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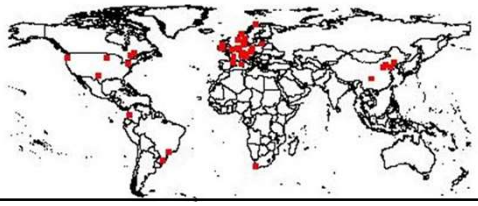
Overview

1. The scientific aims of LegacyNet
    1. Objectives of LegacyNet
    2. Why these objectives are novel/important/relevant
2. The design
    1. Mixture combinations (and diversity)
    2. The high N comparison
    3. The optional species-rich mix
3. From design to field, to visualisation



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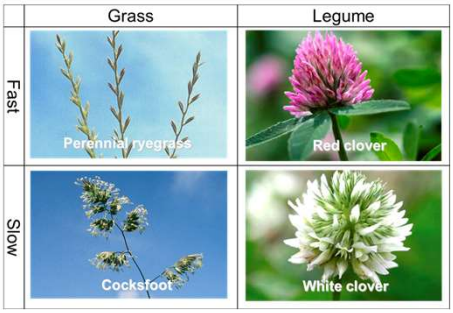
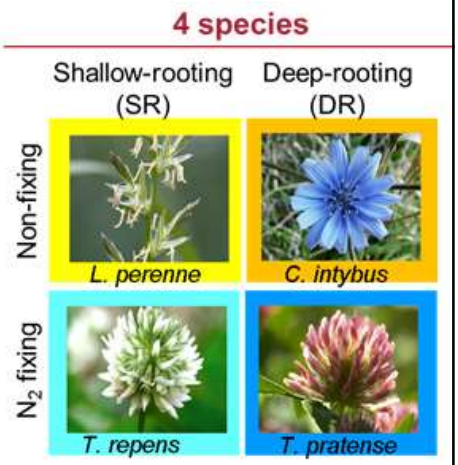
LegacyNet: Origins





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What about >4 species?
What about >2 functional groups?
Within- and between FG interactions?
What about legacy effects?

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Scientific contribution

- How to best design grassland leys within crop rotations to optimise:
  - the function of the ley as a grassland
  - the legacy effect of the grassland on soil health and fertility
- Novelty, importance and relevance
  - diversity and ecosystem function (theory and exptl. design)
  - environmental impacts of high N levels
  - improved design of short-term grassland leys within crop rotations

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Key research questions

- Can (selected) mixtures outperform the average of the monocultures and the best-performing monoculture?
- How do they compare to a high-nitrogen reference level?
- How do they compare to a high-diversity reference level?
- What is the untapped potential of increasing species richness and functional group richness up to six-species mixtures in grassland forage crops?
- How can we best design grassland forage crops to maximise the **legacy effect** of nitrogen capture for follow-on crops?
- What are the trade-offs and/or synergies across **multiple** agronomic functions and services?

