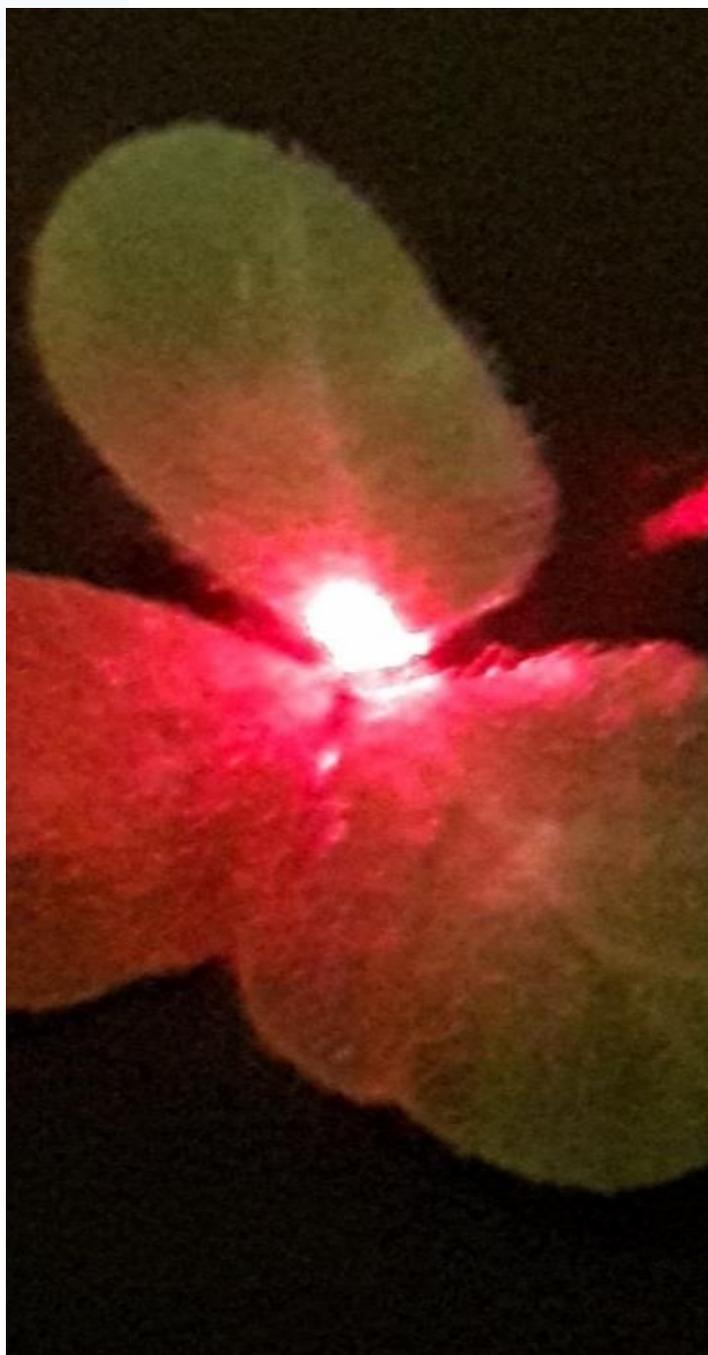


Contributing authors: CSIC, COAG, UNIBO, LZH

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Welcome to the first issue of the WeLASER newsletter

WeLASER is a three-year project funded under the Horizon 2020 programme of the European Commission in the call “Integrated health approaches and alternatives to pesticide use (SFS-04-2019)”. The project aims at merging current technologies to build, assess and push a

precision weeding system into the market 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. The system attempts to eradicate health risks and environmental adverse effects associated with the use of herbicides. The WeLASER newsletter will be a six-monthly publication devoted to engage and keep all potential actors (farmers, agronomists, researchers, engineers, policy makers, students, business institutions and governments, investors, citizens, etc.) informed

