

REDD+, co-benefits and biodiversity:
examples from ~~carbon storage and~~
crop pollination

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- Global pollination crisis
- REDD+
- Ecosystem services
- Co-benefits
- Forest conservation
- Biodiversity



REDD+

Forest conservation

Biodiversity

Pollinator abundance and diversity

Crop pollination

Yield amount and quality

Food security

Economy

LIVELIHOOD



Ecosystem service

Pollination in agriculture

- UK: £430 millions per year
- Globally: \$153 billions per year
- Only 34% of pollination in UK done by honeybees



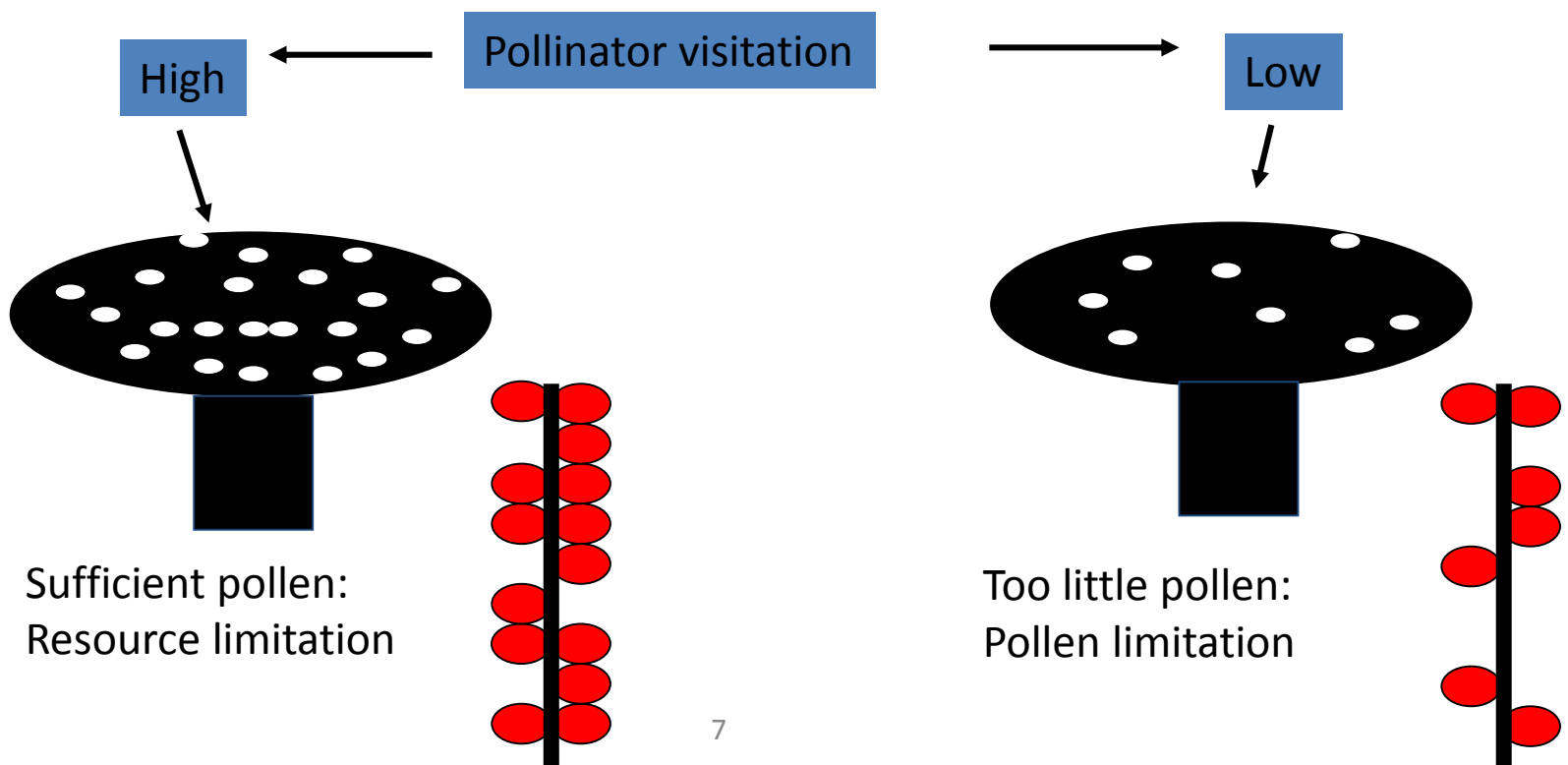
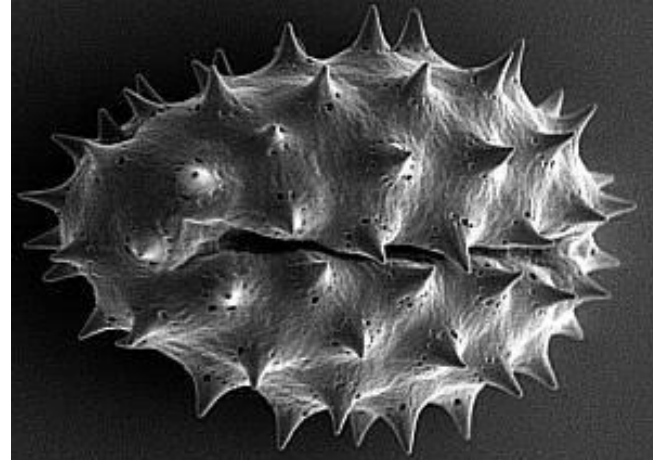
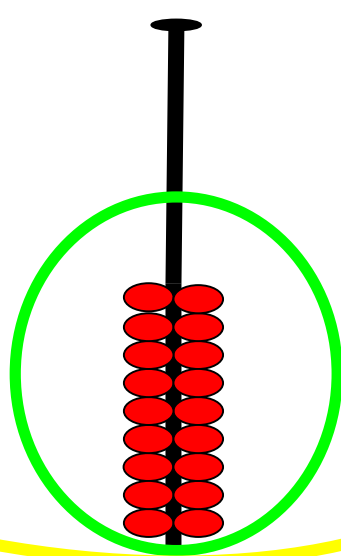
Pollination crisis

