Circular Food Systems: Regional opportunities to mitigate greenhouse gas emissions

The Circular Food Systems Network kick-off workshop | 22nd & 23rd of June, 2021

Workshop report

1. Background: The CFS Network

The Circular Food Systems (CFS) network of the Global Research Alliance on agricultural greenhouse gases aims to develop an active international network of researchers in the field of circular food systems, where knowledge can be shared and collaboration between research groups can increase the development and implementation of circularity within the agri-food system.

On 22nd & 23rd June, 2021, the network was officially launched during an online kick-off workshop in which researchers and policy-makers explored regional opportunities of what a circular food system entails.

This report gives a summary of the start of the journey of the Circular Food Systems Network.

The objective of the CFS network is formulated as: *'To contribute to food security with mitigation of GHG emissions by circularity across the entire agri-food system.'*

We do that by:

- Bringing together, developing, and disseminating knowledge about circular food systems;
- Mobilising agricultural scientists to explore circularity within different agricultural systems focussing on GHG emissions
- Providing policy makers with methodologies and system designs for a climate-smart, circular food system

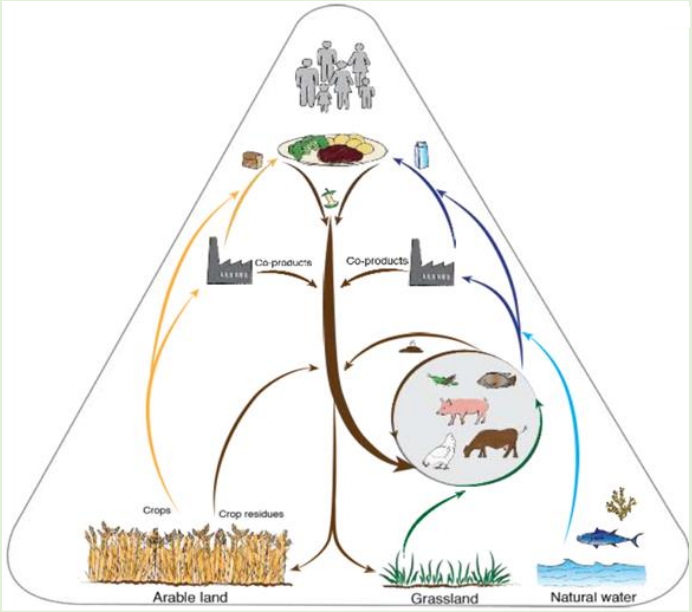
What a circular food system is, or could be, differs per region. Participants were asked to describe what a circular food system means to them in their region.

Please find a short movie of their visions here: https://youtu.be/nO0-NTX3lhU

Circular Food Systems

Circular food systems (CFS) are food systems in which waste streams are minimised and inevitable waste is utilised in processes of production of food, energy or non-food products. Such circular food systems apply practices and technologies that minimize the input of finite resources (e.g. phosphate rock, fossil fuel and land), encourage the use of regenerative ones (e.g. wind and solar energy), prevent leakage of natural resources from the food system (e.g. nitrogen (N), phosphorus (P)), and stimulate recycling of inevitable resource losses in a way that adds the highest value to the food system (De Boer and Van Ittersum, 2018; Van Zanten et al., 2019)[1].

Circular food systems may contribute to increased food security and reduction of GHG-emissions by increasing the resource security (use of waste streams reduces need for inputs e.g. land, water, fossil energy and nitrogen and phosphorus as mineral fertiliser), and by mitigating the net greenhouse effect of emissions from CH_4, CO_2, and N_2O during the different stages of the food systems both via direct mitigation interventions such as reduction of methane emissions and indirect mitigation interventions such as through additional carbon sequestration in soils and biomass. The benefits resulting from circular food systems go beyond mitigation of GHG-emissions and food security, and may also include increased biodiversity, and development of opportunities for ecosystem services.



