interest the user can see a detailed description of the item, the keywords associated with it, in case they want to search for more documents with a specific keyword (Fig. 4). A download link is also provided, if applicable, as well as external links for further information. Furthermore, comments in the form of reviews and ratings are also available for the user in order to provide feedback for any document. (Fig. 5)

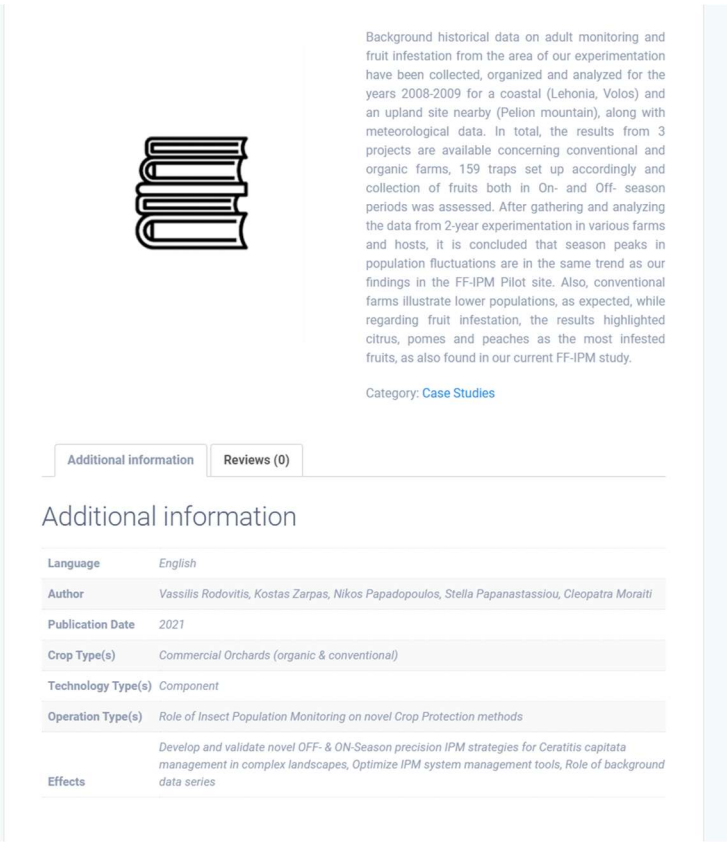

Figure 4: Description of an example technical document

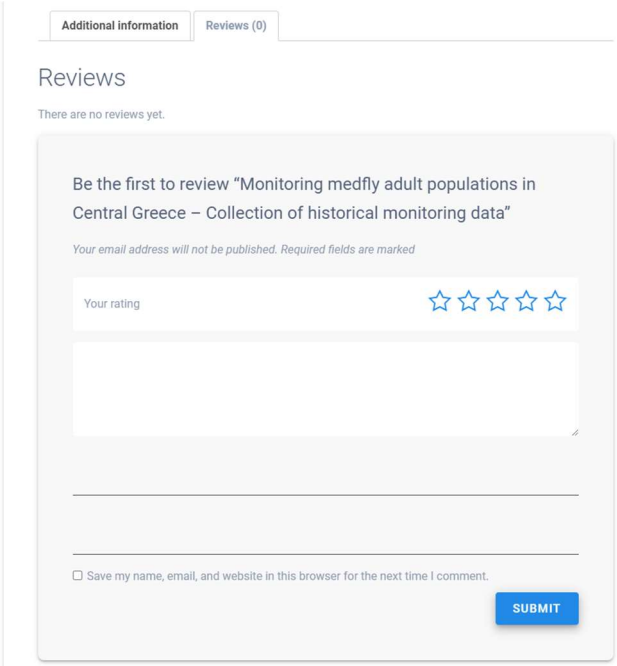

Fig.5 Review of a technical document

4.3 User authentication & authorization

Users can register (Fig. 6) on the platform providing some contact details.

