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# Yield response of grass and grass-clover leys in crop rotations to phosphorus fertilisation


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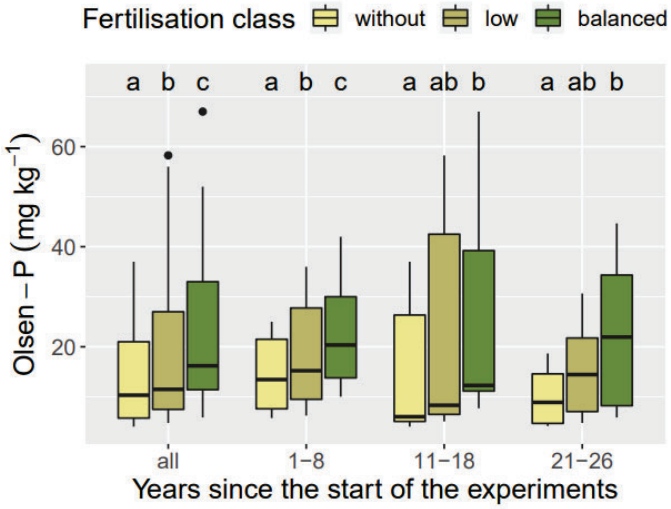
## Introduction

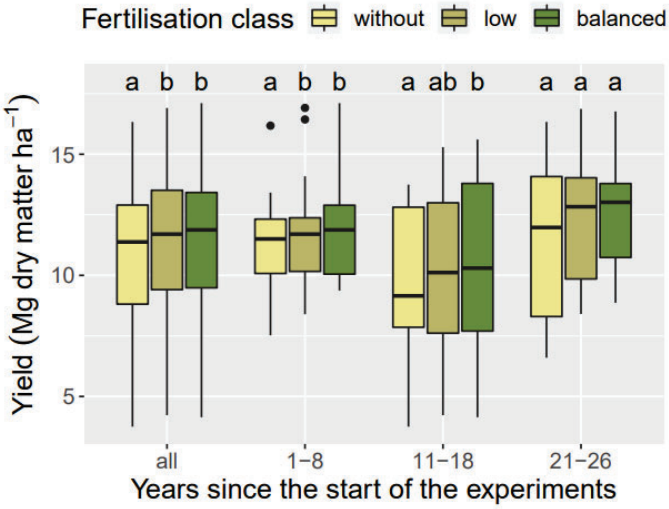
Grass or grass-clover leys are important parts of many crop rotations, providing forage for livestock and exerting positive effects on soil structure and fertility. One of the most important nutrients for optimum ley and especially clover growth is phosphorus (P). In addition to soil test P (STP) values and fertiliser rates, soil properties and climatic factors may influence yield response. We examined the effects of varied long-term P fertilisation on STP (Olsen-P) and yield of grass and grass-clover leys as well as dependencies on general soil characteristics and climate.

## Methods

- Four Danish and four Swiss long-term field experiments
- P Fertilisation classes based on P fertiliser amounts in relation to P export: without (0), low (32-64%), balanced (91-96%)
- Comparison of yield response between classes using the Friedman and Nemenyi tests
- Modelling of relative yield (RY) using a Mitscherlich type model based on Olsen-P; considered covariates: clay content (%), organic carbon content (%), pH ($CaCl_2$), long-term mean temperature (°C) and mean annual precipitation (mm)

## Results




RY = 100 * (1 - exp ((0.04 - 0.02 * clay) * Olsen-P)) Residual standard error: 6.8%

## Conclusions

- Many years of different fertiliser application rates led to significant differences in Olsen-P, but yield response mostly only varied between unfertilised and fertilised classes

→ low fertiliser rates can be sufficient for optimal yields

- Relative yields in relation to Olsen-P values increased with increasing soil clay contents


## References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