NORSØK

Norsk senter for økologisk landbruk

Making Compost with Marine Residues

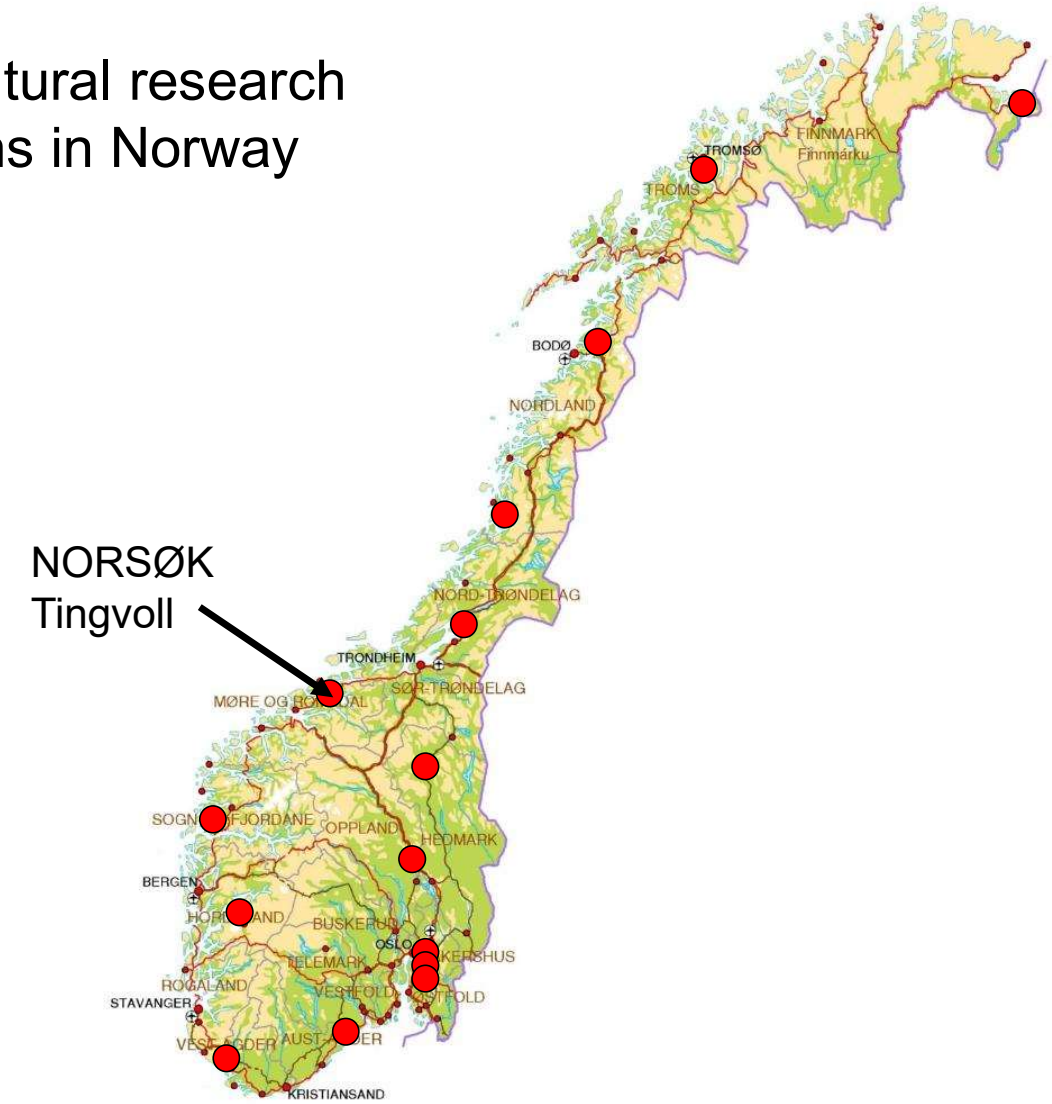
Seminar for bioresources and recycling technlogies

