

Ecosystem services, financial performance, and opportunities for amplification of agroforestry

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Introduction

Agroforestry systems (AFS) are purposeful interactive combinations of trees with crops and/or animals aiming to diversify and increase productivity and benefits from the same land unit (Nair 1993). Improvements in yield, soil conservation, carbon capture, and biodiversity habitat creation are some of the ecosystem services (ESS) associated with AFS (Brown *et al.* 2018). Despite its multiple benefits, AFS is still facing several barriers preventing adoption.

Key questions

Can AFS deliver ESS while maintaining its financial sustainability? What is the effect of different types of management on ESS provision? What are the main barriers for adoption and how can we overcome these barriers?

The Dartington Hall Estate in Devon has dedicated 53 acres of land to agroforestry that can be used as study cases to evaluate the ecological and financial performance, and social acceptability of agroforestry in the region

Methods

Biophysical data

Thirty trees per species were randomly selected to assess aboveground biomass and carbon capture. Understorey vegetation is being recorded to evaluate plant diversity. Soil core samples are collected at three different distances from the trees to evaluate soil organic carbon concentration, and soil macrofauna abundance and diversity.

Financial performance

Revenue values, variable costs and fixed costs per species, crops and farm will be quantified to obtain the net margin of the systems, to allow benchmarking with the Defra Farm Business Survey.

