



**Agrycultural robotic
total agrocycle system
for vineyards and orchards**



NO HAND LABOR IN AGRICULTURE

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Product of  **PeK** *automotive*

Before



in Future



Now



Slopehelper is robotization of Agricultural Cycle.

It's doing through combination of system elements:

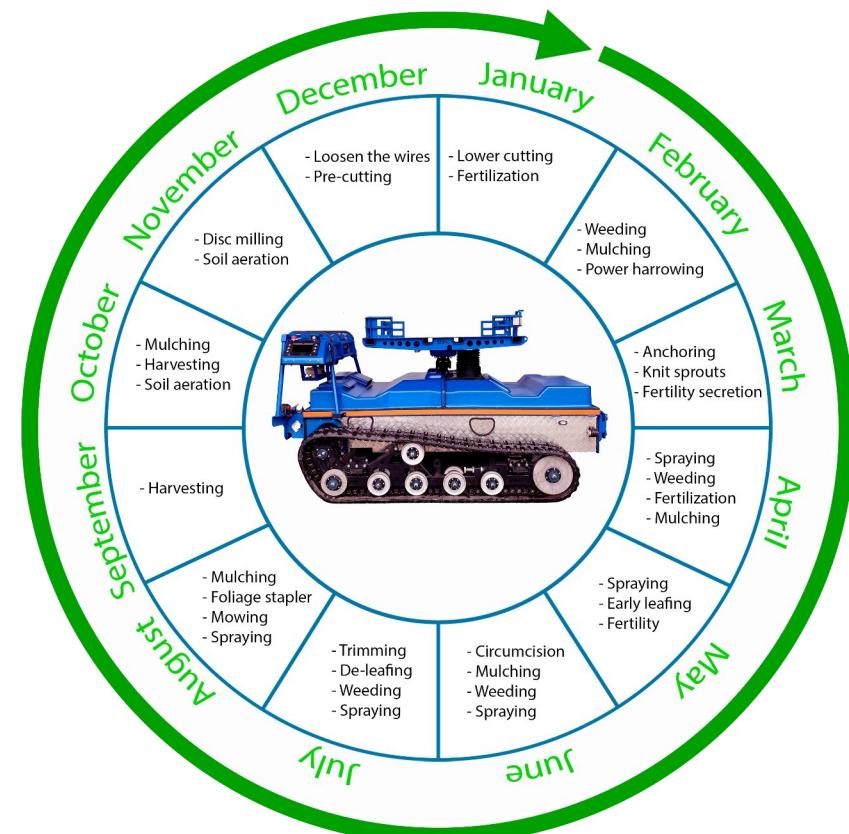


Base platform

Hinged equipment



TeroAIR system
(for Agrocycle control)



What is Slopehelper Product?

One machine for the whole agro cycle. How does this differ from the rest?

Unlike other products that target isolated stages, whether autonomous or conventional, our solution offers comprehensive coverage, seamlessly integrating every phase of the entire agrocycle.

	PRODUCERS	TOOLS	TRACTOR/ PLATFORM	SPRAYER	DRUM MULCHER	SIDE TRIMMER	LAWN MOVER	POWER HARROW	SIDE LAWN MOVER	HV CUTTER	NEEDLE HARROW	FERTILIZER	DE-LEAFER	PRE-PRUNER	HARVESTING SET	BASKET BACK DOWNLOADER	APPLE SHAKER	GRAPE SHAKER	BLOSSOM THINNER
CONVENTIONAL EQUIPMENT	COMPANY A*																		
ROBOTIC SYSTEM	COMPANY B*																		
SLOPEHELPER			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

ONE MACHINE FOR THE WHOLE AGROCYCLE

100%
Autonomous
agricultural
system

100%
48V
low voltage
Electrical


Working time
up to 14 hours


No need
in GNSS
for autonomous
operations


Total
Agricultural
cycle

x3
Lower
Cost


Less
initial
Investments


Easy
deployment



Slopehelper is 100% electric and does not contain hydraulic mechanisms. Due to the absence of hydraulic losses, the machine and tools have high efficiency.

The onboard voltage of 48V is safe for humans.

The operating time of Slopehelper depends on the selected equipment and is 8-14 hours.

Our advanced safety bumpers, which mechanically halt machine movement upon obstacle collision, offer a superior safety standard unmatched by other market solutions.

Specification:

On board voltage – 48V (safety for people)

The working time 8-14 hours

Charging time – 8 hours

100% autonomous Navigation without GNSS technology

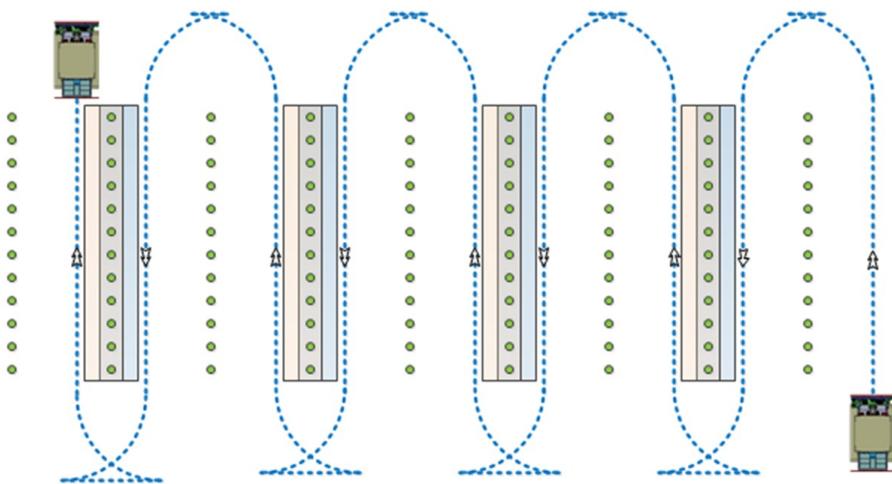


Slopehelper can work without internet, satellite signal and GNSS technology. The robot can navigate in difficult landscape and meteorological conditions. It can work in valleys, near radio towers, tall trees and buildings. Slopehelper is able to work in vineyards of the “Pergola” type, drive into garage and move indoors.

