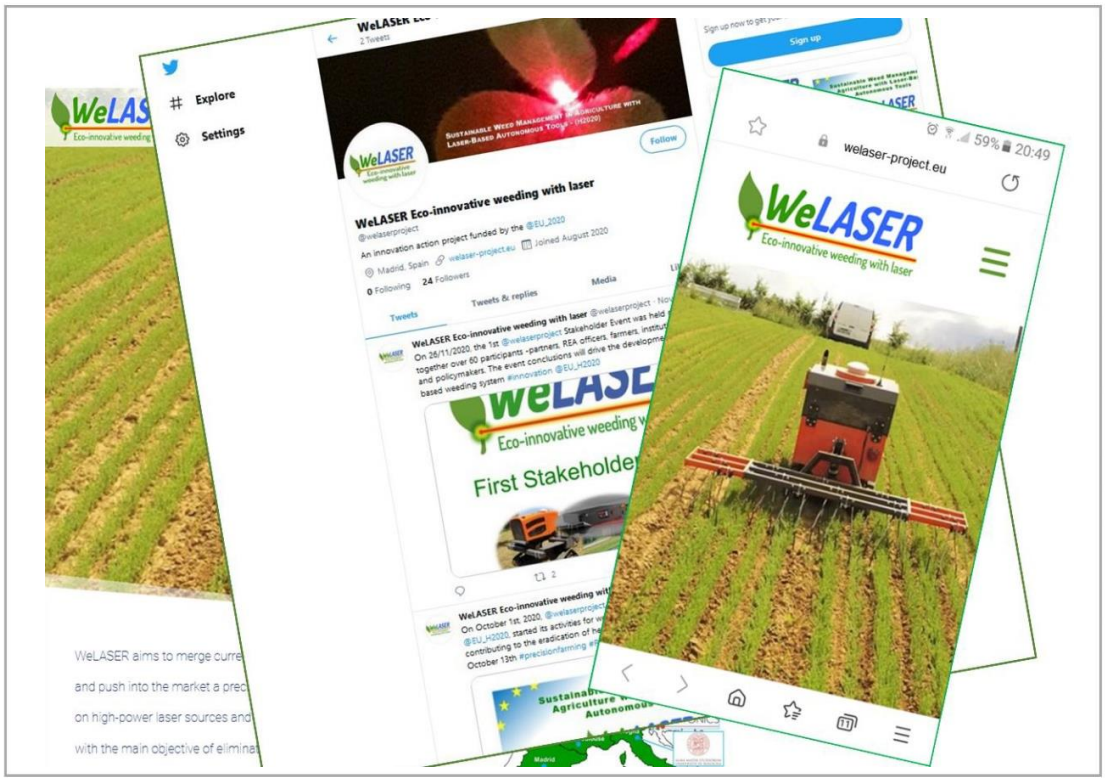
WeLASER

Eco-innovative weeding with laser

Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

D6.3 - Communication, dissemination and exploitation activities and results (II)



CSIC Consejo Superior de Investigaciones Científicas · FUTONICS · LZH Laser Zentrum Hannover e.V. · University of Copenhagen · AGREENCULTURE Smart robots for smart farming · COAG · Alma Mater Studiorum Università di Bologna · IETU Instytut Ekologii Terenów Uprzemysłowionych · Ghent University · van den borne aardappelen

Funded by the Horizon 2020 programme of the European Union

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* Report; Prototype; Demonstrator; Other.

**Public; Restricted to other programme participants (including the Commission Services); Restricted to a group specified by the consortium (including the Commission Services); Confidential, only for members of the consortium (including the Commission Services).

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EXECUTIVE SUMMARY

This deliverable provides a broad overview of the communication, dissemination and exploitation activities implemented within the WeLASER project in the first 24 months of the project, updating the D6.2 (*Communication, dissemination and exploitation activities and results (I)*, delivered on September 30th, 2021), and provides information about the dissemination and exploitation activities planned for the rest of the project.

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LIST OF ACRONYMS AND ABBREVIATIONS

AGC:	Agreenculture
CATI:	Computer Assisted Telephone Interviewing
COAG:	Coordinator of Farmer Organizations and Livestock Rural Initiative of Spain
CSIC:	Spanish National Research Council
DoA:	Description of the Action (A part of the Grant Agreement)
FUT:	Futonics
IETU:	Institute for Ecology of Industrial Areas
IoT:	Internet of Things
KPI:	Key Performance Indicators
LZH:	Laser Zentrum Hannover
M1 – M36:	Month within the period of project development
PESTEL:	Political (P), Economic (E), Social (S), Technological (T), Environmental (E), and Legal (L).
UCPH:	University of Copenhagen
UGENT:	Ghent University
UNIBO:	University of Bologna
VDBP:	Van den Borne Projecten
WP:	Work Package

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1. PURPOSE OF THE DOCUMENT

The objective of this annual report on the communication, dissemination and exploitation activities is to provide a thorough overview of the executed activities for the first two years of the project. This overview is a valuable tool and gives detailed insight into this kind of action made around the project. Furthermore, the project's plans on communication, dissemination, and exploitation activities for the remainder of the project are outlined.

This deliverable will be updated in M36 to produce 6.4.

2. INTRODUCTION

2.1. About WeLASER

WeLASER aims to merge current technologies to build, assess and push into the market a precision weeding system based on high-power laser sources and autonomous mobile systems with the main objective of eliminating the use of herbicides while improving productivity and competitiveness; such a system would eradicate health risks and environmental adverse effects associated with the use of herbicides.

In the context of the world's growing population and higher needs of reducing the uses of pesticides and fertilizers, WeLASER seeks more sustainable management. Mechanical solutions contribute to deteriorate the soil properties, harm beneficial soil organisms and provide poor results for in-row weeding. However, the WeLASER solution focuses on non-chemical weed management based on applying lethal doses of energy to the weed meristems using a high-power laser source. An AI-vision system discriminates crops from weeds and detects the position of the weed meristems to point the laser on them using a laser scanner. An autonomous vehicle carries these systems all over the field. A smart controller coordinates these systems and uses IoT and cloud computing techniques to manage agricultural knowledge. This technology will provide a clean solution to the weeding problem and will help to decrease significantly the chemicals in the environment.

2.2. About WP6 on Knowledge spread

Regarding knowledge spread, WeLASER WP6 main objective is to create visibility for the consortium by planning a fruitful communication and dissemination strategy to promote the project results. To this aim involvement of all actors in the diffusion of knowledge is structured through the multiactor strategy. Communication actions provide targeted information to multiple audiences according to the strategies defined. Dissemination activities diffuse the technological and scientific advances of WeLASER to the research community.

To maximise the project impact, a continuously updated exploitation plan specifies the management of the full-exploitation chain activities focusing on the market analysis and market strategy, distribution and pricing models. Commercialization, exploitation, and market deployment plan

beyond the duration of the project is also addressed.

3. WeLASER Stakeholders and Audience

Stakeholders are an essential point to consider when defining the WeLASER dissemination and communication plans as they are a key target from the outset of the project not only to spread the WeLASER activities, but also to promote the uptake of WeLASER project results. Also, according to the multi-actor involvement strategy, all stakeholders will monitor and contribute to the activities related to communication, dissemination and exploitation.

As part of the multi-actor involvement strategy, the first identification of stakeholders was carried out until mid-November 2020 and continues throughout the duration of the project. Stakeholders were identified, balance-selected and engage from four different groups, which are in line with the categories covered by the dissemination and communication plan:

- **Academic and research**
  - Scientific and education community: universities, high education and research institutes;
  - Education and training institutions, educational institutions and schools;
  - National and international research centres;
  - Students community: to engage the student community in their different levels (undergraduate, graduate, M.Sc. and Ph.D.) are of paramount importance for training new professionals and covering the new expected jobs.
  - Standardization institutions: institutions for standardization through their tools and committees to develop new standards. For instance, the International Organization for Standardization (ISO), the International Electro-technical Commission (IEC), CENELEC - Comité Européen de Normalisation Electrotechnique and collaboration, CEN National Standardization Bodies/CENELEC National Committees and the national trade associations representing different sectors of business and industry.
- **Businesses**
  - Industrial community: machinery associations at the national and European levels. Machinery firms, robotics companies, laser industry. Farming machinery-related industry.
  - End users: farmers and farmer associations at national, European and international levels, crop protection associations, organic farming associations, cooperative and cooperatives associations.
  - Investors: individual and institutional investors, agricultural and investment groups, banks, investment funds, crowdfunding tools and institutions.
- **Decision-makers and Policy-makers**
  - Local, regional, national governments and EU policy-makers, government funding bodies

and agencies.

- Policy influencers: advocacy groups and associations pertinent as influencers and thought leaders in their communities and sectors.
- European Innovation Partnership for Agricultural productivity and sustainability (EIP-AGRI).
- European Commission and Research Executive Agency.

❖ **General public**

- Society at large: civil society and general stakeholders
- General media.
- Professional and specialized media.

4. CONTENT FOR COMMUNICATION AND DISSEMINATION

All WeLASER templates and supporting material for communication and dissemination were created and agreed between M1 and M2 of the project.

4.1. Logos

The WeLASER logos were created and agreed upon in M1 of the project and all specifications around design, colour and presentation were detailed. Every communication involving graphic content (i.e. printed media, online website and social media channels, emails, newsletters, presentations, publications etc.) on all WeLASER channels to external audiences has to include the WeLASER logo in an appropriate format.

Fig. 4.1 WeLASER logo with slogan

Fig. 4.2 WeLASER logo without slogan

Fig. 4.3 WeLASER logos adapted for social media

Fig. 4.4 WeLASER logos adapted to other formats

As established in the Grant Agreement, all dissemination of results display the EU emblem and include the text: "*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000256*".

4.2. Templates

The WeLASER templates were defined and agreed upon in M1 of the project. Specifically, templates for the following types of documents were created:

- POWER POINT format template for presentations.
- WORD format template for deliverables.
- WORD format template for newsletters.
- WORD format template for the agendas and minutes of the meetings.

WeLASER templates are gathered in Annex 1.

4.3. Roll-up

The WeLASER roll-up design was defined and agreed upon in M2 of the project. This design provides WeLASER consortium with a common and high-impact resource for fairs, congress, field days and other dissemination events. Posters presented in section 5.1.11 are based on this roll-up design.

Fig. 4.5 WeLASER roll-up

4.4. Virtual background

The WeLASER virtual background design was defined and agreed upon in M2 of the project. This resource is used in online events and virtual meetings, allowing a common and useful format, especially in the context of COVID-19 restrictions.

Fig. 4.6 WeLASER virtual background

5. Dissemination and Communication Activities

Dissemination activities in WeLASER are devoted to diffuse technological and scientific advances of WeLASER to the industrial community and academia. In particular, the dissemination purposes are devoted to raise awareness and to increase understanding of what is doing, to inform of the advances of the project, to engage and getting input from that audience, and to promote and encourage acceptance and recognition to ease the way for market deployment of the project results and outputs.

The actions are focused on peer-reviewed scientific publications through gold and green open access approaches, where the participants from academia are committed to contribute with publications in scientific conferences and journals indexed in the Journal Citation Report (JCR), at the national and international levels.

Dissemination started in the project kick-off and will continue until the end of the project development.

Communication activities in WeLASER are devoted to generating the proper messages regarding the project activities and the project results to be scattered through the media to reach the general audience, professionals and the local, national and EU governments with the aim of improving awareness and trust in new weeding technology.

The activities are focused on the launch and maintenance of the project website and the creation and management of social media accounts. D6.1 reported the creation of this communication material. Another important part of this activity is devoted to the elaboration and issue of the “Practice Abstracts” of the Agricultural European Innovation Partnership (EIP-AGRI) common format to be made available to the interested communities through the online EIP-AGRI database. Communication started in M1 and will continue to M36.

5.1. Activities planned and developed

5.1.1. Journal articles

WeLASER members coming from academia submit manuscripts to journals indexed in the Journal Citation Report (JCR) to inform the scientific community about the project outcomes, as scientists from universities and research centres traditionally look for new interesting results in peer-reviewed scientific journals. Achieving publication in these types of journals will also be a measure of the quality of the project results.

During the two first years of WeLASER project several articles were published (Table 5.1).

Table 5.1 WeLASER journal articles

	Type	DOI	ISSN or eSSN	Title of the journal	Number, date	Publisher	Place of publication	Year of publication	Relevant pages	Public & private publication[1]	Peer-review	Open access
Title	A Concept of a Compact and Inexpensive Device for Controlling Weeds with Laser Beams											
Authors	Ildar Rakhmatulin, Christian Andreasen											
	Article in journal	10.3390/agronomy10101616	20734395	Agronomy	10/10	MDPI	Switzerland	2020	1616	YES	YES	Gold OA 1,482.0 €
Title	Crop Management with the IoT: An Interdisciplinary Survey											
Authors	Giuliano Vitali, Matteo Francia, Matteo Golfarelli, Maurizio Canavari											
	Article in journal	10.3390/agronomy11010181	20734395	Agronomy	11/1	MDPI	Switzerland	2021	181	YES	YES	Gold OA -- €
Title	"Deep Neural Networks to Detect Weeds from Crops in Agricultural Environments in Real-Time: A Review"											
Authors	Ildar Rakhmatuiln, Andreas Kamilaris, and– Christian Andreasen											
	Article in journal	10.3390/rs13214486	20724292	Agronomy	8/11	MDPI	Switzerland	2021		YES	YES	Gold OA
Title	"Laser Weeding with Small Autonomous Vehicles: Friends or Foes?"											
Authors	Christian Andreasen, Karsten Scholle and Mahin Saberi											
	Article in journal	10.3389/fagro.2022.841086		Front. Agron	4:841086	FRONTIERS		2022		YES	YES	Gold OA

[1] *Both the joint publications coming from academic and corporate project participants as well as joint publications of project participants with academic/corporate organisations outside the consortium (as long as they are related to the funded project) should be reported*

5.1.2. International conference papers and presentations

The WeLASER partners attend relevant conferences to inform the scientific community about the project results through publications in proceedings and engage attendees through public presentations promoting scientific and technical discussions. During the two first years of WeLASER project activities were developed in this area (Table 5.2).

Table 5.2 International conference papers and presentations

Presentation at the IIRB (International Institute of Sugar Beet Research) online seminar held on 4th of May 2021: "Laser applications for sustainable plant production" (LZH, M. Wollweber). https://www.iirb.org/fileadmin/IIRB/Seminars/2021/Programme_IIRB_Seminar_2021.pdf
Presentation at the 107th Congress of Italian Society of Physics held online 13-17 September 2021. (UNIBO, G. Vitali). IoT in Environmental Physics - Book of Abstracts - ISBN: 978-88-7438-127-2 - pg.309. https://welaser-project.eu/wp-content/uploads/2021/12/Societa-Italiana-di-Fisica-107-National-Congress-Vitali.pdf
"Thermische Beikrautbekämpfungstechnologien für die konservierende Bodenbearbeitung" (Technologies for thermal weed treatment in conservation soil cultivation). Merve Wollweber. Fortbildung Pflanzenbau 2021, Landesbetrieb Landwirtschaft Hessen, Bildungsseminar Rauischholzhausen; 9./10.11.2021, online.
"Unkrautbekämpfung mit dem Laser" (Weeding with lasers). Merve Wollweber. OptecNet Jahrestagung, 24./25.11.2021, Hanover, Germany.
Christian Andreasen, Mahin Sabari & Ildar Rakhmatulin, "Weed control with laser beams using autonomous vehicles: pros and cons", World FIRA 2021, Toulouse, France, 7-9 December 2021. https://welaser-project.eu/wp-content/uploads/2021/12/FIRA2021-Andreasen-et-al-.pdf
J. Herrera, L. Emmi, P. González-de Santos, "Enabling navigation for– autonomous robots in early-stage crop growth", World FIRA 2021, Toulouse, France, 7-9 December 2021. https://welaser-project.eu/wp-content/uploads/2021/12/FIRA2021-Herrera-et-al.pdf
Andreasen, I. Rakhmatullin, M. Saberi and Z. Zang; Weed control with laser beams: an ecofriendly alternative to herbicides and mechanical weed control 4th International "Conference on Photonics Research", Muğla, Turkey, April 22-28, 2022. https://welaser-project.eu/wp-content/uploads/2022/07/Christian-Andreasen-presentation-Photonics.pdf
Christian Andreasen, Mahin Saberi, Karsten Scholle, and Pablo Gonzalez-de-Santos; Laser Weeding with an Autonomous Vehicle, 19th European Weed Research Symposium, "Lighting the future of Weed Science", Athens, Greece, 20-23 June 2022. https://welaser-project.eu/wp-content/uploads/2022/06/Laser-Weeding-EWRS-Poster-2022.pdf
Merve Wollweber and Tammo Ripken. "Laser Weeding – A New Technology for Sustainable Weed Management". SLPC2022 -The 4th Smart Laser Processing Conference at Optics & Photonics International Congress (OPIC 2022). 18-22 April 2022, Yokohama, Japan.
Luis Emmi, Jesus Herrera-Diaz and Pablo Gonzalez-de-Santos; Toward Autonomous Mobile Robot

Navigation in Early-Stage Crop Growth, ICINCO 2022: 19th International Conference on Informatics in Control, Automation and Robotics, Lisbon, Portugal, 14-16 July 2022. https://welaser-project.eu/wp-content/uploads/2022/08/Emmi-Herrara-Gonzalez-de-Santos-ICINCO-2022.pdf
Luis Emmi, Rebeca Parra and Pablo Gonzalez-de-Santos; Digital representation of smart agricultural environments for robot navigation, HAICTA 2022: 10th International Conference on ICT in Agriculture, Food & Environment, Athens, Greece, 22-25 September 2022. https://welaser-project.eu/wp-content/uploads/2022/08/PUBLICATION-Digital-representation-of-smart-agricultural-environments-for-robot.pdf

5.1.3. Special sessions in international conferences

Two special sessions as a part of several relevant conferences are planned during the project. In these sessions, the researchers and engineers involved in the project will be invited to make presentations on scientific and technical aspects related to the progress and outcomes of their work in the project.

5.1.4. Summer Schools

A one-week Summer School will be organized in month M36 in Spain (CSIC) with a twofold objective: to promote the project results and to train future system managers and technicians.