Workshop organized by NIBIO, Støtvig hotel, Larkollen, Norway 23.10.2024

Joshua Cabell

NORSØK

Agricultural research Stations in Norway



- Dairy farm, 36 ha
- Demonstration garden
- Center for renewable energy, biogas plant, solar arrays
- Field trials
- Tingvoll Økopark
- Offices for NORSØK, NIBIO, and others…

Main thematic areas in NORSØK

- **Soil fertility, soil biota and soil organic matter**
- **Plant nutrition, recycling of resources**
- **Plant health and alternative crop protection**
- **GHG emissions from agriculture**
- **Animal welfare**
- **Organic food**
- **Organic gardening**
- **Farm-based renewable energy (biogas, solar)**

MARIGREEN

Sustainable utilization of MARIne resources to foster GREEN plant production in Europe

The **MARIGREEN** project will valorize residual materials from the BLUE sector, many of which are currently poorly utilized, by treating them with appropriate technology and applying them in agriculture (GREEN sector).

Significant amounts of fertilizers, applicable in organic growing, are required to achieve 25% organic farmland in EU by 2030, as proposed in the F2F strategy. The project will study available residual materials from fish capture, brown algae industry, mussel industry, and organic aquaculture.

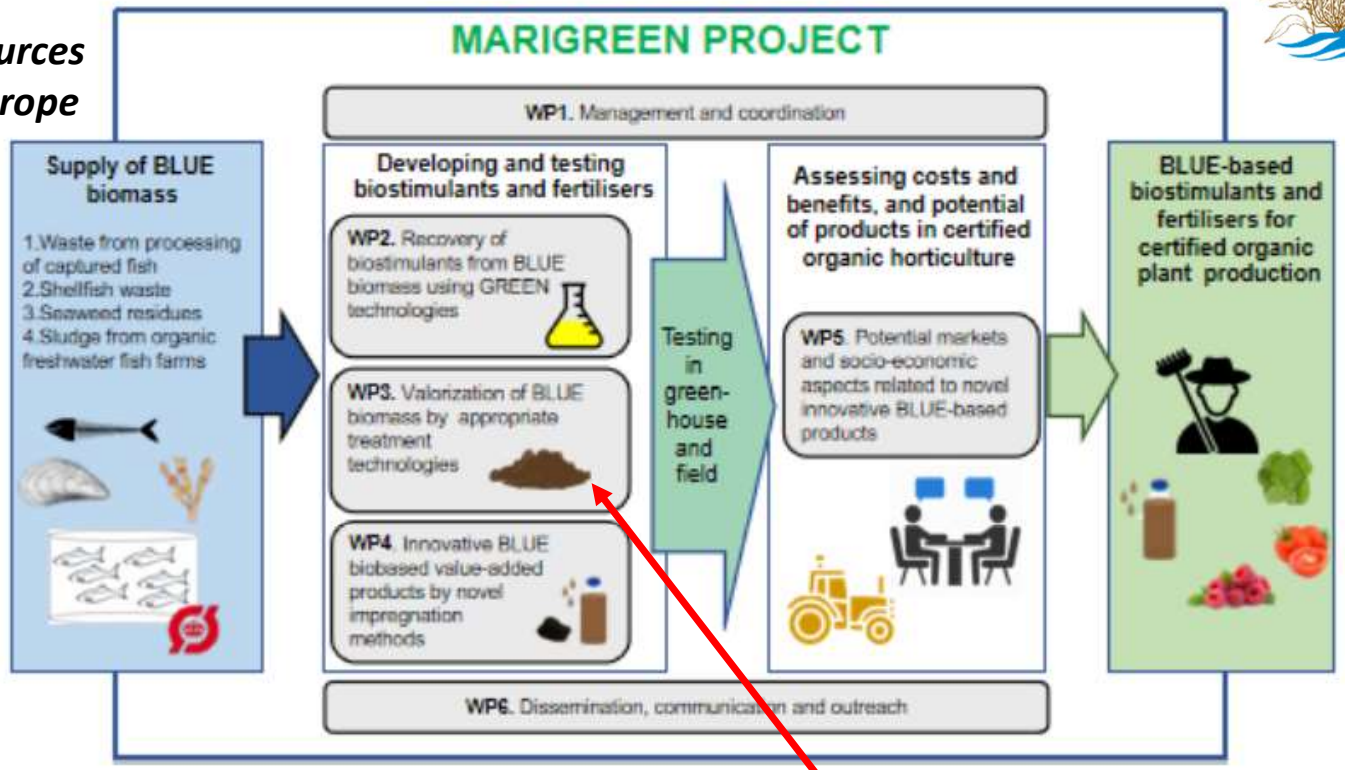


Figure 4. Division of collaborative project into work packages

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 817992.

Consortium partners

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Kevin Salbuvik, Fjordlaks AS, Norway
Inger Lise Berg, Algea AS, Norway
Emil Eliassen Folland, Sigurd Folland AS, Norway
Magne Hoem, Snadder & Snaskum AS, Norway

Seasoil

Value creation and ecosystem services of European seaweed industry by reducing and handling potentially toxic elements from breeding to soil

