Decision support tools for farm-level fertilizer recommendation in Ethiopia

Tilahun Amede
ICRISAT

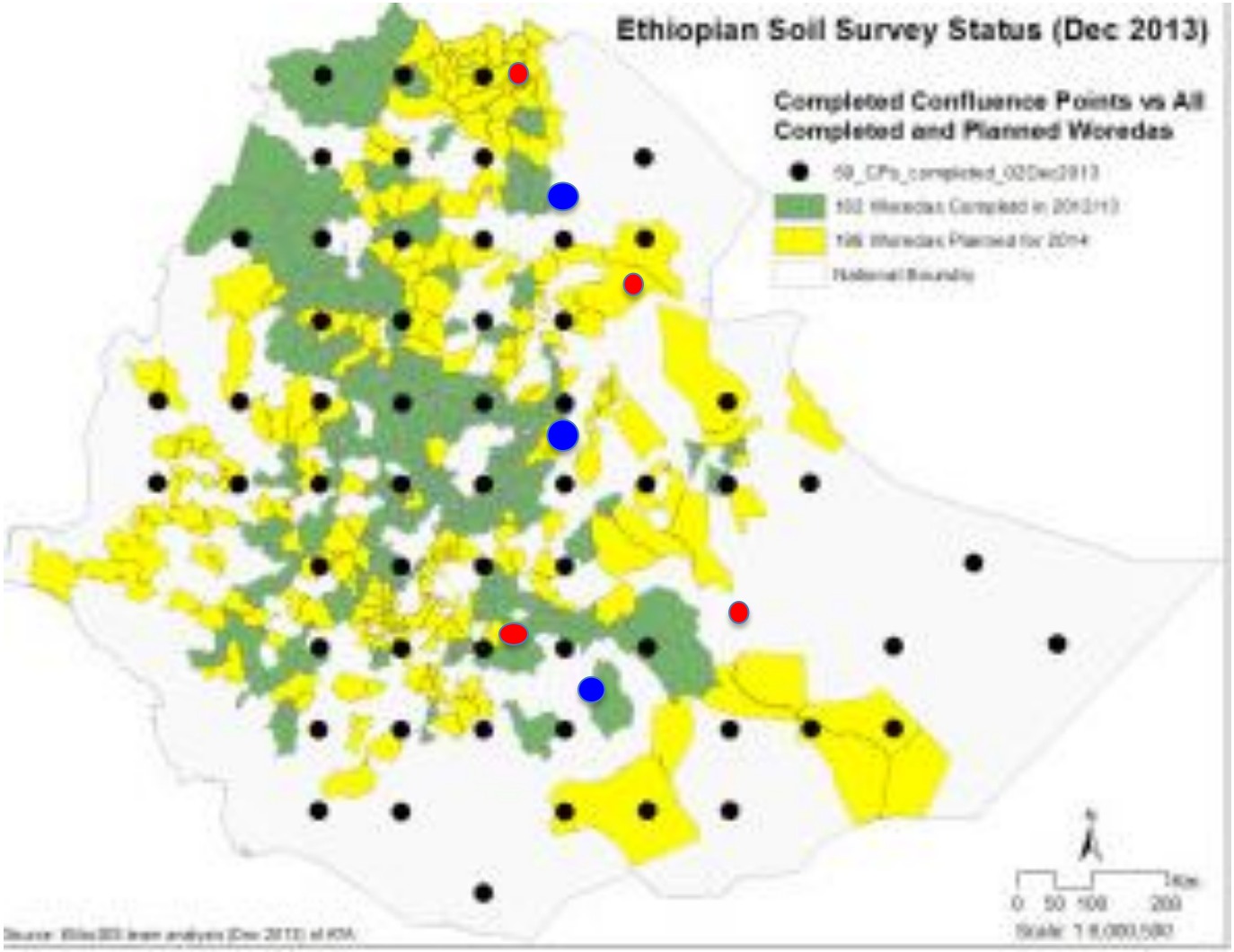
Briefing meeting
USAID Mission, Addis Ababa, 17 June, 2016

