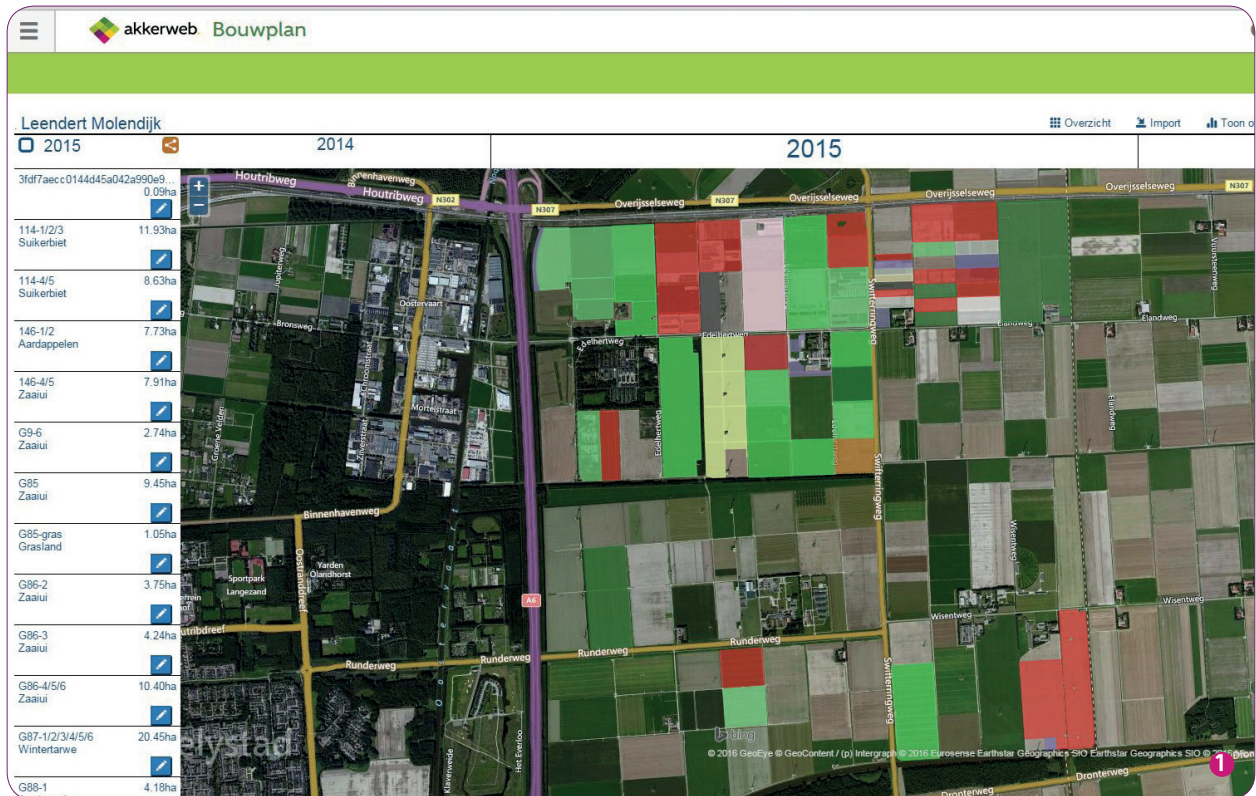




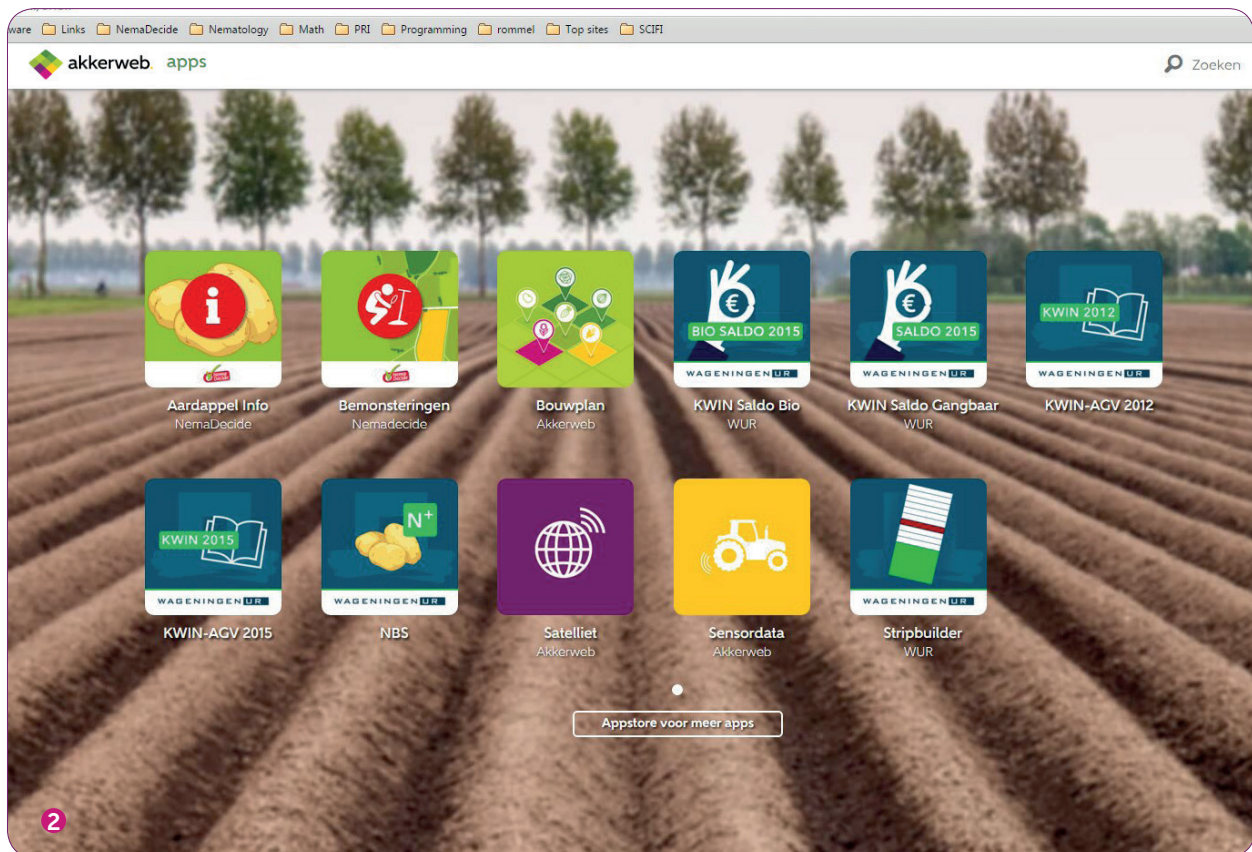
# Akkerweb a view of your plots



Each field carries an enormous amount of information that growers could use for a tailor-made approach of their management. This will result in optimum performance of a field, both in the short term and in the long term. Unfortunately, this information is scattered in space and time. The Grower - owner or tenant encounters difficulties to collect the correct data and to sort them in such a way that well-founded decisions can be taken. Unlocking field information via Akkerweb and combining this information with knowledge of crop management, enables the farmer to increase profit via targeted application of irrigation, fertilization, crop protection and soil tillage. This results not only in increase of production and quality, but also in efficient utilization of minerals and crop protection products.

Companies and research organizations want to make their knowledge and problem-solving expertise available in a geographical environment, in the simplest and fastest way possible. Akkerweb has been developed to unlock field data and to combine these data with knowledge systems in order to offer the grower tools to develop an efficient soil and crop management strategy.

Akkerweb originated in 2012 from the development of the decision support system for plant-parasitic nematodes NemaDecide Geo. Akkerweb offers GIS functionality and a number of generic applications, such as web services to download satellite data or provide the ability to generate a task map. Third parties can use the Akkerweb platform to rapidly develop new applications. The Akkerweb infrastructure serves as a connection between georeferenced field data and relevant additional information.



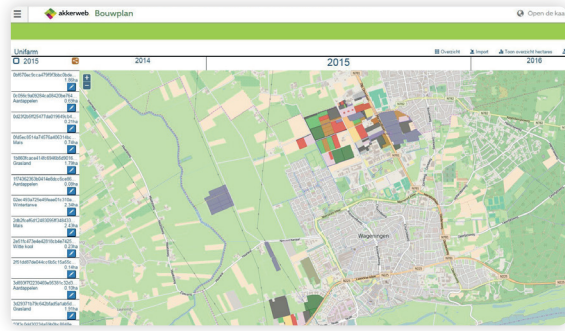
## The Akkerweb platform is being developed for four target groups:

- 1 **The grower:** Akkerweb as an effective geographical information environment supporting day-to-day farm management and as central point for information systems made available by third parties.
- 2 **The advisor:** Up-to-date, GIS-based, advice can be offered via Akkerweb and its GIS applications can help to identify rapidly and efficiently the needs of the grower for each field.
- 3 **The developer:** A toolbox that enables the rapid and simple development of web-based GIS applications is made available.
- 4 **The Wageningen University researcher:** A platform to develop applications and to demonstrate Wageningen University knowledge (showcase of knowledge) to the outside world. In addition, Akkerweb is also intended to initiate new projects after consultation and in collaboration with agro business.

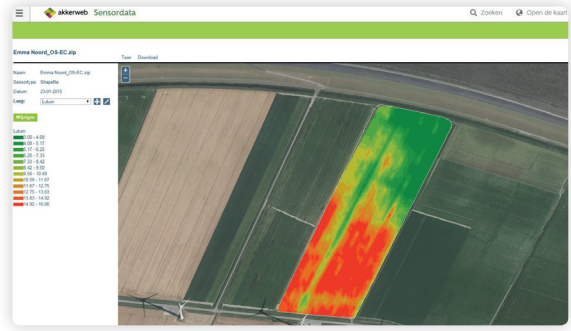
Akkerweb offers companies, cooperatives and growers' groups the opportunity to develop and demonstrate applications on a collaborative basis, and - where appropriate - to take these into production. Development costs of applications are low as Akkerweb provides generic functionality, which is shared with all applications. A brief explanation of the functionalities offered by Akkerweb is given below, including a list of applications already available or in development.



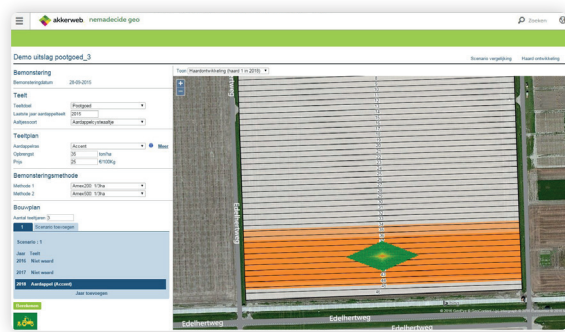
- 3 Wageningen University & Research Uniform: crops 2015 retrieved from RVO, Assen



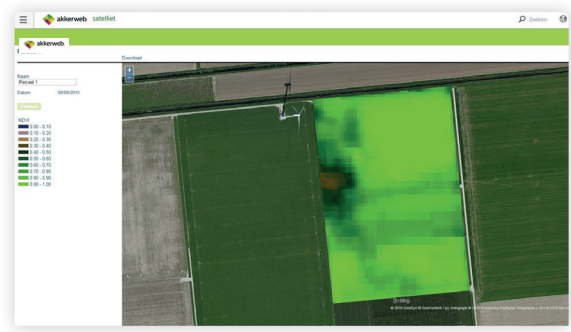
- 4 Lutum map (used in herbicide app)