- Reduced numbers and diversity due to:
 - Habitat fragmentation
 - Habitat loss
 - Pesticides
 - Climate changes
 - Exotic species

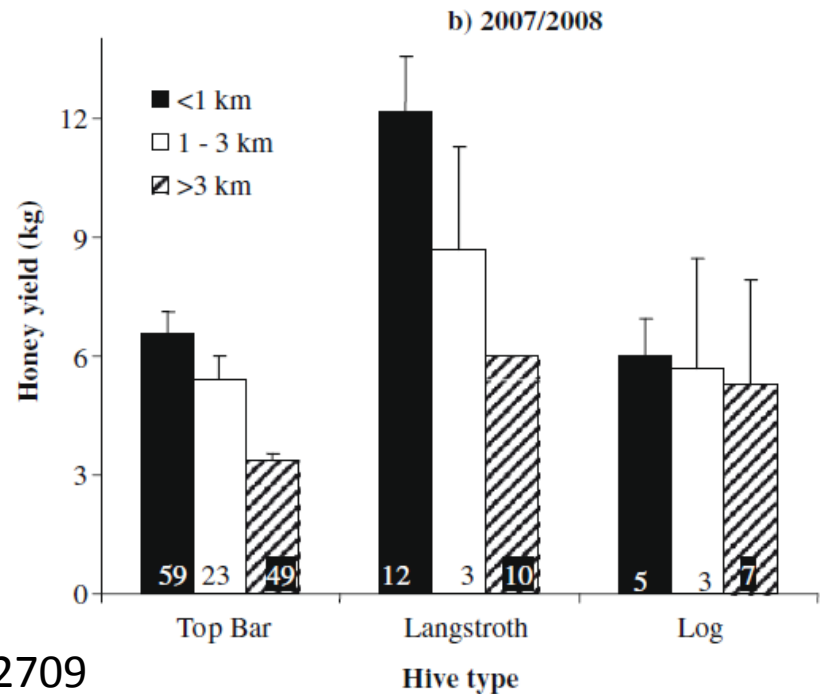
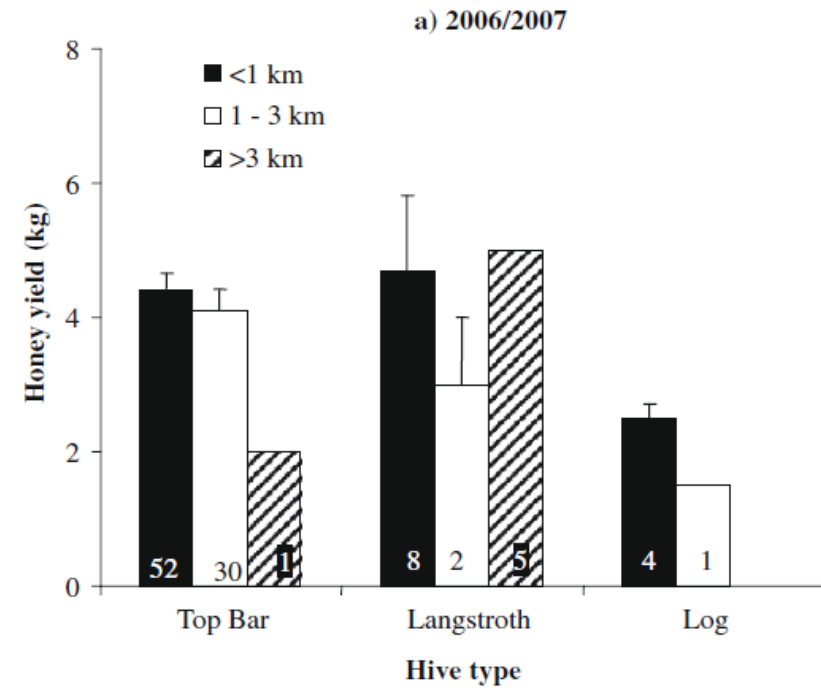


Pollinator limitation on fruit production:
Too low pollen deposition relative to energetic status of plant

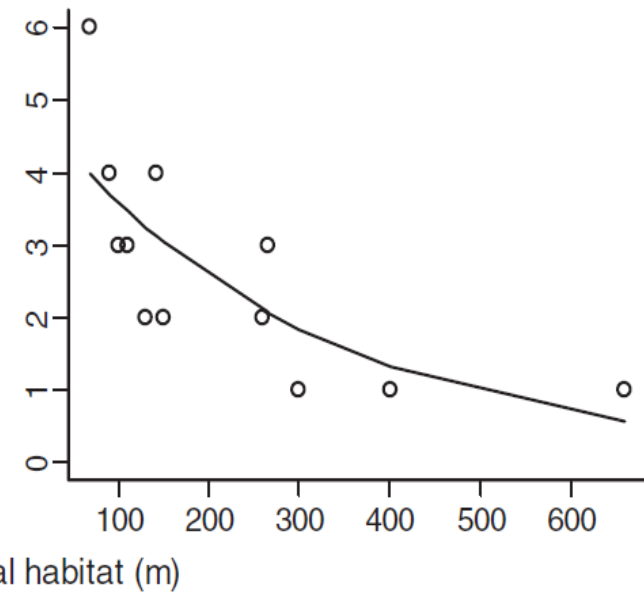
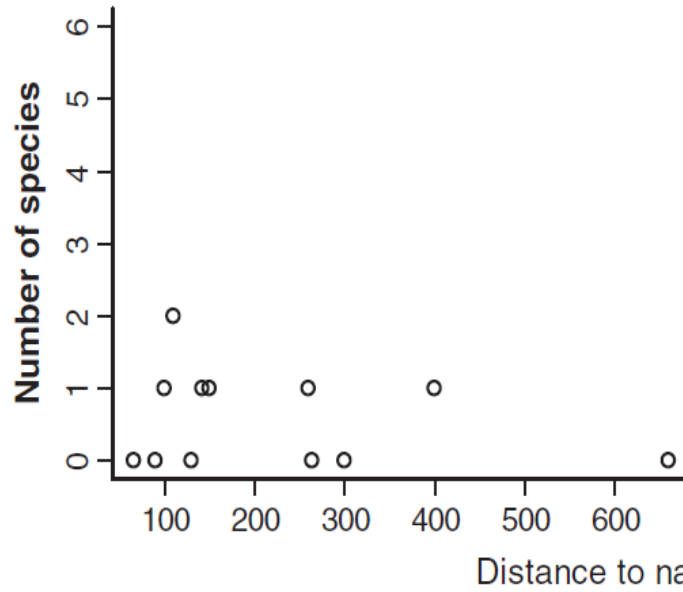
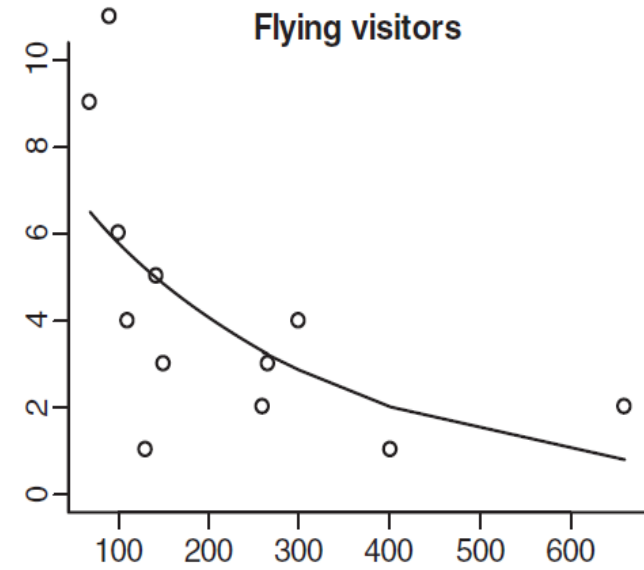
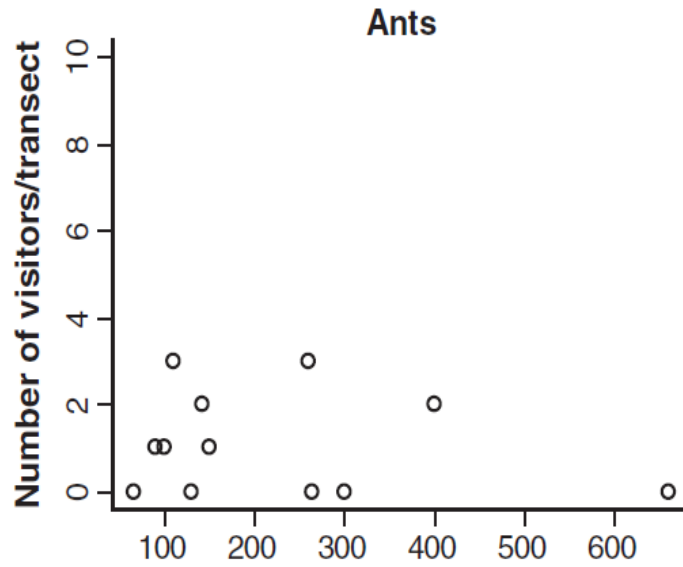




