A soil deal for Europe – mission possible in the Baltic Sea Region, 2020 June 29

Remediation of soil polluted with petroleum hydrocarbons in Phy2Climate project

PhD Mantas Rubežius

bioVala
TVARIOS APLINKOS SPRENDIMAI

Phy2Climate

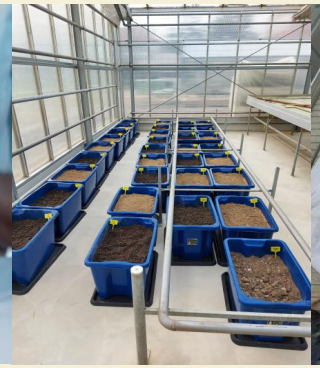
BIOVALA

ABOUT US

Biovala is an innovative, private equity-based science-production biotechnology company founded in 2014, whose core business is improving the quality of the environment. The main goal of the company is to provide professional consultations on environmental improvement issues and to offer high quality products and services that help to solve eco-environmental problems.

ACTIVITIES

- Bioremediation
- Consultancy
- Scientific activity
- Labaratory tests
- Trade in biological products



BIOVALA TEAM

PhD MANTAS RUBEŽIUS

CO-FOUNDER & CEO

Specialist in biogas production, GHG emissions, biodegradable waste management

ŽYGIMANTAS KIDIKAS

CO-FOUNDER & CPO

Energy systems and renewable energy engineer, developer of clean technologies and agribusiness

PhD ALFREDA KASIULIENĖ

SPECIALIST FOR BIOTECHNOLOGIES

Specialist for heavy metal contaminated soil and water clean-up technologies

Partners:

CLEANTECH CLUSTER LITHUANIA

VYTAUTAS MAGNUS UNIVERSITY

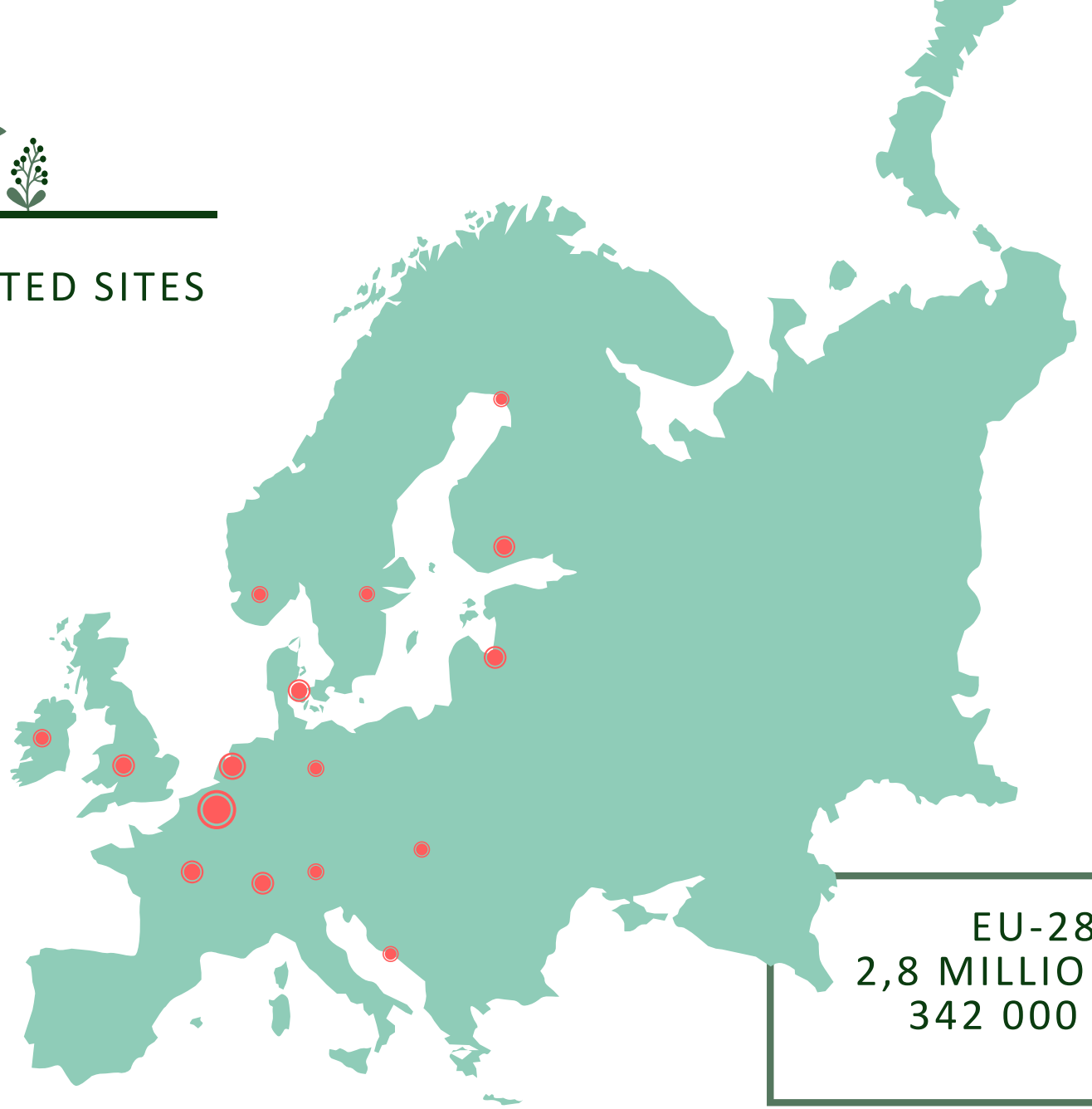
SAULĖTEKIO SLĖNIO MOKSLO IR TECHNOLOGIJŲ PARKAS

LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY

PROBLEM

PCS - POTENCIALLY CONTAMINATED SITES
CS - CONTAMINATED SITES

LITHUANIA
12 500 PCS
ABOUT 5,000 SITES
POLLUTED WITH
PETROLEUM
HYDROCARBONS



EU-28
2,8 MILLION PCS
342 000 CS

5,5 BLN. €/ANNUALLY

https://larcusa.org/technology/phytoremediation/

Phytoremediation solution

Phytoremediation technology is based on the unique properties of plants to collect pollutants, promote their degradation, immobilization or transformation.

Biovala is the first company in Lithuania to offer phytoremediation technology commercially.

https://www.intechopen.com/books/environmental-risk-assessment-of-soil-contamination/continuous-and-induced-phytoextraction-plant-based-methods-to-remove-heavy-metals-from-contaminated-

Phytoremediation

ADVANTAGES

- **Cost-effective** - the cost is lower than for other convectional remediation means;
- **Environmentally friendly**, does not disturb the landscape, does not change the natural physical, chemical and biological properties of the cleaning material and does not use any additional measures that may have a negative impact;
- **Increases soil health**, yield, and plant phytochemicals;
- **Socially-acceptable.**

CHALLENGES

- **Limited** to the **surface area** and depth occupied by the roots;
- **Takes long time**;
- The survival of the plants is affected by the **toxicity** of the contaminated land;
- Plant biomass requires **safe disposal**.

Phy2Climate

Clean biofuel production and phytoremediation solutions from contaminated lands worldwide

