



# Computer intelligence significantly reduces herbicide consumption

An algorithm that enables a camera to differentiate between weeds and crops can reduce a farmer's use of herbicides by virtually half.

To prevent their fields from becoming overgrown with weeds, farmers have to use herbicides in standard mixtures and amounts right across the field. Now researchers will try to improve this spray behaviour by means of a new camera technology and a patented algorithm that differentiates between weeds and crops.

The project was launched back in 2012 when researchers worked with Danish farmers to collect a database with several million images of weeds from the fields.

"The farmers took photos of their fields every 100 metres using their mobile phones or a consumer drone. They sent their photos to an expert who determined the type of weed and registered it in an online database," says Senior Researcher Rasmus Nyholm Jørgensen.

## Computer identifies weeds

The database is now so comprehensive that the researchers can start work on image recognition of the weeds. They have invested in a supercomputer with extremely large and fast graphics cards, and they are now 'training' it to identify a specific weed species within a fraction of a second.

The supercomputer can currently recognise a total of twenty-seven species with a very high level of accuracy and, according to the researchers, it will be capable within a year of identifying considerably more of the approximately 100 species of weeds in the

Danish flora. If they succeed, computer-based identification will provide unprecedented opportunities for effective weed control in agriculture.

## Smart sprayer prevents resistance

The researchers have already carried out experiments with the first early prototype of an intelligent sprayer that can dispense a herbicide dose when it sees weeds in the field.

"Based on the many images in the database, we've 'trained' a computer to look down on the field and identify weeds. When it sees a weed, it can activate a spray nozzle, and when the weed is no longer visible, it can stop. It all takes place automatically, and we also hope that we can use the technology to select the right herbicide and spray it in optimal doses. This will save farmers the cost of purchasing herbicides, protect the environment and systematically vary the herbicides so that we prevent the weeds from developing resistance," says Senior Researcher Jørgensen.

The image analysis is made in less than a second and – with the twenty-seven identifiable weeds – it can already today reduce herbicide consumption in the fields by 40 per cent. However, the system is not yet commercially available.

The researchers' ambition is now to optimise the algorithms for image recognition to make it financially possible to expand it to the agricultural sector.

*The team behind the RoboWeedSupport project has 'trained' a computer to differentiate between different weeds.*

*The technology can be used to make agricultural weed control more efficient.*