

# Assessing the Impact of Climate Change on Postharvest Activities

Johnson OM, Owojaiye OB\*, Akinola-Soji B, Ayembo EO and Ayilara TJ

Research Outreach Department, Nigerian Stored Products Research Institute, Nigeria

ISSN: 2637-7659



**\*Corresponding author:** Owojaiye OB, Research Outreach Department, Nigerian Stored Products Research Institute, KM 3 Asa Dam Road, PMB 1489, Ilorin, Kwara State, Nigeria

**Submission:** 📅 June 25, 2024

**Published:** 📅 July 25, 2024

Volume 14 - Issue 3

**How to cite this article:** Johnson OM, Owojaiye OB\*, Akinola-Soji B, Ayembo EO and Ayilara TJ. Assessing the Impact of Climate Change on Postharvest Activities. Mod Concep Dev Agrono. 14(3). MCDA. 000836. 2024. DOI: [10.31031/MCDA.2024.14.000836](https://doi.org/10.31031/MCDA.2024.14.000836)

**Copyright@** Owojaiye OB. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

## Introduction

The warming of the climate system is unequivocal globally and the impact is felt the most in underdeveloped countries with limited implementation of mitigation and adaptation strategies. Locally, various sectors of the Nigerian economy are vulnerable to the impacts of climate change, including agriculture and the postharvest subsector. The nexus between postharvest agriculture and climate change is well-documented but often overlooked or sometimes downplayed. This review highlights the impact of changes in climate on postharvest activities as well as climate-smart adaptation strategies available to actors in the postharvest subsector.

Climate change is an increasing global concern and simply describes the change in the climatic condition of a place over a given period of time characterized by shifts in average conditions and in the frequency and severity of extreme conditions. These include the temperature, humidity, precipitation and wind. Natural events and human activities are believed to be causative factors to an increase in average global temperature. Undoubtedly, the reasons for climate change are largely caused by human activities as they often lead to the release of greenhouse gases into the air which has the ability to easily retain excessive heat in the earth space. Activities that involve inappropriate land use, burning of fossil fuels, including transportation and energy production, are increasing the concentrations of greenhouse gases (GHGs) in the atmosphere, trapping heat and causing global warming leading to climate change.

Changes in climate are known for notably extreme weather events, including increase in the prevalence of droughts, heat waves, extreme rainfalls and floods or dryness and water shortage, dust storms, tropical cyclones (typhoons or hurricanes), wildfires, melting of snow, and disappearance of river delta and coastal cities [1,2]. This unquestionably has grave consequences for biodiversity, environmental sustainability and human wellbeing. Climate change impacts ecosystems, livelihoods, human security and socio-economic development of societies, and has been defining the direction of human wellbeing and development Tuffuor et al. [3] for some time. Further, Onokerhoraye [4] asserts that the negative impacts of climate change currently reflect on the dwindling natural resources, including food, which generally affect human environment, economy, and health.

The postharvest subsector, like all aspects of agriculture, is significantly impacted by climate change as it is highly sensitive to trends in the average conditions of rainfall and temperature, which influences the global distribution of food crops. Fundamental climate change trends affecting agricultural activities have been delineated and they include a general increase in temperature; more frequent occurrence of dry spells and droughts; more frequent occurrence of high winds, storms, heavy precipitation events and flooding; more erratic rainfall; and increased rainfall amount and/or duration. The effects of climate change translate to expected decline in yields Iglesias et al. [5] and will exacerbate the fragility of global food production

systems and the natural resource base since farmers can no longer rely on historical averages of temperature and rainfall, making it harder for them to plan and manage production. Consequently, the value of harvested and traded commodities increases while the cost of not reducing these postharvest losses also increases. These, coupled with continuing high population growth and regional disparities in income, an additional 550 million people globally could be at risk of climate-related hunger by 2080, with 65 per cent of this increase occurring in Africa Parry et al. [6].