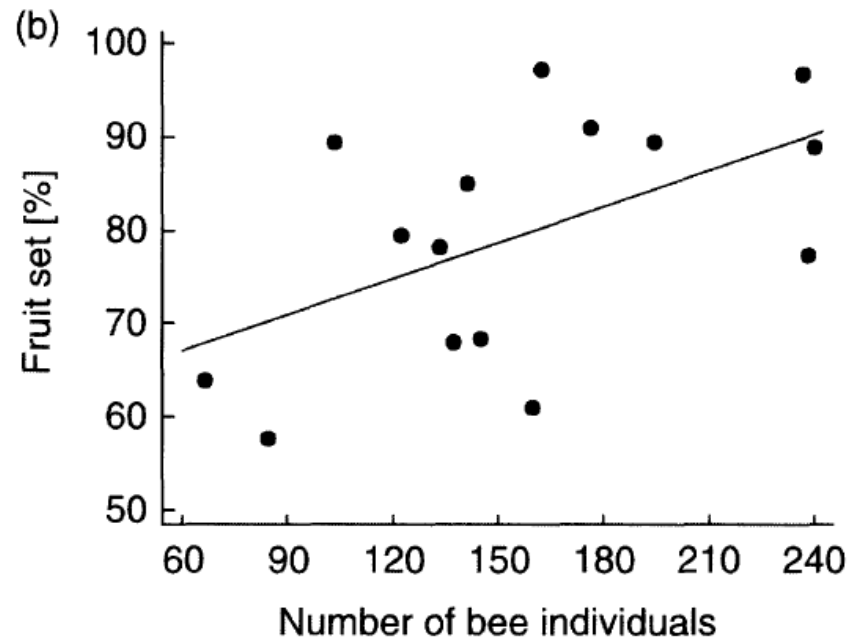
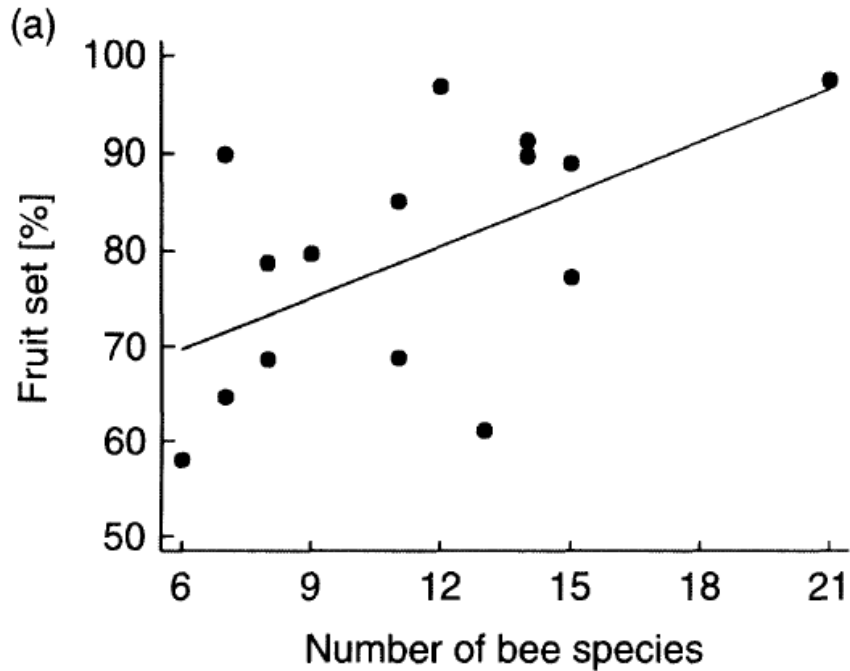
