



IN COOPERATION WITH



CREATING
A CIRCULAR
FUTURE

MELISSA Foundation

Conference Toulouse 8-9-10 November 2022
Bérangère Farges, Max Mergeay, Rob Suters



- **Education issues:**
 - POMP programme of PhD fellows: 5 PhD candidates have been recruited within the POMP3 program
 - Coordination with other MELISSA-oriented PhD fellows
 - MELISSA Summer University organization
- **Communications issues in collaboration with IDDUP (see IDDUP presentation)**
 - scientific production of the MELISSA Project
 - website of the MF: www.melissafoundation.org
- **Toulouse MELISSA conference support – November 8-10, 2022**

- **MOU Evolution: MELISSA Foundation has been informed of the MOU evolution especially related to MELISSA technology transfer issues**

=> possibility to welcome technology transfer of spin-off labeling via MELISSA Foundation has been positively received but as a consequence we need to think about the evolution of the MF statutes, the harmonization with SEMILLA IPStar, as well as the best definition of the processes

- **POMP = Pool Of MELISSA Ph.D. supported by ESA member states:**
 - ✓ Belgium
 - ✓ Romania
 - ✓ Italy
 - ✓ Ireland
 - ✓ Switzerland
 - ✓ Spain
 - ✓ France
 - ✓ United Kingdom
- **3 programs POMP up to now:**
 - ✓ POMP 1: 2016
 - ✓ POMP 2: 2018
 - ✓ POMP 3: 2021

- **Become a POMP student is:**
 - ✓ a PhD scholarship (4 years) or a postdoc (2 years)
 - ✓ 3 years in one of the best European Universities
 - ✓ 1 year within the MELISSA project in the laboratory of a MELISSA partner
 - ✓ the opportunity to integrate the MELISSA PhD pool, to attend the MELISSA conference, to participate to the MELISSA summer University, to benefit of ESA support to create Spin-off company, ...

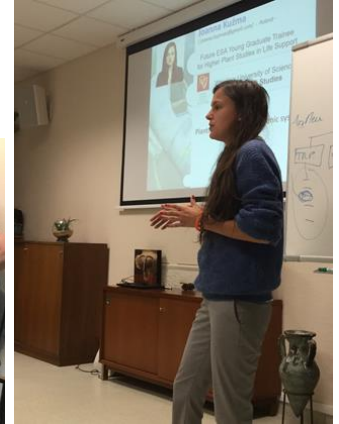
- 3 summer schools in the past :
 - ✓ POMP3: May 2022 in SOFIA (Bulgaria)
 - ✓ POMP2: 2019 Besse-et-St-Anastaise (France)
 - ✓ POMP1: 2016, Llanfranc (Spain)



Llanfranc



Besse-et-St-Anastaise





POMP & summer schools

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European Space Agency

MELISSA Summer School, Sofia, May 2022



- POMP 1 – 5 countries

Name (nationality)	Position	Subject	University	MELISSA partner	Current status
 Jolien De Paepe (B)	PhD	Preparing Nitrogen recycling Processes in the MELiSSA loop for operation in microgravity conditions by novel process control and sensing	U. Gent (Belgium)	UAB	PhD obtained in october 2020 (particip.to 8 public.)
Tom Sassen (NL)	PhD	Genetic stability of MELiSSA	U. Cork (Ireland)	SCK-CEN	Resignation ... but work continued in collaboration with SCK-CEN
 Seher Bahar Aciksöz Özden (TK)	Post-doc	Higher plant modelling of wheat root plasticity under nutrient deficiencies	ETH Zürich (Switzerland)	UCA	Finished (2018) (1publ.)
Radu Mircea Giurgiu (R)	Post-doc	From waste to taste: closing the MELiSSA loops under the framework of the Semilla Sanitation hubs project (LSS)	U. Cluj-Napoca (Romania)	IPStar	Finished(2018) (1 patent)



- Italy (UNApoli) : special MELiSSA program (C4b: plant compartment) with active collaboration with POMP countries

✓ 3 doctorates accomplished: Dr Luigi Izzo, Dr Christoph el-Nakhel, Dr Giuliana Senatore

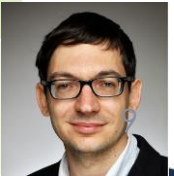
- POMP 1 – Italy (UNApoli): special MELISSA program (C4b: plant compartment) with active collaboration with POMP countries



