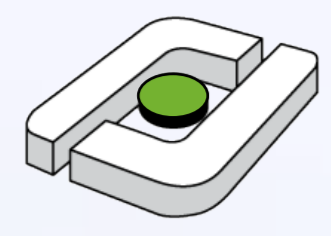


Establishment of perennial field margins and the development of site-adapted seed mixtures



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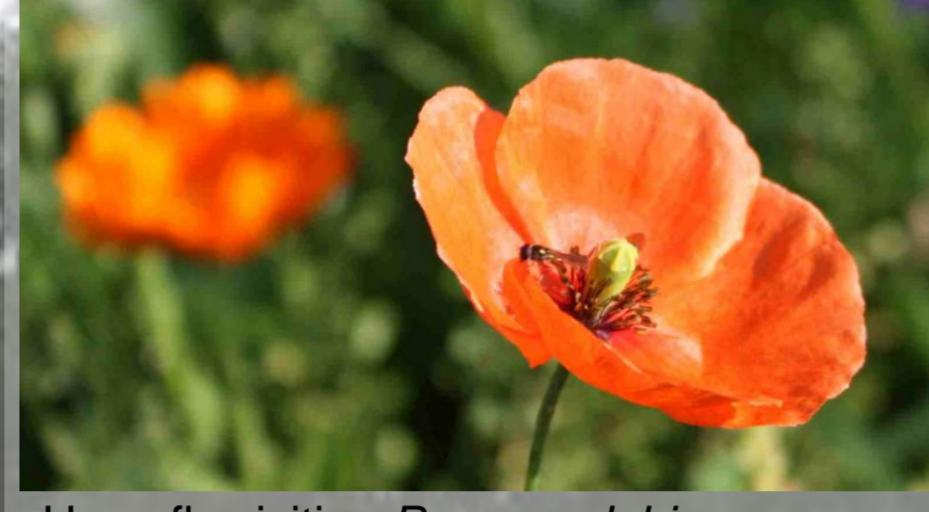
Background

In European agricultural landscapes species-rich perennial field margins and other uncropped areas are often missing today. Agro-environmental schemes (AES) of the EU provide financial support for farmers for the establishment of flower strips on arable fields. In Lower Saxony (Northern Germany), current AES include a program (BS2) on establishing perennial flower strips by seeding a prescribed seed mixture with native wildflowers of regional provenance and some short lived crop species.

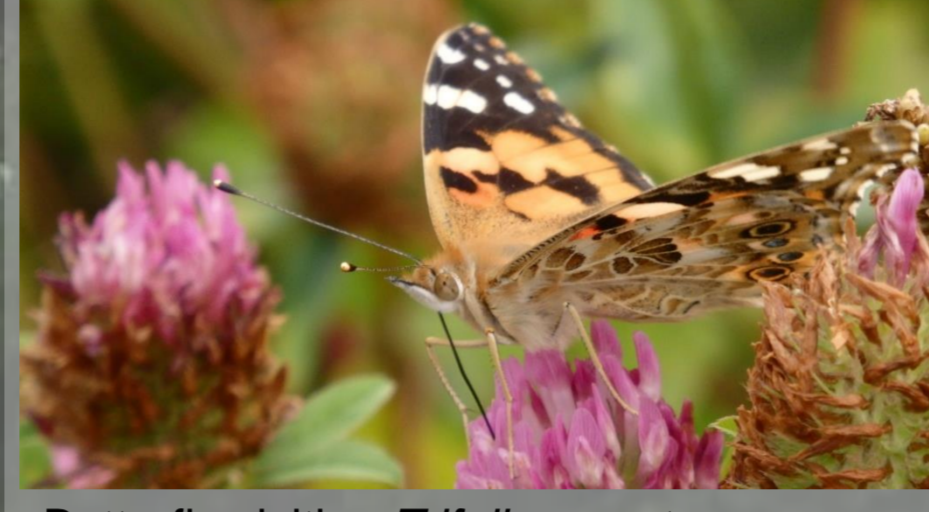
The **aim of our study** is to investigate the effects of different seed mixtures and management variants on plant species establishment, vegetation structure and flowering aspect.



Hoverfly visiting *Achillea millefolium*



Hoverfly visiting *Papaver dubium*



Butterfly visiting *Trifolium pratense*

Perennial flower-strip program BS2 Lower Saxony

- Flower strips of 3 - 6 m width or flower fields of max. 2 ha
- Prescribed seed mixture with 70 % wildflowers and 30 % short-lived crop species, no grasses
- Certified wildflower seeds from regional propagation („VWW-Regiosaaten“ or „Regio-Zert“)
- Seeding: 7 kg per hectare, not later than 15 May
- Obligation of annual mulching on 30 – 70 % of the area between September and March
- Establishment for five years

From seed mixture to flower strip



Seed mixture for program BS2



Tillage for seed-bed preparation



Sowing by hand (also possible by machine)



2½ months after sowing (August 2015)



Flowering aspect in June 2016



Flowering aspect August 2016

Study design

In May 2015 Osnabrück University of Applied Sciences started a block experiment with 5 blocks and 7 treatments (3 seed mixtures, management by annual mulching in March or September, additional cutting to reduce potentially problematic weeds, see Tab. 1).

Tab. 1: Seed mixtures and different mulching regimes at the study site in Osnabrück

Variant	Seed mixture	Mulching	Additional cut
1	A	September	–
2	A	September	July
3	B	September	–
4	B	September	July
5	C	September	–
6	C	September	July
7	C	March	–

In cooperation with the Competence Center for Organic Agriculture (KÖN) we carry out an additional monitoring on flowerstrips established by farmers in Lower Saxony.