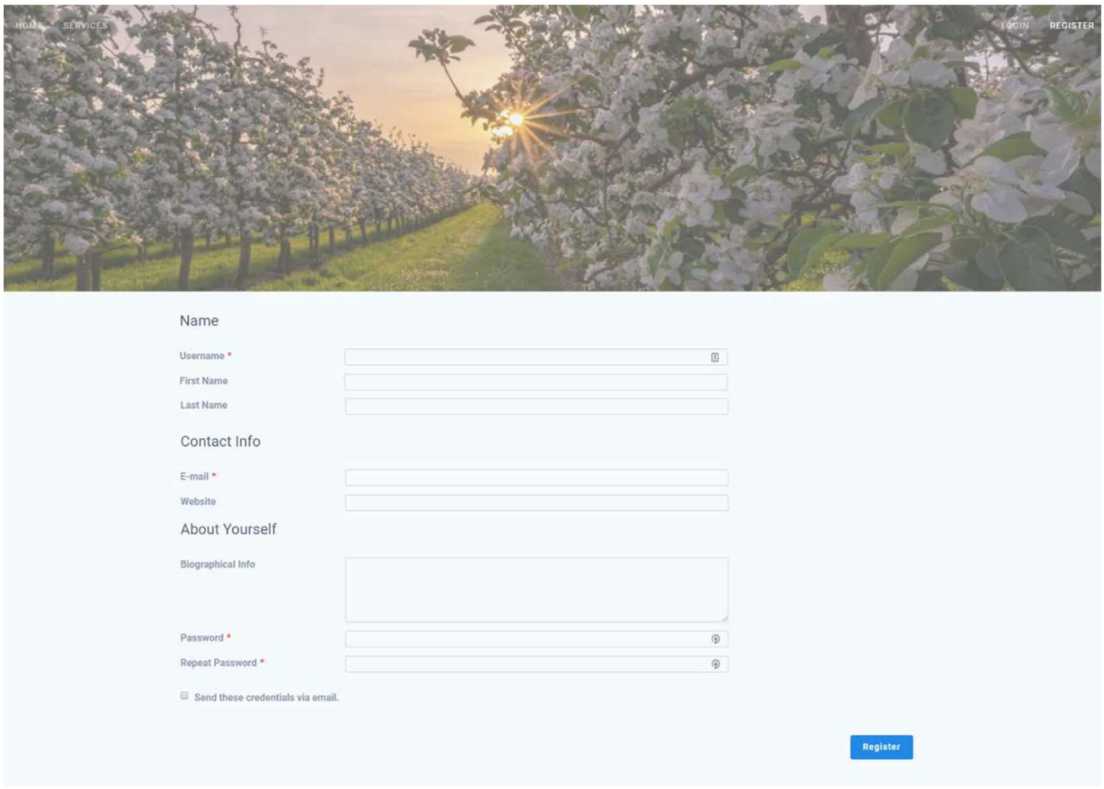

Figure 6: Register menu for new users

Existing users can simply login (Fig. 7). All ethical and governance requirements are enforced, including a GDPR notice and cookies policy (Fig. 8), as described in Deliverable 9.1.

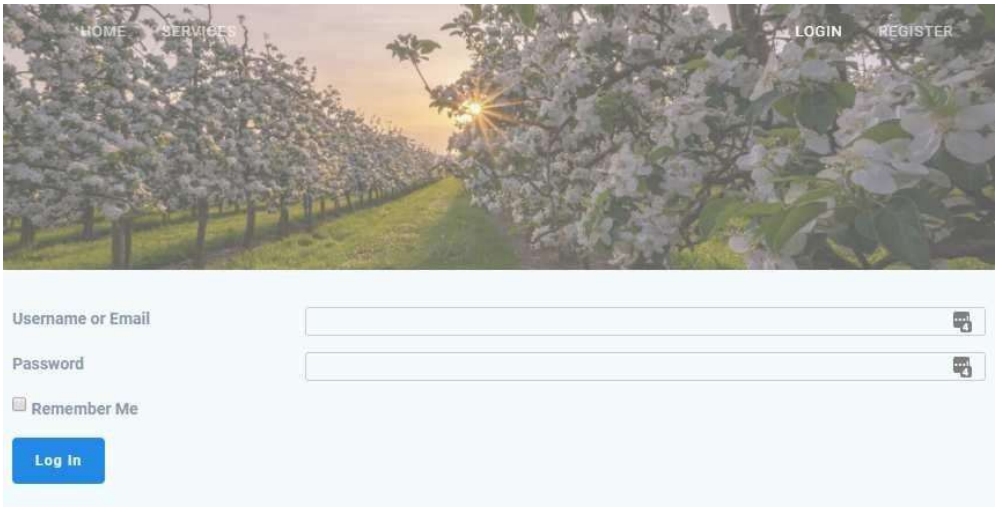

Figure 7: Login menu for existing users

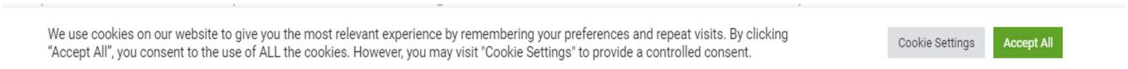

Figure 8: Cookie policy

Certain sections of the platform are available only to registered members, therefore require credentials (Fig. 8). During the registration process a user can specify which services they are interested in, thus when accessing the Services area, the appropriate content is generated.

