

Curriculum Vitae

Priv.-Doz.ⁱⁿ DIⁱⁿ Dr.ⁱⁿ Angela Sessitsch

Position in CoE: Member of the Board of Directors

Personal Details

Place of birth	Graz, Austria
Nationality	Austrian
Children	1 (2002)
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List of publications	ORCID: 0000-0003-0137-930X
Academic age	25 years since PhD



Research Institution

I am the **Head of the Bioresources** Unit of the [AIT Austrian Institute of Technology](#). AIT is Austria's largest **Research and Technology Organisation (RTO)** and an international key player in many of the research areas the institute covers. The institution is a leading center for industrial development. The Republic of Austria (through the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology) has a share of 50.46%, while the Federation of Austrian Industries owns 49.54% of the AIT Austrian Institute of Technology. AIT has seven Centers, and the Bioresources Unit is part of the Center of Health & Bioresources. The Bioresources Unit makes use of plant and microbial resources to **improve crop production** and to elaborate solutions for a **sustainable bioeconomy**. This particularly includes the development of solutions to reduce fertilizer and pesticide input and to increase **stress resilience via understanding plant and microbiome mechanisms** as well as developing specific microbial applications, formulations, and delivery technologies. The Unit investigates the ecology of microorganisms in the soil and plant environment, studies microbial mechanisms to interact with pathogens, to cope with and improve plant stress, and to degrade xenobiotics. More recently, the Unit has started to address the food system, such as the link between environmental health, nutritional quality, and human health. Here, also bioaerosol analysis is performed in relation to allergenicity-causing microorganisms and human health.

Academic Career and Positions Held

I obtained a **Master's degree in bio- and food technology** in 1990 (with distinction) from the Graz University of Technology, Austria and received my **PhD in Microbiology** from the **Wageningen University**, NL, in 1997. In parallel, I worked with the **International Atomic Energy Agency (IAEA)** and the **Food and Agriculture Organization (FAO)** (as Associate Professional Officer) on Biological Nitrogen Fixation developing kits and tools for technology transfer. This position was flanked with consultancies in Ghana, Mexico, and Brazil as well as a research stay at the Center for Molecular Biology in International Agriculture (CAMBIA) in Canberra, Australia. In 1997 I worked as a PostDoc with Prof. Willem de Vos on gut microbiota (Wageningen University, NL) before obtaining a **Hertha-Firnberg scholarship**, which I did at the Austrian Research Center, Seibersdorf, Austria. There, I started to pioneer **plant microbiomes**, in particular bacterial endophytes, and their plant beneficial effects. In 1998, I received the prestigious **APART fellowship** from the Austrian Academy of Sciences, which gave me independence and allowed me to initiate microbiology research activities on a broader scale at the **Austrian Research Center**, where I obtained a position as **Scientist** in

2002. In 2002/2003, I had a short maternity break and obtained my **habilitation** (*venia docendi*) in **2003** at the **Vienna University of Natural Resources and Life Sciences (BOKU)**. In 2004 I was offered the position of the **Unit Head of the Bioresources Unit**. I am responsible for the strategic development of the Unit, financial viability, research performance and personnel development.

I furthermore act as member of **Scientific Advisory Boards** of academic institutions (e.g., Netherlands Institute of Ecology) as well as of major international collaborative projects and companies (e.g., LavieBio, IL; AphaBio, BE), providing scientific and strategic advice. I have been President/Vice-President of the **Austrian Association of Molecular Life Sciences and Biotechnology** (ÖGMBT, >1,400 academic and industry members). I also have initiated the Working Group “Plants and Microbiomes” of the European Plant Sciences Organization (EPSO) and am member of the Leadership Team of the **Global Initiative of Crop Microbiome and Sustainable Agriculture** as well as a member of the Board of Directors of the International Phytobiomes Alliance. From 2003–2006, I was a member of the **Scientific Panel on GMO of the European Food Safety Agency (EFSA)** and from 2006–2010 I served as an ad-hoc expert for the same Panel.

Main Research Areas and Most Important Research Achievement

Main Research Areas. My key research interest is on the **ecology and functioning of plant microbiomes**. Additional research topics include **soil microbial diversity and functioning**, in particular in regard to methane oxidation, bioremediation of organic xenobiotics and phytoextraction of heavy metals. Furthermore, my research team developed **molecular tools** for the identification, quantification and typing of food pathogens, in particular DNA-based microarrays for the detection and (sero)typing of *Salmonella* and other prominent food/water pathogens, all subject of **patents/patent applications**.

Most important research achievements. I performed research on plant microbiomes at a very early stage and particularly addressed the role of **bacterial endophytes** at a time in which most microbiologists considered healthy plants to be (internally) sterile. Here, I investigated the diversity, colonization routes, impact of stress and specifically targeted active endophytes by using **RNA-based methods and SIP** at an early stage. Together with the Joint Genome Institute (JGI) I sequenced the first endophytic microbiome (of rice roots), still with a Sanger sequencing approach and technically challenging because of the presence of plant DNA. In the last years, we particularly addressed the **microbiome of plant seeds**, a topic which has been poorly investigated. We could elucidate important functions and transmission routes, one of them leading to a patent, which is further explored by companies. Based on this know-how, we further developed a new, seed-based microbial delivery technology, which is further advanced within a **spin-off company (ensemo GmbH)**. Overall, together with my research group, I obtained better understanding of plant-microbiome interactions, especially in regard to the biocontrol of plant pathogens and to improving stress resilience of plants. To date, I have authored **>200 publications**, which mostly appeared in high-ranking scientific journals.