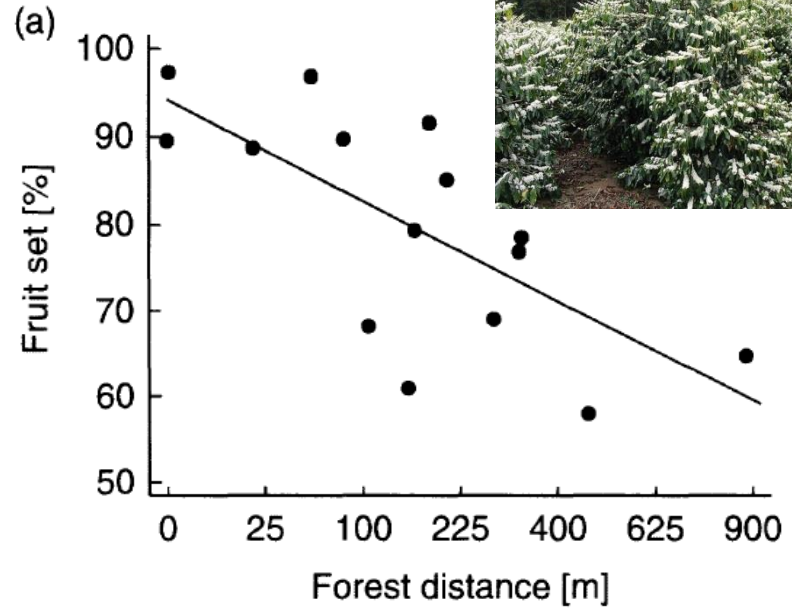
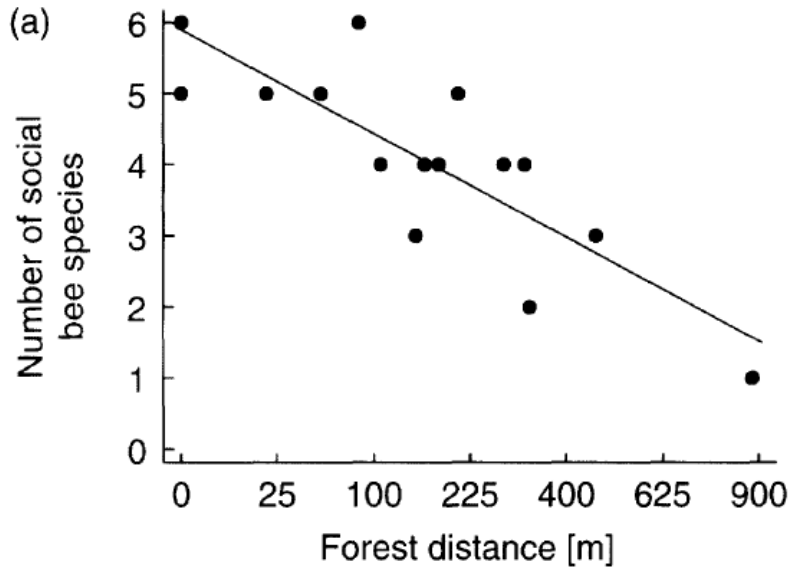
Honey yield in Kenya



