AdvisoryNetPEST

Uv-C-robot in strawberry against powdery mildew

Farmer's name
/

Contact
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Name of the farm
/

Country
Belgium

Description of the farm context

The grower operates a 12-hectare strawberry farm, cultivating five different varieties—Sonata, Sonsation, Elsanta, Falco, and Karima—based on seasonal conditions. All strawberries are grown on gutters. Of the total area, 2.5 hectares consist of glass greenhouses, while the remainder are plastic greenhouses. In 2023, he invested in a UV machine, which is used in the glass greenhouses equipped with pipe rails.

Partner Organization

inagro
ONDERZOEK & ADVIES IN LAND- & TUINBOUW

THE TECHNIQUE

Short Description:

Use of UV-radiation to kill powdery mildew in strawberries

Crop Sector:

Soft fruit

Targeted pest and diseases:

Powdery mildew

Objective of the NA:

A mobile UV-robot has been used to treat soft fruits against powdery mildew. The number of treatments against powdery mildew can be with 50% using this technique.

Level of practice adoption across the country:

1 2 3 4

The practices identified in this project are called 'Novel Approaches' and abbreviated as 'NA'

AdvisoryNetPEST

The **AdvisoryNetPEST** project aims to create a **network** and **upgrade advisory services** across the EU to increase the sharing of knowledge and the **adoption of innovative solutions to reduce the use and risks of pesticides** (RURP) in all **EU Member States**, enabling the agricultural sector to achieve the targets proposed by the Farm to Fork Strategy.

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Expectations regarding RURP

*RURP : Reduction of Use and Risks of Pesticides

This novel approach reduces spraying against powdery mildew by 50%. However, chemical treatments remain necessary, as UV light is a physical method that depends on direct exposure. In dense crop canopies, some areas will inevitably escape treatment.

Key success factors

The positioning of the lamps on the machine is important. Adjusting their placement could improve treatment of the upper parts of the plants.
The cropping system plays a major role: using rails makes operation easier and more cost-effective, while working in plastic tunnels with grass is far more challenging and expensive due to the need for GPS, caterpillars, sensors, and other equipment

Methods/strategy of application in the farm

The strawberries are treated with UV every two days. When disease pressure is high, treatments are applied nightly. The machine runs from 9 p.m. until midnight to cover a 1.2-hectare compartment. This leaves some capacity to treat additional strawberries if needed.

Improvements of the NA

There were modifications made to the greenhouse and plant rows. Sensors were put in the concrete floor to guide the robot's movements as well as adjustments to the rail system to make it compatible with the UV robot. At the end of the greenhouse, the machine also required adaptations to ensure that the final plant in each row could be treated effectively.

Resources and skills needed to adopt the NA

The UV robot costs €29,000, of which €8,000 is for the lamps. Robots operating on rail systems are significantly cheaper than those used in plastic greenhouses on grass, where sensors, high-precision GPS, and caterpillar tracks are needed. These requirements make the latter type far more expensive, typically ranging from €100,000 to €150,000.
No additional labour is required, but initial training is needed to understand how the robot operates.

Figure 1: Powdery mildew on strawberry leaves

Figure 2: Powdery mildew on strawberry fruits

Figure 3: UV robot against powdery mildew in strawberry

Advice from the Advisor

When a farmer is confronted with resistance, there is no other option

Farmers Testimony

"Just buy it. No doubt!"

Policies and Regulatory Support

The grower received 30% funding through the agricultural innovation program

Social and Cultural Acceptance

High social acceptance

To go further on NA replication:

In some countries, this technology is already being used in strawberry and grape cultivation. However, in most countries adoption remains challenging—primarily due to differences in cropping systems and the high cost of suitable UV robots.
Standardizing the caterpillar-type machine and reducing its cost could help generate interest. Innovation funding and incentives—such as rewarding fruit with fewer than five active substances—provide strong motivation for broader uptake. UV-C is now also being tested in vegetables such as zucchini, where Inagro has already very promising results.

BENEFITS

- 50% reduction in pesticides against powdery mildew
- No risk for resistance development
- No negative impact on yield and quality
- Fewer active ingredients on strawberries
- Stronger plants (no growth inhibition from pesticides)

BOUNDARIES

- The corridors must be cleared daily to allow the robot to operate
- High cost of the UV-robot without rail system
- No miracle solution, spraying remains necessary despite the robot's use

Systemic Feasibility Analysis: Expert insights from Literature and Field Data

CRITERIUM	INDICATOR	INDICATOR SCORE	EVALUATION
Pesticide use reduction level	Reduction of the applied volume of pesticides	**high reduction (>25%)** moderate reduction (10-25%) low reduction (<10%) no reduction	
Effectiveness of controlling the target pest/diseases/weed	Percentage reduction of the target pest/weed infestation or of the damage caused by the target disease	**high reduction (>60%)** moderate reduction (30-60%) low reduction (<30%) no reduction	
Biodiversity	Impact on arthropods other than bees	-- / - / **0** / + / ++	
Water quality	Impact on pesticide losses to surface water (runoff)	-- / - / 0 / **+** / ++	
Energy use	Impact on total energy consumption	-- / **-** / 0 / + / ++	
Working conditions	Knowledge requirements	high training level **moderate training level** low training level no training	
	Impact on working-time	**no impact**	
	Impact on human health	high risk moderate risk **low risk** no risk	
Costs	Required level of investment	> EUR 100.000 **EUR 50.000 - 100.000** EUR 10.000 - 50.000 < EUR 10.000	
Outputs	Impact on yields (produced volumes)	**+ 50%**	
Profitability	Payback period	**10 years**	

Impact Highlights

The novel approach using a mobile UV-C robot to control powdery mildew in strawberries effectively reduces pesticide use while managing the disease.

Although investment highly depends on the cropping system and the payback period tends to be long, with variable data. Yield effects are inconsistent, sometimes showing negative impacts. The approach significantly improves working conditions, with no adverse effects on human health or additional labour required.

Environmentally, it performs well, as it does not increase energy consumption, reduces pesticide runoff to surface water, and does not harm arthropods other than bees. However, training is important for successful implementation.

Evaluation: