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## Impact of agroecological practices on farm performance in Botswana

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### Abstract

Although agroecological techniques can help farmers establish sustainable agri-food systems, adoption of these practices is low, and evidence of their impact on farm performance is inadequate. Using data from 308 vegetable farmers at the farm level, this study assesses the adoption of agroecological practices and their effect on farm performance across four administrative districts of Botswana. The multivariate probit (MVP) model was used to understand the complementarity and/or substitutability of the key agroecological practices under consideration – mulching, cover cropping, afforestation, and minimum tillage, as well as their determinants. In addition, the direct-two stage least square (direct<sup>-2</sup>sls) within the framework of instrumental variable treatment effect regression (ivtreatreg) was used to get rid of any self-selection bias that might be present due to observed and unobserved characteristics. The findings revealed that cover cropping and minimum tillage, cover cropping and mulching, as well as minimum tillage and afforestation, were used as complementary agroecological practices by vegetable farmers in the study area. However, afforestation and mulching, as well as minimum tillage and mulching, were used as substitutes. Farmers’ decisions to practice these agroecological practices were influenced by a variety of socioeconomic, institutional, and farm-specific factors. Furthermore, the adoption of agroecological practices resulted in a significant increase in farmers’ net revenue and yield (indicators of farm performance), and farmers who did not adopt any of the practices would have been better off if they had. Thus, adopting at least one of the agroecological practices increased the adopters’ yield and net farm revenue by 29.8% and 15.3%, respectively, over what they would have obtained if they did not adopt. If non-adopters had adopted, their yield and net farm revenue would have increased by 31.6% and 14.7%, respectively. These findings have significant implications for stakeholders and will boost the campaign for the adoption of agroecological practices to improve farm performance and, consequently, farmers’ welfare.

**Keywords:** Agroecology, Botswana, farm performance