Rapid biotest method in precision agriculture

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Introduction

Precision agriculture is a new technology with a long history. The invariable question of the agriculture is how to maximize the physical and economic crop production by varying the input application according to soil types and crop performance. In the past the only one possibility was for the farmers to observe the spatial variability of soil properties and their effects on the development and production of crops and manage them based these differences. In precision agriculture there are several methods to get useable, high amount (BIG DATA) information.

Collecting this information is necessary to increase the yield, to decide the right treating method. There are many things which have an effect on the plant production and the plant growth. Generally applied fertilisers and organic fertilisers could improve yield and the organic matter content of soil, optimize the soil water management etc. The rapid biotest is the simplest method to take specific answer for our question.

Materials and methods

We developed a new plant experiment method, for the rapid and punctual measurement of the plant growing effect caused by plant nutrient, water management or other soil properties. The buildup of this instrument is very simple. There is a 2 m diameter ring which is moves continuously and slowly different soil sample. Type of the test plants depends on the target. Plant growing lamps are used over the pots, and an irrigating system is a part of the ring. The growing period is about 1-2 weeks. A camera system is used in on a fixed point to take photos from each pot in every circle. A computer collects and saves all the images for the pot analysis. For the image analysis we use an internally developed software, which is counting the number of green pixels on the image (Tolner et al., 2010). Based on the time-pixel function we can calculate the growing. Using this method, we can measure the differences between growing effect of plants and the measurement error is less than 0.5 %.

First, we must set out the same plant growing areas which are depending on the remote sensing, production maps or other method. Treatments based on the known average soil properties, and the treatment set up due to a factor plan. After that we collect soil samples, and add fertilizers or other materials and fill the pots with this mixture. After the measurement, and data-analysis we can calculate how to influence the investigated parameter to the plant production, and we can make the precision soil treatment plan.

Results and discussion

The usability of our method is moves on a wide range. It is proper to investigate different soil sample from management zones and different types of plants and amount of nutrients before the application

Conclusions

The preexperiment results prove that the rapid biotest is appropriate for describe the different soil treatments effects.

References

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