AdvisoryNetPEST

Crop Adapted Spray Application (CASA)

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

Farmer's name
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Name of the farm
experimental orchard in Skierniewice

Country
Skierniewice, Poland

Description of the farm context
The orchard is located in the center of Poland, where there is a moderate transitional climate. The total area of the orchard is 74.13 ha. Types of crops: apple trees, pear trees, plums, sour cherries, sweet cherries, peaches, apricots, walnuts, hazelnuts, dogwoods, serviceberries, blueberries, currants, raspberries, haskap berries, actinidia (mini kiwi). This area has podzolic and lessive soils.

Partner Organization

CDR

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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THE TECHNIQUE

Short Description:
The CASA system is a sprayer that adjusts application parameters automatically according to the crop health status and crop characteristics, wind situation and sprayer position in the orchard.

Crop Sector:
Orchard

Targeted pest and diseases:
Pest

Objective of the NA:
Equipped with a system of three ultrasonic sensors to scan the order of trees the CASA system can decide to open or close the sprays when the tree was not visible in their field of vision. In addition, the number of working sprayers and their pressure is corrected according to the current width and density of the crowns.

Level of practice adoption across the country:
1 2 3 4

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Expectations regarding RURP

This CASA system is a solution in the protection of orchards, reducing the use of pesticides by up to 80%. Reduction of pesticide drift to the unintended area.

Key success factors

The key to the success of this machine is the rising prices of chemical pesticides and strict compliance with pesticide residues in fruit . It is crucial to co-financing the purchase of equipment that meets the highest environmental requirements.

Methods/strategy of application in the farm

The implemented solution need to adapt to orchard geometry, weather conditions. Is also neccessary to equip the orchard with and RTK station enabling DGPS navigation, and also anemometer installed on a mast in the orchard, radio-communicated with CASA sprayer.
The main challenge is to construct and test in practice a solution that would improve the effectiveness of orchard protection, significantly reduce the use of pesticides and at the same time ensure the highest possible level of safety associated with their use for the environment, the equipment operator and the consumers of chemically protected fruit.

Improvements of the NA

There are units with selected functions from the set of 3 basic solutions used in CASA.
It would be good if the sales offer included a complete option, but also individual functions

Resources and skills needed to adopt the NA

The most important resources required include access to expensive hardware and software, as well as the need to improve operator skills. Problems that may arise during the preliminary phase of the new solution include the need to calibrate sensors and make appropriate adjustments. However, this is an element that should be handled by qualified personnel.

Figure 1-4 The CASA Sprayer in Skierniewice, Poland.

*RURP : Reduction of Use and Risks of Pesticides

Advice from the Advisor

The fundamental step is an economic analysis of profitability for a given scale of production. It's also necessary to analyze the environment: buffer zones, local wind conditions, and the degree of plantation geometry uniformity. In some cases, it may turn out that achieving the desired goals is possible using other means.

Farmers Testimony

It's worth asking potential adopters whether the characteristics of their orchard and surroundings truly require such advanced technology, or whether certain components of the new solution will suffice, and whether the scale of production justifies the cost-effectiveness of this technology.

Policies and Regulatory Support

Environmentally friendly solutions are promoted. Financial support for the purchase of environmentally friendly technologies exists at the national level. At the local level, support effectively involves monitoring and sanctioning outdated technologies that may negatively impact the environment, human health, and the health safety of agricultural produce.

Social and Cultural Acceptance

The vast majority of our society has long demonstrated a high level of environmental sensitivity and supports all advances in environmentally friendly solutions in agriculture. Traditions of non-chemical pest control (hand-collecting potato beetles and caterpillars) have a long history in Poland.

To go further on NA replication:

The innovative concept of the CASA precision orchard sprayer sets the direction for the development of orchard protection technology and exceeds the expectations of plant protection equipment users.
The success is that it was possibble to create a complete, universal machine that has a future ahead of it in the face of increasingly environmental requirements.

BENEFITS

Improved plant protection effectiveness, improved crop quality, significant reductions in pesticide use, the ability to safely protect crops even under less favorable weather conditions, reduced risk of contamination of unintended areas, and a marketing advantage in the market for responsibly and sustainably protected fruit.

BOUNDARIES

The obstacle may be the lack of funding, the lack of willingness to expand knowledge and test new innovations by some farmers.

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	☺
Soil quality	Impact on soil compaction	-- / - / **0** / + / ++	😐
Biodiversity	Impact on aquatic organisms	-- / - / 0 / **+** / ++	☺
Water quality	Impact on pesticide losses to surface water (runoff)	-- / - / 0 / + / **++**	☺
Air quality	Impact on pesticide emissions	-- / - / 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 human health	high risk moderate risk **low risk** no risk	☺
	Risk mitigation on operator/employee exposure	high mitigation moderate mitigation **low mitigation** no mitigation	😐
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)	**+ 20%**	☺
	Impact on crop quality	-- / - / 0 / **+** / ++	☺

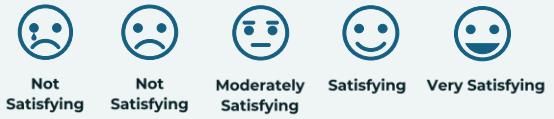
Impact Highlights

The CASA system represents a significant advancement over conventional methods, using sensor-based automation to tailor pesticide application to actual crop needs.

Its primary strength is a substantial reduction in pesticide use (31-82%) and environmental drift (over 80%), thereby improving application precision and protecting the environment without compromising efficacy. This makes it a forward-looking solution for sustainable orchard management.

Conversely, the system's main weaknesses are the higher initial investment costs and the need for more comprehensive data from multi-year trials across various pests and pesticides before further conclusions can be drawn.

Evaluation:



Further information:

- https://www.inhort.pl/files/journal_pdf/journal_2011_1/full16%202011_1_.pdf