Field preparation is required for fully autonomous operation. It consist on the installation of special radio-tags – reflectors.

The machine uses radars, touch sensors and the IMU – inertial measurement unit. Touch sensors allows the machine to find trees and determine the beginning and the end of a row.

How Slopehelper is working?



Slopehelper is done as autonomous agricultural system. All you have to do is to bring it to the plantation, place at the beginning of the row and press 'Start' button. And track working of a system through TeroAIR application.



How Slopehelper is working?

More details about operations of Slopehelper you can find in Slopehelper YouTube channel:

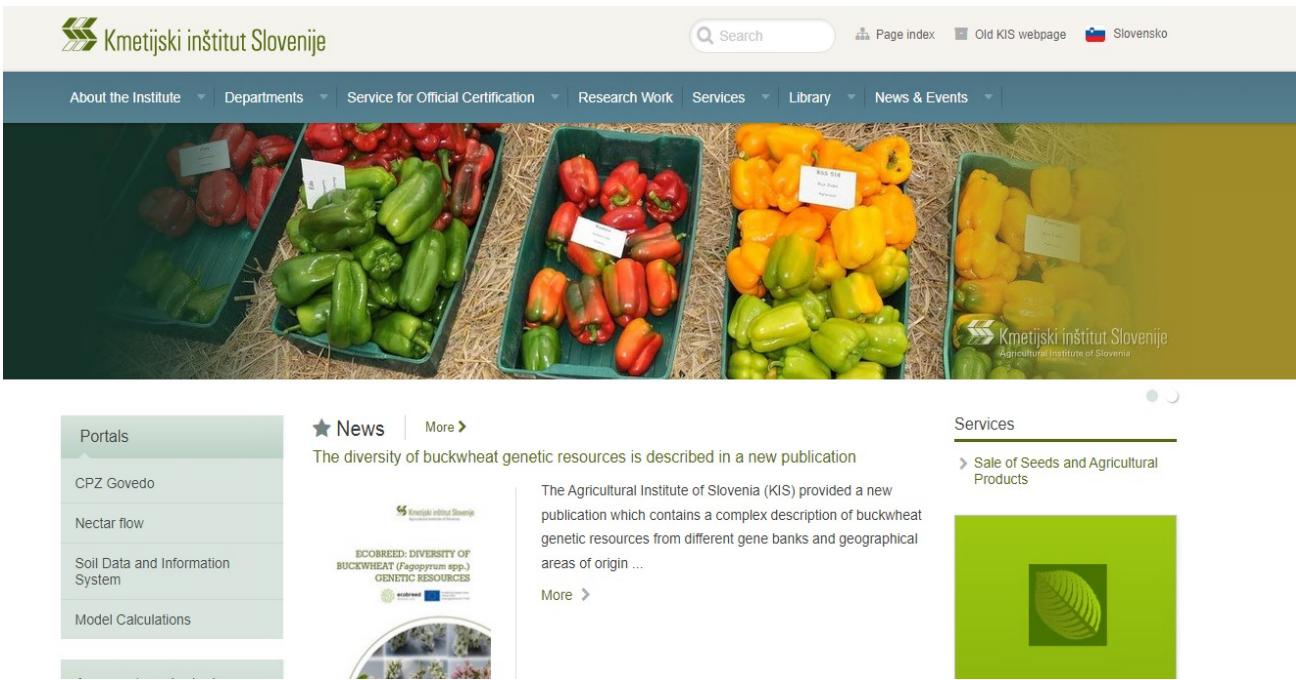
<https://www.youtube.com/@slopehelper>

The screenshot shows the YouTube channel page for 'Slopehelper'. The channel banner features a bright orange background with the text 'AGRICULTURAL ROBOT FOR VINEYARDS AND ORCHARDS' and four key features: '4.0. AGRICULTURE', 'x2 MORE COST EFFECTIVE', '100 % AUTONOMOUS', and '100 % ELECTRICAL'. The channel profile picture is a circular logo with the letters 'Sh' and the word 'SLOPEHELPER'. The channel name is 'Slopehelper' with 308 subscribers and 77 videos. A bio message reads 'Say goodbye to physical labor in agriculture! >'. Below the banner, there are tabs for 'HOME', 'VIDEOS', 'PLAYLISTS', 'COMMUNITY', 'CHANNELS', and 'ABOUT'. A video thumbnail for 'Demonstration of SlopeHelper in Serbia, Hungary and Italy' is displayed, showing a robotic vehicle in a vineyard. The video has 68 views and was posted 8 days ago. A description box below the video reads: 'Join us on a journey through Serbia, Hungary, and Italy as we showcase our amazing robot! We would like to express our gratitude to our hosts and potential partners who welcomed us with open arms and made this demonstration possible. Our robot demonstrated its capabilities and impressed everyone who saw it in action. We hope to establish a lasting partnership with our hosts and bring our robot to even more places around the world. READ MORE'. At the bottom, there are sections for 'Videos' and 'Play all', along with a series of thumbnail images showing the robot in various agricultural settings.

Slopehelper Development

Why do we possess unparalleled expertise in the development of Agro instruments?

We have forged a partnership with the Agricultural Institute of Slovenia, granting us unrestricted access to Slovenia's comprehensive agricultural expertise and research foundation. With the support of these esteemed professionals, our equipment development for our agrosystem has been both efficient and swift.



Kmetijski inštitut Slovenije

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News | More >

The diversity of buckwheat genetic resources is described in a new publication

The Agricultural Institute of Slovenia (KIS) provided a new publication which contains a complex description of buckwheat genetic resources from different gene banks and geographical areas of origin ...

More >

Services

Sale of Seeds and Agricultural Products



Two men are seated at a table outdoors, signing documents. The man on the left is wearing a grey sweater and a dark jacket, while the man on the right is wearing a dark jacket and glasses. They are in front of a white table with papers and a blue banner in the background. The background shows a vineyard and hills.