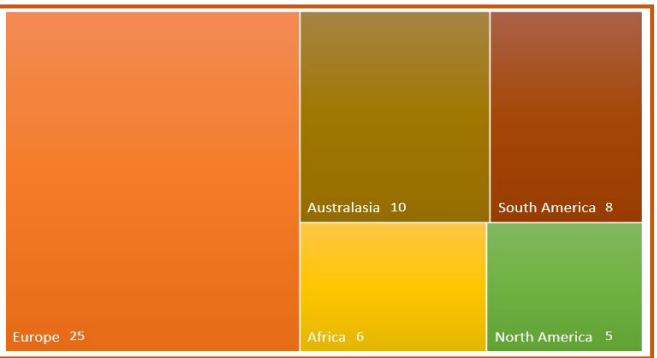
Circularity in food systems, visualised in Van Zanten et al. (2019) Global Food Security

[1] References: Boer, I.J.M. de, Ittersum, M.K. van (2018), Circularity in agricultural production. Mansholt lezing, September 2018.
Zanten, H.E. van, Ittersum, Martin K. van, Boer, Imke J.M. de (2019). The role of farm animals in a circular food system. Global Food Security 21: 18-22.

2. Kick-off workshop: Regional opportunities to mitigate greenhouse gas emissions

Through presentations from across the world and interactive working sessions, participants from 36 different countries discussed what circularity in the food system entails, how this may differ from region to region and what knowledge gaps future collaborations should focus on. The workshop looked for a common ground on what a circular food system is and how it can contribute to greenhouse gas mitigation. The workshop formed the base for the work of the network in the coming years, as well as for new collaborations around the world to research the opportunities for CFS in their region.

- Over 50 participants
- From across 5 continents
- Variety in backgrounds, majority is researcher with different expertise



INTRODUCTION TO THE GRA by Lee Nelson

To kick-off the workshop, Lee Nelson gave an introduction to the Global Research Alliance which the CFS network is part of. Currently, the GRA has 65 member countries and 24 partner organisations and focus points are formation of national networks wherein science and policy communities are connected. In this way, it seeks to integrate climate change into the research and innovation agenda and form a network where knowledge and lessons van be shared between countries.

Through the Integrative Research Group of the GRA, several networks have been established that focus on fostering collaboration between all research groups of the GRA to reduce greenhouse gas emissions intensity while improving the overall production efficiency within agricultural systems. Lee pointed out that he sees a role for the CFS network here, as we have the opportunity to better understand the role of circular systems in adaptation and mitigation of climate change through reducing GHG emissions and increasing the efficiency of resource use globally. International collaboration can allow scientists to retrieve results which would not be possible if working in isolation. Please find Lee's presentation here.

SETTING THE STAGE

Two key note speeches set the stage and elaborated on concepts of circular food systems, how these systems can contribute to food security, better use of resources and reduction of greenhouse gas emissions, as well as circularity in tropical agricultural systems and how challenges of circularity may differ in tropical regions.

Prof. Martin van Ittersum (Wageningen University & Research)

In his presentation, Prof. Martin van Ittersum outlined the impact of the global food system on land use, acidification, eutrophication, GHG emissions and water withdrawals. As an example, he zoomed in on the nitrogen input of farming systems from different regions, how the nitrogen use efficiency changes between these farming systems and how the nitrogen use efficiency of intensive dairy systems leads to a significant surplus of nitrogen/ha.

Martin pointed out answers to the question how we can produce food while respecting the planet cannot be found with a footprint approach, as it does not address feed-food competition or interlinkages in the system. In order to do so, three guiding principles have been presented for circular food systems:

> *"we have to rethink our food system, using a systems approach"*
>
> *Prof. Martin van Ittersum*

1. Use land as efficiently as possible: produce plant biomass for food
2. Avoid waste, and by-products should be recycled back into the system: with a proper prioritisation
3. Use animals for conversion of human inedible biomass into food: consequences for consumption

Lastly, a suggestion for an indicator on circularity in food systems has been presented: the Cycle Count or Circularity Count. For a dairy system, this would be the number of times a given nutrient enters the mouth of a cow before it is lost to the environment or exported as produce.

