

Forests Sustaining Agriculture

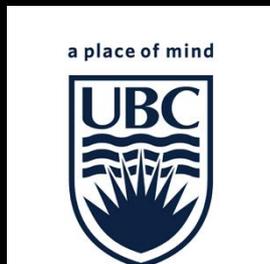
Side Event:

*Contribution of Forests, Trees and Agroforestry to
sustainable Food Security and Nutrition in a time of crisis*

Global Landscapes Forum, Bonn

June 3rd 2020

Terry Sunderland, James Reed and Joli Borah



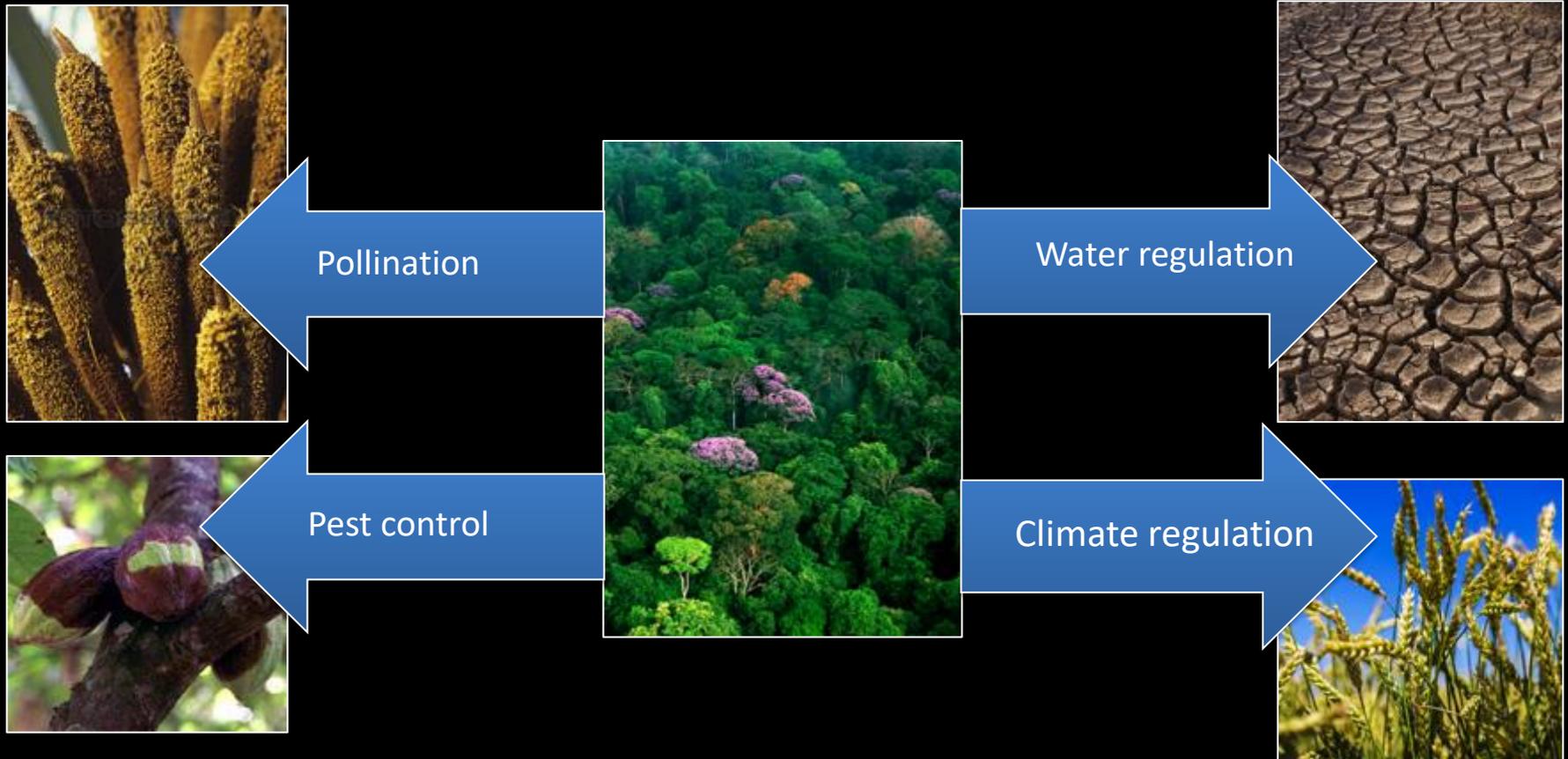
Introduction

- Ecosystem services (ES) are regarded as the structure and functions of ecosystems that result in both goods and services being produced that contribute to support human wellbeing.
- The last three decades has seen an exponential rise in ecosystem service related publications.
- However, the contribution of trees to adjacent or embedded food systems remains poorly understood
- Assessment of the literature base for both the positive (ES) and negative (EDS) functions of forests, trees and agroforestry in relation to food production (Reed et al. 2017).



Forests sustaining agriculture

Foli et al. 2014; Reed et al. 2017



How does landscape configuration maximise the provision of these goods and services for both sustainable forestry and food production?





Contents lists available at ScienceDirect

Forest Policy and Economics

journal homepage: www.elsevier.com/locate/forpol



