



# Autonomous Weeding Robot

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# Agenda

- Who is ecorobotix ?
- Modern farming weeding challenges
- Our approach
- Our solution
- The benefits
- Questions/answers



# Who is ecorobotix ?



- Based in Yverdon Switzerland
- Created in 2012
- Privately founded
- > 10 employees ( mainly engineers)
- R&D and manufacturing
- Autonomo robot



# Modern farming weeding challenges



- Too heavy machines :
- → soil compaction, loss of fertility
- Too many chemicals :
- → harmful for humans and nature
- Too much fossile energy :
- → oil dependent, climate harmful
- Too big farms & machines:
- → loss of independence for farmers



# Today's chemical weeding is :

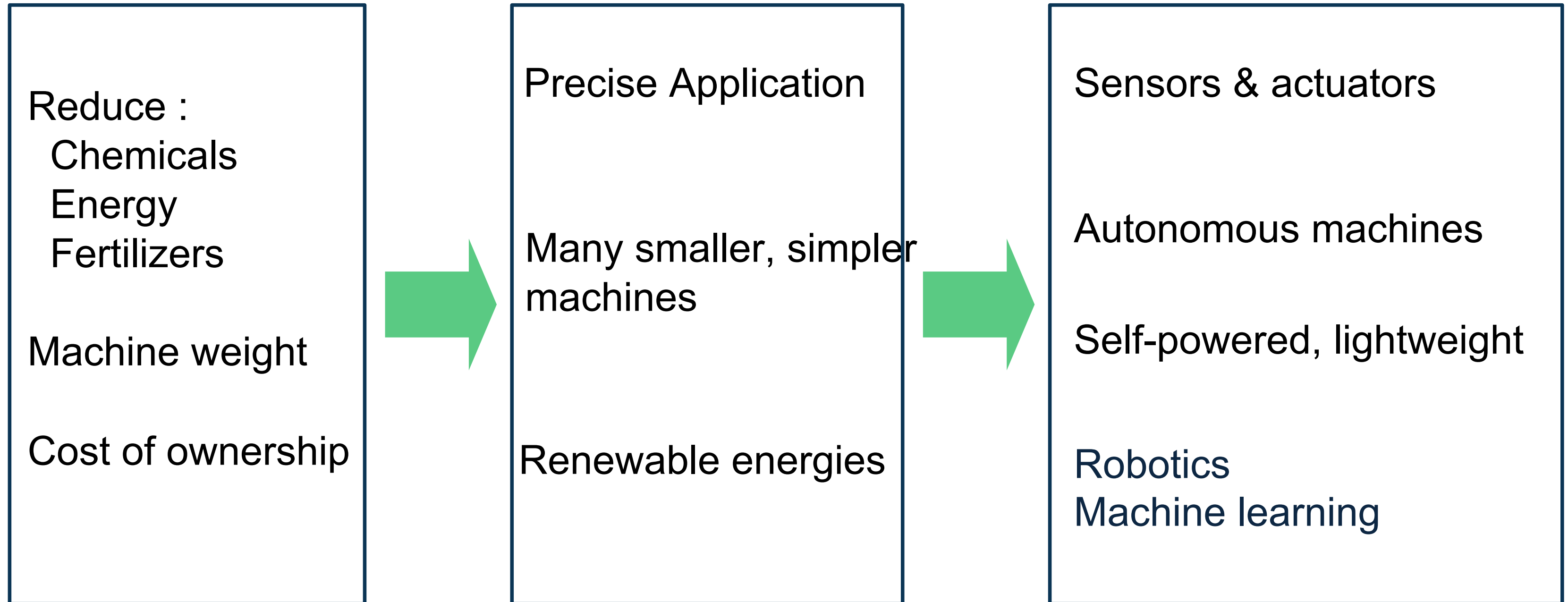


- Harmful for environment and soils
- Dangerous for humans
- Becoming prohibited by regulation