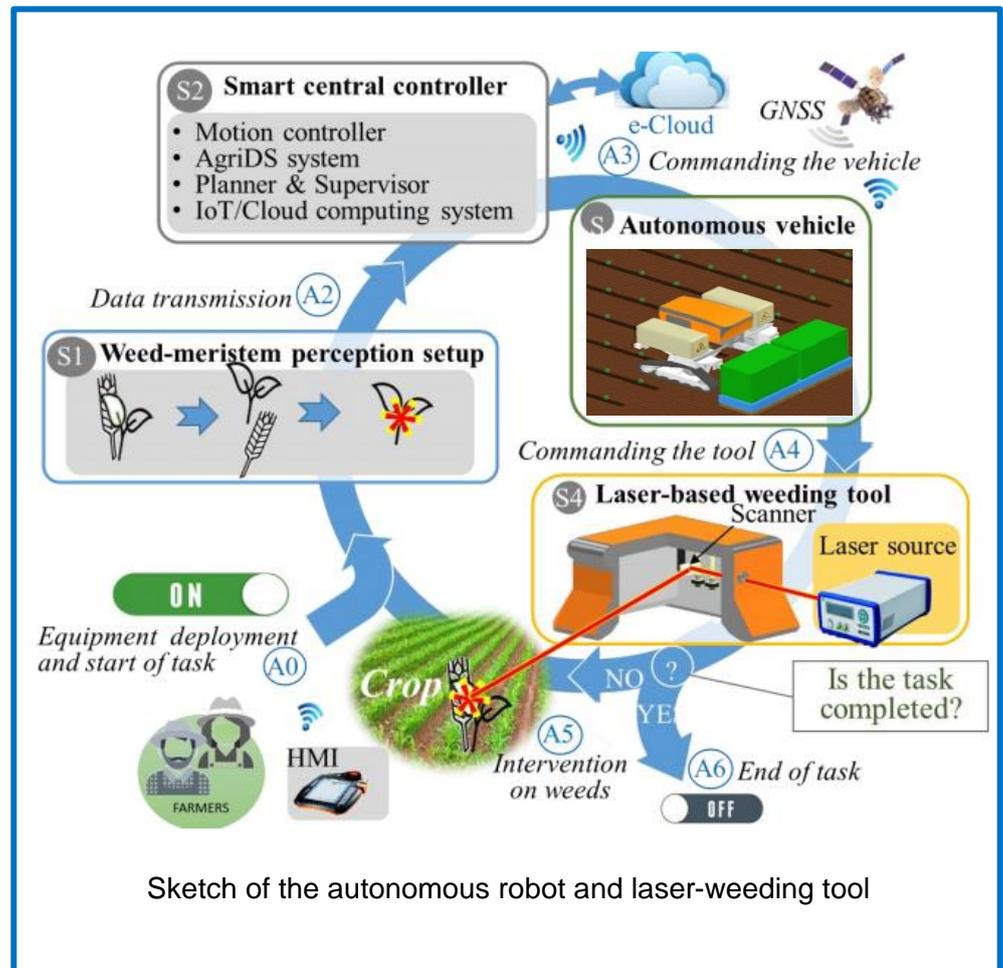
about the project’s progress and activities. In this first issue you will be informed about the project’s objectives, expected results and the activities carried out during the first semester of the project development.

WeLASER Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

Introducing WeLASER

What is it?

WeLASER is a new autonomous intervention system that will destroy weeds using high-power laser technology. This intervention tool will consist of a high-power laser source and a laser targeting device in charge of applying a laser dose on the weed meristems that impairs the



Sketch of the autonomous robot and laser-weeding tool

plant growth (lethal dose). Weeds will be discriminated from crops and their meristems identified by using an innovative perception system based on AI-vision techniques. The mobility of the intervention tool will be provided by a commercial agricultural mobile platform. The action of these systems will be coordinated through a smart navigation manager, which will also be in charge of coordinating the communications with the cloud, the IoT technology devices and the operator interface. This smart manager will be in charge of helping the farmer in planning the missions, supervise the performance of the equipment, and manage the interchange of knowledge with the cloud.

Specific objectives

1. To develop an innovative tailor-made, movable, high-power, thulium-doped fibre laser for weeding.
2. To develop an advanced artificial-intelligence (AI) detection system to provide the positions of the weed meristems (the plants' sensitive growth centres).
3. To build a targeting tool to direct the laser beam onto the weed meristems in real scenarios.
4. To develop a safe autonomous vehicle, based on a proven, innovative and eco-friendly agricultural mobile platform, to carry the weeding system accurately throughout the working field.
5. To achieve a minimum impact of WeLASER precision weeding equipment on crops, the environment and health.
6. To develop a smart navigation manager to coordinate all the systems involved in the precision weeding equipment allowing the farmers to define, execute and supervise their tasks in a reliable, robust and user-friendly way.
7. To ensure the commercial viability and exploitation of the proposed WeLASER system through the implementation of a multi-actor approach.

Consortium and budget

To achieve the project objectives throughout a 36-month period, a consortium of 10 experts with complementary knowledge from 8 EU countries has been formed to cover all required scientific, technical and strategic activities. WeLASER consortium comprises a mixture of academia, SMEs and associations that cover all relevant activities in a prospective value chain and in a multi-actor scheme, specifically the consortium counts on roboticists (CSIC, AGC); agronomists (UCPH); experts in laser sources (FUT), laser applications (LZH), AI-vision systems (LZH), IoT and cloud computing (UNIBO); specialists in social sciences (IETU)

36-month project
5.47 M€ total funding
4.99 M€ EC funding
10 partners from 8 EU
countries

and economy (UGENT); farmer associations (COAG) and farmers (VDBP).

