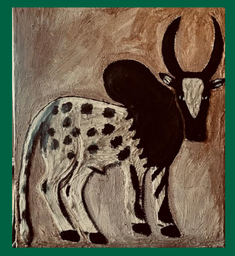
ETHIOPIAGRASS

Cultivating Perennial grassland mixtures: a novel approach to forage and food production, land restoration and climate resilience in Ethiopia



- **Several grass-legume mixtures were identified as more productive and multipurpose than monocultures**
- **An indication of positive legacy effects on soil health and subsequent food crops is observed.**
- **They were also well-received by livestock keepers.**
- **The replacement of 50% of collected fodder by the grass-legume mixtures increased feed value and consequently decreased GHG emission intensity and water and land footprints.**
- **The suitability of the grass-legume mixes is likely to change only marginally under climate change.**

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Context

- Ethiopia suffers from some of the highest rates of soil erosion and land degradation worldwide.
- Climate change is projected to exacerbate this.
- Livestock is crucial for livelihoods and the economy but relies heavily on overgrazed natural pastures and contributes to land degradation.
- Consequently, our study aims to develop **integrated grassland-cropping systems** to address this challenge by enhancing livestock feed provision, simultaneously improving soil quality, and subsequently increasing food crop production.

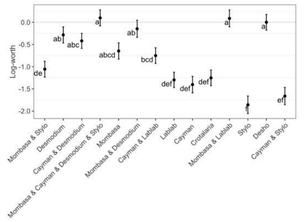
Grass-legume experiments in 2 AEZs

- **Greenhouse experiment:** Microbial functions and soil nutrient turnover
- **On-station trials:** effects on soil quality, carbon storage, and nutrient cycling.
- **Participatory farmer-led testing:** smallholders' preferences and adoption patterns
- **Literature review:** forages and land restoration
- **CLEANED modeling**: environmental co-benefits
- **Suitability mapping:** scaling potential
- **Multi-stakeholder engagement:** validation and scaling

The project is active in the areas around Hawassa and Bahir Dar

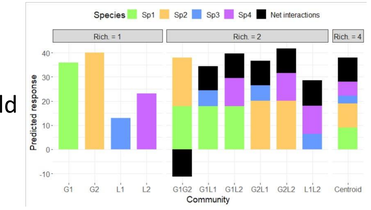
For more information:

Some first results



Farmer-led testing:
Farmers prefer *Panicum* grass mixed with *Lablab*, and *Panicum-Brachiaria* grass mixed with *Desmodium* and *Vetch* or *Stylosanthes*.

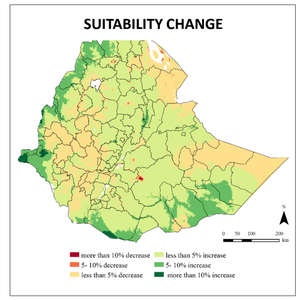
On-station trial (simplex design):
Mixing legumes and grass gave significantly more yields than would be expected from the yields of monocultures



FOOTPRINT FOR ONE LOCAL DAIRY COW	Baseline	+Mixtures	*% change*
Land requirement			
Total land required (ha/year)	0.217	0.190	*-12%*
Total land required (ha/MT FPCM)	0.555	0.443	*-20%*
N balance			
kg N/ kg FPCM	-0.495	-0.418	*-16%*
% area mining	100%	90%	*-10%*
GHG emissions			
kg CO2 eq. /kg FPCM	3.99	3.27	*-18%*
kg CO2 eq. /kg protein	124.55	102.10	*-18%*
Water impact			
m3/kg FPCM	0.51	0.43	*-16%*
m3/kg protein	16.08	13.48	*-16%*
% of precipitation used for feed production	84.3	88.6	5%

Environmental footprints:
A range of environmental co-benefits are associated with including the mixtures in feed baskets

Suitability mapping: Large areas of Ethiopia are projected to remain highly suitable for the preferred grass-legume mixtures



Next steps

- Out-scaling environmental assessment
- Cost-benefit analysis.
- Synthesis.
- Outreach and dissemination

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