European Commission

Blue BIO COFUND

SeaSoil partners

Norway

- Nofima
- Norsøk
- NMBU
- Ocean Forest
- Algea
- Nutrimar

Croatia

- Fazos

Denmark

- Aarhus University

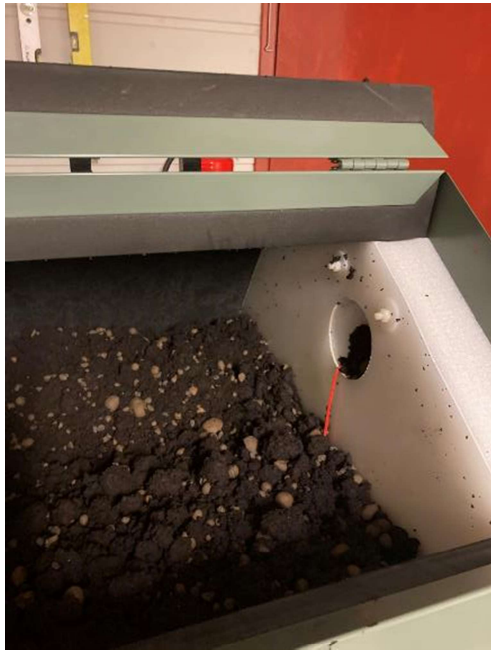
Estonia

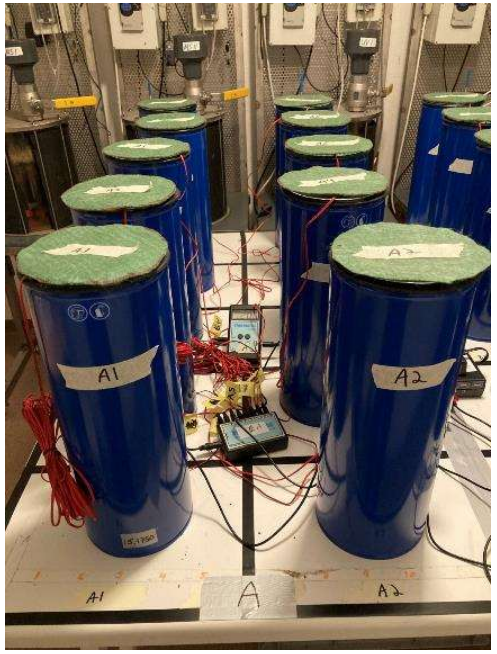
