

# EU-FarmBook

Deliverable 2.8

## Multilingual functionalities (v1)

Report | Public



Funded by  
the European Union

## Summary

<b>Call</b>	HORIZON-CL6-2021-GOVERNANCE-01
<b>Topic</b>	HORIZON-CL6-2021-GOVERNANCE-01-24
<b>Project</b>	EU-FarmBook: supporting knowledge exchange between all AKIS actors in the European Union
<b>Acronym</b>	EU-FarmBook
<b>Project No.</b>	101060382
<b>Management</b>	Universiteit Gent
<b>Duration</b>	84 Months
<b>Start date</b>	01/08/2022
<b>End date</b>	31/07/2029
<b>Deliverable</b>	D2.8. Multilingual functionalities v1
<b>Type</b>	R (Document/Report)
<b>Dissemination level</b>	PU (Public)
<b>Due Date</b>	M18
<b>Submission Date</b>	24/01/2024
<b>Work Package No.</b>	WP2
<b>Lead Beneficiary</b>	Agricultural University of Athens (AUA)
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<b>Version</b>	Version 1.0

## History of Changes

<b>Version 0.1</b>	10/01/2024	Hercules Panoutsopoulos (AUA)	First draft prepared for internal review
<b>Version 0.2</b>	12/01/2024	Hercules Panoutsopoulos (AUA), Daan Vos (TNO)	Input from TNO and revisions based on the comments from TNO
<b>Version 0.3</b>	15/01/2024	Hercules Panoutsopoulos (AUA)	Revisions based on the comments from MU
<b>Version 0.4</b>	17/01/2024	Hercules Panoutsopoulos (AUA), Aitor Garcia Pablos (VICOM)	Annexes added to the report; input from VICOM
<b>Version 1.0</b>	22/01/2024	Hercules Panoutsopoulos (AUA)	Revisions based on the comments from UGent

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## Abbreviations

AI	Artificial Intelligence
AKIS	Agricultural Knowledge and Innovation System
API	Application Programming Interface
DoA	Description of Action
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations)
FAQ	Frequently Asked Question
GPT	Generative Pre-Trained Transformers
KO	Knowledge Object
LLM	Large Language Model
M	Month
MB	Management Board
MS	Member State
NLP	Natural language Processing
PM	Person Month
RIA	Research and Innovation Action
R&I	Research and Innovation
UX	User Experience
WP	Work Package

## Executive Summary

The present report ("Multilingual functionalities v1") is part of a series of technical reports expected to be released throughout the project to document advancements in the work undertaken in the EU-FarmBook project for delivering multilingual functionalities from the EU-FarmBook platform. In this report, the initial steps already taken are described and a roadmap of the work to be implemented in the future is presented. Updates on work on multi-linguality will be reported in M54 (end of January 2027) and M84 (end of July 2029). Best practices and important points to consider within the context of this work are listed in a dedicated section of the report.



## 1. Introduction

The aim of the EU-FarmBook project is to support knowledge exchange between all the actors of the Agricultural Knowledge and Innovation Systems (AKIS) at EU and national levels, by further developing, expanding, exploiting, and maintaining an easily accessible and user-friendly, EU-wide digital platform for practitioners (farmers, foresters, advisors, and other rural actors) in the agriculture and forestry sectors. The EU-FarmBook project will deliver a cross-media platform, focussing on ease of use and enabling user-friendly multilingual access to practice-oriented materials (Knowledge Objects - KOs) generated by EU-funded and national Research and Innovation (R&I) projects.

On the one hand, the EU-FarmBook platform will help existing and upcoming projects to share their knowledge outputs within the AKIS community all over the EU. Users will be able to easily find, access, and use these knowledge outputs for their everyday agronomic practice, agricultural advisory, or any other potential service and benefit. Ease of access across multiple platforms (web, mobile, tablet) using different modalities (text, video, image, audio) will further stimulate research and innovation, hence enabling the knowledge outputs of projects to have real impact on agronomic and forestry practice across the EU and beyond.

The overall concept of the EU-FarmBook project is deeply embedded in the ambition of the European Commission to make European agriculture, forestry, and rural enterprise more sustainable by strengthening the so-called AKISs existing at the regional, national, and EU levels. The EU-FarmBook project is complementary to the overall EU objectives in Open Science, enabling access to and (re-)use of project results.

The platform being developed in the EU-FarmBook project builds upon the work done in the EURAKNOS and EUREKA projects, especially the regarding lessons learnt and the experience of previous technological choices. Nonetheless, the rapidly evolving domain of digital technologies and the necessity to adequately respond to unprecedented changes in knowledge- and data-related needs requires revisiting the choices already made and continuing to their refining per the expectations of the EU-FarmBook users and the AKIS actors at regional, national and EU levels. This further exploration and fine-tuning of technical specifications will be an ongoing exercise based on feedback loops for the timely capture of shifts in end-user needs. Furthermore, the continuous evolution of expectations and preferences, driven mainly by the design paradigms adopted by big corporate players (e.g., social media service providers), requires user research to be a continuous, iterative task, allowing the project to keep pace with the changes in user needs that will occur during the project's lifetime.

EU-FarmBook is a Research and Innovation Action (RIA) project designed for interactive action research. The project plans, implements, and coordinates activities related to the operation of a sustainable online platform to respond to the “evolving AKIS ecosystem” in all Member States (MSs). This iterative and incremental approach facilitates flexibility, adaptation, and responsiveness to the dynamic needs and capacity of the EU (sectoral) and national-level AKISs.

Given the context described above, the aim of this report is to present work in progress for the development and delivery of multilingual functionalities through the EU-FarmBook

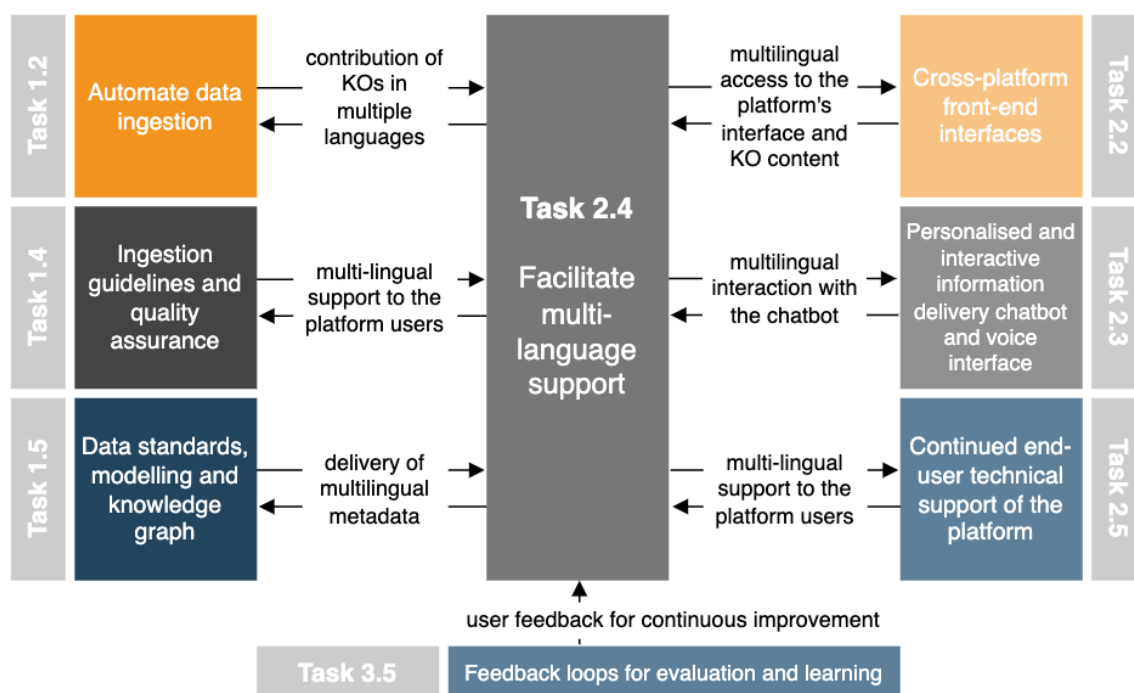
platform. Considering the nature of the project and the breadth of the audience aimed to be reached by the EU-FarmBook platform, research and development work will be carried out during the project with the goal to make decisions and choices for addressing the language needs of users to the best possible extent.

The present report is structured as follows: Section 2 explains how the work in Task 2.4 relates to the work in other tasks and WPs. Section 3 provides the context for our work including underlying assumptions and research questions to focus on. In Section 4, the concept and methodology for the integration of multilingual functionalities are explained. Section 5 gives an overview of our work in multi-linguality by presenting the multilingual functionalities expected to be added to the platform as the project will be progressing. Work already done is explained in Section 6 and the steps to be taken next are discussed in Section 7. Section 8 provides some concluding remarks. There are also three annexes in this report. Annex 1 explains in detail the various facets of multi-linguality considered in our work (initially introduced in Section 4). Annex 2 presents results from preliminary research in the affordances provided by Large Language Models (LLMs) for automatic language translations. Examples of how multi-linguality is addressed in other agrifood- and forestry-related platforms are presented in Annex 3.

## **2. Relation to work in other tasks and Work Packages**

Task 2.4 (“Facilitating multi-language support”) holds a prominent position in the context of the technical work in WP2 (“EU-FarmBook platform”) and WP1 (“Data management and infrastructure”). Being launched in the beginning of the 2<sup>nd</sup> year of the project (and in progress till the project’s end), Task 2.4 is responsible for the delivery of multilingual functionalities from the platform. As shown in Figure 1 below, work in Task 2.4 depends on the work in other tasks of WPs1&2 and impacts the work in them. User feedback from Task 3.5 will help to continuously improve the quality of the multilingual functionalities so as to ensure a high-quality User Experience (UX).

Work in Task 2.4 is linked to the work in Task 2.2 (“Cross-platform front-end interfaces”) given that access to the information available from the EU-FarmBook platform interfaces needs to be available in all 24 languages officially spoken in the EU. Interaction with the chatbot developed in Task 2.3 needs to be also enabled in at least 2 languages. To better address the needs for help and support to the users of the EU-FarmBook platform, multi-linguality is relevant to the work for the creation of the EU-FarmBook’s Support centre in Tasks 1.4 and 2.5.



**Figure 1:** Links between the work in Task 2.4 and work in other tasks and WPs

KOs need to be provided in languages other than English too. Solutions for the automatic translation and delivery of KO content must be also considered. This has implications on the work in Task 1.2. Finally, KO metadata need to be made available in languages other than English (Task 1.5).

### 3. Context and underlying assumptions

The pursuit of web-based service and information/content providers to reach out to broad and diverse audiences implies the availability of their websites in many languages. The quality of information delivered in languages other than the main language of the website is tightly associated with the overall UX. It needs to be carefully considered and goes beyond a mere translation of text from one language to another. Poor multilingual capabilities will result in user dissatisfaction and impact the reputation of the organisation providing the service.

In the past, enabling access to the content and information available from a website in a range of languages was greatly dependent on manual work. This means that the entirety of the content and information had to be translated by native speakers of the language(s) targeted. This approach had high costs in terms of resources. On top of that, translation mistakes could not be avoided. Machine translation technologies have shaped a new landscape for automatic translation and multilingual access to content. Google translate is an indicative example of the achievements in automatic translation.

Enabling access to multilingual content and information via the EU-FarmBook platform is an important objective of the EU-FarmBook project, especially considering the scope of the platform, the user groups targeted, and the intended impact. The EU-FarmBook platform aspires to reach a large audience being diverse in a range of aspects including language. Fluency by the users of the platform in reading and understanding content and

information available only in English cannot be taken for granted. The potential to access the EU-FarmBook platform in the language(s) spoken by its users is a critical enabler of user engagement and a high-quality UX.

The problem of multilingual access to website content and functionalities is not new. It has been studied for nearly three decades. Solutions to this problem go beyond the mere translation of content. Given that language is a social and cultural construct [1], adapting a website to different languages requires to consider the cultural background of the audiences to be reached. Website localisation is the term used in literature for the adaptation of a website's content and functionalities to different languages. Translation is only part of it. According to [2], website localisation is the modification of a website for a specific locale (namely, people speaking the same language and sharing a common cultural background) in adherence to the goals and targets of the owner of the website. As mentioned in [3], website localisation “*consists of far more than just textual translation of websites*”.

