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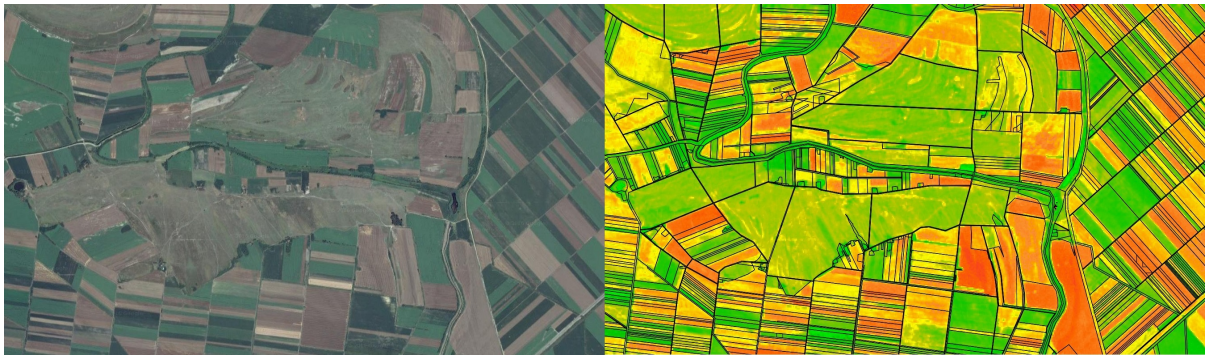
A light-weight multi-spectral aerial imaging system for nitrogen crop monitoring



Title	A light-weight multi-spectral aerial imaging system for nitrogen crop monitoring
Title (native language)	
Category	• Recording or mapping technology
Short summary for practitioners (Practice abstract) in English)	Image-based remote sensing is one promising technique for precision crop management. In this study, the use of an ultra light aircraft (ULA) equipped with broadband imaging sensors based on commercial digital cameras was investigated to characterize crop nitrogen status in cases of combined nitrogen and water stress. The acquisition system was composed of two Canon® EOS 400D digital cameras: an original RGB camera measuring luminance in the Red, Green and Blue spectral bands, and a modified camera equipped with an external band-pass filter measuring luminance in the near-infrared. A 5 month experiment was conducted on a sugarcane (Saccharum officinarum) trial consisting of three replicates. In each replicate, two sugarcane cultivars were grown with two levels of water input (rainfed/irrigated) and three levels of nitrogen (0, 65 and 130 kg/ha). Six ULA flights, coupled with ground crop measurements, took place during the experiment. For nitrogen status characterisation, three indices were tested from the closed canopy: the normalised difference vegetation index (NDVI), the green normalised difference vegetation index (GNDVI), and a broadband version of the simple ratio pigment index (hereafter referred to as the SRPIb), calculated from the ratio between blue and red bands of the digital camera. These results showed that SRPIb could characterise the nitrogen status of sugarcane crop, even in the case of combined stress, and that such acquisition systems are promising for crop nitrogen monitoring.
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Plant production and horticulture | Fertilisation and nutrients management
Additional keywords	Ultra light aircraft; Sugarcane; Digital camera; Spectral index; Nitrogen
Geographical location (NUTS)	EU
Other geographical location	
Cropping systems	
Field operations	Fertilization | Crop and soil scouting
SFT users	Farmer | Contractor

Education level of users	Secondary education | Apprenticeship or technical school education | University education
Farm size (ha)	0-2 | 2-10 | 10-50 | 50-100 | 100-200 | 200-500 | >500

Scientific article

Title	A light-weight multi-spectral aerial imaging system for nitrogen crop monitoring
Full citation	Lebourgeois, V.; Bégué, A.; Labbé, S.; Houlès, M.; Martiné, J.F. (2012). Precision Agriculture, DOI:10.1007/s11119-012-9262-9

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	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	Some decrease
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.	Some decrease
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	No effect

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	agree
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	disagree
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	no opinion
Using the SFT requires a large time investment by farmer	no opinion
The SFT produces information that can be interpreted directly	disagree

View this technology on the Smart-AKIS platform

This factsheet was generated on 2018-Apr-03 11:57:17.