Kmetijski inštitut Slovenije

SLOPEHELPER



BASE PLATFORM

EQUIPMENT

- ▶ Sprayer
- ▶ Drum mulcher
- ▶ Side trimmer
- ▶ Lawn mower
- ▶ Power harrow
- ▶ Side lawn mower
- ▶ Horizontal/Vertical cutter
- ▶ Needle harrow
- ▶ Aerator
- ▶ Fertilizer
- ▶ Leaf remover
- ▶ Pre-prunner
- ▶ Harvesting shelves
- ▶ Harvesting frontal uploader
- ▶ Basket back downloader
- ▶ Grader blade
- ▶ Snow thrower
- ▶ Apple picker
- ▶ Vineyard pruner
- ▶ Grape picker

OPTIONS

- ▶ Autonomous vehicle kit & safety bumpers
- ▶ Harvesting trailer
- ▶ Follow me option
- ▶ Fast charge
- ▶ Batteries for 100% duty cycle
- ▶ Winch kit
- ▶ Trailer
- ▶ Installation carrier
- ▶ TeroAir smart system
- ▶ TeroAir camera view
- ▶ TeroAir analyzer
- ▶ Full remote kit



Total Agricultural Cycle



Advantages:

- No need to balance the shaft or hammers
- Possibility of replacing hammers in the field
- Adjustable shaft speed (from 1000 to 2000 rpm)
- Innovative multi-section shaft (noise and vibration reduction)
- Frontal arrangement of the equipment (branches don't get squeezed into ground by the machine)

Specification:

- Working width – 1600 mm
- Cutting height – 25-60 mm
- No. hammers – 16 pcs
- Speed of rotation – 1400..2000 rpm, selectable
- Sound power level – 70 dB
- Deck material – steel
- Motor type - brushless (BLDC)



Advantages:

- Capability of cutting small branches
- Adjustable knives rotation speed and grass length after cutting
- Detection of obstacles and avoiding damage
- Frontal arrangement of the equipment (grass doesn't get squeezed into the ground by the machine)

Specification:

- Deck material – steel
- Motor type - brushless (BLDC)
- Number of Blades – 5 pcs
- Cutting width – 1500 mm
- Cutting height – 25 - 80 mm
- Speed of rotating – 1500..2500 rpm, selectable
- Sound power level - 60 dB



The **Power Harrow** tool is a high-precision and high-performance system with two knives which perform earth cultivation in the root area that is compatible with the Slopehelper base platform. We have developed an agricultural weeder that, in combination with our autonomous vehicle, can weed, shake and plow the soil between the root areas in each row of plantations.

Specification:

- No. of tines – 2 pcs
- Height of tines – 265 mm
- Speed of rotating – 100..200 rpm, selectable
- Motor type - brushless (BLDC)
- Head diameter – 285 mm



Root area **Side trimmer** is an In-rows weeding system ideal for cleaning around the trunks in vineyards, fruit plantations, etc. It is a highly precise and fast-rotating trimmer, attachable on the basic platform of Slopehelper. We have developed a root area trimmer that, in combination with our autonomous vehicle, can weeding between root area in every row of your plantation.

Specification:

- Head length – 500 mm
- Rotor bar diameter – 60 mm
- Rotating diameter – 660 mm
- Speed of rotating – 500..2000 rpm, selectable
- Sound power level – 45 dB
- Motor type - brushless (BLDC)



Advantages:

- Autonomous work without an operator
- Adjustable swinging angle and fan elevation (for trees up to 4 meters)
- High-precision spraying, independent of wind and other external factors
- Real time weather-based spray scheduling (the weather station is installed)
- Adjustable liquid consumption rate per hectare (minimum 150 liters per hectare)
- Spraying quality does not depend on the pressure of sprinkles or the speed of the fan
- Possibility for interrow spraying

Specification:

- Movement speed – 2-4 km/h
- Fan diameter – 430 mm
- Number ducts - 4
- Speed of fan rotating – 1500..2500 rpm, selectable
- Material consumption – 50..300 l/Ha, adjustable

- Diameter of spraying spot – 600-2000 mm
- Air speed on the exit – 15,6 m/sec
- Sound power level – 50 dB
- Motor type - brushless (BLDC)

Horizontal and Vertical Cutter

Hinged equipment that we have for now



Advantages:

- Autonomous operation
- Perform vertical and horizontal operations simultaneously
- Flexible selection of the cutting height
- Adjustable cutting width and cutting inclination
- Automatic detection of pillars and ability to avoid collisions
- Adjustable speed of the cutting knives
- Cutting various types of objects, including thick branches

Specification:

• Universal machine for vineyards and orchards	• N of saws in vertical deck – 5
• Automatic deck sliding for columns bypass	• N of saws in Horizontal deck – 3
• Maximum height of plantation trees – 4200 mm	• Blade rotation speed – 1000..1800 rpm, selectable
• Minimum height of plantation trees – 1200 mm	• Motor type - brushless (BLDC)

Side Lawn Mower

Hinged equipment that we have for now



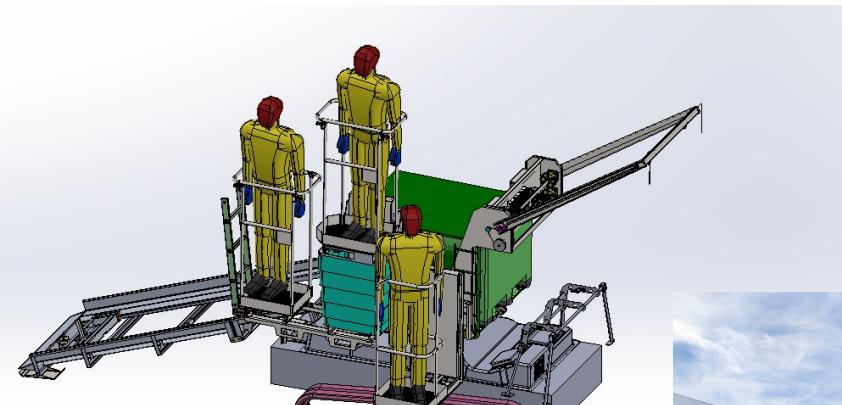
The **Side Lawn Mower** is a device for mulching branches and cutting the grass between and around the roots. It is based on an elliptical rotating blade equipped with a powerful motor, which provides the ability to efficiently suppress the grass growing around the tree trunks. A special mechanism ensures a perpendicular movement in relation to the row to ensure optimal and efficient work.

