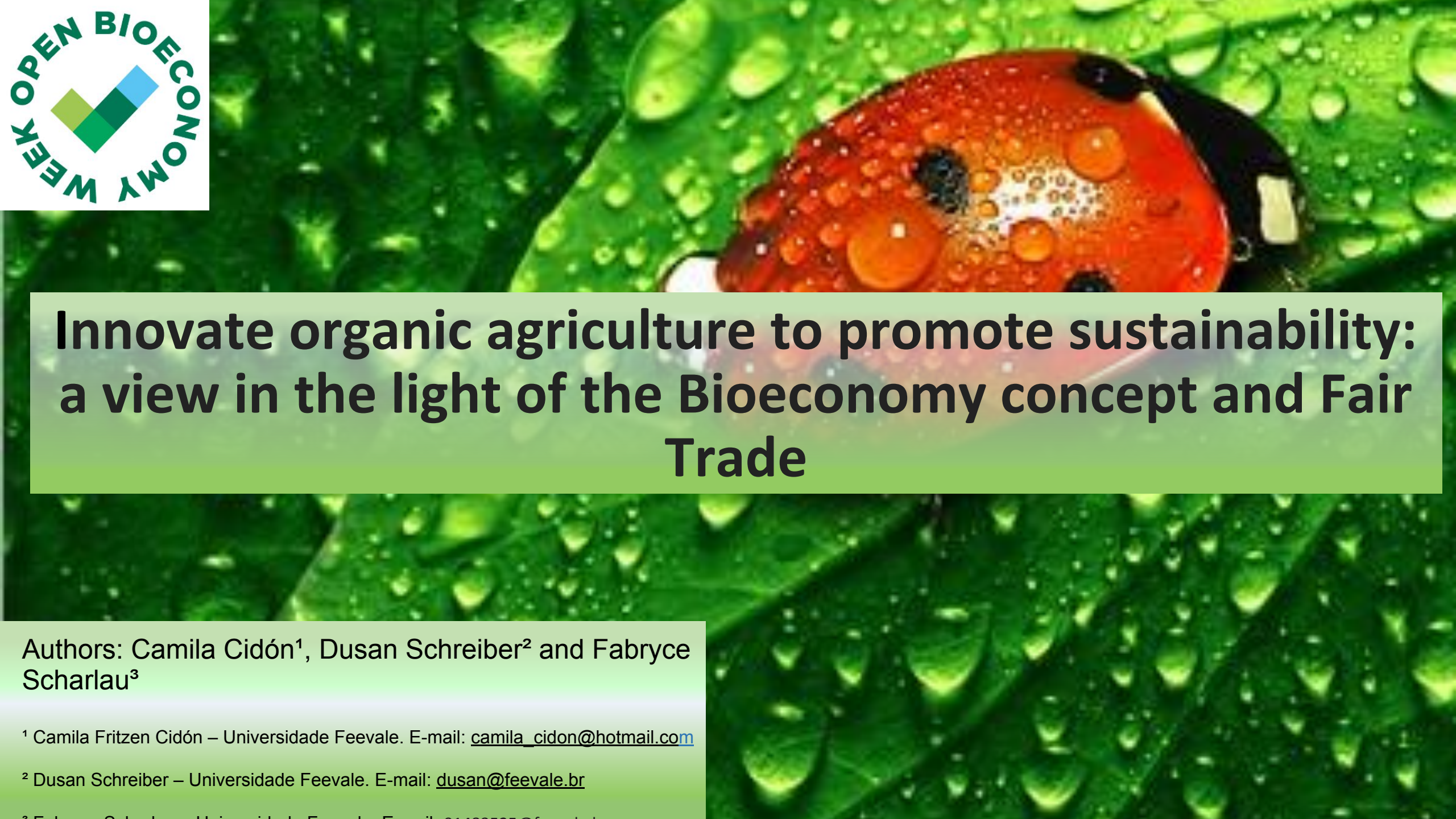
BIO:

Camila Fritzen Cidón is a master´s degree student, currently in the 3rd semester of Environmental Quality at FEEVALE University (Novo Hamburgo – Brazil). Her research interest is on Organic Agriculture, Agroecology, Soil Biodiversity and Crop management Technologies focusing in sustainability.

