

## Extended Abstract

Please do not add your name or affiliation

<b>Paper Title</b>	Impacts of climate change on value chains of underutilized crops: a case study on perceived changes and responses of farms in Germany
--------------------	---

**Abstract prepared for presentation at the 97<sup>th</sup> Annual Conference of the Agricultural Economics Society, The University of Warwick, United Kingdom**

**27<sup>th</sup> – 29<sup>th</sup> March 2023**

<b>Abstract</b>	<b>200 words max</b>
<p>Food value chains experience severe impacts of climate change, whereas the farmers are those agents upstream who are most vulnerable to the climate change risks. The current study aims at understanding how farmers perceive climate change and its impacts, and how they build their coping strategies. This is done through a case study focused on farmers in Germany who grow lentils, buckwheat and eggplant – the underutilized crops in the German context. Qualitative, semi-structured interviews are used to answer the questions about how farmers in Germany perceive climate change impacts and what adaptation strategies they are using in response to these impacts. The results of this study are used to provide insights into behavioral intentions and predict behavioral changes in future. This can support the development of future scenarios that consider climate change related strategies and, in turn, the development of climate change focused policies.</p>	
<b>Keywords</b>	Climate change adaptation, food value chain, crop diversity, underutilized crops
<b>JEL Code</b>	Agriculture: Agriculture and environment Q15
<b>Introduction</b>	<b>100 – 250 words</b>
<p>Manifestations of changing climate become so prominent nowadays, that adaptation to changing conditions is on the agenda for most sectors of economy and a crucial question for the planning of future policies. Food sector and food value chains are not an exception here. Within a food value chain, farmers are the most vulnerable to the climate change risks (Hoffman and Schöpflin 2022, de Sá et al. 2019, Paloviita 2015).</p> <p>Understanding how farmers perceive climate change and its impacts, and how they build their coping strategies can provide insights into behavioral intentions and predict behavioral changes in future. This can support the development of future scenarios that consider climate change related strategies and, in turn, the development of climate change focused policies.</p> <p>Our aim in this article is to explore farmers' perceived climate change impacts and associated adaptation strategies through a case study focused on farmers in Germany*. The research questions are:</p> <ul style="list-style-type: none"><li>- How do farmers perceive climate change impacts?</li><li>- What adaptation strategies are farmers currently using in response to these impacts?</li></ul>	

Furthermore, this article discusses how this information can be helpful for developing future scenarios that take climate change projections into consideration.

\* This study is a part of the BIOVALUE project (HORIZON 2020) that focuses on underutilized crops within the agri-food value chains throughout Europe (BioValue 2022)

## **Methodology**

**100 – 250 words**

Qualitative, semi-structured interviews are used as the data collection approach within this study. German farmers who grow lentils, buckwheat and eggplant – the underutilized crops in the German context – are interviewed within December 2022 and January 2023. Each crop is represented by two or three farmers.

For this study, we focus on the following issues:

- Perceived climate change impacts: Farmers are asked to select from a list of aspects of climate change those that impact their agricultural activity and rank them according to the strength of these impacts (rank 1 for the strongest impact). The climatic change aspects offered include the most important parameters used in climate scenarios and refer to changing temperatures, precipitation and extreme events.
- Adaptation strategies and their cost: Farmers are asked to describe the strategies they use to cope with the impacts of climate change that they ranked in the previous question. Respondents are also asked to rank the identified strategies according to their cost (rank 1 for the most expensive).

The interview structure used within the study allows for insights into further factors that may affect strategies chosen, such as the size of the farm, the number of crops grown and their varieties, farming goals, objectives etc.

The interviews are conducted face-to-face in person or online via video-conference.

## **Results**

**100 – 250 words**

First of all, the results of this study will reveal which of the climatic change aspects are perceived by the interviewed farmers in Germany as the challenges that have the strongest impact on their agricultural activity. Secondly, the gained information will shed light on the adaptation strategies chosen by the farmers as response to these challenges.

These interview results will then be used to build a basis for a narrative related to farmers behavior within future scenarios. RCP 4.5 and RCP 8.5 climate change scenarios will be used to choose the parameters and the direction of future climatic changes predicted for Germany (German Environmental Agency 2021). The narrative on adaptation strategies ranked according to their cost will be arranged according to these climatic parameters.

## **Discussion and Conclusion**

**100 – 250 words**

The approach used within this study and its results can help policy to identify desirable scenarios and support the strategies that are identified as being most sustainable in accordance with the policy objectives.

Typical adaptation strategies to climate change used by farmers are the measures connected to crop diversity, such as diversification of the crop portfolio, adaptation of crop mixes and rotations, introduction of new crops or varieties that are better suited to conditions, as drought-resistant species, (e.g., Megersa et al. 2022, Meldrum et al. 2018). The results of this article will show to which extent the coping strategies used by the interviewed German farmers are corresponding or not to this trend. In this context, it can be also clarified if crop diversity approach and the use of underutilized crops could be a response to new climatic challenges within the considered case study in Germany.

**References:**

- BioValue (2022). BIOVALUE project webpage, available at: <https://www.biovalue-project.eu/>
- de Sá, M.M., de Souza, M.P.L., de Brito, R.P., and S.C.F. Pereira (2019) Supply chain resilience: the whole is not the sum of the parts. *International Journal of Operations and Production Management*, 40(1), pp. 92–115.
- German Environmental Agency (2021). *Climate Impact and Risk Assessment 2021 for Germany*. Dessau-Roßlau, October 2021.
- Hoffman, E. and Schöpflin, P. (2022). Climate Change Risk Assessment and Adaptation Measures in the Food Supply Chain—Perceptions and Responses of Buying Firms. In: Filho, W. L., Djekic, I., Smetana, S., & Kovaleva, M. (Eds.). *Handbook of climate change across the food supply chain*. Springer, pp. 285 - 304.
- Megersa, G. G., Jaleta, M., Tesfaye, K., Getnet, M., Tana, T., & Lakew, B. (2022). Perceived Climate Change and Determinants of Adaptation Responses by Smallholder Farmers in Central Ethiopia. *Sustainability (Switzerland)*, 14(11).
- Meldrum, G., Mijatović, D., Rojas, W., Flores, J., Pinto, M., Mamani, G., Condori, E., Hilaquita, D., Gruberg, H., & Padulosi, S. (2018). Climate change and crop diversity: farmers' perceptions and adaptation on the Bolivian Altiplano. *Environment, Development and Sustainability*, 20(2), 703–730. <https://doi.org/10.1007/s10668-016-9906-4>
- Paloviita, A. (2015) Food processing companies, retailers and climate-resilient supply chain management. In: Paloviita A, Järvelä M (Eds.). *Climate change adaptation and food supply chain management*. Routledge, pp 194–205.