Based on the context described above, the following assumptions need to be considered for the delivery of multilingual functionalities by the EU-FarmBook platform:

- Multi-linguality in the EU-FarmBook platform goes beyond (automatic) translation capabilities.
- Multi-linguality in the EU-FarmBook platform is approached as the localisation of the delivered content and information to the linguistic (and cultural) backgrounds of the user groups targeted.
- Localisation of the EU-FarmBook platform involves the availability of the content of KOs in different languages.
- Machine translation solutions can be considered for the delivery of content and information in multiple languages through the EU-FarmBook platform.
- Quality translations facilitating a high-quality experience for non-English speaking users will need to be ensured by having automatic translations reviewed by native speakers being knowledgeable of the agriculture and forestry terminology.

Moreover, the following requirements mentioned in the Description of Action (DoA) of the EU-FarmBook project need to be accounted for:

- Access to the EU-FarmBook platform will be enabled in all 24 languages that are officially spoken in the 27 MSs of the EU.
- Search facilities will be possible in all 24 EU languages that are officially spoken in the 27 MSs of the EU.
- KO metadata will be available in languages other than English<sup>1</sup>.
- Versions of KOs in languages other than English (if made available by the source projects) will be available in the EU-FarmBook platform.

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<sup>1</sup> The languages in which KO metadata will become available will be decided by the Management Board of the project (see Subsections 5.2 and 7.1 for details).

- Multilingual versions of KOs will become available in at least in six languages (top six of the most spoken languages in Europe)<sup>2</sup> by means of on-the-fly translations.

## 4. Concept and methodology

### 4.1. Concept

The delivery of multilingual functionalities and content by the EU-FarmBook platform is multi-faceted. As shown in Figure 2, interaction with the platform interfaces, access to KOs, contribution of KOs, search for KOs, interaction with the chatbot, and the support to platform users are the facets of multi-linguality related to our work. These facets are defined considering the various components of the technical work described in the tasks of WP1 (“Data management and infrastructure”) and WP2 (“EU-FarmBook platform”).



**Figure 2:** Facets of multi-linguality considered in the context of the EU-FarmBook platform

Brief explanations of what each facet is about are provided in Table 1 below. More details are available in Annex 1.

Table 1. Facets of multi-linguality as being addressed in the EU-FarmBook project and brief descriptions

Multi-linguality facet	Description
Interaction with the platform interfaces	<ul style="list-style-type: none"> <li>• Availability of the platform interfaces in English and other languages.</li> <li>• Delivery of KO metadata in English and other languages.</li> <li>• Emails automatically generated by the system and sent to the user (e.g., emails related to user account management, acknowledgement of receipt of issue/request posted through the Support centre's contact form) in English and other languages.</li> </ul>

<sup>2</sup> English, German, French, Italian, Spanish and Polish.

Access to KOs	<ul style="list-style-type: none"> <li>• Access to KOs in English and other languages (if provided by projects).</li> <li>• Access to KO content translated on-the-fly in languages other than English.</li> </ul>
Contribution of KOs	<ul style="list-style-type: none"> <li>• Contribution of KOs in English and other languages.</li> <li>• Access and use of the upload form in English and other languages.</li> </ul>
Search for KOs	<ul style="list-style-type: none"> <li>• Search for KOs in English and other languages.</li> <li>• Delivery of search results in English and other languages.</li> </ul>
Interaction with the chatbot	<ul style="list-style-type: none"> <li>• Interaction with the chatbot in English and other languages.</li> </ul>
Support	<ul style="list-style-type: none"> <li>• Availability of guides, manuals, and video tutorials in English and other languages.</li> <li>• FAQs available in English and other languages.</li> <li>• Use of the Support centre's contact form in English and other languages.</li> </ul>

Addressing multi-linguality in the context of the EU-FarmBook platform is not a one-off task. On the contrary, the integration of multi-lingual functionalities in the platform will be a step-by-step process that will be implemented as part of the development and release of new platform versions during the lifetime of the project. As the platform will grow more functionalities will be integrated into it based on decisions about the “what”, “how”, “why”, and “when” of the functionalities to be integrated. Research questions will be set, and responses will be sought as part of research in the project. A preliminary list of research questions to guide our work in multi-linguality is provided below:

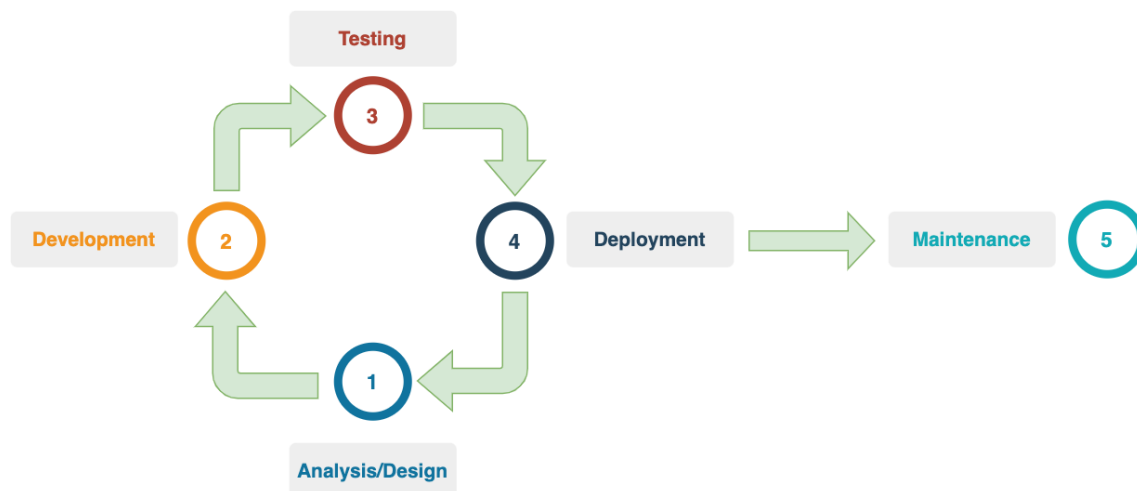
- Are there benefits from on-the-fly metadata translations compared to multilingual metadata persistence?
- How should search results be delivered in languages other than that in which the search is made?
- What should be the response to a search query if no results are available in the language in which the search is made?
- How can LLMs be used for automatic text translation? What are the benefits and costs to be considered?
- How should KO content that is translated on-the-fly be delivered to users?

Through the review of the available scientific literature and existing good practices, these questions will become more concrete. Research already in progress will lead to decisions and developments to properly address the language needs of the targeted audiences.

## 4.2. Methodology

The integration of each new multilingual functionality into the EU-FarmBook platform will be taking place as part of an iterative process based on the agile development paradigm [4]. The process consists of five steps: (i) analysis/design; (ii) development; (iii) testing; (iv) deployment; and (v) maintenance. The methodology is illustrated in Figure 3 and its steps are explained below.





**Figure 3:** Methodology for the integration of new multilingual functionalities into the EU-FarmBook platform

- **Analysis/design**

Work in this step will involve the details to be considered and planned for the integration of a multilingual functionality into the EU-FarmBook platform. Impact on the platform UX will be part of the analysis and design to be made. Review of existing good practices and research will be undertaken to facilitate informed decisions. Concrete development plans will be created, and internal milestones will be set. The functionality integration plan will involve, among others, justification of the use of external automatic translation services. Decisions related to the integration of a multilingual functionality (e.g., platform interfaces will be accessible in X languages by Month Y) will be made by the Management Board (MB) of the project. Decisions will be based on suggestions from the technical partners involved in WPs1&2. Each multilingual functionality will be documented in the platform requirements and design deliverables (M24, M42, M60, and M78).

- **Development**

Development of multilingual functionalities will involve the integration of the functionality into the platform. Where possible, existing automatic translation services will be used to enable quick and cost-efficient language translations. Quality in the translations provided will be ensured by means of manual labour, which will be considered for review of the automatic translations and evaluation of their accuracy. A development team made up of members of the non-technical partners involved in WPs1&2 (Osmos, CDR, ESSET, HCC, IDELE, LKO, UGent) will be assembled with the responsibility to review automatic translations. Contribution from more project partners (involved in WPs 3, 4, and 5) will be considered in case more resources than those available in WPs1&2 are needed. The development team members will be fluent speakers of the languages to be considered for multilingual functionalities available from the EU-FarmBook platform. Familiarity of the development team members with agriculture- and forestry-related terminology will be an advantage.

Contribution regarding the human and time resources to be allocated to the development team will be proportional to partner effort (in PMs) as stated in the DoA. The development team's responsibilities are illustrated in Figure 4 below.

## • Testing

The testing phase will focus on the evaluation of the multilingual functionalities integrated into the EU-FarmBook platform. It will involve the identification of incorrect translations and the actions needed to fix them. To this end, a testing team will be assembled to do quality checks. Testing and evaluation will be taking place prior to the deployment of a functionality. The testing team will be made up of members of the non-technical partners involved in the project. Optimally, there should be no overlaps between the members of the two teams. The testing team will report to the development team and the technical partners. Like the development team, the testing team members will be fluent speakers of the languages considered for multilingual functionalities. Knowledge of agriculture and forestry terminologies will be an advantage. The testing team's scope is shown in Figure 4 below.



**Figure 4:** Scope and responsibilities of the development and testing team

## • Deployment

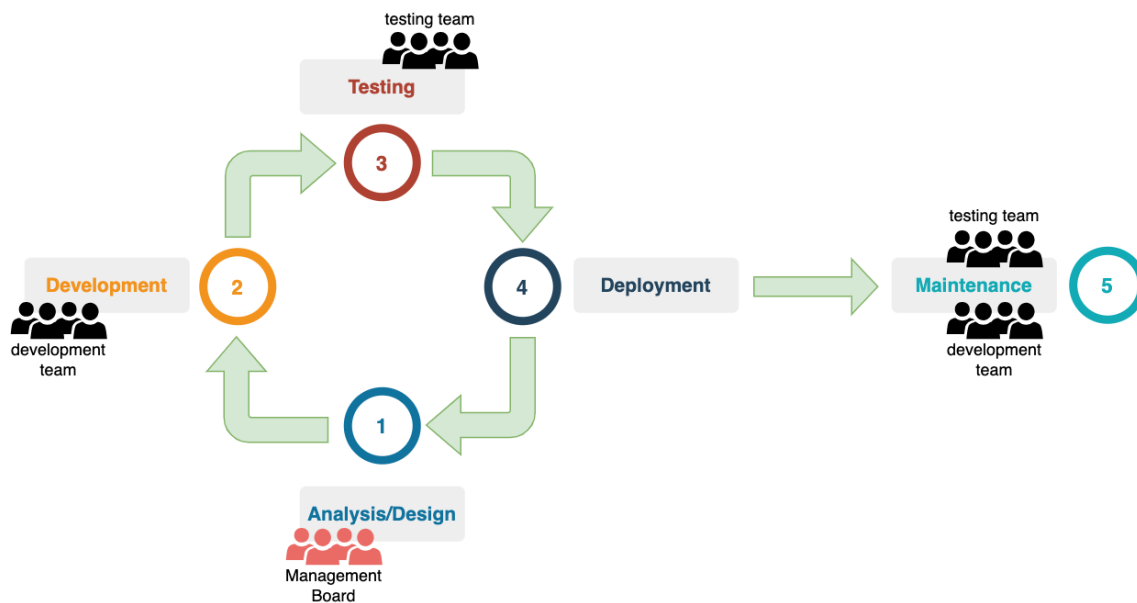
Following the development and testing/evaluation of a new multilingual functionality, the deployment of the functionality will take place by means of making it available to platform users (e.g., platform available in 6 languages). The testing and evaluation implemented in the previous step will ensure the quality of the delivered functionality. However, users will be able to report issues or send comments related to a multilingual functionality using the contact form available in the platform's Support centre.

## • Maintenance

As the work for the development of the EU-FarmBook will be advancing and new content and information will become available by projects wishing to further disseminate results, the provided multilingual functionalities will need to be properly maintained. For instance, new text may need to be added to a platform page. That text will have to be available in all the languages in which interaction with the platform interfaces will be enabled. The implementation of maintenance tasks will be the responsibility of the technical partners involved in WPs1&2, supported by the development and testing teams. Part of the work in the maintenance of multilingual functionalities will also be the continuous improvement of the provided functionalities based on user feedback from the activities in Task 3.5.

Figure 5 illustrates the methodology for multilingual functionality integration with a focus on the steps of the methodology in which contribution from the project's MB, as well as the development and testing teams, is expected.



