



AQUACOMBINE

Final conference, Esbjerg, Denmark, November 21, 2023



Funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 862834. Any results of this project reflect only this consortium's view and the European Commission is not responsible for any use that may be made of the information it contains.

PANEL SESSION I: CULTIVATION OF HALOPHYTES

How to cultivate halopyhtes indoor and outdoor - Pros and cons, challenges and differentiation of options

11.20-12.00 CET, AUDITORIUM C1.119

MODERATION AND IMPULSE



PROF. DR. JUTTA PAPENBROCK
LEIBNIZ UNIVERSITY HANNOVER

PANEL



RUI MIRANDA ROCHA
RIARESEARCH, UNIPESSOAL, LDA



FLÁVIA DUARTE
EUROPEAN SALINE FARMER'S
ASSOCIATION/ADRAL/IRRADIARE



FARMER, OWNER OF SALINE LAND

Plants can be cultivated in different ways: in a nutrient solution, in several substrates and in soil. Each cultivation technique has pros and cons, also dependent on the climatic conditions, the plant species and the purpose of the crop plants. Halophyte cultivation provides additional challenges. After a short introduction we will highlight project results and discuss several aspects from different perspectives with the diverse panel.



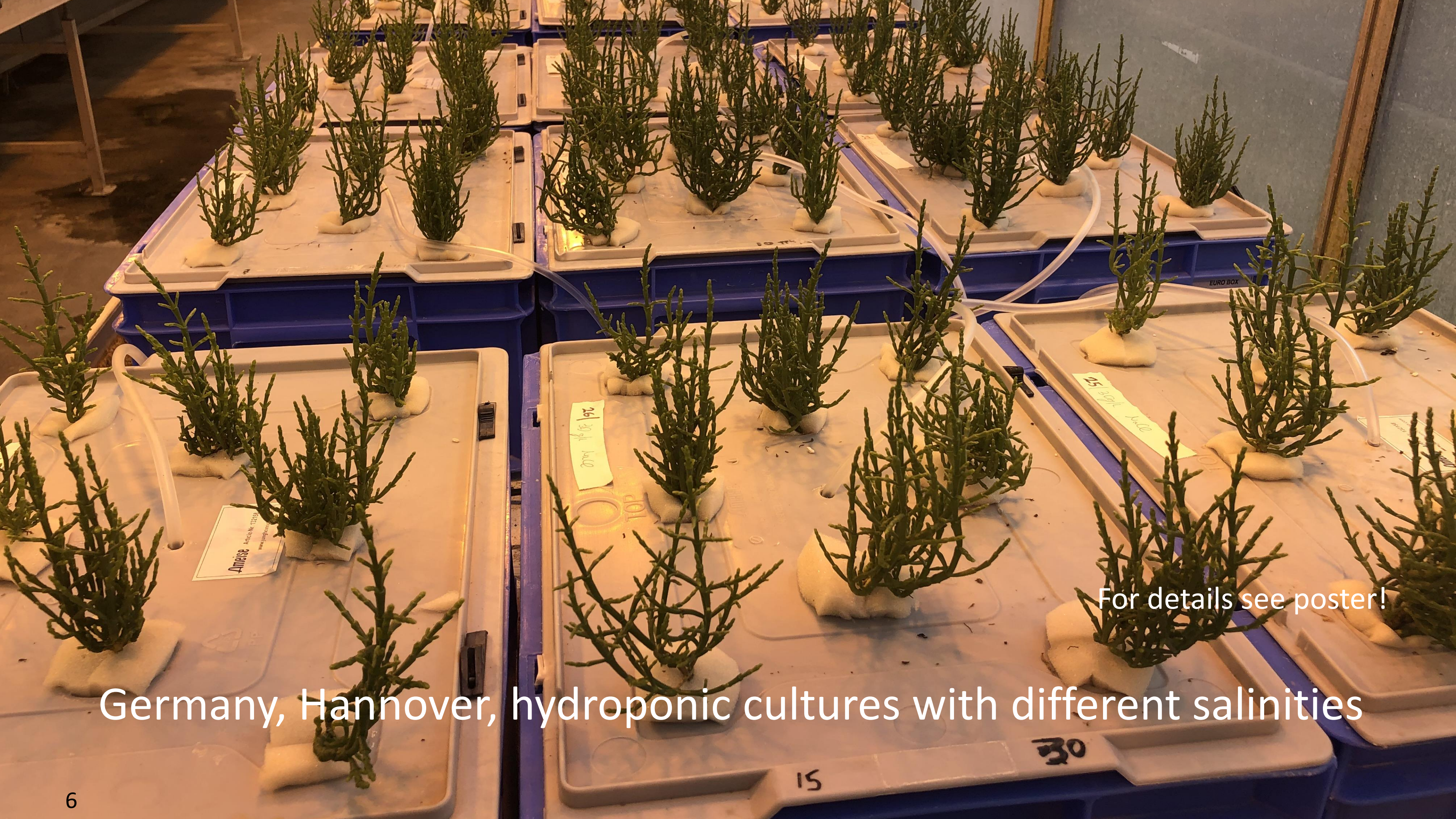




France, La Turballe, previously used for salt collection from the sea



Portugal, Aveiro, irrigated with aquaculture effluents



Germany, Hannover, hydroponic cultures with different salinities

For details see poster!