5.1.5. Lectures in MSc and PhD courses

This activity is focused on lectures and presentations at different levels (undergraduate, graduate, M.Sc. and Ph.D.) to engage the student community, as it is of paramount importance for training new professionals and covering the new expected jobs. Graduates are valuable as technicians and M.Sc. and Ph.D. as prospective researchers in the field. During the two first years of WeLASER project, some courses included presentations and discussions of WeLASER concept (Table 5.3).

Table 5.3 Lectures in MSc and PhD courses

Type of activity	Name of the activity	Reference	Place
Course	Grundkursus i plantebeskyttelse (Basic course in plant protection)	5440-B4-4F21;	UCPH
Course	Pesticide Use, Mode of Action and Ecotoxicology	5440-B3-3F21	UCPH
Course	Afgrødelære (Crop Science)	5440-B4-4F21	UCPH
Course	Plantevidenskab (Robotics in Agriculture)	5440-B2-2E21	UCPH
Lecture	“Navigation Strategies for Field Mobile Robotics: WeLASER project case study”	Doctoral program in Computer Engineering. May 3, 2022	Faculty of Informatics, Complutense University of Madrid

5.1.6. Patents

The knowledge generated in WeLASER will be analysed by the Project Management Team to decide what results are to be protected and what results could be disseminated. The strategies for both protection and dissemination of results are set up in the IPR management strategy.

5.1.7. Participation at external related events

The consortium participates in the main technical exhibitions and fairs with the specific goal of promoting contacts and disseminating the achievements to industrial and professional associations. The main exploitable outcomes of the project will be presented at the fair best fitted to the end of the project.

Presentation at "Sustainable Agriculture and Natural Resources" online cluster event organized by the European Research Executive Agency (REA), and held on May 20, 2021 (attended by WeLASER project coordinator and the Technical & Innovation manager).
Presentation at "H2020 Plant Health related projects" online cluster event organized by the European Research Executive Agency (REA)) in cooperation with the European Commission (DG Agriculture and Rural Development), and held on September 23, 2021 (attended by WeLASER project coordinator, the Technical and Innovation Manager, the Dissemination manager, and WP6 (Knowledge spread and innovation management leader).
Öko-Feldtage 2022 (https://oeko-feldtage.de/) in Villmar-Aumenau (Germany) from 28th to 30th of June 2022. Presentation with roll-ups, videos and a live demo of laser weeding as one of 20 innovation examples that were invited to the fare. Approximately 11,500 visitors – among them the German federal minister for Food and Agriculture Cem Özdemir – attended this largest German field day event on a 20 hectare area.

5.1.8. Field and training days

During the last year of the project, two (2) field days will be organized by COAG (Spain), one (1) by UCPH (Denmark) and one more (1) by VDBP (The Netherlands) devoted to farmers. The objective is to allow farmers to be familiar with the WeLASER system and, thus, promote its use. However, as part of the Multi-Actor Approach strategy; contact with the farmers has been continuously carried out. COAG, the farmer's association involved in WeLASER, keeps informed their represented farmers and other farmer's associations in other EU countries and receives feedback on their needs and expectations.

5.1.9. WeLASER stakeholder Event

As a part of the Multi-Actor Approach strategy, five (5) stakeholder events are planned. During the two first years of the project, the first event was organised by COAG on November 26th 2020 and by IETU on May 25th 2021. Due to COVID-19 restrictions, these events were held virtually. The rest

of the stakeholder events will take place in Italy, Spain and Germany.

The First Stakeholder Event was organised by COAG on November 26th, 2020. The main objectives were to (i) stimulate the involvement of stakeholders in the decision level of the consortium and (ii) include the stakeholders in the definition of the system characteristics. Over a total of 60 participants, 21 stakeholders, joined together in this first event. The information provided to the stakeholders, the discussion and the stakeholder assessment are detailed in deliverable D1.1-Multi-actor involvement plan and activities (I).

The Second WeLASER Stakeholder event was organized by IETU and held virtually on May 25th, 2021. The discussion was focused on (i) the security and safety issues, (ii) infrastructures needed for efficient performance of the robot, and (iii) barriers and economic opportunities for implementation of the WeLASER system. Legal and practical aspects of agro-robotics safety, the efficiency of the machine and economics were presented by invited experts and consortium members. In addition, a panel discussion was held with farmers focusing on barriers and challenges for the real application of the WeLASER system. Over 40 professionals representing end users, industry, researchers, policy makers and NGOs interested in this project got together at this event. The meeting discussion and the stakeholder assessment are detailed in deliverable D1.1-Multi-actor involvement plan and activities (I).

The third WeLASER Stakeholders' Event was organised as a virtual event (videoconference) due to the situation caused by Covid-19 on November 19th, 2021. It was focused on key environmental requirements in relation to farmers' and societal needs and respective EU policies. The discussion was predominantly based on the views of the experts who presented key environmental aspects of WeLASER invention and outlined environmental and health benefits of WeLASER. Feedback from an interview of farmers in the Kymi Organic Coop in Finland related to WeLASER technique was delivered. Environmental aspects were also highlighted during presentations of the work performed in particular work packages. Experts and stakeholders pointed out the need for enhancing environmental and health benefits in WeLASER system application. The main key points raised by the stakeholders were summarized in Practice Abstract 20.

5.1.10. Newsletter

A newsletter is planned to be compiled in the agreed format and distributed worldwide every six months. It will be published in all official languages of the consortium countries.

The first newsletter was released on M6, March 2021 and provided in some of the most representative languages of the EU. It was distributed to targeted audiences through WeLASER social networks, partner social networks and mailing lists and it is available on WeLASER website:

https://welaser-project.eu/newsletter/

The second newsletter was released on M12 (September 2021), the third on M18 (March 2022) and the fourth on M24 (September 2022).

These Newsletters are sent to 220 COAG's local offices in Spain and 31 organizations in Europe via European Coordination Via Campesina (ECVC, https://www.eurovia.org/). It was also sent to the updated project stakeholder email list and can be downloaded on the project website.

5.1.11. Project flyer and posters

The WeLASER flyer was created and published in M2. It was widely disseminated at the beginning of the project to aware potentially interested people of the existence of the WeLASER initiative and it is used in dissemination activities and distributed to targeted audiences during the project development. It is also available on WeLASER website

https://welaser-project.eu/wp-content/uploads/2021/07/WeLASER-Flyer_English.pdf.

The flyer was distributed to 31 organizations in Europe via European Coordination Via Campesina (ECVC, https://www.eurovia.org/) and to COPA-COGECA members (70 organizations in the EU, https://copa-cogeca.eu/) via email.

WeLASER posters were designed for each of the stakeholder events and based on this roll-up design (Fig. 4.5)

Fig. 5.1 WeLASER posters

5.1.12. Website

The project website www.welaser-project.eu is one of the most versatile dissemination tools; it was released in M2. The WeLASER website contains updated information for different audiences with three main purposes:

(i) to provide external open information to interested professional parties on the project and its activities,

(ii) to provide external open information to the general public and

(iii) to provide both a private area for communication between the members of the consortium and a central repository of documents of several kinds, such as restricted deliverables, presentations at project meetings and other project-related information.

The WeLASER website aims at being a reference for people interested in the project objectives, activities and results. The WeLASER website is devoted to depict the project objectives, outline its main goals, define the roles of partners, state a timeline of work, etc. and is an essential mechanism for communication and dissemination of the project results. Furthermore, the website is properly updated the project work, communicating future events and news on the project's progress and its activities.

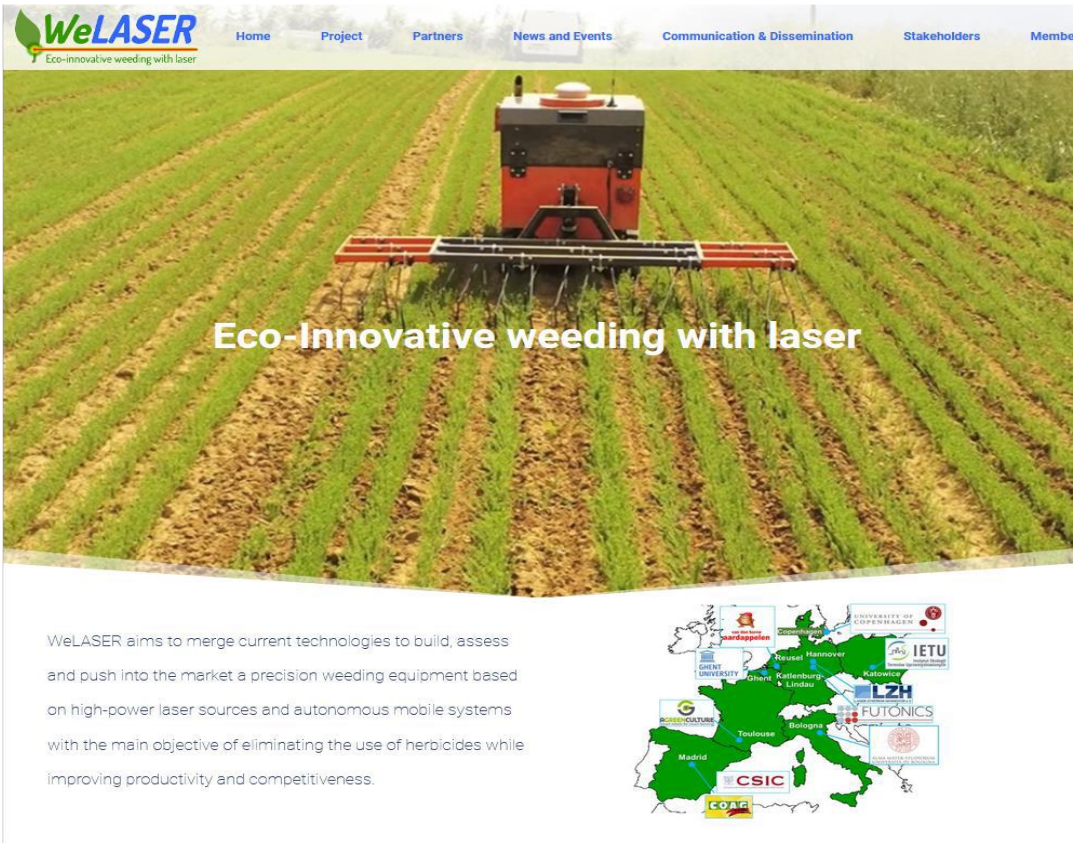


Fig. 5.2 WeLASER website home page

CSIC is the responsible partner for WeLASER website design and management. The main structure has been subcontracted according to the Grant Agreement. CSIC is in charge of updating the website as needed and is open to receive inputs and suggestions from the partners concerning the website contents. The set-up and management of the information for the project website were detailed in Deliverable D6.1. The main statistics of WeLASER website are presented in Annex 2.

5.1.13. Social media

As part of WeLASER strategy for communicating and disseminating project activities and results to all the potentially interested parties, social and media, platforms are active means for sharing information quickly, efficiently and in real-time. Different types and pieces of information are broadcasted depending on both the characteristics of every platform and our objectives at dissemination time. CSIC is the responsible partner for WeLASER social media design and COAG is responsible for management. All WeLASER partners contribute, directly and through their own social media platforms, to enrich this online presence. WeLASER is present on the following platforms:

5.1.13.1. YouTube

YouTube is an online video-sharing platform that allows users to upload, view, share, add to playlists, report, comment on videos, and subscribe to other users. YouTube offers a wide variety of user-generated and corporate media videos. YouTube is an extraordinary tool to disseminate videos on project results. The WeLASER YouTube channel is accessed through the link

https://www.youtube.com/channel/UCGtnXCI44WPgn15HCn5EamA/videos

The WeLASER YouTube channel presents the aspect illustrated in Fig. 5.3. The main statistics of WeLASER Youtube channel are presented in Annex 2.

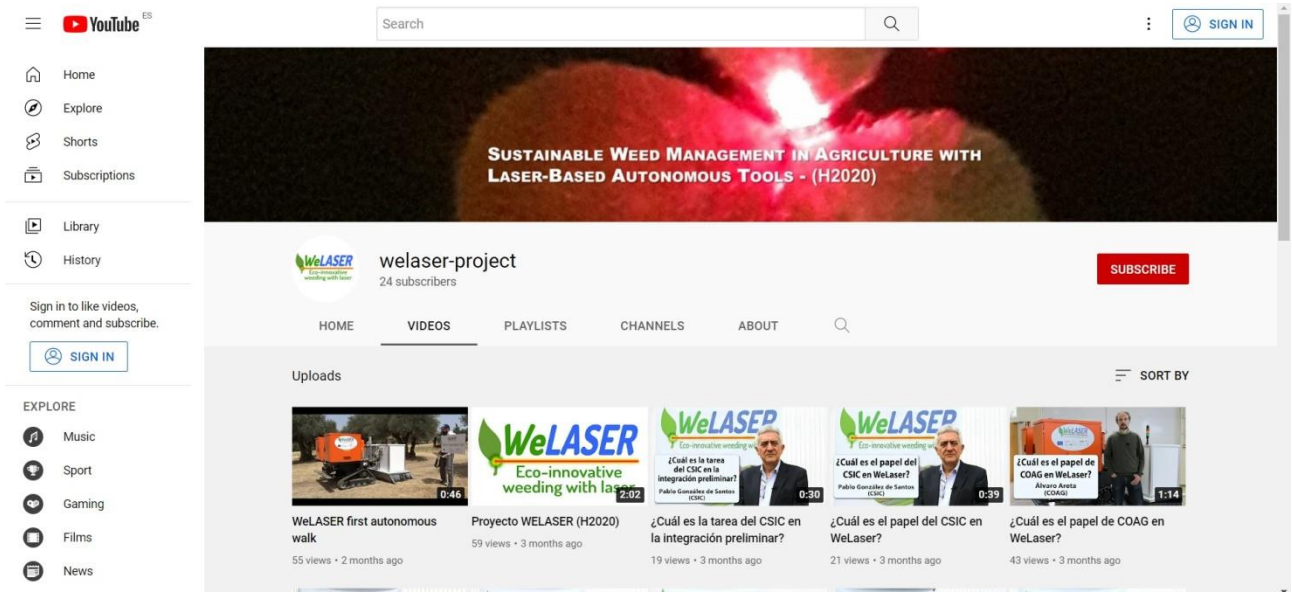


Fig. 5.3 WeLASER home page in YouTube

5.1.13.2. Twitter

Twitter is a micro-blogging and social networking service on which users post and interact with messages known as "tweets". Twitter is an effective way for quick communication. WeLASER twitter is accessed through https://twitter.com/welaserproject. Figure 5.4 illustrates the main page of WeLASER Twitter. The main statistics of WeLASER Twitter are presented in Annex 2.

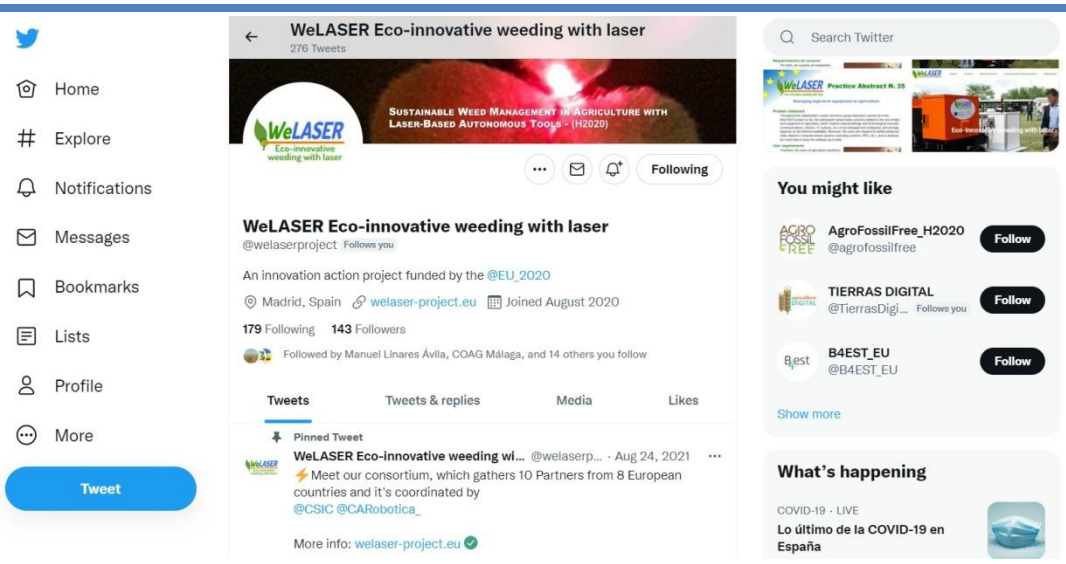


Fig. 5.4 WeLASER home page in Twitter

5.1.13.3. Facebook

Facebook is an online social media and social networking service very effecting in communication. It is used for general text and picture communication. WeLASER Facebook can be accessed through the link https://www.facebook.com/Welaser-project-103771498170178/?modal=admin_todo_tour.

WeLASER main page on Facebook is illustrated in Fig. 5.5. The main statistics of WeLASER Facebook page are presented in Annex 2.

Fig. 5.5 WeLASER home page in Facebook

5.1.13.4. LinkedIn

LinkedIn is a business and employment-oriented online service used for professional networking. It is used for interaction with professionals. WeLASER LinkedIn is accessed through the link: https://www.linkedin.com/company/welaser-project

The home page is illustrated in Fig. 5.6. Main statistics of WeLASER LinkedIn are presented in Annex 2.

