Agroecological Transition of Food Systems in Africa

Agrobiodiversity strategies for improved food security, food diversity and nutrition

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6 May 2025 I Natural History Museum I Brussels

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Food security, Agrobiodiversity strategies and nutrition: Agrobiodiversity strategies for improved food diversity and nutrition

Agroecological crop protection:
An obligate path towards food security and food safety

Quirico Migheli – NRD, University of Sassari
EWA-BELT Project

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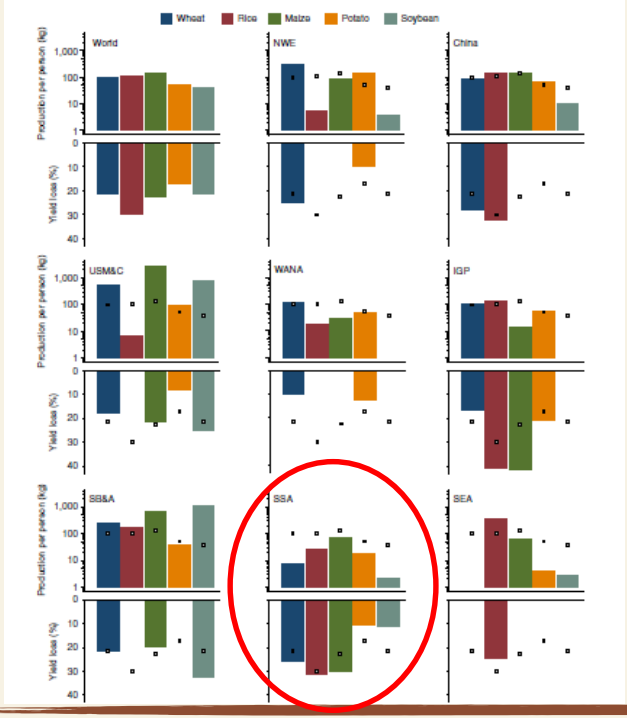

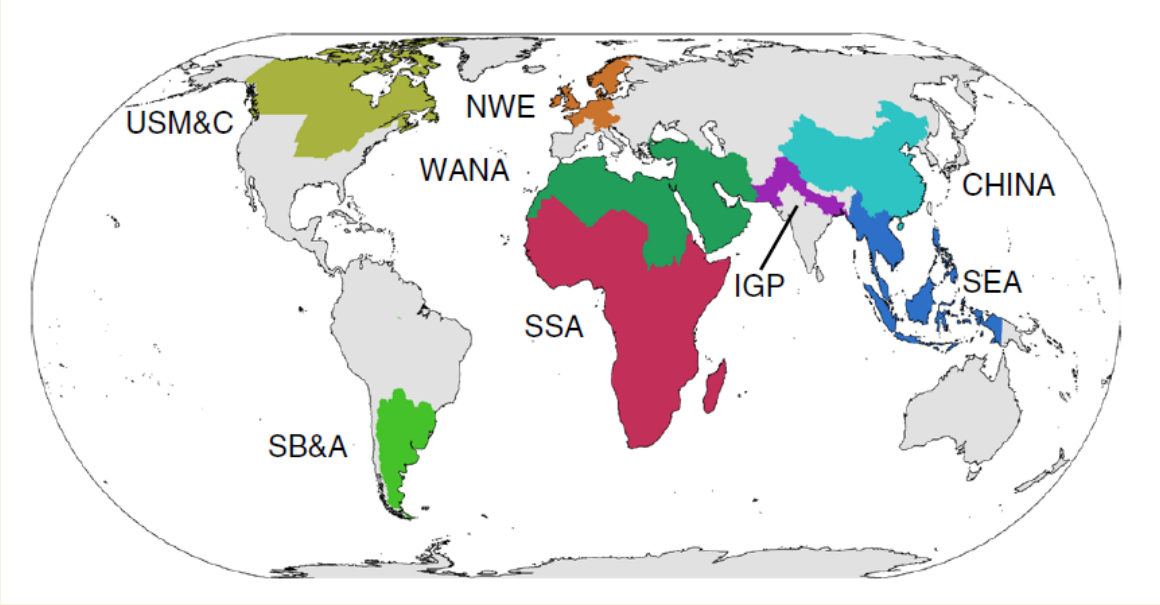

Savary et al. (2019) https://doi.org/10.1038/s41559-018-0793-y

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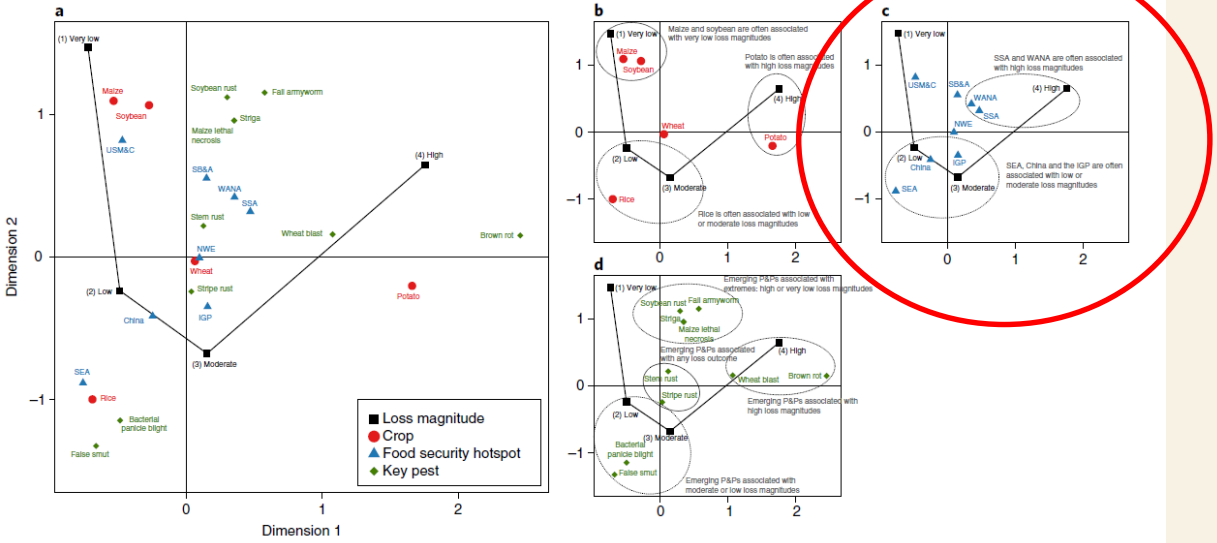

Fig. 3 | Associations between losses, crops, food security hotspots and key pests. Each panel is a correspondence analysis map based on all of the survey responses. **a**, Associations for all of the active variables (loss magnitude and crop) and supplemental variables (food security hotspot and emerging P&Ps, or 'key pests') in the correspondence analysis. **b**–**d**, Associations between loss magnitude and each variable in turn (crop (**b**), food security hotspot (**c**) and key pest (**d**)), with annotations in grey to help interpretation of the associations.

Savary et al. (2019) https://doi.org/10.1038/s41559-018-0793-y

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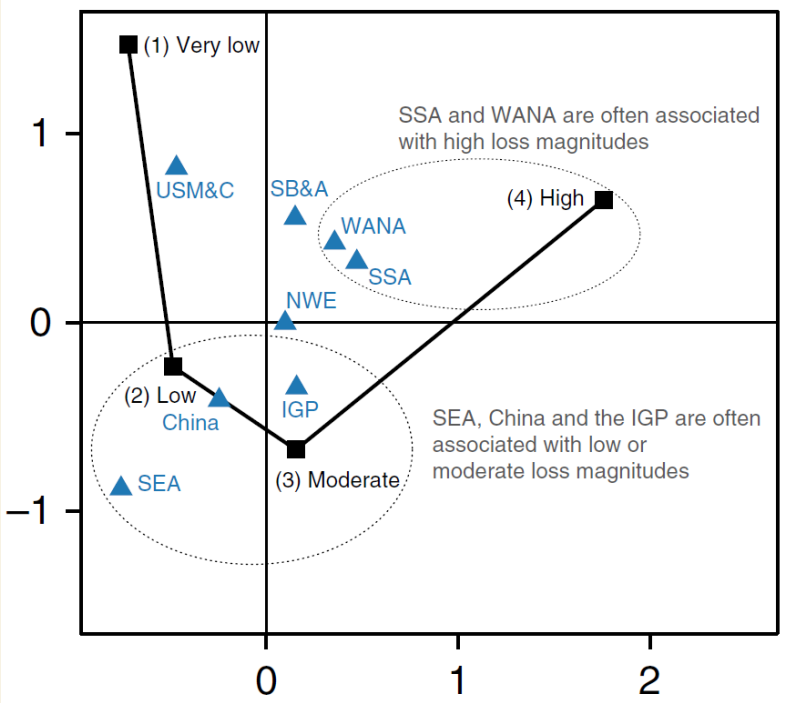

West Asia, North Africa and Subsaharan Africa are often associated with the highest loss magnitudes

Savary et al. (2019) The global burden of pathogens and pests on major food crops. https://doi.org/10.1038/s41559-018-0793-y

Ug99 lineage of wheat stem rust (*Puccinia graminis* f. sp. *tritici*)

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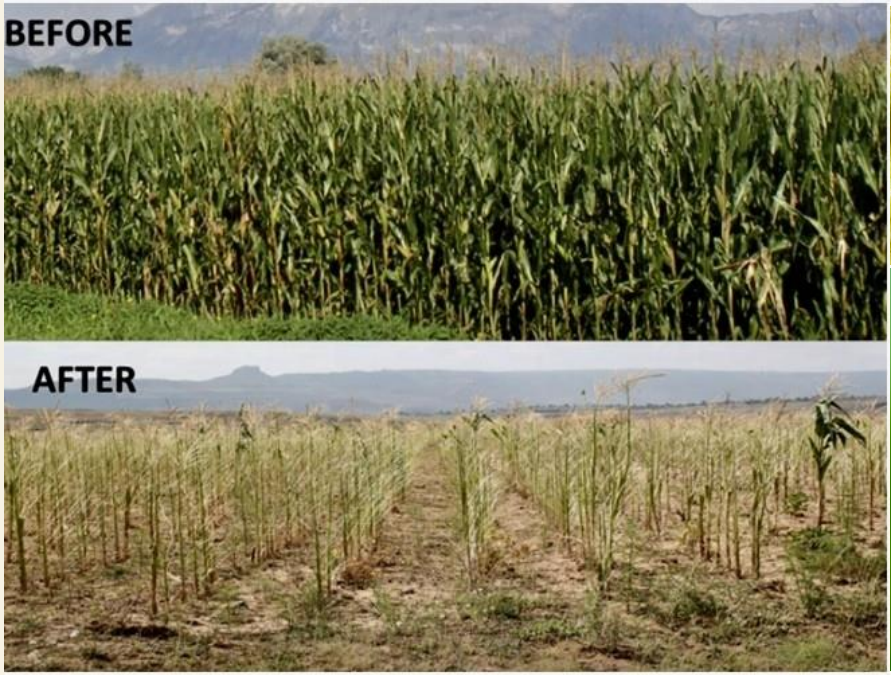

Image: FAO Lesotho

Fall armyworm (*Spodoptera frugiperda*)

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***Aspergillus, Fusarium, Alternaria, Penicillium* spp. may infect crops in pre- and post-harvest stages**

Contamination with harmful **mycotoxins** (carcinogenic, neurotoxic, dermotoxic, haemorragic, immunosuppressive, …) is a major issue in African farming systems due to conducive environmental conditions and poor storage facilities: **Food safety is under constant threat!**

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Sustain Sahel

Synergistic use and protection of natural resources for rural livelihoods through systematic integration of crops, shrubs and livestock in the Sahel

shrub intercropping** and **mulching** have beneficial effects in accelerating degradation and devitalization of the inoculum of many soilborne pathogens, increasing **soil health

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FairSahel Video

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SustIn AFRICA

Sustainable Intensification of Food Production through resilient farming systems in West and North Africa

Two AEZs:

Toukaber and Jammel

Three practices:

Tillage (farmer´s practice)

No-tillage

Faba bean cover crop

Insect community sampling:

Pitfall trap installation

Identification at order level

Ben Hamouda *et al*. (2024) The impact of soil management, agroecological zone, and season on ground-dwelling insects in Tunisian olive groves (DOI:10.13140/RG.2.2.19131.84009)

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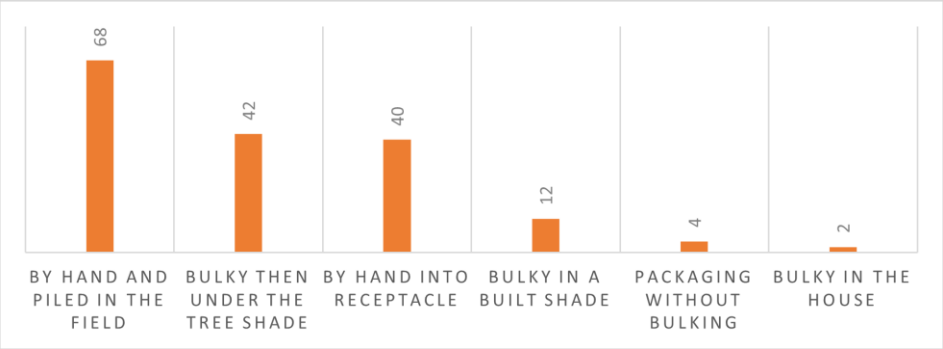
Healthy Food Africa

A strong focus on **postharvest losses**



Practical Recommendations:

- Design *low-cost cooling technologies* accessible to small-scale farmers and traders
- Introduce *rigid harvesting receptacles* to minimize leaf damage
- Implement *grading systems for green leafy vegetables* to ensure premium pricing for higher quality
- Enhance *transportation systems and packaging solutions* to minimize damage during transit.

