

EGU2020-20700

<https://doi.org/10.5194/egusphere-egu2020-20700>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Economic efficiency and physical effectiveness of erosion control systems towards their adoption in the Highlands of Rwanda

Jules Rutebuka<sup>1,4</sup>, Alfred R. Bizozza<sup>2</sup>, Désiré M. Kagabo<sup>3</sup>, Peter Vermeir<sup>5</sup>, and Ann Verdoodt<sup>4</sup>

<sup>1</sup>Rwanda Agriculture and Animal Resources Development Board, Land husbandry and Irrigation Research and Technology Transfer, Rwanda

<sup>2</sup>University of Rwanda, College of Agriculture and Veterinary Medicine (CAVM), Busogo Campus, P.O. Box 210 Musanze-Rwanda.

<sup>3</sup>International Center for Tropical Agriculture (CIAT), Kigali, Rwanda

<sup>4</sup>Ghent University, Department Environment, Coupure Links 653, 9000 Gent, Belgium

<sup>5</sup>Ghent University, Department of Green Chemistry and Technology, Valentin Vaerwyckweg 1, Schoonmeersen, 9000 Gent, Belgium

Despite huge efforts in soil and water conservations such as terraces, little or no evidence of economic efficiency and physical effectiveness is known. Thus, this study aimed to identify whether these investments are economically and technically viable and profitable for smallholder farmers. The economic surplus approach which is rooted in the Double-in-Difference approach was used to assess the economic performance of bench terraces (BT) on potato yields based on two sub-sample populations randomly selected from two datasets collected in two different periods (2004 and 2009) in the Congo-Nile divide (highlands) namely in Nyamagabe District. In terms of physical effectiveness of bench terraces, we compared traditional slope farming practice, referred to as non-protected plots (NP) against bench terraces (BT) in terms of runoff, soil and nutrient losses in the Beburuka highlands (Bureru District) using Wischmeier-type bounded erosion plots (22.2x5 m) at 43% slope gradient.

Our findings suggest improved land productivity associated with investment in bench terraces. Potato yields increase for the period 2004 to 2009 is about 60% on bench terraces compared to the change of 40% without BT. However, the change in yield cannot solely be attributed to the fact that a given household has terraced land (or not) but also other multiple variables determinants of the economic performance of household specific characteristics. On the other hand of physical effectiveness of bench terraces, results revealed that bench (BT) terraces effectively control erosion, once they are well established, managed and regularly maintained by land owners. Terraces effectively reduced runoff and soil and nutrient losses with more than 85 and 98%, respectively. Both assessments thus confirmed the huge potential of bench terraces to reduce soil erosion effects and improve land productivity when established within an integrated approach, paying attention to correct installation and fertility-supporting agronomic practices. Bench terracing proved to be most effective but with slow economic efficiency in Rwanda which influences its adoption.