Background

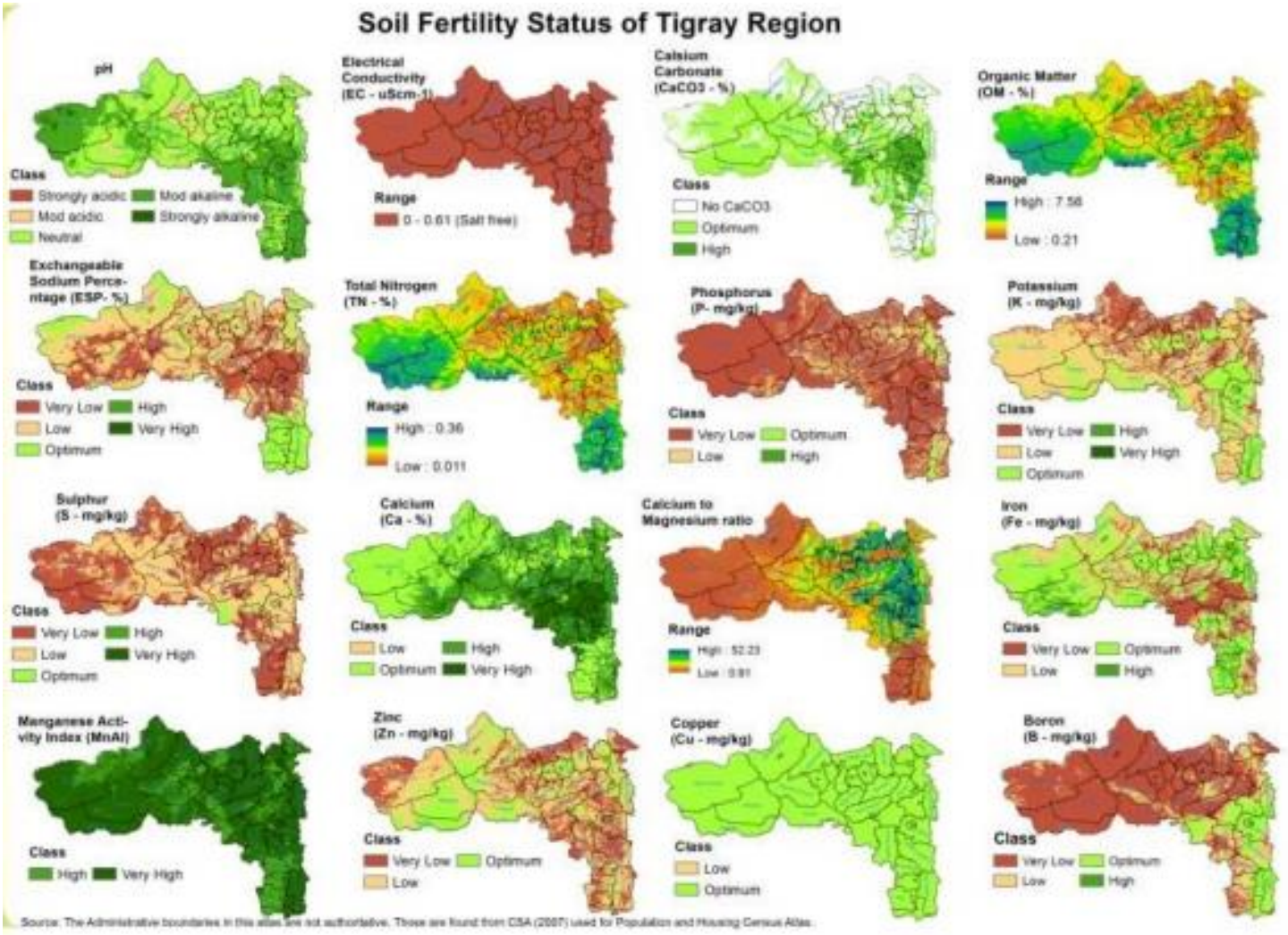
- Ethiopian agriculture is very **old, traditional**
- **Low-input, Low-out put**
- Characterized by **Nutrient mining**
  - Soil erosion for centuries
  - Limited input application (18 kg ha-1)
  - Limited nutrient recycling (e.g manure for cooking, plastering)
- **Diverse** in altitude, agroecology, food habit
- **Agronomical Inefficient**, low productivity per unit of land, labour, water

ATA did a very good job in developing site specific fertilizer recommendation:

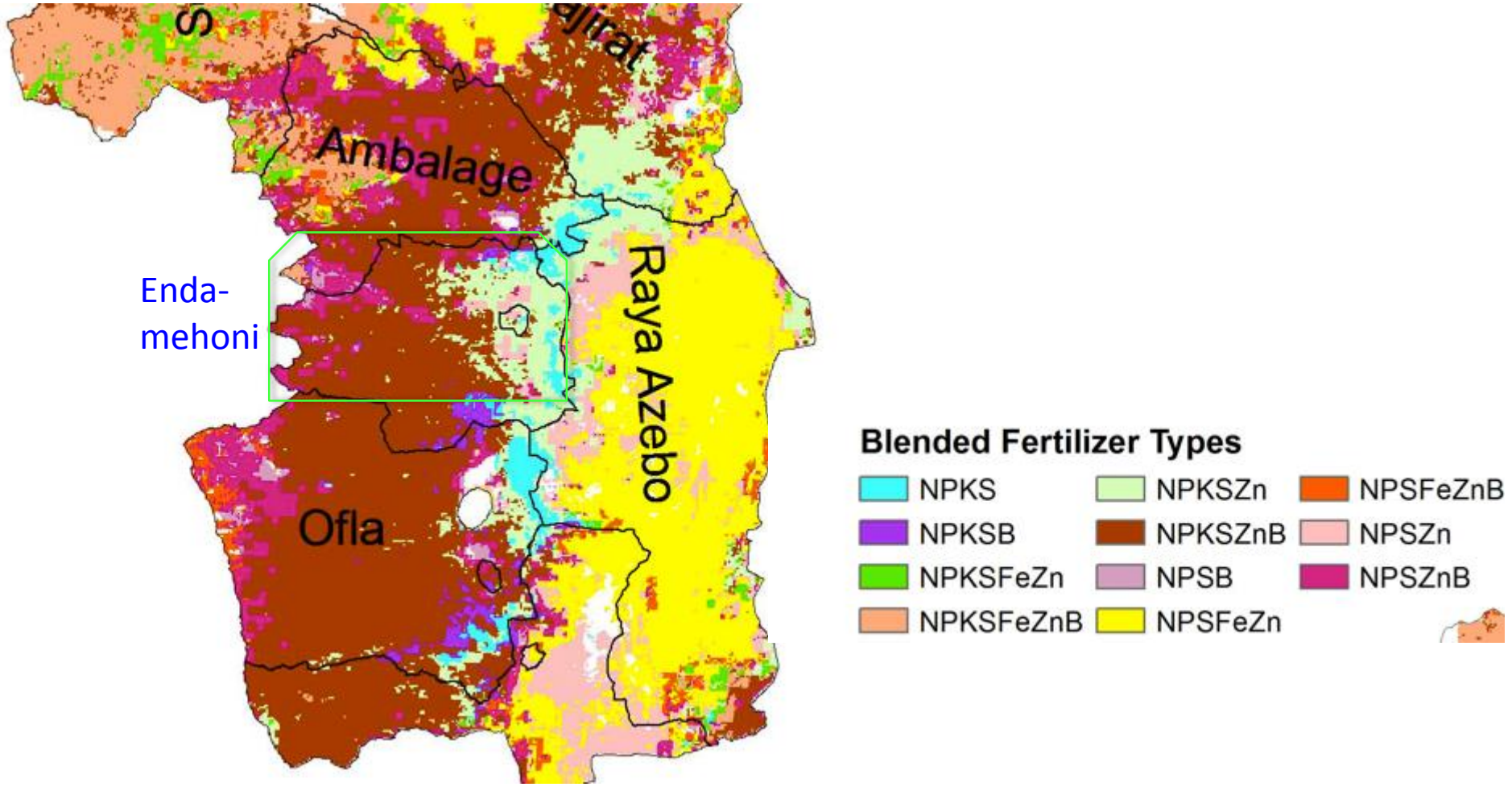
Confluence points and our sites



Soil fertility status of Tigray



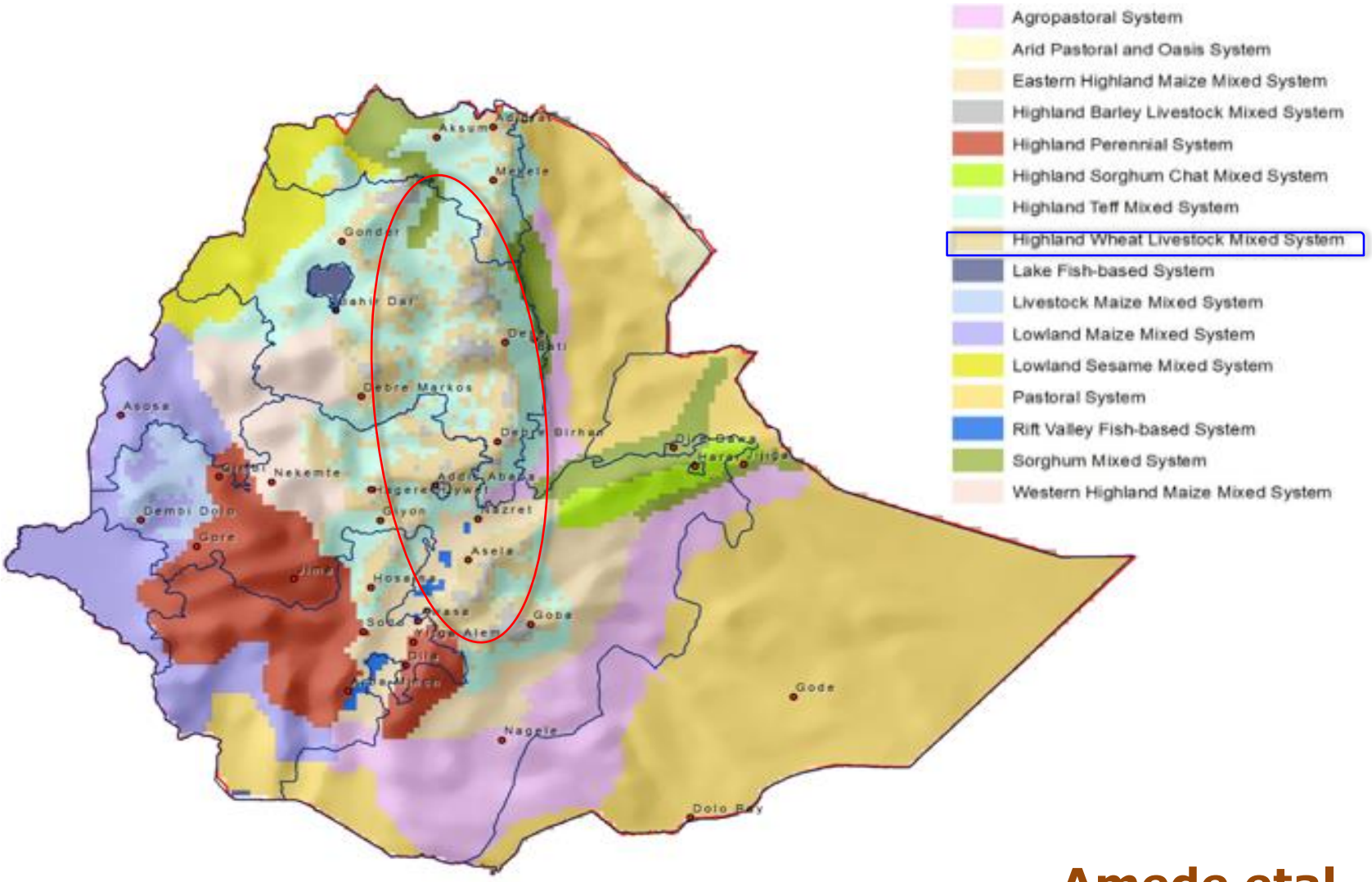
ATA Fertilizer recommendation for Southern Tigray: too fragmented, difficult to operationalize



Identifying Nutrient Management Zones

- ✓ Fields are a mosaic of habitats, each having unique biophysical characteristics that influence soil properties and crop yields.
- ✓ The effectiveness of matching fertilizer types to soil fertility problems rests on the ability to identify limiting factors, characterize sites, and develop appropriate recommendations.
- ✓ Approaches for identifying nutrient management zones require collection and interpretation of spatial data (yield, elevation, RS, electrical conductivity, soil nutrient maps, and Farmers' classification criteria).