Specification:

- Elliptical mulching knives
- Automatic deck sliding for trees bypass
- Speed of operation – up to 2 km/h
- Motor type - brushless (BLDC)
- Speed of rotation – 1000..2000 rpm, selectable
- Cutting zone width – 800 mm
- Sound power level – 40 dB

Harvesting Shelves

Hinged equipment that we have for now



Advantages:

- Easy installation of an empty harvesting basket
- Automatic unloading of harvest to the harvesting basket
- No need for a forklift
- Adjustable extension of the harvesting shelves
- Four vertical levels for manual fruit collection
- No need for specialized harvesting or hail net servicing machines
- Convenient operation on sloped terrain
- Significantly reduced labor requirements
- Cost savings and flexibility

Specification:

- The loader, installed on the cargo platform
- The unloader, installed on the back side
- Height-adjustable left and right harvesting shelves
- No. of workers on shelves – up to 6 (+ 2 on ground level)
- Maximum height of plantation trees – 4200 mm



Innovative **Apple Picker** is a very useful and needed in quality and complete work operations in orchards imitating ergonomic movements of a person while hand picking an apple with principles of getting close to an apple, sensing it (using sensors and our own developed recognition models), catching an apple from the right angle, holding it without squeezing (gently and in a quality way that it can not fold while harvesting hand is moving towards harvesting platform), rotating an apple and pulling it properly with care.

Specification:

- Speed of operation – up to 0.1 km/h
- Operation height – 500...4200 mm
- Maximum collection depth – 500 mm
- Motor type - brushless (BLDC, stepper)



Specification:

- Speed of operation – up to 2 km/h
- 8 spring-loaded needle disks
- The built-in protection mechanism
- Adjustable deepening: from 0 to 150 mm

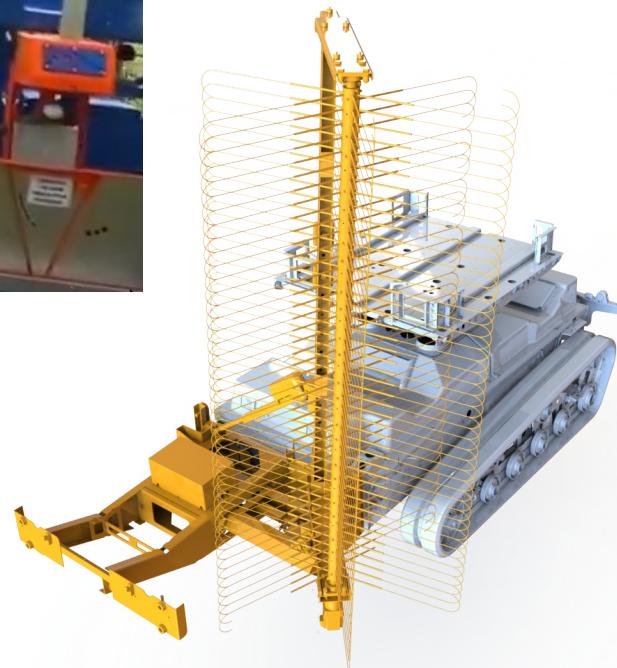
Advantages:

- Improved air and water penetration
- A flat surface after operation and suppressed grass growth
- Prevention of damage to the instrument
- Prevention of soil integrity or functionality damage
- Soil cultivation in various agricultural settings



Blossom Thinner

Hinged equipment that we have for now



Advantages:

- Autonomous operation
- Efficient and uniform reduction of flowers
- Adjustable intensity of the thinning process
- Larger and sweeter fruits production

Components:

- Rotating vertical shaft with ropes
- Automatic regulation mechanisms

Specification:

- Speed of operation – up to 2 km/h
- Configurable rotation speed: 37.. 150 rpm
- Adjustable tilt angle -15...+15 degrees
- Working width - 2400 mm
- Adjustable working height – up to 4 m



Advantages:

- Autonomous work without an operator
- Electronic control system of the spreading process
- Flexibility of the amount and distribution of fertilizer
- Adjustable fertilizer usage rate
- Distribution of granules or pellets in rows
- Regulation of the spread pattern based on desired results
- Optimal fertilization

Specification:

- Speed of operation – up to 4 km/h
- Maximum tank capacity - 1100
- Production rate (Organic pellets) from 0.15kg up to 2kg per minute, if all 8 channels opened
- Production rate (Mineral granules) from 0.25kg up to 2,8kg per minute, if all 8 channels opened
- Adjustable spreading width 1600...3200 mm
- Safety mechanism – spring loaded foldable levers



Advantages:

- Autonomous work without an operator
- Automatic tilt adjustment on slopes
- 2 tools in one instrument: shaver and vacuum leaf remover

Specification:

- Speed of operation – up to 2 km/h
- Width of the row up to - 2800mm
- Lowest position of the cutting/trimming - 850mm
- Highest position- 1650mm
- Inlet airflow velocity - 2.6m/s
- The width of the trimming plane – 500mm
- Horizontal auto adjustment for the width of the rows from 1600mm up to 2800mm



Grape picker / Pruner

- Autonomous operation
- The whole grape branch collection
- Preventing damage to the grapes
- Fruit ripeness detection
- Significantly reduced labor requirements
- Cost savings and flexibility

Equipment that is under development or pending a patent

Pre-Pruner

- Autonomous operation without requiring manual control
- Simultaneous pruning of branches on both sides of grapevines
- Prevention of ropes and pillars damage
- Selectable parameters of branches cutting
- Significantly reduced labor requirements



Ufficio del Giudice di Pace di Forlì

VERBALE DI ASSEVERAZIONE DI PERIZIA

R.G.n. 216121

In data 19 DIC. 2022, nella Cancelleria dell'Ufficio del Giudice di Pace di Forlì, avanti al sottoscritto Funzionario giudiziario, è personalmente comparso il signor MATTEO IUBATTI identificato con documento CARTA D'IDENTITÀ n° AT3658644 rilasciata dal COMUNE DI FORLÌ in data 21/08/2012 il quale dichiara di essere iscritto all'ORDINE DEGLI INGEGNERI DELLA PROVINCIA DI BOLOGNA al n° 7630/A.