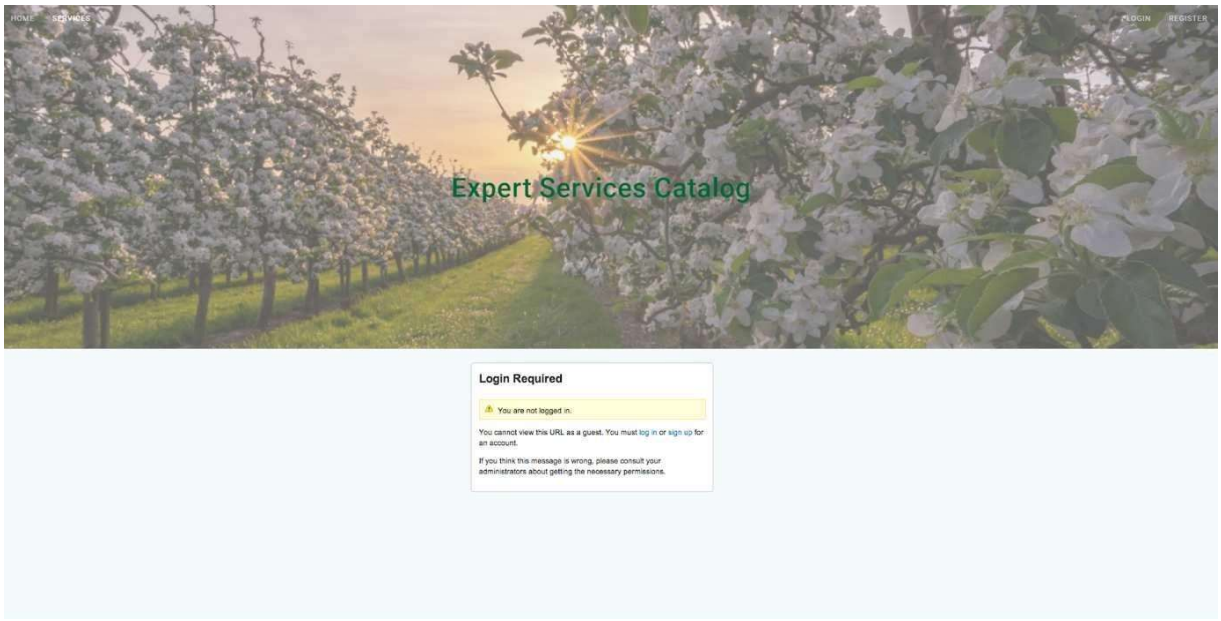

Figure 8: Restricted area

4.4 Populated Data

Following, the collection of dissemination data from FF-IPM partners each category of the FF-IPM platform was populated.

1. Tools

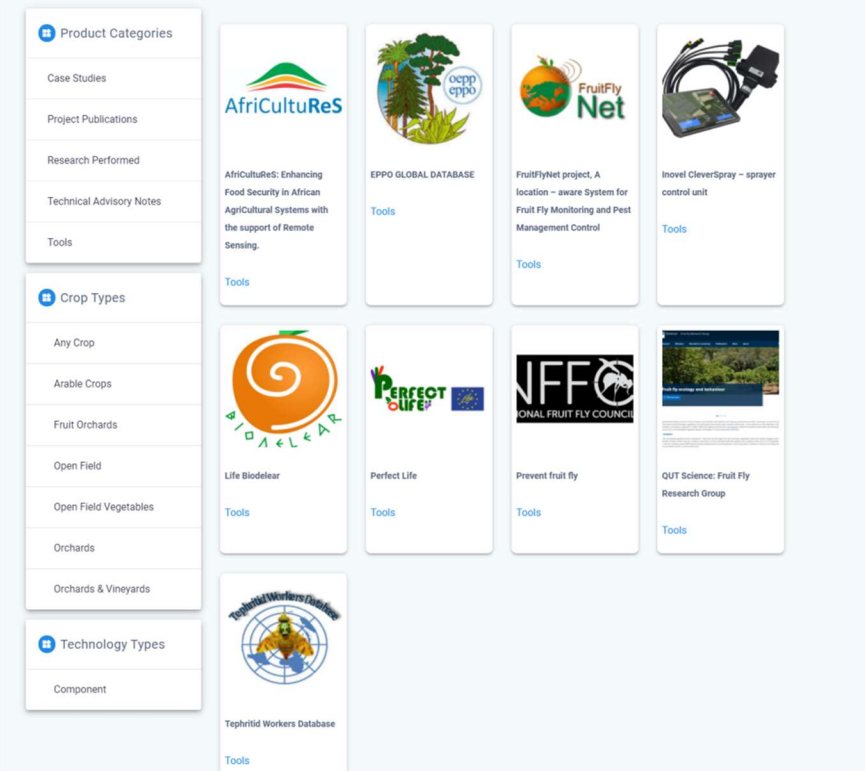

Fig. 9 Summary of "Tools" dissemination data.

