Optimizing manure application rate to grass sward ground coverage before and after the winter season

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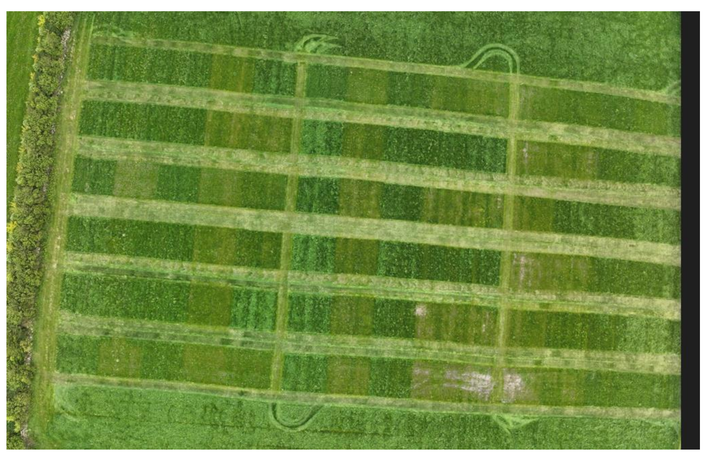
Introduction

- Manure spreading often results in nutrient losses.
- Harsh winter conditions cause uneven sward coverage.
- Grasision® was developed to estimate the coverage of living and dead plants, and bare soil from color images of grasslands.

Aim

Comparing yield and nitrogen use efficiency of perennial grasslands fertilized either evenly, across the whole field or site-specifically, based on plant coverage.



Overview of the experiment, NIBIO Særheim research station, southwestern Norway

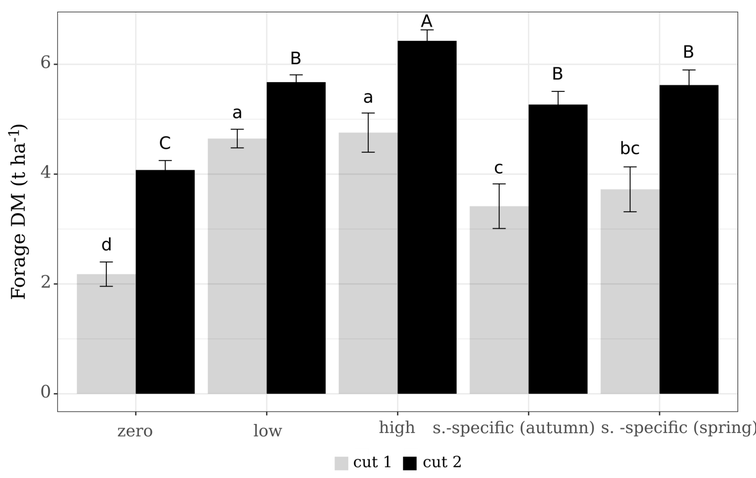
Results and discussion

- ✓ Yield at 1st cut was higher on even N levels than on site-specific ones.
- ✓ At 2nd cut, only the high N level yield was higher than the others.
- ✓ N use efficiency similar for site-specific and even fertilizer treatments.
- ✓ High even fertilization produced a higher N agronomic efficiency than the site-specific treatment based on images in October.
- ✓ A long drought early in the growing season and large amounts of rainfall later affected the yield.
- ✓ Nutritive forage value is being analyzed.

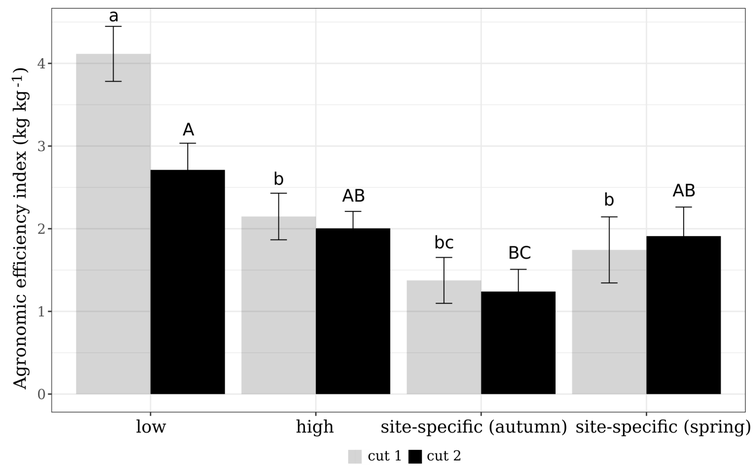
Conclusion

Adjusting site-specific N fertilization based on plant coverage before the start of the growing season, produced acceptable yields and N use efficiency. However, to determine the environmental effects, long-term evaluation is needed. Forage quality and total manure applied should also be investigated.