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CROPS 4HD

Consumption of Resilient Orphan Crops & Products for Healthier Diets

Different NUS/orphan crops retrieved and tested: **bambara beans**, **finger millet**, **spider plant**, …

bungo fruit (*Saba comorensis*) is considered "resistant to drought, pests and pathogens": *need to scientifically assess resistance to biotic and abiotic stresses*

Why were these crops abandoned over time?

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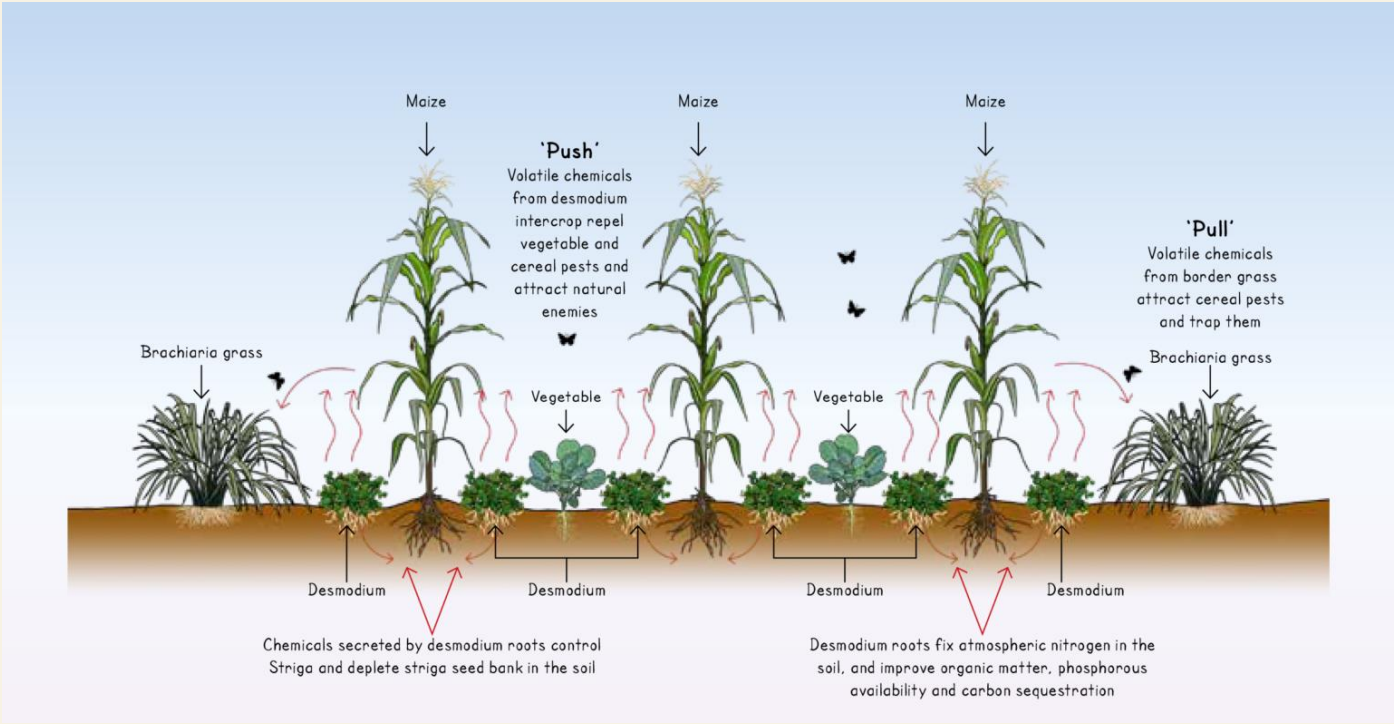
UPSCALE

Upscaling the benefits of push-pull technology for sustainable agricultural intensification of East Africa



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UPSCALE contribution to food and nutrition

Integration of push-pull (PP) with vegetables and legumes

- PP + Indigenous vegetables: Black nightshade (*Solanum nigrum*), Spider plant (*Gynandropsis gynandra*), onions
- PP + Integration with legumes (pigeon pea, cowpea, beans)

Testing sustainable intensification strategies that aligns with agroecological principles

Spider plant (*Gynandropsis gynandra*)

Onions

Kales (*Brassica oleracea* var *acephala*)