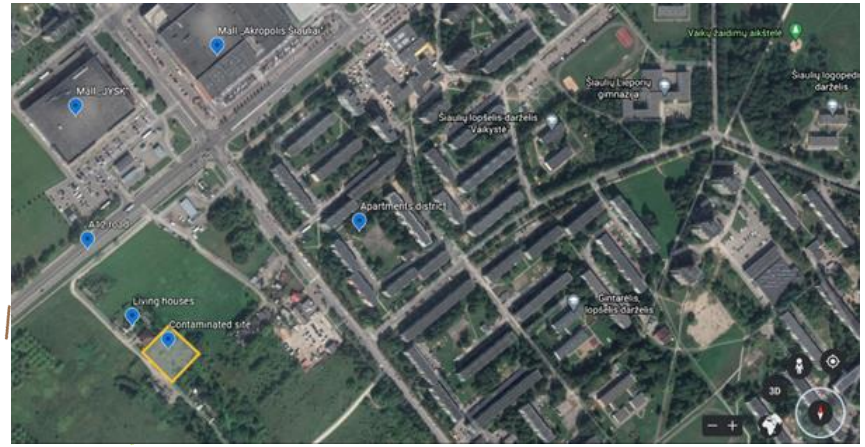
Biovala is one of the project partners

https://www.phy2climate.eu/

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement Nº. 101006912

LITHUANIAN PILOT SITE

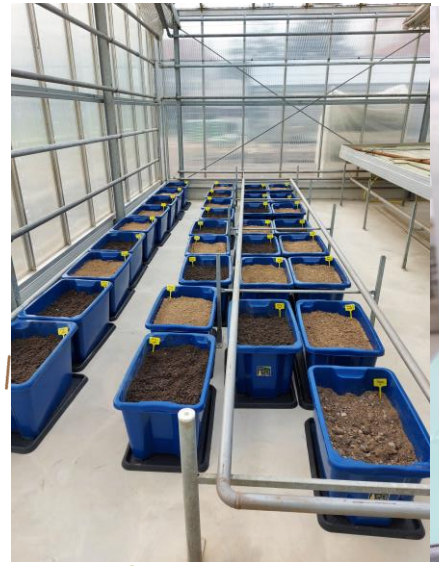
- Former oil base territory, contaminated with organic pollutants.
- Concentration of TPH in soil is exceeding limit value up to 22 times.
- Highest levels of contamination are in 40-100 cm depth.
- Area of the site is 2066 m2.

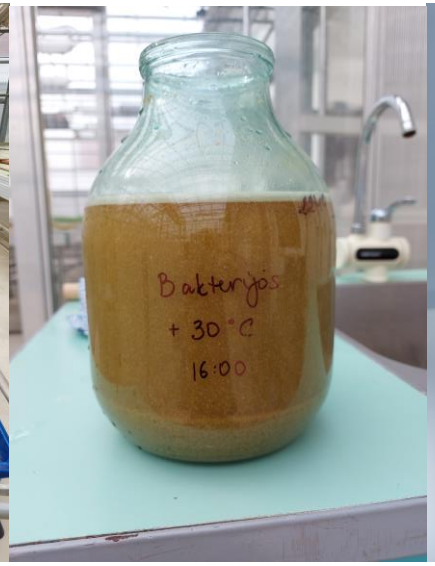


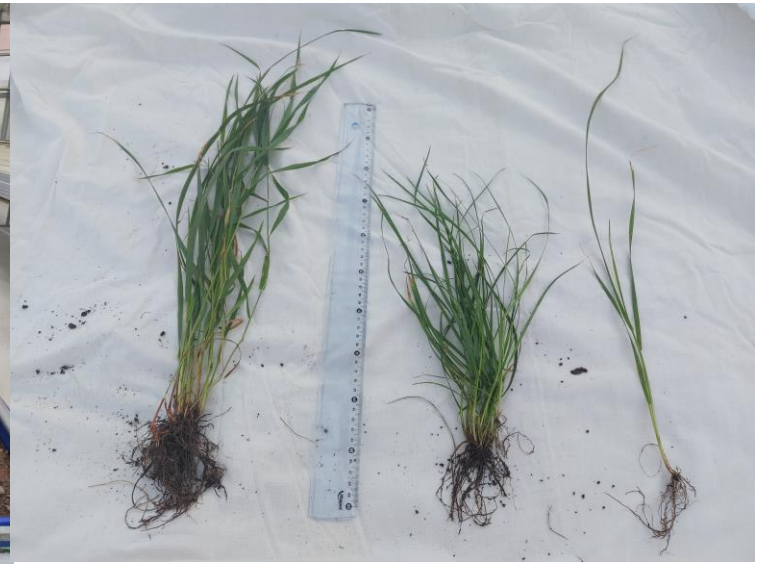
POT TRIALS EXERIMENTAL

Methodology

- Collection and preparation of contaminated soil;
- Organic, biological and mineral additives;
- Plant selection and growing conditions;
- Crop characterization;
- Soil samples;
- Phytoremediation potential.