- EMU

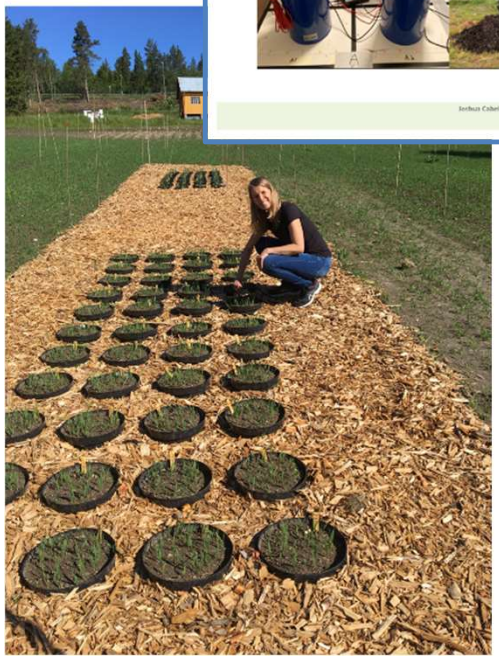
Ireland

- ATU
- Donegal Seaweed
- OGT

Composting and field trials at NORSØK







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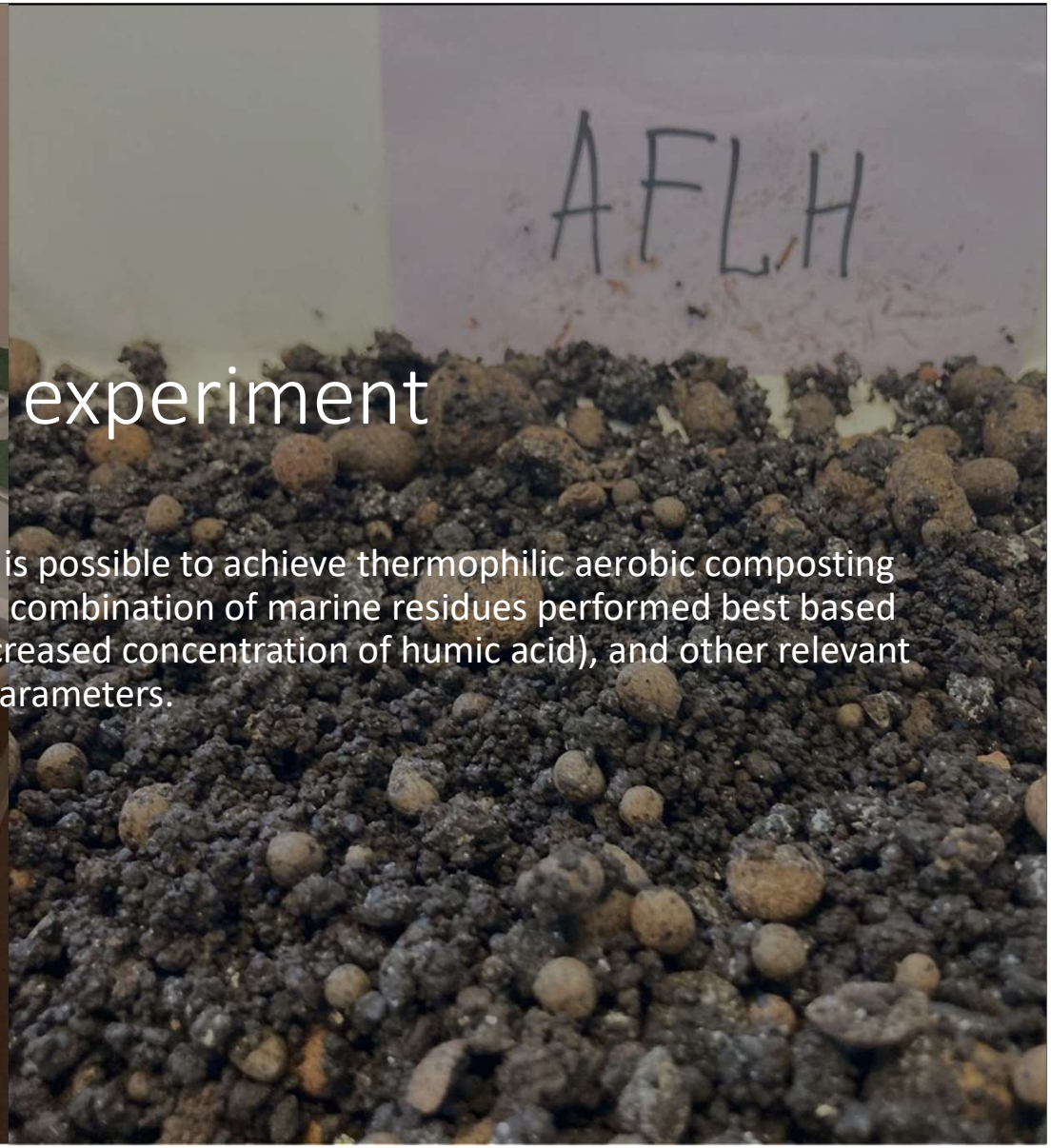