The following presentation is a research derived from the construction of the final dissertation for the master´s degree in Environmental Quality at FEEVALE, with the supervision of professors Dusan Schreiber and Paola Schmitt Figueiró.

FEEVALE is a community university located in Southern Brazil. Nowadays it has 11k students, engaged in 56 graduation and post-graduation courses, with highlight for 10 master and 4 doctorate courses.



Innovate organic agriculture to promote sustainability: a view in the light of the Bioeconomy concept and Fair Trade

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OBJECTIVE

- **Based on the Bioeconomic (BE) principles and the need to transform conventional agriculture into a more resilient system, our main objective is to answer the following question: Is Organic Agriculture capable of meeting the characteristics contained in the Bioeconomy Umbrella?**

- **To answer this question, we reviewed key aspects of BE and then conducted a systematic review of organic agriculture, prioritizing recent studies that converged with BE principles.**

JUSTIFICATION

- **The main challenge of this first half of the 21st century will be to reinvent current methods of producing food for new, more sustainable methods that could offer enough food for twice the world population, without compromising terrestrial ecosystems and, on the contrary, contributing to substantially regulate the climatic emergencies caused by global warming.**

- **As human needs tend to increase, but without being able to cause any more emissions of carbon dioxide into the atmosphere, there is a trend towards a transition to a sustainable bioeconomy, helping to reduce greenhouse gas emissions and our dependence on non-renewable resources.**

JUSTIFICATION

- The development of the bioeconomy will be an important determinant of sustainable agricultural productivity growth to meet food security goals and also to generate jobs and income.

Is organic agriculture capable of meeting the characteristics contained in the Bioeconomy umbrella?

MAIN TOPICS

- **Bioeconomy (BE) is the diversion of dependence on fossil fuel to a situation in which the use of biomass occurs, not only as a supplier of food, but also as raw material for the industry, including the supply of biodiesel. The big debate about the bioeconomy is its sustainability.**

- **BE proposes innovative solutions to help society live within its limits, seeking to decouple economic growth from environmental degradation. It has political resonance, helping nations to meet the requirements of existing policies or newly defined objectives, for example, related to the Paris Agreement.**

- **Fair Trade (FT) producers demonstrate a strong commitment to environmental sustainability from a long-term perspective and are encouraged to move toward organic production.**

- **FT addresses greater global challenges, such as the acceleration of global warming and the degradation of the environment, encouraging the use of natural inputs, without the addition of chemicals and substances that harm nature and people, from production to disposal.**

METHOD

- Systematic review method was carried out, following the sequence of these five consecutive phases: (1) formulation of interrogations; (2) location of the studies; (3) the selection of studies and assessments; (4) analysis and synthesis; (5) presentation of the results and (6) proposal of a framework.