Esibisce la perizia dal lui effettuata in data 13/12/2022 e chiede di poterla giurare ai sensi di legge.

Ammonito ai sensi dell'art. 193 c.p.c. e dell'art. 483 c.p. il comparente presta il giuramento ripetendo le parole: "giuro di aver bene e fedelmente proceduto alle operazioni e di non aver avuto altro scopo che quello di far conoscere la verità".

Si raccoglie il presente giuramento di perizia stragiudiziale per gli usi consentiti dalla legge.

Letto, confermato e sottoscritto

IL PERITO
ORDINE INGEGNERI PROV. BOLOGNA
INGEGNERE
MATTEO IUBATTI
CIP - SPECIALISTICA
Città: Forlì - Provincia: Forlì-Cesena
n. 7630/A

IL FUNZIONARIO GIUD.
IL FUNZIONARIO GIUDIZIARIO
Dott.ssa Laura Filippini

Nota Bene:

L'Ufficio non assume alcuna responsabilità per quanto riguarda il contenuto della perizia asseverata con il giuramento di cui sopra.

EU DECLARATION OF CONFORMITY



The manufacturer:

Pek Automotive
Idrijska Cesta 42
Vrhnik 1360, Slovenia

Declares that the product: Slopehelper SH.056

is conformal to the following directives and standards:

Machinery Directive 2006/42/EC
EMC Directive 2014/30/EU
Low Voltage Directive 2014/35/EU
Radio Equipment Directive 2014/53/EU
ROHS Directive 2011/65/EU (Restriction of Hazardous Substances Directive)

EN 12100:2010 - Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 18497:2018 - Agricultural machinery and tractors - Safety of highly automated agricultural machines - Principles for design
ISO 13849-1:2015 Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
EN 60204-1:2018 - Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 25119-1:2018 - Tractors and machinery for agriculture and forestry -- Safety-related parts of control systems -- Part 1: General principles for design and development
EN ISO 14982: 2009 - Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria
EN 63000:2018 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61439-1:2011 Low-voltage switchgear and controlgear assemblies - Part 1: General rules
EN 61439-2:2011 Low-voltage switch gear and control gear assemblies – Part 2: Power switchgear and controlgear assemblies

This declaration of conformity is issued under the sole responsibility of
Pek Automotive.