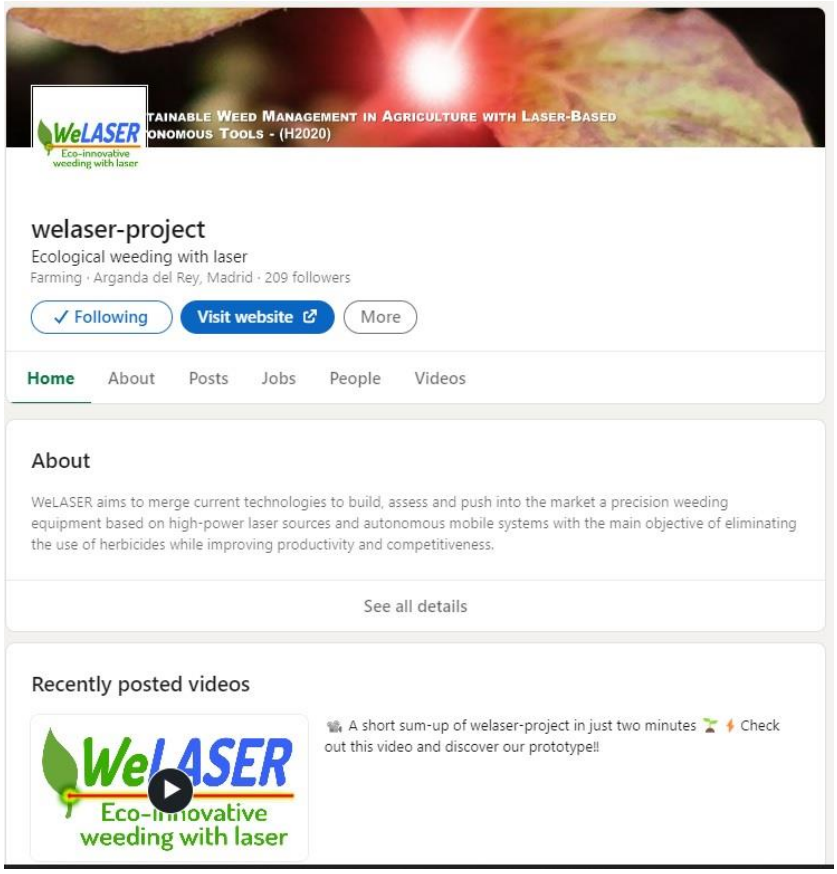


Fig. 5.6 WeLASER home page in LinkedIn

The project website and professional media platforms will be maintained by the WeLASER coordinator for at least 4 years beyond the project development. Expenses caused for this maintenance will be supported by the coordinator (CSIC) as a part of the project indirect costs.

5.1.14. General & Professional media

Companies, end users and general stakeholders are informed about the project findings through press releases published in the technical press, non-scientific and non-peer reviewed publications. Also, the general public is considered as a target and general media are also taken into account in the communication activities. WeLASER uses these important channels to reach the expected targets as it is summarized in Table 5.4.

Table 5.4 WeLASER Press releases and non-scientific and non-peer reviewed publications

Press releases	Partner
WeLASER: the technological solution that aims to end chemical treatments in the weed management https://welaser-project.eu/press-releases/	WeLASER
Nace "WeLASER", la solución tecnológica que pretende acabar con los tratamientos químicos en la eliminación de malas hierbas http://coag.chil.me/post/nace-e2809cwelasere2809d-la-solucion-tecnologica-que-pretende-acabar-con-los-tra-325945	COAG
Un proyecto del CSIC utilizará el láser para eliminar malas hierbas de los cultivos sin necesidad de pesticidas https://www.csic.es/es/actualidad-del-csic/un-proyecto-del-csic-utilizara-el-laser-para-eliminar-malas-hierbas-de-los	CSIC
WeLASER: Technische Alternative im Unkrautmanagement https://www.lzh.de/de/publikationen/pressemitteilungen/2021/welaser-technische-alternative-im-unkrautmanagement	LZH
WeLASER project has successfully achieved its preliminary system integration https://welaser-project.eu/wp-content/uploads/2022/05/NdP-WeLASER-2-22-05-03-EN-vdef-3.pdf	WeLASER
El proyecto WeLASER alcanza con éxito la integración preliminary de su prototipo https://welaser-project.eu/wp-content/uploads/2022/05/NdP-WeLASER-2-22-05-03-version-ES.pdf	WeLASER
WeLASER project enters its final stage https://welaser-project.eu/wp-content/uploads/2022/09/NdP-WeLASER-3-22-09-EN-vdef.pdf	WeLASER
El proyecto WeLASER entra en su etapa final https://welaser-project.eu/wp-content/uploads/2022/09/NdP-WeLASER-3-22-09-ES-vdef.pdf	WeLASER
Non-scientific and non-peer reviewed publications (popularised publications)	
CAMPO GALEGO: https://www.campogalego.es/welaser-la-solucion-tecnologica-que-pretende-acabar-con-los-tratamientos-quimicos-en-la-eliminacion-de-malas-hierbas/	
INTEREMPRESAS https://www.interempresas.net/Horticola/Articulos/320261-COAG-colabora-tratamiento-suprime-completofitosanitarios-toda-aplicacion-quimica.html	
AGROINFORMACIÓN: https://agroinformacion.com/welaser-un-tratamiento-que-suprime-por-completo-los-fitosanitarios-y-toda-aplicacion-quimica-en-la-eliminacion-de-malas-hierbas/	
AGRODIGITAL: https://www.agrodigital.com/2020/12/01/welaser-la-solucion-tecnologica-que-pretende-acabar-con-los-tratamientos-quimicos-en-la-eliminacion-de-malas-hierbas/	
CAMPO DE ASTURIAS: https://www.elcampodeasturias.es/blog/2020/11/30/welaser-la-solucion-tecnologica-que-acabara-con-malas-hierbas-sin-tratamientos-quimicos/	
INFOAGRO: https://www.infoagro.com/noticias/2020/investigan_un_tratamiento_suprime_por_completo_los_fitosanitarios_y_to.asp	

AGRONEWS CASTILLA Y LEÓN https://www.agronewscastillayleon.com/coag-colabora-en-un-tratamiento-que-suprime-por-completo-los-fitosanitarios-y-toda-aplicacion
PROFESIONALES HOY https://profesionaleshoy.es/jardineria/2020/11/30/welaser-una-solucion-tecnologica-para-eliminacion-demalas-hierbas-sin-tratamientos-quimicos/23410
El DÍA DE SEGOVIA: https://www.eldiasegovia.es/Noticia/Z8FB3A914-CBE6-92E8-9A838F9E7F73053E/202012/Nace-WeLASER-el-sistema-que-quiere-acabar-con-el-herbicida
AGROBANK: https://agrobankcaixabank.com/Noticias/nace-welaser-adios-a-las-malas-hierbas
CAMPO CASTILLA Y LEÓN: https://www.campocyl.es/category/sanidad-vegetal/nace-welaser-la-solucion-tecnologica-para-acabar-con-los-tratamientos-quimicos-y-eliminar-malas-hierbas/
AGROCLM: https://www.agroclm.com/2020/11/30/estudiaran-uso-de-laser-para-acabar-con-tratamientos-quimicos-en-eliminacion-de-malas-hierbas/?fbclid=IwAR2k3QCAIfyewQGUgxfMZn9z34fxuJ
INNOVAGRI: https://www.innovagri.es/actualidad/welaser-la-solucion-tecnologica-que-pretende-acabar-con-las-malas-hierbas-sin-tratamientos-quimicos.html
DIARIO DE ÁVILA: https://www.diariodeavila.es/Noticia/Z8FB3A914-CBE6-92E8-9A838F9E7F73053E/202012/Nace-WeLASER-elsistema-que-quiere-acabar-con-el-herbicida
LA TRIBUNA DE TOLEDO: https://www.latribunadetoledo.es/Noticia/Z8FB3A914-CBE6-92E8-9A838F9E7F73053E/202012/Nace-WeLASER-el-sistema-que-quiere-acabar-con-elherbicida
LA TRIBUNA DE ALBACETE: https://www.latribunadealbacete.es/Noticia/Z8FB3A914-CBE6-92E8-9A838F9E7F73053E/202012/Nace-WeLASER-el-sistema-que-quiere-acabar-con-elherbicida
DIARIO PALENTINO: https://www.diariopalentino.es/Noticia/Z8FB3A914-CBE6-92E8-9A838F9E7F73053E/202012/Nace-WeLASER-el-sistema-que-quiere-acabar-con-elherbicida
EL ECONOMISTA: https://revistas.eleconomista.es/agro/2020/diciembre/el-laser-como-alternativa-a-los-productos-quimicos-para-eliminar-malas-hierbas-EA5727042
TECNOVINO: https://www.tecnovino.com/desarrollaran-un-robot-para-eliminar-con-laser-las-malas-hierbas-de-los-cultivos/?utm_source=mailpoet&utm_medium=email&utm_campaign=espana-lider-mundial-en-superficie-de-vinedo-de-produccion-ecologica-tecnovino-759_265
DIE LINDE: https://dielinde.online/12638/laserstrahlen-statt-pestizide/
DEUTSCHER PRESSE INDEX: https://www.deutscherpresseindex.de/2021/03/25/welaser-technische-alternative-im-unkrautmanagement/

OPTICS.ORG https://optics.org/news/12/3/52
F3 https://f3.de/future/laserstrahlung-alternatives-unkrautmanagement-1300.html
LASERSYSTEMS EUROPE https://www.lasersystemseurope.com/feature/how-can-ai-benefit-industrial-laser-systems-users
FUTURE FARMING https://www.futurefarming.com/tech-in-focus/welaser-robot-to-kill-weeds-using-a-powerful-laser/
ELECTRO OPTICS https://www.electrooptics.com/news/ai-powered-lasers-remove-weeds-fields
LASERSYSTEMS EUROPE https://www.lasersystemseurope.com/news/ai-powered-lasers-remove-weeds-fields-0
EILBOTE-ONLINE.COM https://www.eilbote-online.com/artikel/welaser-die-dritte-alternative-im-unkrautmanagement-38786
HANNOVER.DE https://www.hannover.de/Service/Presse-Medien/Hannover.de/Aktuelles/Wirtschaft-Wissenschaft-2021/Technische-Alternative-im-Unkrautmanagement
IDEX-HS https://www.idex-hs.com/news-events/industry-news/welaser-project-refines-laser-based-weed-control/
CORDIS https://cordis.europa.eu/project/id/101000256/fr
KONSTRUKTION & ENTWICKLUNG https://www.konstruktion-entwicklung.de/so-wird-der-laser-zum-autonomen-unkrautvernichter
ECOINVENTOS: https://ecoinventos.com/welaser/?utm_source=dlvr.it&utm_medium=twitter
FRESH FRUIT PORTAL: https://www.freshfruitportal.com/news/202 2/03/15/laser-system-to-kill-weeds-withsurgical-precision/
EIP-AGRI Newsletter (October 2021, Edition 95) : https://mailchi.mp/eip-agri/newsletter-on-agriculture-innovation-edition-95-oct2021
EURACTIV https://pr.euractiv.com/pr/welaser-project-has-successfully-achieved-its-preliminary-system-integration-233106
AGRONOMA (ABC) https://sevilla.abc.es/agronoma/noticias/agricultura/proyecto-malas-hierbas/
AGROINFORMACIÓN https://agroinformacion.com/el-proyecto-welaser-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo-para-acabar-con-las-malas-hierbas/
EL ECONOMISTA https://revistas.eleconomista.es/agro/2022/mayo/el-proyecto-welaser-supera-una-de-sus-principales-fases-MB11232680

JARA Y SEDAL https://revistajaraysedal.es/prototipo-agrario-permite-eliminar-malas-hierbas-con-laser/
INNOVAGRI https://www.innovagri.es/actualidad/welaser-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo.html
EL CAMPO DE ASTURIAS https://elcampodeasturias.es/2022/05/03/el-proyecto-welaser-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo/
CAMPO GALEGO https://www.campogalego.es/el-proyecto-welaser-logra-la-integracion-preliminar-de-su-prototipo-para-eliminar-malas-hierbas-sin-quimicos/
INTEREMPRESAS https://www.interempresas.net/Grandes-cultivos/Articulos/387978-El-proyecto-WeLASER-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo.html
EUROGANADERÍA https://www.euroganaderia.eu/ganaderia/actualidad/el-proyecto-welaser-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo_10180_5_13842_0_1_in.html
ECOINVENTOS https://ecoinventos.com/welaser/
PORTAL FRUTÍCOLA https://www.portalfruticola.com/noticias/2022/01/05/el-sistema-laser-para-eliminar-malas-hierbas-de-forma-quirurgica/
OLIMERCA https://www.olimerca.com/noticiadet/el-fin-de-las-malas-hierbas-sin-utilizar-productos-quimicos/9029ab0bb4b738588842c52a30ef504d
MERCACEI https://www.mercacei.com/noticia/56530/actualidad/welaser:-una-solucion-tecnologica-para-acabar-con-los-tratamientos-quimicos-en-el-manejo-de-malas-hierbas.html
LAS PROVINCIAS https://www.lasprovincias.es/economia/investigadores-espanoles-desarrollan-20210301235922-ntvo.html
DIARIO DE VALDERRUEDA https://www.diariodevalderrueda.es/texto-diario/mostrar/3691587/proyecto-welaser-alcanza-exito-prototipo-eliminar-malas-hierbas-quimicos
ALTO JALÓN https://www.elaltojalon.es/texto-diario/mostrar/3691636/proyecto-welaser-alcanza-exito-integracion-preliminar-prototipo-acabar-malas-hierbas-tratamientos-quimicos
AGROBANK https://agrobankcaixabank.com/Noticias/el-proyecto-welaser-alcanza-con-exito-la-integracion-preliminar-de-su-prototipo
CULTUM http://coag.chil.me/download-file/104758-418203

Non-scientific and non-peer reviewed publications in technical press
P. González de Santos, Luis Emmi, Roemi Fernández, La utilización del láser como alternativa sostenible a los herbicidas: Proyecto WeLASER, Tierras, Nº 294, pp. 56-60, 2021, ISSN 1889-0776 / 269-3752 (digital). In Spanish.
Interview with P. Gonzalez-de-Santos on the Onda Agraria program of the radio station Onda Cero, May 7, 2022. https://www.ondacero.es/programas/onda-agraria/programas-completos/onda-agraria-07052022_20220507627615a5e547f100017f7f5e.html

5.1.15. Practice Abstracts

An important part of the dissemination activities is devoted to the elaboration and issue of the "Practice Abstracts" of the Agricultural European Innovation Partnership (EIP-AGRI) common format to be made available to the interested communities through the online EIP-AGRI database. The EIP-AGRI common format facilitates knowledge flows on innovative and practice-oriented projects from the start to the end of the project. The use of this format also enables farmers, advisers, researchers and all other actors across the EU to contact each other. WeLASER Practice Abstracts are available on the EIP-AGRI website (https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-weed-management-agriculture-laser) and on the WELASER website as indicated in Table 5.5, which contains the title and links of the Practice Abstracts issued during the two first years of the project.

Table 5.5 WeLASER Practice Abstracts

	Title	Link
PA1	An efficient and profitable weeding system friendly with the environment and health: WeLASER project is on its way	https://welaser-project.eu/download/pa-1_english/
PA2	Stakeholders help defining the WeLASER system specifications	https://welaser-project.eu/download/welaser-pa-2-english/
PA3	Selecting target crops for laser weeding testing	https://welaser-project.eu/download/welaser-pa-3-english/
PA4	Selecting plants for the initial laser-weeding test	https://welaser-project.eu/download/welaser-pa-4-english/
PA5	Strategies for weeding with laser	https://welaser-project.eu/download/welaser-pa-5-english/
PA6	IoT in robotic systems for agriculture	https://welaser-project.eu/download/welaser-pa-6-english/
PA7	Cloud Computing in robotic systems for agriculture	https://welaser-project.eu/download/welaser-pa-7-english/
PA8	Laser technology for weed management	https://welaser-project.eu/download/welaser-pa-8-english/
PA9	Weed management – safety requirements for laser outdoor usage	https://welaser-project.eu/download/welaser-pa-9-english/
PA10	Extending agricultural robot capabilities for weeding with laser – WeLASER navigation strategies	https://welaser-project.eu/download/welaser-pa-10-english/
PA11	Stakeholders provide insight into key aspects of WeLASER implementation in practice	https://welaser-project.eu/download/welaser-pa-11-english/

PA12	Laser weeding in organic production	https://welaser-project.eu/download/welaser-pa-12-english/
PA13	Futonics develops a new high-power laser module for weed eradication	https://welaser-project.eu/download/welaser-pa-13-english/
PA 14	PESTEL analysis of the WeLASER solution	https://welaser-project.eu/download/welaser-pa-14-english/
PA 15	IoT for safe robotic agriculture	https://welaser-project.eu/download/welaser-pa-15-english/
PA 16	Integration of IoT and robotic data	https://welaser-project.eu/download/welaser-pa-16-english/
PA 17	Is WeLASER using the correct laser technology?	https://welaser-project.eu/wp-content/uploads/2021/12/PA-17-English-FUT.pdf
PA 18	How laser weeding can contribute to improving the environment and sustaining biodiversity (I)	https://welaser-project.eu/wp-content/uploads/2021/12/PA-18-English-UCPH.pdf
PA 19	How laser weeding can contribute to improving the environment and sustaining biodiversity (II)	https://welaser-project.eu/wp-content/uploads/2022/03/PA-19-English-UCPH.pdf
PA 20	Stakeholders point at enhancing environmental and health benefits of WeLASER system application	https://welaser-project.eu/wp-content/uploads/2022/03/PA-20-English-IETU.pdf
PA 21	Preliminary competitive analysis of the WeLASER solution	https://welaser-project.eu/wp-content/uploads/2021/12/PA21-English-UGENT.pdf
PA 22	Focus Group Interview strengthens understanding of the WeLASER technique implementation	https://welaser-project.eu/wp-content/uploads/2021/12/PA-22-English-IETU-UGENT.pdf
PA 23	Deep learning helps autonomous navigation in early-stage growth crops	https://welaser-project.eu/wp-content/uploads/2022/01/PA-23-English-CSIC.pdf
PA 24	Safety Issues with Laser Weeding (1) Heat and Fire Risks	https://welaser-project.eu/wp-content/uploads/2022/02/PA-24-English-UCPH.pdf
PA 25	Safety Issues with Laser Weeding (2)	https://welaser-project.eu/wp-content/uploads/2022/02/PA-25-English-UCPH.pdf
PA 26	Safety Issues with Laser Weeding (3)	https://welaser-project.eu/wp-content/uploads/2022/02/PA-26-English-UCPH.pdf
PA 27	Belgian/Dutch Focus Group Interview to get insights into the future implementation of the WeLASER technique	https://welaser-project.eu/wp-content/uploads/2022/03/PA-27-English-UGENT.pdf
PA 28	WeLASER Focus Group Interview in Spain: main results	https://welaser-project.eu/wp-content/uploads/2022/03/PA-28-English-COAG.pdf
PA 29	Polish Focus Group Interview to get insights into the future implementation of the WeLASER technique	https://welaser-project.eu/wp-content/uploads/2022/03/PA-29-English.pdf
PA 30	The multiactor approach in WeLASER: a midterm overview	https://welaser-project.eu/wp-content/uploads/2022/03/PA-30-English-COAG.pdf

PA 31	Risks from exposure to laser radiation during weed control	https://welaser-project.eu/wp-content/uploads/2022/03/PA-31-English-LZH.pdf
PA 32	Possible release of hazardous substances during weed control using laser radiation	https://welaser-project.eu/wp-content/uploads/2022/03/PA-32-English-LZH.pdf
PA 33	Boundary conditions for the operation of a laser robot	https://welaser-project.eu/wp-content/uploads/2022/03/PA-33-English-LZH.pdf
PA 34	OECD works on the safety of robotic agricultural machinery	https://welaser-project.eu/wp-content/uploads/2022/04/PA-34-English-COAG.pdf
PA 35	Managing high-tech equipment in agriculture	https://welaser-project.eu/wp-content/uploads/2022/06/PA-35-English-CSIC-UNIBO.pdf
PA 36	WeLASER project preliminary system integration: some results and next steps	https://welaser-project.eu/wp-content/uploads/2022/08/PA-36-English-COAG.pdf
PA 37	WeLASER status at the project midterm	https://welaser-project.eu/wp-content/uploads/2022/08/PA-37-English-CSIC.pdf

5.2. Future activities

Future communication activities will be reported in D6.4 in month M36.

