Experiences from a new shrimp research facility in Lithuania

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EURO SHRIMP

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First shrimp RAS in Lithuania

- RAS for *L. vannamei* shrimp cultivation integrated with renewable energy sources at KU Business Incubator
- Pilot infrastructure created within **InnoAquaTech** project – Development and transfer of innovative and sustainable aquaculture technologies in the South Baltic area.
- The goal is to acquire shrimp cultivation knowledge and to optimize growth technology for local conditions.

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Interreg South Baltic

EUROPEAN UNION

InnoAquaTech

Aquaculture in Klaipeda University

Klaipėda University (KU) is the only R&D and studies institution in western Lithuania, which consolidates its leadership in the fields of marine sciences and technology.

The **Marine Research Institute** is a subdivision of KU, conducting fundamental and applied research on marine and coastal environment and maritime technologies.

One of the MRI competence field – fisheries biology, fish stock assessment, management and conservation (started since 1989).

Recently developing area – **aquaculture** – new possibilities for blue economy related researches, and business.

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Aquaculture in Klaipeda University

- Innovative, blue biotechnology based aquaculture – one of priorities in Klaipeda blue economy development Strategy 2030;
- Lithuanian fishery sector is concentrated in Klaipeda region, international aquaculture companies increase their interest in the region
- **Fisheries and Aquaculture Laboratory** in MRI – new infrastructure for aquaculture experiments, developement of unique competences and student training
- **Aquaculture Competence Center** established in collaboration with Klaipeda Science and Technology Park
- **Aquaculture Research** based on KU high competences in aquatic ecology, hydrobiology, chemistry, fish biology, also on close collaboration with scientific institutions, aquaculture and biotechnology business.

baltic probiotics

NORAS LT

UAB KINTAI NUO 1993

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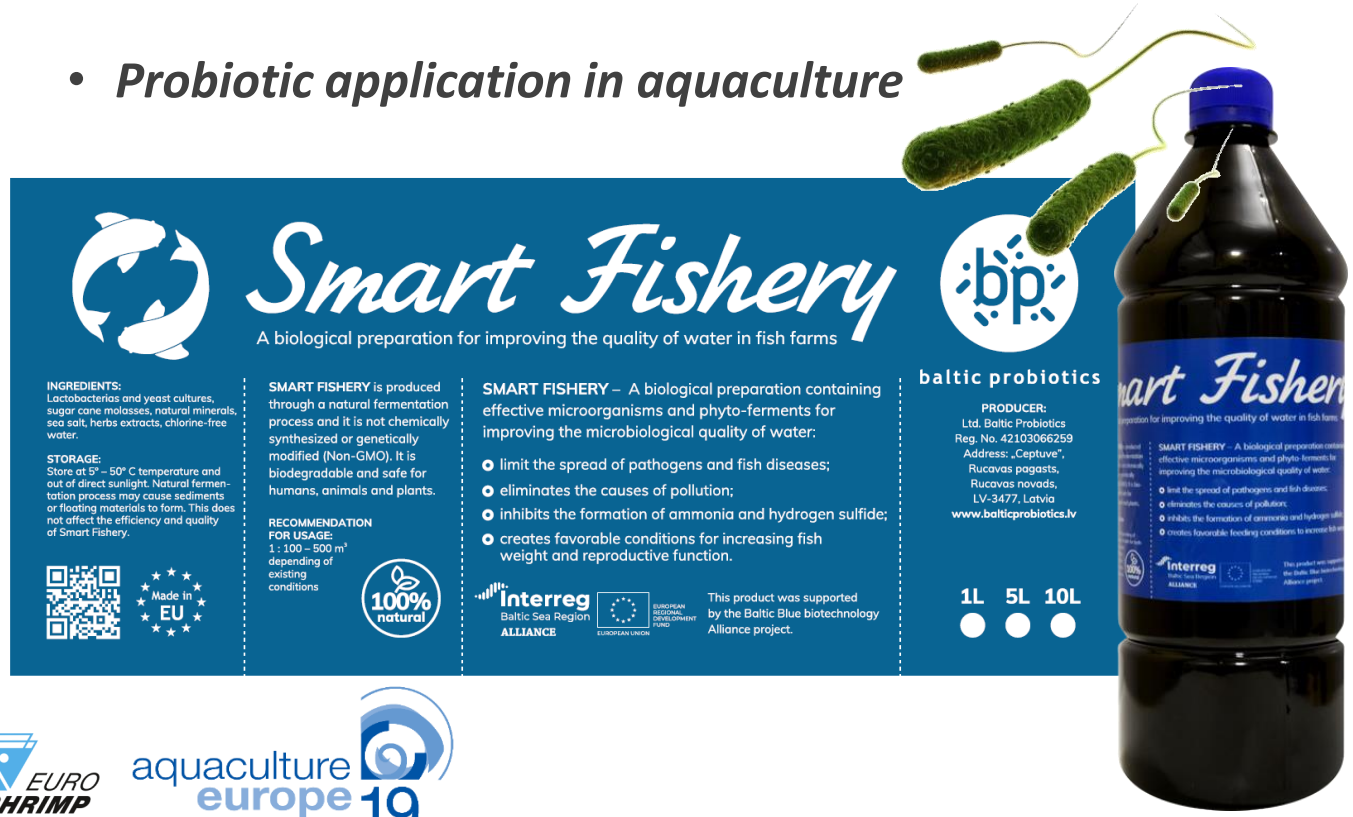
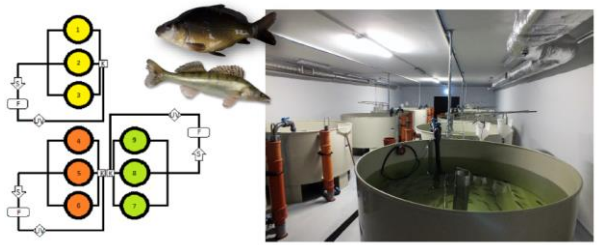
Aquaculture in Klaipeda University

