Fertilization effects on the fungal biomass in grasslands

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Introduction

Mineral fertilizer application is a common practise in grass production systems, performed to increase primary production.

Different fungal groups, like saprotrophic fungi (SF) and the obligate symbionts arbuscular mycorrhizal fungi (AMF), may respond differently to the fertilizer application.

Background

three controlled grassland field experiments * two Countries

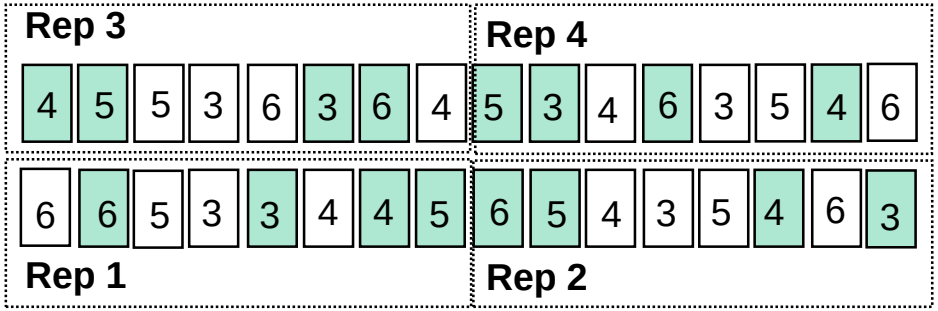
Sweden: two medium term (6 year) experiments, varying in N

Switzerland: one long-term (46 year) experiment, varying in P, K & N

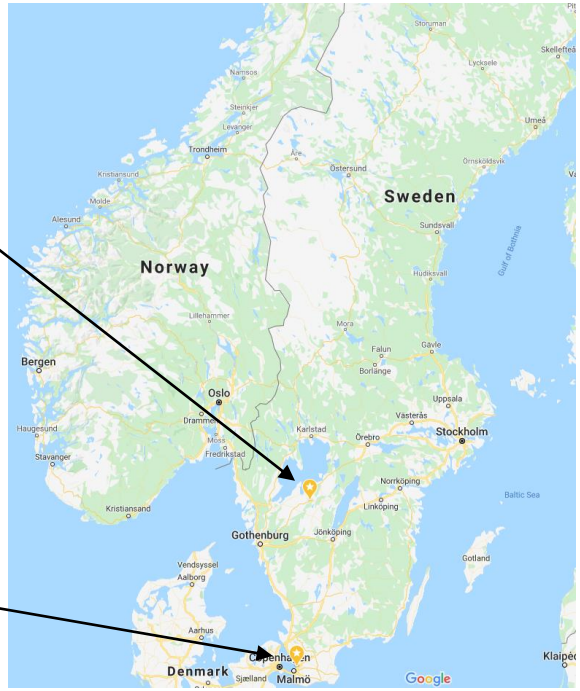



Swedish experiments

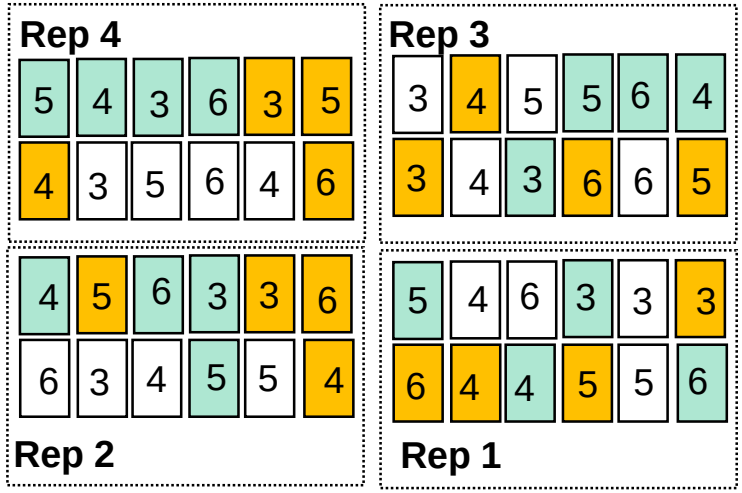
Established: 2012



Lanna



Alnarp



Plant mixture:
PM3: Cocksfoot, DONATA
PM4: three-grass mixture (PM1+PM2+PM3)
PM5: three-grass mixture + legumes (PM4 + lucerne + alsike clover + white clover + eastern galega
PM6: species-rich mixture (PM5 + diverse meadow seed mixture)