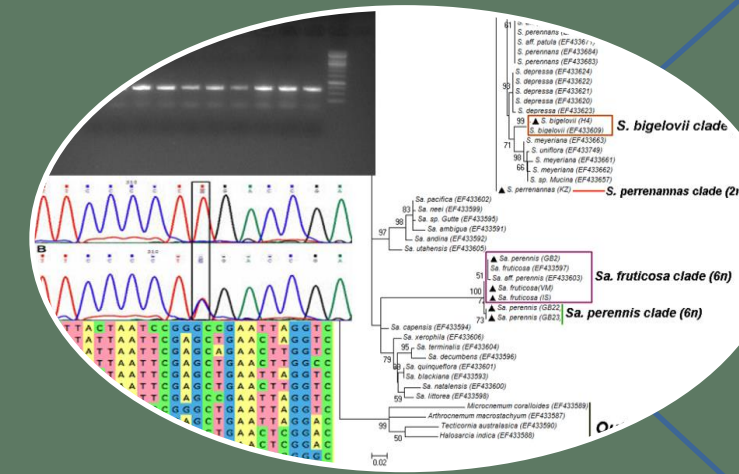
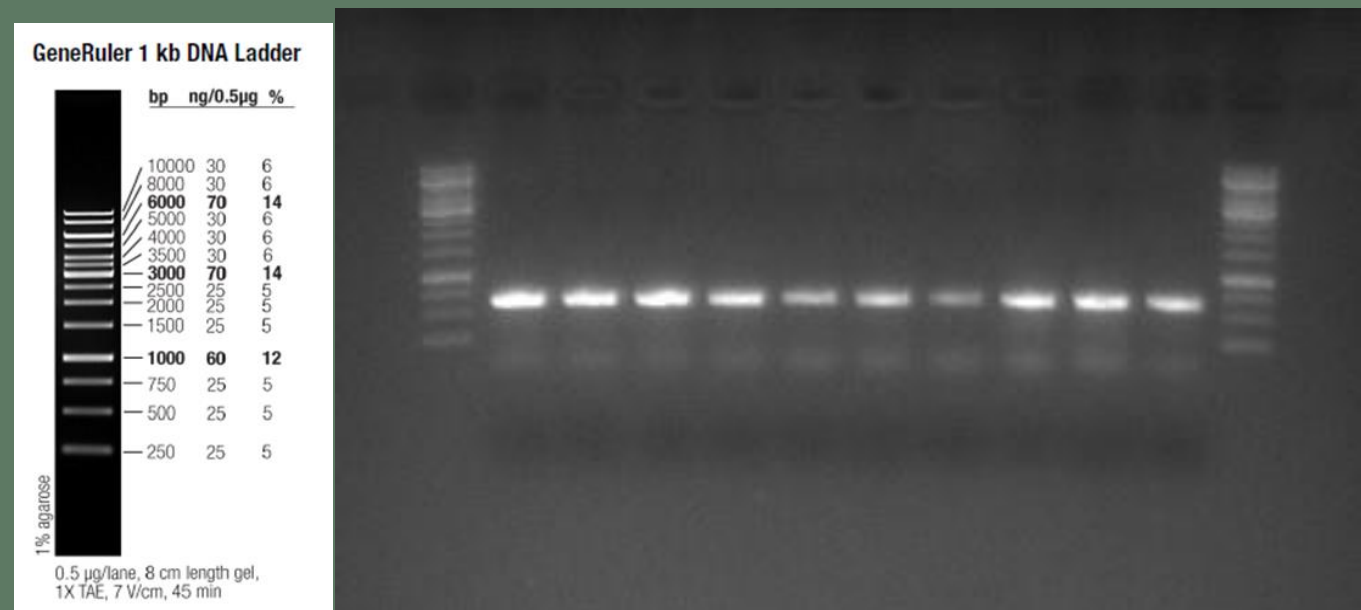
CHALLENGES

- Species
- Seed material
- Cultivation optima, also for biorefinary purposes
- Biomarkers for stress and certain traits
- Best time point for harvesting
-

7



SPECIES DETERMINATION BY MOLECULAR TOOLS



AAU

- *Salicornia* material for species determination

RSR

- *Salicornia* material for species determination

LDM

- *Salicornia* material for species determination
- Seeds/material for species determination



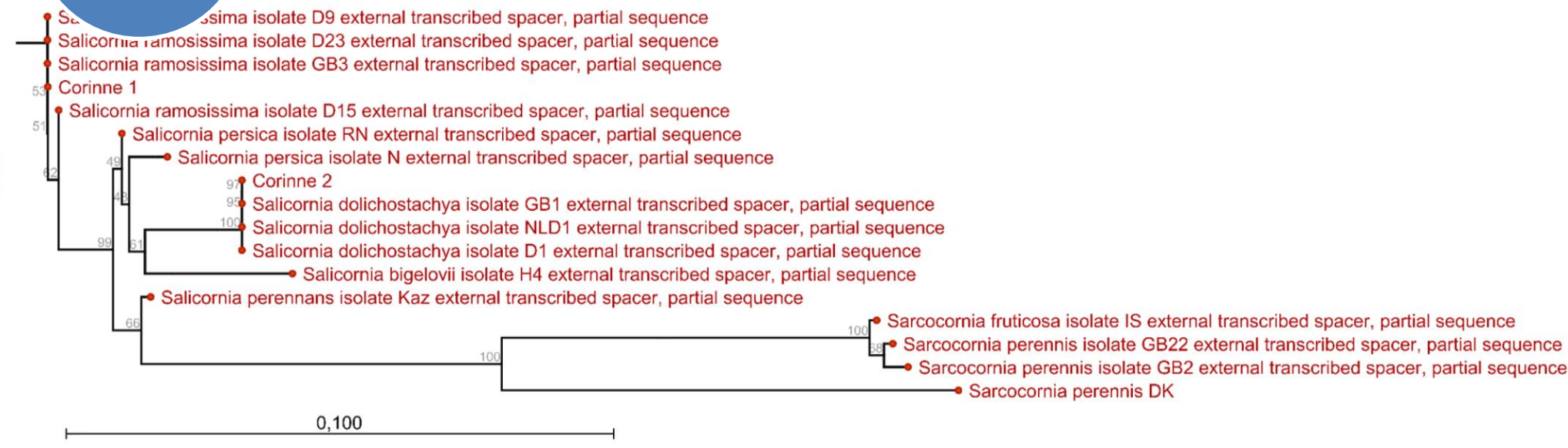
For details see poster!