Pollinators on Mango in South Africa

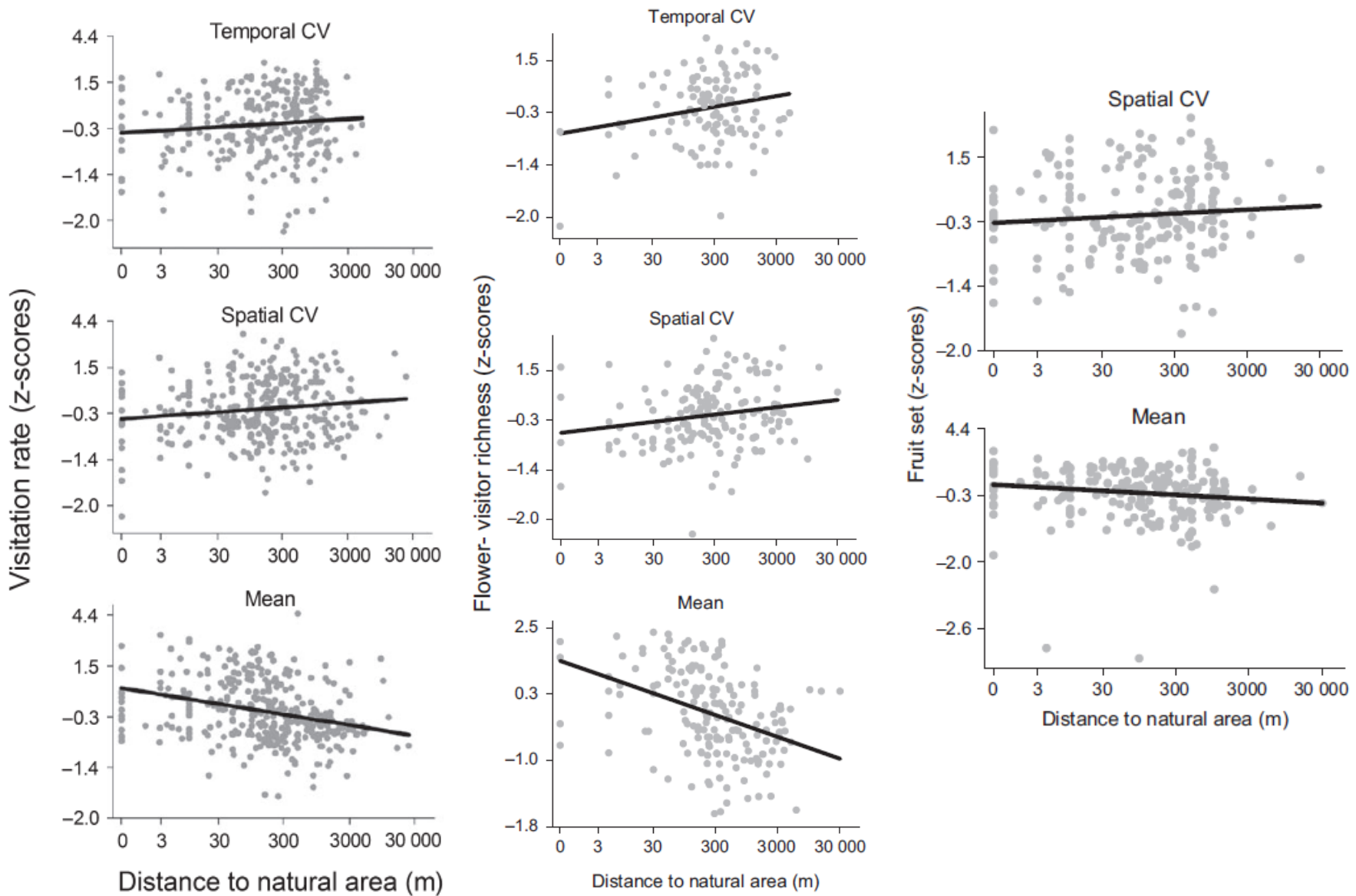


Coffea canephora in Indonesia

