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HOEING ROBOTS

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Hoeing robots implement autonomous mechanical weed management in vegetable crops. They can assist vegetable producers by controlling weeds through hoeing and by monitoring vegetable crops through generating key indicators. Some of these indicators are relative to the presence of weeds and the density and stage of cultivation.

By weeding and hoeing, robots help to increase profitability while respecting the environment. Weed control by such robots reduces tedious farm work and can increase economic efficiency of vegetable production.

The data collected can be used as a decision-support tool. Some hoeing robots can issue a plot report synthesising a set of relevant data.

Hoeing robots have different options for changing weeding/hoeing tools so that they can be adapted to the specific needs of different operations.

Application scenario

Reduced weed pressure and optimised vegetable production

Digital technologies

Robot, GPS, Camera, Laser, Sensors, Smartphone/Tablet

Socio-economic impact

- Economic: Operation efficiency, Labour costs, Investment costs
- Environmental: Reduced use of chemical pesticides, No direct polluting emissions, Low soil compaction,
- Social: Workload, Decision support, Work conditions, Silent operation, Security

More info on the farm demo channel:
https://www.youtube.com/channel/UCdigVLNjyy5YrAdHl5G2frA/

Examples of robot models:

Carré ANATIS: https://www.carre.fr/entretien-des-cultures-et-prairies/anatis/?lang=en

Naïo DINO: https://www.naio-technologies.com/en/agricultural-equipment/large-scale-vegetable-weeding-robot/

They move using a system equipped with GPS guidance and camera. Some robots also include laser technology to scan the environment around the machine. They have an electric drive allowing for four to ten working hours, depending on the model.

Hoeing robots can be fully monitored and operated via a smartphone or tablet, so that checks can be carried out continuously and important data can be recorded in real-time. Some robot models can communicate with the farmer via text messages.

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Purpose of the tool

Hoeing robots have been primarily developed to implement fully autonomous mechanical weed management in vegetable crops. The objective is to replace laborious manual work to control weeds and also to increase the cost-efficiency of the weeding operations. Hoeing robots work autonomously in crops by inter-row weeding, and by generating key indicators for decision-making purpose via the acquisition of various data. Some robot models create a report summarising relevant data to allow vegetable producers to better manage their crops.

Source: naio-technologies.com

Description of the tool

Hoeing robots operate autonomously to mechanically control weeds between rows of vegetable crops, with different possible tools attached. At the same time, some robot models can be used as a decision support tool through processing key indicators about the presence of weeds, the density and stage of cultivation, humidity, and the soil and air temperature. Concretely, this feature allows, for example, to determine the vegetable crop development stage between two passages of the robot, making it possible to assess the effectiveness of the work carried out by the machine.

To move around the plot, hoeing robots are equipped with GPS guidance and camera, associated with a laser technology in some models. They can cover up to five hectares a day, and have a working autonomy of four to ten hours, depending on whether lead-acid or lithium batteries are used. Charging times are around three to four hours. The user can fully control and monitor the robot using a smartphone or tablet. Such robots are equipped with four directional wheels for good traction and easy movements in the field.

Different weeding tools can be attached to the robot, making it adaptable to the specific needs of different weeding operations. Sensors monitor the surroundings to ensure security while operating.

Areas of socio-economic impacts

Social	Reduced laborious work and overall workload at field level for farmers; improved working conditions through absence of noise; security; information and communication with passers-by (walkers) might be needed
Economic	Higher weeding and hoeing operation efficiency; decreased labour costs; investment costs to be considered
Environmental	Reduced use of chemical pesticides (when used in conventional agriculture); no direct polluting emissions (use of electric engine); reduced soil compaction compared to machinery pulled by a tractor (robots have less weight)