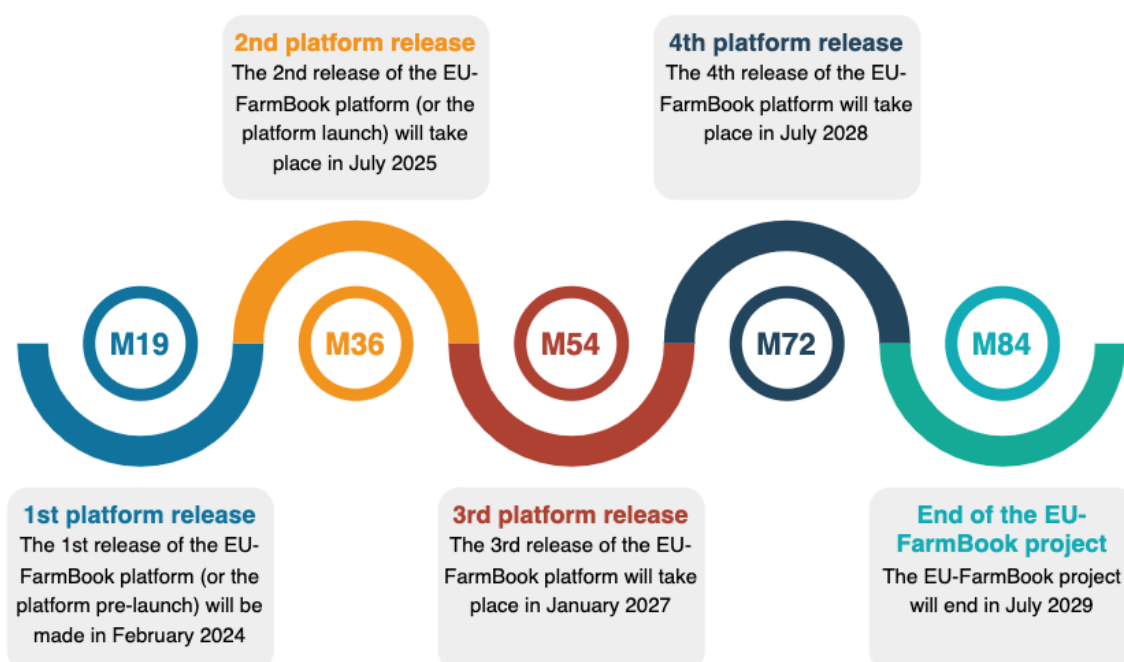


**Figure 5:** Involvement of the project's MB, as well as the development and testing teams, to the work for the integration of multilingual functionalities

## 5. Multi-linguality in the EU-FarmBook platform

The integration of multilingual functionalities will take place gradually as part of the work for the development and delivery of the EU-FarmBook platform releases expected to be made available during the project's lifetime. Starting from February 2024 (M19) when the 1<sup>st</sup> platform release will become available (pre-launch of the EU-FarmBook platform), three more major releases are expected. The timeline of EU-FarmBook platform releases is shown in Figure 6 below.

The releases shown below signify major platform versions (in terms of the functionalities and features to be delivered) that are expected to become available during the course of the project. They are used mostly for communication and dissemination purposes to let users know that with each platform release a cycle of functionality/feature integration is closed. Most of the features and functionalities will become available by the time at which the 2<sup>nd</sup> release is expected (platform launch). The 3<sup>rd</sup> and 4<sup>th</sup> releases will mostly focus on the update and upgrade of functionalities and features already provided, based on feedback from the users. New functionalities and features will be gradually added to the platform in the time period between two consecutive platform releases.



**Figure 6:** Timeline of the EU-FarmBook platform releases

Regarding the integration of multilingual functionalities into the EU-FarmBook platform, Subsections 5.1 to 5.3 present what is to be expected with each platform release. Details of the work in multi-linguality done so far (i.e., multilingual functionalities integrated into the 1<sup>st</sup> release) and the work to be done next (multilingual functionalities to be integrated into the 2<sup>nd</sup> and 3<sup>rd</sup> releases) are provided in Sections 6 and 7 respectively. Multilingual functionalities will be added in an incremental manner. This means that the multilingual functionalities available in the 2<sup>nd</sup> platform release will be added on top of those in the 1<sup>st</sup> release. The addition of multilingual functionalities follows the methodology presented in Section 3.2.2. Apart from the integration of new multilingual functionalities, maintenance work will take place to keep all multilingual functionalities up to date.

## **5.1. 1<sup>st</sup> platform release**

### **5.1.1. Interaction with the platform interfaces**

Interaction with the interfaces of the EU-FarmBook platform is made in English. This also includes the automatic generation of emails sent to users as a response to specific user actions (e.g., confirmation of the creation of a user account). The content of the email is in English. Metadata of KOs are available in English.

### **5.1.2. Access to KOs**

Users of the EU-FarmBook platform can access KOs in English, which is normally the default language in which KOs become available. Access to KOs available in languages other than English is possible if uploaded by KO contributors (representatives of projects assigned the role of KO contributor by the project coordinator). No on-the-fly translations of KO content are yet provided.

### **5.1.3. Contribution of KOs**

KO contributors can upload KOs in English and if available in other languages too. The upload form is available in English.

### **5.1.4. Search for KOs**

Search for KOs is made in English. The results returned to the user are KOs available in English or in any other language in which a KO (qualifying as a result to the search) may exist in the platform.

### **5.1.5. Interaction with the chatbot**

Access to the chatbot will be enabled in the 2<sup>nd</sup> platform release. There has been already work for the development and availability of the chatbot in English. Details about the work done so far on the development of the chatbot are provided in Subsection 6.3.

### **5.1.6. Support**

Access to (i) guides, manuals, and video tutorials; (ii) FAQs; and (iii) the Support centre's contact form is possible in English.

## **5.2. 2<sup>nd</sup> platform release**

### **5.2.1. Interaction with the platform interfaces**

Interaction with the EU-FarmBook platform interfaces will be enabled in all 24 languages officially spoken in the EU. KO metadata will be available in languages other than English as well. Generation of emails by the system (to be sent as user notifications) in languages other than English.

### **5.2.2. Access to KOs**

Users of the EU-FarmBook platform will be able to access KOs in English and other languages if uploaded by KO contributors. No on-the-fly translations of KO content are yet provided.

### **5.2.3. Contribution of KOs**

KO contributors will be able to upload KOs in English and if available in other languages too. The upload form will be available in English. Access of the upload form in languages other than English will be enabled if such a decision is made by the MB of the project.

### **5.2.4. Search for KOs**

Search for KOs will be enabled in English and other languages as well. Eventually, users of the EU-FarmBook platform will be able to perform searches in any of the 24 languages spoken in the EU. Search in languages other than English will be gradually enabled as access to the platform interfaces will be made possible in new languages.

### **5.2.5. Interaction with the chatbot**

The chatbot will be available in at least two languages (English and depending on the capabilities of language interface modules, other important EU languages).

### **5.2.6. Support**

Users will be able to have access to the support material delivered from manuals, guides, and video tutorials in languages other than English too. Access to the FAQs will also be enabled in languages other than English. Access and use of the contact form will not be able only in English but other languages too.

## **5.3. 3<sup>rd</sup> and 4<sup>th</sup> platform releases**

### **5.3.1. Interaction with the platform interfaces**

Interaction with the EU-FarmBook platform interfaces will be enabled in all 24 languages officially spoken in the EU. KO metadata will be available in languages other than English as well. Generation of emails by the system (to be sent as user notifications) in languages other than English.

### **5.3.2. Access to KOs**

Users of the EU-FarmBook platform will be able to access KOs in English and languages other than English if uploaded by KO contributors. Moreover, the content of appropriately selected KOs will become available in languages other than English (German, French, Italian, Spanish and Polish) using automatic translation services. The quality of automatic translations will be evaluated by the testing team, as well as considering the feedback of platform users.

### **5.3.3. Contribution of KOs**

KO contributors will be able to upload KOs in English and if available in other languages too. The upload form will be available in English. Access of the upload form in languages other than English will be enabled if such a decision is made by the MB of the project.

### **5.3.4. Search for KOs**

Search for KOs will be possible in English and other languages as well. Users of the EU-FarmBook platform will be able to perform searches in any of the 24 EU languages.

### **5.3.5. Interaction with the chatbot**

The chatbot will be available in at least two languages (English and depending on the capabilities of language interface modules, other important EU languages).

### **5.3.6. Support**

All facilities related to the EU-FarmBook platform's Support centre (i.e., support material provided in the form of guides/manuals/video tutorials, FAQs, contact form) will become available in more languages (compared to the languages considered in the 2<sup>nd</sup> release).

Figure 7 shows the multilingual functionalities available by the EU-FarmBook platform.



**Figure 7:** Multilingual functionalities available by the various releases of the EU-FarmBook platform

Details about the work done so far for integrating multilingual functionalities into the EU-FarmBook platform, as well as the work to be done for the next releases are provided in the following sections.

## 6. Work done so far

Work done so far has focussed mostly on access to KOs and contribution of KOs using the upload form. Research work has also been done for the availability of the chatbot in English and at least one more language. Moreover, preliminary research has taken place regarding the affordances provided by LLMs for automatic language translation tasks. The findings of that research are presented in Annex 2.

### 6.1. Access to KOs

The EU-FarmBook platform users can access KOs available in English, which is normally the default language in which KOs become available from projects, but also in languages other than English provided that such KO versions have been uploaded by contributors. Users are provided with textual and visual prompts (available from the platform interface) letting them know what language versions of a KO are available from the platform. Figure 8 below shows the prompts used to inform the user about the language versions of a KO available in the platform.



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CROP FARMINGENVIRONMENTSOCIETY

## Deliverable No. 5.3 Evaluation report of on-site implementation of technologies to improve water and nutrient use efficiency for soil crops

This report aims to exchange technologies among the different regions, crops and growing systems in order to fulfil the gaps pointed out by the benchmark study (WP3).

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### Detail description

Deliverable No. 5.3 is an evaluation report that focuses on the on-site implementation of technologies to improve water and nutrient use efficiency for soil crops. The purpose of this report is to provide an overview of the technologies used, assess their effectiveness in improving water and nutrient use efficiency, and identify any challenges encountered during the implementation process.

The report begins by outlining the technologies used, which include precision irrigation, fertigation, soil moisture sensors, and weather stations. These technologies were selected based on their ability to improve water and nutrient use efficiency while reducing the environmental impact of agriculture. The report then goes on to describe the implementation process, which involved collaboration between farmers, technology providers, and researchers.

### Contribution detail info

PUBLISHED ON  
18/05/22

PROJECT

**Fertinnowa**  
 Transfer of INNOvative techniques for sustainable Water use in FERTigated crops

LOCATION

Belgium, Estonia, Netherlands, Romania, Spain, Sweden

CREATORS

Juan José Magán, Elodie Derivry

PURPOSE

Access to data, Dissemination, Monitoring, Modelling

FILE TYPE

Document

FILE SIZE

12.5 MB

RELATED LINKS

Fertinnowa

ORIGIN LANGUAGE

Spanish, English

KEYWORDS

TechnologiesFertigationIrrigationRemote sensingSoil waterSoil nutritional status sensors

SHARE CONTRIBUTION

Transfer of INNOvative techniques for sustainable Water use in FERTigated crops

FERTINNOWA

### Deliverable No. 5.3

#### Evaluation report of on-site implementation of technologies to improve water and nutrient use efficiency for soil crops

Project acronym	FERTINNOWA
Project number	689687
Project title	Transfer of INNOvative techniques for sustainable Water use in FERTigated crops

Organisation responsible for deliverable	IFAPA
Deliverable author(s)	Juan José Magán, FC Elodie Derivry, APREL Biserka Donik Purgaj, CAFS Carlos Campillo, OCYTEX Juan del Castillo, INTIA José Miguel de Paz, IVA Elsie Vandewoestijne, PCG

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689687

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English

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YesNo

**Figure 8:** Textual and visual prompts used in the EU-FarmBook platform for the delivery of KOs available in more than one language

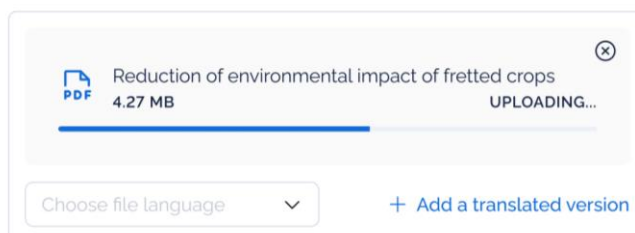
## 6.2. Contribution of KOs

Users with the role of contributor of KOs can provide versions of a KO available in languages other than English. To facilitate the process of multilingual KO contribution, after the upload of the digital file corresponding to the English version of the KO (or the language being the KO's default language) there is the option to select a new language and upload another file being a new language version of

the same KO. Figure 9 shows the features of the upload form enabling the easy upload of KOs available in multiple languages.

### File upload

You can upload files with a size up to 50MB.