- ***Marine recirculating aquaculture technologies***
  - Marine RAS and shrimp production
  - Baltic Sea brackish water for freshwater fish cultivation
  - Geothermal water and energy potential in aquaculture

- ***Probiotic application in aquaculture***





Within Interreg BSR Alliance project after surveys in recirculating and pond aquaculture systems project partner JSC Baltic Probiotics developed new probiotic product for pond aquaculture ***„Smart Fishery"***

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Aquaculture in Klaipeda University

Research and experimental infrastructure in Fisheries and Aquaculture Laboratory :

- **recirculating aquaculture systems**
- **integrated mesocosm system**
- **experimental flume**

Unique possibility to use groundwater, Curonian lagoon and brackish Baltic seawater.

First shrimp RAS in Lithuania

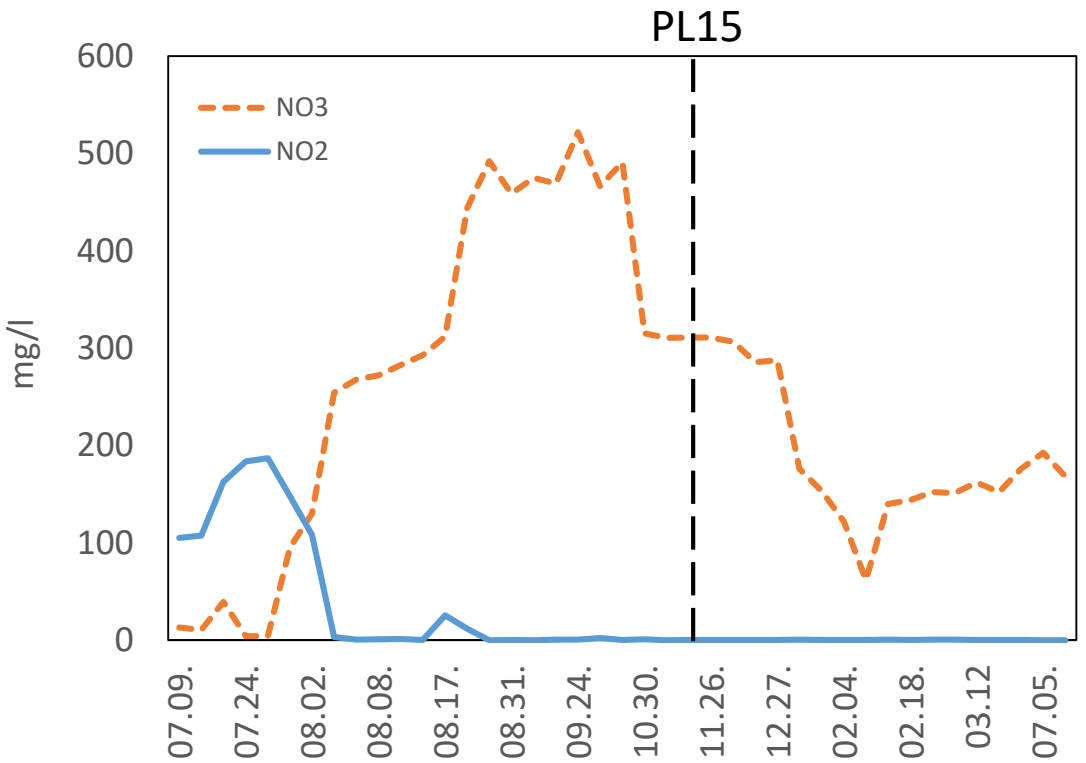
General parameters of the system:

- Artificial saltwater RAS
- Uses solar energy
- Unique to LT – denitrification filter
- System setup in two rooms
- Water volume – ~40 m^3
- Daily water loss – ~2 % (so far)
- 8 rearing tanks, surface area – ~29 m^2
- Max yield/cycle ~145 kg (5kg/m^2)
- Electricity consumption – 5 kW/month
- 2 employees

- Drum filter
- Biological filter
- Sump
- Protein skimmer
- Denitrification filter
- Oxygenation cone
- Heater
- UV
- Monitoring and control system
- Salt water preparation system

Water quality in RAS

- Temperature – 28.5 (28-30)°C
- Salinity – 15-16 ppt
- Oxygen – 70-90%, some drops to 40-50%
- pH – 7,6-8,1
- Mn – 351 µg/l; Fe – 70 µg/l;
- NH_4 – 0.04 mg/l (some short increases to 0.32-0.85 mg/l)
- Good nitrification, problems with denitrification
- Some increase in algae and nematode growth followed by ozonizer failure

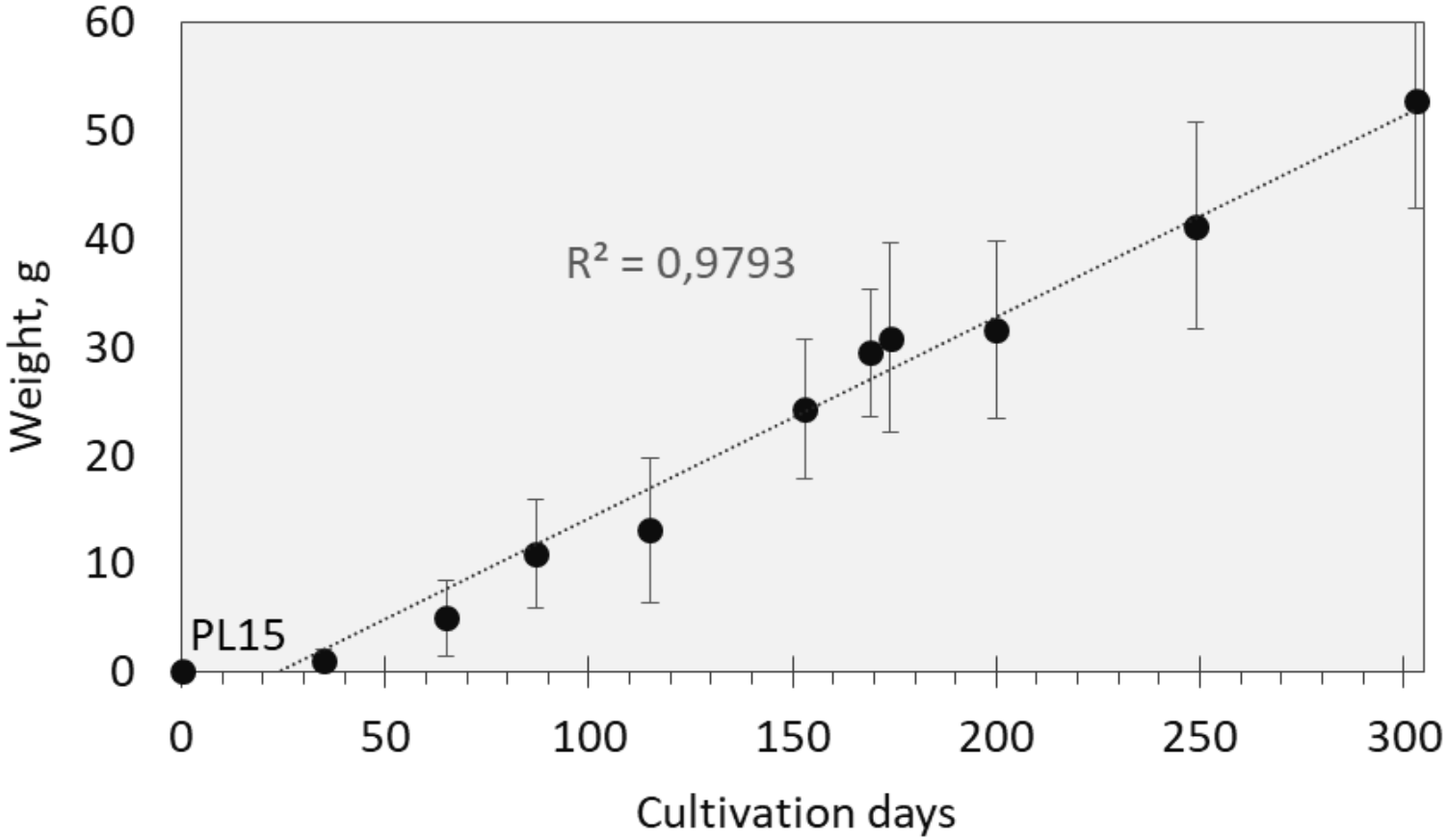


First round

- Very poor transportation survival – ~50 % of 15 000 PL15
- Canibalism observed
- Distributed into 5 tanks (1000 ind. per tank)
- Growth to the market size took 5 months and average size was 24.3±6.4 g (up to 40 g)
- Total harvest 80 kg
- Stocking density 2,5-3 kg/m^2
- FCR – 1,9-2,0 (1,9-2,0 kg feed/1 kg shrimp)
- Jumping issue

Feeding and growth performance of *L. vannamei*

Feeding rate ~2%
Manually x4/day
Growth rate 0.18 g/day
Mortality ~65 %
Sensitive period at 90-120 days
Handling mortality: 20-25 %