SPECIES DETERMINATION BY MOLECULAR TOOLS

LDM

Salicornia dolichostachya, *S. procumbens*,
S. ramosissima



RSR

Salicornia ramosissima

AAU

Salicornia dolichostachya

AAU

• *Salicornia* material for species determination

RSR

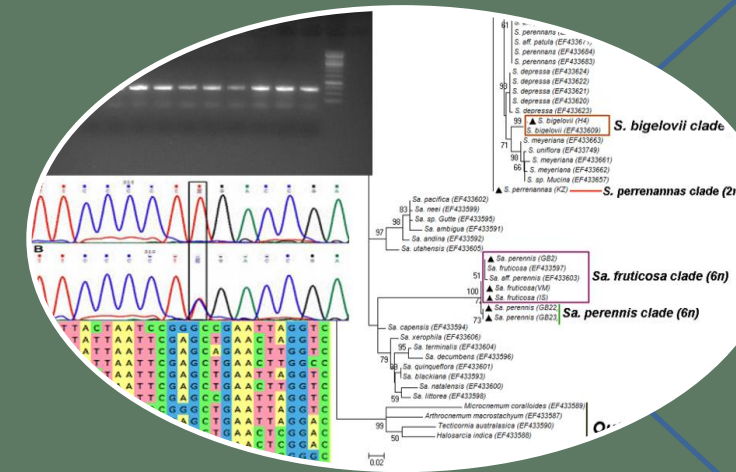
• *Salicornia* material for species determination

LDM

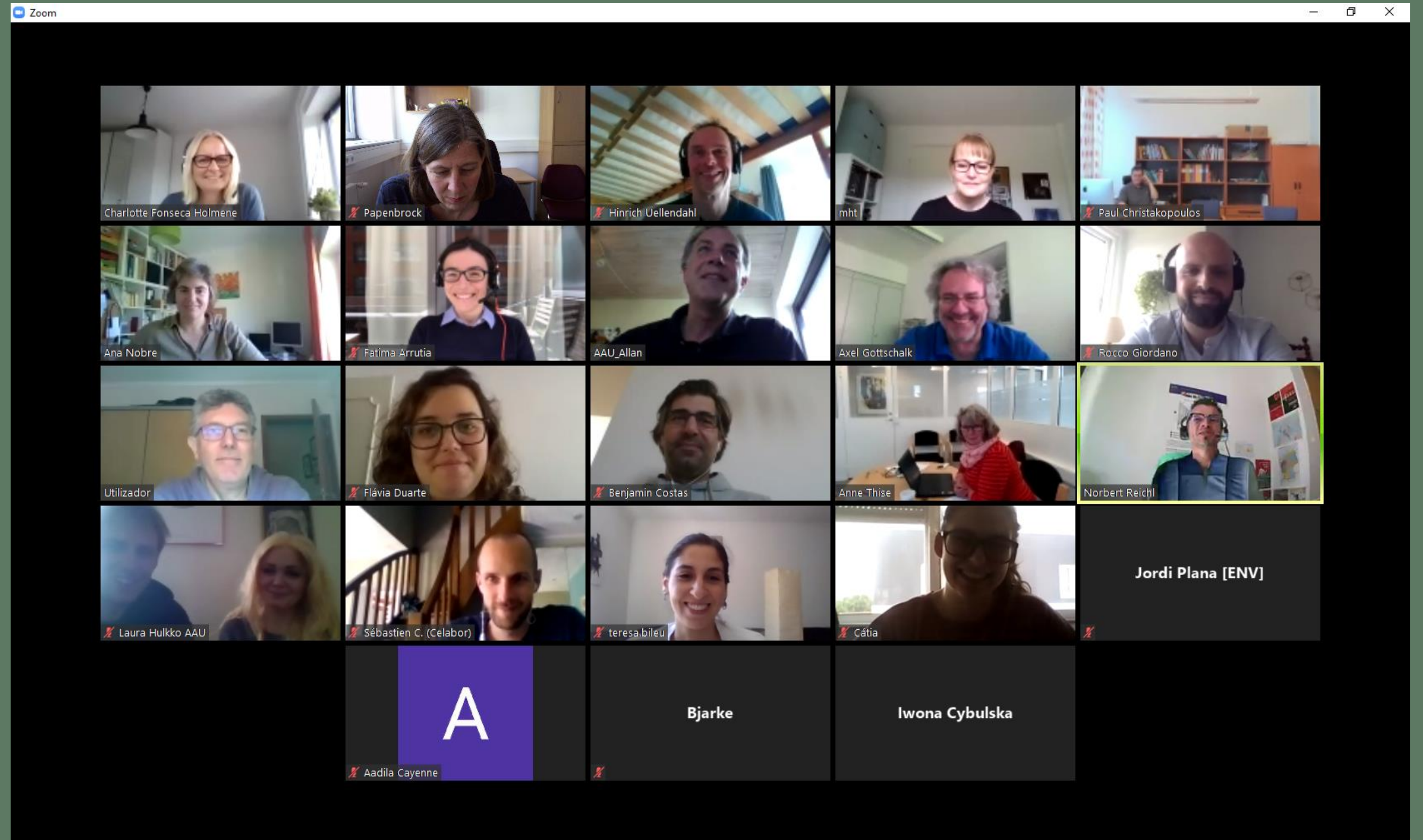
• *Salicornia* material for species determination
• Seeds/material for species determination

!?