**Figure 9:** Features of the upload form enabling the contribution of multiple language versions of a KO

## 6.3. EU-FarmBook chatbot

The basic chatbot components including search and recommendation have been built in the context of the work for accomplishing Milestone 03 ("Chatbot in two languages"). An important factor for the adoption and use of the chatbot by the EU-FarmBook platform users is the option to interact with it in their native language. English is the language of primary focus of the work done so far considering both developments in Natural Language Processing (NLP) and Generative Artificial Intelligence (AI)/LLMs, as well as the fact that most KOs in the EU-FarmBook are in English. To make the chatbot available in a second language, current developments in the field of new language model creation are closely followed. Language technologies are being developed at a fast speed, with new models becoming available almost daily. It is expected that soon models capable of providing high-quality translations into a wide set of languages will be available. In this context, the work for the delivery of a multilingual chatbot is focused on a multilingual translation module as part of the user-faced aspects of the chatbot. Adding multilingual support to the chatbot is ongoing and based on the use of automatic machine translation services. Considering that chatbot functionalities will become available in the 2<sup>nd</sup> release of the EU-FarmBook platform, final decisions on the second chatbot language (or more languages in which the chatbot will be accessed) will be made as work on the 2<sup>nd</sup> platform release will be progressing. This way, it will become feasible to build upon advancements in LLM technologies and language translation capabilities provided by them at that time.

## 7. Next steps

Most of the work for the integration of multilingual functionalities into the EU-FarmBook platform will take place as part of the development of the 2<sup>nd</sup> release. Almost all expected functionalities will be available by the time of the EU-FarmBook platform's full launch in M36. The lessons learned from the work done in EUREKA for the pilot platform version will be capitalised to ensure the quality of the multilingual functionalities that are expected



to be delivered. The feedback collected from a series of webinars held in EUREKA will be the starting point for making decisions on the integration of multilingual functionalities into the platform. In the pilot version, interaction with the platform interfaces was enabled in 14 EU languages. To provide that functionality, DeepL<sup>3</sup>, an off-the-shelf language translation service was used. A translation management system (POEditor<sup>4</sup>) was used to manually edit the translations generated by DeepL and correct mistakes. Translation edits with the POEditor were made by a task force of project partner members. Feedback from the EUREKA webinars showed that despite the combined use of automatic translations and manual reviews, translation mistakes were not avoided. Such mistakes had an impact on the overall UX.

This section offers details for the work to be done for multilingual functionality integration into the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> platform releases. Considering that the 4<sup>th</sup> release is expected by the end of M72, the last 12 months of the project will be dedicated to the maintenance of the platform's multilingual functionalities. Maintenance work will ensure that both the needs of users and what will form the state-of-the-art at that time will be considered.

### **7.1. Interaction with the platform interfaces**

Access to the EU-FarmBook platform's interfaces in all 24 EU languages is expected to be available with the 2<sup>nd</sup> platform release. This functionality will be gradually provided by adding 6 languages every four months. This means that access to the platform interfaces in 6 languages will be possible by M23. Access in 12 languages will be enabled by M27. All 24 EU languages will be integrated by M35. Decisions about which 6 languages will be added in each 4-month interval will be made by the MB. Regarding the delivery of KO metadata, decisions will be made about: (i) the languages in which metadata will become available; and (ii) whether metadata will be translated on-the-fly or the various language versions of metadata will be stored in the platform's database. Work for the multilingual access to the platform interfaces will also be concerned with decisions on the languages (apart from English) in which notification emails will be sent to platform users. In the case that is decided to send notification emails in languages other than English, the integration of the specific functionality will start from the 2<sup>nd</sup> release of the EU-FarmBook platform.

Work that will be done for platform releases 3 and 4 will focus on the maintenance of the multilingual platform interfaces. Based on the MB's decisions for multilingual KO delivery, access to KO metadata may be enabled in more languages compared to those added in the 2<sup>nd</sup> platform release. Similarly, communication with users through system-generated emails may also be enabled in more languages than those considered for the 2<sup>nd</sup> platform release depending on the decisions of the MB.

### **7.2. Access to KOs**

The issue of KO content translation will be addressed in platform releases 3 and 4. Apart from the language in which the content of a KO is originally available (normally English), on-the-fly translations of KO content in at least 6 other languages will be provided. These will be the languages mostly spoken in the EU (English, German, French, Italian, Spanish

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<sup>3</sup> <https://www.deepl.com/translator>

<sup>4</sup> <https://poeditor.com/>

and Polish). Decisions about the categories and types of KOs to consider for automatic content translation will be made by the MB. Translations in at least three languages will be provided in the 3<sup>rd</sup> platform release. Translations in at least three more languages will be addressed in release 4. The languages to consider in each of the platform versions 3 and 4 will be decided by the project's MB.

### **7.3. Contribution of KOs**

The upload form available in the 1<sup>st</sup> platform release allows to contribute KOs in English and other languages if available by the source projects. The upload form is accessed in English. Decisions about whether the upload form will be accessed in languages other than English will be made by the MB based on the suggestions of the technical partners. In the case of deciding to enable multilingual access to the upload form, further decisions will be made on the number of languages to address. Decisions will be also concerned with the timeline for enabling access to the upload form in languages other than English. If decided, this functionality will be integrated into platform releases 2 and 3 (e.g., half of the languages in which the upload form will be accessed will be added in the 2<sup>nd</sup> platform release, and the other half in the 3<sup>rd</sup> release).

### **7.4. Search for KOs**

Search for KOs in languages other than English will follow a plan similar to that for access to the platform interfaces. This means that KO search will be enabled in 6 new languages every 4 months. Research will be made in the delivery of results (especially for the case of searches in languages other than English) and how the order of search result delivery is/should be affected by factors like the query language, user location, availability of search results in other languages, etc.

### **7.5. Interaction with the chatbot**

The chatbot needs to become available in at least two languages. Decisions about other languages (apart from English) in which interaction with the chatbot will be enabled will be made as part of the work for the 2<sup>nd</sup> platform release's development. The integration of the multilingual chatbot into the platform will gradually take place till the full release of the platform in M36. If decided, more languages will be integrated into the chatbot within the context of the work for developing the 3<sup>rd</sup> and 4<sup>th</sup> release of the platform. Maintenance work will take place in platform releases 3 and 4.

### **7.6. Support**

In the 1<sup>st</sup> release of the EU-FarmBook platform, support (i.e., access to guides, manuals, and video tutorials; access to FAQs and their responses; use of the contact form) will be provided only in English. In the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> releases, users will be able to have access to support in other languages too. Decisions about the languages in which user support will be provided will be made after the 1<sup>st</sup> release (platform's pre-launch in M19). Support in at least 6 languages (English included) will become possible. Based on the languages to be considered, work will be done for: (i) the availability of guides, manuals, and video tutorials in multiple languages; (ii) multilingual access to FAQs; and (iii) the multilingual

access and use of the contact form. Support in new languages will be gradually provided as part of the work for developing the platform versions 2, 3, and 4.

## 8. Conclusions

The EU-FarmBook platform aspires to reach a wide range of users with various language and cultural backgrounds, being situated within the AKIS networks of all EU MSs. To achieve the expected impact, platform functionalities need to be made available not only in English but in other languages too. To do so, existing good practices need to be reviewed, research work take place, and concrete plans developed prior to integration of multilingual functionalities into the EU-FarmBook platform. Our work in multi-linguality is multi-faceted and follows the agile paradigm to ensure continuous need capturing, design and development, as well as maintenance and improvement by making use of user feedback. Functionality development takes place based on the decisions of the MB of the project after specific suggestions from the technical partners. Existing, off-the-shelf services for automatic language translations will be considered. However, manual review of automatic translations is a necessary condition to ensure the quality of the multilingual functionalities provided. Work on the back- and front-end of the platform to enable the contribution and delivery of multilingual KOs, as well as the development of a multilingual chatbot, have launched our work on multi-linguality in the EU-FarmBook platform. Most of the multilingual functionalities envisioned will be integrated into the 2<sup>nd</sup> release of the platform due in July 2025. Some more multilingual functionalities will be integrated into the 3<sup>rd</sup> and 4<sup>th</sup> releases of the platform. The delivery of KO content translated on-the-fly will be one the most important multilingual functionalities to be provided by those platform releases.

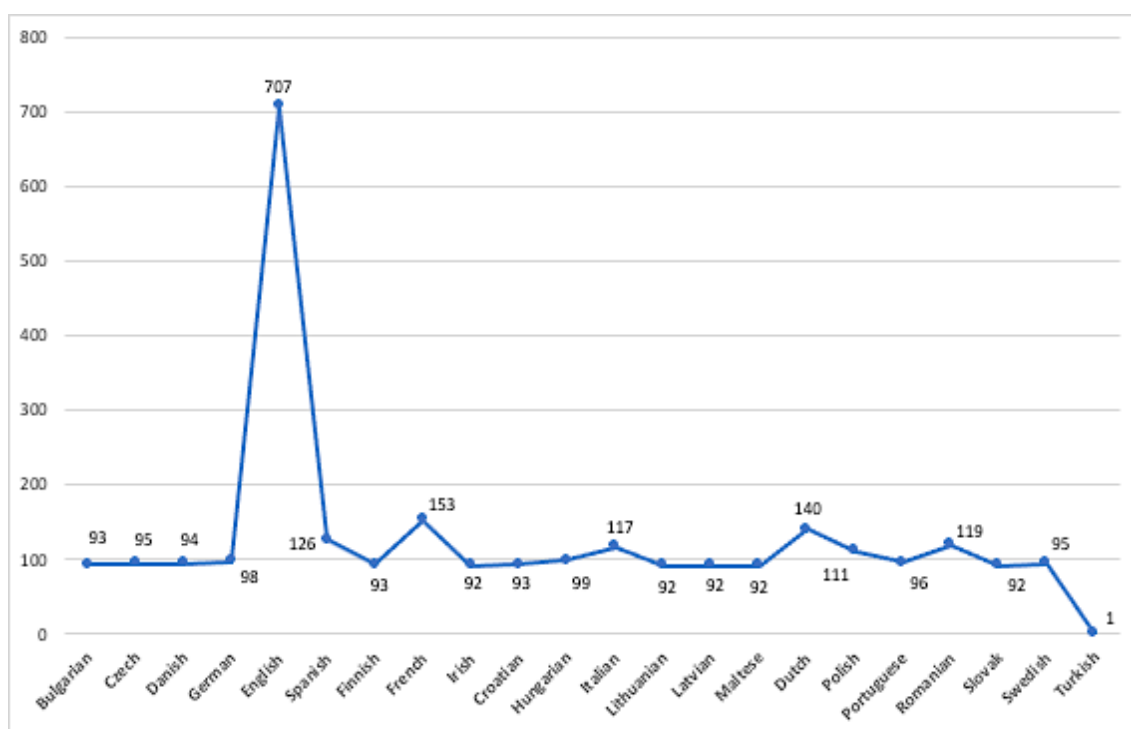
## **Annex 1: Multi-linguality facets explained**

### **Interaction with the platform interfaces**

This facet relates to any action that can be performed through the interfaces of the EU-FarmBook platform, such as the reading of text that may be available in one of the pages of the platform. It also includes the metadata of the KOs available from the platform, which is mostly textual information the user can get from the platform interfaces. Finally, this facet is also about email messages automatically generated by the system to notify users about (the status of) actions performed from their side (e.g., creation of an account to the platform, acknowledgement of receipt of an issue/request sent via the contact form available in the Support Centre, etc.). The above are parts of a whole enabling users to properly navigate through the platform, receive useful information about what each page of the platform is about, as well as access important background information related to KOs. Providing quality translations for these pieces of information is important to ensure a high-quality user experience. Machine translation solutions can indeed help to address the issue of multi-linguality in an effective manner. Despite the progress in NLP research and the capabilities of existing language models, the quality of machine translations may still be an issue. This is because existing, off-the-shelf language models (LLMs as they are called in literature) are mostly trained on generic text, thus not that robust in providing quality translations of specialised, domain-specific terminology. This is an issue that must be approached with caution because poor translations may lead to loss of interest and user disengagement. There may also be an impact on the perceived scientific soundness of the KOs delivered through the platform, as well as the credibility of the platform itself. access the content of a KO.

### **Access to KOs**

Apart from generic information delivered to the users through the EU-FarmBook platform interfaces, access to KOs and the content delivered through them is the main reason of the platform use. Given the scope of the Eu-FarmBook platform and the impact intended to be made, KOs should be available in as many languages as possible. This will ensure that a critical mass of platform users will be able to have access to useful and important information in the language they speak. Considering the user groups of that are primarily targeted by the EU-FarmBook platform, we cannot take fluency in understanding English texts for granted. To enable access to KOs in languages other than English, multilingual versions of KOs need to be provided by the projects producing them. Based on analysis made in the previous project (EUREKA) regarding the languages of approximately 400 KOs that were integrated into the pilot version of the EU-FarmBook platform, it was found that English was by far the language most frequently used for the creation of KOs (more than four times compared to the second most frequent language). Spanish, Romanian, Italian, French, Dutch, and German are also languages that are quite frequently used for the creation of KOs by EU-funded projects (mostly Horizon 2020 projects). These results are shown in Figure 10 below.



