

Impact of fertilizer applications on grain and vegetable crops in smallholder Mixed Crop-Livestock (MCL) systems in West Africa

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Background and Objective

- Mixed crop-livestock (MCL) systems can enhance crop yield while reducing chemical fertilizer use.
- However, limited studies have tested this assumption under real-world conditions of farmers.
- Better understanding of nutrient management in MCL system could help guide recommended fertilizer applications.
- This study determined the impact of fertilizer application practices on the yield of grain and vegetable crops in real-world MCL systems

Key results

- Fertilizer source increased ($p < 0.05$) grain and fruit yields across various crop types (Fig. 3).
- The application of crop and country specific recommended N rates influenced ($P < 0.05$) several crop types in both countries (Fig. 4).
- With the exception of tomato, the primary source of N input for all other crops in Burkina Faso was from manure (Fig. 5).
- In Ghana, N input from manure constituted the entire N input for millet, peanut, cowpea, and soybean (100% of their N input) (Fig. 5).

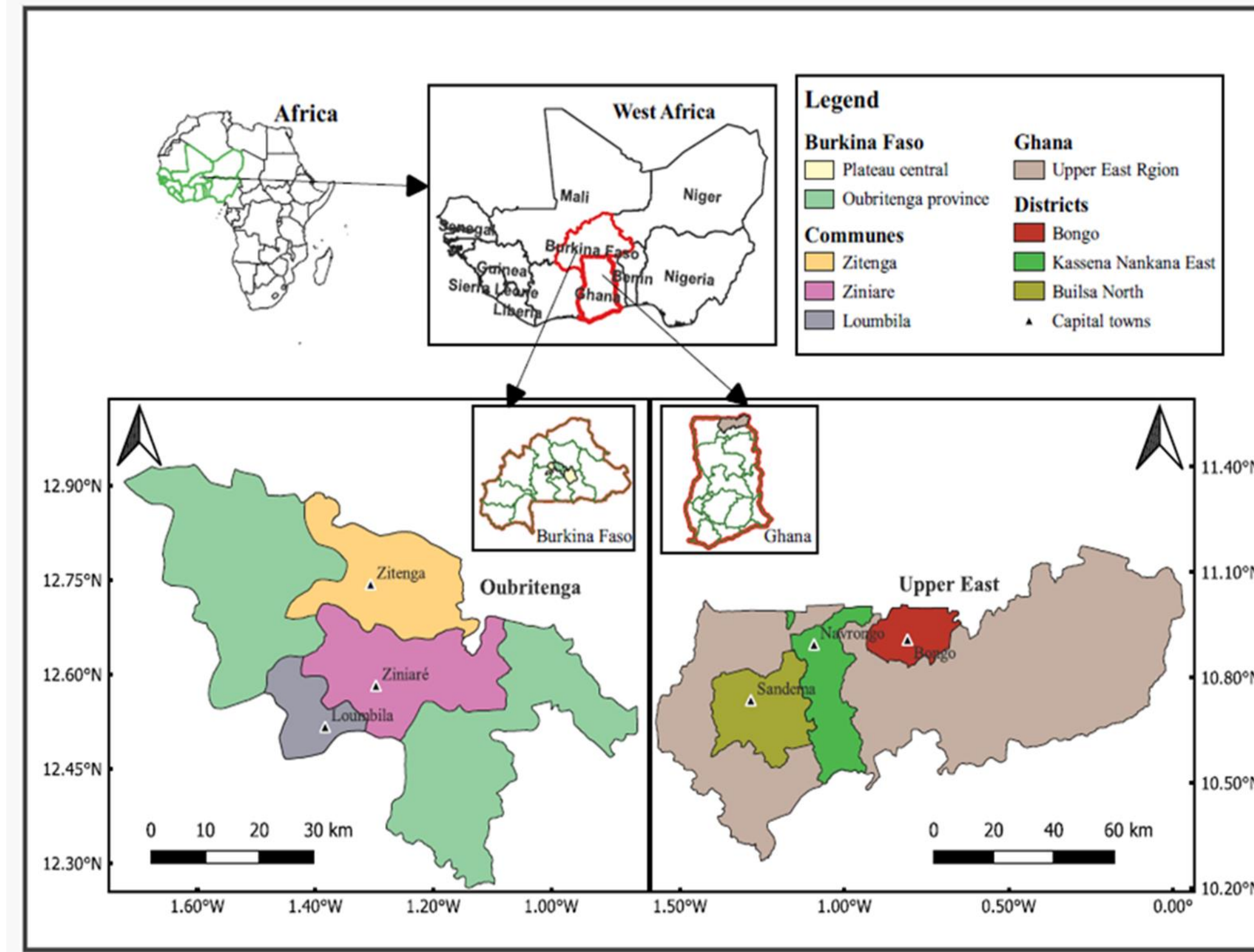


Fig. 1 A map showing study sites where the surveys were conducted in Burkina Faso and Ghana, respectively

Conclusion

- No substantial reduction in grain and vegetable yields was observed under combined fertilizer application.
- Fertilizer application in furrows has shown a strong potential to enhance grain and vegetable yields
- High variability characterized yield responses to the blanket recommended timing of chemical fertilizer application for specific crop types.
- Yield gains with the amount of N applied did not correspond to the high N contribution from manure

