



Effect of Climate Change on Yam Production in South-South Nigeria

V.O Amuwah¹, T.T Amos², W. Leal Filho³

1. Department of Agriculture and Natural Resources, Local Government Service Commission, P.M.B 5044-320241 Asaba, Delta State, Nigeria
2. Department of Agricultural and Resource Economics, School of Agriculture and Agricultural Technology, The Federal University of Technology, P.M.B 704-340252 Akure, Nigeria
3. Hamburg University of Applied Sciences, Ulmenliet20, D-21033 Hamburg, Germany

Key words: yam production, adaptation strategies, climate change

Agriculture is at the nexus of three of the greatest challenges of the 21st century – food security, climate change adaptation and climate change mitigation while critical resources such as; water, energy and land are becoming increasingly scarce (Beddington *et al.*, 2012). Humanity faces difficult tradeoffs in producing sufficient food to feed her growing population and stabilizing the climate system. Agriculture is by far, the sector most affected by climate variations, since short- and long-term effects of climate change have significant impacts on agricultural productivity, rural livelihoods, and food security (FAO, 2017). This is further buttressed by Parker, *et al.* (2019) who asserted that Agriculture is one of the sectors mostly affected by climate change. The need for an integrated approach to sustainably address the challenges of hunger, agricultural production and climate change which are key components of the UN Agenda 2030, the Sustainable Development Goals is expedient and calls for immediate action. According to Elijah *et al.* (2018) yam production in Nigeria seems to be the most vulnerable by the deleterious effects of climate change. Adequate knowledge of the adaptive processes by yam farmers would enhance assessments of its production and improve prospects for optimal results. This is very apt given the new initiative on yam exportation by Nigerian government as one of the major foreign income earner for the country.

This study sought to analyse the long- run relationship between yam yield and climate variables in the study area, compare the profitability level of yam production across the agro ecological zones and identify climate change adaptation strategies by yam farmers amongst others. To achieve these objectives, the study used both primary and secondary data and multistage sampling procedure was adopted. In all a total of eighty yam farmers were selected from each of the three agro-ecological zones in Cross River and Delta States, giving a sum total of two hundred and forty (240) respondents for the study. However a total of two hundred and sixteen (216) viable questionnaires were finally retrieved for analysis.

The results of the analysis revealed that yam production was dominated by male-headed households as majority (67.7%, 63.2% and 65.2%) of the yam farmers were male, in Cross River, Delta and pooled data respectively. The results of the time trend analysis of yam output in Cross River and Delta States revealed that the F-values were statistically significant at 1% level both at the linear and quadratic equations results.



Category 3 – Education, Awareness and Adaptation

The results of co-integration test using autoregressive distributed lag (ARDL) model revealed that in both Cross River and Delta States, maximum (CX1) and minimum (CX2) relative humidity are stationary at level, $I(0)$. However, yam output (CY), maximum temperature (CX3), minimum temperature (CX4) and rainfall CX5 are stationary at their first difference, $I(1)$. The results confirmed the presence of long run equilibrium between yam production and relative humidity, temperature and rainfall. The results of the short run dynamic coefficients associated with the long-run co-integration relationships indicated that the Error Correction Model (ECM) in the study area was statistically significant at 1% level and had a value of -0.006 and -0.081 for Cross River and Delta States respectively.

The results of the Profitability level of yam production across the Agro-ecological zones (Budgetary analysis) showed that yam production is profitable in all the three prominent agro ecological zones but comparatively, it is most profitable in the tropical rainforest zone, followed by the derived/guinea savannah zone then mangrove swamp zone. The return per gross farm income (total revenue) was ₦0.69, ₦0.65 and ₦0.57 for tropical rainforest, derived/guinea savannah and mangrove swamp zones respectively. Findings from the study on yam farmers' perceptions on climate change showed that majority, 65.7% and 57.8% of the sampled respondents claimed that temperature and rainfall respectively had been on increase over the years.

Based on the findings, it can be concluded that the anomalies of climate variables over the periods were responsible for the variations in yam production in the study area. Also, climatic variables, specifically temperature, rainfall and relative humidity were important factors that influenced the production of yam. Juxtaposing this with the global need to address key issues to end hunger, achieve food security and promote sustainable agriculture (SDG 2) in an environmentally friendly and climate-smart approach (SDG 13), it's imperative to critically look at the impediments and constraints across the borderlines with the common goal of addressing them as a cross-cutting issue. The study also concluded that the main adaptation strategies employed by the yam farmers are; planting different varieties, practicing crop diversification, mixed cropping/ farming, soil conservation techniques and move to different location. The study recommends amongst others, the need for conscious, systematic and sustainable efforts by Government, Civil Society Organisations and Individuals to sensitize and create more awareness on climate-smart and eco-friendly agricultural practices.

References

- Beddington, J.R., Asaduzzaman, M., Clark M.E., Fernandez, B. A., Guillou, M.D., Howlett, D. J. B., Jahn, M.M., Lin, E., Mamo, T., Negra, C., Nobre, C.A., Scholes, R.J., Van, B. N. and Wakhungu, J. (2012). What Next for Agriculture after Durban? *Science* 335: 289–290.
- Elijah S.T., Osuafor O. O. and Anarah S. E. (2018). Effects of Climate Change on Yam Production in Cross River State. *International Journal of Agriculture and Forestry*, Vol. 8 No. 2, 2018, pp. 104-111. doi: 10.5923/j.ijaf.20180802.09.
- FAO (2017). Migration, Agriculture and Climate Change. Reducing Vulnerabilities and Enhancing Resilience; Technical Report; United Nations: Rome, Italy. [Google Scholar]



Parker, L., Bourgoïn, C., Martinez-Valle, A., & Läderach, P. (2019). Vulnerability of the agricultural sector to climate change: The development of a pan-tropical Climate Risk Vulnerability Assessment to inform sub-national decision making. <https://doi.org/10.1371/journal.pone.0213641>.