Pigeon pea (*Cajanus cajan*)

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FAIR

Fostering an Agroecological Intensification to improve farms Resilience in Sahel

Functional agroecology, intercropping, **plant pest and disease diagnosis, production of biopesticides – neem and other botanicals**

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Linking East and West African Farming Systems Experience into a BELT of Sustainable Intensification

***First step**: > 500 interviews to evaluate main problems, level of awareness on specific issues such as pest control, mycotoxins, exposure to chemical pesticides, traditional knowledge*

***Answers**: increasing problems related to climate change, erosion of traditional knowledge and loss of cultural biodiversity: only a few botanicals are known and still used. Many of the farmers acknowledged it would be very difficult to achieve the required yields without proper pest and disease management*

***Strategy**: restart from traditional knowledge but only after a careful evaluation of the efficacy based on scientifically-sound experiments*

Linking East and West African Farming Systems Experience into a BELT of Sustainable Intensification

Biocontrol Agent	Pathogen	Crops	Country	Partner
AflaSafe®	*Aspergillus* spp.	Maize, peanut	Tanzania, Kenya	KARLO
Trichoderma spp.	*Fusarium oxysporum*	Pepper	Ethiopia	Hawassa University
Phonoctonus lutescens	*Dysdercus* spp.	Cotton	Burkina Faso	INERA
Bacillus thuringiensis	*Spodoptera frugiperda* (FAW)	Cotton	Burkina Faso	INERA

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Linking East and West African Farming Systems Experience into a BELT of Sustainable Intensification

Botanicals tested on common bean, lablab, maize, cowpea in Ghana, Burkina Faso, Tanzania

Cassia nigricans

Securudaca longipedunculata

Tephrosia vogelii

Azadirachta indica

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Cassia nigricans: a success story from Burkina Faso (ACRA)

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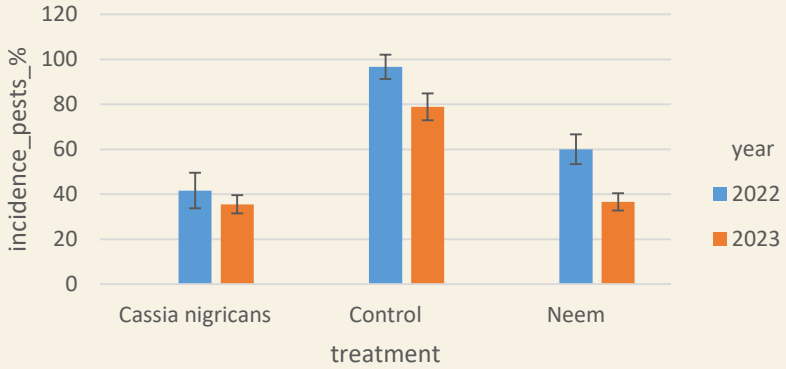

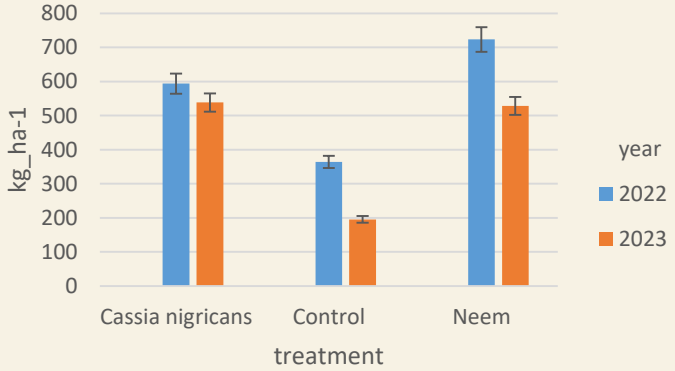

On cowpea (2022-2023) *Cassia nigricans* leaf extracts showed **significant differences in the control of pathogens and pests** and in **yield** compared to control and the more widely used neem-based biopesticide. In the FFRUs, the plant is now **widely applied** and **nurseries** are being established to **produce it commercially** at the local scale (ACRA)

United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas, Article 15

*"Peasants and other people working in rural areas have the **right to adequate food and the fundamental right to be free from hunger**. This includes the right to **produce food** and the right to **adequate nutrition**, **which guarantee the possibility of enjoying the highest degree of physical, emotional and intellectual development.**"*

"Human dignity refers to the intrinsic worth and respect that every individual deserves simply by being human." The Oxford Review

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Universal Declaration of Human Rights, Article 24: Right to Rest and Leisure.
*"Everyone has the **right to rest and leisure**, including reasonable limitation of working hours and periodic holidays with pay."*

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