

Optimization of nutritional and functional qualities of local complementary foods of southern Ethiopia using a customized mixture design

Dagem Alemayehu¹, Tadesse Fikre Teferra¹, Jan Frank², Samson Gebremedhin¹

¹Hawassa University, School of Public Health. ² University of Hohenheim, Institute of Biological Chemistry and Nutritional Science

Introduction

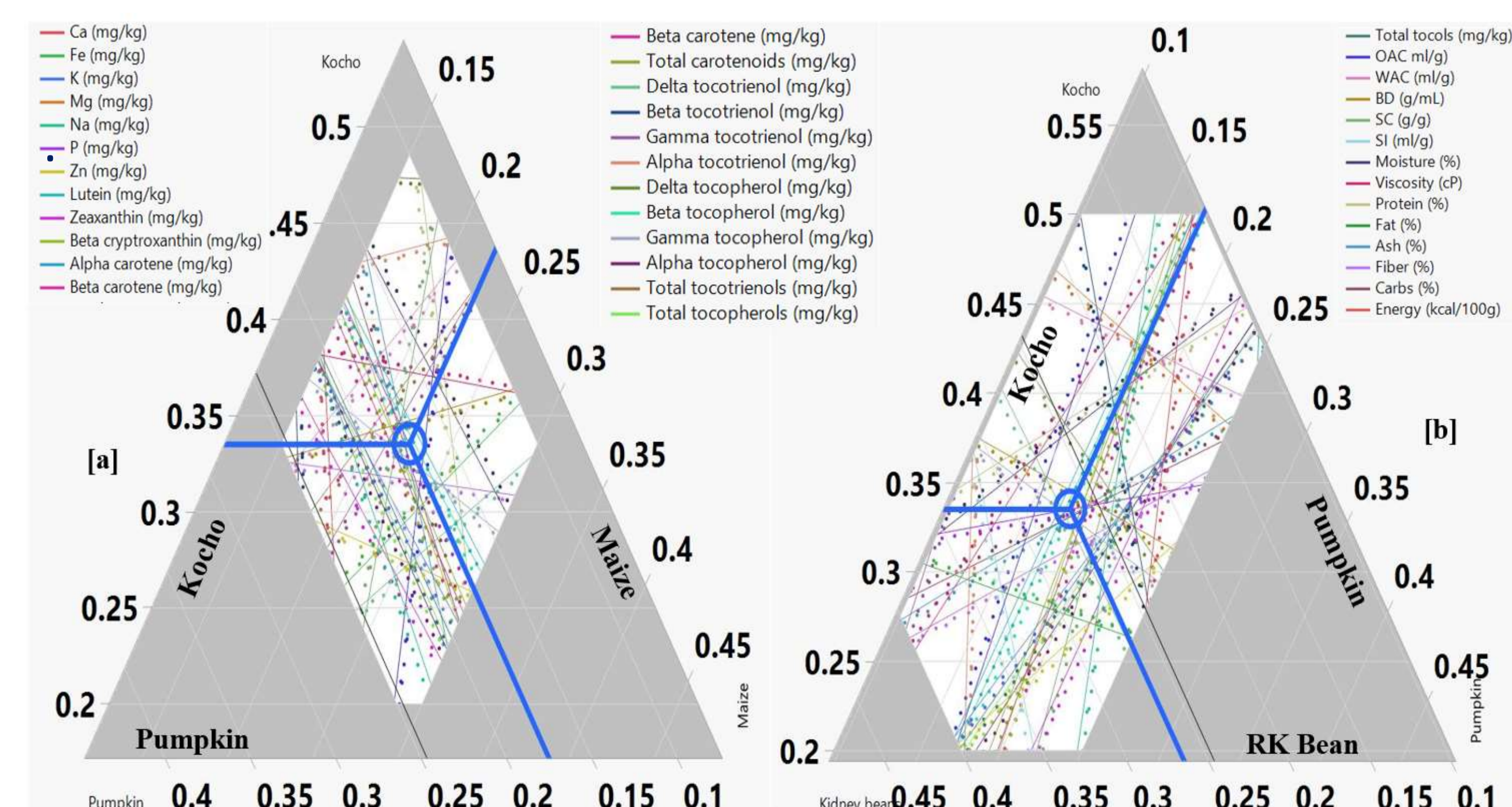
Commercially produced complementary foods are inaccessible to rural households in Ethiopia. Globally, undernutrition contributes to nearly 50% of deaths among children under 5 years of age (UNICEF/ChildInfo, 2018). In Ethiopia the prevalence of wasting and stunting is 7% and 37%, respectively, for children younger than 5 years, the value is higher than the average (6.4%) for the African region (DHS & ICF, 2021; Global Nutrition Report, 2020).

Methodology

Customized –mixture design optimization using JMP-Pro software with three points was used to optimize the ingredients. AOAC and other standardized methods were used to quantify the macro and micronutrients contents. A five-point hedonic scale was used for the determination of organoleptic properties, and standard methods were used for the analyses of nutritional composition and functional properties.