Company (not active anymore):
Salicornia europaea
Seed source necessary!



CHALLENGES MAY 2020



CULTIVATION OPTIMA – DEVELOPMENT OF BASIC AGRONOMIC TECHNIQUES



Hoagland solution plus NaCl

S. europaea: Biomass 12.12 kg/m² (20 g/L NaCl)

Aster tripolium: Biomass 3.6 kg/m² (10 g/L NaCl)

Crithmum maritimum: Biomass 1.84 kg/m² (5 g/L NaCl)

**Tripolium* and *Crithmum* production is higher under non-saline conditions



Germination: 2 weeks, soil irrigation with fresh water.

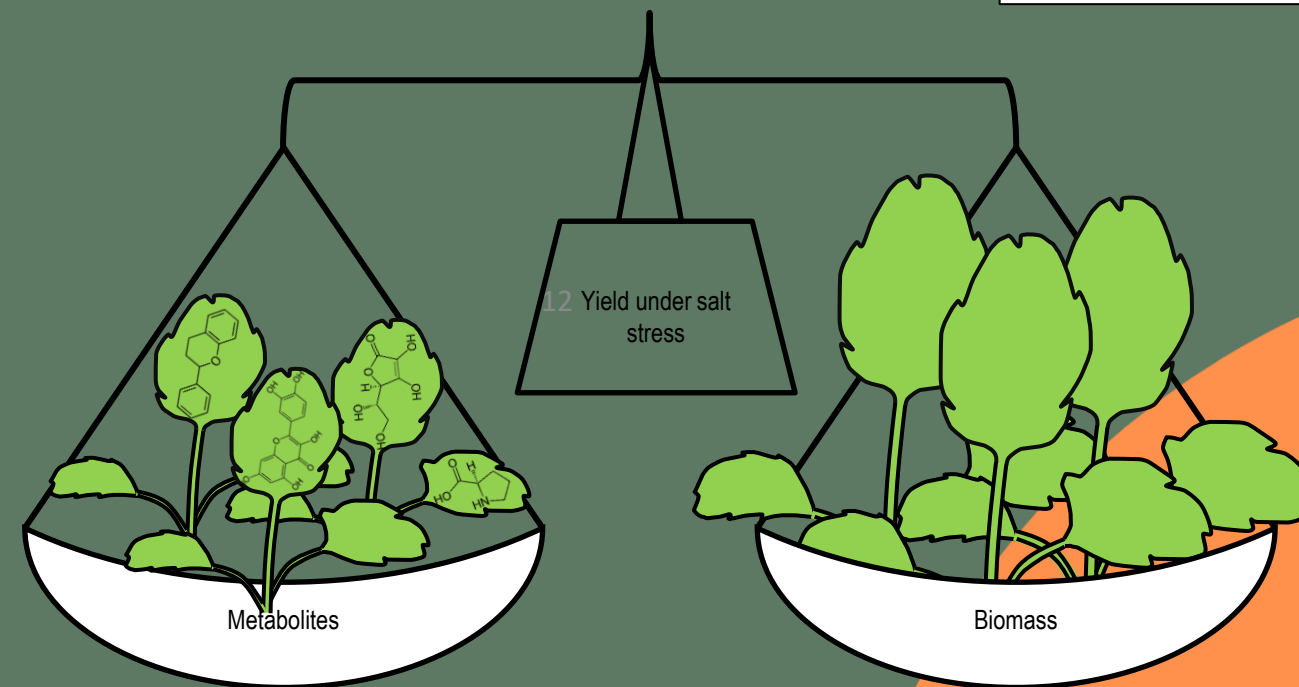
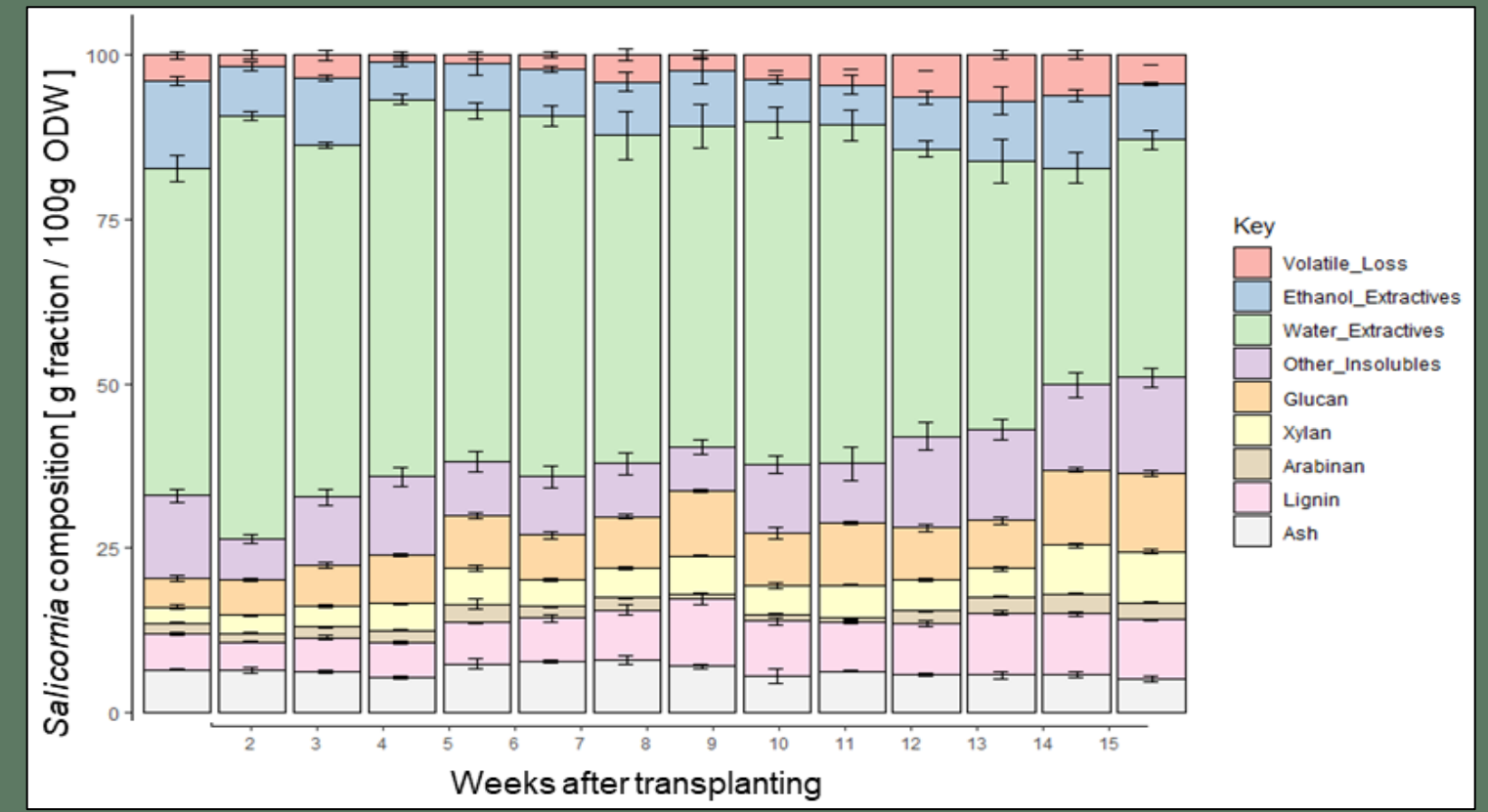
Growth conditions: irrigation with a mixture of the RAS effluent (salinity – 18 ppt) and freshwater to maintain the soil salinity close to 12 ppt