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PlotN	Community	Diversity	Nfert	FG_r	Sp_r	FG1	FG2	FG3	G1	G2	L1	L2	H1	H2
1	1	Reg	Low	1	1	1	0	0	1	0	0	0	0	0
2	1	Reg	Low	1	1	1	0	0	1	0	0	0	0	0
3	1	Reg	Low	1	1	1	0	0	1	0	0	0	0	0
4	2	Reg	Low	1	1	1	0	0	0	1	0	0	0	0
5	2	Reg	Low	1	1	1	0	0	0	1	0	0	0	0
6	2	Reg	Low	1	1	1	0	0	0	1	0	0	0	0
7	3	Reg	Low	1	1	0	1	0	0	0	1	0	0	0
8	3	Reg	Low	1	1	0	1	0	0	0	1	0	0	0
9	3	Reg	Low	1	1	0	1	0	0	0	1	0	0	0
10	4	Reg	Low	1	1	0	1	0	0	0	0	1	0	0
11	4	Reg	Low	1	1	0	1	0	0	0	0	1	0	0
12	4	Reg	Low	1	1	0	1	0	0	0	0	1	0	0
13	5	Reg	Low	1	1	0	0	1	0	0	0	0	1	0
14	5	Reg	Low	1	1	0	0	1	0	0	0	0	1	0
15	5	Reg	Low	1	1	0	0	1	0	0	0	0	1	0
16	6	Reg	Low	1	1	0	0	1	0	0	0	0	0	1
17	6	Reg	Low	1	1	0	0	1	0	0	0	0	0	1
18	6	Reg	Low	1	1	0	0	1	0	0	0	0	0	1
19	7	Reg	Low	1	2	1	0	0	0.5	0.5	0	0	0	0
20	8	Reg	Low	1	2	0	1	0	0	0	0.5	0.5	0	0
21	9	Reg	Low	1	2	0	0	1	0	0	0	0	0.5	0.5
22	10	Reg	Low	2	2	0.5	0.5	0	0.5	0	0.5	0	0	0
23	11	Reg	Low	2	2	0.5	0.5	0	0.5	0	0	0.5	0	0
24	12	Reg	Low	2	2	0.5	0	0.5	0.5	0	0	0	0.5	0
25	13	Reg	Low	2	2	0.5	0	0.5	0.5	0	0	0	0	0.5
26	14	Reg	Low	2	2	0.5	0.5	0	0	0.5	0.5	0	0	0
27	15	Reg	Low	2	2	0.5	0.5	0	0	0.5	0	0.5	0	0
28	16	Reg	Low	2	2	0.5	0	0.5	0	0.5	0	0	0.5	0
29	17	Reg	Low	2	2	0.5	0	0.5	0	0.5	0	0	0	0.5
30	18	Reg	Low	2	2	0	0.5	0.5	0	0	0.5	0	0.5	0
31	19	Reg	Low	2	2	0	0.5	0.5	0	0	0.5	0	0	0.5
32	20	Reg	Low	2	2	0	0.5	0.5	0	0	0	0.5	0.5	0
33	21	Reg	Low	2	2	0	0.5	0.5	0	0	0	0.5	0	0.5
34	22	Reg	Low	3	3	0.33	0.33	0.33	0.33	0	0.33	0	0.33	0
35	23	Reg	Low	3	3	0.33	0.33	0.33	0.33	0	0.33	0	0	0.33
36	24	Reg	Low	3	3	0.33	0.33	0.33	0.33	0	0	0.33	0.33	0
37	25	Reg	Low	3	3	0.33	0.33	0.33	0.33	0	0	0.33	0	0.33
38	26	Reg	Low	3	3	0.33	0.33	0.33	0	0.33	0.33	0	0.33	0
39	27	Reg	Low	3	3	0.33	0.33	0.33	0	0.33	0.33	0	0	0.33
40	28	Reg	Low	3	3	0.33	0.33	0.33	0	0.33	0	0.33	0.33	0
41	29	Reg	Low	3	3	0.33	0.33	0.33	0	0.33	0	0.33	0	0.33
42	30	Reg	Low	2	4	0.5	0.5	0	0.25	0.25	0.25	0.25	0	0
43	31	Reg	Low	2	4	0.5	0	0.5	0.25	0.25	0	0	0.25	0.25
44	32	Reg	Low	2	4	0	0.5	0.5	0	0	0.25	0.25	0.25	0.25
45	33	Reg	Low	3	6	0.33	0.33	0.33	0.17	0.17	0.17	0.17	0.17	0.17
46	33	Reg	Low	3	6	0.33	0.33	0.33	0.17	0.17	0.17	0.17	0.17	0.17
47	33	Reg	Low	3	6	0.33	0.33	0.33	0.17	0.17	0.17	0.17	0.17	0.17
48	34	Reg	High	1	1	1	0	0	1	0	0	0	0	0
49	34	Reg	High	1	1	1	0	0	1	0	0	0	0	0
50	34	Reg	High	1	1	1	0	0	1	0	0	0	0	0
51	34	Reg	High	1	1	1	0	0	1	0	0	0	0	0
52	34	Reg	High	1	1	1	0	0	1	0	0	0	0	0
53	35	High	Low	3										
54	35	High	Low	3										
55	35	High	Low	3										
56	35	High	Low	3										
57	35	High	Low	3										

These five plots are optional, but recommended. If you choose to sow these plots, please use as high a diversity mix of seed as possible. All six regular experimental species should be chosen, plus as many more as possible, e.g. 12 species in total, with four from each functional group, to include the original six species.