Farming systems of Ethiopia



Amede etal., 2015

Appreciating diversity; Wheat systems

Nutrient Zonation within the Wheat systems

Our research (240 farmers fields) shows three types of responses to application of various fertilizer combinations

EndaMehoni
Footslope. Good Crop, No effect of blends

- Crop is doing well but there is no visible difference among our treatments in terms of growth, height and vigour;
- Our treatments are not even better than farmers plots
- This is where agronomic management played more than nutrient application

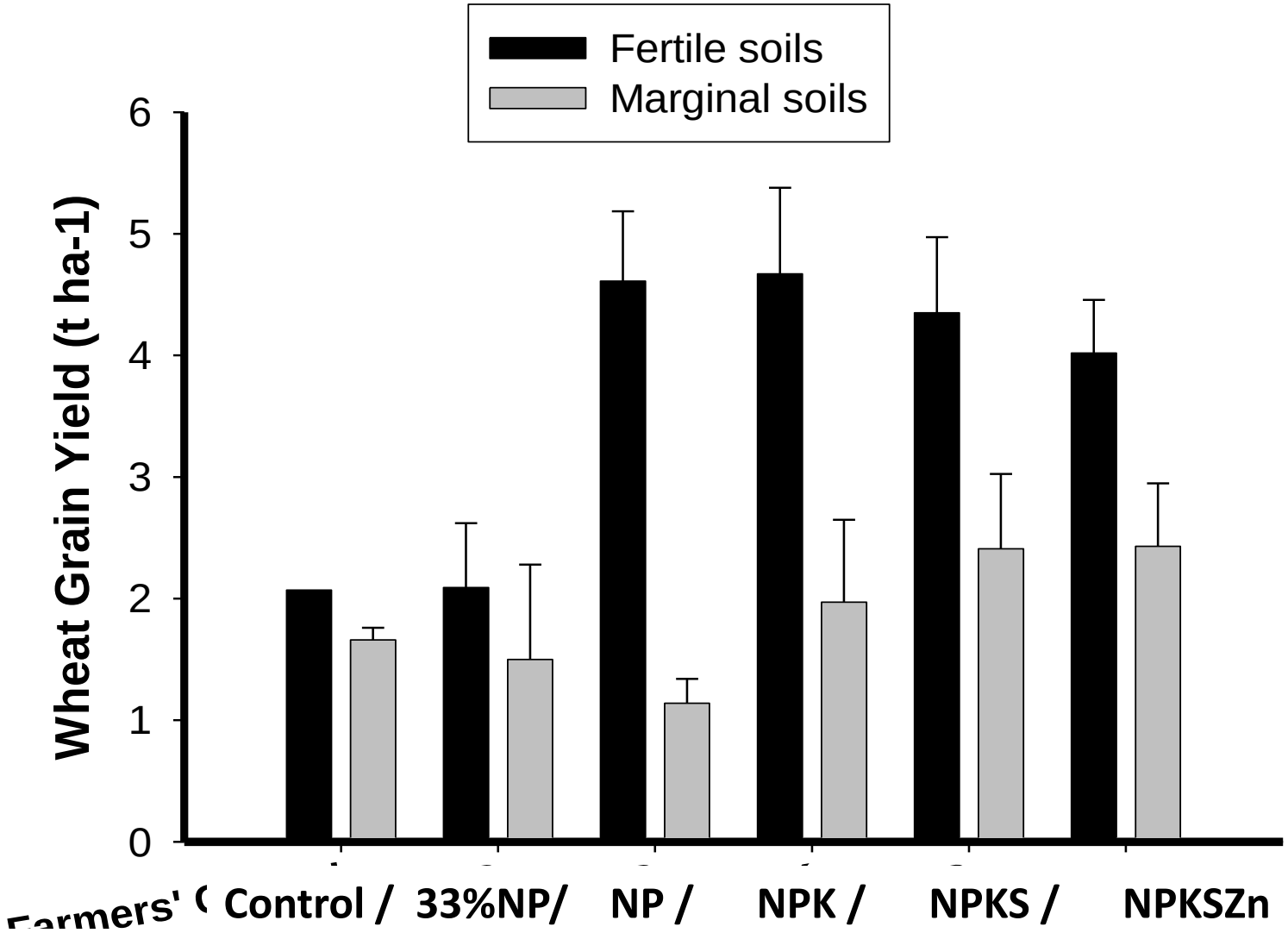
Midslope farms. Distinct difference among treatments

Major effect from NP, and in some case K or S

Hillslope. Bad crop, no difference, lost investment (Non-responsive soils)

No visible yield margin for the investment

Crop response to fertilizer blends, Enda-Mehoni (Midslope and Hillslope)