- 5 Decision support system NemaDecide Geo



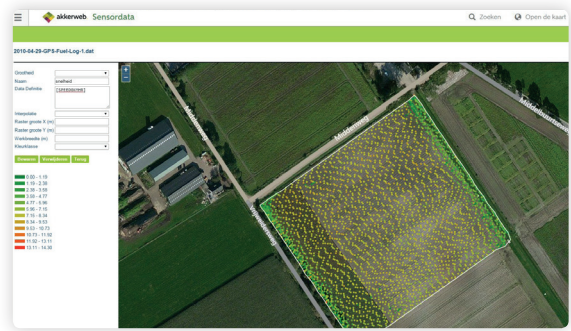
- 6 Satellite biomass map (NVDI)



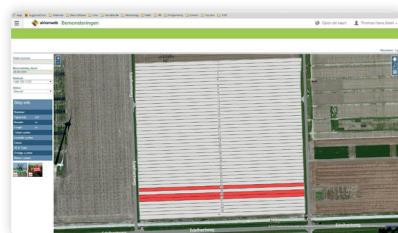
- 7 Task map haulm killing



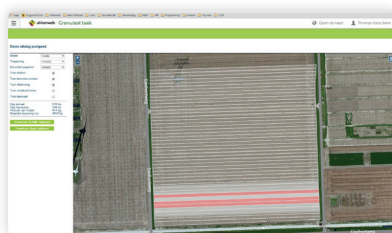
- 8 Fuellog tractor data



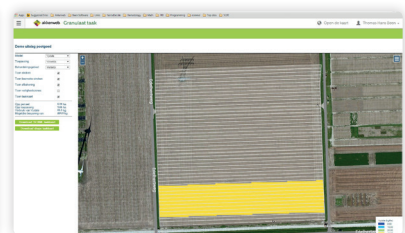
9 Potato cyst nematode (PCN) sampling results are directly retrieved from the soil sampler using a webservice. The sampled strips with the infected units are displayed (left). Including legal delimitation (middle). Direct linking with the decision support system NemaDecide Geo is possible, e.g. to compare scenarios. Also, a task map for application of granular nematicides can be created (right). In the same way, other sampling results (fertilization) can also be linked and displayed.



Sampling result PCN

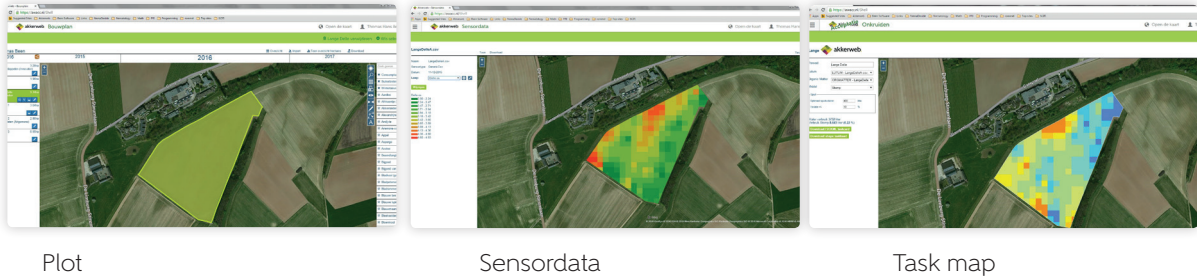


Delimitation of the infestation

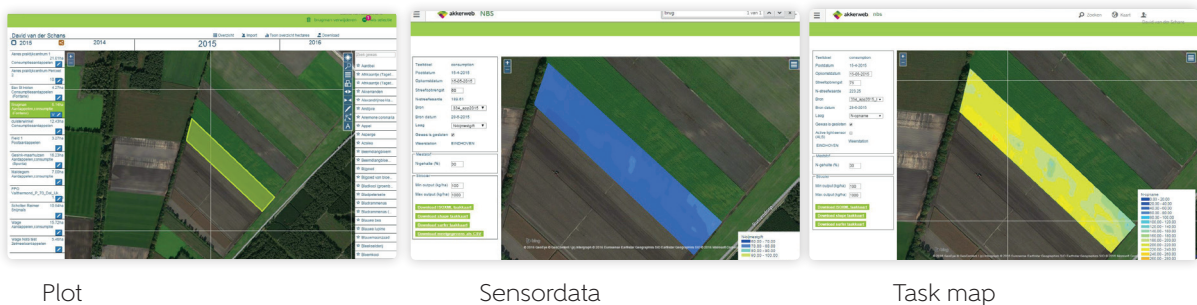


Task map granulate

10 Choose the plot. Based on a lutum and an organic matter map, a task map for a herbicide is calculated.



11 Application for topdress nitrogen in potato. Based on cultivation data, sensor data and temperature a task map for site specific fertilization is created.