**Figure 10:** Languages of the KOs available in the pilot version of the EU-FarmBook platform that was built in the EUREKA project

To further enable the availability of multilingual KOs from the EU-FarmBook platform, on-the-fly translations of KO content will be provided. For this purpose, automatic translation services will be considered and used. Given that this functionality will be provided in the 3<sup>rd</sup> platform release, it remains to be seen what the capabilities of LLMs in automatic text translation will be at that time.

## Contribution of KOs

The “contribution of KOs” facet is twofold. It relates to offering users the functionalities to provide KOs in more than one language. The availability of KOs in languages other than English has the potential to increase the engagement of users with the platform, as well as the uptake of results by practitioners with different language and cultural backgrounds. Access to the upload form in languages other than English is also worth of attention and deserves investigation considering that fluent use of the English language by contributors of KOs should not be taken for granted.

## Search for KOs

Search for KOs not only in English but in other languages too is as an important aspect of the overall user experience. Given that search for KOs in the EU-FarmBook platform will be eventually enabled in all 24 languages spoken in the EU, there are several issues for research in the project related, but not limited to, the resolution of queries submitted in languages other than English, the ordering of the search results returned to the user, as well as the structuring of responses to user searches when there are no results in the language of the search query. Our research and development work will build on existing

good practices, such as the multilingual search capabilities in the AGRIS database<sup>5</sup> [5]. Details about the multilingual search approach adopted and used in the AGRIS database are provided in the next Annex section.

## **Interaction with the chatbot**

In the past few years, chatbots have been increasingly used in websites as an alternative means of interaction. They are used to support users in more easily finding what they are in search of. By allowing users to express their search needs with the use of natural language, chatbots hold the promise of addressing search requests by means of human-like communication and interaction. The integration of a chatbot into the EU-FarmBook platform aims to provide solutions to the search for KOs by guiding users into the search process. By asking questions, the chatbot will be able to “understand” the search needs of users and suggest KOs making a good fit with user needs. English will be the language of primary focus for the chatbot development. Considering the need to enable interaction with the chatbot in (at least) two languages, research and advancements in LLM-enabled language translations will be followed to make informed decisions about other languages in which interaction with the chatbot could be enabled.

## **Support**

Access to support facilities is equally important to the delivery of information and content through the platform. Therefore, it is necessary to make the various resources aiming to support users in their interaction with the EU-FarmBook platform available in more than one language. Support to users of the EU-FarmBook platform will be provided via: (i) the guides, manuals, and video tutorials available from the platform’s Support centre; (ii) the list of FAQs which will be updated throughout the project’s lifetime to better capture and address needs; and (iii) the Support centre’s contact form to enable the communication of the user with the EU-FarmBook project team in a direct way. As work on the platform development will be progressing with the various releases envisioned and planned, there will be decisions on which languages (except for English) support will be provided. The decisions that will be made will target a top-quality user experience enabled by the quality of the translated support material to be made available.

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<sup>5</sup> <https://agris.fao.org/>



## Annex 2: Initial insights into the use of LLMs for automatic language translations

Considering that work on the development and delivery of multilingual functionalities from the EU-FarmBook platform needs to start right after the pre-launch of the platform in M19 (1<sup>st</sup> platform release), initial research in the affordances provided by LLMs for automatic language translations has been made. Another incentive for this research is the fact that interaction with LLMs can easily take place through dedicated APIs exposed by the LLM development teams. In the EU-FarmBook project, there are requirements for (potentially) many-to-many translations of information and content related to very specific domains (i.e., agriculture and forestry). A problem with automatic translation services has always been the fact that despite being faster and usually more affordable compared to the use of human resources for translation tasks, they may deliver poor-quality results especially in cases of presence of domain terminology in the information/content to be translated.

LLMs are promising regarding their capabilities for automatic language translations and could be considered for the implementation of language translations within the context of our work on the EU-FarmBook platform. In this Annex section, we present the results of a small experiment held for the needs of a one-to-many language translation task. For this experiment, the API of the GPT3.5 language model (more specifically, gpt-3.5-turbo-1106) was used<sup>6</sup>. The experiment involved the translation of the content of a KO taken from the pilot version of the EU-FarmBook project built in EUREKA. The KO was a three-page leaflet consisting of 1333 tokens<sup>7</sup>. The original language of the content of the KO was English. The conducted experiment was about the automatic translation of the KO's content to Spanish, Greek, French and Dutch. We could have chosen more languages, but for the sake of brevity with have reduced the test to those.

Table 2 below provides some translation demographics. More specifically, it contains: (i) the number of tokens received as input by the LLM (i.e., number of tokens making up the original English text); (ii) the number of outputs in the translated text generated by the LLM; (iii) the total number of tokens (input + output); (iv) process time; and (v) the cost of the LLM use. The LLMs of the GPT series can be accessed and used (through their APIs) on a pay-per-use basis. The cost of their use depends both on the number of input and output tokens. It also needs to be noted that LLMs have a fixed window of tokens they can receive as input, as well as produce as output. In the case of the LLMs of the GPT series the input window can be up to 128K tokens. Outputs cannot be more than 4096 tokens. Given the above, there may be cases in which the input text may have to split into smaller chunks to be processed by the LLM or the output truncated.

In our experiment, Input tokens are the tokens of the text given to the LLM for translation. The output tokens make up the translated text generated by the LLM.

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<sup>6</sup> For details go to <https://platform.openai.com/docs/guides/text-generation>.

<sup>7</sup> LLMs use tokenizers which are software applications segmenting the text into tokens. A token is the “building block” of a text. It may be a word, however, in some cases, it may also be a sub-word. Details about how text tokenization is done in the LLMs of the GPT series are available at <https://platform.openai.com/tokenizer>.

Table 2. Translation demographics

Translation	Demographics
English to Spanish	<ul style="list-style-type: none"> <li>• Number of input tokens: 1333</li> <li>• Number of output tokens: 1524</li> <li>• Total number of tokens: 2857</li> <li>• Response time (in sec): 24.20</li> <li>• Translation cost (in US dollars): 0.0044</li> </ul>
English to Greek	<ul style="list-style-type: none"> <li>• Number of input tokens: 1333</li> <li>• Number of output tokens: 3326</li> <li>• Total number of tokens: 4659</li> <li>• Response time (in sec): 53.56</li> <li>• Translation cost (in US dollars): 0.0080</li> </ul>
English to Dutch	<ul style="list-style-type: none"> <li>• Number of input tokens: 1333</li> <li>• Number of output tokens: 1702</li> <li>• Total number of tokens: 3035</li> <li>• Response time (in sec): 27.13</li> <li>• Translation cost (in US dollars): 0.0047</li> </ul>
English to French	<ul style="list-style-type: none"> <li>• Number of input tokens: 1333</li> <li>• Number of output tokens: 1634</li> <li>• Total number of tokens: 2967</li> <li>• Response time (in sec): 24.75</li> <li>• Translation cost (in US dollars): 0.0046</li> </ul>

One observation from the figures recorded above is that the response times for GPT3.5 are above 24 seconds for a single translation (translation from one language to another) although the input text was quite short. In cases of more verbose translations (e.g., from English to Greek) the number of output tokens may be high. This has an impact both on the response time (53.56 seconds for the translation to Greek) and cost (almost double the cost of translations to the other three languages). If a more sophisticated LLM (e.g., GPT4) is used, response times and costs will be higher. To get an idea of how translation times and costs may escalate with the increase of the number of texts and tokens being input to the LLM, in the pilot version of the EU-FarmBook platform built in the EUREKA project a total number of 240 pdf documents, with an average of 4K to 6K tokens each, were available.

With GPT3.5, approximately 100 to 200 text documents can be translated per dollar spent. With GPT4, 10 to 20 text documents can be translated at the cost of a US dollar. Response times are also an issue that needs to be considered. Generating text for the needs of the automatic translation task may take quite a lot of time despite optimisations and the high-end hardware used by the LLM provider. Response times may also vary at different time points in the day. In any case, using off-the-shelf LLMs for text translation purposes implies dependency from an external service. This means that both the quality and the terms of service use are at the hands of an external service provider.

The original text in English and the translations obtained as the output of the calls to the API of GPT3.5 are available in Table 3 below.



Language	Text
English (input to the LLM)	<p>Implantation of species more resistant to summer drought</p> <p>The classic perennial ryegrass, dactyl, white clovers... species, which do not withstand the summer droughts known in recent years, are replaced by more resistant species such as fescue, lucerne, sainfoin, chicory or ribwort plantain. These species have good summer growth and for some, a pivoting root system that allows better moisture retention during the summer and better tillage. In addition, some of these species also have a significant health effect for animals. So, it is about learning how to use the right plants, for the right soil, adapted to the type of animal and pedoclimatic conditions of the plots.</p> <p>Advantages</p> <ul style="list-style-type: none"> <li>- More productive species in summer</li> <li>- Rotating root system of some good for the floor</li> <li>- Health effect of certain species</li> <li>- Coherence of all practices: soil / species / conditions / animal.</li> <li>- Improvement of biodiversity</li> </ul> <p>Disadvantages</p> <ul style="list-style-type: none"> <li>- Care during sowing to ensure good productivity of the meadow</li> <li>- Accuracy of grazing</li> </ul> <p>Technical leaflet</p> <p>Adapting grasslands to climate change</p> <p>Description of the innovation</p>
	<p>Technical leaflet</p> <p>A few landmarks:</p> <ul style="list-style-type: none"> <li>- High Fescue</li> <li>- Resistant to both high and cold temperatures</li> <li>- Supports all types of soil: acidic, heavy, hydromorphic ...</li> <li>- One of the grasses that grows the most throughout the year</li> <li>- Long term (about 10 years)</li> <li>- Spring sowing or late summer</li> <li>- Sowing at 1 or 2 cm deep</li> <li>- Monitor the competition at implementation</li> <li>- Seed rate 10 -20 kg/ha in pure stands or 10 -12 kg/ha in combination with lucerne (10 -15 kg/ha of lucerne).</li> </ul> <p>Sainfoin</p> <ul style="list-style-type: none"> <li>- Two different types of sainfoin are known:             <ul style="list-style-type: none"> <li>- common or simple sainfoin, which only blooms once a year. It gives only a first cut of fodder and a revival, but it lasts 3 years at least. It is reserved for dry areas or at altitude, mainly for pasture.</li> <li>- the ascending or double sainfoin, which provides 2 to 3 cuts a year. More productive than the simple type, it is also less durable.</li> </ul> </li> <li>- Very resistant to drought and cold</li> <li>- Can be grazed even after heavy frosts</li> <li>- Non-bloating fodder</li> <li>- Rich in tannin</li> <li>- Sainfoin values calcareous soils (up to pH 8), but fears moist, clayey or acid soils.</li> </ul>

Language	Text
	<ul style="list-style-type: none"> <li>- Sowing in late summer or spring in bare soil, or under cover of cereal in spring</li> <li>- The seeding rate is 40 to 50 kg/ha in kernels and 140 to 160 kg/ha in seed pods.</li> </ul> <p>Technical leaflet</p> <p>Alfalfa</p> <ul style="list-style-type: none"> <li>- 45 to 50% of the annual production of lucerne is made during the summer period</li> <li>- Drought resistant thanks to its taproot</li> <li>- Forage plant the richest in protein</li> <li>- Excellent cultural precedent thanks to its nitrogen restitution</li> <li>- Spring or summer sowing</li> <li>- Healthy and low acid soils (pH&gt; 6)</li> <li>- Sowing at 1-2 cm maximum depth</li> <li>- Sowing dose 15 to 20 kg/ha in pure stands, 10 -15 kg/ha in combination with grasses (bromegrass, cocksfoot, fescue ...)</li> </ul> <p>Plantain</p> <ul style="list-style-type: none"> <li>- Tolerant to drought episodes thanks to its taproot supported by a fibrous root system.</li> <li>- Rich in tannins.</li> <li>- Often associated with chicory</li> <li>- Two sowing periods are possible: in spring or after harvest (from August to September)</li> </ul> <p>It is often sown as a mixture for a long time (in this case, provide 1.5 kg / ha with grasses or a mixture of clover and chicory). Some also mix plantain with alfalfa. As for the sowing, it is rather advisable to realize it in the spring than in the autumn because in the latter case, the plantain will not have developed enough to spend the winter.</p> <ul style="list-style-type: none"> <li>- Sowing at 1cm depth Chicory</li> <li>- Perennial plant with taproot.</li> <li>- It tolerates acid soils (pH 5.5 to 6.2) as shallow soils. It has very good resistance to cold and drought.</li> <li>- Rich in tannin</li> <li>- Only regular grazing is recommended. It must be grazed at the leafy stage every 15 to 20 days following the growth of the plant.</li> <li>- Its low dry matter content limits its use to 75% maximum of the ration.</li> <li>- Nitrogen-rich, chicory is recommended in mixture with legumes: the seedling dose is 8 kg in pure stands with 3 kg of TB, or 2 to 3 kg of chicory associated with 25 kg of mixture multispecies.</li> <li>- Its longevity is on average 4 years.</li> </ul>
Spanish (LLM output)	<p>Implantación de especies más resistentes a la sequía estival</p> <p>El clásico tipo de ballico perenne, dátilo, tréboles blancos... especies, que no resisten las sequías veraniegas conocidas en los últimos años, son reemplazadas por especies más resistentes como festuca, alfalfa, esparceta, achicoria o llantén menor.</p>