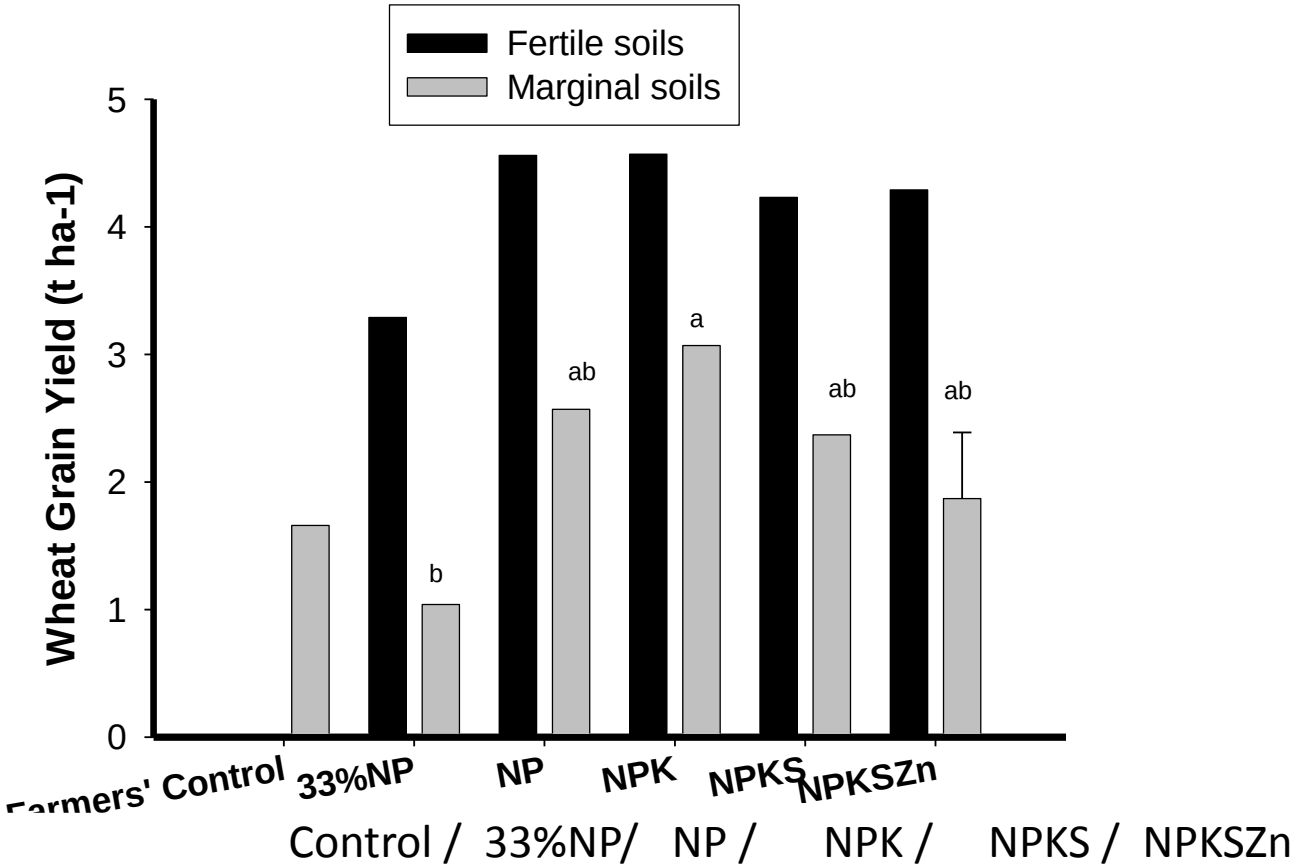
Zonation in DBirhan

Footslope

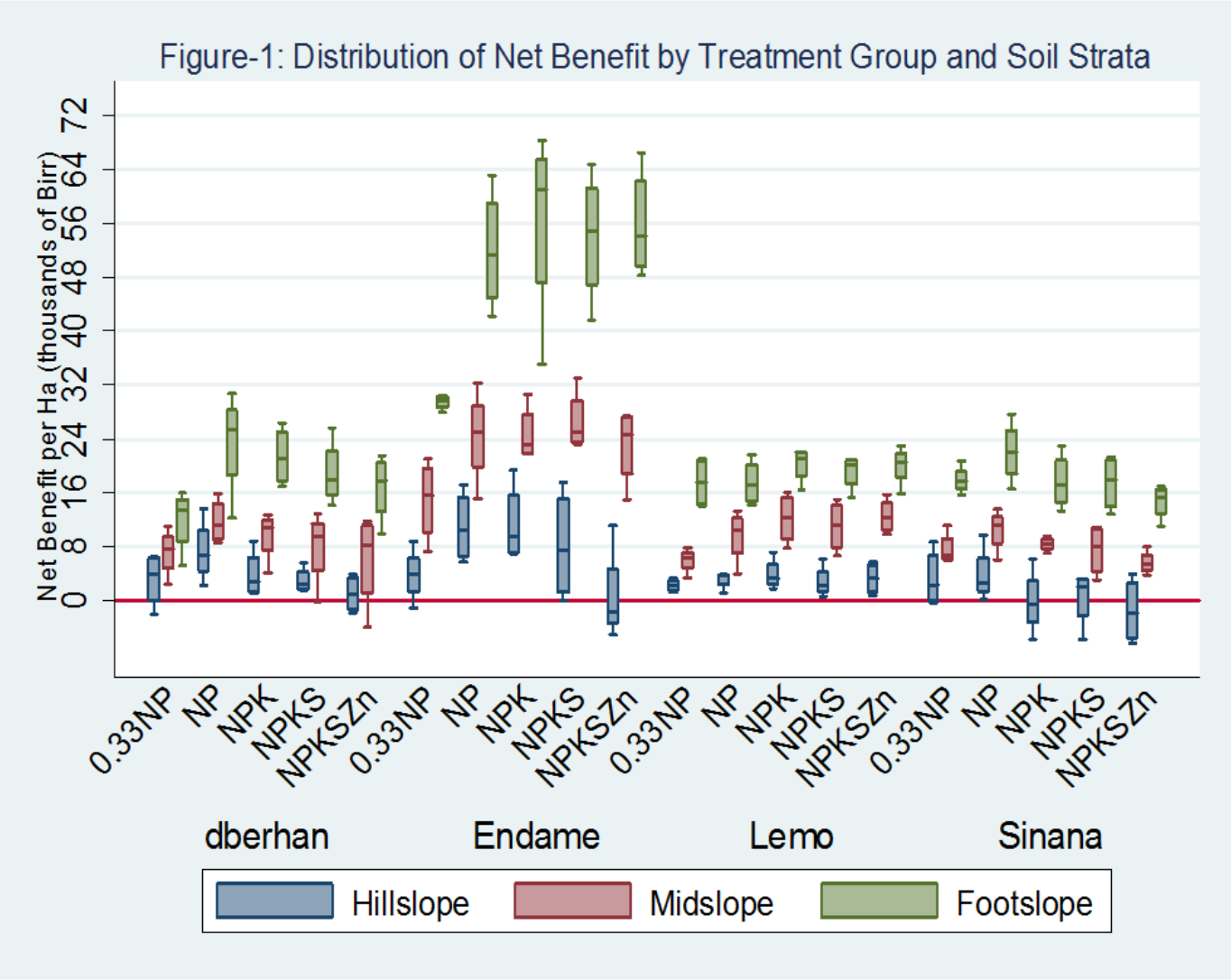
Midslope