Trees for life: The ecosystem service contribution of trees to food production and livelihoods in the tropics

James Reed ^{a,b,*}, Josh van Vianen ^a, Samson Foli ^a, Jessica Clendenning ^a, Kevin Yang ^c, Margaret MacDonald ^a, Gillian Petrokofsky ^d, Christine Padoch ^a, Terry Sunderland ^{a,e}

^a Center for International Forestry Research, Bogor, Indonesia

^b Lancaster Environment Centre, University of Lancaster, Lancaster, LA1 4YQ, UK

^c University of British Columbia, Vancouver, BC V6T 1Z4, Canada

^d University of Oxford, Oxford, UK

^e Center for Tropical Environmental and Sustainable Science, School of Earth and Environmental Sciences, James Cook University, Cairns, Qld 4870, Australia

*“When incorporating forests and trees within an appropriate and contextualized natural resource management strategy, there is **potential to maintain, and in some cases, enhance agricultural yields comparable to solely monoculture systems**”.* Reed et al. 2017



Forests sustaining agriculture



Nutrient Cycling:

Studies conducted in agroforestry systems (AFS): 79% showed a positive effect of tree presence

Pollination:

87% of studies showed a positive effect of nearby (0.3 – 1.6km) forest/forest fragment. Pollination and nutrition linkages

Climate regulation:

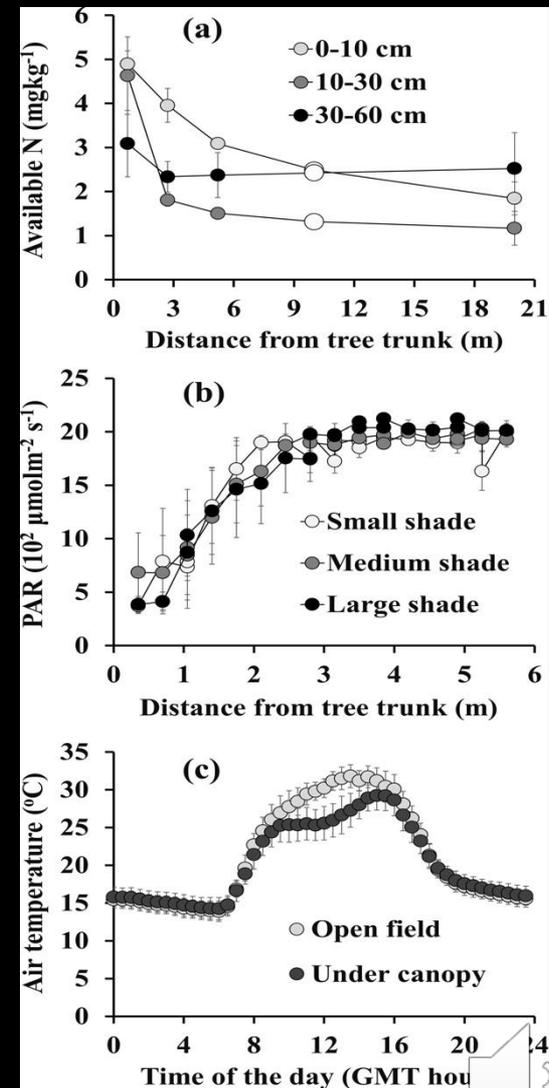
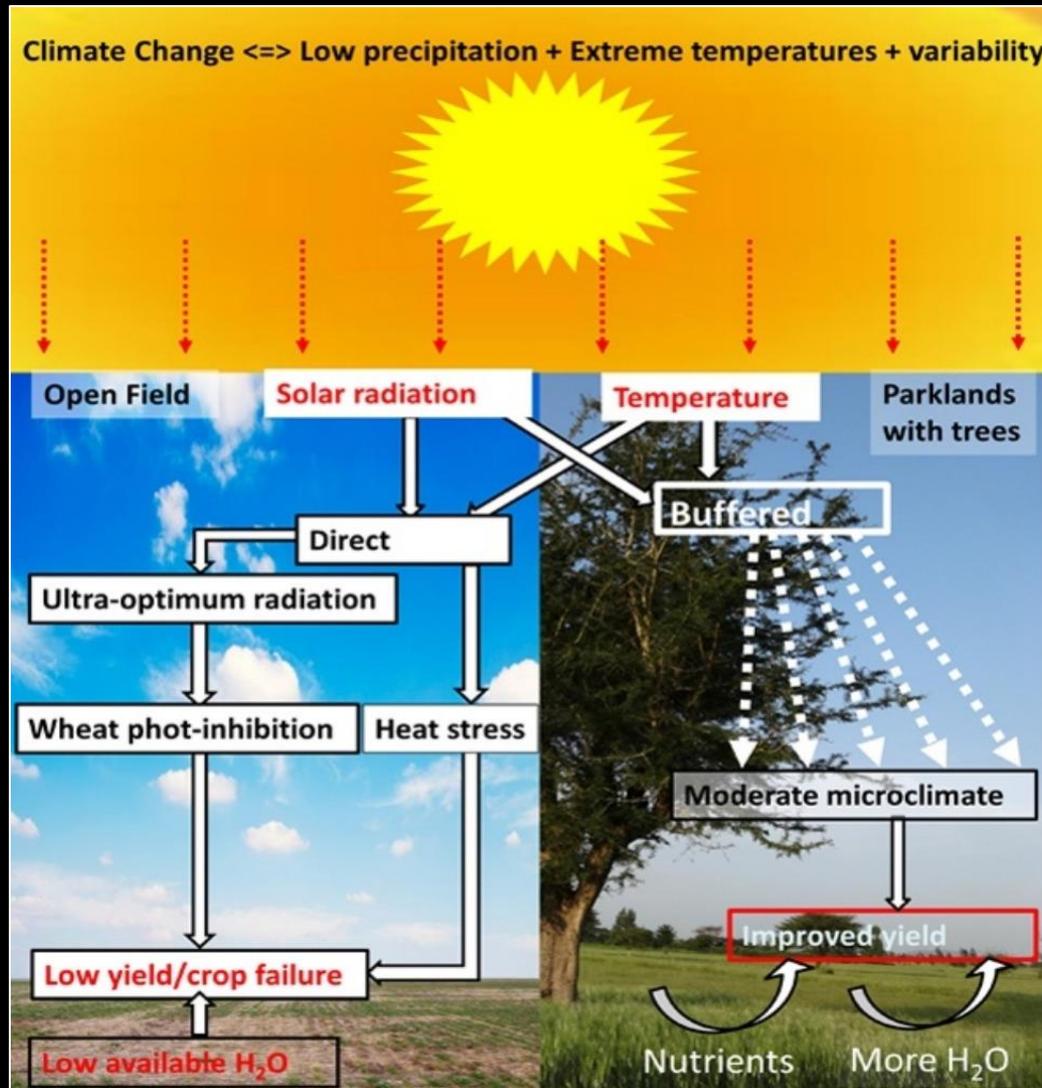
Yields of some crops diminish, further from forests

