Bringing Soil information in the hands of farmers

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Having adequate soil information to adapt fertilizers plans, and support farmers yield ambitions is either hard to obtain or rather expensive as it often requires soil sampling and analysis in a lab. AgroCares has developed two services, the Scanner and the Lab-in-a-box, that bring the knowledge of soil analysts and agronomists into the hands of the farmer in a quick, easy and affordable way. Starting with a soil scan the spectra produced by the spectrometers inside follow a range of processes until it is returned to the user as a soil status report.

The spectral image of the soil provided by the scanner is connected to the Global Soil Database and its algorithms; which through machine learning regression models, predicts the content of a soil sample from a spectrum. From the spectra obtained, several regression models produce the numerical predictions that are returned to the farmer as a soil status.

In order to assure quality in the predicted soil status, the regression models are developed country by country. For country calibration, Agrocares starts by determine the number and location of samples required to cover the full spectral range of that specific country using data like soil type, land use, fertiliser and crop residue management, satellite crop development images, climate and elevation.

These samples are then collected following protocols and shipped to the Golden Standard Laboratory in the Netherlands where they are analyzed using regulated traditional wet chemistry techniques and scanned with the sensors of the Lab-in-a-Box (Mid Infra Red and XRF) and the Scanner (Near Infra Red). The reference values obtained in the GSL and the spectra for each sample obtained from the Scanner and the Lab-in-a-Box form the ground truthing data set required for the machine learning algorithms.

Once all the soil data has been extracted from the spectral image, it is sent to the fertilizer module, where the different nutrients are allocated to their respective soil fertility classes. These classes are used to establish the quantities in kg/ha of nutrients needed to reach an "adequate" soil fertility level. Using local nutrient crop uptake tables, the total nutrient requirement is calculated and converted into fertilizer recommendations that consider factors like nutrient loss after application and available fertilizer.

The user then receives a full soil management report that includes soil analysis results in classes for N, P, K, pH and organic matter with the Scanner and in values for all Macro and Micro nutrients with the Lab-in-a-box. But also, customized, locally adapted fertilizer recommendations for a better yield.
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