Vrhnik, 2022

Mikhail Kostkin, Director

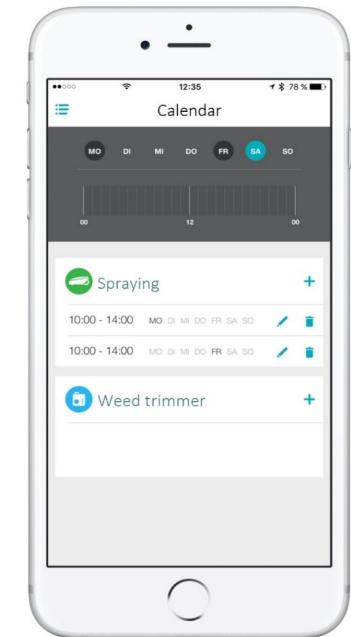


TeroAir

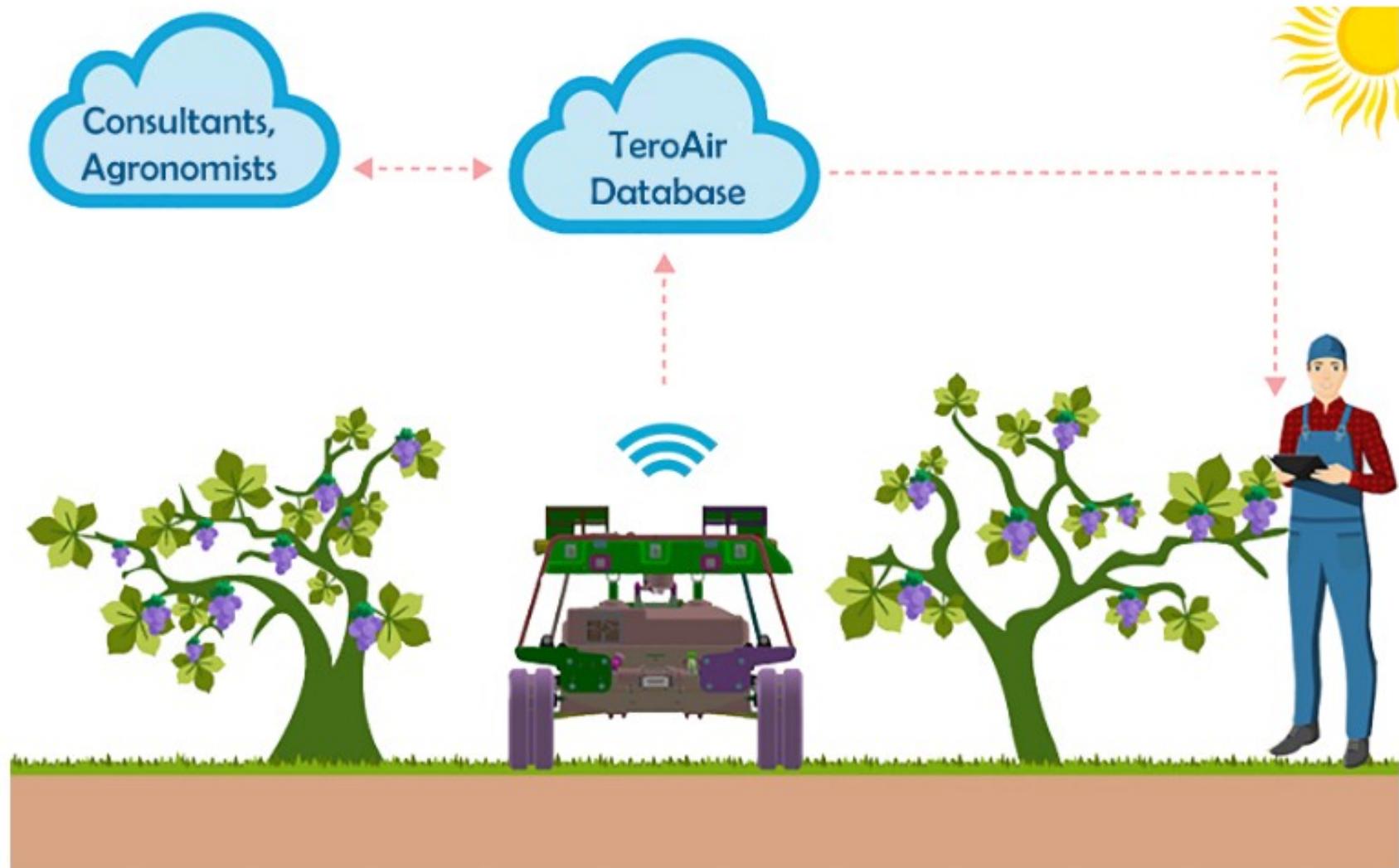
Next level mobile application

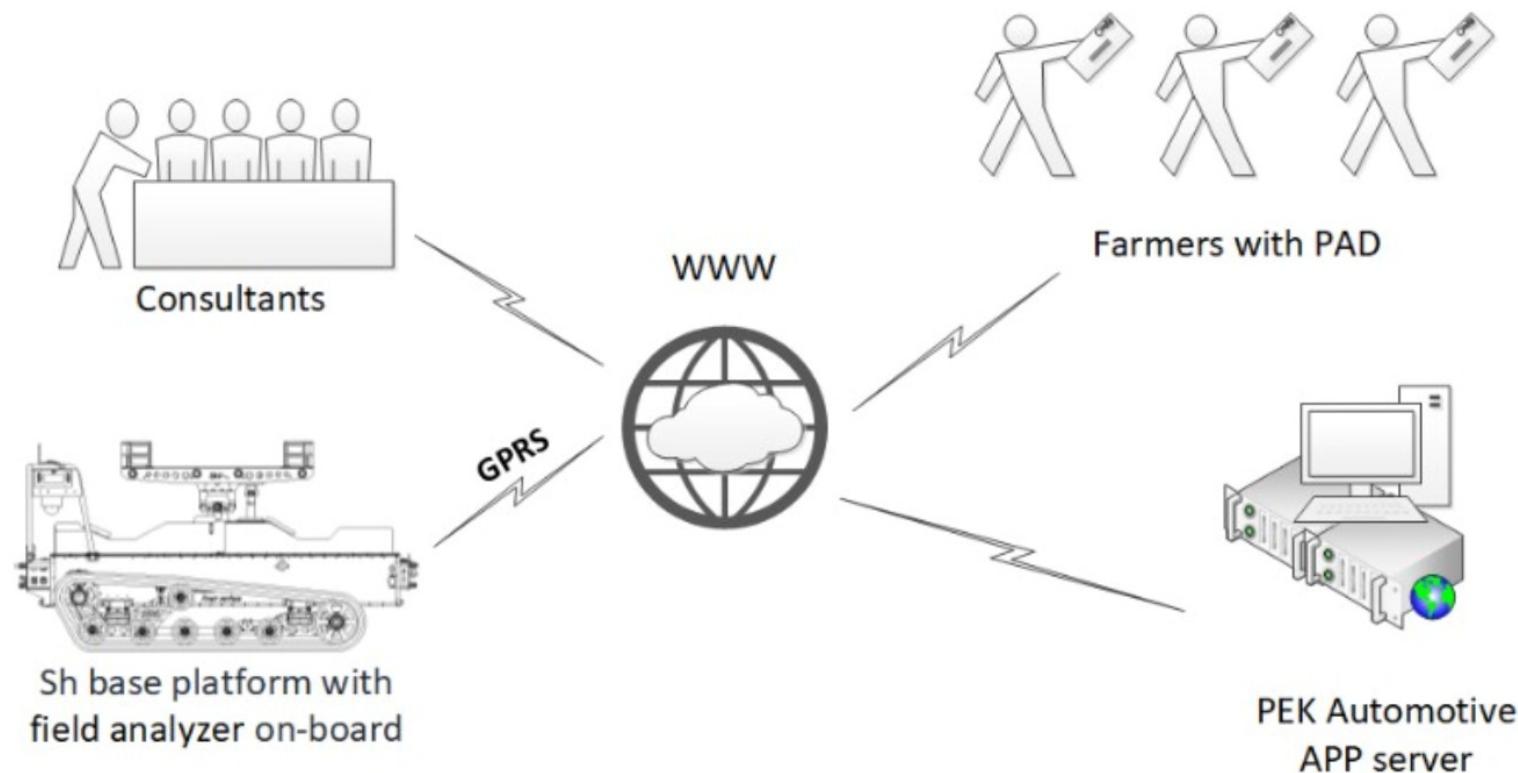
Main functions:

- provides information from sensors about the atmospheric conditions, humidity, wind speed etc.
- gives you a real-time data (start of the operation, time of the end, battery charge, speed of movement, current row, total number of rows for the current operation, distance)
- reports section that allows the users to go through history of previous operations
- gives access to the live video broadcast and photos taken
- shows the position of the Slopehelper on the map in real time



We are bringing the new digital age into agriculture.