Forests, trees = resilience

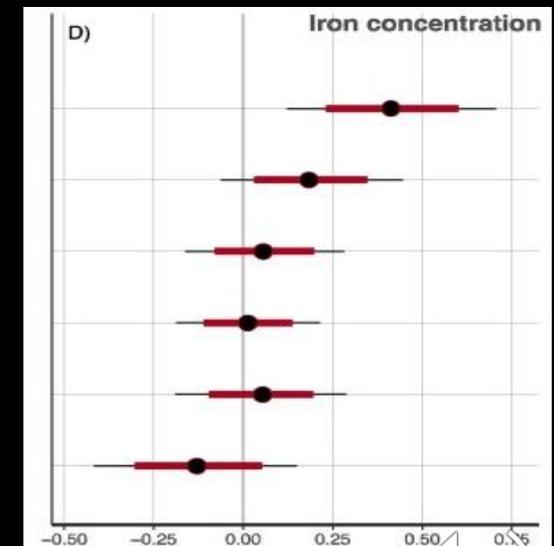
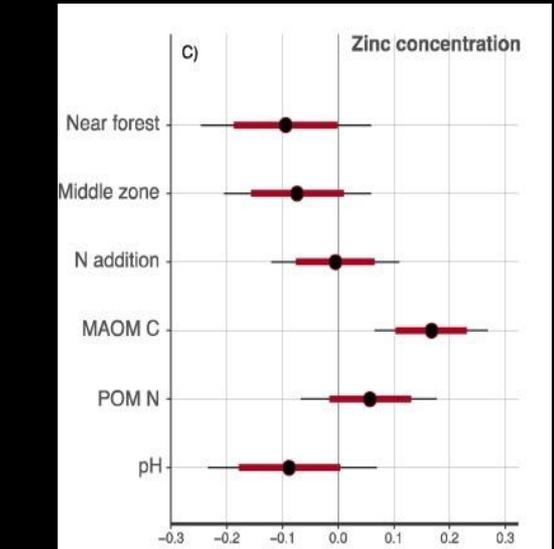
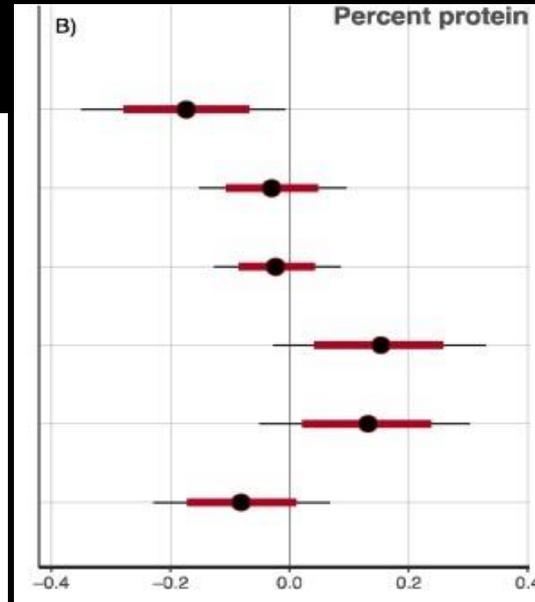
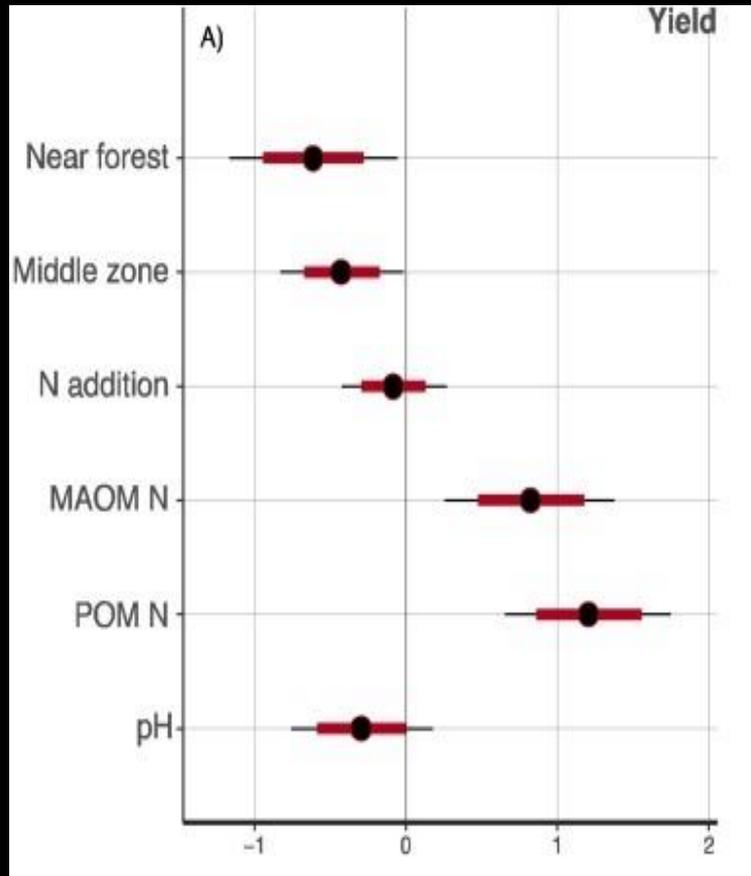
(Foli et al. 2014 Env. Evidence; Ellis et al 2015, Plos One)