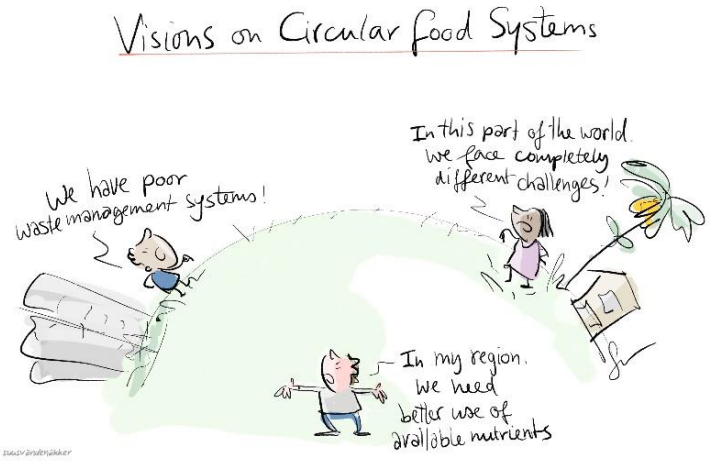
The full presentation can be found here.

Dr. Simon Fraval (University of Edinburgh)

Dr. Simon Fraval zoomed in on food systems in the tropics and how circularity can play a role in ensuring food security while taking care of the environment as well. Food systems in the tropics differ from other food systems, in terms of climatic conditions that influence production systems, species choice and potential yields. Additionally, populations in tropical regions are growing fast and poverty and food insecurity are major challenges to tackle.

So also when looking at circularity as a solution for sustainable systems, additional challenges like food security and poverty need to be taken into account, and linked to the SDGs.

After this introduction, Simon summarised interventions that enhance circularity in the food system by taking examples from the short communications that were submitted by participants of the workshop. These interventions were plotted in order to show the potential to conserve resources in relation to the timeframe of these interventions to wide-scale adoption. He then zoomed in on multiple themes and aspects of possible interventions, from short- and long-term solutions, to solutions focused on returning bio-waste and land-use.



Emphasis was put on possible food security trade-offs and how monitoring of these trade-offs is essential in order to measure the long-term benefits of specific circular interventions and systems, through showing various frameworks adopted from literature.

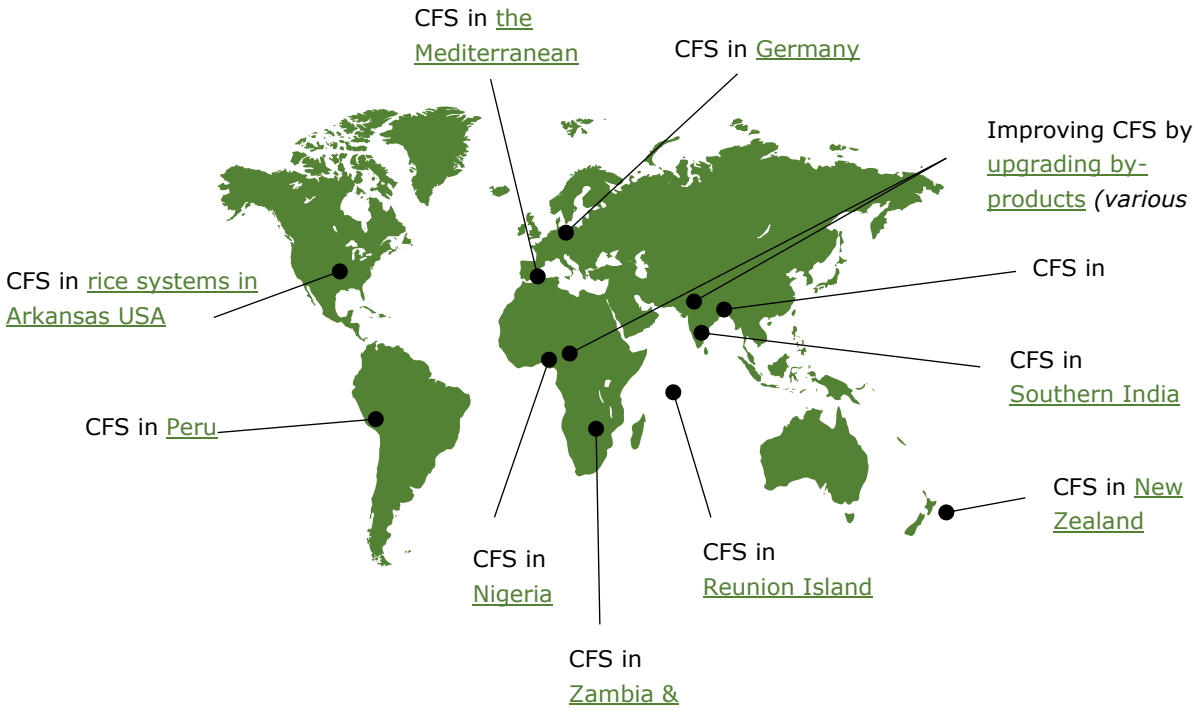
Through his presentation, Simon showed the potential solutions of circular food systems and the importance to monitor and evaluate these systems in terms of effectiveness and possible trade-offs with other issues in a specific region.