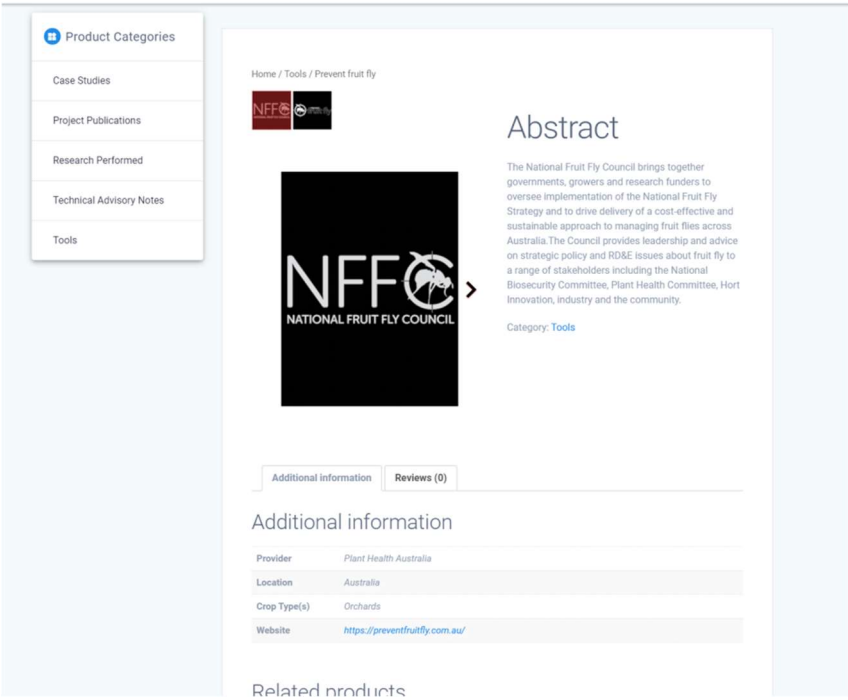

Fig.10 Instance of a dissemination entry in category "Tools"

2. Expert Services

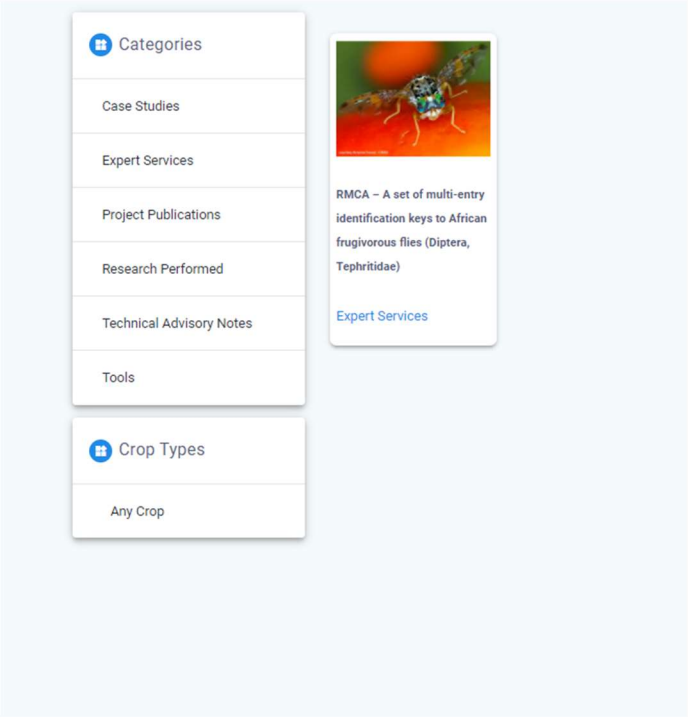

Fig.11 Summary of "Expert Services" dissemination data

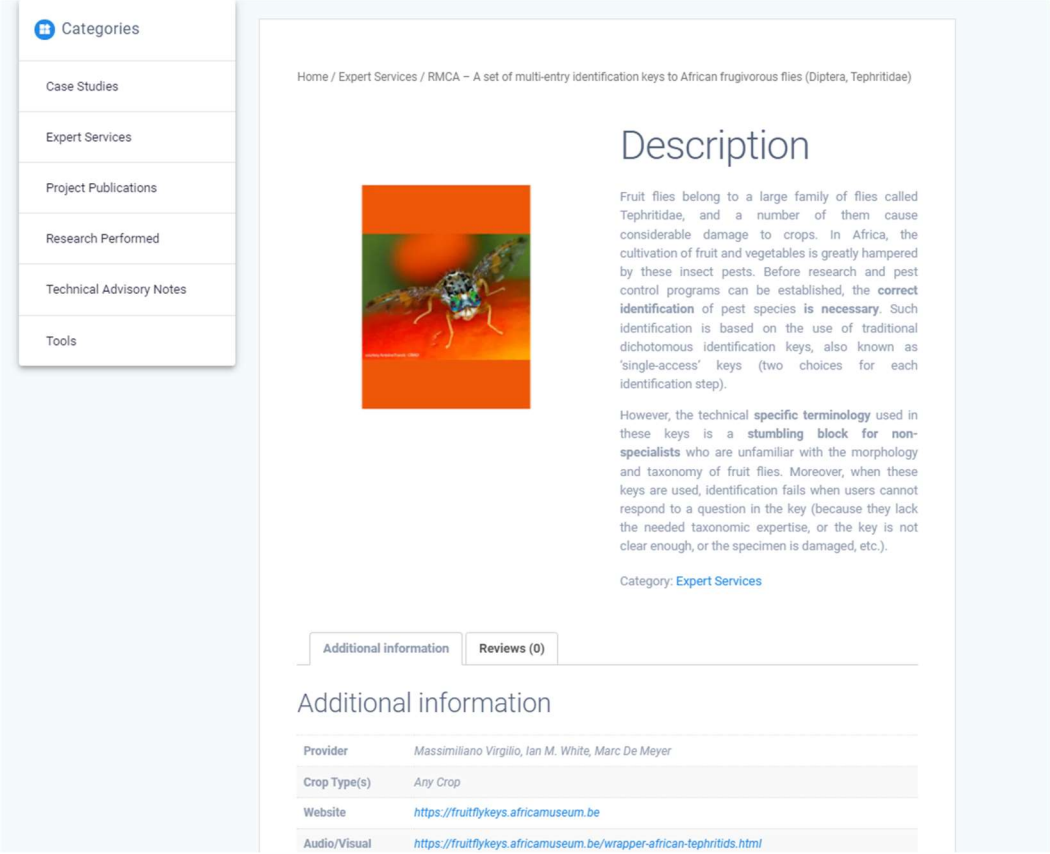

Fig.12 Instance of a dissemination entry in category "Expert Services"