First harvest

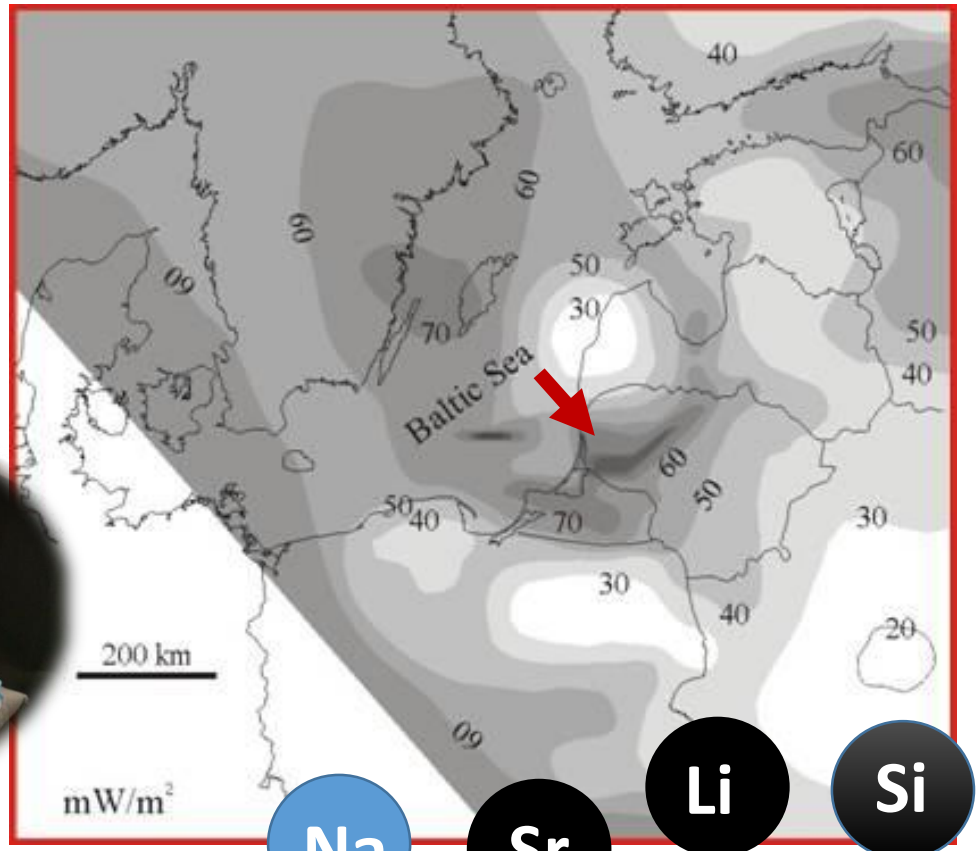
Further challenges

- Feeding management
- Shrimp tank design. Extra surface area in tank.
- Very unequal growth rate during first few months
- High operational costs for salt. **Solutions**:

  - Low cost salt mixture: (Na, Ca, K, Mg chlorides, sulphate)

  - Use of geothermal brine (110 g/L) from 1300 m deep Cambrian aquifer in western Lithuania, which is highly rich in natrium, calcium, magnesium and other elements.