### Expected Impact of Climate Change on Postharvest Activities

Changes in climate are expected to lead to increased rate of crop drying in field and at home, and increased fire risk of the mature crop on field. It may also translate to faster reproduction of insect pests and diseases, that is, insects would have shorter lifecycles due to higher temperatures, resulting in more rapid build-up of insects and fungi in stored commodities. There is also the possibility of increased risk of fungal rot and mycotoxin contamination of stored products while pest and disease territories are expected to expand. The efficacy of active ingredients in certain grain protectants would also decrease and others increase above the desired levels. In storage, there may be higher pest incidence which increases the need for thorough storage structure hygiene and management of residual infestation prior to storing new crops. Also, increased pest reproduction and mobility that might lead to need to re-winnow, sort and re-treat grain midway through storage period as well as increased moisture migration and condensation resulting in rotting zones in grain bulks with excess free moisture. Finally, there is an increased risk of reduced seed viability.

### Climate-Smart Postharvest Strategies

Adaptation is defined as attempts to limit susceptibility to climate change impact. It differs from mitigation which is a means through which the causation of climate change can be curbed. It involves the action that people take in response to, or in anticipation of projected or actual changes in climate to reduce adverse impacts or take advantage of the opportunities posed by climate change [7]. It is a method of dealing with the symptoms to reduce the vulnerability of ecosystems to climate change and not the underlying causative factors. Adaptation begins with an evaluation of the diverse magnitudes of vulnerability in addition to assessment of the appropriateness of potential options for action. Widespread uptake of sustainable practices in agriculture and food supply chains both at the individual and community level is essential to meet current and future threats to food security and environmental resilience. Alternative agricultural practices, suitable in different regions, can reduce net GHG emissions while maintaining or improving yields and adapting to more extreme weather.

Climate-smart postharvest adaptation strategies include growing and/or storing crops and varieties which are less susceptible to postharvest pest attack; harvesting mature crops promptly; adequate and protected drying to recommended moisture level; maintenance of physical storage structures; careful store cleaning and hygiene; accurate estimation of food stock requirements; protection and monitoring of grain to be stored for more than three months; use of low GHG emission food preparation methods; understanding and applying basic food safety principles; increasing farmer access to market information and transport options; use of early warning seasonal forecasts to project impact of climatic conditions on food storage or marketing strategies; utilization of more water, energy and resource efficient processing, packaging and transport operations; and ensuring plant breeders evaluate postharvest as well as pre-harvest crop characteristics.

### Conclusion

The impact of climate on agricultural activities as a whole and on postharvest activities in particular are far-reaching as it affects harvesting and drying, pest and disease management, and storage. Inadequate institutional, political, and economic policies coupled with limited access to finance, technology, and resources reduce the capacity of value chain actors to adopt effective adaptation strategies. The use of climate-smart postharvest techniques as adaptation strategies would reduce vulnerability to the impact of changes in climate.

### References

1. Handmer J, Honda Y, Kundzewicz ZW, Arnell N, Benito G, et al. (2012) Changes in impacts of climate extremes: human systems and ecosystems, managing the risks of extreme events and disasters to advance climate change adaptation special report of the intergovernmental panel on climate change. Intergovernmental Panel on Climate Change, pp. 231-290.
2. Nava A, Shimabukuro JS, Chmura AA, Luz SLB (2017) The impact of global environmental changes on infectious disease emergence with a focus on risks for Brazil. *ILAR J* 58(3): 393-400.
3. Tuffuor K, Tenkorang E (2023) Effects of climate change on human security and sustainable development. *Resilient horizons: Building sustainable environments for climate adaptation and health*, pp. 159-172.
4. Onokerhoraye A (2011) Climate change and advocacy on adaptation strategies at the local level in Nigeria. Centre for Population and Environmental Development (CPED).
5. Iglesias A, Rosenzweig C (2010) Effects of Climate Change on Global Food Production.
6. Parry MN, Arnell P, Berry D, Dodman S, Fankhauser C, et al. (2009) Assessing the costs of adaptation to climate change: A review of the UNFCCC and other recent estimates. International Institute for Environment and Development and Grantham Institute for Climate Change, London, UK.
7. Ngigi SN (2009) Climate change adaptation strategies: water resources management options for smallholder farming systems in sub-saharan Africa. A study supported by the rockefeller foundation.