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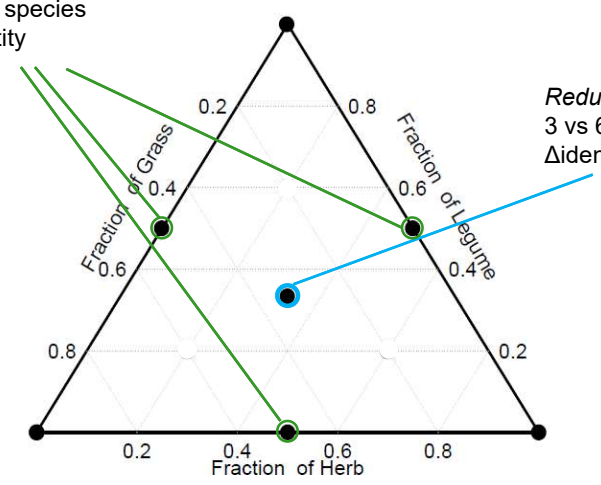
From design, to field, to visualisation...

Redundancy:
2 vs 4 species
Δidentity



Redundancy:
3 vs 6 species
Δidentity

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From design, to field, to visualisation...

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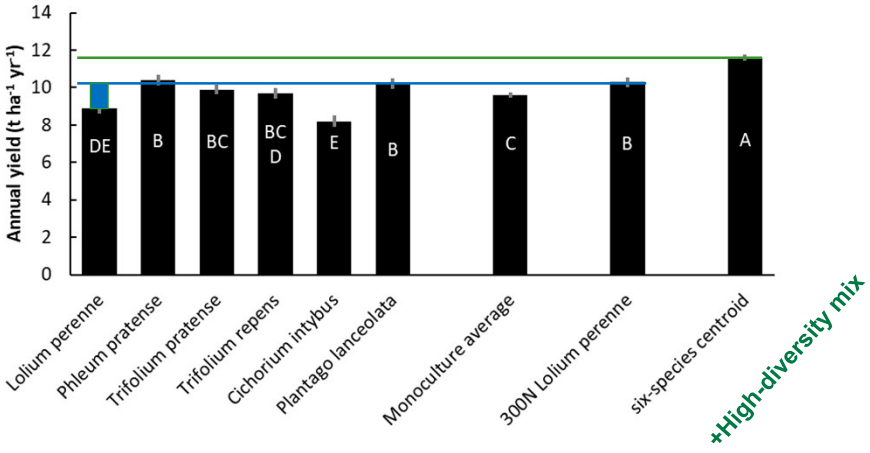
From design, to field, to visualisation...

Rainfed treatment, 2 year average of annual yields, 6 species

Grange *et al.*, 2021, *J. Appl. Ecol.*



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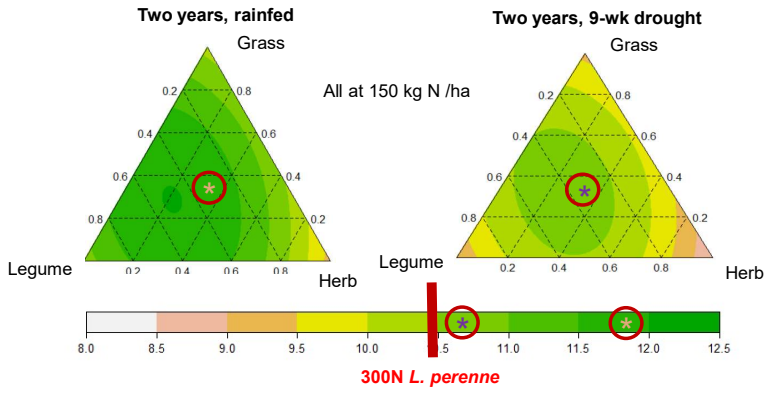
From design, to field, to visualisation...

Drought experiment, 6 species Grange *et al.*, 2021, *J. Appl. Ecol.*



Total annual yield, tonnes/ha of harvested forage (dry matter)

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Thank you!

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