1 Is organic agriculture capable of meeting the characteristics contained in the Bioeconomy umbrella?

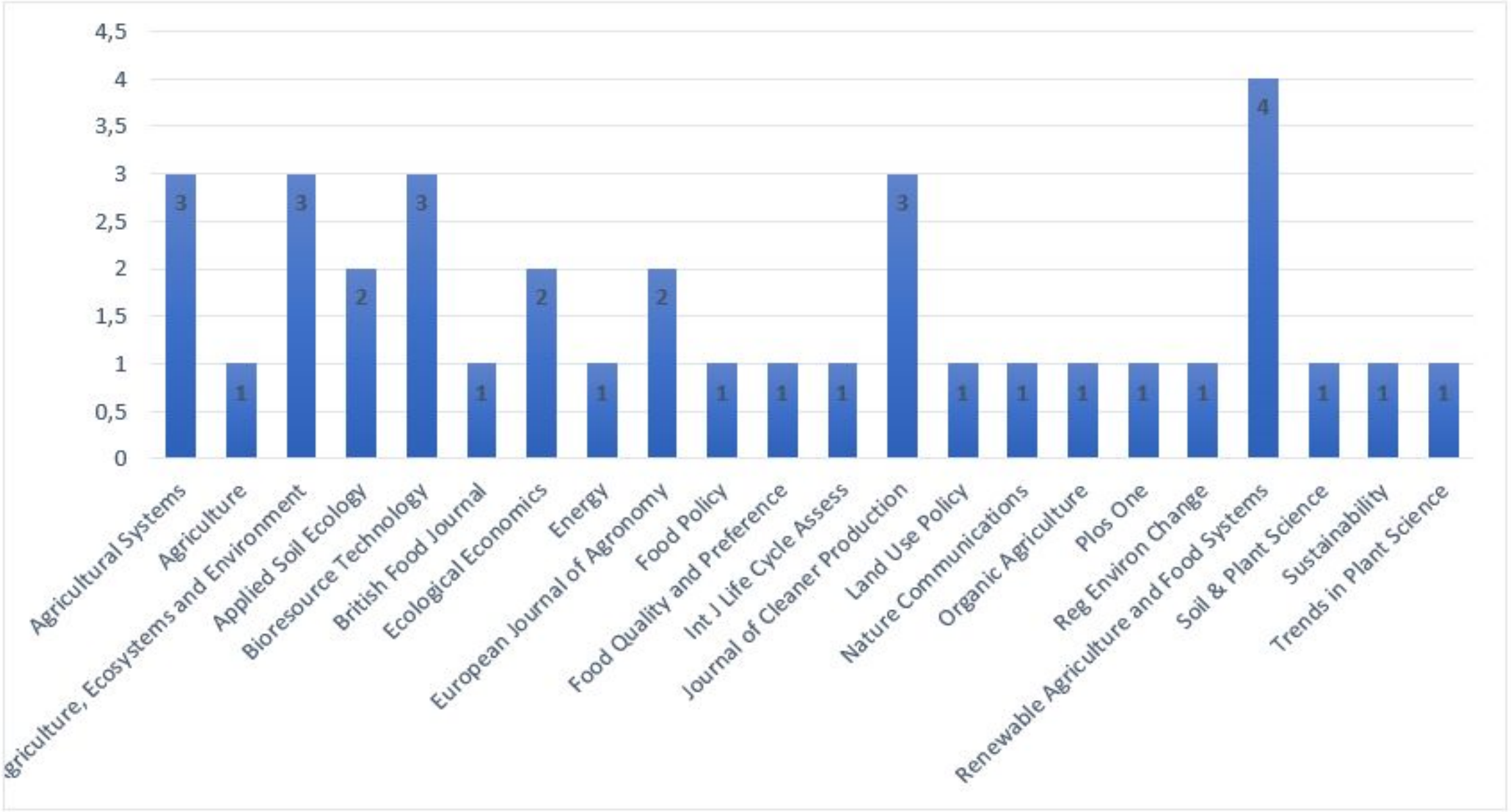
2 Sciverse SCOPUS database.

3 Selection of the studies by reading the abstracts

4-5 Articles related with the key issues of BE (8); related with OF + Sustainability (121)

Integral reading of articles and synthesis of the sustainability dimension, principles of BE and organic strategies

6 Construction of a framework containing the OF strategies which represents the principles of BE.



Graphic 1 - Journals distribution

Fig. 1 – Key aspects from BE based on the Sustainability dimensions

REFERENCES	ECONOMIC	ECOLOGIC	REFERENCES
(Rosegrant et al., 2013; Oni et al., 2019;)	Biotechnologies	Use of Water, Energy and Land Resources	(Rosegrant et al., 2013; Hertel et al., 2013)
(Rosegrant et al., 2013; Uzoh and Babalola, 2018)	Improved crop management	Biotechnologies	(Rosegrant et al., 2013; Oni et al., 2019;)
(O´Brien et al., 2017)	Life-cycle analysis	Improved crop management	(Rosegrant et al., 2013; Uzoh and Babalola, 2018)
REFERENCES	SOCIAL	Greenhouse Gas Emissions	(Sarkar et al., 2018)
(Mustalahti, 2018)	Well Being	Biomass efficient utilization	(Rosegrant et al., 2013; Uzoh e Babalola, 2018)
Devaney & Henchion, 2018	Education, Training and Clusters	Life-cycle analysis	(O´Brien et al., 2017)