## Akkerweb Toolbox

Developers can use the infrastructure of functions and services of the Akkerweb platform for the rapid development of new applications. A description of API's will be made available. Applications visible on Akkerweb can run on the Akkerweb servers, but also on a third party servers. Applications on Akkerweb can be visible to everyone or exclusively for certain companies or persons. Akkerweb applications can also be embedded in other websites without the Akkerweb visibility.

Applications on Akkerweb can be free for use or after license payment. Pay per ha, fee reduction using promotion codes, etc are possible. All applications on Akkerweb can exchange data with each other.

## Akkerweb applications

Free **Akkerweb** applications

- ▶ **My Cropping Plan:** Entering grower's fields (manually, own measurements, via web services connecting to official bodies and Farm Management Systems) and adding crops.
- ▶ **Map:** Overview of all grower's fields on a map. Add layers of information from your applications: e.g. all fields that have been sampled. All fields with sensor data, etc. Click on a field and all information available will be listed.
- ▶ **Sensor data:** Upload all types of sensor data and visualize the information. Use these data in the different applications on Akkerweb.
- ▶ **Satellite:** Download satellite imagery - WdVI and NVDI biomass maps for further use in Akkerweb, e.g. Haulmkillling
- ▶ **My Advices:** Advice generated in the various apps, including those of the advisory Apps, can be found here.
- ▶ **Contacts:** Connect with another Akkerweb user and share information in different ways (time-bound, editable or not, etc.).

## Akkerweb offers the user the following standard features:

- ▶ **Login:** Akkerweb offers an individual login for accounts; this means that only the user (grower) has access to the files he owns. Via 'single sign on' the user is directly logged onto other services and applications that are relevant for him; this avoids repeated entering of user account credentials
- ▶ **Background maps:** Displaying geographical information against a freely chosen background: Google maps, OpenStreetMap, Bing, Top10 or any other background.
- ▶ **Geographical field information government:** Can be downloaded using various web services, directly from the government or by public reference map layers of crop fields (most EU countries).
- ▶ **Address details of growers/fields:** Once entered, data are available in all applications the grower wishes to use.
- ▶ **Downloading or drawing fields:** Fields can be uploaded from Farm Management Systems CROP-r and CropVision (upload xml message) or added using drag and drop'' (different formats are supported: shape files, Google polygons, etc.). If necessary they can be drawn by hand.
- ▶ **Cultivation data:** If not available by upload from a Farm Management Systems, Akkerweb provides a simple crop rotation application to provide advisory systems with cropping information (crops, varieties, planting date, growing period).
- ▶ **Sensor data:** Tractor logs, data via .csv, .xlsx, .dbf, .dat, but also satellite data (NVDI, WdVI, yield maps (geotiff) can be uploaded. Addition of a new format will take half a day.
- ▶ **Editing:** Standard functionality for editing geographical information; Edit, merge or split fields, add objects, convert grid files and other formats into visual information.
- ▶ **Links:** Web services to collect data from external Agro partners are available, a.o. NAK, ISAcert, De Groene Vlieg, Eurofins, Alterra, NEO,CROP-R and CropVision.
- ▶ **Storage:** All Data remain property of the grower/owner and can be used or stored for later application.
- ▶ **Output:** Generic output is possible. As csv file, as pdf for pictures, etc. This functionality is available to each application.
- ▶ **Applications:** The grower can use the free and the commercial applications with the plot as his starting point.
- ▶ **ISOBUS, shape and surfer:** Task maps can be generated created for ISOBUS, shape and surfer format.
- ▶ **Sharing information:** Growers can share their geographical information, time-limited if necessary, completely or partially, with third parties (neighbour, cooperation or payroll employee).
- ▶ **Send / Retrieve Data:** Edi-Crop v 4.0 and the eLab messages are supported. Using services to business management systems duplicate data input is prevented.
- ▶ **Uptime and scalability:** The Akkerweb platform is hosted on Amazon servers under European law. This ensures an uptime of almost 100%, an instant scalability (number of users) and provides the need for fast processing of geographic data.
- ▶ **Weather:** Available are forecasts and observed weather and rain radar information.
- ▶ **Use of soil maps, crop growth models, etc.**

