Extended Abstract
Please do not add your name or affiliation

Paper/Poster Title	***Innovation and challenges in the global bioeconomy: a case study of Ghana's emerging tropical fruit value web***

Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	***200 words max***
The transition to the bioeconomy is lauded as a means to transform industrial production and consumption in a sustainable way based on biomass, which will entail the restructuring of related sectors including agriculture, forestry and fisheries as well as chemistry, energy and biotechnology. Given that agriculture is an important source of biomass, our study focuses on understanding how this transition may present opportunities and challenges for important actors in agriculture: smallholders in the Global South. To understand the mechanisms through which the bioeconomy transition may impact smallholders, we analyze a case study of Ghana's tropical fruit sector, which represents potential economic growth but also unintended ecological and social consequences. We use semi-structured interviews with stakeholders and farmer focus groups and Grounded Theory following the Gioia Method to develop a theoretical construct for the evolving role of smallholders in the global bioeconomy. We find that challenges include knowledge gaps, low productivity, constrained market access, and cultural barriers. We find that opportunities include engaging in residue valorization and extension services. In turn, we develop a framework which shows how smallholders may be integrated into the global bioeconomy.	

Keywords	Ghana; bioeconomy; global value chains
JEL Code	Agriculture: Micro Analysis of Firms, Farm Households, and Farm Input Market Q12 see: www.aeaweb.org/jel/guide/jel.php?class=Q)

Introduction	***100 – 250 words***
The tropical fruit industry in Ghana is expanding with increasing integration into global markets and the bioeconomy. Ghana's economy is heavily reliant on agriculture,	

contributing to 35% of West Africa's GDP, with 60-70% of the total workforce employed in the sector. However, the predominantly rain-fed agricultural system faces increasing exposure to climate variability, characterized by unpredictable rainfall patterns, rising temperatures, and a heightened frequency of droughts and floods. At the same time, initiatives have arisen to transform organic waste into compost, dry fuel, biochar and biogas in sustainable business models. The transformation of linear value chains to multidimensional biomass value webs captures multiple pathways and considers the cascading effects of biomass utilization. For Ghana, the development of global value webs presents opportunities to be integrated within international markets as well as to introduce innovations related to new production technologies, logistics and organizational relations. Using a case study of Ghana's emerging pineapple value web, this study aims to identify the primary innovations and their associated challenges including institutional and governance issues related information asymmetry, financial interventions, human capital and uncertainty related to climate change. By understanding the challenges, the study aims to shed light on the potential of the emerging biomass value webs in Ghana.

Methodology	***100 – 250 words***

Using Grounded Theory following the Gioia Method, we conducted semi-structured interviews and focus group discussions along the coastal and eastern regions of Ghana, which comprise the so-called pineapple belt of the country and investigated common themes through inductive coding. This inclusive approach engaged various stakeholders across the tropical fruits value chain, with a specific emphasis on smallholders, who contribute to 70% of Ghana's agricultural production. Respondents included NGOs, food processing agencies, and public agents to provide a comprehensive understanding of the tropical fruit value chains, specifically pineapple and mango. The original interviews and focus groups were conducted in local languages and translated to English.

Results	***100 – 250 words***

The challenges identified include a lack of knowledge and information, low productivity, constrained market access, as well as cultural beliefs impeding the integration of new agricultural technologies. Climate change exacerbates these existing challenges by diminishing soil fertility, adversely affecting growing periods through heat waves, and causing destruction to plantations and transportation routes due to floods. This, in turn, intensifies the demand for innovative and sustainable adaptive mechanisms. Engaging in residue valorization, alongside the effective utilization of extension services, can open up new opportunities to reduce climate impacts and ultimately escape poverty by increasing smallholder income. The benefits of residue valorization can mitigate declines in soil fertility decline and reduce the burning of waste in fields. In turn, this could reduce indirect costs, while simultaneously creating economic value through the establishment of market connections for waste products.

Discussion and Conclusion	***100 – 250 words***

The findings of the study propose that tackling challenges through the distribution of knowledge and enhanced access to technologies and markets could foster the utilization of adaptation mechanisms, ultimately augmenting the productivity of smallholder farmers. Moreover, engaging in residue valorization introduces the opportunity to avoid disrupting traditional farming systems aligned with cultural and ethnic beliefs while concurrently serving as an adaptation strategy to climate change. The economic value generated directly from residue recovery, along with the indirect value derived from the enhanced income of smallholders, can in the end be used for reinvestment in innovative and sustainable agricultural production technologies. To achieve this, it is particularly crucial to disseminate information and knowledge among smallholders.