Fertilization (kg N/ha):
0
60
120

Swiss experiment

Variation in P, K and N application

Elevation: 930 m (Jura mountains)

Bremgarten

Established: 1972

2 cutting frequencies and 4 fertilizer applications

Rep 1		Rep 2		Rep 3	
0	PK	NNPK	NPK	0	PK
0	PK	NNPK	NPK	0	PK
NNPK	NPK	0	PK	NNPK	NPK
NNPK	NPK	0	PK	NNPK	NPK

0 = No fertilizer

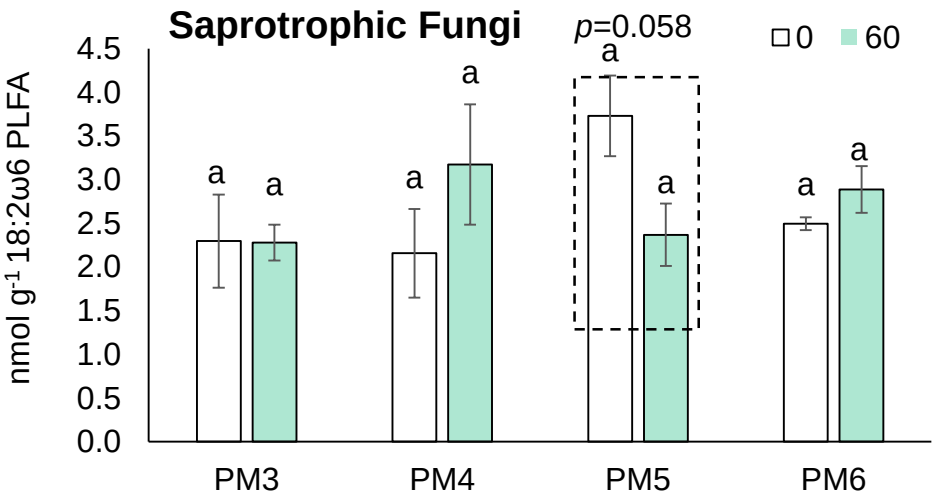
PK = 80 kg phosphate/ha and 240 kg K /ha