Dewar flask experiment

The objectives of this research were to determine if it is possible to achieve thermophilic aerobic composting with exclusively marine residues and to identify which combination of marine residues performed best based on the temperature profile, degree of humification (increased concentration of humic acid), and other relevant process parameters.


RINSED
NOT RINSED

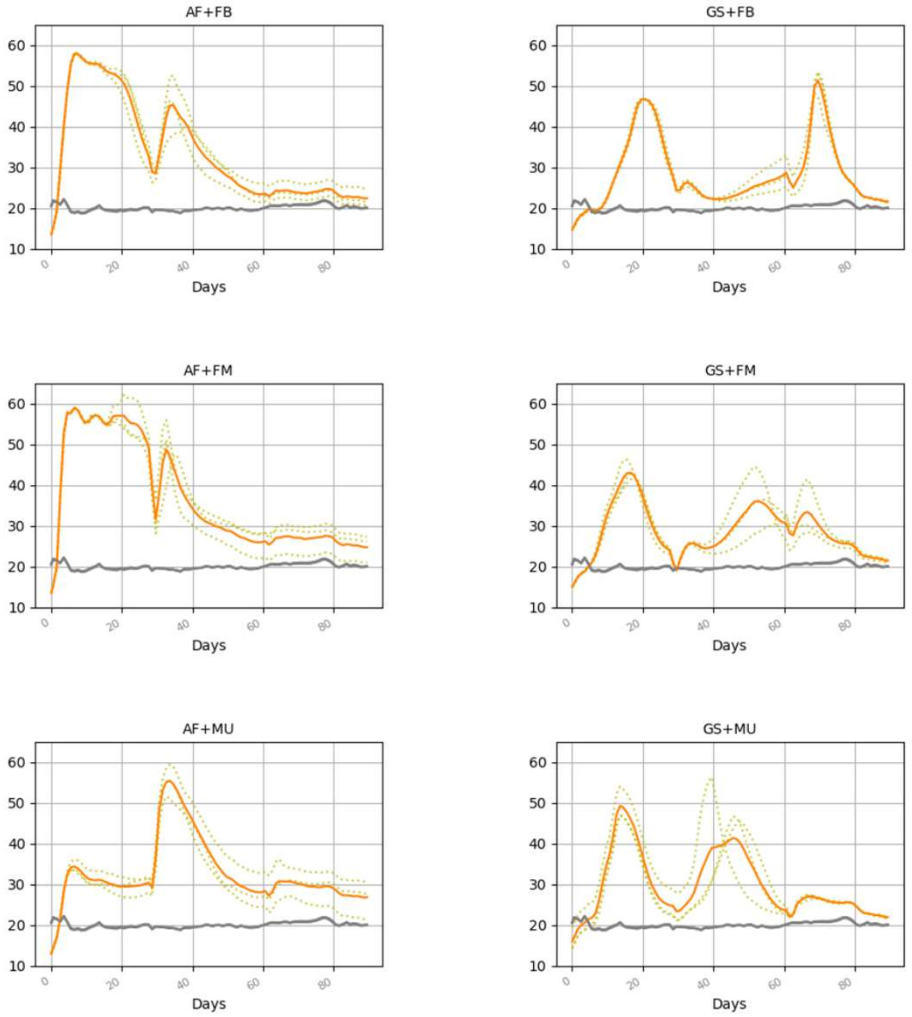
Composting algae fiber and ground seaweed