As Unit Head at AIT, I am responsible that research is translated into applications, partly together with the industry. In this regard, we developed novel microbial applications, which are licensed to industry partners and widely used in agriculture, particularly in the US and South America. I accompanied the founding process of the spin-off ensemo GmbH, which has been taken over by two of my team members. In the last four years, I have led the **EU-funded international *Coordination & Support Action Microbiome Support*** in which we, together with academic, policy and industry stakeholders, identified burning issues and needs to implement microbiome research and innovation for a sustainable bioeconomy in the EU and beyond. Besides elaborating a strategic research and innovation agenda and policy recommendations, we addressed technical challenges with the research community and were widely active in dissemination activities.

Scientific contribution to the CoE. With my understanding on plant microbiomes and application requirements I will contribute to our cluster by leading a research project to investigate the **role of plant microbiomes for N and P nutrition** of plants and elaborate new application approaches. In addition,

I will participate in projects assessing the role of plant and soil microbiomes for **pathogen control** and more specifically investing some of the involved mechanisms as well as in a project, which addresses the environmental applications and effects of **nanomaterials**.

10 Most Important Publications (*relevant for the CoE)

Denotes equal contribution

1. *D'Hondt, K.; Kostic, T.; McDowell, R.; Eudes, F.; Singh, B. K.; Sarkar, S.; Markakis, M.; Schelkle, B.; Maguin, E.; **Sessitsch, A.** Microbiome Innovations for a Sustainable Future. *Nat Microbiol* **2021**, *6* (2), 138–142. <https://doi.org/10.1038/s41564-020-00857-w>.
2. *Compant, S.; Samad, A.; Faist, H.; **Sessitsch, A.** A Review on the Plant Microbiome: Ecology, Functions, and Emerging Trends in Microbial Application. *Journal of Advanced Research* **2019**, *19*, 29–37. <https://doi.org/10.1016/j.jare.2019.03.004>.
3. *Berg, G.; Rybakova, D.; (30 authors); **Sessitsch, A.**[#]; Schloter, M[#]. Microbiome Definition Re-Visited: Old Concepts and New Challenges. *Microbiome* **2020**, *8* (1), 103. <https://doi.org/10.1186/s40168-020-00875-0>.
4. ***Sessitsch, A.**; Pfaffenbichler, N.; Mitter, B. Microbiome Applications from Lab to Field: Facing Complexity. *Trends in Plant Science* **2019**, *24* (3), 194–198. <https://doi.org/10.1016/j.tplants.2018.12.004>.
5. *Mitter, B.; Brader, G.; Pfaffenbichler, N.; **Sessitsch, A.** Next Generation Microbiome Applications for Crop Production — Limitations and the Need of Knowledge-Based Solutions. *Current Opinion in Microbiology* **2019**, *49*, 59–65. <https://doi.org/10.1016/j.mib.2019.10.006>.
6. *Brader, G.; Compant, S.; Vescio, K.; Mitter, B.; Trognitz, F.; Ma, L.-J.; **Sessitsch, A.** Ecology and Genomic Insights into Plant-Pathogenic and Plant-Nonpathogenic Endophytes. *Annu. Rev. Phytopathol.* **2017**, *55* (1), 61–83. <https://doi.org/10.1146/annurev-phyto-080516-035641>.
7. *Mitter, B.; Pfaffenbichler, N.; Flavell, R.; Compant, S.; Antonielli, L.; Petric, A.; Berninger, T.; Naveed, M.; Sheibani-Tezerji, R.; von Maltzahn, G.; **Sessitsch, A.** A New Approach to Modify Plant Microbiomes and Traits by Introducing Beneficial Bacteria at Flowering into Progeny Seeds. *Front. Microbiol.* **2017**, *8*. <https://doi.org/10.3389/fmicb.2017.00011>.
8. *Hardoim, P. R.; van Overbeek, L. S.; Berg, G.; Pirttilä, A. M.; Compant, S.; Campisano, A.; Döring, M.; **Sessitsch, A.** The Hidden World within Plants: Ecological and Evolutionary Considerations for Defining Functioning of Microbial Endophytes. *Microbiol Mol Biol Rev* **2015**, *79* (3), 293–320. <https://doi.org/10.1128/MMBR.00050-14>.
9. *Brader, G.; Compant, S.; Mitter, B.; Trognitz, F.; **Sessitsch, A.** Metabolic Potential of Endophytic Bacteria. *Current Opinion in Biotechnology* **2014**, *27*, 30–37. <https://doi.org/10.1016/j.copbio.2013.09.012>.
10. ***Sessitsch, A.**; Hardoim, P.; Döring, J.; Weilharter, A.; Krause, A.; Woyke, T.; Mitter, B.; Hauberg-Lotte, L.; Friedrich, F.; Rahalkar, M.; Hurek, T.; Sarkar, A.; Bodrossy, L.; van Overbeek, L.; Brar, D.; van Elsas, J. D.; Reinhold-Hurek, B. Functional Characteristics of an Endophyte Community Colonizing Rice Roots as Revealed by Metagenomic Analysis. *MPMI* **2012**, *25* (1), 28–36. <https://doi.org/10.1094/MPMI-08-11-0204>.