The full presentation can be found here.

Simon wrote a blog about the kick-off workshop and his key note speech. Please find it here.

CIRCULAR FOOD SYSTEMS AROUND THE WORLD

For circular agri-food systems to become the norm we need action at global, regional and local levels. Such a wide-scale transformation has the potential to mitigate environmental degradation, while improving economic mobility, human nutrition and social equality. Participants from all over the world were asked to provide their view on circular food systems in their region. These views underlined the differences between challenges and ideas of circularity around the world and formed a basis to formulate a common ground on circular food systems. Please find the links to their video's below.



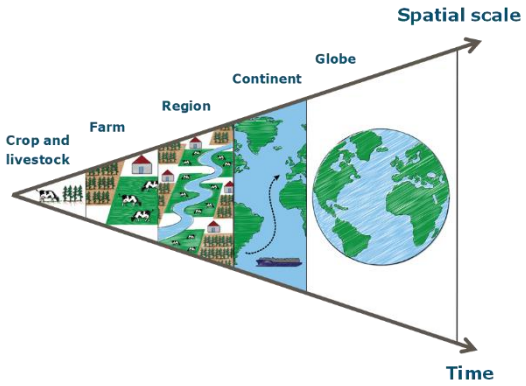
FINDING COMMON GROUND

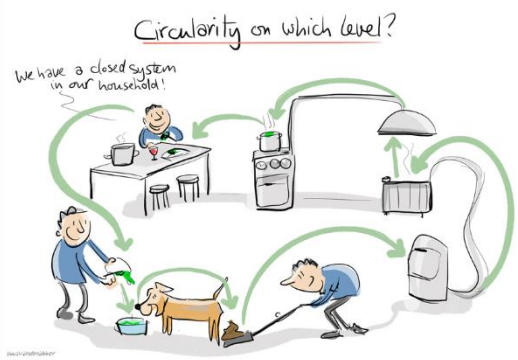
This kick-off workshop focused on various ideas of circular food systems and to discover examples of circular thinking from around the world. It aims to discover similarities and differences and find common ground as to what circular food systems entail. Through the presentations and the submitted abstracts and short communications, perspectives from all over the world were shared. The discussion, supported through the Mentimeter tool, gave an impression participants' ideas and perspectives on circular food systems.

From the discussion, we determined the following aspects as common ground for circular food systems:

Circularity: at which level?