- Algae fiber «low nitrogen» (AF)
- Ground seaweed (GS)
- Fish meal (FM)
- Hydrolyzed fish bone (FB)
- Mussels (MU)
- Leca (lightweight clay aggregates for bulking


Seaweed (A. nodosum) filter cake, "low-N"
Seaweed (A. nodosum) filter cake, "high-N"
Expanded clay ab


AFLH +FM
1. 3. 2023


AFLH +FM
1. 3. 2023



From: Cabell et al., 2024

Article

Suitability of Residues from Seaweed and Fish Processing for Composting and as Fertilizer

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Abstract: There is a need to find novel sources of fertilizers to meet the increasing food demands of a growing human population and alternatives to mined and synthetic fertilizers for the certified organic sector. Composting is a common method for processing and stabilizing organic residues for use in horticulture. To that end, a small-scale composting experiment with six combinations of dried and ground rockweed (*Ascophyllum nodosum*), algae fiber from chemically processed rockweed, ground bones and fishmeal from cod (*Gadus morhua*), and ground blue mussels (*Mytilus edulis*) was conducted in Dewar flasks to assess whether these residues are suitable for composting and have potential for use as fertilizers. Expanded clay aggregates were used as a bulking material. Physicochemical analyses were performed on the residues and their mixtures before and after composting, and the temperature in the flasks was monitored for 92 days. Suitability was determined by evaluating the temperature dynamics, changes in physiochemical parameters, and nutrient profiles. All treatments generated heat, with reductions in C/N ratio, weight, and volume, demonstrating suitability for composting. The treatments with algae fiber had a higher mean temperature (34.5 vs. 29.0 °C) and more degree days above the thermophilic range (mean = 176- vs. 19-degree days), the greatest reduction in volume (mean = 35% vs. 27%), and the lowest C/N ratios at the end of active composting (18 vs. 24) compared to the treatments with dried and ground seaweed. In terms of fertilizer value, none of the finished composts were balanced for use as fertilizers alone and, in some cases, contained too much Na, but contained sufficient concentrations of K, S, Mg, and Ca and could be a valuable source of these nutrients and organic matter in combination with other N- and P-rich sources.

Keywords: compost; marine biomass stabilization and conversion; thermodynamics; organic fertilizer; plant nutrients; composting degree days; electrical conductivity

check for updates

Citation: Cabell, J.; Eich-Greatorex, S.; Ion, V.A.; Krogstad, T.; Matsia, S.; Perikli, M.; Salifoglou, A.; Loes, A.-K. Suitability of Residues from Seaweed and Fish Processing for Composting and as Fertilizer. *Sustainability* 2024, *16*, 7190. https://doi.org/10.3390/su16167190

Academic Editor: Tim Gray

Received: 28 June 2024
Revised: 14 August 2024
Accepted: 19 August 2024
Published: 23 August 2024

1. Introduction

A growing human population will need more food, and for food production to be sustained into the future, it must be produced in a way that not only does less harm to the resource base, but ideally improves it [1–4]. Soil that contains a high amount of organic matter is more capable of handling ongoing and future climatic changes and is more productive [5,6]. One way to increase the organic matter content of soils is to add compost [7,8]. While there are numerous sources of raw material for composting already

Cabell, J.; Eich-Greatorex, S.; Ion, V.A.; Krogstad, T.; Matsia, S.; Perikli, M.; Salifoglou, A.; Loes, A.-K. Suitability of Residues from Seaweed and Fish Processing for Composting and as Fertilizer. Sustainability 2024, 16, 7190.