Language	Text
	<p>Estas especies tienen un buen crecimiento en verano y, para algunas, un sistema de raíces pivotantes que permite una mejor retención de humedad durante el verano y un mejor laboreo.</p> <p>Además, algunas de estas especies también tienen un efecto significativo en la salud de los animales.</p> <p>Se trata, entonces, de aprender a utilizar las plantas adecuadas, para el suelo adecuado, adaptadas al tipo de animal y a las condiciones pedoclimáticas de las parcelas.</p> <p>Ventajas</p> <ul style="list-style-type: none"> <li>- Especies más productivas en verano</li> <li>- Sistema de raíces pivotantes de algunas beneficioso para el suelo</li> <li>- Efecto en la salud de ciertas especies</li> <li>- Coherencia de todas las prácticas: suelo/especies/condiciones/animal</li> <li>- Mejora de la biodiversidad</li> </ul> <p>Desventajas</p> <ul style="list-style-type: none"> <li>- Cuidado durante la siembra para asegurar una buena productividad del prado</li> <li>- Precisión del pastoreo</li> </ul> <p>Folleto técnico</p> <p>Adaptación de praderas al cambio climático</p> <p>Descripción de la innovación</p> <p>Folleto técnico</p> <p>Algunos puntos de referencia:</p> <p>Festuca Alta</p> <ul style="list-style-type: none"> <li>- Resistente tanto a altas como a bajas temperaturas</li> <li>- Soporta todo tipo de suelos: ácidos, pesados, hidromórficos...</li> <li>- Una de las gramíneas que más crece durante todo el año</li> <li>- Largo plazo (alrededor de 10 años)</li> <li>- Siembra en primavera o a finales de verano</li> <li>- Siembra a 1 o 2 cm de profundidad</li> <li>- Monitorear la competencia en la implantación</li> <li>- Tasa de siembra de 10-20 kg/ha en cultivos puros o 10-12 kg/ha en combinación con alfalfa (10-15 kg/ha de alfalfa).</li> </ul> <p>Esparceta</p> <ul style="list-style-type: none"> <li>- Dos tipos diferentes de esparceta son conocidos:</li> <li>- esparceta común o simple, que solo florece una vez al año. Proporciona solo un primer corte de forraje y una recuperación, pero dura al menos 3 años. Está reservada para áreas secas o en altitud, principalmente para pastoreo.</li> <li>- la esparceta ascendente o doble, que proporciona de 2 a 3 cortes al año. Más productiva que el tipo simple, pero también menos duradera.</li> <li>- Muy resistente a la sequía y al frío</li> <li>- Puede ser pastoreada incluso después de heladas intensas</li> <li>- Forraje no hinchante</li> <li>- Rico en tanino</li> <li>- La esparceta valora los suelos calcáreos (hasta pH 8), pero teme los suelos húmedos, arcillosos o ácidos.</li> </ul>

Language	Text
	<ul style="list-style-type: none"> <li>- Siembra a finales de verano o primavera en suelo desnudo, o bajo cobertura de cereal en primavera</li> <li>- La tasa de siembra es de 40 a 50 kg/ha en granos y de 140 a 160 kg/ha en vainas de semillas.</li> </ul> <p>Folleto técnico</p> <p>Alfalfa</p> <ul style="list-style-type: none"> <li>- El 45-50% de la producción anual de alfalfa se realiza durante el período de verano</li> <li>- Resistente a la sequía gracias a su raíz pivotante</li> <li>- Planta forrajera más rica en proteínas</li> <li>- Excelente precedente cultural gracias a su restitución de nitrógeno</li> <li>- Siembra en primavera o verano</li> <li>- Suelos saludables y poco ácidos (pH&gt; 6)</li> <li>- Siembra a una profundidad máxima de 1-2 cm</li> <li>- Dosis de siembra de 15 a 20 kg/ha en cultivos puros, 10-15 kg/ha en combinación con gramíneas (bromo, ballico, festuca...)</li> </ul> <p>Llantén Menor</p> <ul style="list-style-type: none"> <li>- Tolerante a episodios de sequía gracias a su raíz pivotante respaldada por un sistema de raíces fibrosas.</li> <li>- Rico en taninos.</li> <li>- A menudo asociado con achicoria</li> <li>- Dos períodos de siembra son posibles: en primavera o después de la cosecha (de agosto a septiembre)</li> </ul> <p>A menudo se siembra como una mezcla durante mucho tiempo (en este caso, proporcionar 1,5 kg/ha con gramíneas o una mezcla de trébol y achicoria). Algunos también mezclan llantén menor con alfalfa. En cuanto a la siembra, es más recomendable realizarla en primavera que en otoño, porque en este último caso, el llantén menor no habrá desarrollado lo suficiente para pasar el invierno.</p> <ul style="list-style-type: none"> <li>- Siembra a 1 cm de profundidad</li> </ul> <p>Achicoria</p> <ul style="list-style-type: none"> <li>- Planta perenne con raíz pivotante.</li> <li>- Tolera suelos ácidos (pH 5,5 a 6,2) y suelos poco profundos. Tiene muy buena resistencia al frío y a la sequía.</li> <li>- Rico en taninos</li> <li>- Solo se recomienda el pastoreo regular. Debe ser pastoreada en estado folioso cada 15 a 20 días siguiendo el crecimiento de la planta.</li> <li>- Su bajo contenido de materia seca limita su uso al 75% máximo de la ración.</li> <li>- Rica en nitrógeno, la achicoria se recomienda en mezcla con leguminosas: la dosis de siembra es de 8 kg en cultivos puros con 3 kg de TB, o de 2 a 3 kg de achicoria asociada con 25 kg de mezcla multiespecies.</li> <li>- Su longevidad es en promedio de 4 años.</li> </ul>
Greek (LLM output)	<p>Εμφύτευση ειδών πιο ανθεκτικών στη θερινή ξηρασία</p> <p>Το κλασικό είδος πολυετούς λυγκού, δακτύλιο, λευκά τριφύλλια... είδη, τα οποία δεν αντέχουν τις θερινές ξηρασίες που είναι γνωστές τα τελευταία χρόνια, αντικαθίστανται από πιο ανθεκτικά είδη όπως η φεστούκα, η λουκέρνη, το σανφουάν, η σικόρια ή το φυτό της φυλλής.</p>

Language	Text
	<p>Αυτά τα είδη έχουν καλή θερινή ανάπτυξη και για κάποια ένα σύστημα ριζών που επιτρέπει καλύτερη διατήρηση υγρασίας κατά τη διάρκεια του καλοκαιριού και καλύτερη εργασία του εδάφους.</p> <p>Επιπλέον, μερικά από αυτά τα είδη έχουν επίσης σημαντική επίδραση στην υγεία των ζώων.</p> <p>Έτσι, πρόκειται για το να μάθουμε πώς να χρησιμοποιούμε τα σωστά φυτά, για το σωστό έδαφος, προσαρμοσμένα στον τύπο του ζώου και τις πεδοκλιματικές συνθήκες των αγροτεμαχίων.</p> <p><b>Πλεονεκτήματα</b></p> <ul style="list-style-type: none"> <li>- Πιο παραγωγικά είδη το καλοκαίρι</li> <li>- Περιστρεφόμενο σύστημα ριζών ορισμένων καλό για το έδαφος</li> <li>- Επίδραση στην υγεία ορισμένων ειδών</li> <li>- Συνέπεια όλων των πρακτικών: έδαφος / είδη / συνθήκες / ζώο</li> <li>- Βελτίωση της βιοποικιλότητας</li> </ul> <p><b>Μειονεκτήματα</b></p> <ul style="list-style-type: none"> <li>- Φροντίδα κατά τη σπορά για να εξασφαλιστεί καλή παραγωγικότητα του λιβαδιού</li> <li>- Ακρίβεια της βοσκής</li> </ul> <p><b>Τεχνικό φυλλάδιο</b></p> <p>Προσαρμογή λιβαδιών στην κλιματική αλλαγή</p> <p>Περιγραφή της καινοτομίας</p> <p><b>Τεχνικό φυλλάδιο</b></p> <p><b>Μερικά οδοντωτά:</b></p> <p><b>Υψηλή Φεστούκα</b></p> <ul style="list-style-type: none"> <li>- Ανθεκτική τόσο σε υψηλές όσο και σε χαμηλές θερμοκρασίες</li> <li>- Υποστηρίζει όλους τους τύπους εδάφους: οξεία, βαριά, υδρομορφικά ...</li> <li>- Ένα από τα χόρτα που αναπτύσσονται περισσότερο καθ' όλη τη διάρκεια του έτους</li> <li>- Μακροπρόθεσμη (περίπου 10 χρόνια)</li> <li>- Σπορά την άνοιξη ή το αργό καλοκαίρι</li> <li>- Σπορά σε βάθος 1 ή 2 εκατοστών</li> <li>- Παρακολούθηση του ανταγωνισμού κατά την εφαρμογή</li> <li>- Ποσοστό σπόρων 10 -20 κιλά/στρέμμα σε καθαρές καλλιέργειες ή 10 -12 κιλά/στρέμμα σε συνδυασμό με λουκέρνη (10 -15 κιλά/στρέμμα λουκέρνης).</li> </ul> <p><b>Σανφουάν</b></p> <ul style="list-style-type: none"> <li>- Γνωστοί δύο διαφορετικοί τύποι σανφουάν:             <ul style="list-style-type: none"> <li>- κοινό ή απλό σανφουάν, που ανθίζει μόνο μια φορά το χρόνο. Δίνει μόνο μια πρώτη κοπή ζωοτροφής και μια αναβίωση, αλλά διαρκεί τουλάχιστον 3 χρόνια. Είναι επιφυλαγμένο για ξηρές περιοχές ή σε υψόμετρο, κυρίως για βοσκή.</li> <li>- το αναδυόμενο ή διπλό σανφουάν, που παρέχει 2 έως 3 κοπές το χρόνο. Πιο παραγωγικό από τον απλό τύπο, είναι επίσης λιγότερο ανθεκτικό.</li> </ul> </li> <li>- Πολύ ανθεκτικό στη ξηρασία και το κρύο</li> <li>- Μπορεί να βοσκηθεί ακόμα και μετά από έντονες παγωνιές</li> <li>- Ζωοτροφή χωρίς φουσκώματα</li> <li>- Πλούσιο σε τανίνες</li> </ul>