Trees in wheat fields increase nitrogen availability in soil, water use efficiency, reduces heat stress and increases yield....

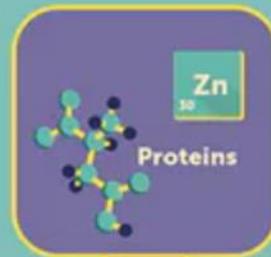
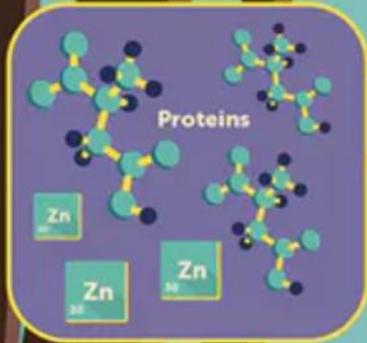


Nutritional value of crops increases with proximity to forest...



IN
SOUTHWESTERN
ETHIOPIA

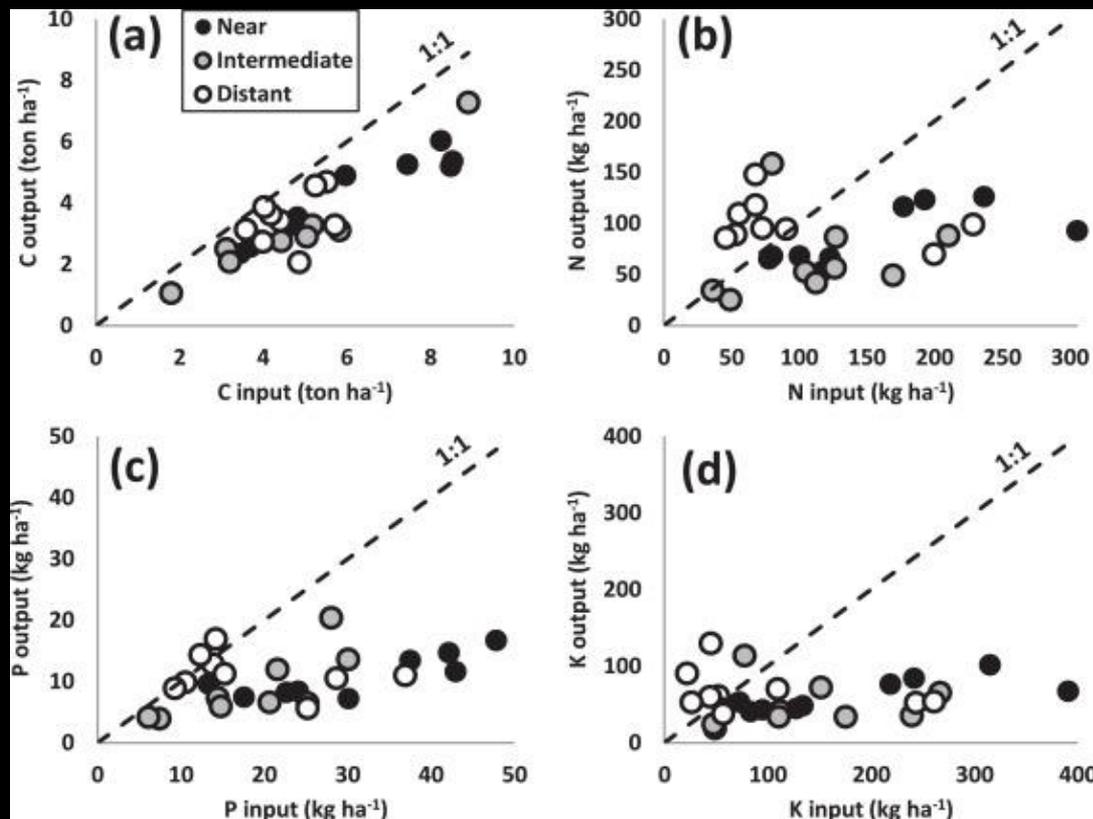
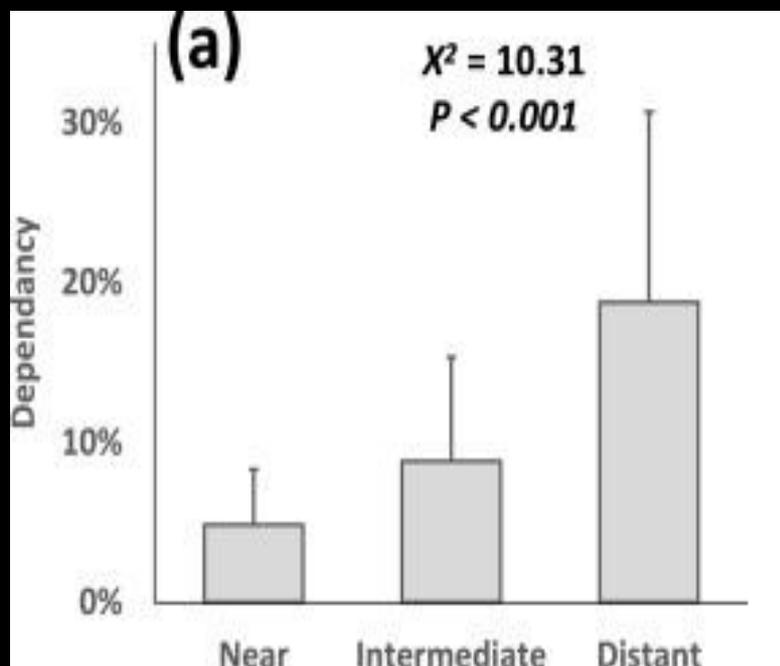
wheat grown on farms **NEAR the forest** have more **proteins**, greater **nutrient** content, and **HIGHER YIELDS** than wheat grown on farms **AWAY from the forest**.