6. Dissemination and Communication Monitoring

Table 6.1 Measurements (KPI) to assess dissemination during months M1-M24 of the project development

Key Performance Indicators					
Target audience	**Type of dissemination activity**	**Measurement**	**Months M1-M24**		**Total in the project (M1-M36)**
			Current measures	**Grant Agreement**	
The Scientific Community	Journal articles	Number of articles	4	18	30
		Number of citations	33	18	30
		Text views	12,680[2]		
	International conference papers and presentations	N. of papers/presentations	11	18	30
		Number of citations	-	9	15
	Special sessions in international conferences	Number of special sessions	-	1	2
	Summer School	Number of students	-	-	30
Student community	Lectures in MSc courses	Number of courses	-	10	15

[2] See metrics at the article links in section 5.1.1.

	Lectures in PhD courses	Number of courses	5	10	15
The Industrial Community	Patents	Number of applications	-	2	2
	Technical and general press	Number of appearances	44[3]	30	54
		Number of references	49[3]	50	90
	Participation at external related events	Number of events	3	4	5
The end users	Dissemination to farmers	N. of field and training days	-	-	3
The general stakeholders	Newsletter	N. of copies sent/downloaded/views	- 241 views on the project website. - 220 offices and 31 organizations [4] - 52 stakeholders	600	1200
	The project flyer and posters (Flyer and Poster)	N. of copies sent/downloaded	220 offices and 101 organizations[5]	800	1500
	Project Website	Website visits	7,485 visits 3,904 users[6]	5000	10000
	Practice Abstracts	Number	37	48	72
	Social media	Followers/tweets/etc.	Twitter: 145 Followers 281 Tweets Youtube: 25 subscribers 28 videos 1,735 views Facebook: 16 followers Linkedin: 208 followers		
	Professional media	Number of messages/videos/ Press releases	1134[7]	1000	1500
	General media	Evidence of debates in the media	2	6	10

KPI and measurement indicators during months M1 to M24 of the project development show that

[3]See "Non-scientific and non-peer reviewed publications" and "Non-scientific and non-peer reviewed publications in technical press" in section 5.1.14.

[4] The Newsletter was sent to 220 COAG's local offices in Spain and 31 organizations in Europe via European Coordination Via Campesina (ECVC)

[5] The flyer was distributed to 31 organizations in Europe via European Coordination Via Campesina (ECVC) and to COPA-COGECA members (70 organizations in the EU) via email

[6] See Google Analytics Report in section 5.1.12. An estimate has been made based on previous data (1-12 months data) and new data provided by GOOGLE ANALYTICS 4, to cover the lack of information after migrating the analytics tool from UNIVERSAL ANALYTICS to GOOGLE ANALYTICS 4.

[7] According to sections 5.1.13 and 5.1.14

dissemination and communication efforts must be improved in the following period. The Dissemination and Communication plan will be revised in the next General Assembly and specific measures will be taken, in other to optimise these actions and achieve the expected impact.

7. EXPLOITATION PLAN

The exploitation plan contains different components namely market research, marketing plan and strategy, financial plan, and business plan. These activities were planned throughout the course of the project.

Regarding the **market research**, a top-down analysis was first employed to evaluate the potential of the innovative weed control application developed in the WeLASER project. Two internal reports for the market analysis namely *PESTEL analysis* and *preliminary competitiveness analysis* were formulated. The PESTEL analysis report constitutes a comprehensive view of six main factors that affect the prospect of the WeLASER application namely political, economic, social, technological, environmental, and legal factors (see Section 7.1 for a summary). In the preliminary competitiveness analysis, we assessed the potential of the WeLASER application in comparison to its indirect and direct competitors (see Section 7.2 for a summary). These two reports are corresponding to the first steps of the exploitation plan where market research is the key to identifying the efficient pathway for implementation of the WeLASER innovation. Furthermore, a systematic review approach was used to identify the determinants that affect farmers' willingness to adopt robotics or unmanned aerial vehicles. Based on the results from this literature review, a questionnaire will be developed to gather farmers' data regarding their intention to adopt field crop robots.

As the market data remain lacking and the target technology in this project is still at a nascent stage, the bottom-up approach for market analysis is employed in the second half of the project. A questionnaire was developed in the collaboration with WP1 to collect data regarding farmers' perception of and willingness-to-pay for the WeLASER technique. This questionnaire will be the base for a computer-assisted telephone interviewing (CATI) survey, which will be launched in the last year of the project. The primary data would be crucial to identify the actual market demand with a clear market size and penetration rate of the WeLASER application in the market of weed control machinery.

As for the **marketing plan and strategy**, a SWOT analysis was performed to generate a strategy for the spin-off company. This SWOT analysis was based on the four focus group discussions from December 2021 to February 2022, with participants from several countries in Europe with a wide range of expertise. A summary of the SWOT analysis can be found in Section 7.3.

Concerning the **financial plan**, the cost data of the subsystems are being collected from the project's partners to complete the cost structure of WeLASER. Along with the primary data of willingness-to-pay collected from the CATI survey, Internal Return Rate (IRR) and Net Present Value (NPV) will be

calculated. Also, different (worst to best) case scenarios will be taken into consideration in a sensitivity analysis, with attention to the impact of COVID-19 and the Russia-Ukraine war, to determine the best approach for the WeLASER spin-off company.

Lastly, a **business plan** is being formulated based on the inputs from the abovementioned activities. Currently, three business models for the WeLASER spin-off company are considered namely (1) selling WeLASER as a complete system, (2) selling subsystems of WeLASER, and (3) contracting a complete WeLASER system. Each model has different implications in terms of cost structures, distribution channels, and targeted customers. As the WeLASER's subsystems are still under development, the corresponding business plans will be continued revising and finalised in Deliverable 6.4, which is the last periodical report.

7.1. PESTEL analysis

The combination of different technologies from the IoT to precision agriculture makes the WeLASER solution have unique competitive advantages compared to the current weed control practices. The WeLASER solution can address pressing issues such as herbicide-resistant weeds, soil damage due to the impacts of mechanical weeders, health issues related to overuse of chemical herbicides, the high cost of manual weed control, and so on. However, the novelty of this new technique can also raise concerns regarding the readiness of the technology, its economic potential to implement in a real-life setting, and the required legislation to adopt it. Thus, PESTEL analysis is employed to shed the light on the mentioned external environmental issues related to the prospect of the WeLASER solution.

PESTEL analysis is a multifaceted approach to provide the general picture of factors that affect the prospect of a focal organisation or an industry. PESTEL analysis takes into consideration six categories of external environmental factors corresponding to its acronym: Political (P), Economic (E), Social (S), Technological (T), Environmental (E), and Legal (L). By assessing these six factors, this tool provides an overview of the macro-environmental factors that a focal organisation (a company) can use to make informed decisions for tailoring its strategic plans. Table 7.1 summarises the research subjects with their corresponding categories that were captured in this report.

This report takes into consideration both primary and secondary data. The primary data were derived from the first and second stakeholder events in the WeLASER project. The first stakeholder event was organised virtually on 26th November 2020 with the discussion focusing on the technological aspects of the WeLASER vehicle. The second stakeholder event took place on 25th May 2021 and emphasised the socio-economic-legal aspects of the WeLASER application. The secondary data for this report comprises diverse sources, namely scientific studies; reports of political initiatives; industry initiatives and associations; NGOs, and media information.

Table 7.1 Research categories for PESTEL in correspondence with specific research subjects

PESTEL category	Research subject
Political	– Political aspects regarding trends in organic and sustainable farming (e.g., reduction in synthetic herbicides)
Economic	– General market conditions and economic factors in organic farming – Business model trends for agricultural machinery – The acceptance of farmers as the end-users of the technology
Social	– Safety for humans, animals, and surrounding subjects – Relation between agricultural labour employment and autonomous weed control
Technological	– Technological trends and needs in weed control – Development of new and/or competing technologies
Environmental	– Interaction with the environment and environmental impacts related to the laser de-weeding machine
Legal	– Considering the existing legislation for the WeLASER vehicle

Source: Adapted from Hunger (2012)[8]

The PESTEL analysis indicates that the WeLASER project has great potential for future exploitation due to the favourable political and economic landscape for organic farming and sustainable weed control. However, several issues should be addressed along the project to successfully implement the WeLASER vehicles. The current legislation regarding AI and autonomous agri-bots still needs to be discussed and elaborated on to deal with the unprecedented scenarios in this field. The most important issues for the future of WeLASER would be to ensure the cost-effectiveness of the application and tailor efficient business plans for the exploitation phase. In the initial stage of the technology development, the WeLASER does not focus on the cost reduction of the technology but rather emphasises the full development of an effective solution to weed control using autonomous vehicles which can precisely kill weeds by laser beams. Therefore, the economic analysis in the WeLASER project will be served as preliminary inputs for later consideration of adapting the WeLASER system to market demand. Also, the economic analysis can provide solid proof of the potential of the WeLASER solution, which is crucial to obtain the funding for the following stage of the project.

7.2. Competitiveness analysis

To detail a business plan for the WeLASER application, it is important to assess the competitiveness of the WeLASER vehicle in comparison to the current competitors in the market. To this extent, the competitive analysis is crucial to refining the marketing strategy and vividly illustrating the realistic potential of the new product in the market as this analysis identifies the unique selling points of the

[8]Hunger, D. J. (2012). *Strategic management and business policy*. Pearson Education.

product of interest.

Given the diverse weed control applications in the market, it is difficult to comprehensively identify the main competitors of the WeLASER vehicle. In this competitiveness analysis report, we aim to analyse the competitiveness of the WeLASER application in two folds. Firstly, we compare the WeLASER application with the general groups of indirect competitors namely the chemical, mechanical, and other physical weed control approaches. This comparison will be detailed in Table 7.2. Also, we compile a set of innovative weed control applications from different reports and market insights to provide a glimpse of the current development stage of the weed control machinery industry (Table 7.3). Secondly, we compare the WeLASER application with its direct competitor(s) using a CO_2 laser system for laser-weeding treatments (See Table 7.4).

This preliminary competitiveness analysis indicated the advantages and disadvantages of the WeLASER application in comparison with other indirect and direct competitors in the field of weed control machinery. In essence, the WeLASER application possesses several advantages thanks to its advanced technologies in automation and precision agriculture. Also, the political landscape favouring organic farming provides a comparative advantage for sustainable approaches like the WeLASER application. However, the limits in terms of slow operation speed and high investment cost can hinder the adoption of the WeLASER vehicle in the exploitation phase.

As the market of weed control machinery is rapidly evolving along with the technologies in automation and precision agriculture, this competitiveness analysis will be updated accordingly. Besides, as the WeLASER vehicle is still under development, the technical figures and estimated costs of the vehicle remain unclear. To this extent, the specification of the WeLASER vehicle can also be modified during the project.

During the following periods of the project, we will conduct interviews with the machinery developers, end users, and other stakeholders to better understand the potential of the WeLASER application as the final specification will be getting clearer. Based on the future findings from the literature review and primary data from interviews, we will be able to elaborate the competitiveness analysis with a clear scientific underpin. Also, in this current competitiveness analysis report, we only emphasize the technological aspects in our comparison. In the next updated version of the report, we aim to employ a customer-oriented approach to acquire a holistic analysis of the competitiveness of the WeLASER application. In conclusion, this report is preliminary work and will get updated during the course of the project.

Table 7.2 Summary of the comparison among weed control approaches

Features	WeLASER	Other physical control	Mechanical control	Chemical control
Effectiveness with in-row weeding	Fully	Without AI sensors, often limited. Except in the case of complementing with precision seeding.	Without AI sensors, often limited. Except in the case of complementing with precision seeding.	Without AI sensors, often limited. Except in the case of complementing with precision seeding.
Speed	Slow, but expected in the future to be fast if treated only for in-row weed.	Mostly fast, except for precision methods.	Mostly fast, except for precision methods.	Mostly fast, except for precision methods.
Accuracy/ Precision	Highly accurate	Normally low, can be improved if having support from precision-seeding or AI sensors.	Normally low, can be improved if having support from precision-seeding or AI sensors.	Normally low, can be improved if having support from precision-seeding or AI sensors.
Organic farming	Yes	Yes	Yes	No, except using organic herbicides
Agricultural trends	Favoured	Favoured	Favoured	More stringent regulations for chemical use
Mobility	Fully autonomous	Autonomous / Mounted onto tractors/ Manned controlled	Autonomous / Mounted onto tractors/ Manned controlled	Autonomous / Mounted onto tractors / Manned controlled
Energy consumption for operation	High	High	Low to moderate	Low to moderate
Initial investment cost	High	High, especially if including precision and automation application.	Moderate, if not including precision and automation application.	Low due to inexpensive herbicides, if not including precision and automation application.
Development phase	Testing	A few marketed, mostly testing	Mostly marketed	Mostly marketed

Source: Self-compilation

Table 7.3 Some innovative weed control applications in the current market

#	Category [a]	Machine (company)	Country	Main features
1	C	AVO (ecoRobotix)	Switzerland	Using machine learning, the robot detects, and selectively sprays the weeds with a micro-dose of herbicide.
2	C/M	Robotti (Agrointelli)	Germany	Mechanical weeding and band-spraying/spraying. Supported by a reliable and powerful diesel and hydraulic system. Using Lidar scanners, emergency stops, and cameras for live monitoring.
3	M	Dino (Naio technology)	France	Inter-row weeding, autonomously navigate, remote mission supervision, electric batteries.
4	M	FD20 (FarmDroid)	Germany	High precision RTK-GTS, seeding system, weeding system for inter-row and intra-row weeding, CO2-neural operation using solar power.
5	M	Weed Whacker robot (Odd.bot)	The Netherlands	Autonomous mechanical in-row weeding for high-density crops (stamper/pusher, puller, pucker) using AI and machine learning with Delta arm robots.
6	P	HarryV1 (Small robot company)	United Kingdom	Electrical weed control using ZAP
7	P	Annihilator (The Weed Zapper)	The United States	Using electric shock to kill weeds

[a] Weed control approach: M = Mechanical control, C = Chemical control, P = Physical control.

Source: Self-compilation

Table 7.4 Comparison between the vehicle of WeLASER and that of CO_2 laser system

	Fibre laser system (WeLASER)	CO_2 laser system
Type of laser	Fibre laser	CO_2 laser
Cost-effectiveness	A simple system requires low maintenance costs and less energy consumption.	A complex system requires more maintenance costs and consumes more energy.
Weight	Smaller, more flexible	Heavier, potentially damaged soil
Speed	Fibre laser: Quicker speed for thin material compared to CO_2 laser.	CO_2 laser: Slower for thin materials but more effective for thick materials.
Price	Unknown for the prototype	Not available in Europe yet
Development phase	Ongoing development process	Marketed

Source: Self-compilation

7.3. Marketing plan and strategy

Four focus group discussions were conducted to identify the marketing strategy for the spin-off company of WeLASER. The first focus group discussion was organised with international participants in English, whereas the latter three discussions were held in the national languages of the organised countries namely Dutch, Polish, and Spanish in Belgium/the Netherlands, Poland, and Spain respectively. In total, 55 participants attended these discussions. The participants included farmers and representatives of agricultural cooperatives, machinery providers/dealers, researchers, agricultural advisory bodies, and policymakers. Based on the SWOT analysis, a scientific article was prepared and submitted to a journal. To comply with the journal's policy, this section only summarises the main findings of the SWOT analysis. Once the article is published with open access, it will be provided as a supplementary document for this deliverable.