3. Technical Advisory Notes

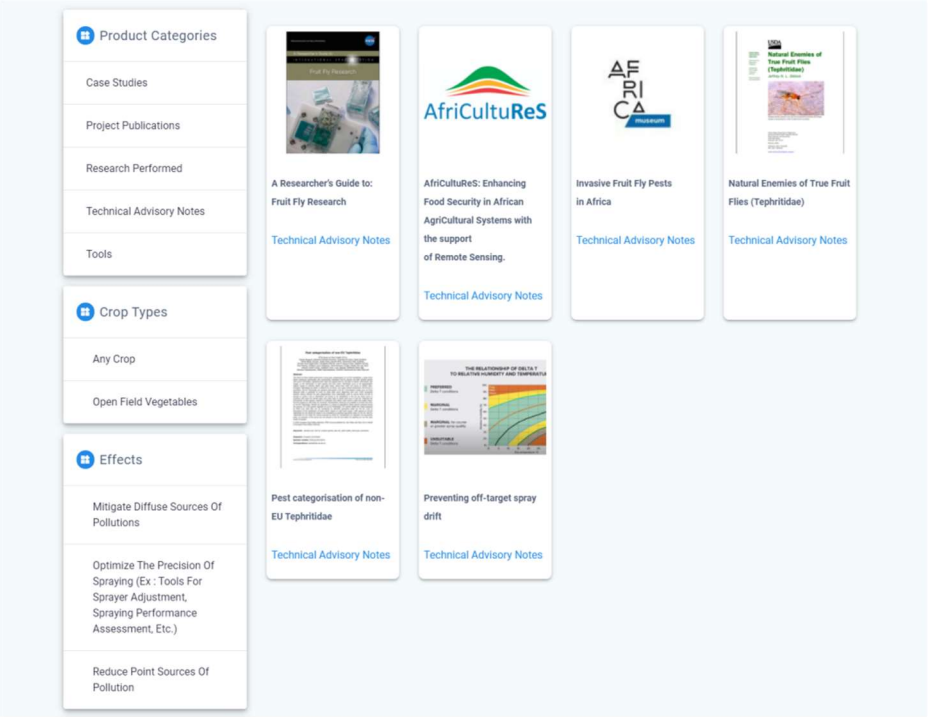

Fig. 13 Summary of "Technical Advisory Notes" dissemination articles

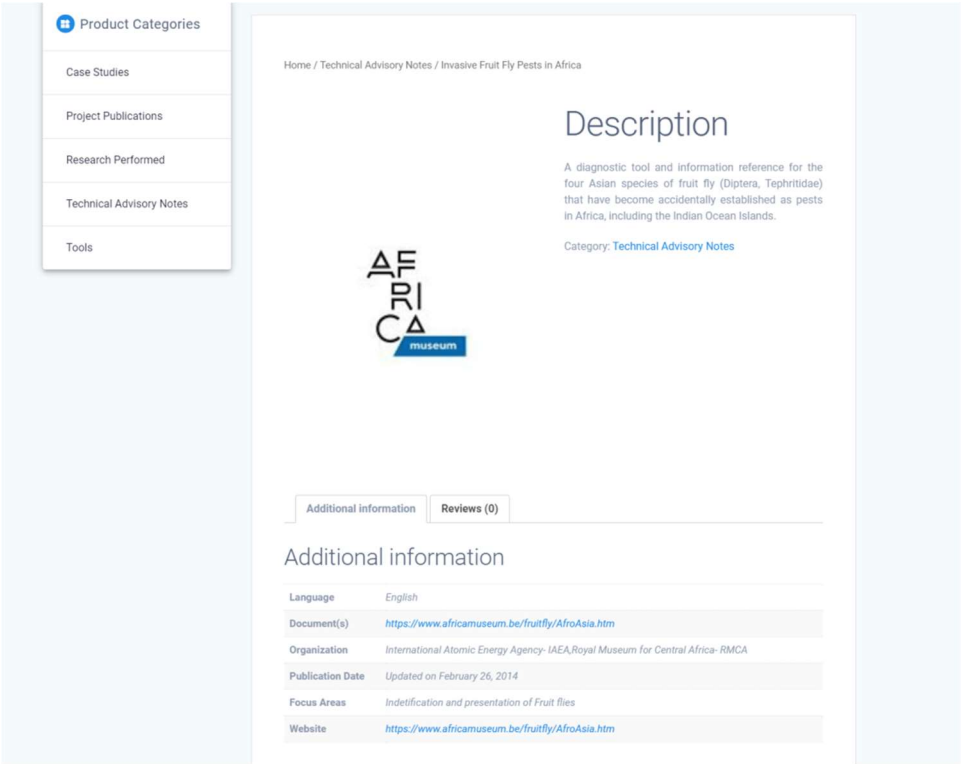

Fig. 14 Instance of a dissemination document in category "Technical Advisory Notes"

