Vision Systems for Agriculture

WeedEye

WeedEye

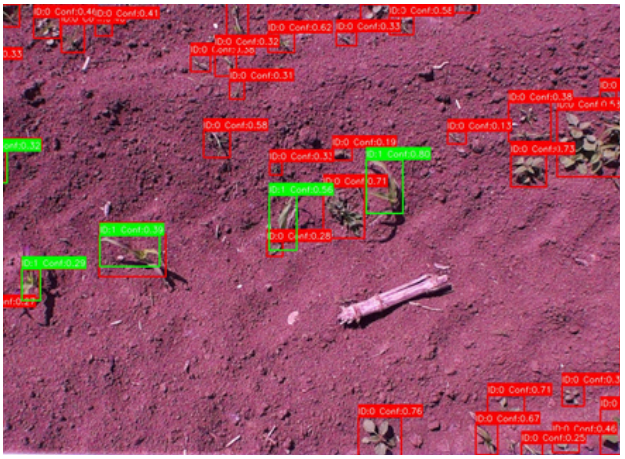
Real time spot spraying solutions

www.weedeye.hu

WeedEye FALCON

Vision & intelligence

Rugged, IP67-rated **integrated vision system** mounted at **1 - 1.5-meter** intervals along the boom. Designed as a plug-and-play modular device, it can be applied for any use case.



Stunning precision

Each **WDU** has a high resolution **camera** and a **processing unit integrated** into a **metal** enclosure. This way the detections can run **locally** on the device level without the need of cloud connection and multi step processes.

All cameras along the sprayer boom take images completely **synchronously** with **microsecond precision**. The cameras distinguish between the crops and weeds in under **20 milliseconds**.

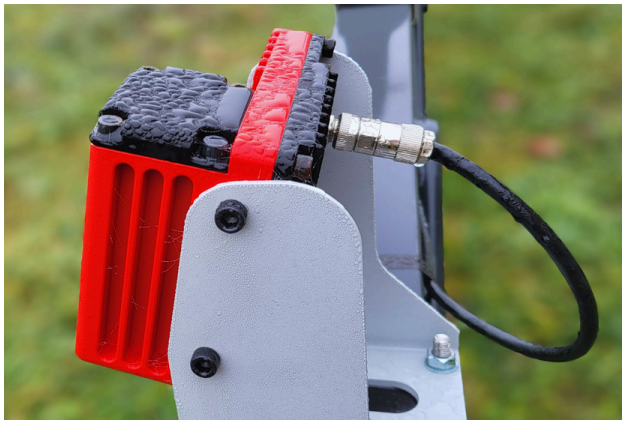
The cameras are slightly bent with a pre calculated angle so that it can see in the desired field of view without the need of hanging them in front of the boom to save space.

Made for harsh conditions

Every component was carefully selected to meet **heavy-duty** requirements. All of the electronics and mechanics has been **tested** for shock, vibrations and temperature changes that are present during field usage. The metal housing gives the components strong **protection against collisions** with tree branches or similar objects. Every component can be mounted onto the boom with mounting brackets without harming the boom itself.

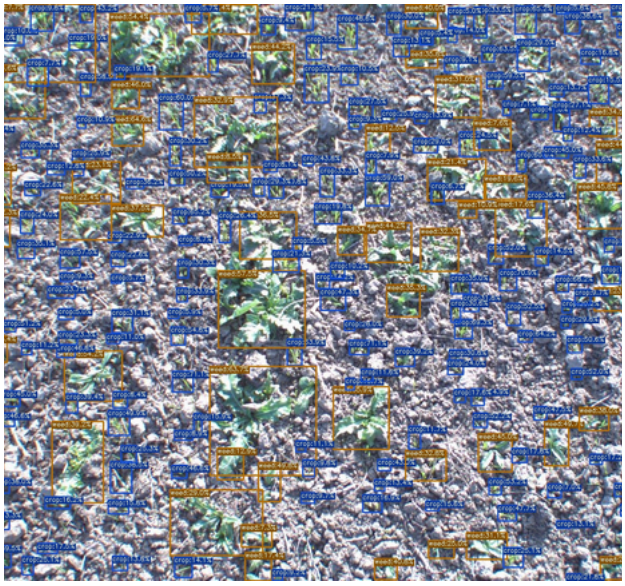
Our philosophy: Keep it simple!

Providing farmers cutting edge solutions is not just about putting a system together. We are proud that our hardware components were **designed from the ground up by us** to make the **most compact solution**. We integrated every component into discrete hardware elements so that the final product architecture is **as simple as possible**. This way no only the operation is simple but the maintanance tasks don't require expertise. Also because of the highly modular design of the system, part replacement is convenient.