Monitoring

Both, in the block experiment and on farmer's fields, **vegetation structure and phenology** are analyzed on **permanent plots of 30 m²** four times per year by recording the following parameters:

- Vegetation height
- Total cover of the sown species and species of the spontaneous vegetation
- Phenology of the sown native and crop species
- Flowering aspect

The **percentage cover of all plant species** is recorded annually on **8 m² plots** within each 30 m² plot.



Trifolium pratense



Hypochaeris radicata



Silene vulgaris



Linaria vulgaris



Prunella vulgaris



Leucanthemum vulgare



Silene dioica



Daucus carota

Results

At the different study sites 75 – 100 % of the sown species established successfully in the 1st year. As expected, crop species mostly disappeared in the 2nd year. The cover of the sown native wildflowers increased distinctly from 2015 to 2016 (see Fig. 1). All seed mixtures led to a distinctive flowering aspect in both years. The additional cut prolonged the flowering aspect, but no other management effects were detected up to now.



August 2015

August 2016

Flowering aspect on a field of a local farmer in the first and second year.

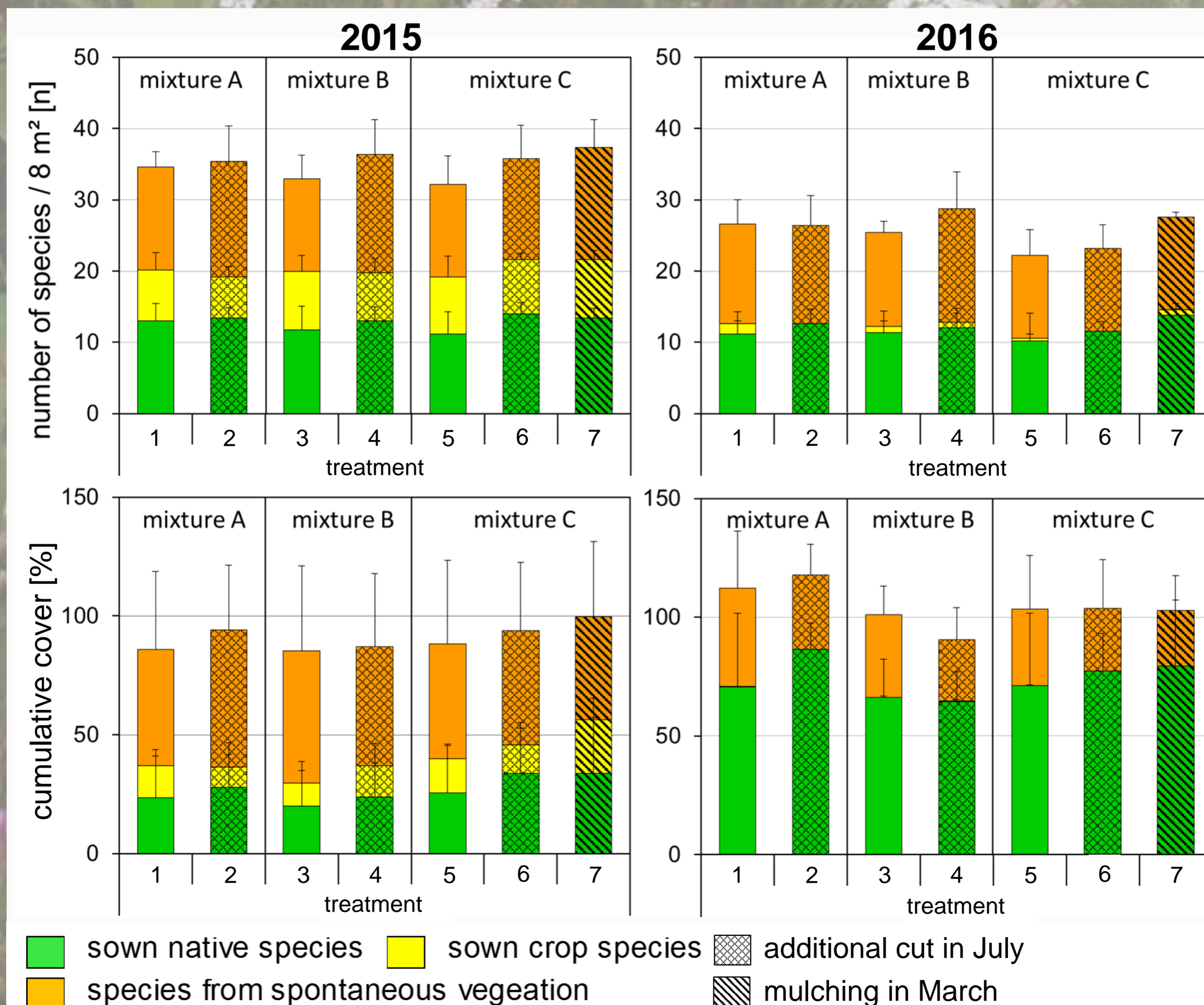


Fig. 1: Number and cumulative cover of sown species and spontaneously established species on the 8 m² plots (mean ± 1 sd, n=5).

Conclusion

Up to now we found only few differences between treatments. On the long run, however, management effects will become more pronounced. Large differences in vegetation development between and within study sites, indicate strong effects of varying soil conditions and shading. This means that a careful selection of species for different environmental conditions is necessary for a successful establishment of perennial flower strips.



„Beneficiary“ of program BS 2