Name (nationality)	Position	Subject	Current status	Publications
Luigi G. Izzo	PhD	Impact of light on plant growth: characterisation and modelling	PhD obtained	8
Christophe el-Nakhel	PhD	Nutrient delivery and water management for producing lettuce (<i>Lactuca sativa</i> L.) for bioregenerative life support systems .	PhD obtained	5
Giuliana Senatore	PhD	Impact of the exposure to simulated microgravity conditions on the probiotic <i>Lactobacillus reuteri</i> DSM 17938	PhD obtained	2







Name (nationality)	Position	Subject	University	MELISSA partner	Current status	Publications
 Carles Ciurans (ES)	PhD	MELISSA Overall Control Loop and Possible strategy	UAB (Spain)	UCA	Finished	3
 Valentin Faust (CH)	PhD	Alkalinity-limited urine nitrification for space application - Process stabilization	ETH Zürich (Switzerland)	U. Antw	In progress (to finish in june 2023)	2
 Ellen Harrison (UK)	PhD	The use of synthetic ecology for the provision of vitamin B12 for human consumption on long space missions	U. Cambridge (Great Britain)	U. Gent/U. Mons	In progress	
 Van Tinh Nguyen (Vietnam)	PhD	Definition and characterization of the metabolic interactions within the microbial community of the MELISSA waste degradation compartment C1	K.U.Leuven (Belgium)	UCA	In progress (to finish in february 2023)	1 + 1 in prep.
 Grace Crains (USA)	PhD	Hydroponic crop production with human derived waste products	ETH Zürich (Switzerland)	U. Gent	Resignation ... but an agreement has been found with ETH Zurich to provide deliverables	
 Pietro Guarato (I)	Post-Doc	Closing anthropogenic carbon loops: towards implementing a circular economy	U. Lausanne (Switzerland)	Sherpa	Finished (2021)	2 books



- Better stability of MELISSA R&D due to 4 years cycles which overcome the ESA ministerial cycle of 3 years
- Re-inforcement of MELISSA partners collaboration thanks to students exchanges: MELISSA has its own Erasmus Program!!
- Bibliography of the MELISSA project :
 - ✓ MELISSA topics and Space research involving all MELISSA partners
 - ✓ monthly updated on the MELISSA Foundation website managed by IDDUP
 - ✓ around 20 publications up to now for POMP1 & UNINA PhD (2017-2021)
- Creation of one spin-off: HYDROHM

- POMP 3 – 3 countries

Name (nationality)	Position	Subject	University	MELISSA partner	Current status
 Nele KIRKERUP (DE)	PhD	Urine COD reduction in the MELISSA loop - optimizing nutrient recovery from urine for space missions	ETH Zürich/EAWAG (Switzerland)	U. Antwerpen	In progress
 Iciar GIMENEZ DE AZCARATE BORDONS (ES)	PhD	More than nitrate: the importance of phosphate and cations availability from solid biowastes to complement nitrified urine for plant growth	ETH Zürich/Group of plant nutrition (Switzerland)	UNINA/ UCA	
 Laia VULART BACH (ES)	PhD	Impact of MEC integration in the MELISSA loop	UAB/MPP (Spain)	U Gent	
 Joanna KUZMA (Pol)	PhD	Improvement and validation of a mechanistic physical model for the prediction of mass transfer (gas/liquid, species) on/in higher plant growth in reduced gravity	UCA/Institut Pascal (France)	UAB/ETHZ	

Italy (UNApoli): special MELISSA program (C4b: plant compartment) with active collaboration from POMP countries

Name	Position	Subject	University	MELISSA partner
Stefania COZZOLINO	PhD	Plant root zone characterisation and modelling	UNINA (Italy)	Gent U. ETHZ UAB Guelph U.
Sara DE FRANCESCO	PhD	Radiation effects on plants	UNINA (Italy)	SCK-CEN
Arouna NAFIOU	PhD	Impact of light on plant growth: characterisation and modelling	UNINA (Italy)	UAB Gent U. Guelph U. UCA



Bibliography of the MELISSA project



European Space Agency

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- -MELISSA topics and relevant Space research involving all MELISSA partners
- -Monthly updated on the MELISSA Foundation website managed by IDDUP (communication)
- -up to now (11/2022): ~225 publications listed on the MF website.

<https://www.melissafoundation.org>

- The POMP project stimulates more and more interaction between the MELISSA partners and external partners from both academia and industry
- every POMP3 PhD student is now in contact with various MELISSA partners for a part of her/his project
- The whole MELISSA loop is addressed in the PhD projects and in the resulting manuscripts and publications (including the C1 compartment)
- Terrestrial relevance increasing
- POMP 4?

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THANK YOU.

www.melissafoundation.org

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