



## Recent advances in sensing plant diseases for precision crop protection



Title	Recent advances in sensing plant diseases for precision crop protection
Title (native language)	
Category	<ul style="list-style-type: none"> <li>Recording or mapping technology</li> </ul>
Short summary for practitioners (Practice abstract) in English)	<p>Near-range and remote sensing techniques have demonstrated a high potential in detecting diseases and in monitoring crop stands for sub-areas with infected plants. The occurrence of plant diseases depends on specific environmental and epidemiological factors; diseases, therefore, often have a patchy distribution in the field. This review outlines recent insights in the use of non-invasive optical sensors for the detection, identification and quantification of plant diseases on different scales. Most promising sensor types are thermography, chlorophyll fluorescence and hyperspectral sensors. For the detection and monitoring of plant disease, imaging systems are preferable to non-imaging systems. Differences and key benefits of these techniques are outlined. To utilise the full potential of these highly sophisticated, innovative technologies and high dimensional, complex data for precision crop protection, a multi-disciplinary approach—including plant pathology, engineering, and informatics—is required. Besides precision crop protection, plant phenotyping for resistance breeding or fungicide screening can be optimized by these innovative technologies.</p>
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Farming practice   Plant production and horticulture
Additional keywords	Precision crop protection; Plant disease detection; Optical sensors; Hyperspectral techniques; Spectral signatures
Geographical location (NUTS)	EU
Other geographical location	
Cropping systems	
Field operations	Crop protection
SFT users	Farmer   Contractor
Education level of users	All
Farm size (ha)	0-2   2-10   10-50   50-100   100-200   200-500   >500

# Scientific article

Title	Recent advances in sensing plant diseases for precision crop protection
Full citation	Mahlein, A.-K.; Oerke, E.-C.; Steiner, U.; Dehne, H.-W. (2012). European Journal of Plant Pathology, DOI:10.1007/s10658-011-9878-z

## Effects of this SFT

Productivity (crop yield per ha)	Some increase
Quality of product	Some increase
Revenue profit farm income	Some increase
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	Some decrease
Variable costs	Some decrease
Post-harvest crop wastage	Some decrease
Energy use	Some decrease
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	Some decrease
Stress or fatigue for farmer	Some decrease
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.)	Some decrease
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	no opinion
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	agree
The SFT has effects that can be directly observed by the farmer	no opinion
Using the SFT requires a large time investment by farmer	disagree
The SFT produces information that can be interpreted directly	no opinion

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

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