4. Case Studies

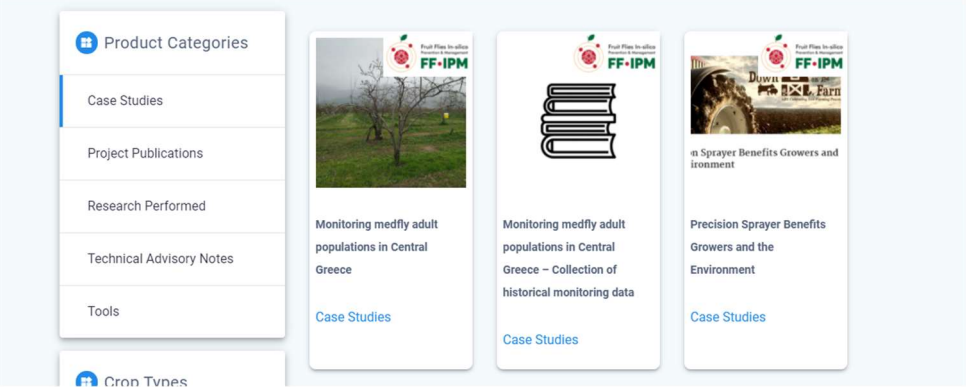

Fig. 15 Summary of "Case Studies" dissemination articles

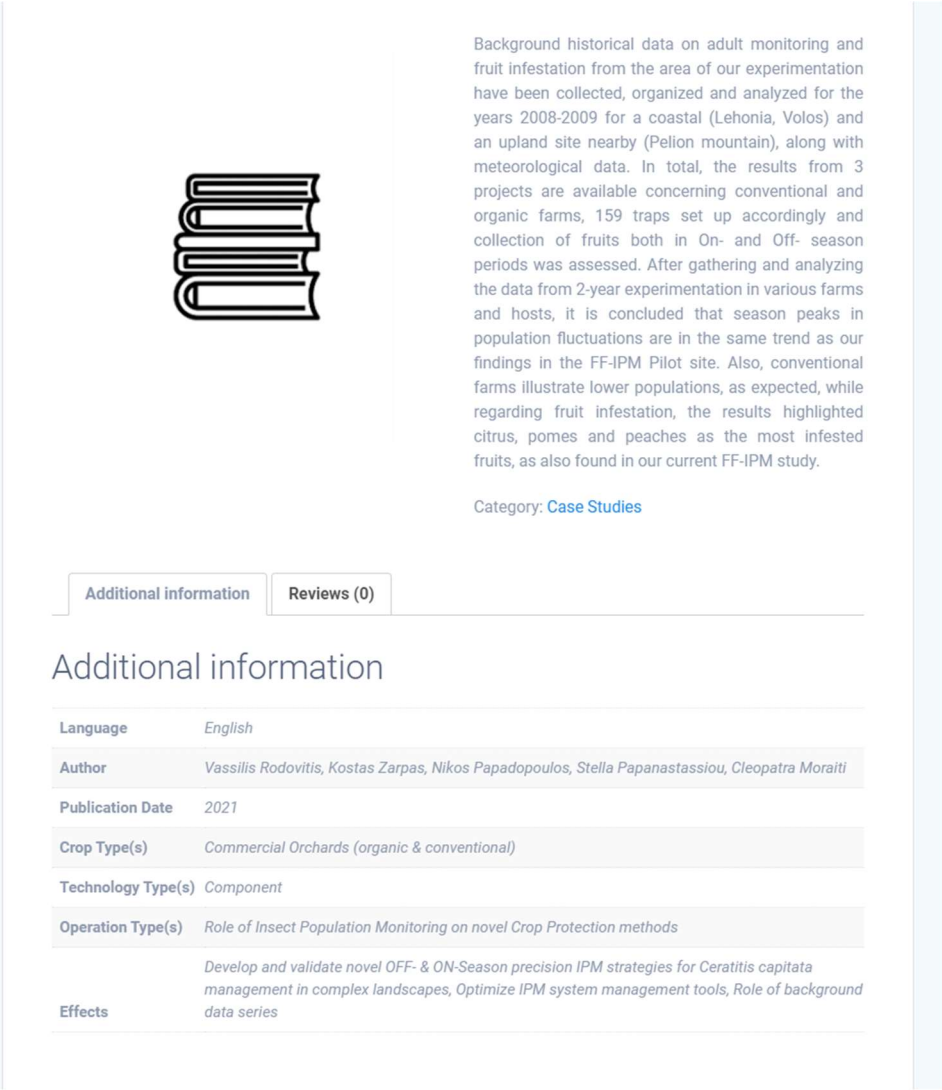

Fig. 16 Instance of a dissemination document in category "Case Studies"