WeLASER official start

WeLASER officially started on October 1st, 2020 and will conclude on September 30th, 2023. The project kickoff meeting was held virtually on October 13th, 2020, bringing together the partner

Consortium

1. CSIC - Spanish National Research Council, Spain.
2. FUT - Futonics Laser GmbH, Germany
3. LZH - Laser Zentrum Hannover e.V., Germany
4. UCPH - University of Copenhagen, Denmark
5. AGC - Agreenculture, France
6. COAG - Coordinator of Professional Agricultural Organisations, Spain
7. UNIBO - University of Bologna, Italy
8. IETU - Institute for Ecology of Industrial Areas, Poland
9. UGENT - University of Gent, Belgium
10. VDBP - Van den Borne Projecten BV, The Netherlands



representatives, the Research Executive Agency (REA) and the DG Agriculture Policy project officers. In this meeting a general project overview was given by the project coordinator, the partners' representatives introduced their organizations, the work package (WP) leaders introduced the activities in their WP and the project officer gave two presentations on several aspects of the H2020 programme. Finally, the activities for the next quarter were stated. No doubt that the main activity was the organization of the First WeLASER Stakeholder Event.

WeLASER First Stakeholder Event

The First WeLASER Stakeholder Event was held on November 26th, 2020, gathering over 60 participants including farmers, research and agriculture institutions, civil societies-NGOs, policymakers, the EC project officers and the project partners. The event was an opportunity to involve the stakeholders in the project and in the definition of the system characteristics. The stakeholders suggested allowing the exploitation of individual subsystems, to design the subsystems to be used with conventional tractors, to increase the tool width, to try to reach a treatment rate of about 10 Ha/day, and focus the treatments on high-value crops (sugar beet) and strategic crops (wheat and maize) for the EU. A general approval of the project objective and interest shown in WeLASER emerged from the meeting. Definitely, stakeholders' participation will ease the way for the final commercialization of the system.

The screenshot shows a presentation slide with the following content:

- Characteristics of the call**
- Multi-actor approach (MAA)**
 - must focus on the solution of real problems or opportunities that end-users (farmers) are facing.
 - must join forces of partners with complementary knowledge in the project activities from beginning to end.
- WeLASER multi-actor approach coverage**
- Partners:** VDBP | COAG, CSIC | LZH | FUT | UNIBO, AGC | FUT, UCPI | COAG | VDBP | UNIBO, IETU, UGENT
- Stakeholders:** Operational service groups, Practise abstracts
- CSIC** logo and text: "Partnership with an interest in the success of the project and by the outcome of a project"

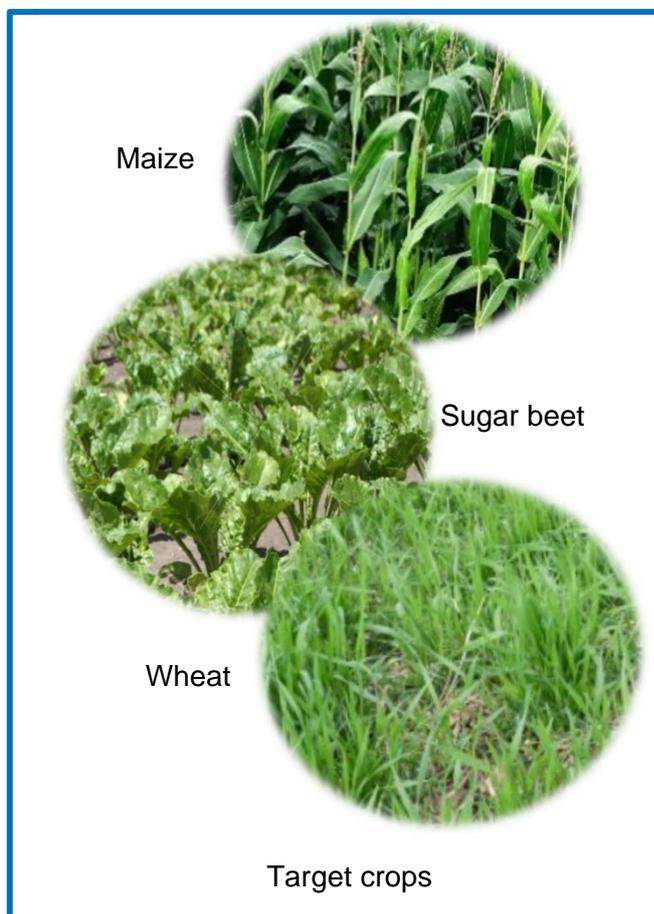
First Stakeholder Event (Virtual meeting)