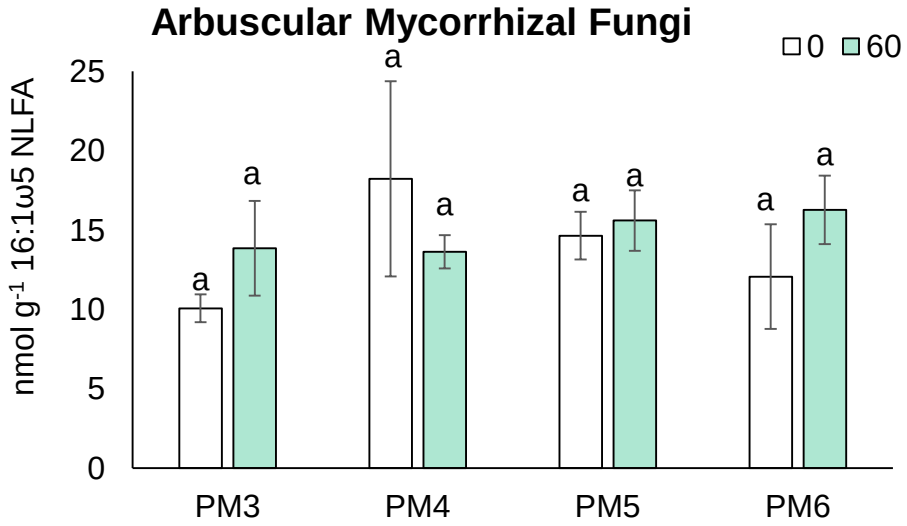
NPK = PK fertilizer with 75 kg/ha N

NNPK = PK fertilizer with 150 kg/ha N

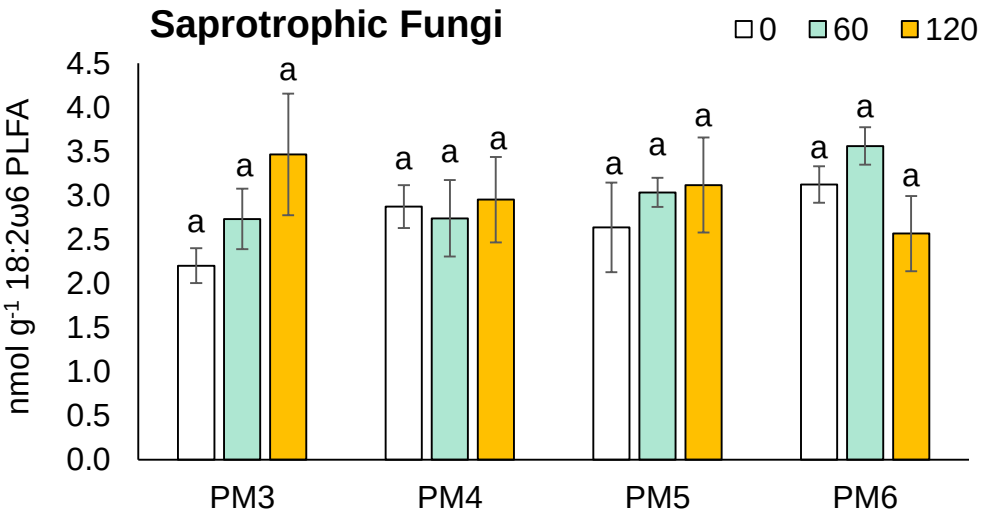
Sweden - Lanna

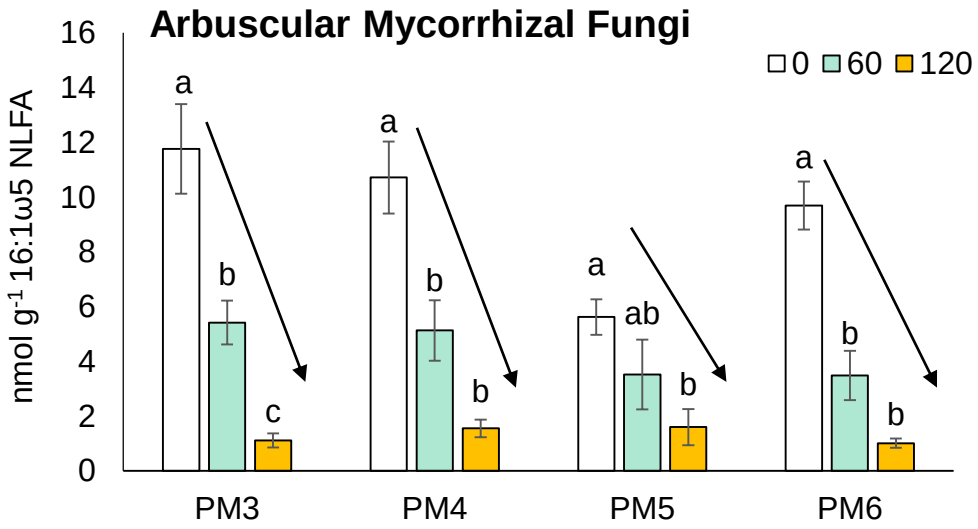
Different letters means significant differences among the fertilization levels (t-student, p<0.05). Error bars = Standard Error