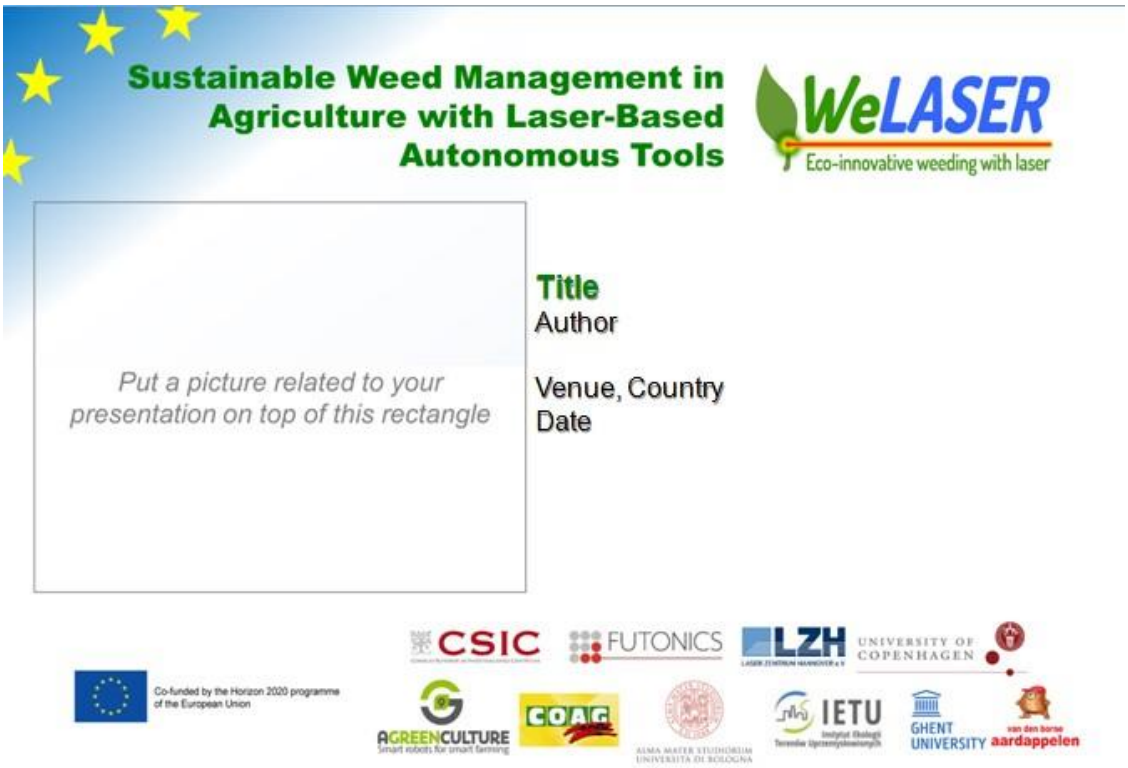
In general, the participants responded positively to the potential of the WeLASER system. The key strength of WeLASER is that it promotes environmental sustainability. Furthermore, the precision approach of WeLASER also increases the efficiency of agricultural production and has a positive impact on food safety. Its autonomous feature also addresses the crisis of agricultural labour shortage in Europe. However, high cost, uncertainty of efficiency, limited capacity, regulatory boundaries of autonomous machinery and dependence on external services are the main drawbacks

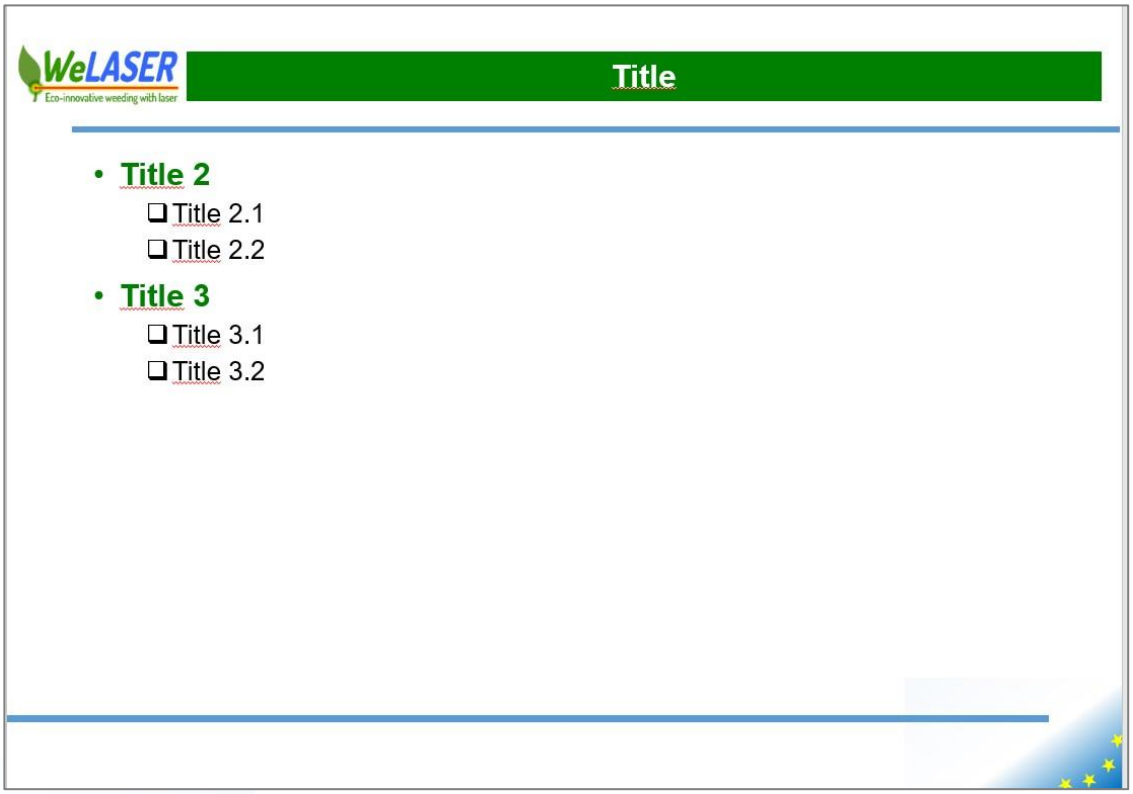
of WeLASER. Many opportunities for the implementation of WeLASER were also identified. For instance, the WeLASER developers are advised to take advantage of the favoured policies and regulations for green production and the high demand for precision agriculture to seek investment and/or funding for the establishment of a spin-off company. Also, the WeLASER developers should be aware of the fierce competition in the precision agriculture machinery market and the low willingness-to-adopt of farmers given the novelty of the technique.

8. ANNEXES

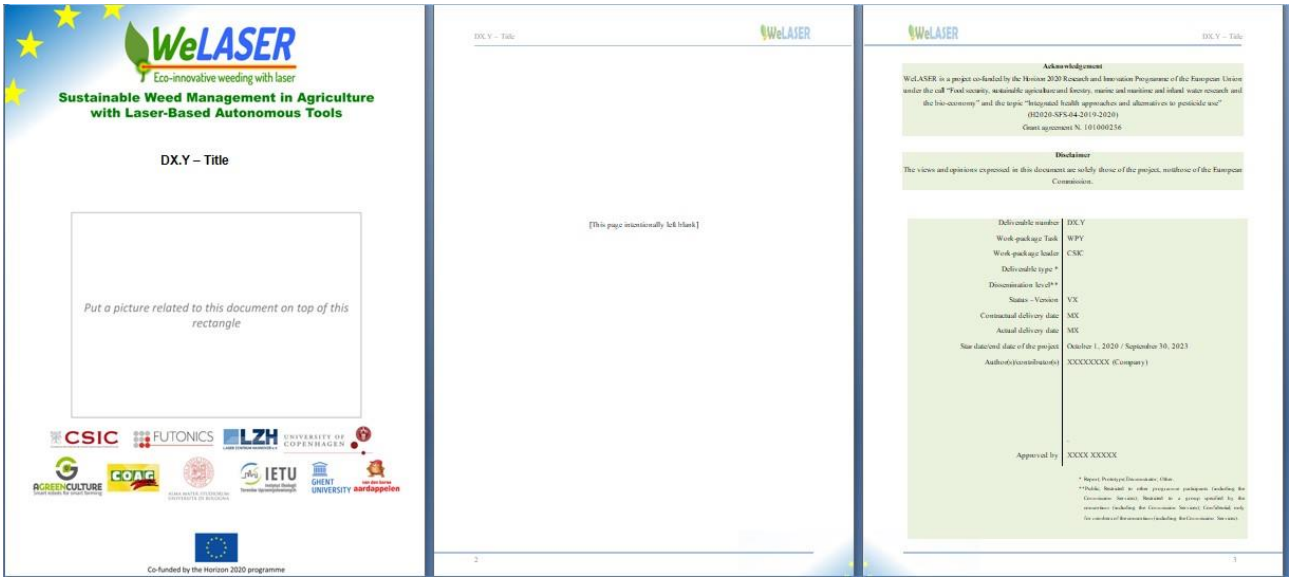
8.1. Annex 1 – WeLASER Templates

8.1.1. POWER POINT format template for presentations





8.1.2. WORD format template for deliverables


WeLASER
Eco-innovative weeding with laser
Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

DX.Y – Title

Put a picture related to this document on top of this rectangle

CSIC FUTONICS LZH UNIVERSITY OF COPENHAGEN AGREENCULTURE COMAG IETU GHENT UNIVERSITY aardappelen

Co-funded by the Horizon 2020 programme

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Acknowledgement

WeLASER is a project co-funded by the Horizon 2020 Research and Innovation Programme of the European Union under the call "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy" and the topic "Integrated health approaches and alternatives to pesticide use" (H2020-SFS-04-2019-2020)
Grant agreement N. 101000256

Disclaimer

The views and opinions expressed in this document are solely those of the project, neithose of the European Commission.

Deliverable number	DX.Y
Work-package Task	WPY
Work-package leader	CSIC
Deliverable type *	
Dissemination level**	
Status – Version	VX
Contractual delivery date	MX
Actual delivery date	MX
Star date/end date of the project	October 1, 2020 / September 30, 2023
Author(s)/contributor(s)	XXXXXXXX (Company)
Approved by	XXXX XXXXX

8.1.3. WORD format template for the agendas and minutes of the meetings


WeLASER
Eco-innovative weeding with laser
Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

AGENDA OF THE KICK-OFF MEETING AND THE GENERAL ASSEMBLY

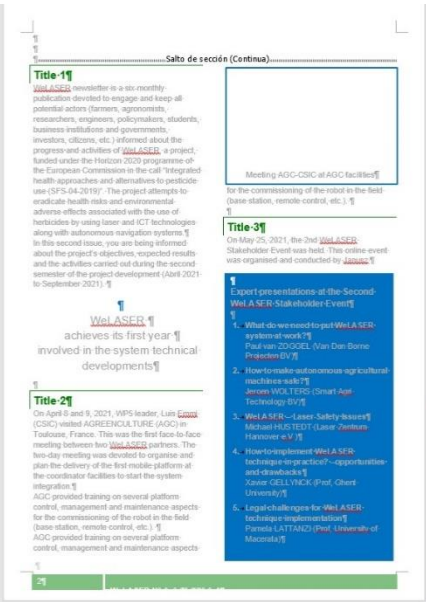
Videoconference
October X, 2020

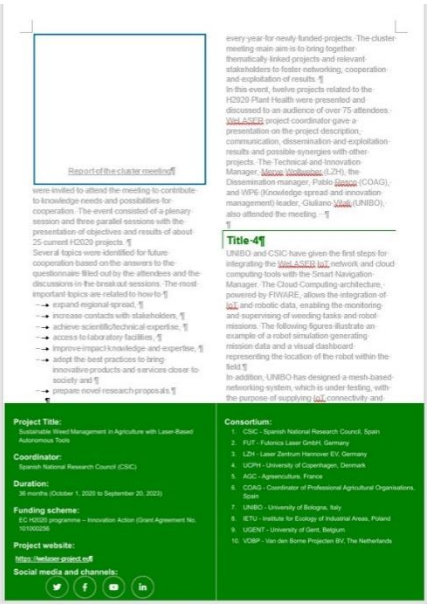
DAY 1 - October X, 2020

10:00 – 10:15	Welcome and WeLASER project overview	Pablo GONZALEZ-DE-SANTOS (Project coordinator)
10:15 – 10:30	EC and H2020 general information	Silvia GEMINI (EC project officer)
10:30 – 11:30	Presentation of the consortium A five-minute presentation per beneficiary following the template WeLASER-Beneficiary presentation (acronym).ppt. Please, use a few slides with the content: 1.- Description of the organisation; 2.- Main projects and products of the group; and 3.- Role in WeLASER	Beneficiaries 1-CSIC :Pablo GONZALEZ-DE-SANTOS 2-FUT: Karsten SCHOLLE 3-LZH: Merve WOLL 4-UCPH: Chr 5-AGC
11:30 – 11:40	Break	
11:40 – 13:00		
		KRUPANEK (IETU)
	and impact	Karsten SCHOLLE (FUT)
W	stem perception system	Merve WOLLWEBER (LZH)
WP	Autonomous vehicle for laserweeding	Christophe AUBE (UCPH)
	WP5 – Industrial integration and evaluation	Pablo GONZALEZ-DE-SANTOS (CSIC)
	WP6 – Knowledge spread and innovation management	Giuliano VITALI (UNIBO)

TEMPLATE DRAFT

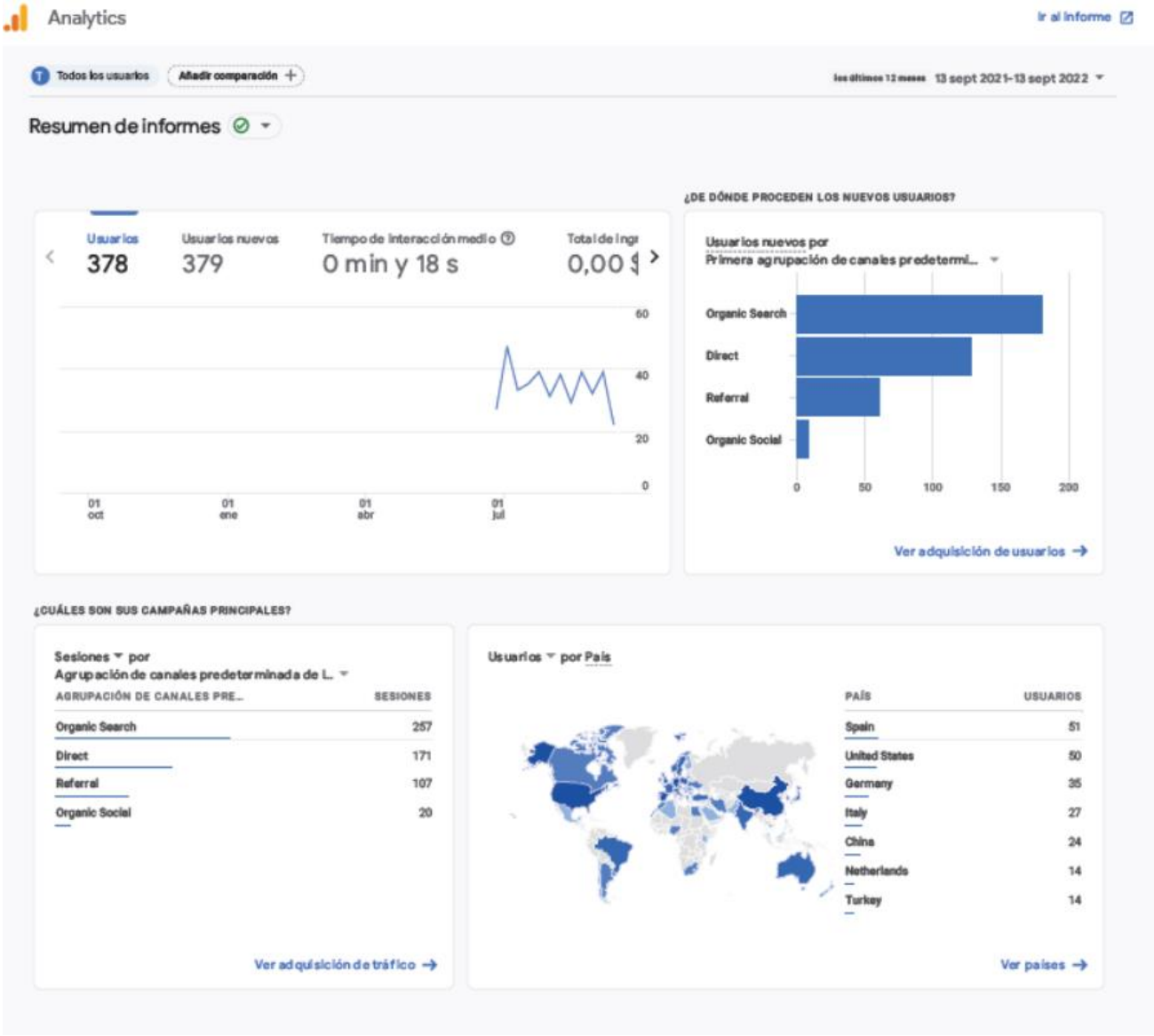
8.1.4. WORD format template for newsletters



