



Methodological Evaluation of Municipal Water Systems Yield Improvement in South Africa: A Randomized Field Trial Approach

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Abstract

Recent studies have highlighted the potential of municipal water systems to improve agricultural yields in South Africa. However, methodological rigor is essential for understanding these impacts accurately. A randomized field trial was conducted across two regions in South Africa, with a sample size of 50 fields per region. Randomization ensured that all variables except those under investigation were controlled to isolate the effect of municipal water systems on crop yields. Data analysis revealed a significant increase in average yield by 12% (95% CI: 6-18%) when utilising municipal water systems compared to non-intervention fields, demonstrating the potential for methodological improvements in evaluating agricultural interventions. The randomized field trial demonstrated that employing rigorous methodology can enhance our understanding of the impact of municipal water systems on South African agriculture. Future research should continue to refine and validate these methods to ensure reliable and consistent yield assessments from municipal water systems. municipal water systems, agricultural yield improvement, randomized field trials, methodological evaluation Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta (\xi)) + \lambda \operatorname{Vert} \theta \operatorname{Vert}^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, randomized controlled trial, econometrics, irrigation efficiency, water management systems, agrometeorology, precision agriculture*

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