Western Lithuanian Geothermal Anomaly

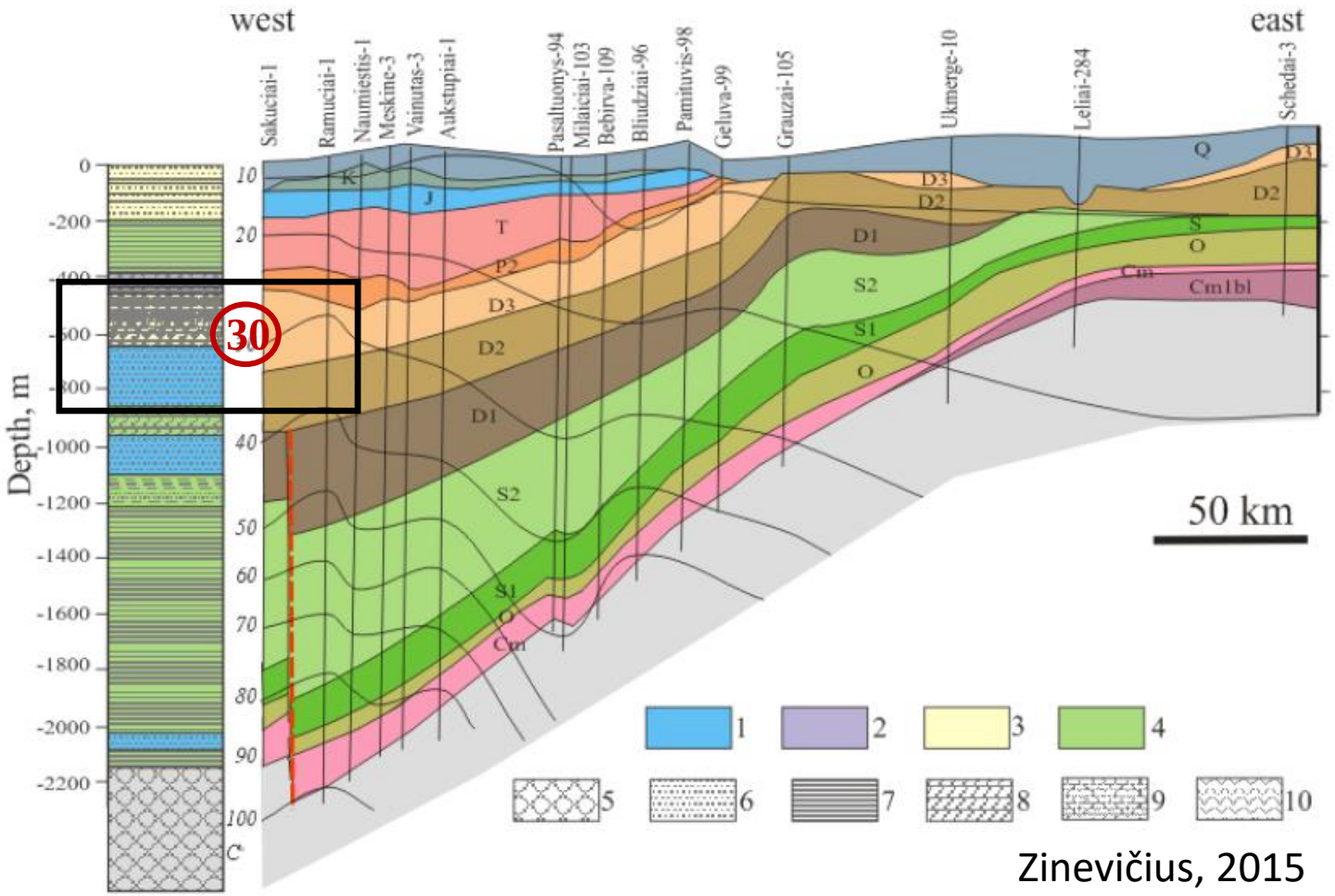


Na Sr Li Si