System main characteristics

- Dimensions: 2.4 × 2.1 × 1.65 m
- Clearance: 0.25 m
- Weight: ~1243 Kg
- Tracks distance: from 1.26 m to 2.40 m
- Treatment efficiency: > 65%
- Treatment speed: ~2 Km/h
- Treatment rate: ~9.6 Ha/day – With the complete tool

Milestone 1

WeLASER consortium met together in a General Meeting on December 17th, 2020, to review the system characteristics and the target crops, which had been modified according to the stakeholders' suggestions received during the First WeLASER Stakeholder Event. The consortium agreed on a few changes on the system characteristics and crops for final tests. This agreement is essential for the project because fixing the system features and target plants allows the sub system design and development to be started. With this decision, the consortium achieved project milestone 1 and



opened a 27-month period for sub system development and system integration.

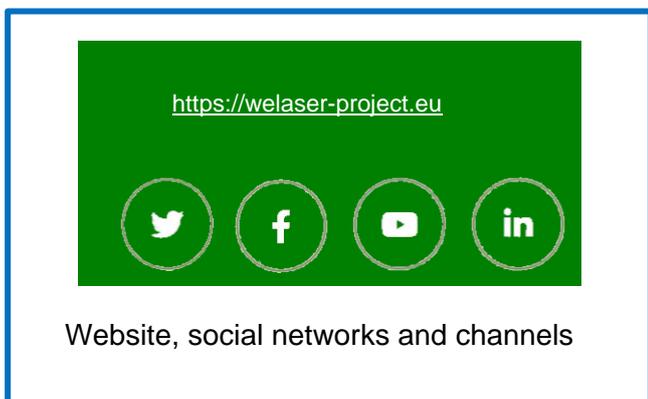
WeLASER
achieved its first milestone
“*Final specifications, test
procedures and system
breakdown*” in
month 4



tested on plants using different focal diameters and power densities.

WeLASER website, social networks and channels

WeLASER social networks (Twitter, Facebook and LinkedIn) and channels (YouTube) are operating since the very beginning of the project and the website was launched in the middle of January 2021. These mechanisms are devoted to communicate activities and disseminate project results and they are a feedback tool for readers' ideas and comments. We encourage you to access these communication conduits and participate in the management of the project (see the links at the end of this newsletter).



Futonics delivers a 2 μm laser at the University of Copenhagen for performing the first tests

By the middle of February, Futonics delivered a 2-μm laser with a chiller to the University of Copenhagen. The system includes an optic to focus the laser with a working distance from 0.20 m to 1 m, which enables the laser to be

Communication and dissemination activities

During the first semester of project development, the consortium has been very active in communicating the project activities. Nine practice abstracts have been published at the AGRI-EIP [website](#) and WeLASER [websites](#) illustrating different aspects of the different subsystems and the activities carried out. Moreover, some press releases have been issued in Germany, recently, and Spain. In Spain only, the press releases had impact on the following publications: [CAMPO GALEGO](#), [INTEREMPRESAS](#), [AGROINFORMACIÓN](#), [AGRODIGITAL](#), [CAMPO DE ASTURIAS](#), [INFOAGRO](#), [AGRONEWS CASTILLA Y LEÓN](#), [PROFESIONALES HOY](#), [EI DÍA DE SEGOVIA](#), [AGROBANK](#), [CAMPO CASTILLA Y LEÓN](#), [AGROCLM](#), [INNOVAGRI](#), [DIARIO DE ÁVILA](#), [LA TRIBUNA DE TOLEDO](#), [LA TRIBUNA DE ALBACETE](#), [DIARIO PALENTINO](#), [EL ECONOMISTA](#).

Dissemination of preliminary project results in academia have been achieved through the following scientific articles:

- Ildar Rakhmatulin, Christian Andreasen, “A Concept of a Compact and Inexpensive Device for Controlling Weeds with Laser Beams”, *AGRONOMY* Vol 10, No. 10, 2020.
- Giuliano Vitali, Matteo Francia, Matteo Golfarelli, Maurizio Canavari, “Crop Management with the IoT: An Interdisciplinary Survey”, *AGRONOMY* Vol 11, No. 1, 2021.

Project Title:

Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

Coordinator:

Spanish National Research Council (CSIC)

Duration:

36 months (October 1, 2020 to September 20, 2023)

Funding scheme:

EC H2020 programme – Innovation Action (Grant Agreement No. 101000256)

Project website:

<https://welaser-project.eu>

Social media and channels:**Consortium:**

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