



Fibre sensor in grain drill



Title	Fibre sensor in grain drill
Title (native language)	
Category	<ul style="list-style-type: none"> Recording or mapping technology
Short summary for practitioners (Practice abstract) in English)	<p>A new sensing system to estimate the mass flow of seeds in the grain drill was developed and evaluated in this paper. This was a manipulation of an estimation model developed indoors using fibre sensors, by considering the operational conditions of the machine and environment. Therefore, an original method to install the sensor within the grain drill was tried, and modifications on the estimation model and algorithm were performed. The experiment to test and evaluate the sensing system consisted of running a grain drill-propelling tractor in the farm of Hokkaido University several times to sow rye seeds, where each run was approximately 160 m. Two fibre sensors were installed at two different metering units, that use axial flute rollers, inside the grain drill. Also, the seeds being discharged during the experiment were collected and weighed at the end of each run. The results of 52 trials to estimate the mass flow of seeds indicated that in approximately 98% of the trials the estimation rate exceeded 90%. Moreover, the overall estimation rate was approximately 95%. These results seemed not to be biased by the change of the sensor set nor the sensing location. The modifications on the estimation model were successful in eliminating the overestimation or underestimation bias that resulted by changing the speed in the indoor experiments. In addition, the modifications on the estimation algorithm could eliminate error in the sensor output values that may result from dust, vibration, or variation in the sensor internal resistance. These results showed that the sensing system can be used practically to monitor the seed flow in the grain drill which would have many applications in precision agriculture practices.</p>
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Farming equipment and machinery
Additional keywords	Mass flow, Sowing, Fibre sensor, Estimation rate, Sensing system
Geographical location (NUTS)	EU
Other geographical location	Global
Cropping systems	Arable crops
Field operations	Sowing

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	Application of fibre sensor in grain drill to estimate seed flow under field operational conditions
Full citation	Al-Mallahi, AA; Kataoka, T. (2016). Computers and Electronics in Agriculture, DOI:10.1016/j.compag.2016.01.006

Effects of this SFT

Productivity (crop yield per ha)	Some increase
Quality of product	No effect
Revenue profit farm income	Some increase
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.	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	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	strongly agree

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