Get insight into your land

While the real time weed and crop detection is happening during spraying, the FALCON system **logs all of the captured metadata**, including weed and crop positions and sizes. It can be **downloaded** from the system in GeoJSON format and analyzed in any software that you prefer.



Valve system - WeedEye RAPID

Guarantees precise application

The solenoid valves are controlled by **dedicated current control circuitry** that provides reliable opening and closing of the valves. This way the opening and closing times are **5-5 milliseconds** which is the best on the market. This short timing makes the valves suitable for regular and ultra high precision spot spraying.

Everything under control

Because of the market leading opening and closing times the valves are able to be used in PWM mode up to 100Hz. This way the exact dose rates can be sprayed across the field.

Modular setup

The valve system operates on CAN bus and every four valves have a dedicated controller device that they are plugged into. **Any number of controllers** can be connected to form a bus thus the valves can be fitted onto any boom with any size and arbitrary spacing. The lowest available valve spacing is **4cm** and for large booms the recommended spacing is **25-50cm.**

Mounts to existing nozzle holders

Compatible with standard **TeeJet/Arag nozzle holders** so spare parts can be easily purched from local stores. The materials of the solenoids and the cabeling are made to **withstand strong chemicals**.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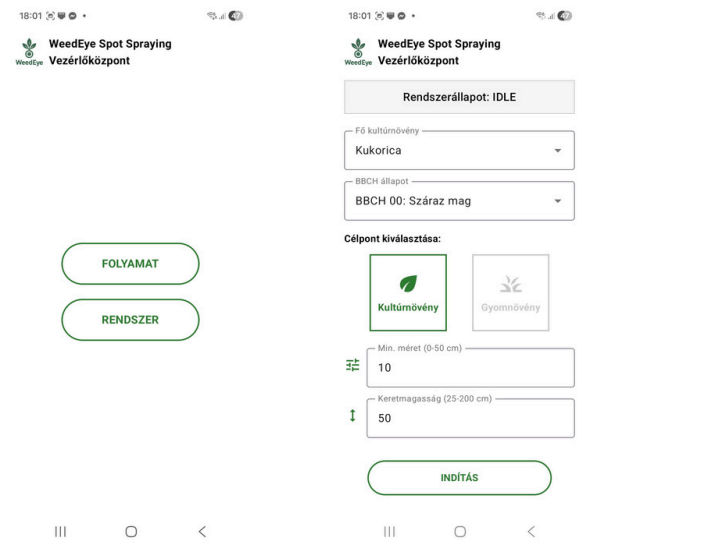
User Interface

ISOBUS Universal Terminal

For tractors that **have ISOBUS installed**, we can provide **ISOBUS UT** application for our system. When the sprayer is connected to the tractor the system automatically loads the **WeedEye ISOBUS UT application** besides the other ISOBUS implement applications. The interface is very simple: just select the culture you are spraying, set the parameters and you are ready to go.

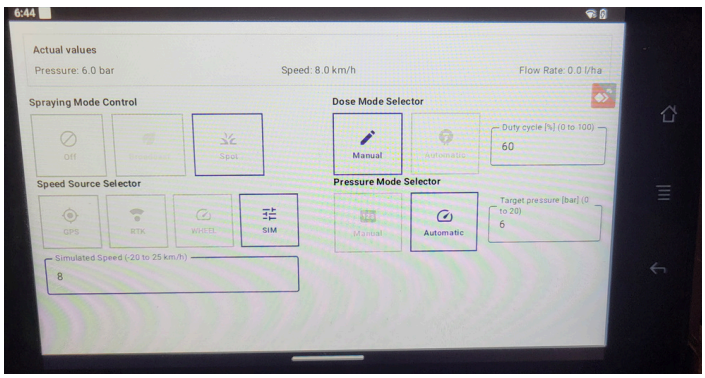
The WeedEye ISOBUS UT is available for the WeedEye Easy Kit. The existing functionalities are used from the tractor: ISOBUS-Task Controller, Sprayer controller

Android interface



The **Android interface** is available for any system as a dedicated and robust user interface for the WeedEye systems. The WeedEye FALCON system can be configured, started and stopped and also the sprayer functionalities can be controlled with a user-friendly, simple screen. It can be installed on any phone or tablet

Real time feedback



The Android interface provides insight into what is happening during the operation. The user can see the **live camera feed, valve states** (open or closed) and get **statistics** about the weed density and applied chemicals.

The AI system

Working principle

The AI system is needed because in outdoor applications with challanging lighting conditions, dust and unstructured envirnoment, the existing rule-based image processing algorithms can not be used alone, because they are not robust enough.

Thanks to our years of experience, if a new, unseen crop and weed culture is needed for a specific use case, a new algorithm can be trained in as short as 3 days.