REFLECTIONS

Fig. 2 – Methodological framework of Sustainable OF Strategies in the view

References	BE Key aspects	OF Strategies	References
(Mustalahti, 2018)	Well Being	Farmers who apply organic practices expressed a sacred relationship with land, and rejected actions such as the use of herbicides; the identity of coffee growers associated with place-based ties is boosted with the achievement of high quality of organic coffee production; OF are strongly attached to their method of production by conviction and values; Many farmers appreciate environmental integrity; OF enables smallholder farmers to improve their livelihood; OF ensure food safety for population; OF with an emphasis on local and indigenous knowledge	Monroy et al., 2016; Hermann et al., 2015; De los Rios et al., 2016; Altenbuchner et al., 2017; Jouzi et al., 2017; Kamau et al., 2019; Gomiero, 2018; Qiao et al., 2018
(Rosegrant et al., 2013; Hertel et al., 2013)	Use Water, Energy and Land Resources	Organic agriculture can to providing sufficient food and simultaneously reducing environmental impacts if it is implemented in a well-designed food system, with reduced animal numbers and animal product consumption, and when food wastage are addressed; organic soil management practices	Muller et al., 2017; Chocano et al., 2016; Jouzi et al., 2017; Gomiero, 2018
(Rosegrant et al., 2013; Oni et al., 2019)	Biotechnologies	OF use innovative approaches to implement conservation agriculture without herbicides; application of new techniques (reproduction, diseases management, breeding strategy, rewilding); vermicomposting; soil microbial technology applied in Rhizosphere	Peigne et al., 2015; Horrillo et al., 2016; Caproni et al., 2018; Andersen et al., 2015; Chattopadhyay, 2012; Nihorimbere et al., 2011

(Rosegrant et al., 2013; Uzoh and Babalola, 2018)	Improved crop management	Agroecological service crops were more prone to enhance the environmental performance by increasing recycling energy outflow; cover crop based reduced tillage; diversification of crop rotations by inclusion legumes in a cereal rotation; reen manure and legume-based catch crops contributed to enhancing yield	Miró et al., 2019; Silva and Delate, 2017; Canali et al., 2017; Feiziene et al., 2016; Lori et al., 2017; Chocano et al., 2016; Shah et al., 2017; Landry et al., 2019; Chun Lin et al., 2016
(O´Brien et al., 2017)	Life-cycle analyses	Life-cycle analyses is often used to estimate efficient conversion to OF	Hokazono and Hayashi, 2015; Tricase et al., 2018; Foteinis and Chatzisymeon, 2016
Devaney & Henchion, 2018		Common idea of OF proves to contribute to the cohesion of a network, to its progressive structuring, and this interaction is the necessary platform to produce innovation and local	Favilli et al., 2015; Delmotte et al., 2016; De los Rios et al., 2016
	Education, Training and Clusters	change; Engaging farmers, integrating participatory and modeling methods has potential to uncover tradeoffs, and to put the light on their associated costs and benefits for better informed decision making; Cooperative collective management together with a constant flow of knowledge and learning, contributes to create more sustainable and resilient agricultural models	

(Sarkar et al., 2018)	Greenhouse Gas Emissions	Lower total energy consumption in Agroecological service with crops under no-till roller crimper; Biogas integration in OF may contribute to renewable energy supply and reducing greenhouse gas emissions; Conservation tillage; Biogas driven machinery	Miró et al., 2019; Siegmeier and Blumenstein, 2015; Frankova and Cattaneo, 2018; Maier et al., 2017
(Rosegrant et al., 2013; Uzoh e Babalola, 2018)	Biomass efficient utilization	Biochar; Bioenergy across anaerobic digestion; Biodigestors	Chen et al., 2011; Zhang et al., 2016; Plaza et al., 2016; De Meester et al., 2012

CONCLUSION & DISCUSSION

BE technologies can be useful to OF in order to increase productivity, crop nutrition and improve ecosystem services provided by properties, to be resilient to the climate variations, and offer social benefits such as increased consumer welfare, with better conditions for farmers and animals to inhabit agricultural areas.

OF can be substantially balanced in its economic, social, cultural and environmental dimensions, contributing to a more sustainable future of growing climate challenges.

Through the systematic review of periodicals that deal with the principles of sustainability of organic agriculture, practices of social, economic and environmental innovations, we found evidence that there is a direct relationship between the principles of bioeconomic, the innovations of organic agriculture, with respect to the tackling climate change and promoting fair trade.

Verified limitation is the lack of validation of these techniques in a case study, which can be proposed as a future research route.

The validation of the framework will be necessary to better understand critical points and real benefits.

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