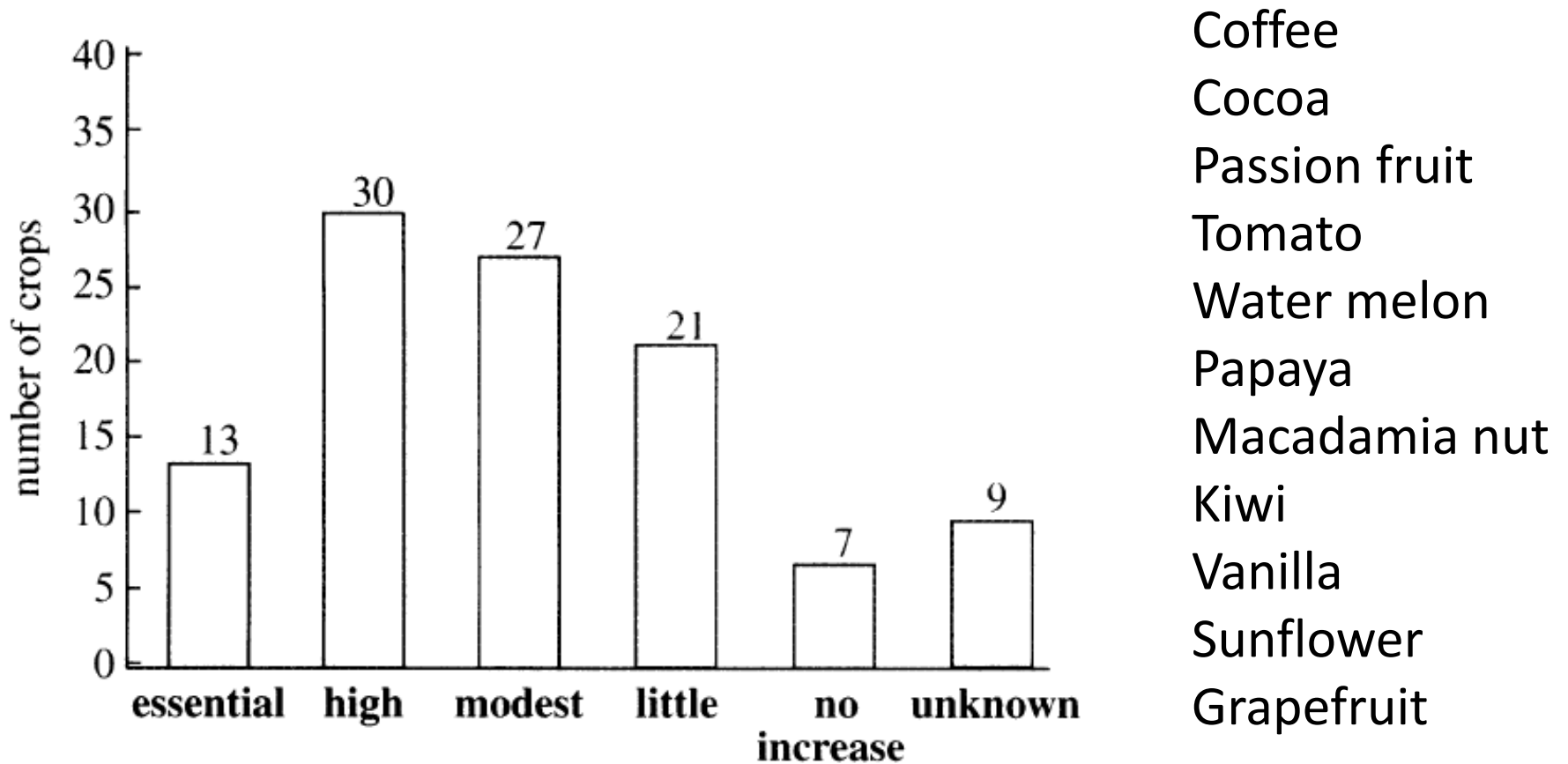


Meta analysis on effects of forest proximity on pollinator richness and variation

