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Assessing the Welfare Impact of Biochar as a Soil Ameliorant on Urban Farmers in West Africa

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Abstract

Low soil fertility and high population growth rates have increased the incidence of food insecurity in Africa, particularly in sub-Saharan Africa. Urban agriculture, which supplies 60–90 % of the fresh vegetables consumed in West African cities, is also threatened by continuous conversion of farmland to settlements, thus aggravating the incidence of food insecurity. To enhance resource use efficiency in urban and peri-urban agriculture, UrbanFood^{Plus} (UFP), a research project funded by the German Federal Ministry of Education and Research (BMBF) under its programme GlobE (Securing the Global Food Supply), aims to assess the effectiveness of biochar to increase agricultural output in the West African cities of Tamale (Ghana) and Ouagadougou (Burkina Faso). As using biochar as a soil amendment is an uncommon practice among farmers so far, this study sets out to assess the welfare implications of adoption of this new technology from the perspective of urban producers through an *ex-ante* impact evaluation. Household-level data were collected through the administration of a structured questionnaire. Following a spatial, GIS-based sampling procedure, 168 open-space farmers in Tamale and 237 in Ouagadougou were randomly selected for interviews. In addition, focus group discussions with farmers were held in both cities. Study results indicate that on an average landholding (size: 650 m^2 in Tamale; 1740 m^2 in Ouagadougou), farmers will incur an initial costs of US$265 and US$707, respectively, to incorporate biochar in Tamale and Ouagadougou in the counterfactual situation. On-going field experiments suggest a significant, biochar-related yield increase for vegetables that are typically produced by urban farmers. These results are used to simulate the net welfare effect of biochar application from the perspective of urban farming households, considering the costs related to technology adoption. The focus group discussions highlighted farmers' difficulty in accessing organic and other soil ameliorants. Thus, markets for farm inputs, including biochar, need to be enhanced to sustainably meet the growing food needs of the population.

Keywords: Biochar, BMBF GlobE, food security, UrbanFood^{Plus}, welfare

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