In case of AI these challenging environments can be tackled with collecting and preprocessing large amount of field data. A Machine Learning model is trained on this data that is developed in house by WeedEye and it is uploaded to the system.

As a result Green on Green and Green on Brown methods are supported by default.

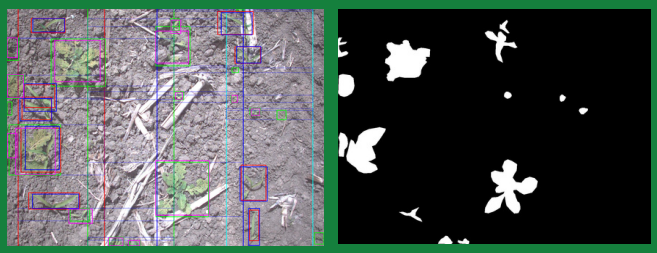
Capabilities

System can be configured for blanket spraying, spot spraying. In case of spot spraying, the system gives several possibilities to fine-tune the usage.

The user can select to spray the weeds or the crops. During spot spraying the sprayer can travel in **any direction**, the detection algorithm can detect precisely during turning too. The crops do not need to be planted in rows. Also, no calibration is needed before the operation. Just start the spraying as you are used to.

Ultra High Precision additional features

In case of Ultra High Precision, the user can select beween weed dominant or crop dominant mode. In case of crop dominant mode, even if a weed overlaps a crop, the weed is not sprayed above the crop to protect the crop from chemicals. In case of weed dominant mode, the crop might be sprayed as well partially if they overlap with a weed.



When Ultra High Precision application is used, the contours of the objects are extracted to segment them. This provides the precision needed for the reliable treatment.

Configurability

For safety, a **padding** can be added to the detected target objects so that the nozzle sprays a bigger patch than the target object.
Furthermore, the **sensitivity** of the algorithm can be modified to detect smaller or just bigger weeds.

WeedEye Easy Kit

Simple solution for pre installed valve systems

This kit is ideal for those farmers **who have a sprayer with pre installed precision valve system with ISOBUS section control capabilities**. The WeedEye Easy Kit seamlessly integrates into the ISOBUS system by extending the section control with real time spot spraying.
That also means that the spot spraying system usability is limited by the factory valve system reacton time and section number and section widths.

Seamless integration

The **WeedEye Easy** kit plugs directly into the ISOBUS IBBC connector with our **gateway module**. No other connection is needed. It provides a user interface for the ISOBUS Universal Terminal. As the system extends the ISOBUS section controller, every original features of the system are kept.
The only components of this kit are: WeedEye FALCON vision system with WDUs with 1.5 meter spacing, ISOBUS gateway integrated into the Central Unit and adapter brackets that mount the WDUs to the sprayer boom non-destructively.

Requirements

- ISOBUS capable valve system pre installed on the sprayer
- ISOBUS section control enabled

Features

- Operating speed limited by valve reaction times (typical: 12-15km/h)
- Spot spraying resolution limited by the section widths that the sprayer ECU or ISOBUS TC is capable of

Solution for any machine

The WeedEye **Full Retrofit** kit is a complete real time spot spraying solution for **any sprayer without compromises**. We not only provide the WeedEye Falcon system, but also the WeedEye RAPID valve system. This kit features all the components that are needed for transforming any kind of sprayer to a state-of-the art modern precision machine. We provide the FALCON vision system with WDUs spaced **every 1.5 meters** along the boom, the RAPID valve system and the ISOBUS connector and interfaface or the Android interface. The WDUs are mounted to the boom in a non-destructive way.

RAPID-Standalone

The RAPID valve system replaces the original valve system or is installed as a new valve system if there are no valves on the sprayer initially. With this approach WeedEye provides the Spot Spraying mechanism with Broadcast spraying option too and variable rate mode. The valves are spaced with 25 cm spacing along the boom.

RAPID-Augment

When there is an already installed valve system on the sprayer that the owner wants to use or the Easy kit features are not enough, then we offer a valve augmentation solution. It means that the WeedEye RAPID system is installed next to the original valve system and they can be used independently for different purposes. For augmentation, the WeedEye RAPID system can be installed with 25-50 cm nozzle spacing.