Hillslope

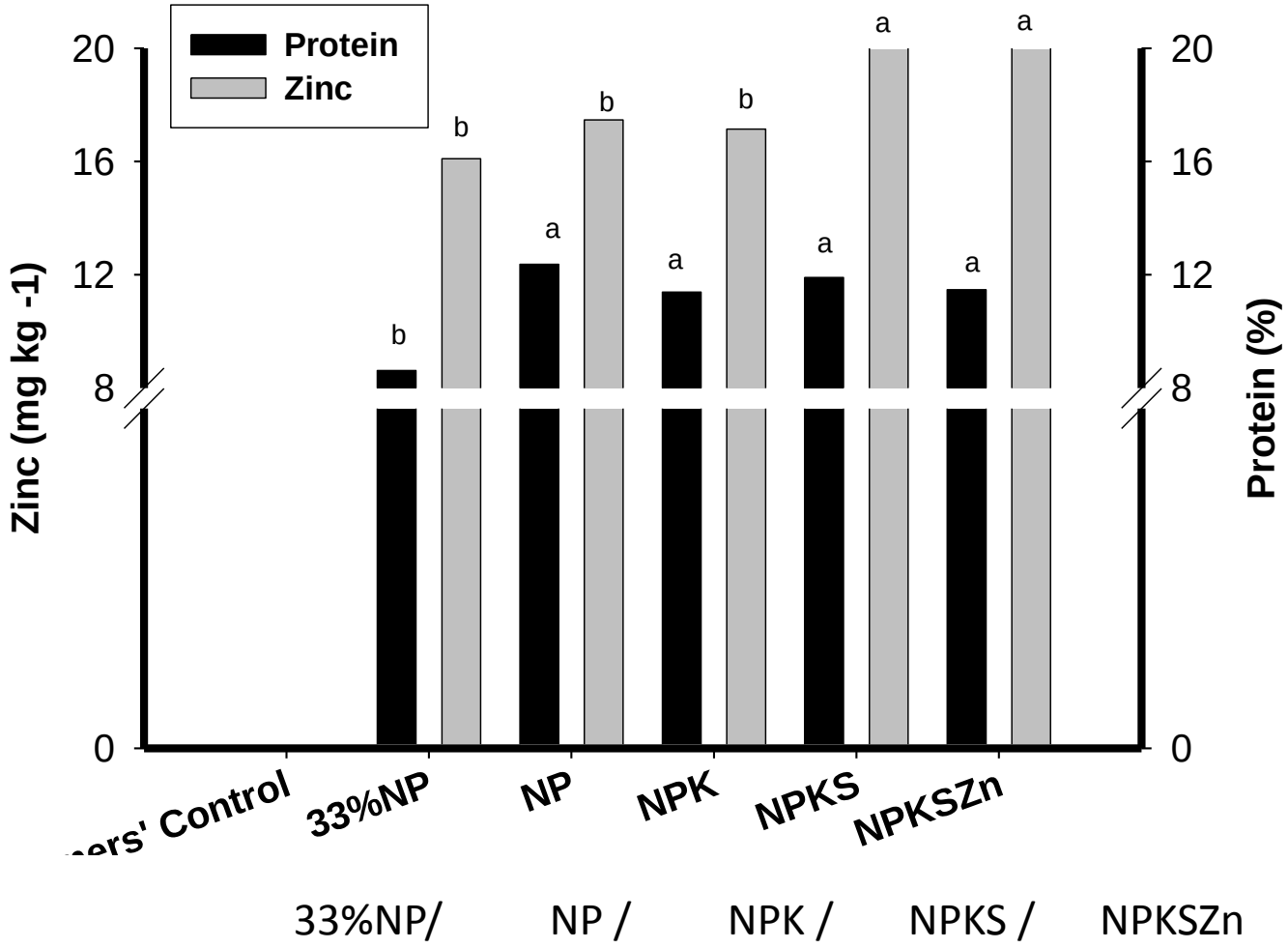
Crop response to fertilizer blends, Dbirhan (Footslope and Midslope)