## Commercial Akkerweb applications

- ▶ **Digital sampling request:** nematodes, phosphate, white rot.
- ▶ **Stripbuilder:** Subdivision of fields into sampling units for nematodes, phosphate, white rot, tracks, buffers, to display results of soil sampling.
- ▶ **NemaDecide Geo:** Free version of the decision support system for the potato cyst nematode.
- ▶ **NemaDecide Geo PLUS:** Extended version of NemaDecide including the root-knot nematode (*M. chitwoodi*) and the root lesion nematode (*Pratylenchus penetrans*) and extended features.
- ▶ **Agrifirm Mineral:** Calculate fertilizer needs, based on crop, soil type, acreage for your whole farm.
- ▶ **Agrifirm Crop Protection:** Calculate for all fields the need for crop protection.
- ▶ **Task map nematostats:** based on soil sampling results a task map will be calculated including official delimitation.
- ▶ **Potato information:** More than 400 potato cultivars and all their properties, including partial resistance against potato cyst nematodes, blight, etc. including data querying and links to the breeders.

- ▶ **Task map haulm killing:** Biomass-dependent haulm killing of potatoes based on NDVI and WDWI originating from satellite and ebee.
- ▶ **Task map top dress nitrogen:** Biomass-dependent task map for nitrogen top dress for potato based on NDVI and WDWI originating from satellite and ebee.
- ▶ **Task map herbicides:** an application map based on lutum (clay particles < 2 µm), and organic matter content of the soil.
- ▶ **Get hold of your grass production:** Measure your grass height georeferenced using your mobile and calculate the Feed Wedge on Akkerweb.
- ▶ **Bioscope:** a service that provides a farmer with different products, among which an WDWI-green biomass map, every 10 days. Imagery is originates from satellites or from drones, when satellite images are unavailable.
- ▶ **Late Blight:** A completely new state of the art decision support system to avoid yield losses by *Phytophthora infestans*

## Akkerweb applications in development

- ▶ **Fuel log:** Time, distance, fuel consumption, speed, number of tracks, and driving path of a tractor over the field on the map.
- ▶ **Life stream data:** See your tractor driving over the field. Drive off your field and the sensor data are available in Akkerweb.
- ▶ **Task map lime application:** Calculate task map for site-specific need for potassium based on pH map (Veris sensor).
- ▶ **Grip on Data:** Drop word, excel and pdf files on your plot and make them georeferenced. Click on your plot and have a look at all your plot data.
- ▶ **Mycokey App:** Comprehensive monitoring of mycotoxins at critical control points in the food/feed chains for wheat and maize (DON, Aflatoxin B1 and Fumonisin) <sup>1</sup>.
- ▶ **OnTheSpot:** Georeferenced recording of events and remarks in the field using your mobile. Indicate deviating spots (disease, stunted growth, birds'nest), make photographs of these spots, store the information for future reference or share with friends or advisor. Let him retrace the spot with his mobile and get advice. Mobile app in combination with a web-based application where all information is presented on a map. <sup>1</sup>
- ▶ **GAOS:** Calculate the optimal driving path of your tractor over the field, avoiding obstacles and download it to your tractor.
- ▶ **Zoning:** Read in sensordata of your field, calculate treatment zones and make a taskmap yourself.

<sup>1</sup> The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678781.



For more information about the possibilities that Akkerweb may offer you and your farm, agro business or company, please contact:

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