S. ramosissima: Estimated biomass production of 1.85 kg/m²

!?

No standard protocols yet!

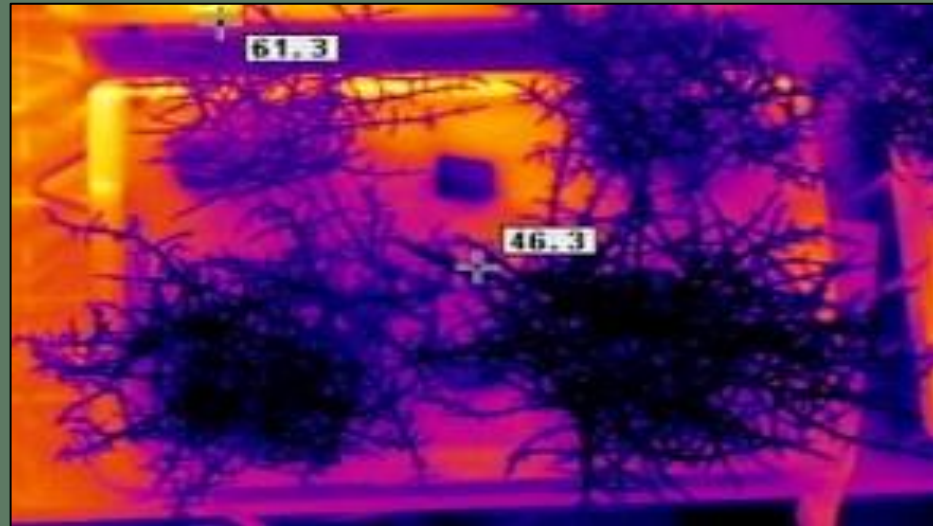
CULTIVATION OPTIMA - BEST TIME FOR HARVESTING



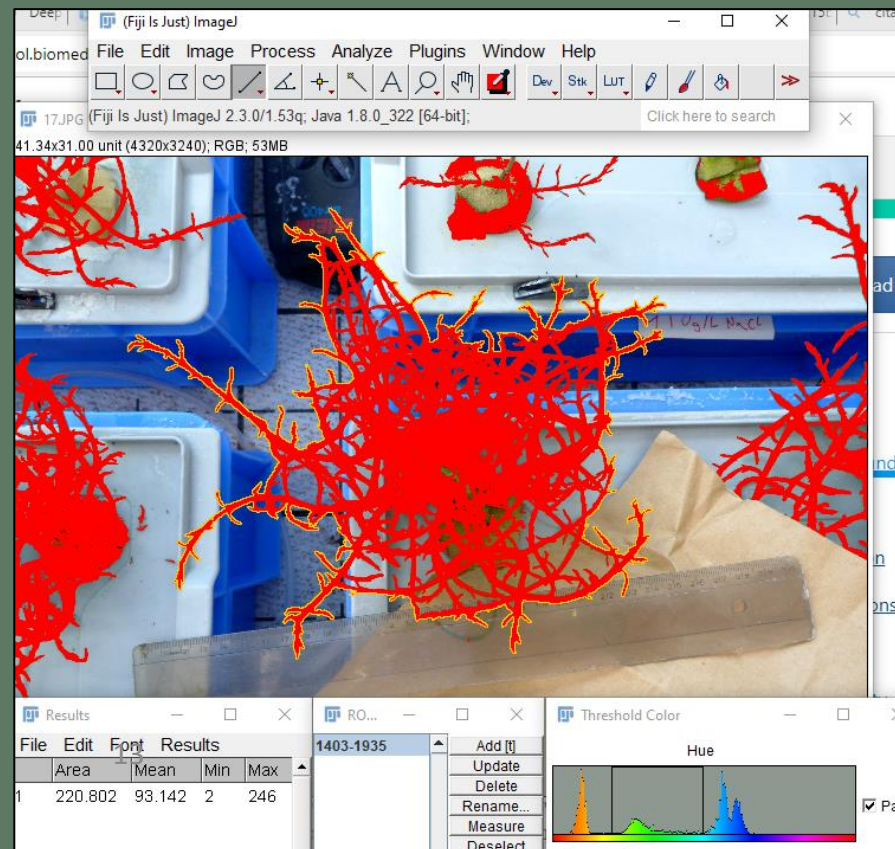
First criteria, needs further development



