Functional diversification with crops that nourish: 'More is better'

Sieglinde Snapp[1], Julia Sibiya[2], Kevin Pixley[3], Vimbayi Chimonyo[4], Anthony M. Whitbread[5] and Andrew Smith[5]

[1]International Maize and Wheat Improvement Center (CIMMYT), Mexico, S.SNAPP@cgiar.org [2]International Maize and Wheat Improvement Center (CIMMYT), Kenya, [3]International Maize and Wheat Improvement Center (CIMMYT), Senegal, [4]International Maize and Wheat Improvement Center (CIMMYT), Zimbabwe, [5]International Livestock Research Institute (ILRI), Tanzania.

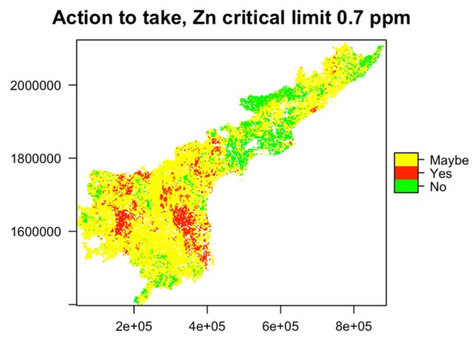
INTRODUCTION

Agrifood systems and farmers today face growing challenges, including:

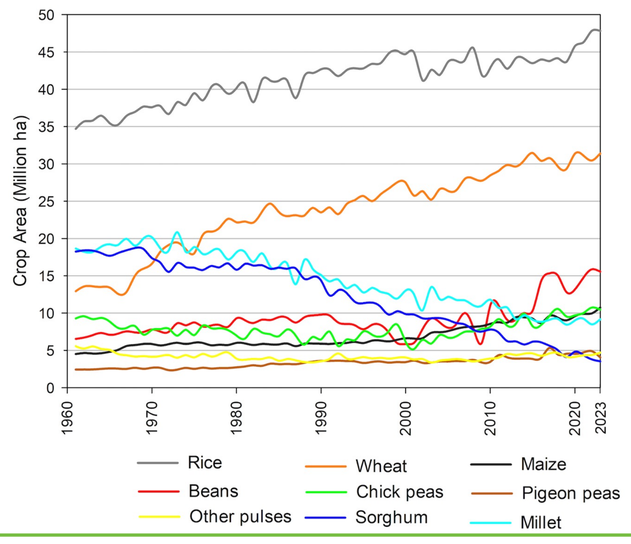
- Extreme weather, resource degradation with soil nutritional deficiencies and rapidly fluctuating market prices.
- Genetics that have become overly simplified.
- A narrow focus on high yield grain production that has led to overlooking of resilience and nutritional goals.

We explore the benefits of considering trait diversification and functional combinations in selection criteria, and in the design of cropping systems. Specific use cases are presented that explore nutrition in wheat, from biological nitrification inhibition to zinc biofortification. Multiple criteria to consider include enhanced nutrition for people, livestock and soil health.

