Phosphate in soil and the effect on barley production

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Abstract

The summary should contain a summary of the problem that you are working with, which results you got, as well as main conclusions.
Don't get into technical details. The summary should not be very long
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1 Introduction

Briefly introduce the background and setting of the problem, as well as the aim of the report. Furthermore, you could give a very short description of the analysis that will be applied.

The world is overpopulating. The population has grown exponentially over time while the surface of earth has naturally stayed constant. People have ever increasing problems with having enough space, both for living and agriculture. The latter will undoubtedly lead to huge agricultural problems, especially underproduction. One way to solve this issue could be to get a larger amount of cultivated land, which is not an effective long term solution as the population grows and the skirmish for proper households becomes ever tougher. The other option is to get more bang for your buck, or in other terms, getting a bigger yield from the same amount of land. There are many different ways of accomplishing this, but one would be to make sure to have large amounts of unbounded phosphate in the soil of the farmland, as this is a necessary nutrient for plant growth. Two possible measurements for this phosphorous amount are Olsen P and the newer, although more expensive, DGT measures.

One natural and important question for farmers, which will be uncovered in this paper, is whether one measure is significantly different than the other and which measure is best, which will be determined by finding the measure with the lowest error on a non-linear fit to the data. Meanwhile, another interesting question for this paper is if the phosphorous amount even has a significant influence on the yield of the farms, which can be uncovered by a simple use of ANCOVA. The hypothesis prior to the carrying out of the experiments is that DGT should be a better measurement for determining the amount of bioavailable phosphorous is the soil, as this method is both more expensive and newer. Meanwhile, it is expected that the amount of bioavailable phosphorous should have a significant effect on the yield, as more plant nutrients should lead to bigger and stronger plants.

2 Data

Describe of the data you are analyzing. What kinds of data do you have, how were they collected (if applicable)?
Include a few good plots to highlight important features in data. You can put additional plots in the appendix.

3 Methods

Describe the methods you used and why you decided to use them. Also discuss the assumptions behind the methods. Do not go into detail with theory.

4 Results

Present the results.
Tables and figures are good ways of illustrating results.

For determining which measurement best describes the yield, the linear fits of the yield over DGT and yield over olsen P with accompanying r^2-values are shown below.

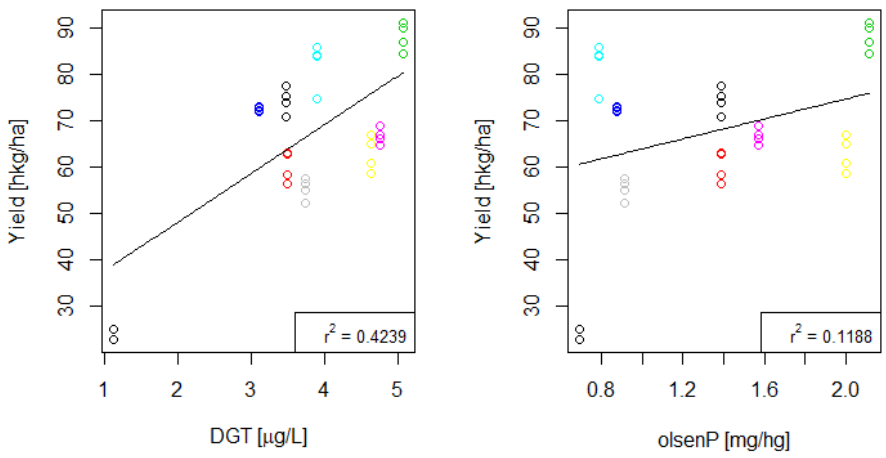

Figure 1:

The non-linear Michaelis-Menten fits of the yield over DGT and yield over olsen P with accompanying MSE-values are also shown below.

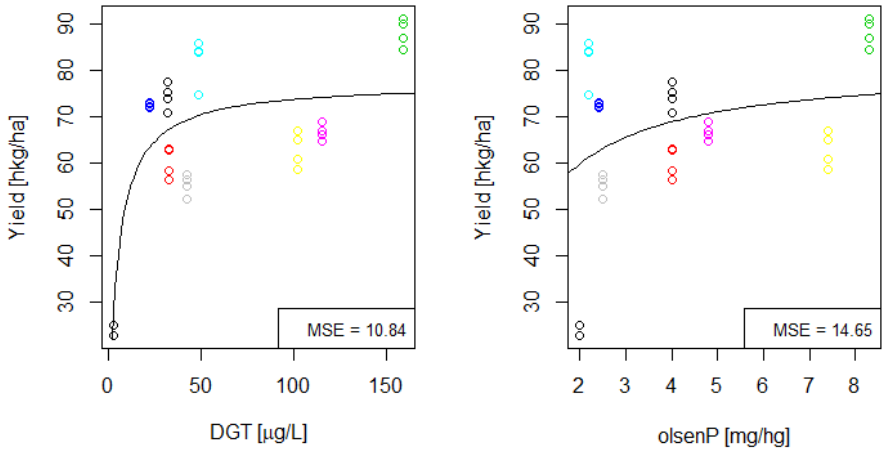

Figure 2:

To investigate if the amount of bioavailable phosphorous has a significant influence on the yield, an ANCOVA is performed with yield as the response variable and Olsen P, DGT and location as the explanatory variables. This yields the following p-values.

Variable	p-value
DGT	$1.715 \cdot 10^{-10}$
Olsen P	$7.621 \cdot 10^{-10}$
location	$2.234 \cdot 10^{-16}$

5 Discussion

What do your results show?
Discuss your results. How reliable are they?

6 Conclusion

What are your conclusions? The conclusion should be connected to the aim of the report in the introduction.
Highlight important results
If you have found interesting problems/aspects that you haven't carried out, you can specify them here as 'future work'.

7 Appendix