Prof. Martin van Ittersum during his introductory key-note speech discussed the level at which circularity could be aimed for. Would circularity at global scale be feasible? And would it be more sustainable? Participants were asked their thoughts and opinion to achieve circularity in food systems. Most agreed circular food systems ideally have a regional focus.





Focus points for improving circularity

Next to the guiding principles presented by Prof. van Ittersum, participants were asked what, in their region, are focus points for improving circularity in food systems. The outcomes of the poll were to put most efforts on:

- Increase resource-use efficiency
- Minimise nutrient losses and food waste
- Recycle unavoidable waste streams back into the system

CFS in a wider context

The CFS network focuses, in line with the GRA objectives, on supporting mitigation of agricultural GHG emissions by improving circularity. Circular food systems do / could not only contribute to GHG mitigation, other important benefits CFS research should focus on are:

- Climate adaptation & resilience
- Income and jobs
- Food & nutrition security
- Biodiversity and nature
- Health

What is needed in future research?

Most of the time, knowledge gaps tend to focus on technical issues. Participants stressed that socio-economic and organisational aspects of CFS are equally important for innovations toward CFS are to bee successful. In addition, a good indicator or set of indicators for circularity need to be developed, and regional specific, to measure impact, effects and trade-offs.

Focus point of the network

As the kick-off workshop also meant the launch of the network, we wanted to hear from participants what their thoughts were on what the network should focus on, what participants wanted to bring to the network and how we should ideally stay connected. From this Mentimeter session, participants were mainly looking for collaboration, sharing ideas and knowledge and establish partnerships in research projects. Focus points of the network that stood out were facilitating joint research, data sharing and new research projects, sharing knowledge on circular food systems and connecting researchers with policy makers.

3. Future collaborations

The CFS network aims to increase collaboration between research groups to advance knowledge development, development and implementation of circularity within the agri-food system. During the second day of the kick-off workshop, the network held several time-zone and thematic workshops to deepen understanding of regional issues regarding CFS. In this way, participants could discuss the possibilities for future collaboration that could focus on a specific region and its challenges (in the time-zone workshops) or a case study focusing on a specific theme or aspects of a circular food system (in the thematic workshops).

The sessions were organised around one or more abstracts and short communications that were submitted for the workshop. From the time-zone workshops multiple ideas for future collaborations emerged. The CFS network will support several case studies on regional or topical circularity. An overview of the approved case studies will be published on the website soon.

Video links

1. Video link Bangladesh: https://youtu.be/RQTdEJ0FyGQ
2. Video link Germany: https://youtu.be/ARZ33jGyK6I
3. Video link Malawi-Zambia: https://youtu.be/v8LFh0-bD04
4. Video link Mediterranean: https://youtu.be/mQLUeVwNLjc
5. Video link New Zealand: https://youtu.be/8fuYKi8eoCw
6. Video link Nigeria: https://youtu.be/nz_M9CsqW0s
7. Video link Peru: https://youtu.be/L0VpqDL39Pc
8. Video link Reunion Island: https://youtu.be/8asSvsjJ4tI
9. Video link Southern-India: https://youtu.be/b1cbcUTfJxI
10. Video link USA Arkansas: https://youtu.be/XLuk7ZcYLn8
11. Upgrading of by-products: https://www.youtube.com/watch?v=T7DPd4p9sfM

More info: CFS network website

Colophon

Report of the online kick-off workshop of the Circular Food Systems Network, 22-23 June 2021

Authors: Flavia Casu & Karin Andeweg
Date: June, 2021
Illustrations: Suus van den Akker, a live cartoonist who attended the meeting
Please cite as: CFS Network, 2021. Circular Food Systems: Regional opportunities to mitigate greenhouse gas emissions. Kick-off workshop 22-23 June, 2021. Workshop report. Wageningen University & Research, Netherlands.

Acknowledgement: This workshop and its report was undertaken by the CFS Network to support the objectives of the Global Research Alliance on Agricultural Greenhouse Gases. The information contained within should not be taken to represent the views of the Alliance as a whole or its Partners.