Language	Text
	<ul style="list-style-type: none"> <li>- Τα αξίζει ασβεστούχα εδάφη (έως pH 8), αλλά φοβάται υγρά, πηλώδη ή οξεία εδάφη.</li> <li>- Σπορά το αργό καλοκαίρι ή την άνοιξη σε γυμνό έδαφος, ή κάτω από κάλυμμα σίτου την άνοιξη.</li> <li>- Το ποσοστό σπορών είναι 40 έως 50 κιλά/στρέμμα σε κόκκους και 140 έως 160 κιλά/στρέμμα σε καστανές.</li> </ul> <p>Τεχνικό φυλλάδιο</p> <p>Λουκέρνη</p> <ul style="list-style-type: none"> <li>- Το 45 έως 50% της ετήσιας παραγωγής της λουκέρνης γίνεται κατά την περίοδο του καλοκαιριού</li> <li>- Ανθεκτική στην ξηρασία χάρη στην ταπεινή της ρίζα</li> <li>- Φυτό ζωτροφής πλούσιο σε πρωτεΐνες</li> <li>- Εξαιρετικό προηγούμενο καλλιέργειας χάρη στην αποκατάσταση του αζώτου</li> <li>- Σπορά την άνοιξη ή το καλοκαίρι</li> <li>- Υγιή και χαμηλή οξύτητα των εδαφών (pH&gt; 6)</li> <li>- Σπορά σε βάθος 1 -2 εκατοστών μέγιστο</li> <li>- Δόση σπορών 15 έως 20 κιλά/στρέμμα σε καθαρές καλλιέργειες, 10 -15 κιλά/στρέμμα σε συνδυασμό με χόρτα (βρωμόχορτο, κοκκινοπόδαρο, φεστούκα...)</li> </ul> <p>Φυλλή</p> <ul style="list-style-type: none"> <li>- Ανεκτική σε επεισόδια ξηρασίας χάρη στην ταπεινή της ρίζα που υποστηρίζεται από ένα ινώδες σύστημα ριζών.</li> <li>- Πλούσιο σε τανίνες.</li> <li>- Συχνά συνδυάζεται με σικόρια.</li> <li>- Δύο περίοδοι σποράς είναι δυνατές: την άνοιξη ή μετά τη συγκομιδή (από Αύγουστο έως Σεπτέμβριο)</li> <li>- Συχνά σπείρεται ως μείγμα για μεγάλο χρονικό διάστημα (σε αυτήν την περίπτωση, παρέχετε 1,5 κιλά/στρέμμα με χόρτα ή ένα μείγμα τριφυλλίου και σικορίας). Κάποιοι αναμειγνύουν επίσης τη φυλλή με λουκέρνη. Όσον αφορά τη σπορά, είναι προτιμότερο να γίνει την άνοιξη παρά το φθινό...</li> </ul> <p>[Output truncated due to model max context length]</p>
Dutch (LLM output)	<p>Inplantatie van soorten die beter bestand zijn tegen zomerdroogte</p> <p>De klassieke soorten blijvend raaigras, kropaar, witte klavers... soorten, die de zomerdroogtes die de laatste jaren bekend zijn, niet doorstaan, worden vervangen door meer resistente soorten zoals zwenkgras, luzerne, esparcette, cichorei of smalle weegbree.</p> <p>Deze soorten hebben een goede zomergroei en voor sommige een pivoterend wortelsysteem dat een betere vochtretentie tijdens de zomer en een betere bewerking mogelijk maakt.</p> <p>Bovendien hebben sommige van deze soorten ook een significant gezondheidseffect voor dieren.</p> <p>Het gaat er dus om te leren hoe de juiste planten te gebruiken, voor de juiste grond, aangepast aan het type dier en de pedoklimatologische omstandigheden van de percelen.</p> <p>Voordelen</p> <ul style="list-style-type: none"> <li>- Meer productieve soorten in de zomer</li> <li>- Pivoterend wortelsysteem van sommige goed voor de bodem</li> </ul>

Language	Text
	<ul style="list-style-type: none"> <li>- Gezondheidseffect van bepaalde soorten</li> <li>- Coherentie van alle praktijken: bodem / soorten / omstandigheden / dier.</li> <li>- Verbetering van de biodiversiteit</li> </ul> <p>Nadelen</p> <ul style="list-style-type: none"> <li>- Zorg bij het zaaien om een goede productiviteit van de weide te waarborgen</li> <li>- Nauwkeurigheid van begrazing</li> </ul> <p>Technische fiche</p> <p>Aanpassing van graslanden aan klimaatverandering</p> <p>Beschrijving van de innovatie</p> <p>Technische fiche</p> <p>Enkele richtpunten:</p> <p>Hoog Zwenkgras</p> <ul style="list-style-type: none"> <li>- Bestand tegen zowel hoge als koude temperaturen</li> <li>- Ondersteunt alle soorten grond: zuur, zwaar, hydromorf ...</li> <li>- Een van de grassen die het meest groeit gedurende het hele jaar</li> <li>- Lange termijn (ongeveer 10 jaar)</li> <li>- Zaaïen in het voorjaar of laat in de zomer</li> <li>- Zaaïen op 1 of 2 cm diepte</li> <li>- Concurrentie bij de implementatie monitoren</li> <li>- Zaaïdichtheid 10 -20 kg/ha in zuivere stands of 10 -12 kg/ha in combinatie met luzerne (10 -15 kg/ha luzerne).</li> </ul> <p>Esparcette</p> <ul style="list-style-type: none"> <li>- Er zijn twee verschillende soorten esparcette bekend:             <ul style="list-style-type: none"> <li>- gewone of enkele esparcette, die slechts eenmaal per jaar bloeit. Het levert alleen een eerste snede voer en een heropleving, maar het duurt minstens 3 jaar. Het is gereserveerd voor droge gebieden of op hoogte, voornamelijk voor begrazing.</li> <li>- de opgaande of dubbele esparcette, die 2 tot 3 keer per jaar wordt gesneden. Productiever dan het enkele type, maar ook minder duurzaam.</li> </ul> </li> <li>- Zeer bestand tegen droogte en kou</li> <li>- Kan zelfs na zware vorst worden begraasd</li> <li>- Niet -opgeblazen voer</li> <li>- Rijk aan looistoffen</li> <li>- De esparcette waardeert kalkrijke gronden (tot pH 8), maar vreest vochtige, kleiachtige of zure gronden.</li> <li>- Zaaïen laat in de zomer of in het voorjaar in kale grond, of onder dekking van graan in het voorjaar</li> <li>- De zaaïdichtheid is 40 tot 50 kg/ha in korrels en 140 tot 160 kg/ha in zaadhulzen.</li> </ul> <p>Technische fiche</p> <p>Luzerne</p> <ul style="list-style-type: none"> <li>- 45 tot 50% van de jaarlijkse productie van luzerne vindt plaats tijdens de zomerperiode</li> <li>- Droogtebestendig dankzij zijn penwortel</li> <li>- Voederplant met het hoogste eiwitgehalte</li> <li>- Uitstekende groenbemester dankzij zijn stikstofrestitutie</li> </ul>



Language	Text
	<ul style="list-style-type: none"> <li>- Zaaïen in het voorjaar of de zomer Gezonde en licht zure gronden (pH&gt; 6)</li> <li>- Zaaïen op maximaal 1 -2 cm diepte</li> <li>- Zaaïdosis 15 tot 20 kg/ha in zuivere stands, 10 -15 kg/ha in combinatie met grassen (bromegrassen, kropjaar, zwenkgras ...)</li> <li>- Smalle Weegbree</li> <li>- Tolerant voor droogteperiodes dankzij zijn penwortel ondersteund door een vezelig wortelstelsel.</li> <li>- Rijk aan looïstoffen.</li> <li>- Vaak geassocieerd met cichorei</li> <li>- Twee zaaitijden zijn mogelijk: in het voorjaar of na de oogst (van augustus tot september)</li> </ul> <p>Het wordt vaak gezaaid als mengsel voor een lange tijd (in dit geval 1,5 kg/ha met grassen of een mengsel van klaver en cichorei). Sommigen mengen ook weegbree met luzerne. Wat betreft het zaaïen, is het eerder aan te raden om dit in het voorjaar te doen dan in de herfst, omdat in het laatste geval de weegbree niet genoeg ontwikkeld zal zijn om de winter door te komen.</p> <ul style="list-style-type: none"> <li>- Zaaïen op 1 cm diepte Cichorei</li> <li>- Meerjarige plant met penwortel.</li> <li>- Het verdraagt zure gronden (pH 5,5 tot 6,2) en ondiepe gronden. Het heeft een zeer goede weerstand tegen kou en droogte.</li> <li>- Rijk aan looïstoffen</li> <li>- Alleen regelmatige begrazing wordt aanbevolen. Het moet bij het bladstadium worden begraasd, elke 15 tot 20 dagen na de groei van de plant.</li> <li>- Het lage drogestofgehalte beperkt het gebruik tot maximaal 75% van het rantsoen.</li> <li>- Stikstofrijk, cichorei wordt aanbevolen in mengsel met peulvruchten: de zaaïdosis is 8 kg in zuivere stands met 3 kg TB, of 2 tot 3 kg cichorei in combinatie met 25 kg multispecies mengsel.</li> <li>- De levensduur is gemiddeld 4 jaar.</li> </ul>
French (LLM output)	<p>Implantation d'espèces plus résistantes à la sécheresse estivale</p> <p>Le type classique de ray-grass vivace, de dactyle, de trèfle blanc... des espèces, qui ne résistent pas aux sécheresses estivales connues ces dernières années, sont remplacées par des espèces plus résistantes telles que le fétuque, la luzerne, le sainfoin, la chicorée ou la plantain lancéolé. Ces espèces ont une bonne croissance estivale et pour certaines un système racinaire pivotant qui permet une meilleure rétention d'humidité pendant l'été et un meilleur travail du sol.</p> <p>De plus, certaines de ces espèces ont également un effet significatif sur la santé des animaux.</p> <p>Il s'agit donc d'apprendre à utiliser les bonnes plantes, pour le bon sol, adaptées au type d'animal et aux conditions pédoclimatiques des parcelles.</p> <p>Avantages</p> <ul style="list-style-type: none"> <li>- Espèces plus productives en été</li> <li>- Système racinaire pivotant de certaines bon pour le sol</li> <li>- Effet sur la santé de certaines espèces</li> <li>- Cohérence de toutes les pratiques : sol / espèces / conditions / animal.</li> <li>- Amélioration de la biodiversité</li> </ul>



Language	Text
	<p>Inconvénients</p> <ul style="list-style-type: none"> <li>- Attention lors du semis pour assurer une bonne productivité de la prairie</li> <li>- Précision du pâturage</li> </ul> <p>Fiche technique</p> <p>Adaptation des prairies au changement climatique</p> <p>Description de l'innovation</p> <p>Fiche technique</p> <p>Quelques repères :</p> <p>Fétuque élevée</p> <ul style="list-style-type: none"> <li>- Résistante aux températures élevées et froides</li> <li>- Supporte tous types de sol : acide, lourd, hydromorphe...</li> <li>- Une des herbes qui pousse le plus tout au long de l'année</li> <li>- Long terme (environ 10 ans)</li> <li>- Semis au printemps ou fin de l'été</li> <li>- Semis à 1 ou 2 cm de profondeur</li> <li>- Surveiller la concurrence à la mise en place</li> <li>- Densité de semis de 10 à 20 kg/ha en culture pure ou de 10 à 12 kg/ha en combinaison avec de la luzerne (10 à 15 kg/ha de luzerne).</li> </ul> <p>Sainfoin</p> <ul style="list-style-type: none"> <li>- Deux types différents de sainfoin sont connus :             <ul style="list-style-type: none"> <li>- le sainfoin commun ou simple, qui ne fleurit qu'une fois par an. Il ne fournit qu'une première coupe de fourrage et une reprise, mais dure au moins 3 ans. Il est réservé aux zones sèches ou en altitude, principalement pour le pâturage.</li> <li>- le sainfoin ascendant ou double, qui fournit 2 à 3 coupes par an. Plus productif que le type simple, il est aussi moins durable.</li> </ul> </li> <li>- Très résistant à la sécheresse et au froid</li> <li>- Peut être pâturé même après de fortes gelées</li> <li>- Fourrage non ballonnant</li> <li>- Riche en tanin</li> <li>- Le sainfoin valorise les sols calcaires (jusqu'à pH 8), mais craint les sols humides, argileux ou acides.</li> <li>- Semis en fin d'été ou au printemps sur sol nu, ou sous couvert de céréales au printemps</li> <li>- Le taux de semis est de 40 à 50 kg/ha en graines et de 140 à 160 kg/ha en gousses.</li> </ul> <p>Fiche technique</p> <p>Luzerne</p> <ul style="list-style-type: none"> <li>- 45 à 50% de la production annuelle de luzerne est réalisée pendant la période estivale</li> <li>- Résistante à la sécheresse grâce à sa racine pivotante</li> <li>- Plante fourragère la plus riche en protéines</li> <li>- Excellent précédent cultural grâce à sa restitution d'azote</li> <li>- Semis au printemps ou en été</li> <li>- Sols sains et peu acides (pH &gt; 6)</li> </ul>