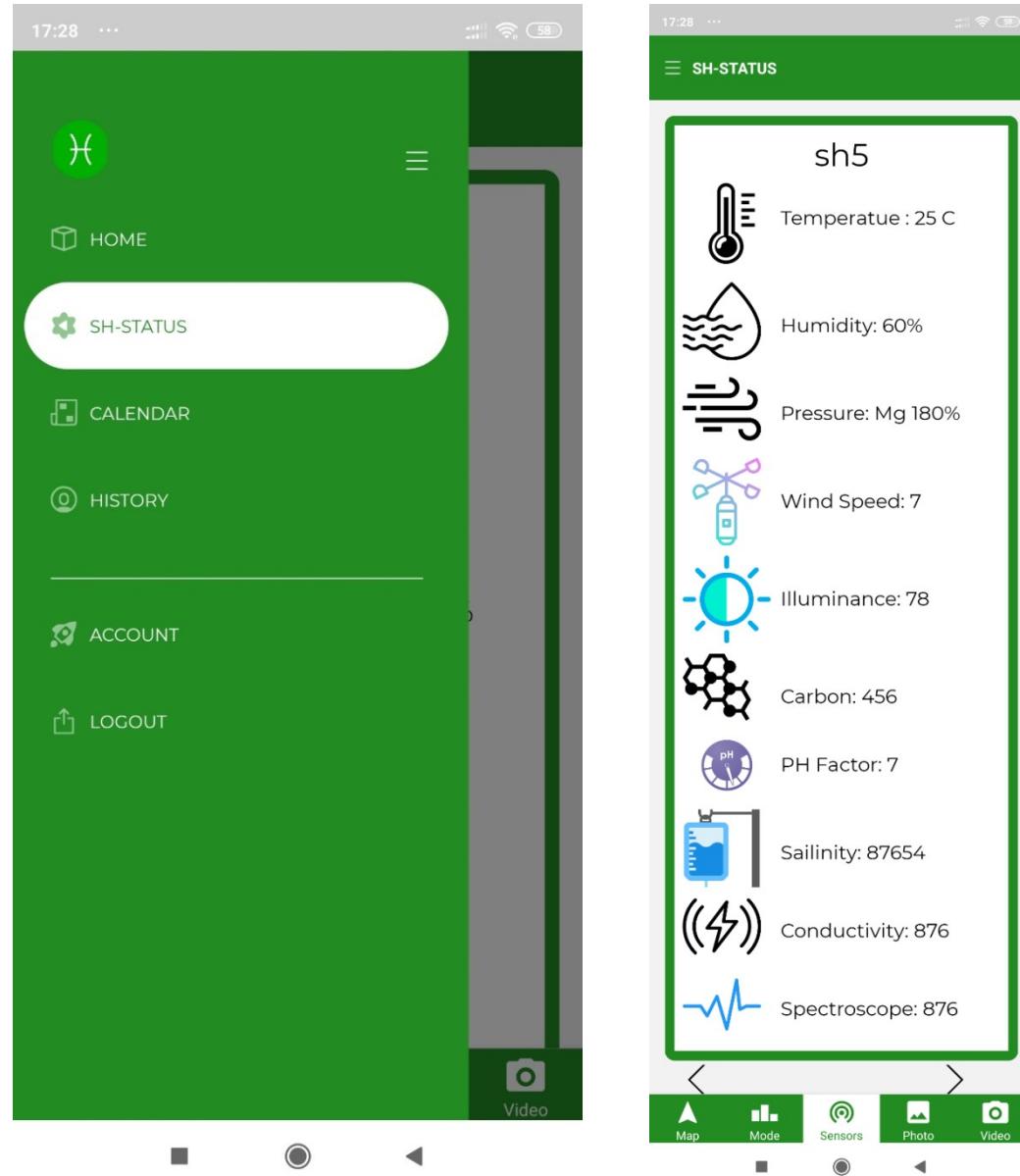


Android version
since v. 11



TeroAir is a bridge between agriculture
and the modern world.

Slopehelper system is fully compatible
with **Agricoltura 4.0** concept.



Main reasons:

- Low voltage (48V)
- No oil or hydraulics inside
- No clutches (or CVT) in transmission
- Only electromechanical transmission
- Cost of annual maintenance service is around €600

Design of Slopehelper has extraordinary reliability compared to a conventional tractor

Slopehelper warranty period is 5 years/8000 hours (1600 h/year)