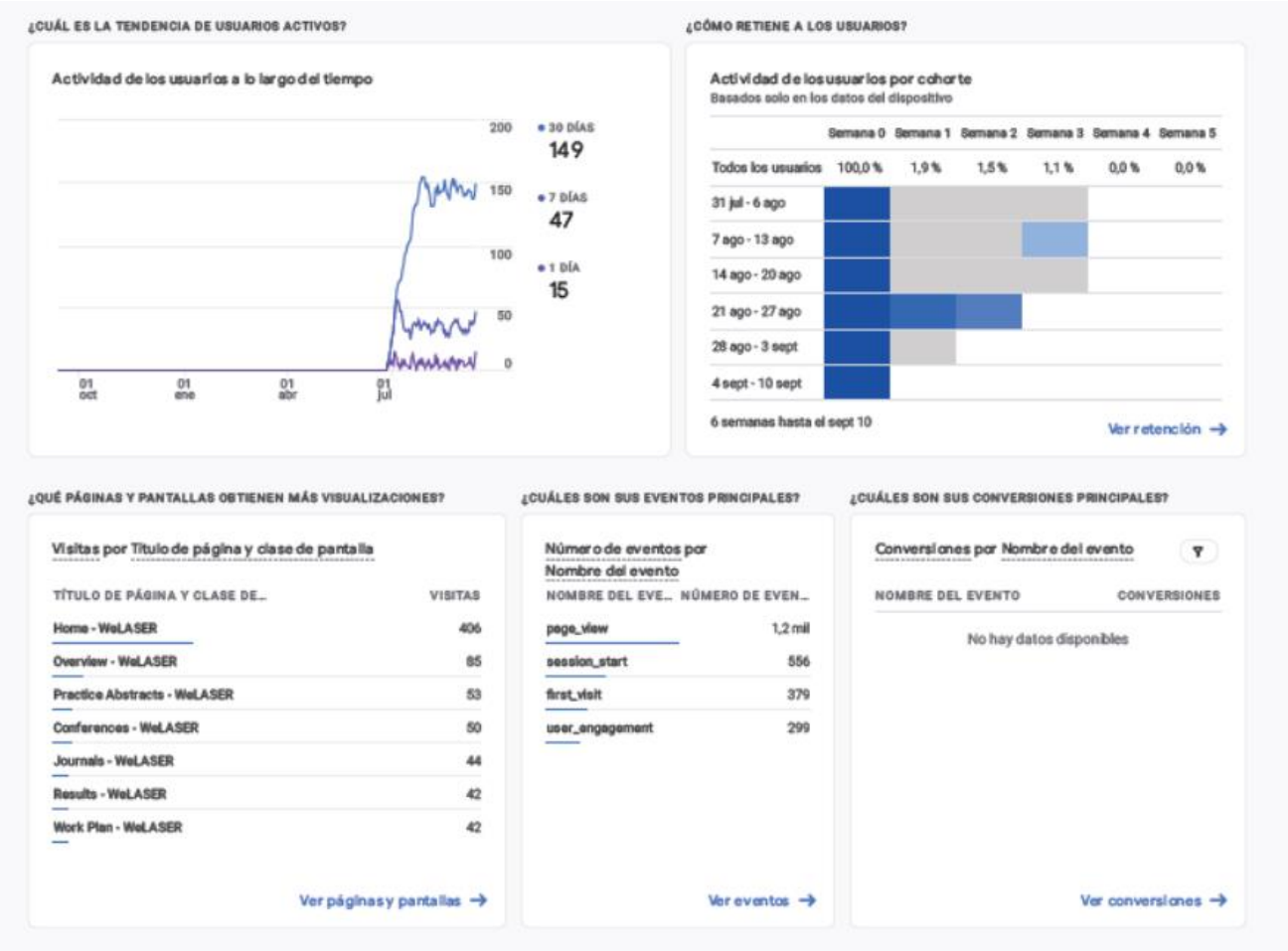


8.2. Annex 2 – WeLASER websites and social media statistics

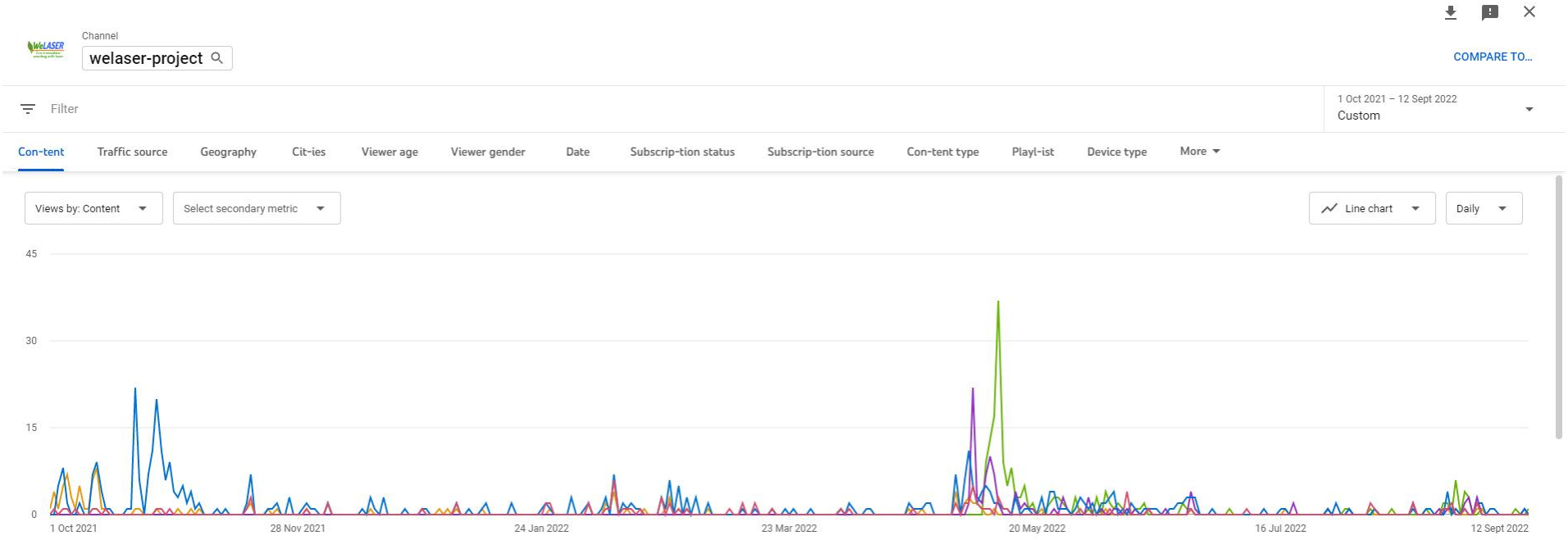
8.2.1. Website[9]



[9] Data are available from 1st July 2022 until 13th September 2022, period after migrating the analytics tool from UNIVERSAL ANALYTICS to GOOGLE ANALYTICS 4


¿CUÁL ES LA TENDENCIA DE USUARIOS ACTIVOS?
Actividad de los usuarios a lo largo del tiempo
200
150
100
50
0
01 oct
01 ene
01 abr
01 jul
30 DÍAS
149
7 DÍAS
47
1 DÍA
15
¿CÓMO RETIENE A LOS USUARIOS?
Actividad de los usuarios por cohorte
Basados solo en los datos del dispositivo
Semana 0 Semana 1 Semana 2 Semana 3 Semana 4 Semana 5
Todos los usuarios 100,0 % 1,9 % 1,5 % 1,1 % 0,0 % 0,0 %
31 jul - 6 ago
7 ago - 13 ago
14 ago - 20 ago
21 ago - 27 ago
28 ago - 3 sept
4 sept - 10 sept
6 semanas hasta el sept 10
Ver retención
¿QUÉ PÁGINAS Y PANTALLAS OBTIENEN MÁS VISUALIZACIONES?
Visitas por Título de página y clase de pantalla
TÍTULO DE PÁGINA Y CLASE DE... VISITAS
Home - WeLASER 406
Overview - WeLASER 85
Practice Abstracts - WeLASER 53
Conferences - WeLASER 50
Journals - WeLASER 44
Results - WeLASER 42
Work Plan - WeLASER 42
Ver páginas y pantallas
¿CUÁLES SON SUS EVENTOS PRINCIPALES?
Número de eventos por Nombre del evento
NOMBRE DEL EVE... NÚMERO DE EVEN...
page_view 1,2 mil
session_start 556
first_visit 379
user_engagement 299
Ver eventos
¿CUÁLES SON SUS CONVERSIONES PRINCIPALES?
Conversiones por Nombre del evento
NOMBRE DEL EVENTO CONVERSIONES
No hay datos disponibles
Ver conversiones

8.2.2. Youtube



Content	Views	Watch time (hours)	Subscribers	Impressions	Impressions click-through rate
Total	**1,735**	**17.1**	**15**	**8,967**	**6.9%**
WeLASER Mobile platform	407 23.5%	3.5 20.2%	2 13.3%	1,379	9.5%
WELASER project (H2020)	176 10.1%	3.3 19.4%	1 6.7%	911	4.4%
WeLASER First mobile platform assembled	116 6.7%	0.6 3.6%	0 0.0%	378	11.1%
WeLASER preliminary integration tested in the field (manual control)	103 5.9%	0.8 4.7%	0 0.0%	297	15.8%

Channel
welaser-project

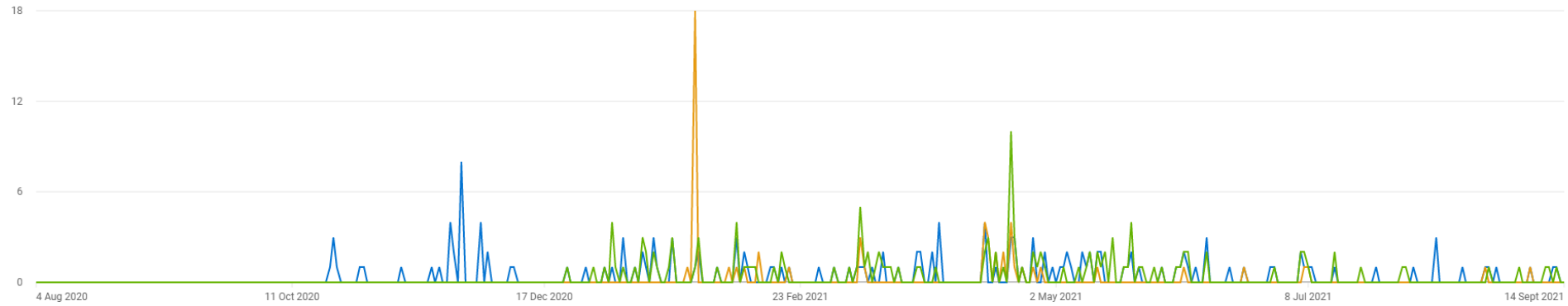
COMPARE TO...

Filter

4 Aug 2020 – 14 Sept 2021
Custom

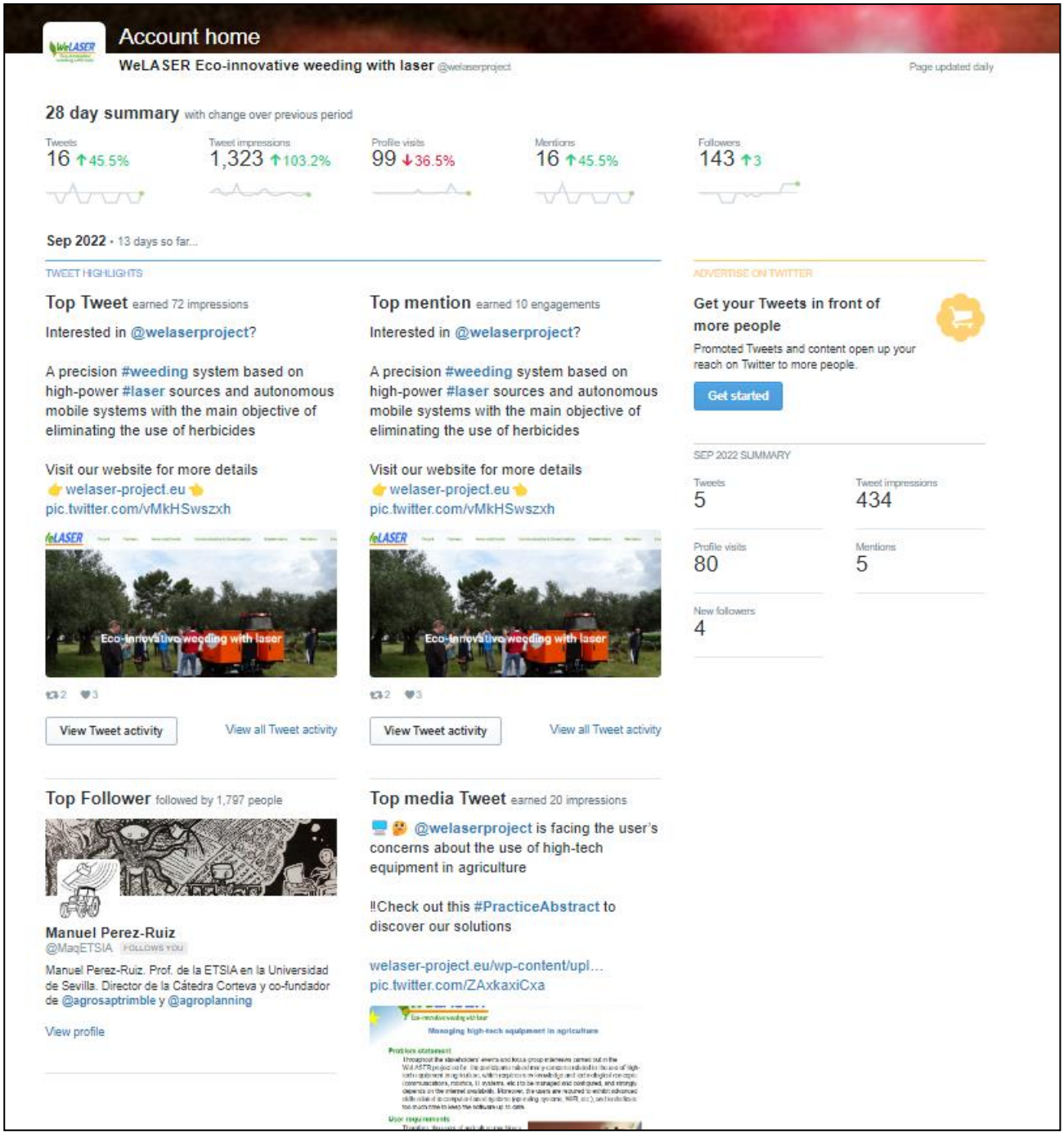
Video | Traffic source | Geography | Viewer age | Viewer gender | Date | Playlist | Device type | YouTube product | Video type | Playback location | Operating system | More

Views by: Video | Select secondary metric | Line chart | Daily



Video	Views	Average view duration	Average percentage viewed
Total	361	0:34	46.3%
WeLASER Video 4	153 42.4%	0:48	40.0%
WeLASER autonomous robot	135 37.4%	0:21	83.8%
WeLASER-Robot implement dimensional study	55 15.2%	0:25	53.0%

8.2.3. Twitter


Account home
WeLASER Eco-innovative weeding with laser @welaserproject
Page updated daily
28 day summary with change over previous period
Tweets 16 ↑45.5%
Tweet impressions 1,323 ↑103.2%
Profile visits 99 ↓36.5%
Mentions 16 ↑45.5%
Followers 143 ↑3
Sep 2022 · 13 days so far...
TWEET HIGHLIGHTS
Top Tweet earned 72 impressions
Interested in @welaserproject?
A precision #weeding system based on high-power #laser sources and autonomous mobile systems with the main objective of eliminating the use of herbicides
Visit our website for more details
welaser-project.eu
pic.twitter.com/vMkHSwszxh
Eco-innovative weeding with laser
View Tweet activity
View all Tweet activity
Top mention earned 10 engagements
Interested in @welaserproject?
A precision #weeding system based on high-power #laser sources and autonomous mobile systems with the main objective of eliminating the use of herbicides
Visit our website for more details
welaser-project.eu
pic.twitter.com/vMkHSwszxh
Eco-innovative weeding with laser
View Tweet activity
View all Tweet activity
ADVERTISE ON TWITTER
Get your Tweets in front of more people
Promoted Tweets and content open up your reach on Twitter to more people.
Get started
SEP 2022 SUMMARY
Tweets 5
Tweet impressions 434
Profile visits 80
Mentions 5
New followers 4
Top Follower followed by 1,797 people
Manuel Perez-Ruiz
@MaqETSIA FOLLOWS YOU
Manuel Perez-Ruiz. Prof. de la ETSIA en la Universidad de Sevilla. Director de la Cátedra Corteva y co-fundador de @agrosaptrimble y @agroplanning
View profile
Top media Tweet earned 20 impressions
@welaserproject is facing the user's concerns about the use of high-tech equipment in agriculture
!Check out this #PracticeAbstract to discover our solutions
welaser-project.eu/wp-content/upl...
pic.twitter.com/ZAxkaxiCxa

Aug 2022 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 177 impressions

The main tasks of @La_COAG in the @welaserproject in a #video

Here you can find a short explanation by @alvaroareta @COAGInnova youtube.com/watch?v=YswAUg...

1 2

View Tweet activity | View all Tweet activity

Top mention earned 4 engagements

The main tasks of @La_COAG in the @welaserproject in a #video

Here you can find a short explanation by @alvaroareta @COAGInnova youtube.com/watch?v=YswAUg...

1 2

View Tweet activity | View all Tweet activity

Top media Tweet earned 98 impressions

Interested in @welaserproject?

A precision #weeding system based on high-power #laser sources and autonomous mobile systems with the main objective of eliminating the use of herbicides

Visit our website for more details
welaser-project.eu
pic.twitter.com/2a1F2WBDge

3 3

View Tweet activity | View all Tweet activity

AUG 2022 SUMMARY

Tweets 16	Tweet impressions 1,209
Profile visits 161	Mentions 16
New followers -1	

Jul 2022 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 168 impressions

The main tasks of @La_COAG in the @welaserproject in a #video

Here you can find a short explanation by @alvaroareta @COAGInnova youtube.com/watch?v=YswAUg...