NON-INVASIVE METHODS FOR PHYSIOLOGICAL STATUS DETERMINATION



TEMPERATURE MEASUREMENTS WITH A THERMOCAMERA



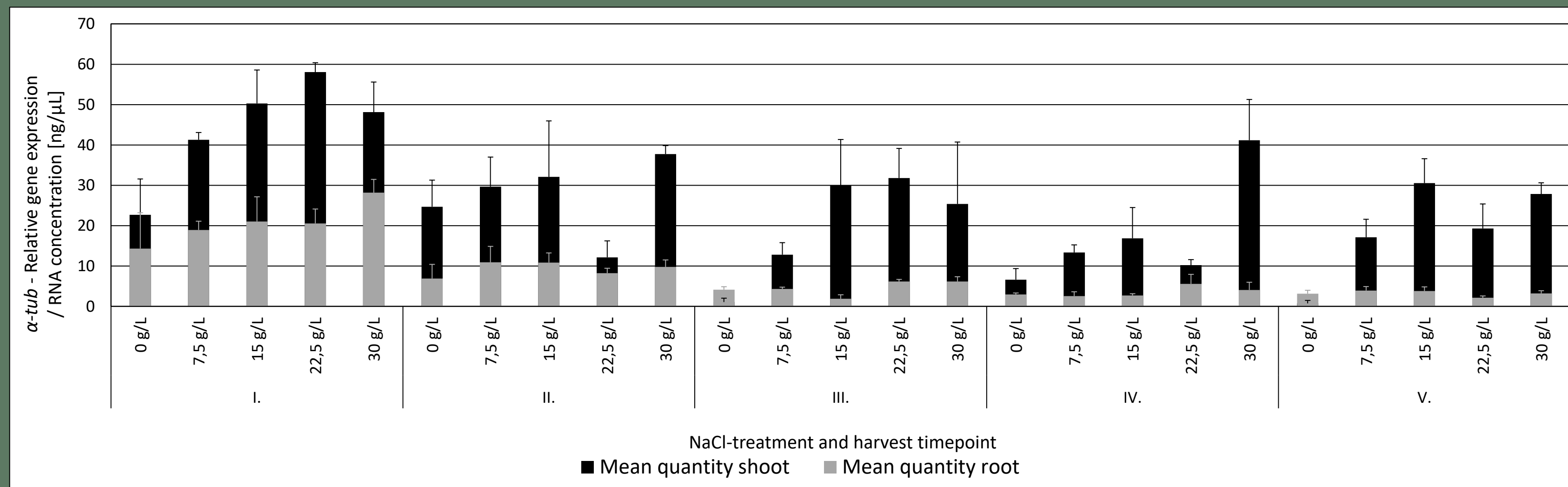
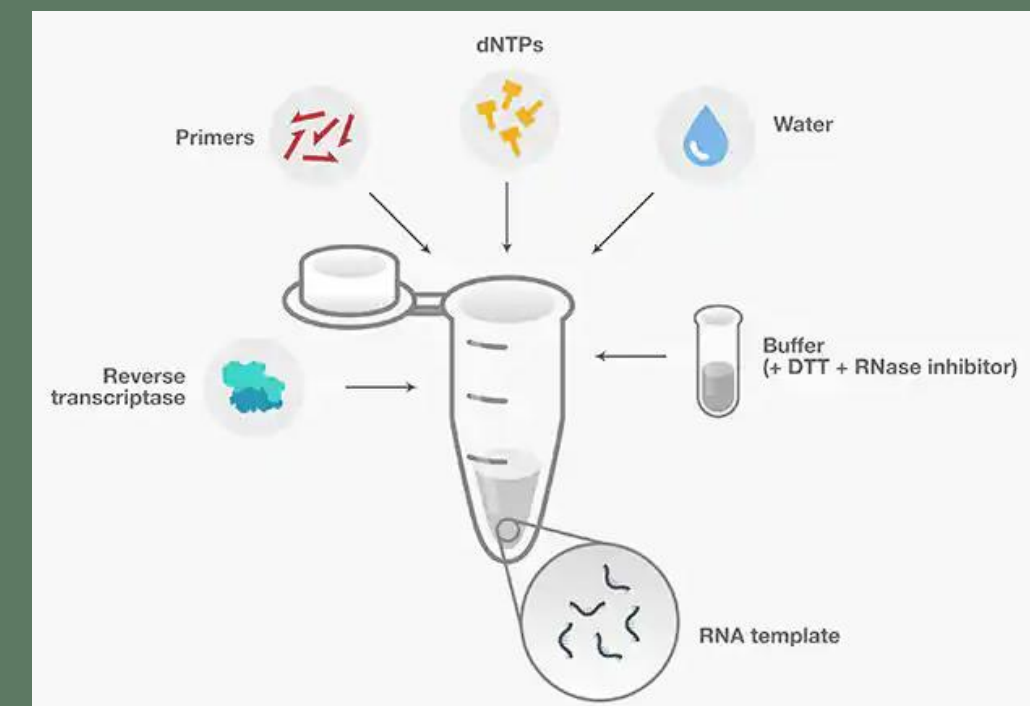
CALCULATING THE LEAF/STEM AREA



Digitalization of agriculture
e.g. use of drones!
No standard protocols yet!