Features

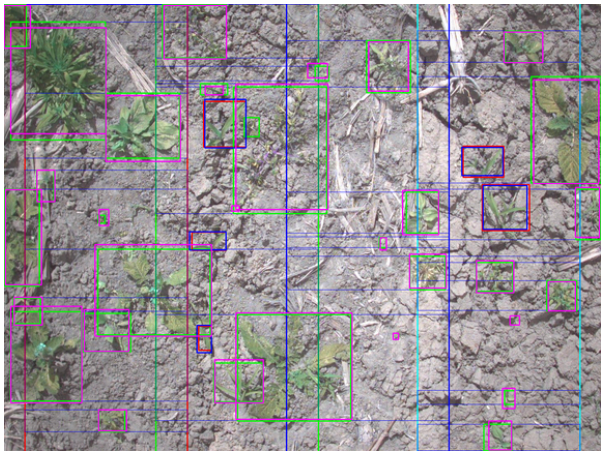
- Operating speed **up to 20km/h**
- Spot spraying resolution: **25 x 25 cm or 50 x 25 cm**

Unlock never seen precision

Built on the Berthoud ALTO sprayer, WeedEye offers the ultimate solution for needs where **surgical precision** is needed. This standalone product brings together the century long expertise of Berthoud in sprayer manufacturing, the expertise of WeedEye in machine vision and forms a product as a fusion of Berthoud ALTO sprayer, WeedEye FALCON system and ultra tight **4 cm nozzle spacing.**

The best solution for farmers

The core value of this product relies in its **simplcity**. We designed it to make it **easy to operate** and **easy to maintain**. Everyone can make a functionally correct product. But making a simple product shows what a company is capable of. At WeedEye we are proud that we took the time and designed our **own dedicated hardwares** for the UHP system to offer a solution that does not rely on complex cableing or complex system architecture, uses highly integrated hardwares and carefully selected components that are durable and fault tolerant. Every part of the sprayer is **easy to access phisically** to make usage and maintanance convenient.



WeedEye UHP7.0 sprayer technical details

Mounted design with support wheels

The tank and its supporting frame are rigidly connected to the tractor's three-point hitch - always in the upper position during operation
The boom is connected to the tank's support with parallelogram suspensions mechanism - rough height adjusment via hydraulic control from the tractor, fine adjusment via supporting wheels
The boom is divided into 3 parts; the two outer parts fold up hydraulically during transport
The support wheels are needed for following the terrain

Dual tank solution - minimize wasted liquid

600 l water tank, 50 l herbicide tank, 50 l mixing tank.
Achieving a minimum level of mixture (10 liter) in the mixing tank 30 liters of water and the desired amount of herbicide (~1 l) are added. The quantities of water and herbicide can be changed as desired, hence the residual amount of mix can be minimised.
This is the ideal solution for spot spraying, because unlike static inline mixers, this solution does not need constant high liquid flows.
The sprayer comes with constant pressure control.

WeedEye FALCON with ultra high precision features

Comes with WeedEye FALCON installed on the sprayer
Every software feature that the FALCON system basically has plus the UHP features
WDU (camera) spacing is 1 meter, so 7 WDUs are installed on the boom to guarantee that every weed is detected.
Additional external lighting is provided for each WDU with constant on lights
Recommended maximum operating speed: 8 km/h

WeedEye RAPID valve system on the boom

WeedEye RAPID valve system is used with 4cm nozzle spacing.
Comes with 175 solenoid valves and flat fan nozzles.
Individual nozzle control is implemented to maximize precision.
Easy to access each valve and nozzle, installed on the rear of the sprayer

Optimized dimensions

Effective working width: 700cm
Closed width: 240cm
Length: 210cm
Open height: 2.7m
Closed height: 3.3m
Empty weight: 450kg

Electrical deatils

Nominal voltage: 12V
Current consumption:

- 60A (when all nozzles are open and the spot spraying is active)
- 15A (when all nozzles are closed and the spot spraying is active)
- 5A idle

If the tractor generator is not sufficient, additional battery can be integrated

The "Bottom-Up" Advantage

WeedEye

Purpose-Built for Agriculture.

WeedEye was designed with a bottom-up engineering philosophy. We built our hardware and software architecture specifically for one purpose: detecting weeds in harsh agricultural environments.

By eliminating "bloatware" and unnecessary complexity, we created a system that is leaner, faster, and far more robust then any other available system.

About Us

WeedEye was established in **2022** with a clear vision: to solve real problems for real farmers. After completing our prototype in 2023, we dedicated two full years to **intensive field testing**. In 2025, we introduced the WeedEye Easy and Full Retrofit kits that have earned their stripes in the field.

Our strength lies in the unique diversity of our founding team, covering every aspect of a perfect product:

Industrial Durability: Backed by heavy industry expertise (foundry & machining), guaranteeing that our mechanical design is rugged and built to last.

Scientific Excellence: Our electronics designs are led by a University PhD, combining academic innovation with industrial stability. We also have great university connections and partnership with agricultural university as well as international manufacturers in agriculture.

Deep Agronomic Roots: Co-founded by a farmer **managing 2,000 hectares**, ensuring our system is built on **40+ years of experience** and tested in real-world conditions.