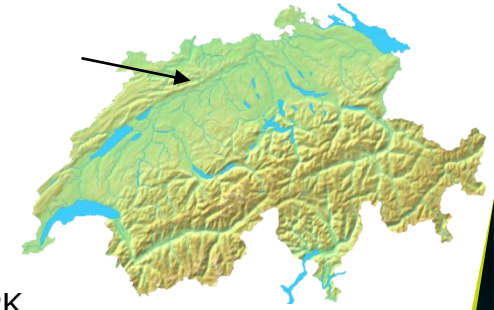
Sweden - Alnarp

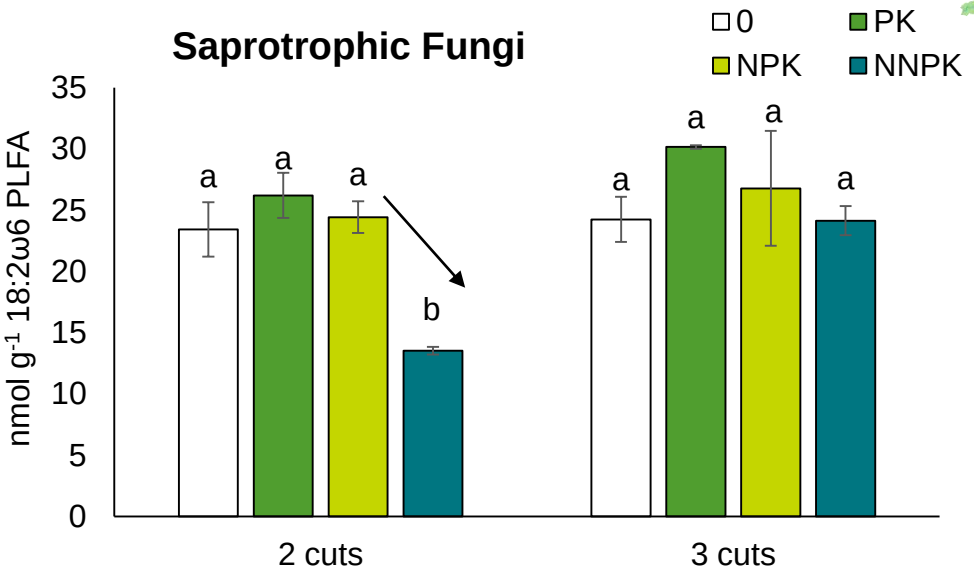


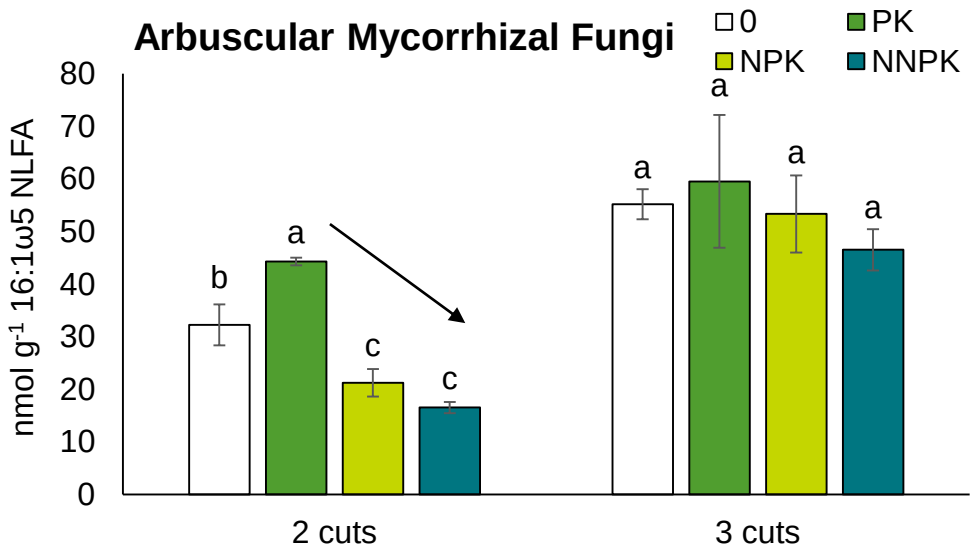


Different letters means significant differences among the fertilization levels (ANOVA, $p<0.05$). Error bars = Standard Error.

Switzerland - Bremgarten







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Conclusion

- Nitrogen fertilization influences microbial community structure
- Primarily through the reduction in the abundance of AMF
- AMF were more sensitive than SF to fertilizer application.

AMF may play a key role in plant N acquisition; under N limiting conditions.

SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE

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