



smart **AKIS**
Smart Farming Thematic Network



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A fuzzy control system for decision-making about fungicide applications against grape downy mildew.



Title	A fuzzy control system for decision-making about fungicide applications against grape downy mildew.
Title (native language)	
Category	<ul style="list-style-type: none"> • Reacting or variable rate technology
Short summary for practitioners (Practice abstract) in English)	Using the information provided by the DSS, this fuzzy control system (FCS) was able to reproduce the expert reasoning regarding the decision to apply a fungicide against <i>P. viticola</i> in a vineyard. The FCS uses the following information provided by the DSS as input variables: i) grapevine phenology; ii) risk of primary infection; iii) abundance of secondary sporangia; iv) risk of secondary infection; and v) residual protection provided by the last fungicide application. The FCS was tested by comparing the scheduling of copper fungicides against <i>P. viticola</i> in 18 organic vineyards of Italy as determined by a panel of five experts vs. the FCS. The FCS was able to reproduce the expert reasoning with an overall accuracy of 0.992. Once the FCS is incorporated into the DSS, it will help inexperienced viticulturists in taking right decisions about downy mildew control.
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Plant production and horticulture

Additional keywords	fungicide, decision support, grape, fuzzy, expert system
Geographical location (NUTS)	EU
Other geographical location	
Cropping systems	Vineyards
Field operations	Crop protection
SFT users	Farmer
Education level of users	All
Farm size (ha)	0-2 2-10 10-50 50-100 100-200 200-500 >500

Scientific article

Title	A fuzzy control system for decision-making about fungicide applications against grape downy mildew
Full citation	Gonzalez-Dominguez, E.; Caffi, T.; Bodini, A.; Galbusera, L.; Rossi, V. (2016). European Journal of Plant Pathology, DOI:10.1007/s10658-015-0781-x

Effects of this SFT

Productivity (crop yield per ha)	Some increase
Quality of product	No effect
Revenue profit farm income	No effect
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	No effect
Variable costs	No effect
Post-harvest crop wastage	No effect
Energy use	No effect
CH4 (methane) emission	No effect
CO2 (carbon dioxide) emission	No effect
N2O (nitrous oxide) emission	No effect
NH3 (ammonia) emission	No effect
NO3 (nitrate) leaching	No effect
Fertilizer use	No effect
Pesticide use	No effect
Irrigation water use	No effect
Labor time	No effect
Stress or fatigue for farmer	No effect
Amount of heavy physical labour	No effect
Number and/or severity of personal injury accidents	No effect
Number and/or severity of accidents resulting in spills property damage incorrect application of fertiliser/pesticides etc.	No effect
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	Some decrease

Information related to how easy it is to start using the SFT

This SFT replaces a tool or technology that is currently used. The SFT is better than the current tool	no opinion
The SFT can be used without making major changes to the existing system	agree
The SFT does not require significant learning before the farmer can use it	agree
The SFT can be used in other useful ways than intended by the inventor	no opinion
The SFT has effects that can be directly observed by the farmer	agree
Using the SFT requires a large time investment by farmer	disagree
The SFT produces information that can be interpreted directly	agree

[View this technology on the Smart-AKIS platform](#)

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