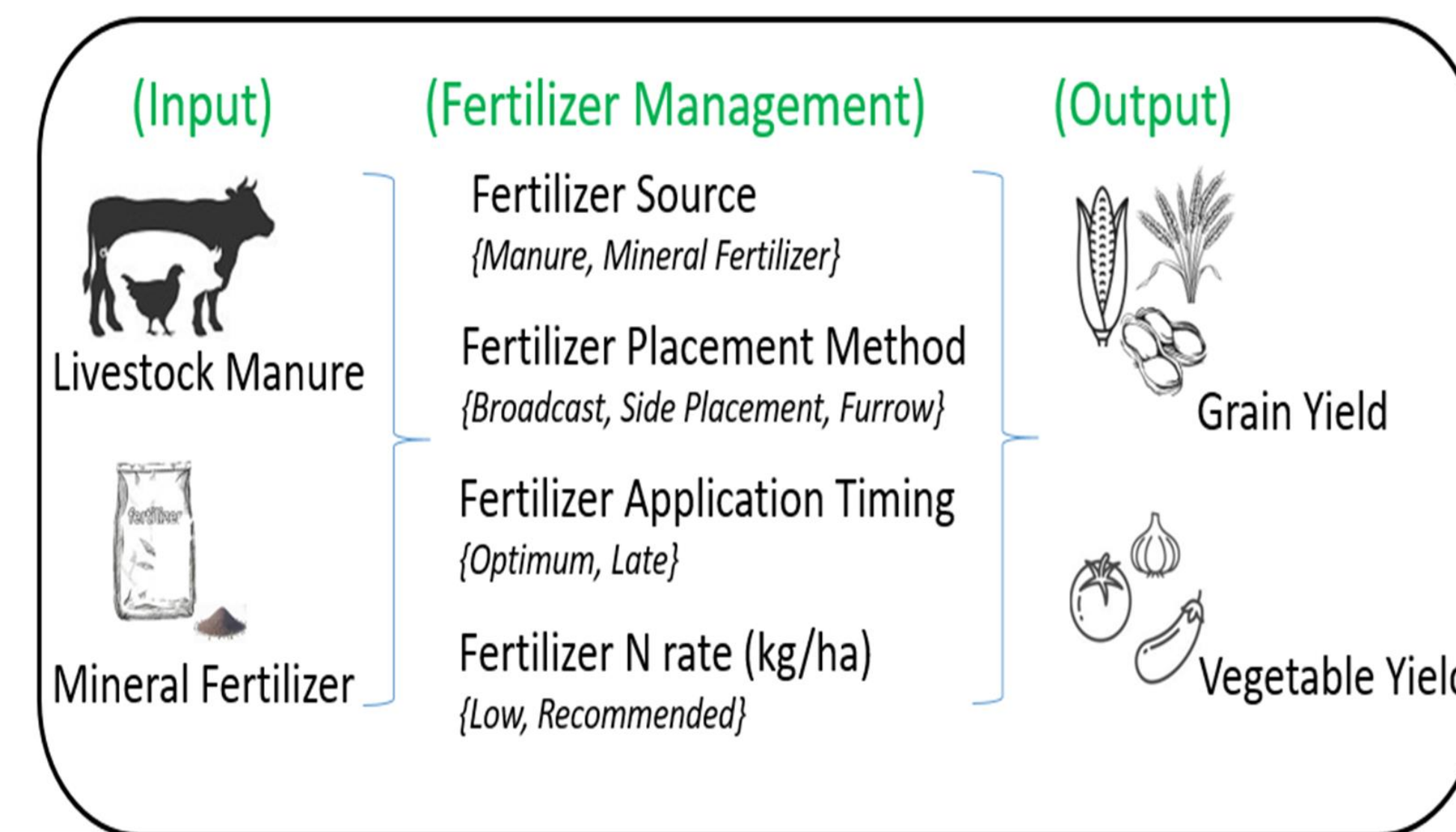


Fig. 2 An illustrative summary of the Impact of fertilizer applications on grain and vegetable crops

Materials and Method

Farm surveys were conducted in three major MCL system representative sites in Burkina Faso and Ghana (Fig. 1)

- Burkina Faso: 143 MCL farms surveyed from September to December 2023, focusing on the cropping seasons of 2022 and 2023.
- Ghana: 218 MCL farms surveyed from September to December 2022, with the reference period covering both the 2021 and 2022 cropping seasons.

Farmer fertilizer application management information was gathered using a digital questionnaire hosted on the KoboToolbox platform and deployed via KoBoCollect.