INVASIVE METHODS FOR (PHYSIOLOGICAL) STATUS DETERMINATION QUANTITATIVE PCR – GENE EXPRESSION ANALYSIS

For details see poster!

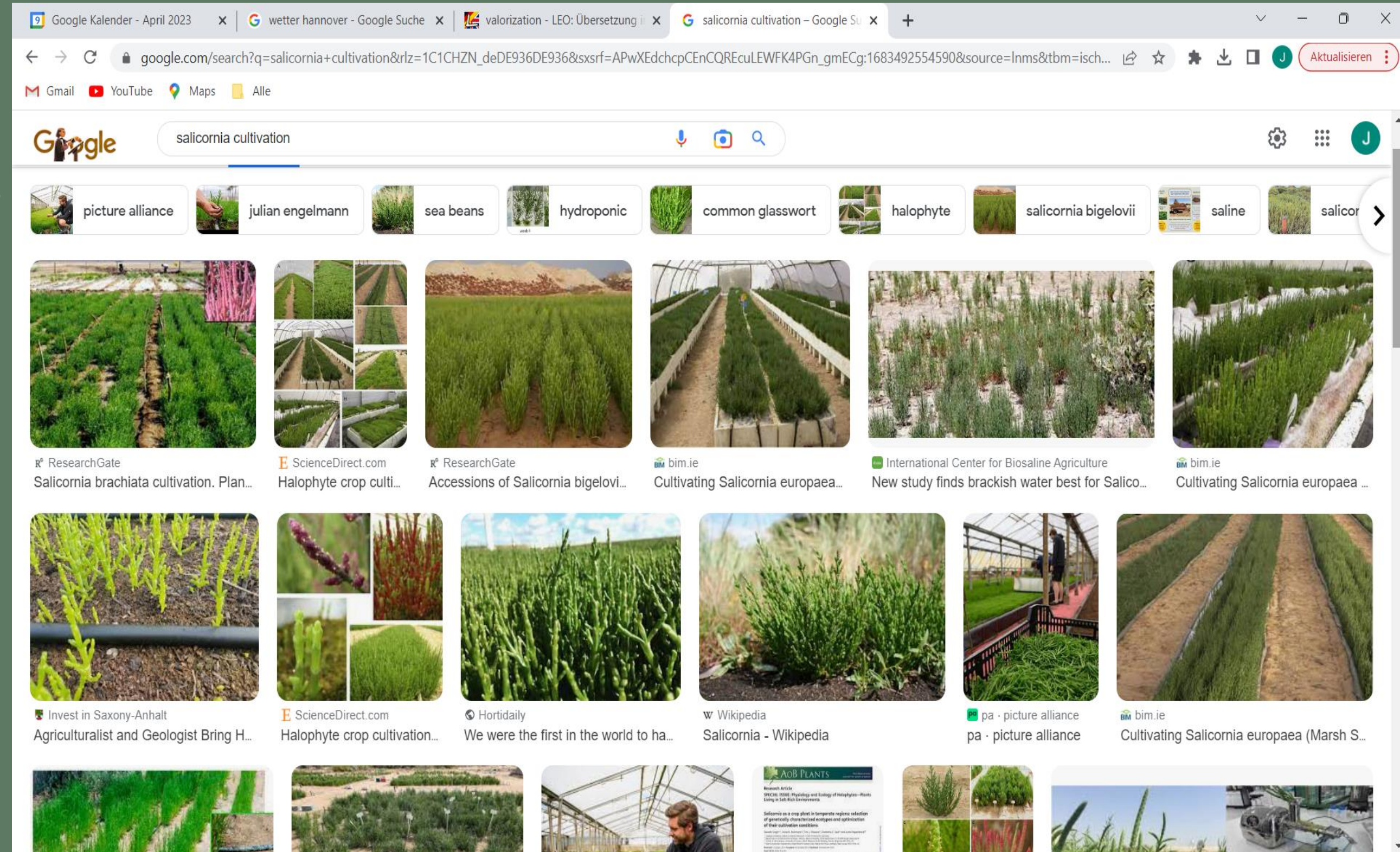


CULTIVATION IN THE FIELD

- MANY OPTIONS

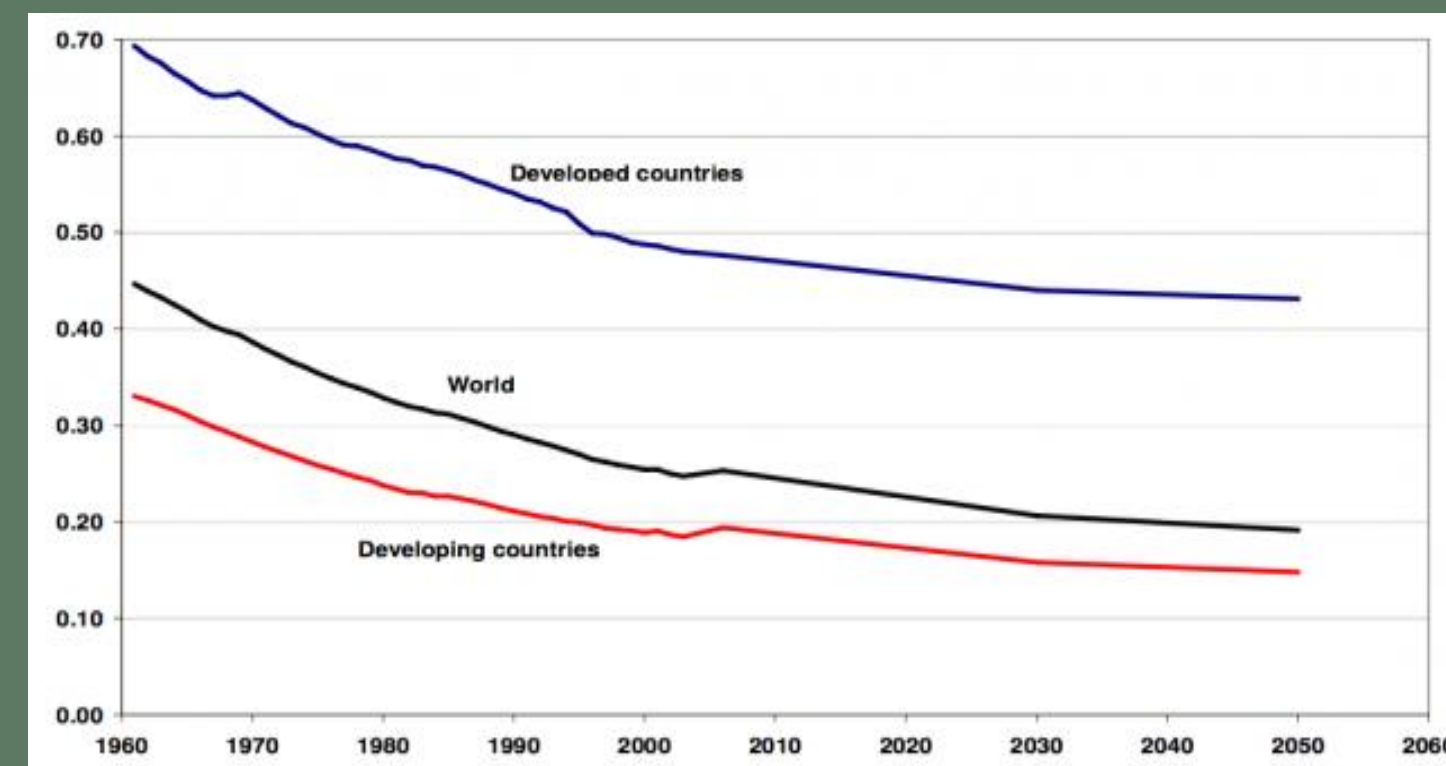


- NOT YET STANDARDIZED



NEXT STEPS AND POINTS FOR DISCUSSION

- Sustainable cultivation (agronomic techniques!)
- Economically successful production (specific directions)
- Further upscale of the biorefinery processes (bioeconomy!)
- More species
- Species that produce also starch/grains
-



Arable land per capita (ha in use per person)

Source: Bruinsma (2009)

Google Kalender - November 2 | G wetter hannover - Google Suche | G leo english - Google Suche | Action CA22144 - COST

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SEARCH e-COST MENU

CA22144 - Sustainable use of salt-affected lands (SUSTAIN)

Downloads

Home > Browse Actions > Sustainable use of salt-affected lands (SUSTAIN)

- Description
- Management Committee
- Main Contacts and Leadership
- Working Groups and Membership

Description

Salinisation, the accumulation of water-soluble salts in the soil, is one of the major causes of soil degradation affecting 833 million hectares of land and 1.5 billion inhabitants worldwide. However, these lands can be used by applying saline agriculture, involving soil, water and salt-tolerant crop management methods. Cultivation of salt-affected lands aids in addressing food and water security in the times of progressing climate change and population growth. As a result, there is an urgent need to create a network of research and practice and foster the sustainable use of salt-affected lands.