Manure application on April 5th, 2023.



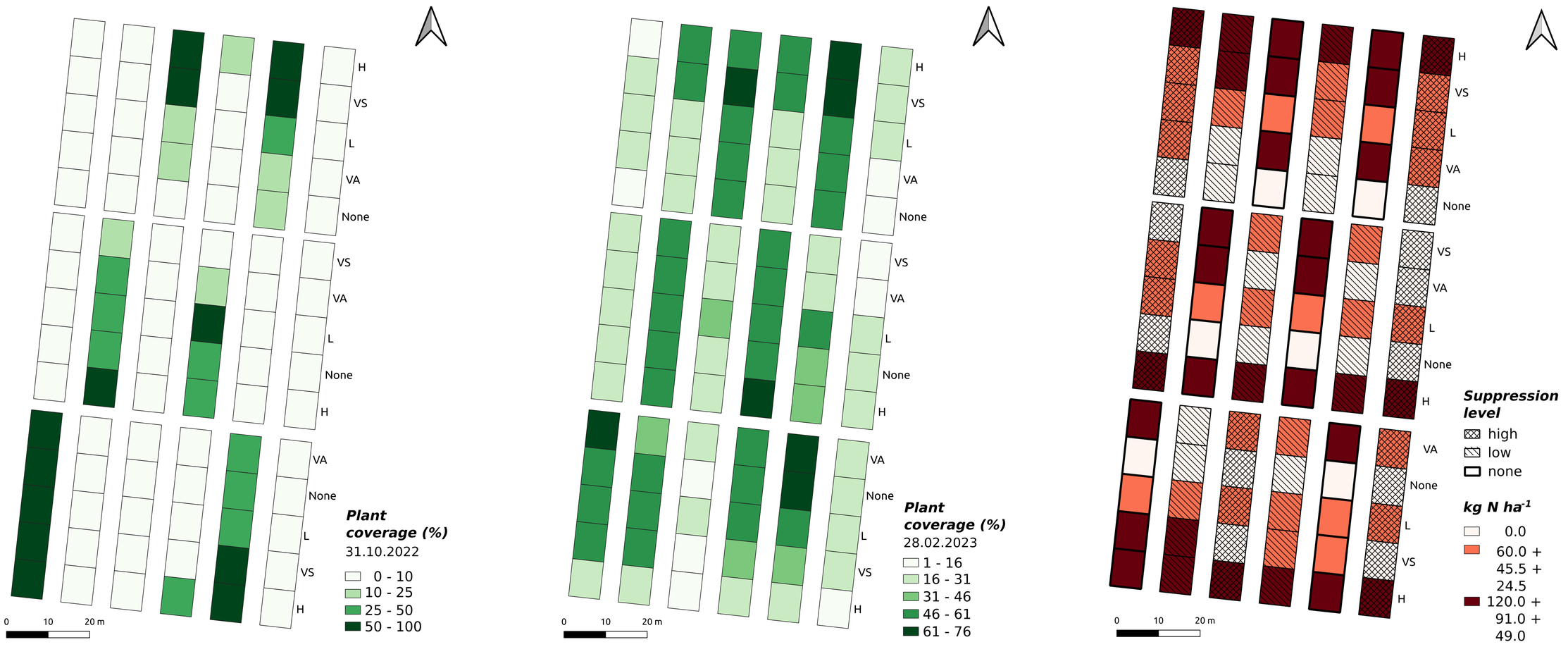
Average DM forage yield (t ha^{-1}) per fertilization treatment. Letters indicate differences between the Tukey HSD adjusted marginal means. Lowercase letters represent cut 1; Uppercase cut 2.



Average calculated Agronomic efficiency index per fertilization treatment. Letters indicate differences between the Tukey HSD adjusted marginal means. Lowercase letters represent cut 1; Uppercase cut 2.

Materials and methods

- Field unevenness was boosted by rotary harrowing or mowing with a low stubble hight in autumn 2022.
- Plant coverage was determined from UAV images in autumn and spring.
- Constant N and plant cover based N fertilizer regimes were compared.
- Approximately 40 % of the N was provided from manure, the rest from mineral fertilizer.
- Three forage cuts.
- Biomass yield was determined after drying at 60°C for 48 hours.
- Agronomic Efficiency
  $AE = (Yield_t - Yield_0) / Fertilizer\ N$



Living plant coverage on Oct 31, 2022, (left panel) and Feb 28, 2023, (middle panel), and suppression levels and fertilizing regimes (right panel). Slurry was applied on April 5, 2023, and after the 1st cut on June 8, 2023.

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