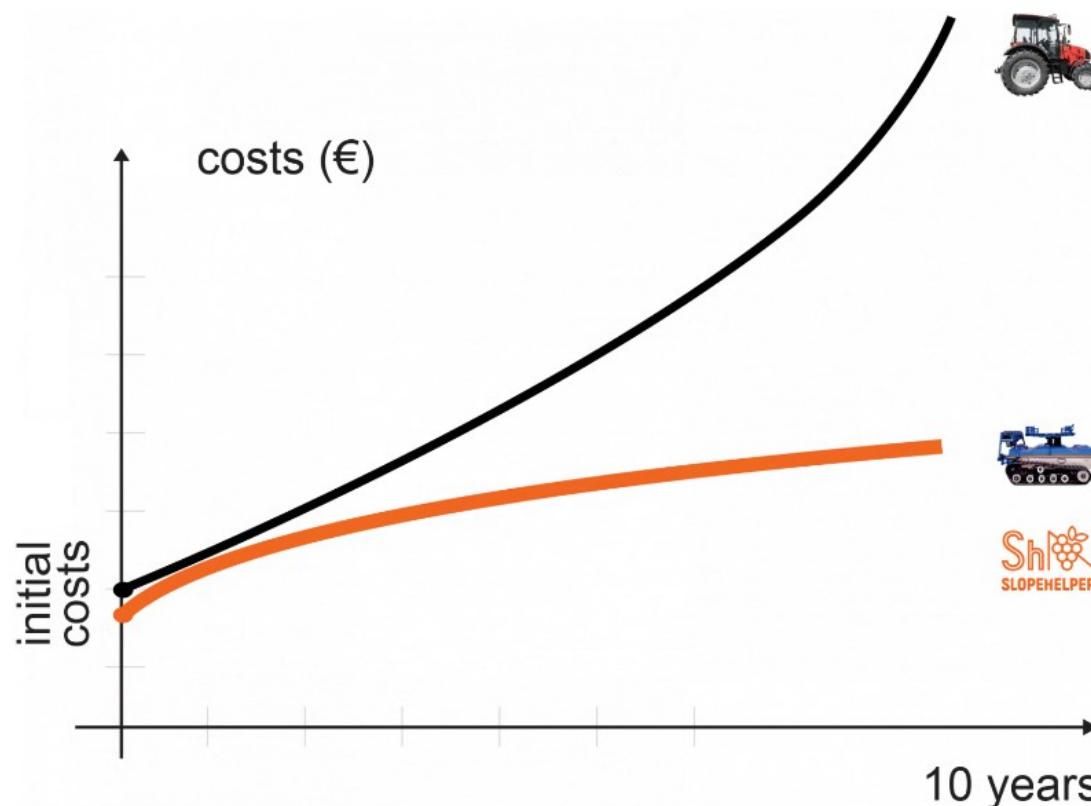
Speed of operation – up to 0.1 km/h

Operation height – 500...4200 mm

Maximum collection depth – 500 mm

3x times more cost effective
The data based on calculations for an average agro-cycle

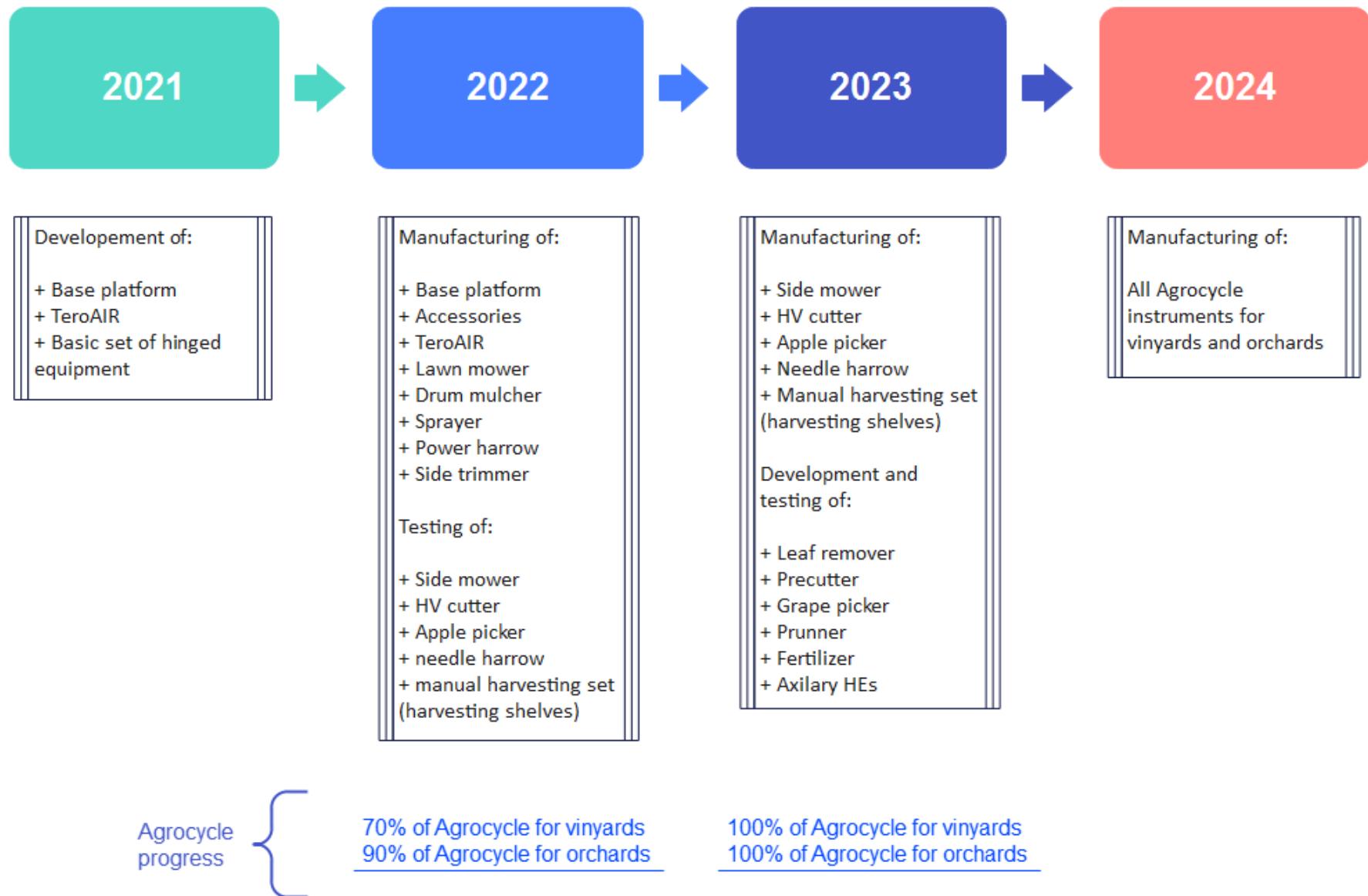
Slopehelper is 3 times **more cost-effective than a conventional tractor**.
In the period of 10 years, the owner **saves** about **240.000 €***



Slopehelper main parameters

Parameter	Value
Weight	1750 kg (basic platform)
Cargo platform size	EU standard bin for agricultural applications (1200 x 1000mm)
Payload	Up to 2000 kg
Maximum speed	10 km/h
Maximum speed for 45° slope	5 km/h
Maximum slope operation in any direction with maximum bin	40°
Maximum slope operation in any direction with half payload (EU standard bin)	42°
Platform tilt	±35° (70%) (in axial directions) ±28° (70%) (in diagonal directions)
Width	1600 mm
Length of base platform	2600 mm
Clearance	250 mm
Operation time	up to 14 hours (depends on instrument)
Maximum on-board voltage	48V (based on EV48 FEV technology)

Development Timeline of the Slopehelper





Facility in Logatec
Production volume - 1600 sets per year



Expected in Q4 2023





Sh
SLOPEHELPER

Welcome to future
of agriculture!

in f @ www.slopehelper.com