5. Project Publications

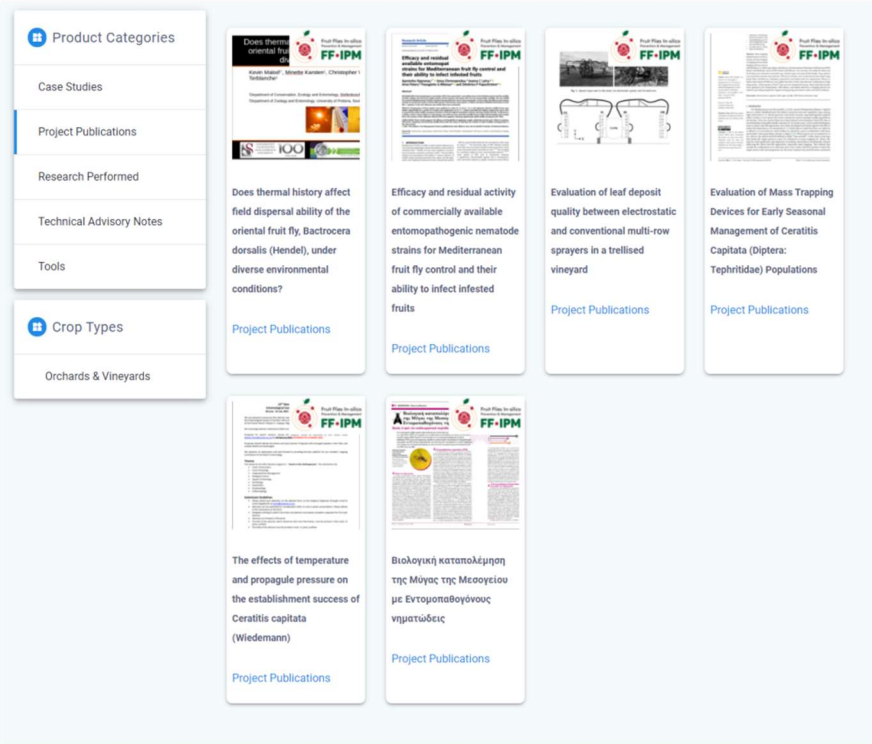

Fig. 17 Summary of "Project Publications" dissemination articles

Fig. 18 Instance of a dissemination document in category "Project Publications"