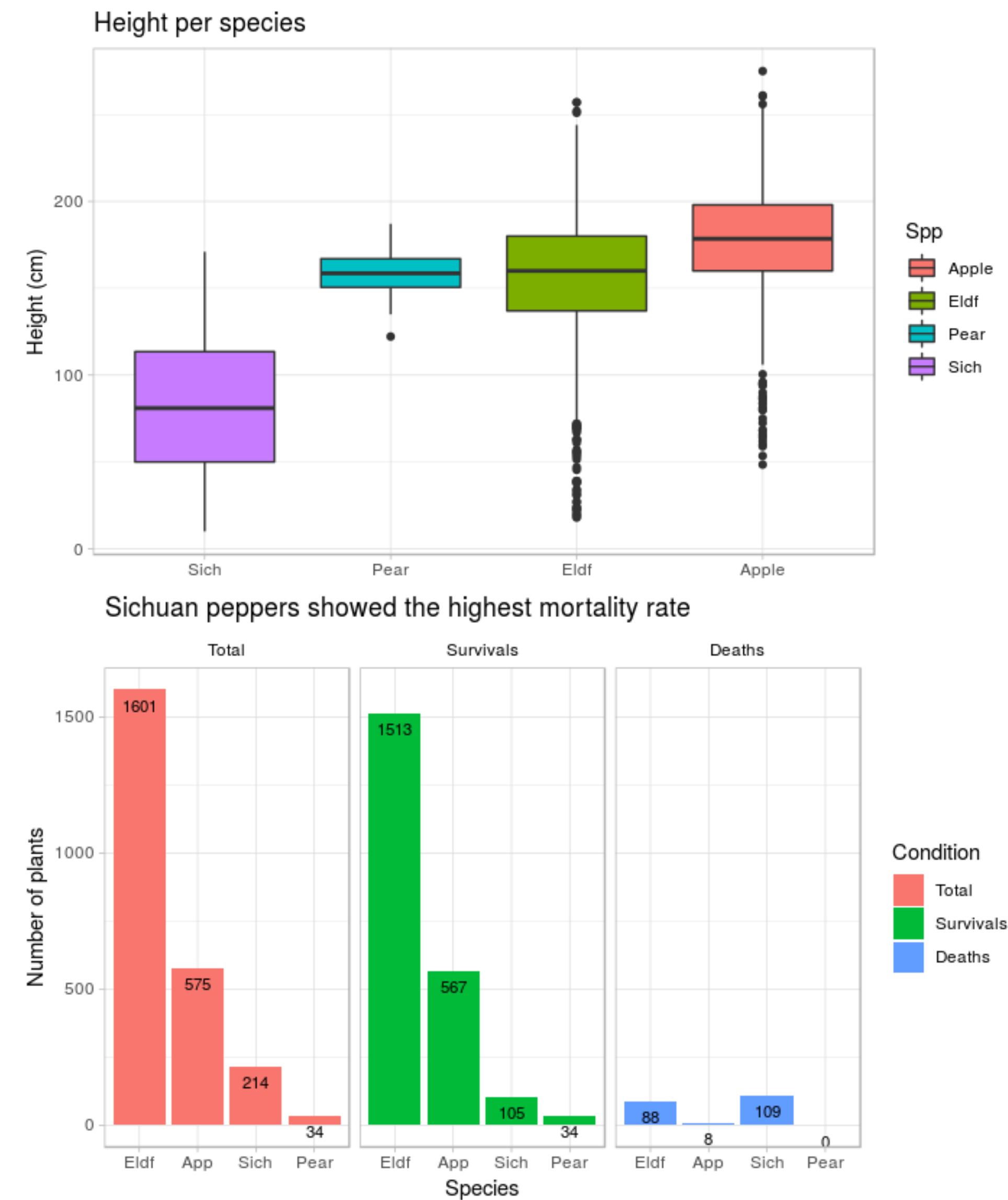
Barriers to adoption

Thirty farmers practising AF and conventional agriculture will be interviewed to conduct:

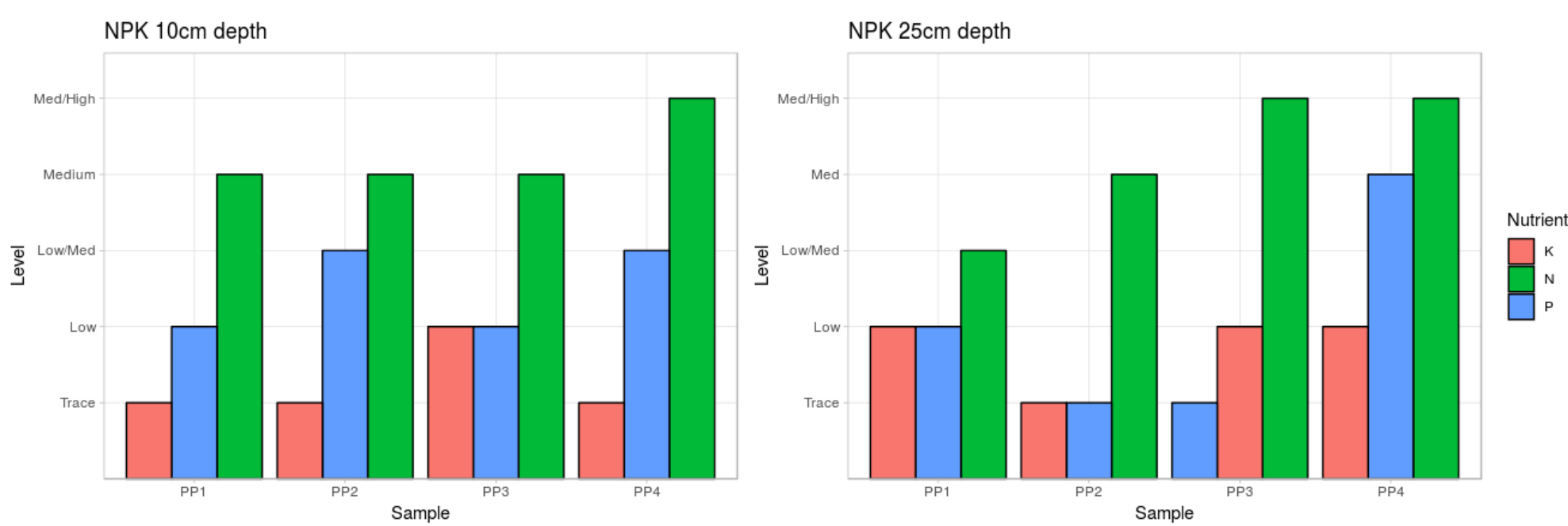
- 1) An evaluation of values, attitudes and perceptions regarding adoption of AFS.
- 2) Annual training workshops on technical aspects of AFS implementation.
- 3) A second survey campaign to evaluate the impacts of the workshops.

Initial observations

A baseline data collection campaign has been conducted where 2424 trees have been measured and tree survival rates per species have been calculated.



Soil data has been recorded in a second trial before trees were planted. The results show relatively acidic soils poor in P.



Expected outcomes

- Design of a matrix of evaluation criteria and monitoring indicators suitable as decision-making support to landowners and farmers.
- Science based evidence of the impacts of AFS in South Devon over ESS, economic feasibility and social acceptability that can support policy advocacy on the contribution of tree planting to farm enterprises.

References

1. Nair, R. P. K. An introduction to Agroforestry (KLGWER Academic Publishers, and ICRAF: 1993). 489 p.
2. Brown, S. *et al.* Evidence for the impacts of Agroforestry on agricultural productivity, ecosystem services, and human well-being in high-income countries: a systematic map protocol. (Environmental Evidence: 2018). pp: 7-24.

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