Language	Text
	<ul style="list-style-type: none"> <li>- Semis à 1-2 cm de profondeur maximum</li> <li>- Dose de semis de 15 à 20 kg/ha en culture pure, de 10 à 15 kg/ha en combinaison avec des graminées (brome, dactyle, fétuque...)</li> </ul> <p>Plantain</p> <ul style="list-style-type: none"> <li>- Tolérant aux épisodes de sécheresse grâce à sa racine pivotante soutenue par un système racinaire fibreux.</li> <li>- Riche en tanins.</li> <li>- Souvent associé à la chicorée</li> <li>- Deux périodes de semis sont possibles : au printemps ou après la récolte (d'août à septembre) Il est souvent semé en mélange pour une longue durée (dans ce cas, prévoir 1,5 kg/ha avec des graminées ou un mélange de trèfle et de chicorée). Certains mélangent également du plantain avec de la luzerne. En ce qui concerne le semis, il est plutôt conseillé de le réaliser au printemps qu'en automne car dans ce dernier cas, le plantain n'aura pas assez développé pour passer l'hiver.</li> <li>- Semis à 1 cm de profondeur Chicorée</li> <li>- Plante pérenne à racine pivotante.</li> <li>- Elle tolère les sols acides (pH 5,5 à 6,2) ainsi que les sols peu profonds. Elle a une très bonne résistance au froid et à la sécheresse.</li> <li>- Riche en tanin</li> <li>- Seul le pâturage régulier est recommandé. Il doit être pâturé à l'état feuillu tous les 15 à 20 jours suivant la croissance de la plante.</li> <li>- Sa faible teneur en matière sèche limite son utilisation à 75% maximum de la ration.</li> <li>- Riche en azote, la chicorée est recommandée en mélange avec des légumineuses : la dose de semis est de 8 kg en culture pure avec 3 kg de TB, ou de 2 à 3 kg de chicorée associée à 25 kg de mélange multi-espèces.</li> <li>- Sa longévité est en moyenne de 4 ans.</li> </ul>

## Annex 3: Multi-linguality practices in existing agri-food and forestry platforms

In this section, example cases of agri-food (and forestry) platforms are demonstrated in relation to the multilingual functionalities they provide. The aim is to help towards further shaping the context within which our work on the EU-FarmBook platform, and especially the work on the delivery of multilingual functionalities, is situated. The platforms selected as the cases to be presented in this section are Groen Kennisnet<sup>8</sup>, Organic Eprints<sup>9</sup>, and AGRIS. Regarding the first two platforms, initial contacts and communication have taken place with the aim to establish a channel of collaboration with the EU-FarmBook platform. This collaboration involves the further distribution and dissemination of results available in Groen Kennisnet and Organic Eprints from the EU-FarmBook platform to facilitate a broader outreach and impact.

### Groen Kennisnet

Groen Kennisnet is a knowledge platform delivering a wide range of digital objects, or knowledge sources as they are termed in the platform's website, related to the agri-food and green domains. The knowledge sources available from Groen Kennisnet are freely available and belong to a broad spectrum of types (articles, reports, theses, blog posts, factsheets, etc.). The collection of knowledge sources is enriched with the contribution of a network of collaborators/contributors including publishers, knowledge institutions, and other organizations to ensure that relevant articles, research and project results, learning material, and other knowledge sources get available to the Groen Kennisnet collection.

The interfaces of the Groen Kennisnet platform are accessible in two languages, Dutch and English. In case of a user located in a non-Dutch speaking language, English is the language in which the platform interfaces are accessed. There is no option in the platform to manually select the language in which the platform interfaces are accessed. As made evident from the search filters in the platform, there are knowledge sources in languages other than Dutch and English including languages that are non-European. The users of the platform can create an account by filling in their email address and a password in the form provided to them for their account creation. In case of interacting with the Groen Kennisnet platform in English, an email for account confirmation details is also received in English.

Searches in the platform need by default to be made in Dutch and English. When trying out the platform as part of our platform investigation exercise reported in this section, a search with the term "fertiliser" was made. The search term was submitted both in English and Dutch ("kunstmest"). The search with the English term yielded 4828 results, whereas the search using the Dutch version of the term yielded 6979 results. Searches were also made using the Greek ("λίπασμα") and Italian ("fertilizzante") versions of the term. In the first case, no results were yielded. In the latter case, five results were returned having no

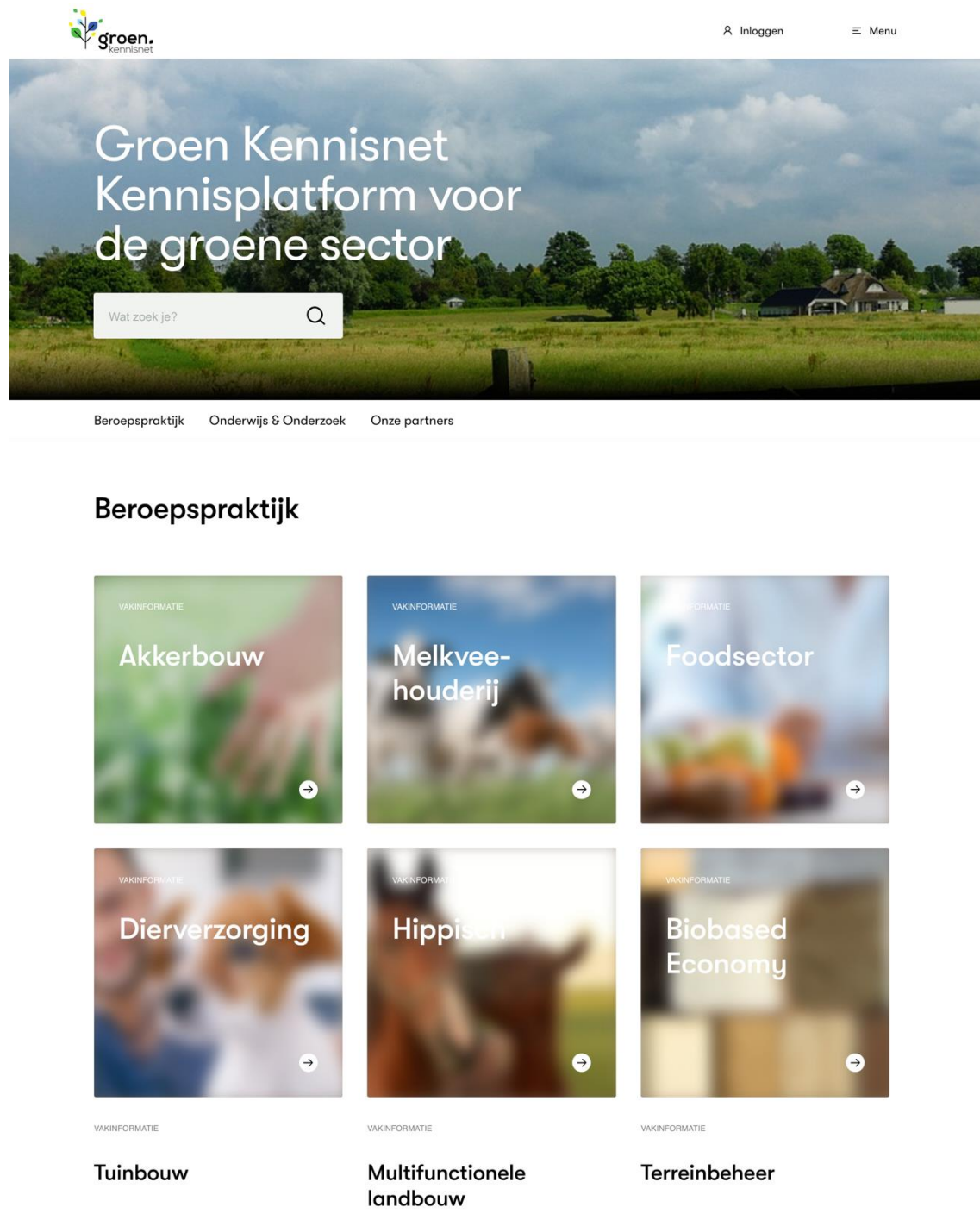
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<sup>8</sup> <https://groenkennisnet.nl/>

<sup>9</sup> <https://orgprints.org/>

direct relevance to the search term. The relation was indirect and had mostly to do with the language of the search (e.g., the word “Italian” was mentioned in the returned result, the organisation responsible for the creation of the knowledge source is in Italy, etc.).

The landing page of the Groen Kennisnet platform is shown in Figure 11 below.



**Figure 11:** The landing page of the groen kennisnet platform

## Organic Eprints

Organic Eprints is an international open access archive of electronic documents related to research in organic food and farming. The archive contains full-text papers together with bibliographic information, abstracts, and other metadata. It also provides information on organisations, projects, and facilities related to organic farming research. The platform delivers resources such as scientific papers, theses, reports, book chapters, newspaper articles, videos, and project descriptions. The main condition for any of these resources to become available from the Organic Eprints platform is that the content delivered from it is relevant to research in organic agriculture.

The platform interfaces can be accessed in English and German. The user can manually switch from English to German by clicking a link at the bottom right corner of the landing page (see Figure 12 below). The metadata of the digital objects available in the platform is also available in English and German. No automatic translation services are used for the translations in German. FiBL is responsible for the translations.

Welcome to Organic Eprints

Organic Eprints is an international open access archive for papers and projects related to research in organic food and farming. The archive contains full-text papers in electronic form together with bibliographic information, abstracts and other metadata. It also offers information on organisations, projects and facilities in the context of organic farming research. [More about the archive.](#)

Manual for Organic Eprints in English, Czech, French, Portuguese, Spanish and Turkish can be found [HERE](#)  
 Manual do Usuário do Organic Eprints em Português, [AQUI](#)  
 Manual de Organic Eprints en español, [AQUI](#)  
 Manuál k Organic Eprints v českém jazyce [ZDE](#)  
 Türkçe Organik Eprints kullanma kılavuzu [BURADA](#) bulunabilir.  
 Manuel d'utilisation d'Organic Eprints en français, cliquer [ICI](#)

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[supporters](#)



**FiBL**

auf deutsch

**Figure 12:** Selecting German as the language for accessing the Organic Eprint platform's interfaces

As shown in Figure 13 below, support in the form of guides and manuals is available in several languages (English, Czech, French, Portuguese, Spanish and Turkish).

Manual for Organic Eprints in English, Czech, French, Portuguese, Spanish and Turkish can be found [HERE](#)  
 Manual do Usuário do Organic Eprints em Português, [AQUI](#)  
 Manual de Organic Eprints en español, [AQUI](#)  
 Manuál k Organic Eprints v českém jazyce [ZDE](#)  
 Türkçe Organik Eprints kullanma kılavuzu [BURADA](#) bulunabilir.  
 Manuel d'utilisation d'Organic Eprints en français, cliquer [ICI](#)

**Figure 13:** Languages in which support to users is provided from the Organic Eprints platform

Users can make contributions in any language. The only request to the contributors is to provide a summary of the digital object they upload (the so-called "Eprint") in English.



## AGRIS

The AGRIS database was considered in the context of the platform investigation exercise we undertook because of the approach it embraces for addressing the search operations executed by users. The AGRIS platform delivers a wide range of digital resources related to the agri-food domain, such as journal articles, conference proceedings, monographs, books, book chapters, grey literature (theses, dissertations, technical reports, working papers, etc.), as well as datasets focussing on a range of topics relevant to FAO thematic areas. The AGRIS platform's audience is made up of researchers, librarians, information managers, and anyone having an interest in agri-food matters. The AGRIS platform was initially created by FAO and is maintained by the same organisation. It is a sister project of AGROVOC<sup>10</sup>, which is a structured vocabulary of agricultural concepts and their relations, used in the AGRIS platform for tagging resources. The landing page of AGRIS is shown in Figure 14 below.



**Figure 14:** The landing page of the AGRIS platform

As described in [5], AGRIS offers a functionality called multilingual search which enables the delivery of search results even in languages different from that in which the search is made. The incentive for multilingual search is to enable multilingual information retrieval, which is considered highly important for the usefulness of the AGRIS platform. Multilingual search is enabled from the use of AGROVOC concepts for resource tagging and the fact that AGROVOC contains definitions of concepts in multiple languages. When a search is made, the search keywords get translated in languages other than that of the search query and results are returned in other languages too. The range of languages in which results for the search can be returned depends on the languages in

<sup>10</sup> <https://www.fao.org/agrovoc/>

which a keyword appears in AGROVOC. For instance, if a user makes a search with the term “precision agriculture” the results may contain resources in English, Czech, Italian, Romanian, and German. This is because “precision agriculture” is defined in AGROVOC in all the above languages. Most of the results are provided in the language of the search. Results available in the language of the search query are delivered first. Results in other languages (if any) are delivered next. By making the multilingual search functionality available on demand, the users of the AGRIS platform can access digital resources that make a fit to their needs even if the results available in the language of their preference are few. In a small series of experiments described in [5], it was found that the extra time needed to expand a search query in languages other than English was not more than 27.14 milliseconds on average. This extra time is only 7.4% of the time for the execution of a search query without any language expansion, which was 367.14 milliseconds on average. Based on data presented in [5], in 2016 the rate of users of the AGRIS platform making use of the multilingual search functionality was 2%. Considering the fact that the AGRIS platform receives visits of tens or hundreds of thousands per month, the rate that makes use of the multilingual search functionality corresponds to a large user number.



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