6. Research Performed

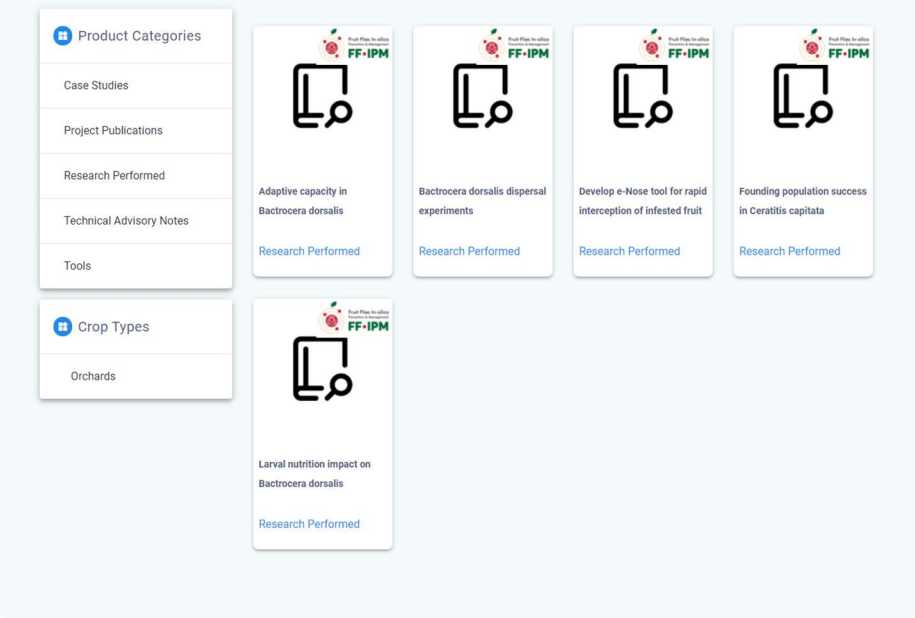

Fig. 19 Summary of "Research Performed" dissemination articles

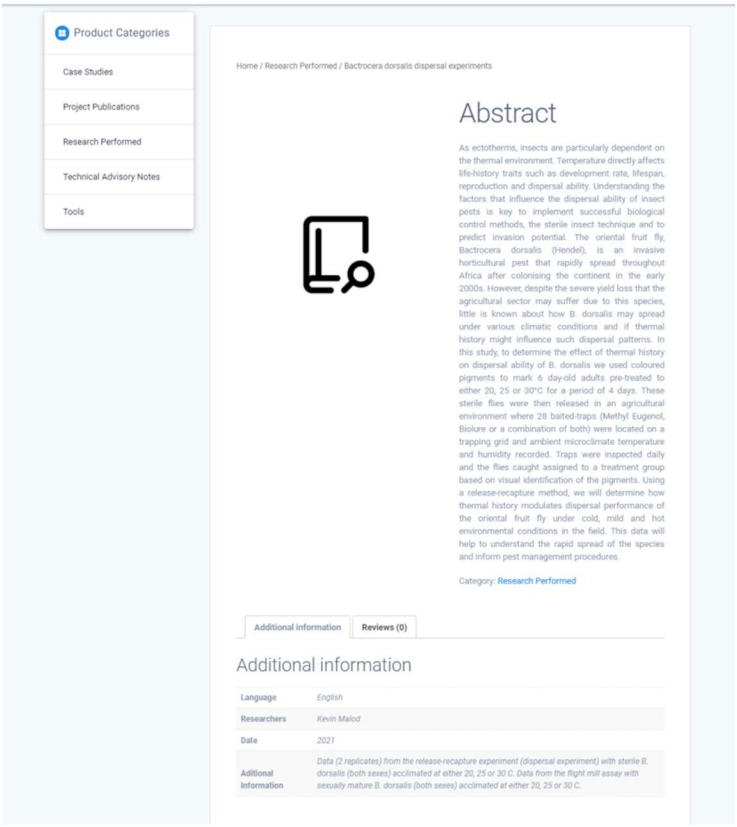

Fig. 20 Instance of a dissemination document in category "Research Performed"

5 Data Management

The data management follows the guidelines as described in the Data Management Plan – DMP (D1.1), which describes the data information that will be generated during the project and the challenges and constraints that need to be considered for managing it. The FF Management Platform follows all the procedures and manages the data as described in D1.1. Storage information and documents generated during the project will be stored on the Intranet and the Management Platform which is the all-around project management system of FF-IPM. This information, data and documents produced during the project will be protected for a period after the project completion, as is described in the Grant Agreement and the Consortium Agreement (CA) and subsequent decisions taken by the Executive Board (EB).

6 FF Management Platform sustainability

The FF Management Platform will continue its operation after the end of the project and aims to be a sustainable tool/product that will serve the specific scientific and business community. UTH is committed to continue the operation and maintenance of the FF Management Platform for at least five (5) years after the end of the project. During the next few months, a detailed exploitation plan will be developed, and will include a map of the exploitable outcomes in relation of the specific business models and the targeted stakeholders.

The FF Management Platform will integrate the novel expert services that FF-IPM will establish. It should be noted that the private companies/technology providers of the consortium will use the FF-IPM system and/or its major components to enhance and advance their product portfolios (i.e. upgrade their regular product/service portfolio and/or to develop new innovative products and services).

Exploitation Activities: The FF Management Platform exploitation strategy will be completed by a set of exploitation activities including:

1. ***identifying innovative exploitable assets***, whether these are technological components, models or added value services, which FF Management Platform will deliver through its results to its target users,
2. ***a thorough market analysis*** which will aim at the identification of the market towards which FF Management Platform is targeted, its segmentation, the positioning of current competitors and all corresponding emerging trends,
3. ***an analytical IPR management strategy*** based on the principles outlined in the project CA which will guide the joint and individual exploitation capabilities of the project partners,
4. ***defining a risk management strategy***, aiming not only at managing research, technical, financial, management, exploitation and other related risks as they appear, but mainly at proactively acting so as to avoid the appearance of these risks,
5. ***defining all possible commercial and non-commercial exploitation models***,
6. ***defining and evaluating the sustainability and viability of possible business models*** and alternative solutions that may be followed for the provision of FF Management Platform to the identified stakeholders, including licensing schemes, pricing, etc., and the corresponding tactical revisions as deemed necessary throughout its lifecycle,
7. ***establishing tactical alliances with other industrial or research organizations*** that hold the potential of promoting the FF Management platform,
8. ***establishing relationships of trust with customers early within the project***, who can facilitate the quicker adoption of the solution and provide valuable feedback which can be used in the commercialization phase,
9. ***identifying financial support*** from diversified funds that can be used to support direct and/or

indirect commercial transformation, ranging from additional research activities to bug fixing and to technology integration in existing or future solutions.

Exploitation Models: The consortium recognizes four main exploitation models for the FF Management Platform:

1. ***Commercial exploitation***, drawing on the rich set of models, individual plans will be made for exploiting different IPR, depending on factors such as the size and nature of the market opportunity, the availability of capability and interest to exploit the opportunity, and technological and investment readiness of the technology.
2. ***Research exploitation model***, which implies the re-use of the research know-how acquired in future research activities,
3. ***Technological exploitation model***, which implies the re- use of the technological know-how acquired for the development of innovative products and the provision of advanced services built on top of them, and.
4. ***Publication***, placing the knowledge into the public domain. This is suited to knowledge or tools that have clear public benefit, but which either do not require sustainable delivery, or do not have a cost-effective means of monetization to support sustainable delivery.

The exploitation models are not exclusive. For example, it is possible to licence IPR for use in a future research activity.

7 Next steps

Next steps involve enhancing the interconnections between the FF Management Platform and the SME services, as well as populating the system with content from the project. A cyclic User Experience (UX) enhancement process will be undertaken, consulting users on their experience in using the platform, undertaking enhancements, then re-testing.

8 Conclusion

The final version of FF Management Platform as described in WP7 (T7.1) has been developed as described above. Both the overall architecture and the technologies that underly its structure, as well as, how it can be used.