29 studies



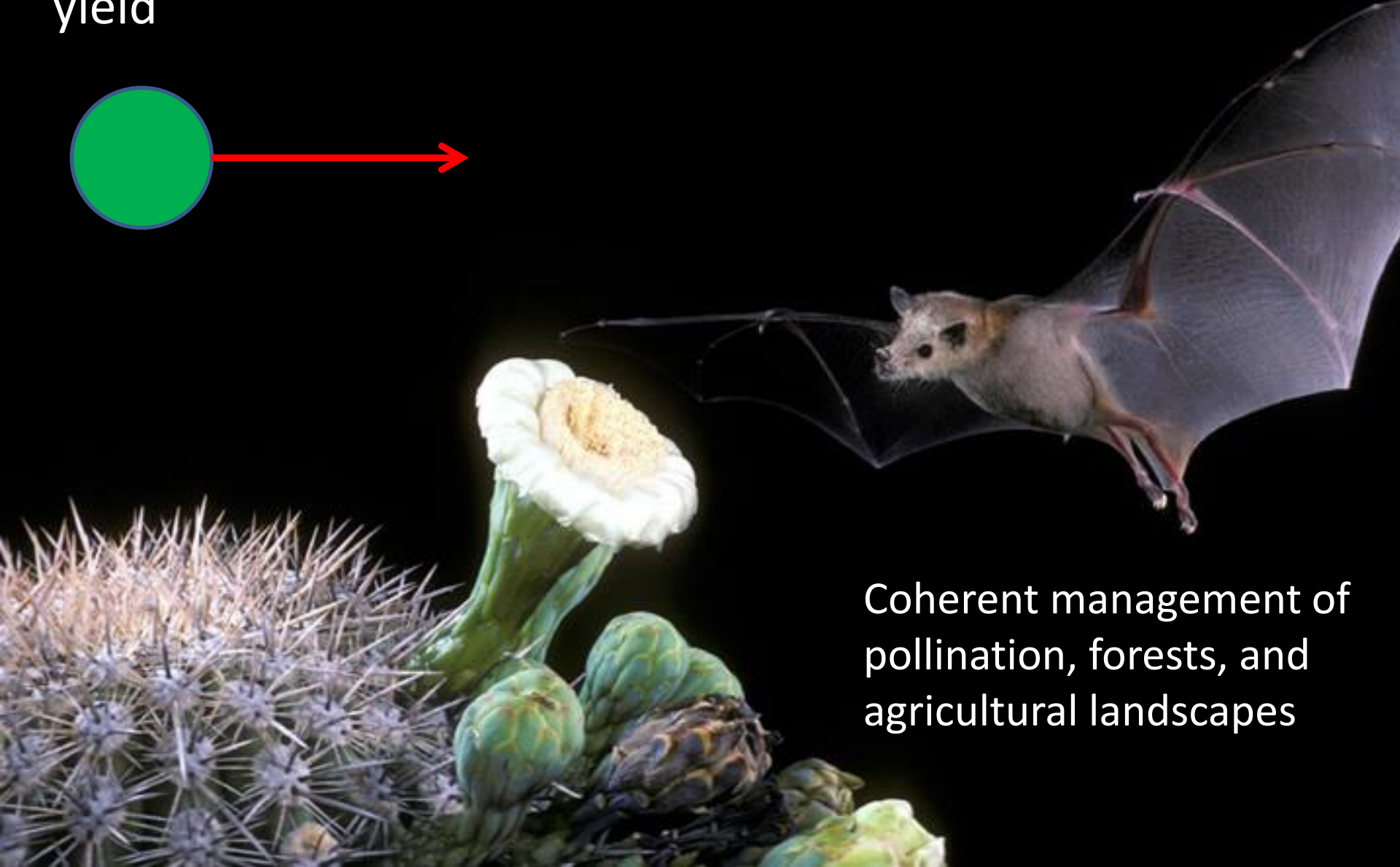
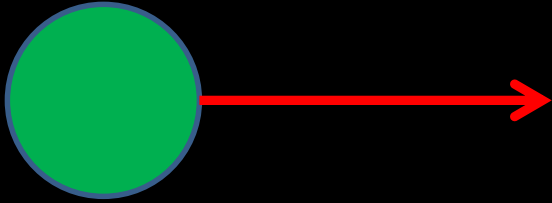
Pollinator dependence of world crops



Economic value of pollination

Crop category	Average value of a production unit € per metric ton	Total production economic value (EV) 10 ⁹ €	Insect pollination economic value (IPEV) 10 ⁹ €	Rate of vulnerability (IPEV/EV) %
Stimulant crops	1225	19	7.0	39.0
Nuts	1269	13	4.2	31.0
Fruits	452	219	50.6	23.1
Edible oil crops	385	240	39.0	16.3
Vegetables	468	418	50.9	12.2
Pulse	515	24	1.0	4.3
Spices	1003	7	0.2	2.7
Cereals	139	312	0.0	0.0
Sugar crops	177	268	0.0	0.0
Roots and tubers	137	98	0.0	0.0
All categories pooled together		1618	152.9	9.5

Thus, reducing deforestation and forest degradation may enhance crop pollination and yield



Coherent management of
pollination, forests, and
agricultural landscapes

The way forward at INA

- A new PhD project on crop pollination and forest degradation in Tanzania
- A proposal submitted to study relationships between forest degradation (by LiDAR), pollinator diversity, crop pollination, and livelihood (in Tanzania)

- Pollination of a medicinal species (*Aframomum*) and forest degradation in Uganda