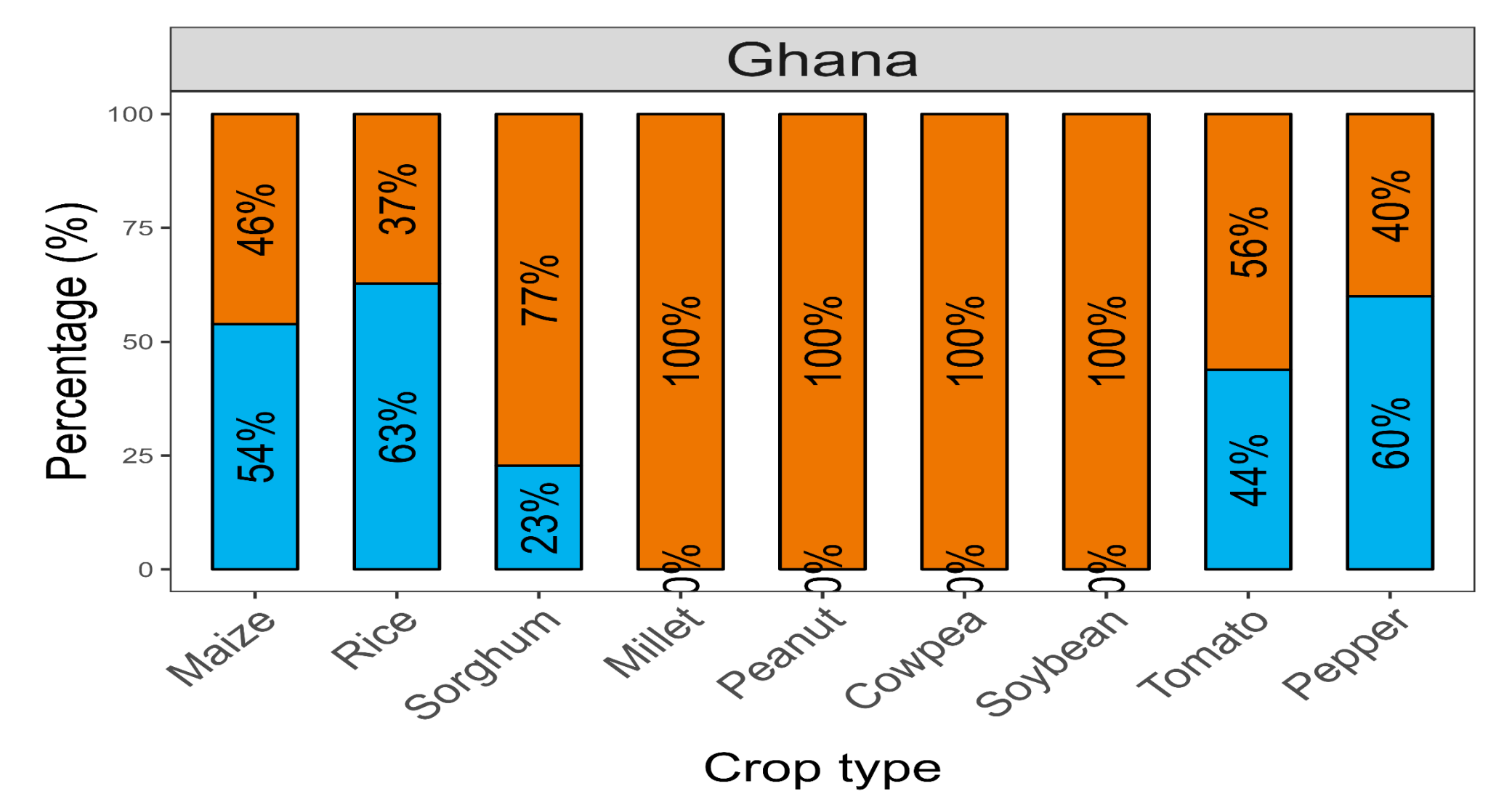
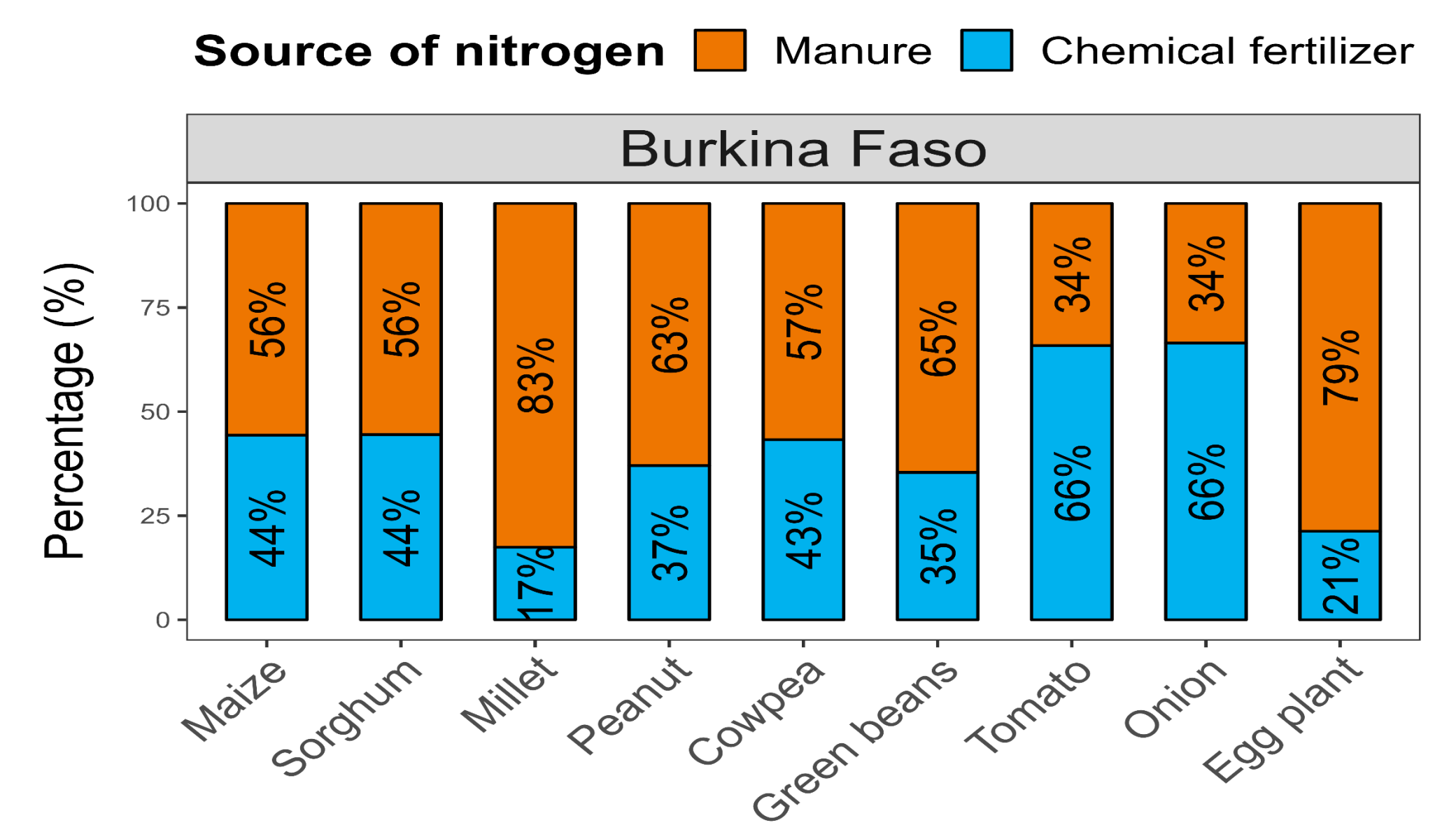