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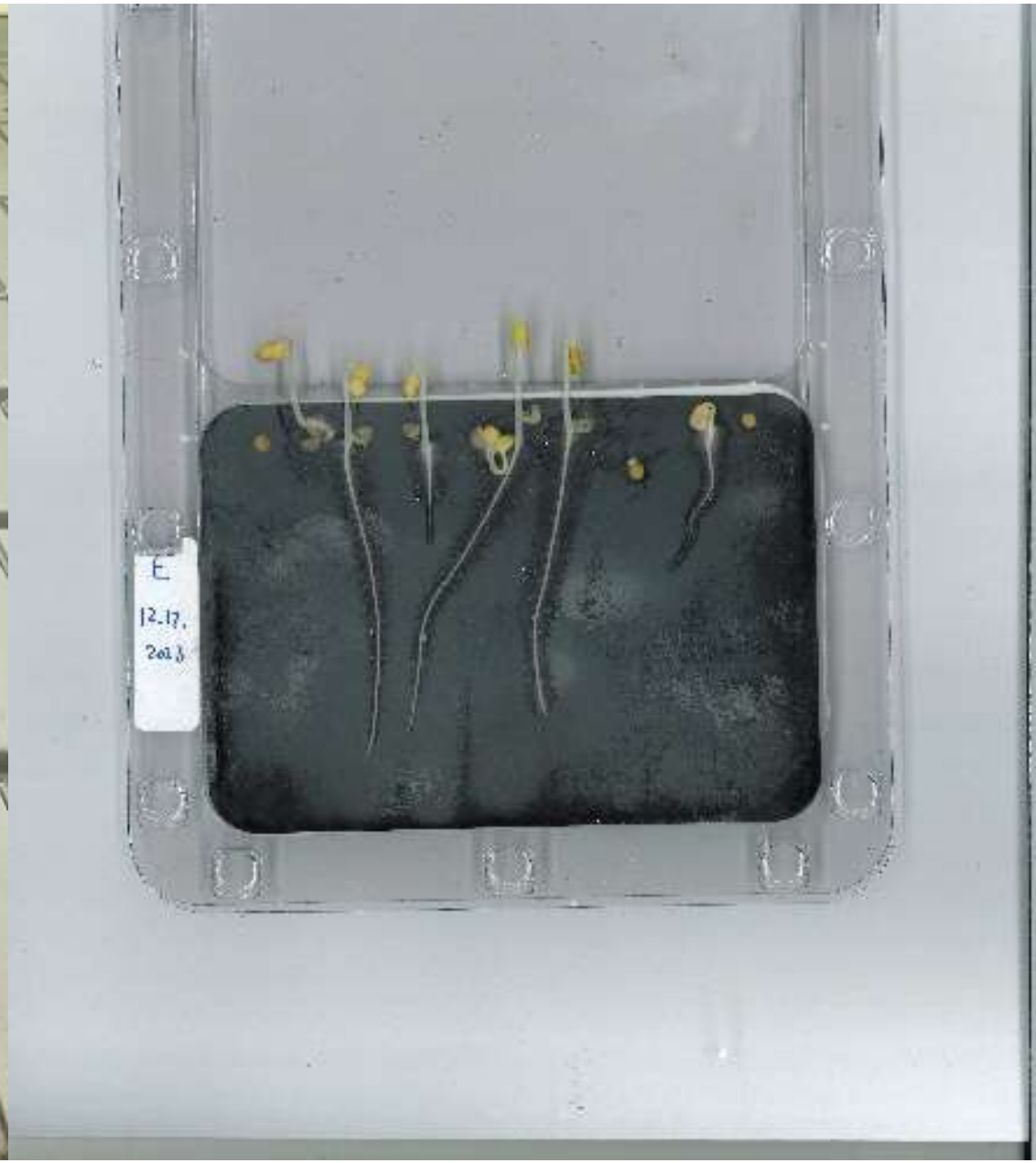
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Thank you!

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