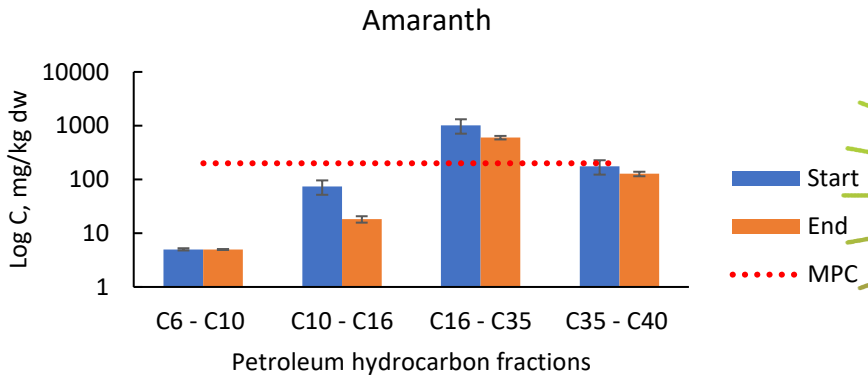




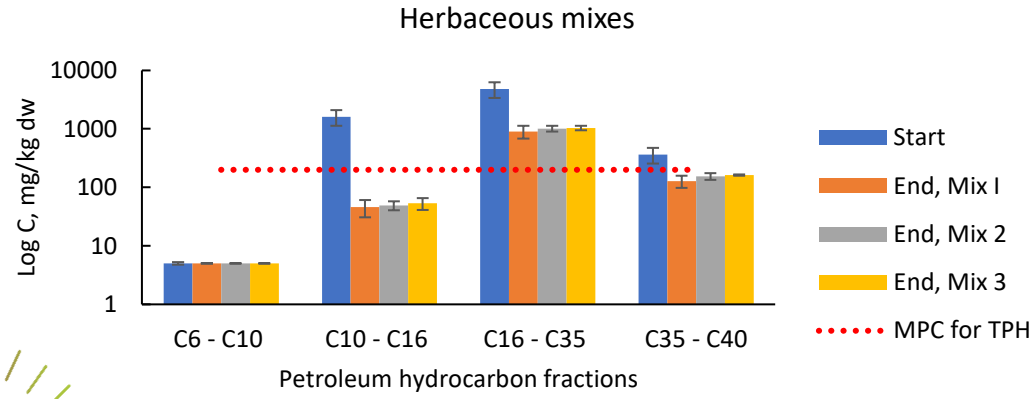


POT TRIALS EXERIMENTAL MAIN RESULTS

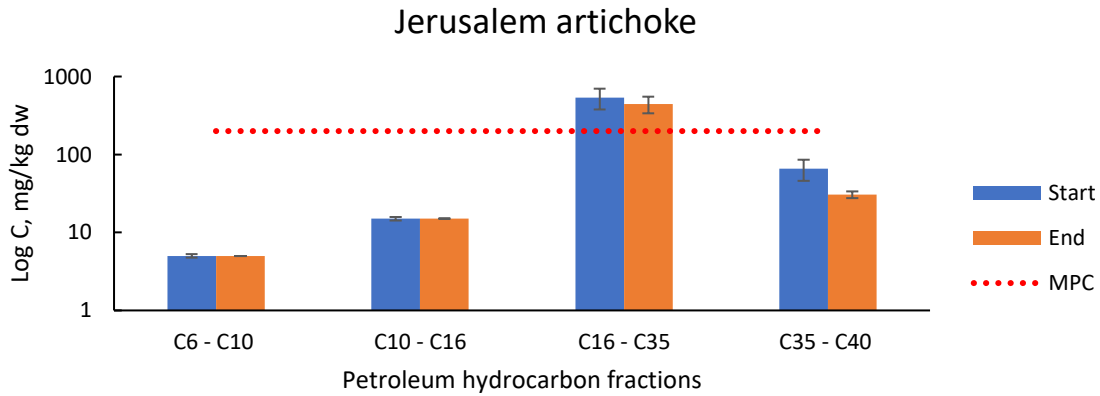
- The phytoremediation potential for all plant species used in the pot experiment can be summarized as follow: Mix I (6.3) > Mix II (5.6) > Mix III (5.4) > amaranth (1.7) > Jerusalem artichoke (1.3).
- Plants cultivated on contaminated soil with appropriate strategy can produce equal and if not higher biomass output.



TPH 1275 mg/kg (dw) → 754 mg/kg (dw)



TPH 6790 mg/kg (dw) → 1077-1257 mg/kg (dw)



TPH 625 mg/kg (dw) → 426 mg/kg (dw)

Maximum permissible value, according to Lithuanian legislative document LAND 9-2009, is 200 mg/kg for TPH.

FIELD TRIAL IN ŠIAULIAI PILOT SITE 2022

Thank you!

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