3 2

View Tweet activity | View all Tweet activity

Top Follower followed by 6,848 people

ETSIAM UA
@ETSIAMCordoba FOLLOWS YOU

Perfil oficial de la Escuela Técnica Superior de Ingeniería Agronómica y de Montes @UnivCordobaUA. Más de 50 años comprometidos con los retos de la sociedad

View profile

Top mention earned 10 engagements

!Comprueba cuáles son las principales tareas del @CARobotica_ en la integración preliminar del proyecto @welaserproject

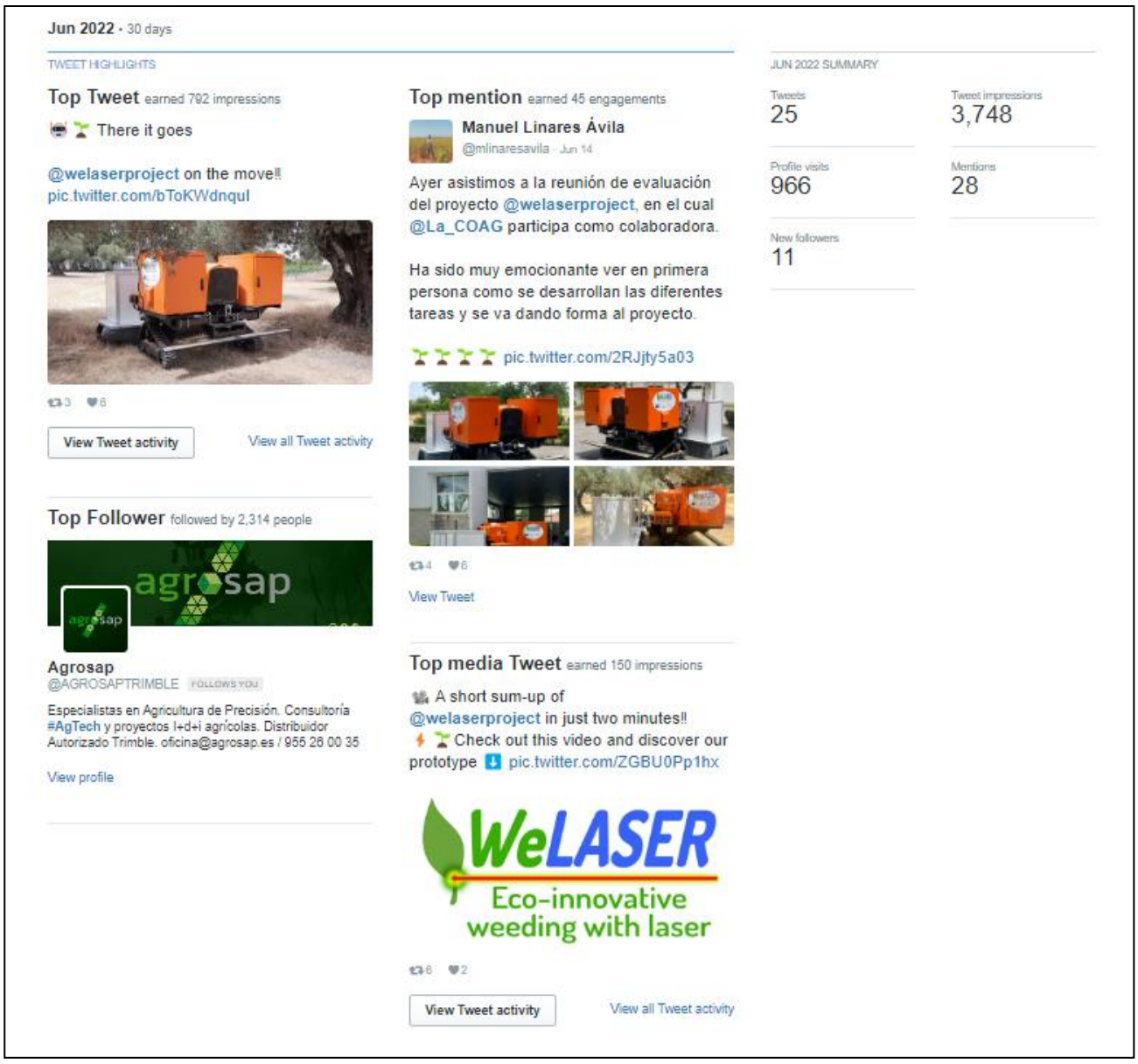
Mira en este breve video las explicaciones de Pablo González de Santos @CSIC youtube.com/watch?v=AQ_QJz...

3 4

View Tweet activity | View all Tweet activity

JUL 2022 SUMMARY

Tweets 18	Tweet impressions 1,340
Profile visits 100	Mentions 19
New followers 2	


Jun 2022 · 30 days
TWEET HIGHLIGHTS
Top Tweet earned 792 impressions
There it goes
@welaserproject on the move!!
pic.twitter.com/bToKWdnqul
View Tweet activity
View all Tweet activity
Top Follower followed by 2,314 people
agrosap
Agrosap
@AGROSAPTRIMBLE FOLLOWS YOU
Especialistas en Agricultura de Precisión. Consultoría #AgTech y proyectos I+d+i agrícolas. Distribuidor Autorizado Trimble. oficina@agrosap.es / 955 26 00 35
View profile
Top mention earned 45 engagements
Manuel Linares Ávila
@mlinaresavila · Jun 14
Ayer asistimos a la reunión de evaluación del proyecto @welaserproject, en el cual @La_COAG participa como colaboradora.
Ha sido muy emocionante ver en primera persona como se desarrollan las diferentes tareas y se va dando forma al proyecto.
pic.twitter.com/2RJjty5a03
View Tweet
Top media Tweet earned 150 impressions
A short sum-up of @welaserproject in just two minutes!!
Check out this video and discover our prototype pic.twitter.com/ZGBU0Pp1hx
WeLASER
Eco-innovative weeding with laser
View Tweet activity
View all Tweet activity
JUN 2022 SUMMARY
Tweets 25
Tweet impressions 3,748
Profile visits 966
Mentions 28
New followers 11

May 2022 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 3,573 impressions

!!New Press Release
@welaserproject has successfully achieved its preliminary system integration
welaser-project.eu/wp-content/upl...
pic.twitter.com/7dYDmNRpU9

8 10

View Tweet activity View all Tweet activity

Top mention earned 101 engagements

!!New Press Release
@welaserproject has successfully achieved its preliminary system integration
welaser-project.eu/wp-content/upl...
pic.twitter.com/7dYDmNRpU9

8 10

View Tweet activity View all Tweet activity

MAY 2022 SUMMARY

Tweets 15	Tweet impressions 5,838
Profile visits 1,615	Mentions 19
New followers 29	

Top Follower followed by 9,773 people

La Huerta Digital
@huerta_digital FOLLOWS YOU

Espacio de difusión sobre nuevas tecnologías en la #agricultura, #ganadería y #agroalimentación | #AgTech #AgriTech #AgroTech

View profile

Top media Tweet earned 602 impressions

!!New Press Release
@welaserproject has successfully achieved its preliminary system integration
welaser-project.eu/wp-content/upl...
pic.twitter.com/2zf6cHVGdw

9 9

View Tweet activity View all Tweet activity

Apr 2022 · 30 days

TWEET HIGHLIGHTS

Top Tweet earned 239 impressions

After 18 months of the development of @welaserproject the #MultiactorApproach has shown its potential

In this #PracticeAbstract, we summarize how. Have a look here!
welaser-project.eu/wp-content/upl...
pic.twitter.com/9N6DDihfEA

4 1

View Tweet activity View all Tweet activity

Top Follower followed by 245 people

E. Küttschreutter
@Eddy_AR FOLLOWS YOU
"I'm a follower of Jesus Christ. I know it. I live it. I love it."

View profile

Top mention earned 52 engagements

COAG
@La_COAG · Apr 21

@welaserproject, el proyecto para acabar con los productos químicos en la eliminación de las malas hierbas en #agricultura, alcanza su ecuador centrado en la integración preliminar de subsistemas.

Conoce todos los detalles en el nuevo newsletter welaser-project.eu/wp-content/upl... pic.twitter.com/zrivf1P4Wz

12 10

View Tweet

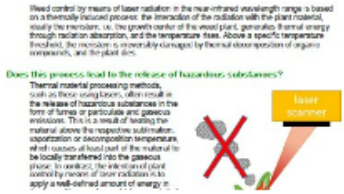
Top media Tweet earned 210 impressions

In @welaserproject we keep an eye on risk evaluation and possible protective measures.

This #PracticeAbstract is about possible release of hazardous substances during #weed control using #laser radiation

@LZH_Hannover @LZH_News

welaser-project.eu/wp-content/upl...
pic.twitter.com/DS51MNwVUU



3 4

View Tweet activity View all Tweet activity

APR 2022 SUMMARY

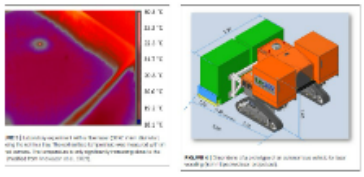
Tweets 12	Tweet impressions 1,766
Profile visits 229	Mentions 9
New followers 2	

Mar 2022 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 804 impressions

New @welaserproject publication!!
"Laser Weeding With Small Autonomous Vehicles: Friends or Foes?" by @KU_PLEN in @FrontAgro
Pros and cons of replacing or supplementing common used weed control methods with laser weeding
frontiersin.org/articles/10.33...
pic.twitter.com/SkUofK701R

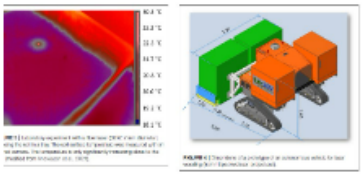


4 4

View Tweet activity View all Tweet activity

Top mention earned 32 engagements

New @welaserproject publication!!
"Laser Weeding With Small Autonomous Vehicles: Friends or Foes?" by @KU_PLEN in @FrontAgro
Pros and cons of replacing or supplementing common used weed control methods with laser weeding
frontiersin.org/articles/10.33...
pic.twitter.com/SkUofK701R



4 4

View Tweet activity View all Tweet activity

Top Follower followed by 8,361 people

Robin Booker
@CDNag FOLLOWS YOU

I report on agricultural technology for @westernproducer. Viewpoints are my own.

View profile

Top media Tweet earned 285 impressions

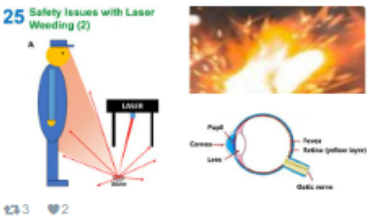
Important things you need to know about #SafetyIssues with #laser weeding

Three #PracticeAbstracts with all the details

1 welaser-project.eu/wp-content/upl...

2 welaser-project.eu/wp-content/upl...

3 welaser-project.eu/wp-content/upl...
pic.twitter.com/lleFf6mttx



3 2

View Tweet activity View all Tweet activity

MAR 2022 SUMMARY

Tweets 12	Tweet impressions 2,657
Profile visits 362	Mentions 11
New followers 8	

Feb 2022 · 28 days

TWEET HIGHLIGHTS

Top Tweet earned 321 impressions

We have already conducted four Focus Groups with #Stakeholders to share experiences and insights regarding the implementation of #PrecisionAgriculture and @welaserproject innovation

Thank you all for your participation!

Stay tuned for our next events!!
pic.twitter.com/cmSo4CcbR1

4 2

View Tweet activity View all Tweet activity

Top Follower followed by 20.9K people

Permagriculture
@permagriculture FOLLOWS YOU

Carbon Farming, Agroecology. Donating our surplus leaves. Ukraine list:

View profile

Top mention earned 14 engagements

‼ El @welaserproject organiza un taller online y en ES sobre posibilidades y barreras de la tecnología láser para la eliminación de malas hierbas

Jueves, 24 Febrero 9.30
¿Te interesa? Regístrate aquí:
forms.gle/cmVVaQmBgFhMfv…
pic.twitter.com/xpNwVTMVyt

4

View Tweet activity View all Tweet activity

Top media Tweet earned 265 impressions

Stakeholders are really important in @welaserproject. This #PracticeAbstract shows the main conclusions of our #FocusGroup.

Valuable insights were provided into the future implementation of #PrecisionAgriculture techniques in #weed control
welaser-project.eu/wp-content/upl…
pic.twitter.com/K3MQGWyJbV

4 2

View Tweet activity View all Tweet activity

FEB 2022 SUMMARY

Tweets 13	Tweet impressions 2,343
Profile visits 569	Mentions 24
New followers 7	

Jan 2022 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 524 impressions

We participated in a #H2020 #planthealth cluster event organised by @EUgreenresearch @EU_Commission @REA_research.

‼You can download here our presentation. Discover @welaserproject in a couple of minutes
welaser-project.eu/wp-content/upl...
pic.twitter.com/jhAkSsgh9g

1 8

View Tweet activity View all Tweet activity

Top mention earned 26 engagements

We participated in a #H2020 #planthealth cluster event organised by @EUgreenresearch @EU_Commission @REA_research.

‼You can download here our presentation. Discover @welaserproject in a couple of minutes
welaser-project.eu/wp-content/upl...
pic.twitter.com/jhAkSsgh9g

1 8

View Tweet activity View all Tweet activity

JAN 2022 SUMMARY

Tweets 12	Tweet impressions 2,389
Profile visits 852	Mentions 15
New followers 7	

Top Follower followed by 20.9K people

Stratodesk
@stratodesk FOLLOWS YOU

VDI Endpoint & Management Leader | Thin Client Innovator | x86, ARM/Raspberry Pi | IoT | Citrix Workspace Hub | Cloud #stratodesk

View profile

Top media Tweet earned 225 impressions

#PracticeAbstract

How #laser weeding can contribute to improving the environment and sustaining #biodiversity?

Discover it here
welaser-project.eu/wp-content/upl...
pic.twitter.com/8keucszJmQ

4 1

View Tweet activity View all Tweet activity

Dec 2021 · 31 days

TWEET HIGHLIGHTS

Top Tweet earned 203 impressions

Are you worried about #weeds in #organic production?

Check out in this #PracticeAbstract how laser weeding can help to solve this problem ⬇️

welaser-project.eu/download/welas...
pic.twitter.com/0TW9ZC1IC9

3 3

View Tweet activity View all Tweet activity

Top mention earned 15 engagements

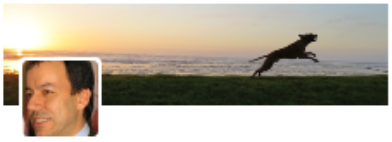
#PracticeAbstract !! @welaserproject works for safe robotic agriculture 🤖. How to ensure a secure internet connection and to monitor our robot operations are key elements ⬇️

welaser-project.eu/download/welas...
pic.twitter.com/co23OUXqVs

2 1

View Tweet activity View all Tweet activity

Top Follower followed by 3,252 people



Norbert Keil
@NorbertKeil FOLLOWS YOU

Project-Manager @WassenhovenUG #XING: https://t.co/EGW8WZ82VS #DataCenter #Rechenzentrum #KI #Marketing @ITDataSummit @IT_Connection @HundeCon

View profile

Top media Tweet earned 176 impressions

#PESTEL analysis of the @welaserproject solution. Crucial elements to adapt the system to market demand #PracticeAbstract

welaser-project.eu/download/welas...
pic.twitter.com/0rNRO38XxL

4

View Tweet activity View all Tweet activity

DEC 2021 SUMMARY

Tweets 6	Tweet impressions 1,544
Profile visits 936	Mentions 8
New followers 10	

Nov 2021 - 30 days

TWEET HIGHLIGHTS

Top Tweet earned 375 impressions

Our second #newsletter is out!

Interesting information about the first steps of system integration and the results of the 2nd welaser-project Stakeholder Event.

It's available here welaser-project.eu/download/welas... #PrecisionFarming #Robotics pic.twitter.com/DBWiENgga0

2 2

View Tweet activity View all Tweet activity

Top Follower followed by 1,335 people

IQFR-CSIC
@iqfr_csic FOLLOWS YOU

Instituto de Química Física Rocasolano, Consejo Superior de Investigaciones Científicas @CSIC

View profile

Top mention earned 24 engagements

‼ New opportunity to be part of @welaserproject and to become an advance stakeholder!

📅 Next Friday 19 November we celebrate our 3rd Stakeholder Event

You can register here ➡ bit.ly/WeLASER--Stake...

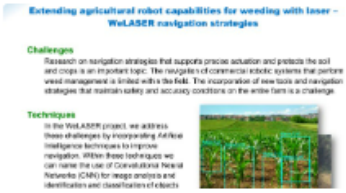
For more information ➡ welaser-project.eu/news/ pic.twitter.com/sXpEpA5Rty

4 5

View Tweet activity View all Tweet activity

Top media Tweet earned 332 impressions

In the @welaserproject, we teach our robot 🤖 to locate itself in the farm by incorporating #ArtificialIntelligence techniques to improve navigation. This #PracticeAbstract provides more information ➡ welaser-project.eu/download/welas... pic.twitter.com/XQLMsRGonx

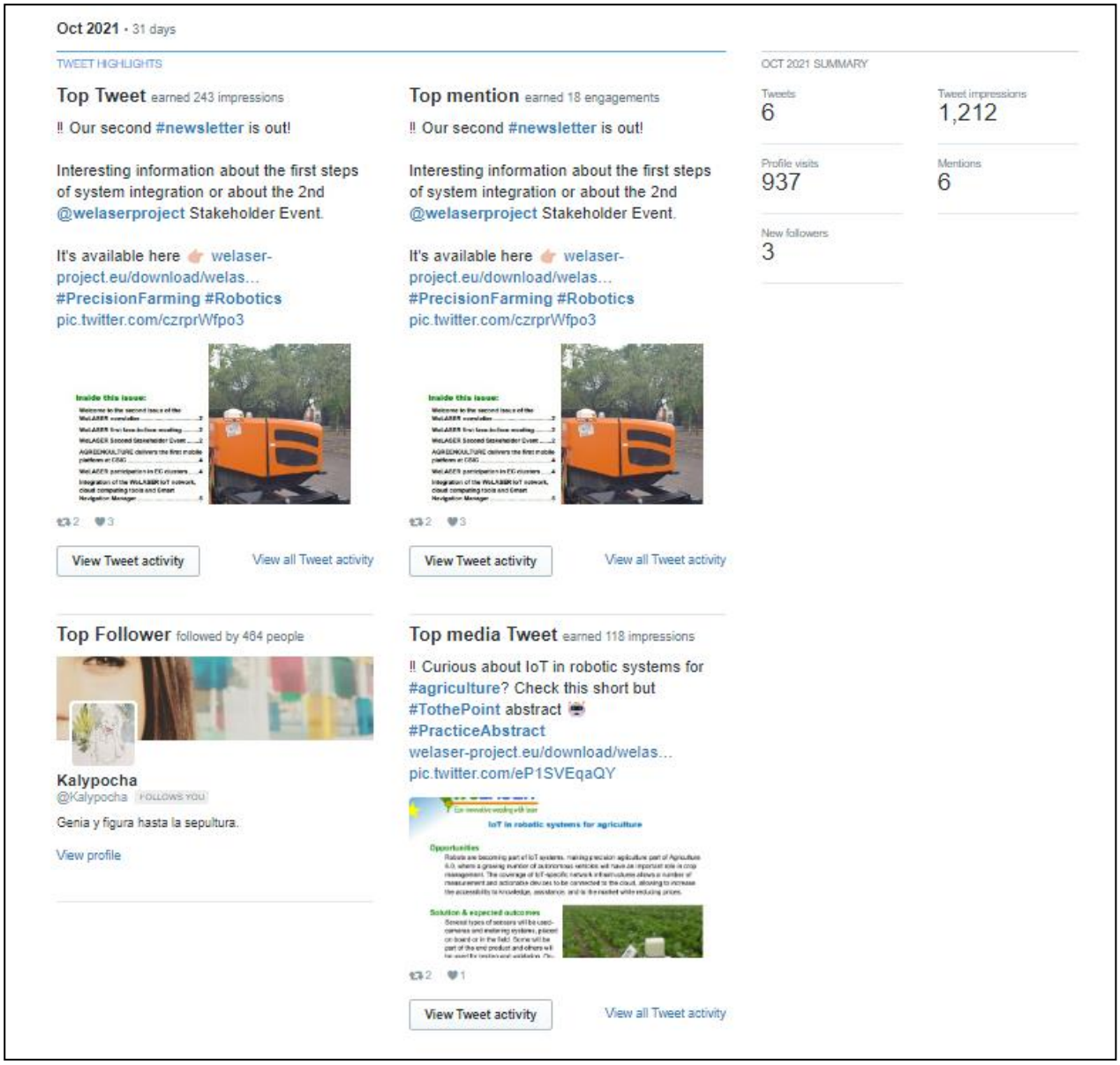


2 2

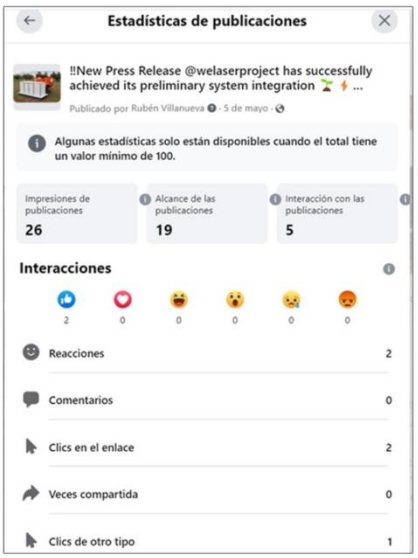
View Tweet activity View all Tweet activity