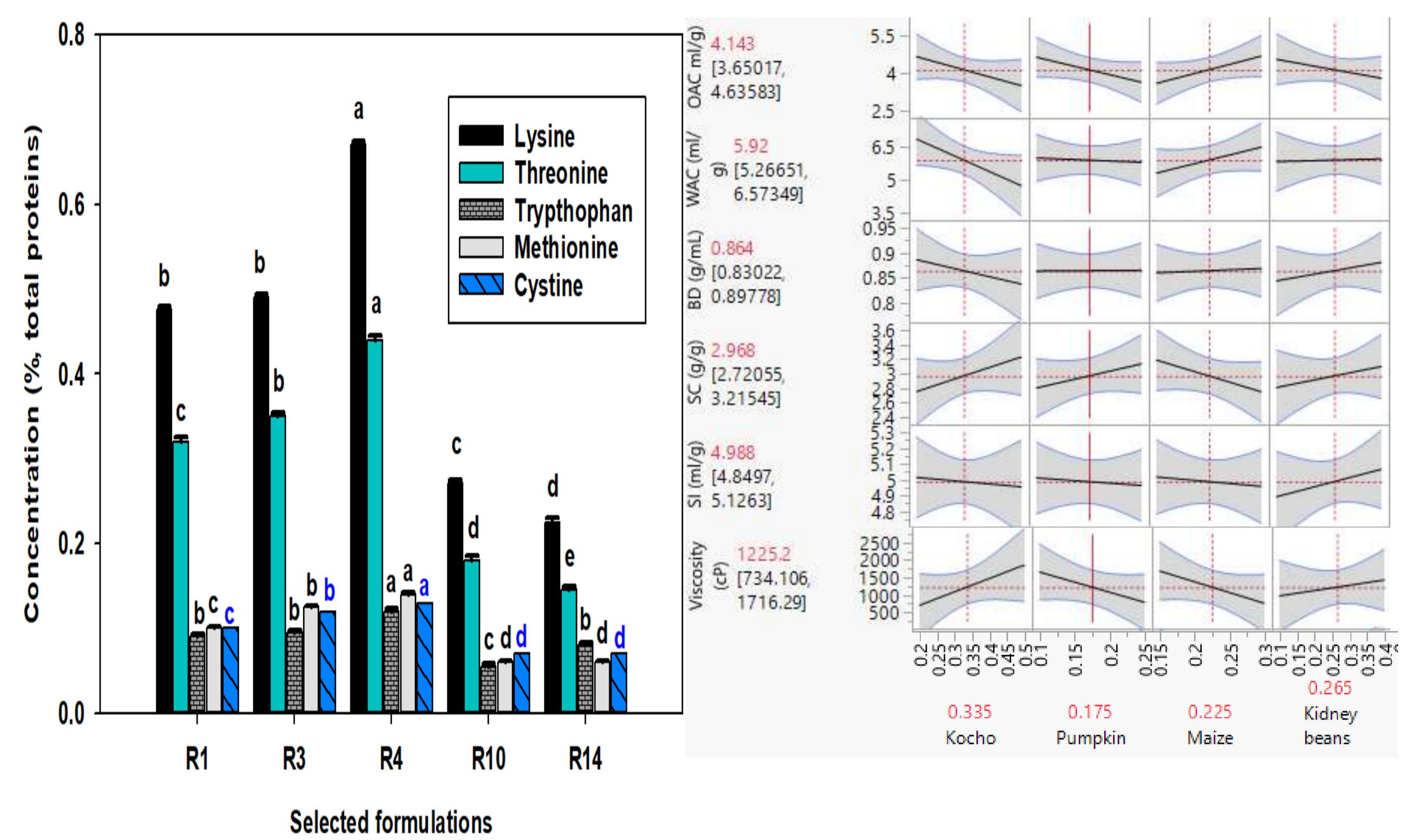
Results

- Optimal values for functional properties were 0.86 g/ml, 5.94 ml/g, 4.14 ml/g, 2.96 g/g, 5.0 ml/g, and 1225.3 cP for bulk density, water absorption capacity, oil absorption capacity, swelling capacity, swelling index, and viscosity, respectively.
- All formulations were within acceptable limits with scores ranging from 3.00 to 4.32 on a scale of 5.



Fig(1) Optimal formulation(blue circle) for proximate composition, functional properties and nutrient content of composite flours

Fig(2) Amino concentration (left) and functional properties of flours(right)



Conclusion

The finding witnessed locally available crops could be used for the formulation of nutrient-and energy-dense complementary foods. We further observed that by optimizing the ratios of kidney bean, maize, and kocho flours, the content of limiting amino acids and the protein also improved.

References

- UNICEF/ChildInfo. (2018). *Nutrition Profile Ethiopia* (Issue February). http://www.childinfo.org/files/nutrition/DI_Profile_Ethiopia.pdf
- Global Nutrition Report. (2020). *Global Nutrition Country Profile*. globalnutritionreport.org/resources/nutrition-profiles/africa/eastern-africa/ethiopia

Acknowledgements

The authors acknowledge the financial support provided for this research by DAAD German–Ethiopian SDG Graduate School “Climate Change Effects on Food Security (CLIFOOD).



Follow us on:



Dagem Alemayehu Ayele (CLIFOOD, PhD Candidate in Human Nutrition)
 email: dagemmame@yahoo.com / abesalat24@gmail.com
 cell-phone: +251911743218

clifood.de

part of the Food Security Center