→ Demand for cost-effective, ecological weeding technique



# Towards sustainable agriculture



# Fields robots – two approaches

« robotize » existing machines



EU-RHEA

project

+ : flexibility, experience

- : few advantage except labour costs

Develop specialized robots



LadyBird, Univ. Sydney

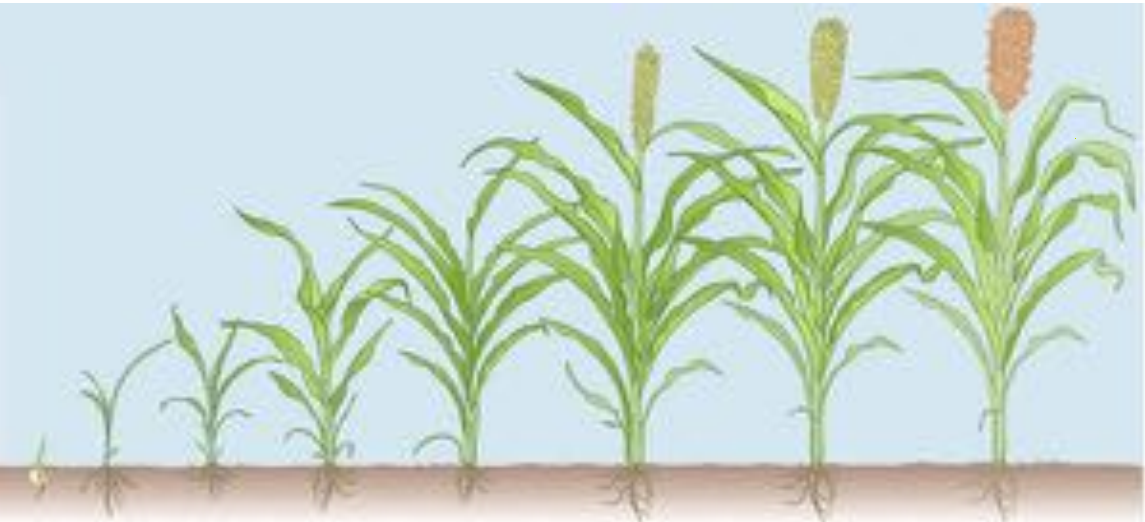
+ : more specific tasks, efficiency

- : acceptance, flexibility



# Robot's potential applications

Annual culture cycle



	Tilling	Fertilizing	Seeding	Weeding	Harvesting
Required Energy	High	Low	Medium	Low	High
Required Accuracy	Low	Low	High	High	M/High
Mass to transport	High	Medium	Low	Low	High

Our approach





# Our solution



- Completely autonomous.
- Works up to 12 hours a day without a human operator.
- Solar powered, no rechargeable batteries.
- Position itself with the help of its camera and GPS
- Its system of vision enables it to follow crop rows, and to detect the presence and position of weeds in and between the rows.
- Two robotic arms then apply a micro dose of herbicide, systematically targeting the weeds that have been detected.
- In bare fields or meadows the robot positions itself precisely thanks to its GPS RTK.
- Reliance on solar power makes the robot completely autonomous in terms of energy, even with cloudy skies.
- Smartphone/tablet remote control



# Vidéo



# Technical specifications



- Dimensions 2.20 x 1.70 x 1.30 (width x length x height)
- Weight 130 kg
- Tanks 2 x 15 litres – more than enough for one day of autonomous operation
- Space between crops 35 to 70 cm (adjustable)
- Maximum height of crop 25 cm
- Robotic arms Fast Delta - executing 4000 movements per hour
- Effectiveness > 95% of weeds are detected and destroyed
- Energy Highly efficient solar cells (380W) and battery
- Sensors Colour megapixel camera, GPS RTK, compass
- Communication Short (WiFi) or long distance (mobile phone networks)
- Incorporates antitheft system



# Applications



- Initial crops : Sugar beets, Rape, Meadows
- Next crops : Spinaches, onions, green beans...
- Ideal after an initial standard application of herbicide, in order to replace subsequent applications (2 or 4 runs depending on the situation)
- Speed : 0.4 m/s (average).
- 2 to 3 ha processed per day



# Applications



## Examples of Chemicals :

- Tanks A : Dicotylédones : phenmédiophame + ethofuméate = Betanal progress ou Beetup Pro : Dilution 1/50
- Tanks B : Graminées : anti-graminées, Gallant 535 ou Aramo, Dilution 1/50



# Advantages



- 10 to 20 less herbicides. Thanks to the precise detection and discriminating spraying of weeds
- 100% autonomous. Works up to 12 hours a day without a human operator – solar powered, no rechargeable batteries.
- Lightweight design (only 130Kg) minimises soil compaction
- Low operation costs (30% cheaper than conventional sprayers)
- Works both in and between rows



# Commercials



- 2017 : a dozen of robots are tested throughout Europe
- Next deliveries : early 2018
- The robot's price will include the tractor's transportation system and 3 crops algorithms.



Questions ?

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