Action Details

- MoU - 054/23
- CSO Approval date - 12/05/2023
- Start date - 03/10/2023
- End date - 02/10/2027

Action CA22144 - COST

SEARCH e-COST MENU

Working Groups and Membership

Working Groups

Number	Title	Leader
1	Soil and water salinity: physical and biochemical characteristics at different scales	Dr Michail ORFANOUDAKIS
2	Plant responses to salinity at the shoot and the root level	Prof Jutta PAPENBROCK
3	Total value of saline ecosystems and landscapes	Ms Zenepe DAFKU
4	Knowledge sharing and stakeholders' engagement	Prof Henrik Per ARONSSON
5	Policy framework for the salinisation management	Dr Vítor João PEREIRA DOMINGUES MARTINHO
6	Network communication and dissemination of results	Dr Luísa CUSTÓDIO

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How can I participate?

- Read the Project Description [MoU](#)
- Inform the Main Proposer/Chair of your interest ([email](#))
- [Apply](#) to join your Working Groups





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LEIBNIZ UNIVERSITY HANNOVER

Professor at the Institute of Botany of the LUH, Germany. Leader of WP2
“Cultivation of Halophytes”

Topics: Interested in stress-tolerant plant species and their development to new crop plants, in the effects of biostimulants on plant growth and in the characterization of specialized molecules from plants. Expertise in: Plant physiology, molecular biology, analytics.

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<https://www.botanik.uni-hannover.de/en/research/research-groups/sulfur-metabolism-and-abiotic-stress>