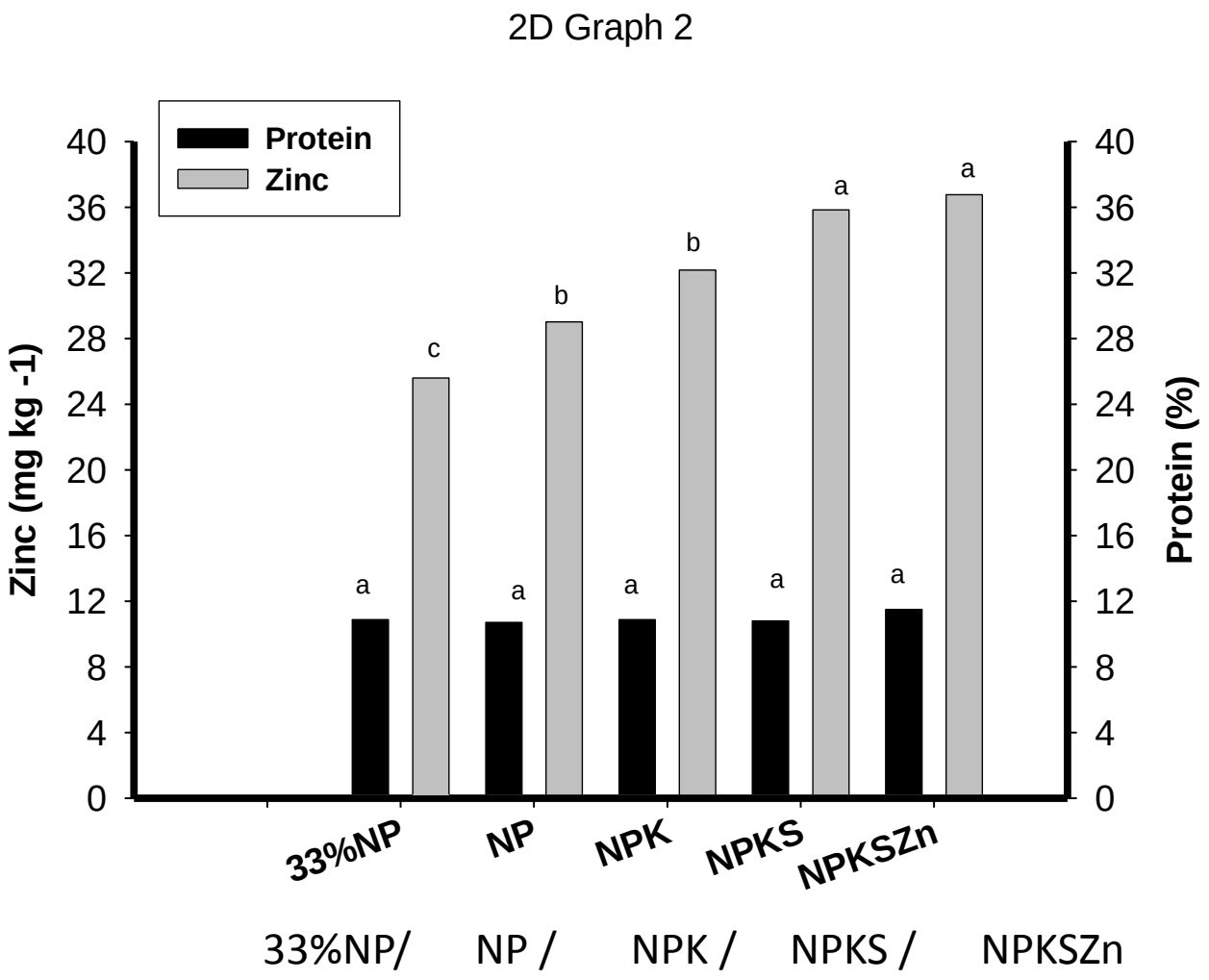
Net benefits of fertilizer application



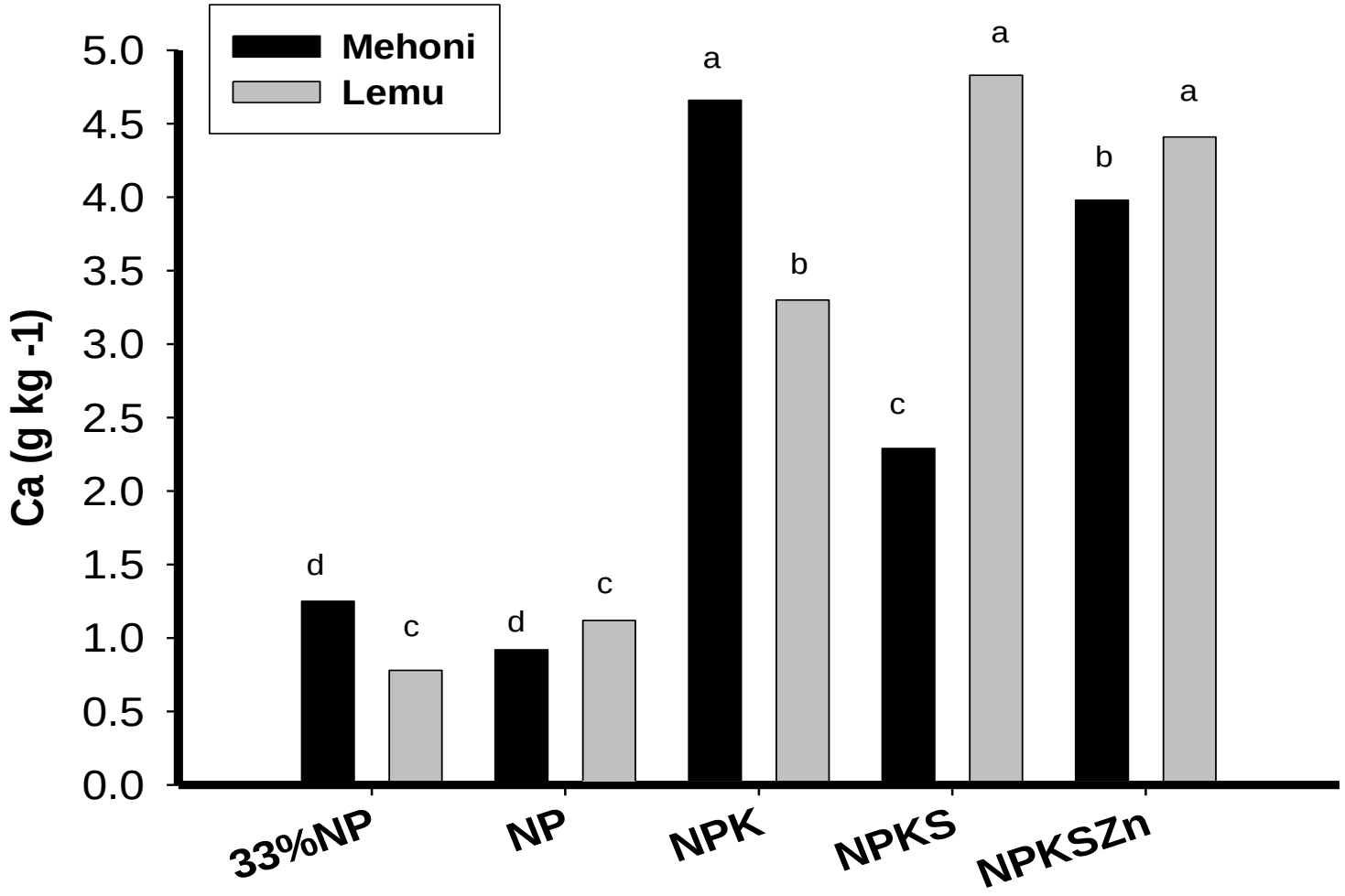
Zinc and Protein as affected by blends, Endamehoni



Zinc and Protein as affected by blends, Lemo



Calcium as affected by blends (confounding effect?)



What does it mean?

- Crop productivity is dictated not only by soil fertility but also climate, crop type, slope, management etc.
- Fertilizer recommendation should be based on comprehensive analysis of cropping systems;
- There are similarities between agricultural fields, located in different parts of the region or country, demanding similar treatments
- Instead of Kebele/woreda based recommendation the need to consider system based fertilizer recommendation
- Agronomic and Economic efficiency needs to be assessed for fertilizer recommendation
- Aggregated decisions could be made with system-based recommendations

Initiatives towards Nationwide Approach

- EIAR invited ICRISAT/Africa RISING to share experiences
- Dec 18, 2015. National Workshop, Led and Facilitated by EIAR DG Conducted;
- March, 2016: National Task Force that would revisit the current approaches and recommendations created;
- National Task Force include various institutions; including ATA, EIAR, Universities (Mekelle, Hwassa), MoANR; CG
- May 20, 2016. ATA and EIAR called a meeting to

  a) Rethinking approach, using Africarising experiences;

  b) Distilling key technologies/ recommendations for extension; with timeline..
- Attracted huge interest from various groups (GiZ, Teagasc-Ireland, Nebraska University, CG centres, LandMark EU)

Next steps

- Validating our model in other two major cropping systems (Maize/Teff based and Sorghum-based systems) in major regions; also with high value crops, with higher returns;
- Assembling and re-analysing the available country wide ATA data, based on top-sequence/cropping system/soil types
- Through our national taskforce, and together with the ATA, EIAR and MoANR develop **Farmer friendly tool for efficient use of inputs,** country-wide
- Through Regional RARIs, Strengthen our Policy dialogue with the regions and lobby for change in approaches across the regions

Thank You

Africa Research in Sustainable Intensification for the Next Generation

africa-rising.net

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

IFPRI

IITA
Research to Nourish Africa

Our treatments (Optimal nutrient applications?)

- NP (90/45)
- NPK (90/45/61)
- NPKS (90/45/61/63)
- NPKSZn (90/45/61/63/10
- Minimum application (30% recommended NP)
- Farmer's fields (control)