The secret is in the soil



Livestock productivity and nutrient balances improve with increasing proximity to forest....



WHY DO FARMS NEAR THE FOREST HAVE BETTER SOILS?

Putting farm resources to their proper use

Plentiful firewood means burning less dung

Farmers keep more livestock due to access to forest for grazing; more animals produce additional manure

When more manure is applied to the soil, it makes more nutrients available for crops



Shade trees decrease the abundance of pests....

Figure 1

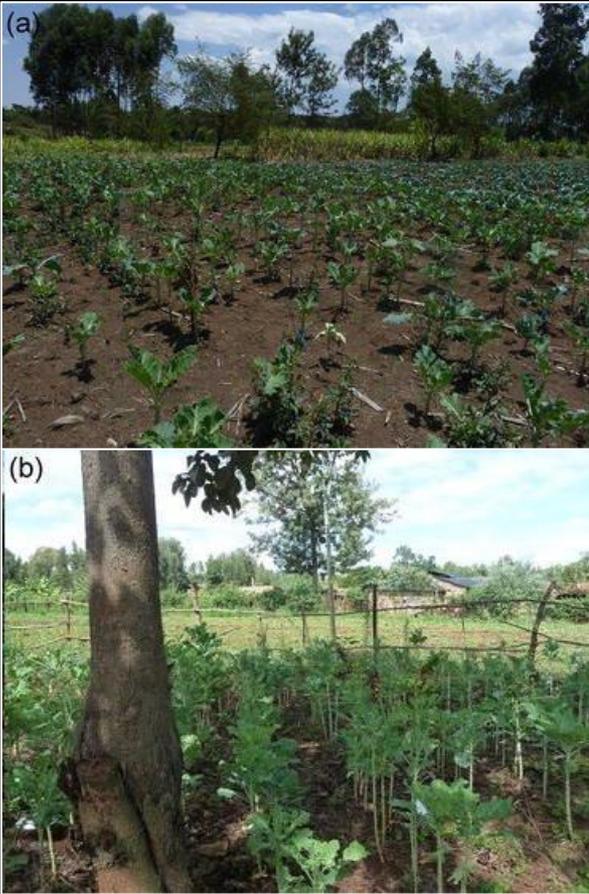
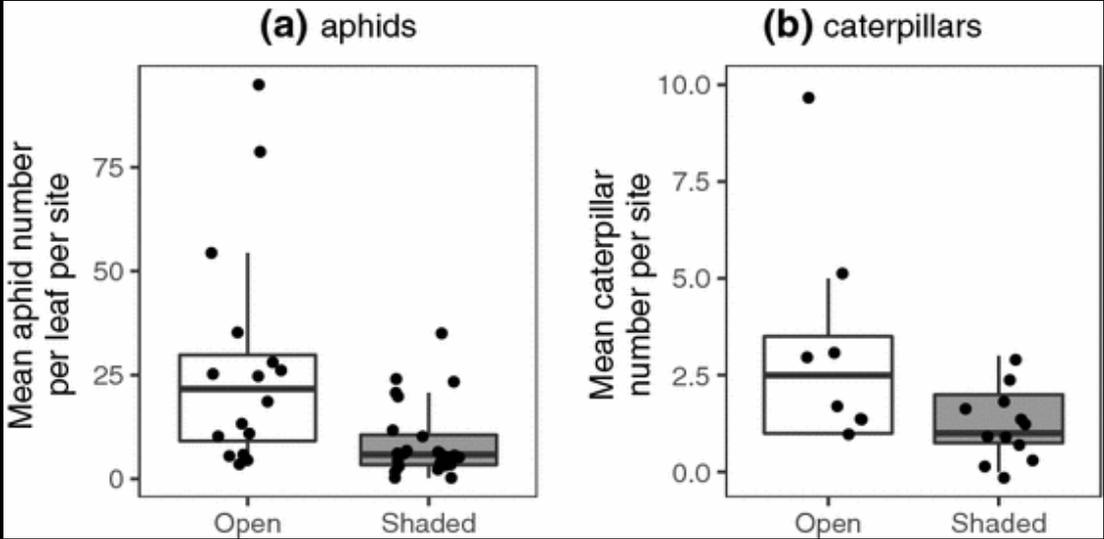
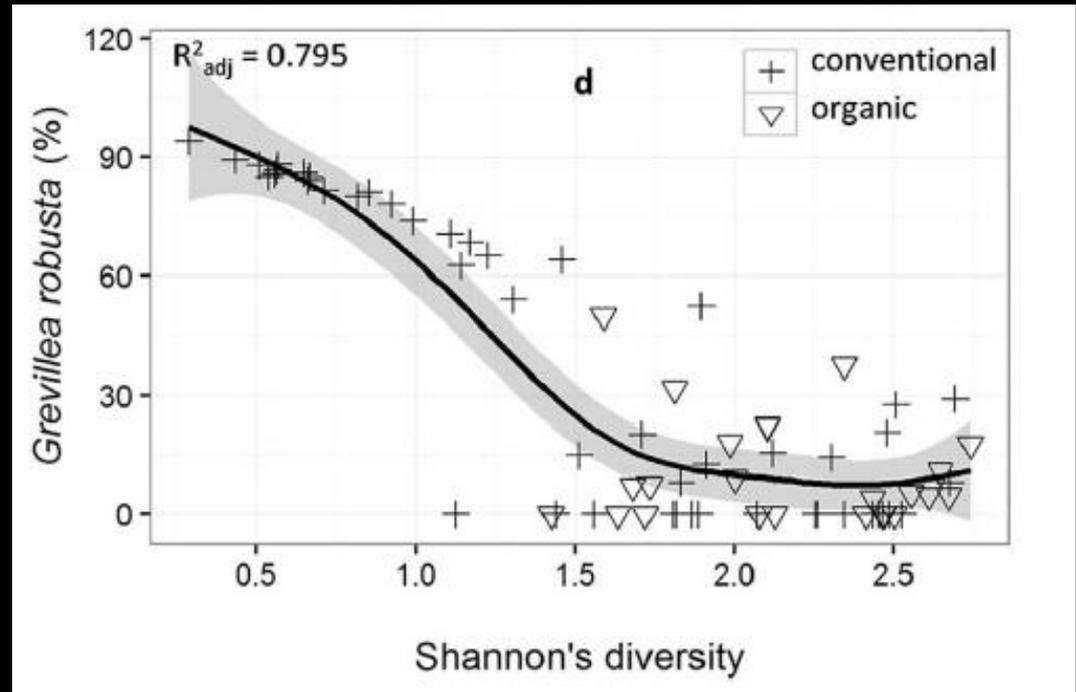


Figure 2



Shade tree diversity enhances coffee production and crop quality in agroforestry systems....



Evergreen Agriculture.....



Key messages

- Diverse forest and tree-based production systems offer advantages over monocropping systems because of their adaptability and resilience.
- There are a multitude of ecosystem services provided by forests and trees that simultaneously support food production, nutrition, sustainability and environmental and human health.
- Managing landscapes on a multi-functional basis that combine food production, biodiversity conservation and the maintenance of ecosystem services can contribute to food and nutritional security
- Forests and trees alone will not achieve global food security, but can play a major role: discourse has started to change



Thank you!

Terry Sunderland: terry.Sunderland@ubc.ca

James Reed: j.reed@cgiar.org

Joli Borah: joli.borah@ubc.ca



@TCHSunderland

@James_D_Reed

@JoliBorah