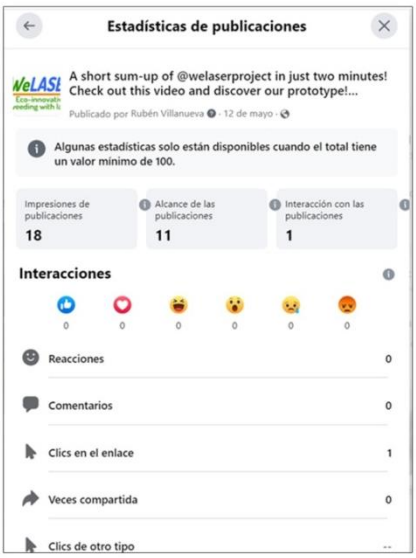
NOV 2021 SUMMARY

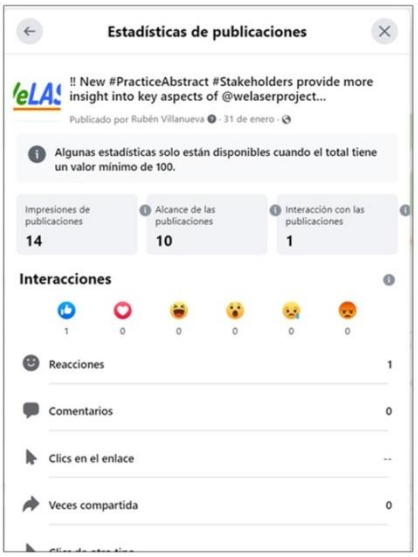
Tweets 10	Tweet impressions 2,956
Profile visits 551	Mentions 9
New followers 4	

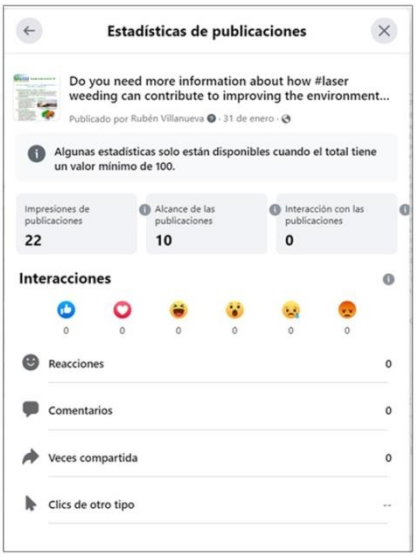

Oct 2021 · 31 days
TWEET HIGHLIGHTS
Top Tweet earned 243 impressions
‼ Our second #newsletter is out!
Interesting information about the first steps of system integration or about the 2nd @welaserproject Stakeholder Event.
It's available here 👉 welaser-project.eu/download/welas... #PrecisionFarming #Robotics pic.twitter.com/czrprWfpo3
View Tweet activity
View all Tweet activity
Top mention earned 18 engagements
‼ Our second #newsletter is out!
Interesting information about the first steps of system integration or about the 2nd @welaserproject Stakeholder Event.
It's available here 👉 welaser-project.eu/download/welas... #PrecisionFarming #Robotics pic.twitter.com/czrprWfpo3
View Tweet activity
View all Tweet activity
OCT 2021 SUMMARY
Tweets 6
Tweet impressions 1,212
Profile visits 937
Mentions 6
New followers 3
Top Follower followed by 464 people
Kalypocha
@Kalypocha FOLLOWS YOU
Genia y figura hasta la sepultura.
View profile
Top media Tweet earned 118 impressions
‼ Curious about IoT in robotic systems for #agriculture? Check this short but #TothePoint abstract 🚌 #PracticeAbstract welaser-project.eu/download/welas... pic.twitter.com/eP1SVEqaQY
IoT in robotic systems for agriculture
View Tweet activity
View all Tweet activity

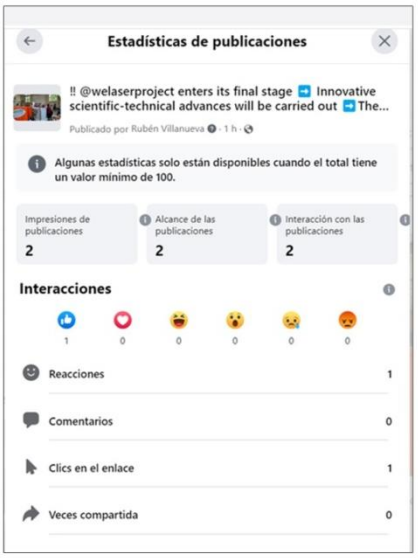
8.2.4. Facebook

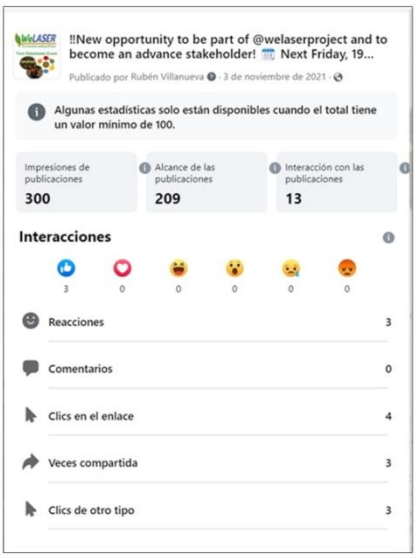




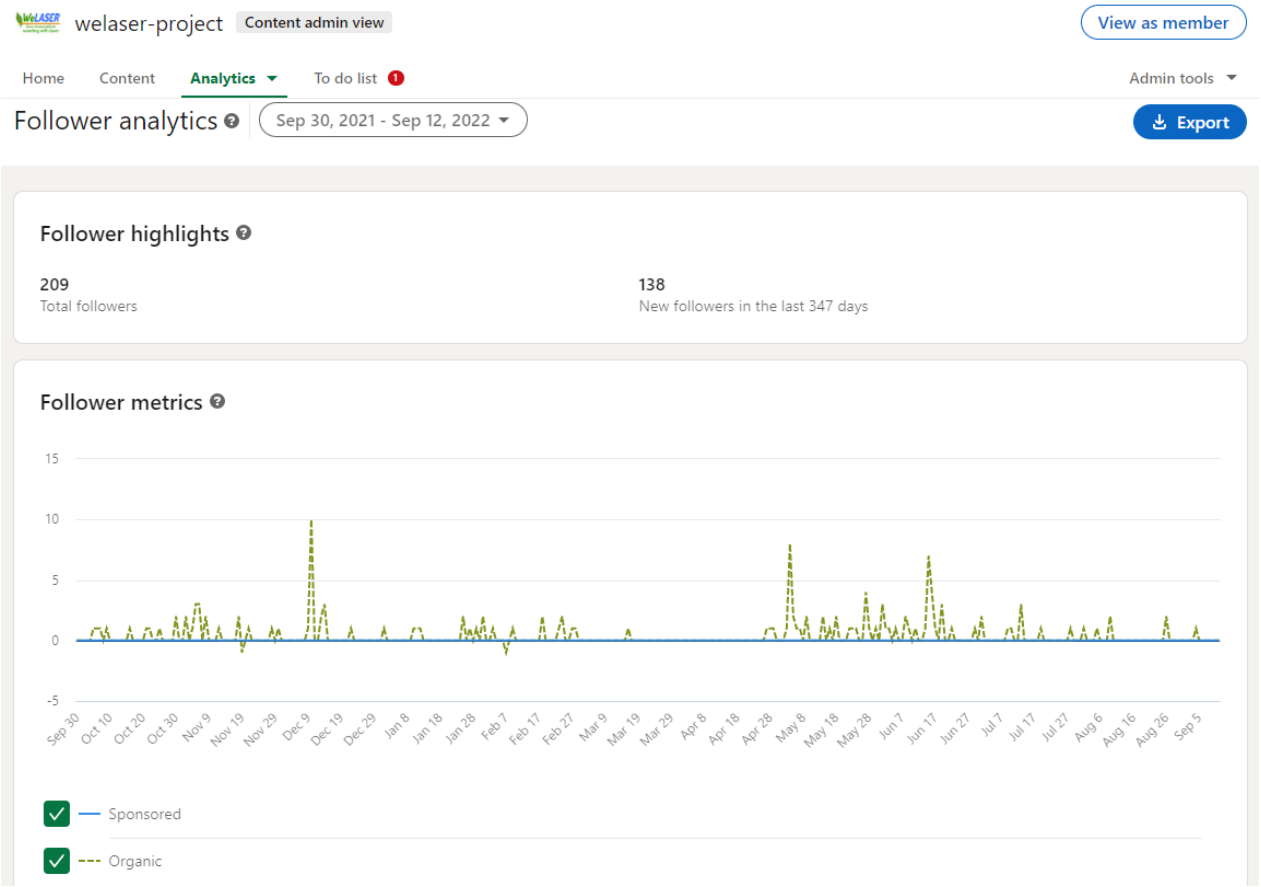


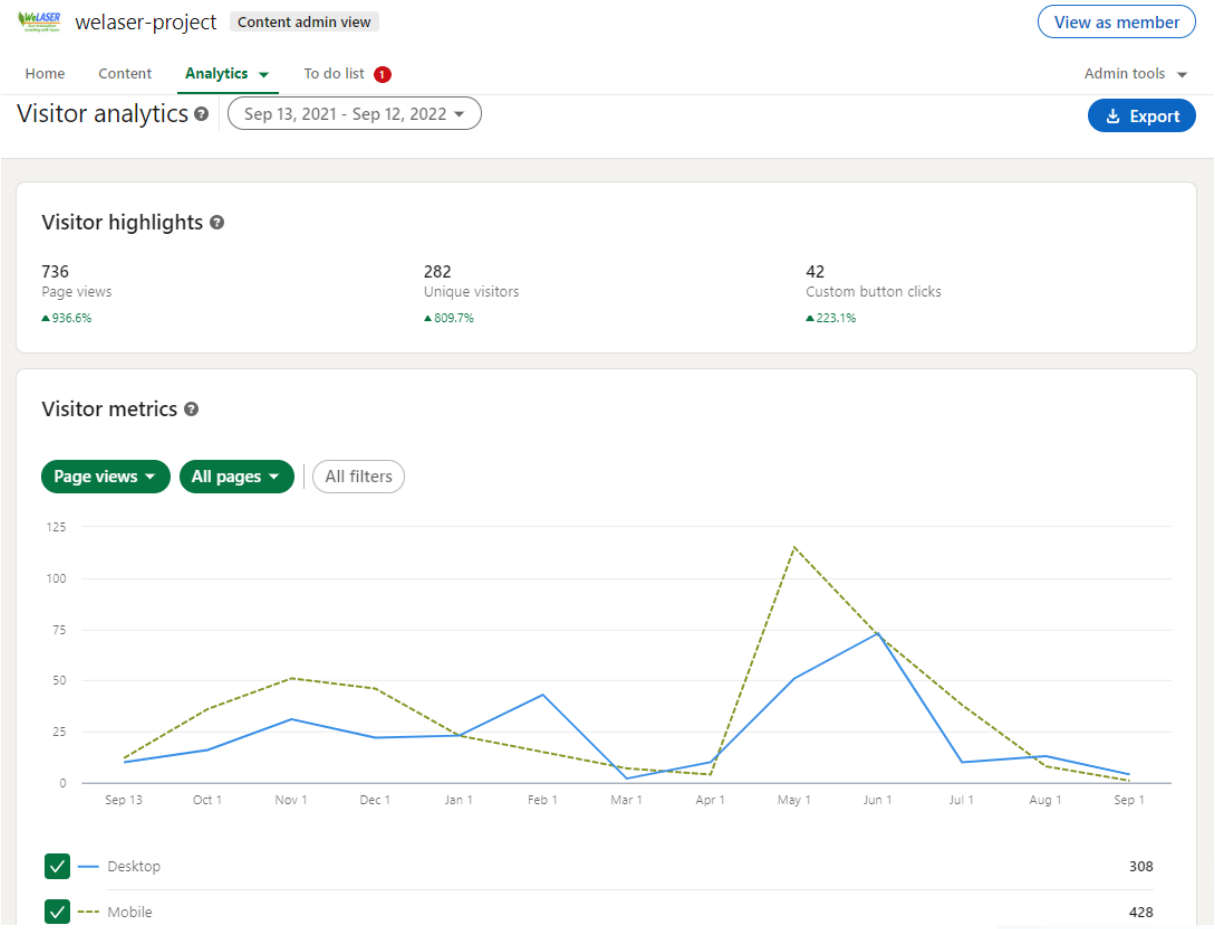


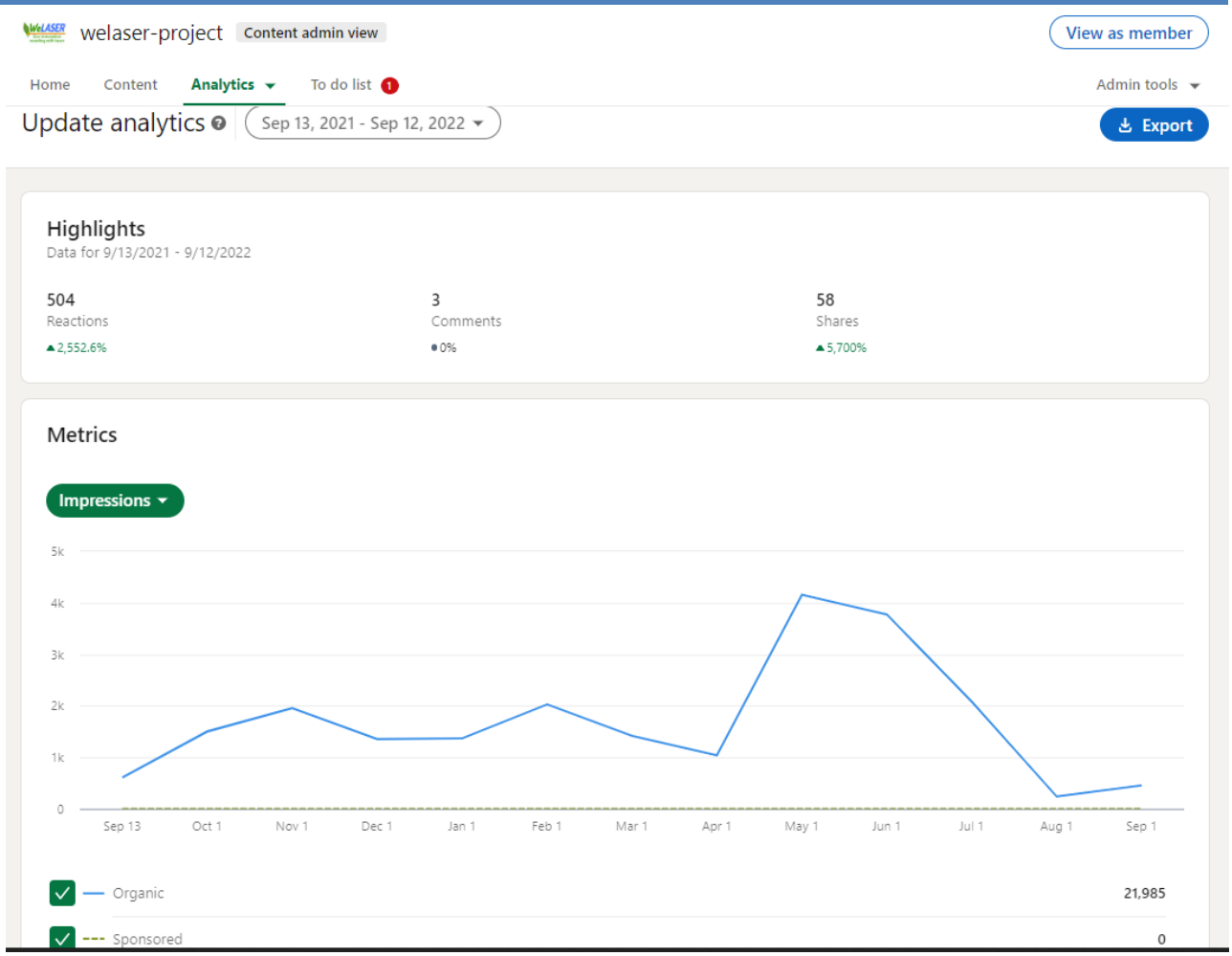




8.2.5. Linkedin






welaser-project
Content admin view
View as member
Home
Content
Analytics
To do list
Admin tools
Update analytics
Sep 13, 2021 - Sep 12, 2022
Export
Highlights
Data for 9/13/2021 - 9/12/2022
504
Reactions
2,552.6%
3
Comments
0%
58
Shares
5,700%
Metrics
Impressions
5k
4k
3k
2k
1k
0
Sep 13
Oct 1
Nov 1
Dec 1
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Organic
21,985
Sponsored
0