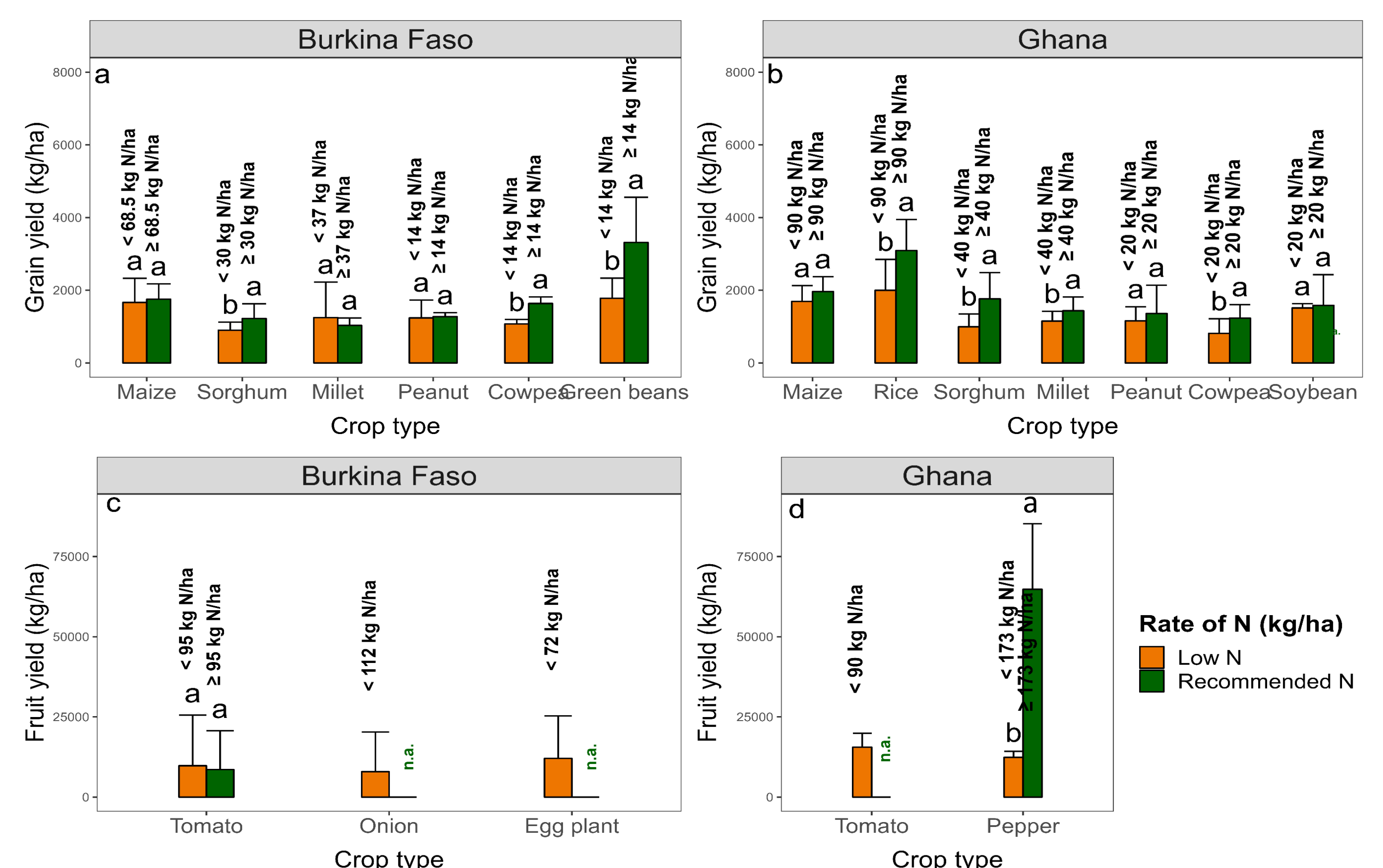
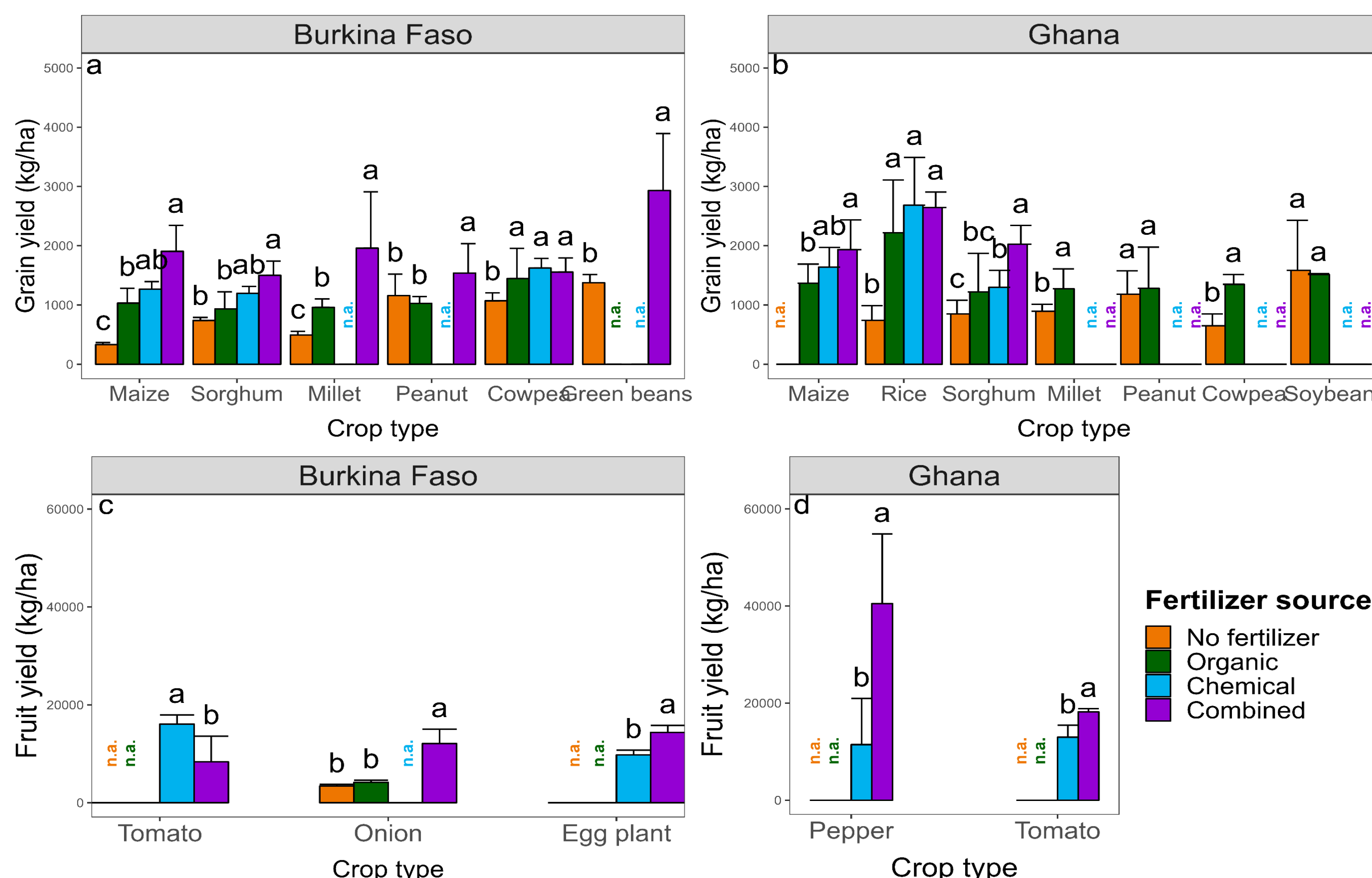


Fig. 5 Contribution of manure and chemical fertilizer to the rate of N (kg/ha) applied to crop type in MCL system farms



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