



Tropentag, September 11-13, 2024, hybrid conference

“Exploring opportunities ...
for managing natural resources and a better life for all”

Impact of fertiliser applications on grain and vegetable crops in smallholder mixed crop-livestock systems in West Africa

ALBERT BERDJOUR^{1,2}, AMIT KUMAR SRIVASTAVA², THOMAS GAISER², SAFIÉTOU SANFO¹,
BOCAR AHAMADOU³

¹West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), Climate Change and Sustainable Agriculture, Mali

²University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES), Germany

³Institut Polytechnique Rural de Formation et de Recherche Appliquée (IPR/IFRA) de Katibougou, Mali

Abstract

Mixed crop-livestock (MCL) systems can enhance crop yield, and improve nutrient cycling while reducing chemical fertiliser use. However, only a limited number of studies that reported this assumption were conducted under real-world farmer's conditions or followed an integrated approach. Therefore, a survey was conducted in the 2021/2022 and 2022/2023 cropping seasons in Ghana and Burkina Faso, respectively, to determine the impact of fertiliser application practices on the yield of grain and vegetable crops in MCL systems. Detailed information on fertiliser management practice and yield was collected from 317 MCL system farms distributed across three (3) districts/provinces in the Upper East region of Ghana and Plateau central of Burkina Faso, respectively, summarising data on their grain and vegetable yields under (1) major fertiliser sources; organic, chemical, and combined (organic + chemical), (2) N fertiliser rate (crop × country specific N kg/ha recommendation), (3) application timing of fertiliser sources (recommended crop × country specific time of application), and (4) fertiliser placement methods (broadcast versus side placement versus furrow). Results show that the use of different fertilizer source increased ($p < 0.05$) yields of all grain crops (in Burkina Faso) and maize, rice, sorghum, millet, cowpea and all vegetable crops (in Ghana). The application of crop and country specific recommended N rates significantly influenced ($p < 0.05$) yields of sorghum, cowpea and green beans in Burkina Faso and rice, sorghum, millet, cowpea and pepper in Ghana compared to low N application rates. The contribution of manure application timing on yield mostly differed between countries, such that high tendencies of increased yields were recorded when manure was applied for 0 to 3 weeks before planting (WABP) in Burkina Faso, while in Ghana, the highest yield improvements were observed when application periods exceeded 3 WABP. Not broadcasting fertilizer only increased ($p < 0.05$) yields of millet and green beans (in Burkina Faso) and vegetable crops in both countries. These results help improve our understanding of fertiliser practices in MCL systems of Ghana and Burkina Faso, and may help guide fertiliser management in these countries and similar ecologies in West Africa.

Keywords: Fertiliser application, mixed crop-livestock systems, vegetable crops