



Methodological Evaluation of Regional Monitoring Networks in Senegal for Yield Improvement Measurement: A Randomized Field Trial

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Abstract

Recent developments in regional monitoring networks have shown promise for improving agricultural yields in Senegal through systematic data collection and analysis. A randomized field trial was conducted with 100 randomly selected agricultural plots distributed evenly across three major regions in Senegal. Each plot received standard input management practices, with one-third receiving additional inputs based on regional monitoring network recommendations. Data collection included yield measurements and environmental conditions at each site over a two-year period. The analysis revealed that the inclusion of regional monitoring network recommendations led to an average 15% increase in yield across all regions ($p < 0.05$), with significant variability observed between sites, suggesting the need for local adaptation and robust standard error adjustments. This study provides empirical evidence supporting the methodological effectiveness of regional monitoring networks in enhancing agricultural yields in Senegal, offering a structured approach to improve future yield measurement systems. Further research should focus on validating these findings across different crops and regions within Senegal, as well as exploring ways to enhance system scalability and cost-effectiveness. Agricultural Yields, Regional Monitoring Networks, Randomized Field Trial, Senegal 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, Geographic Information Systems, Sampling Theory, Randomization, Data Analytics, Precision Agriculture, Field Experimentation

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