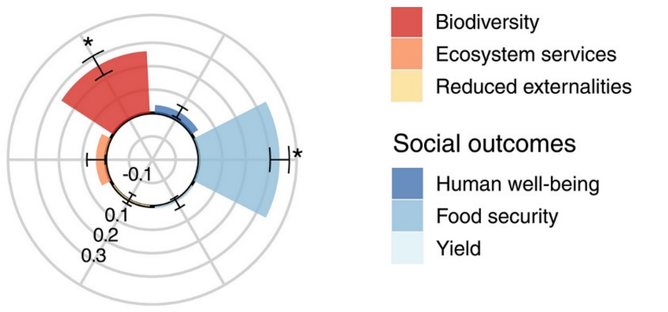
Nutrition Challenges



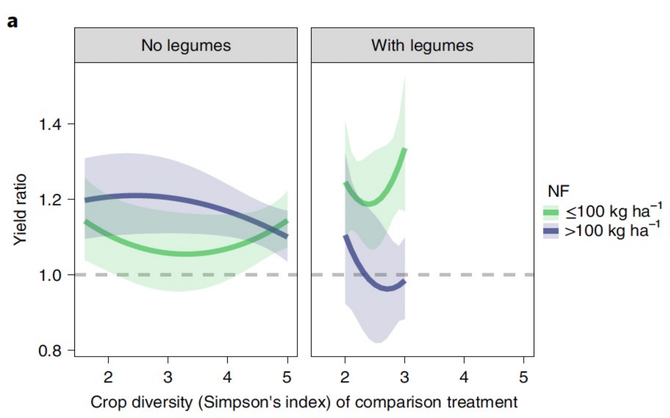
Agricultural Simplification



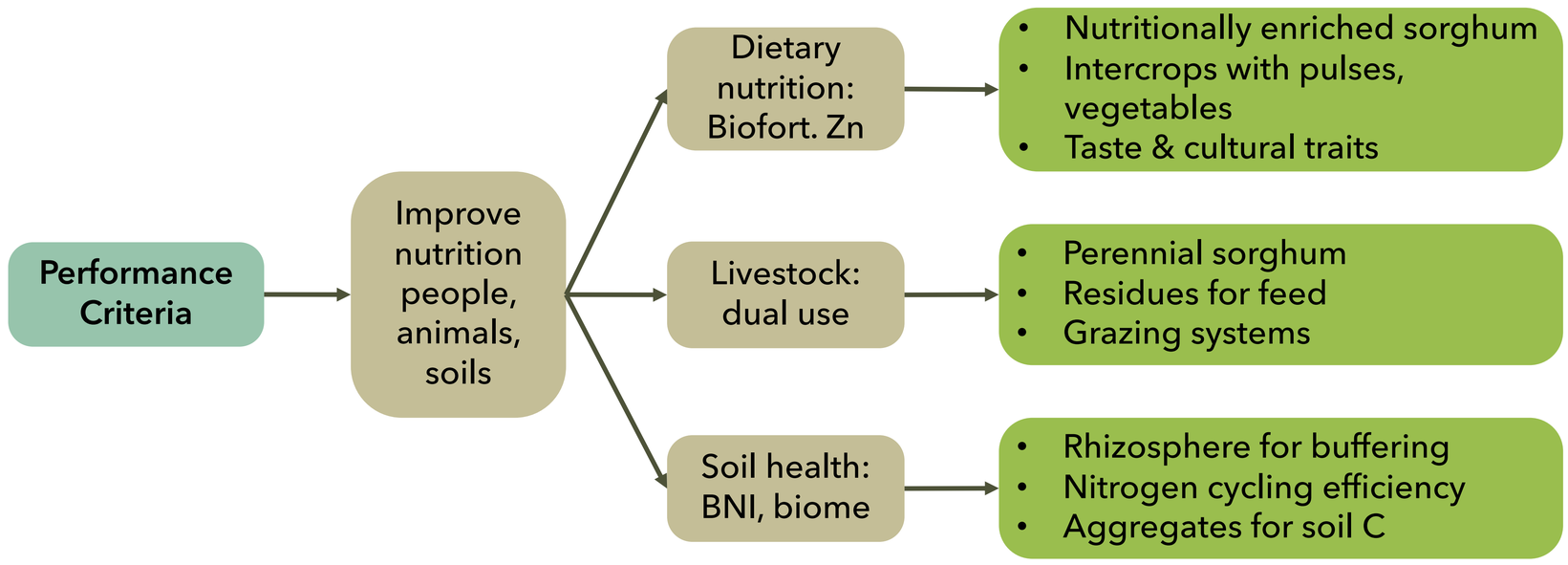
Diversification benefits: More is better



Rasmussen et al., 2024 Science

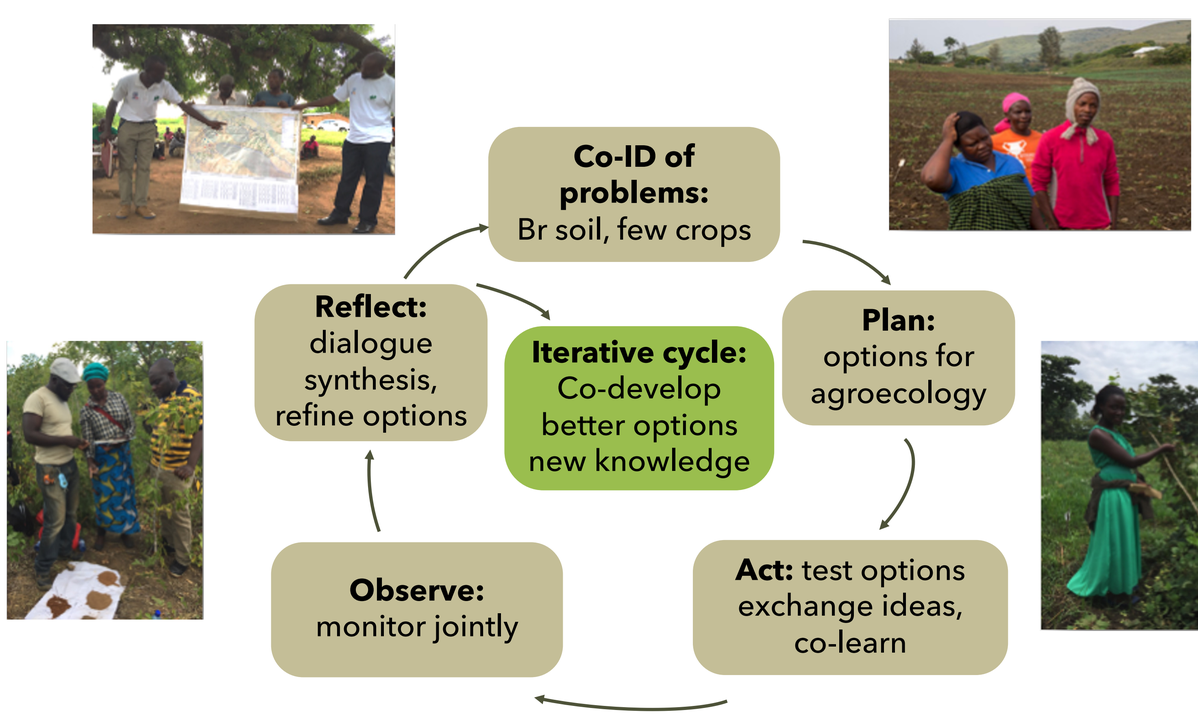


Multi-crop traits for nutrition use case: sorghum



Breeding 'crops that nourish': consider the environment & the farmer

Sorghum from controlled environment to mixed context to farmer's priorities



Snapp et al., 2023 FEE

Rewiring through innovation

- Biological rewiring: Crop improvement that targets plant traits & associated microbial processes
  - Biological nitrification inhibition (BNI)
  - Wheat varieties with BNI being tested for N emissions, losses