K Cl- Ba

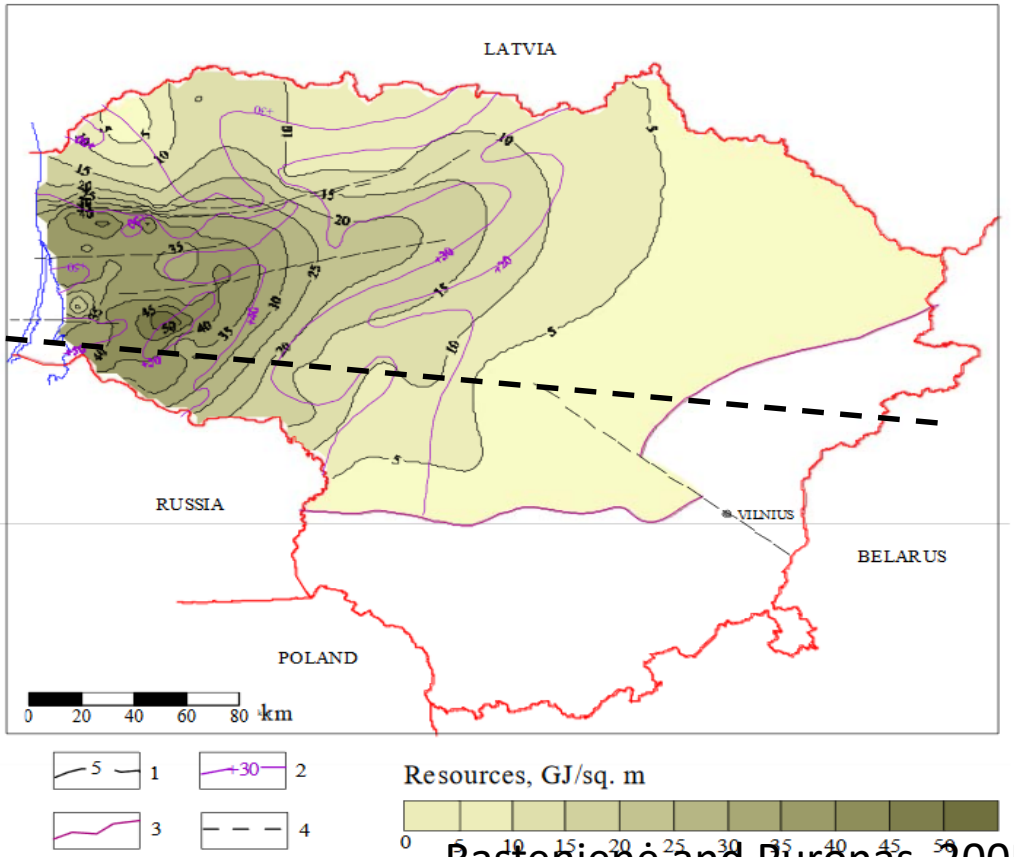
Ca+ Mg B Zn

Geothermal application: direct?



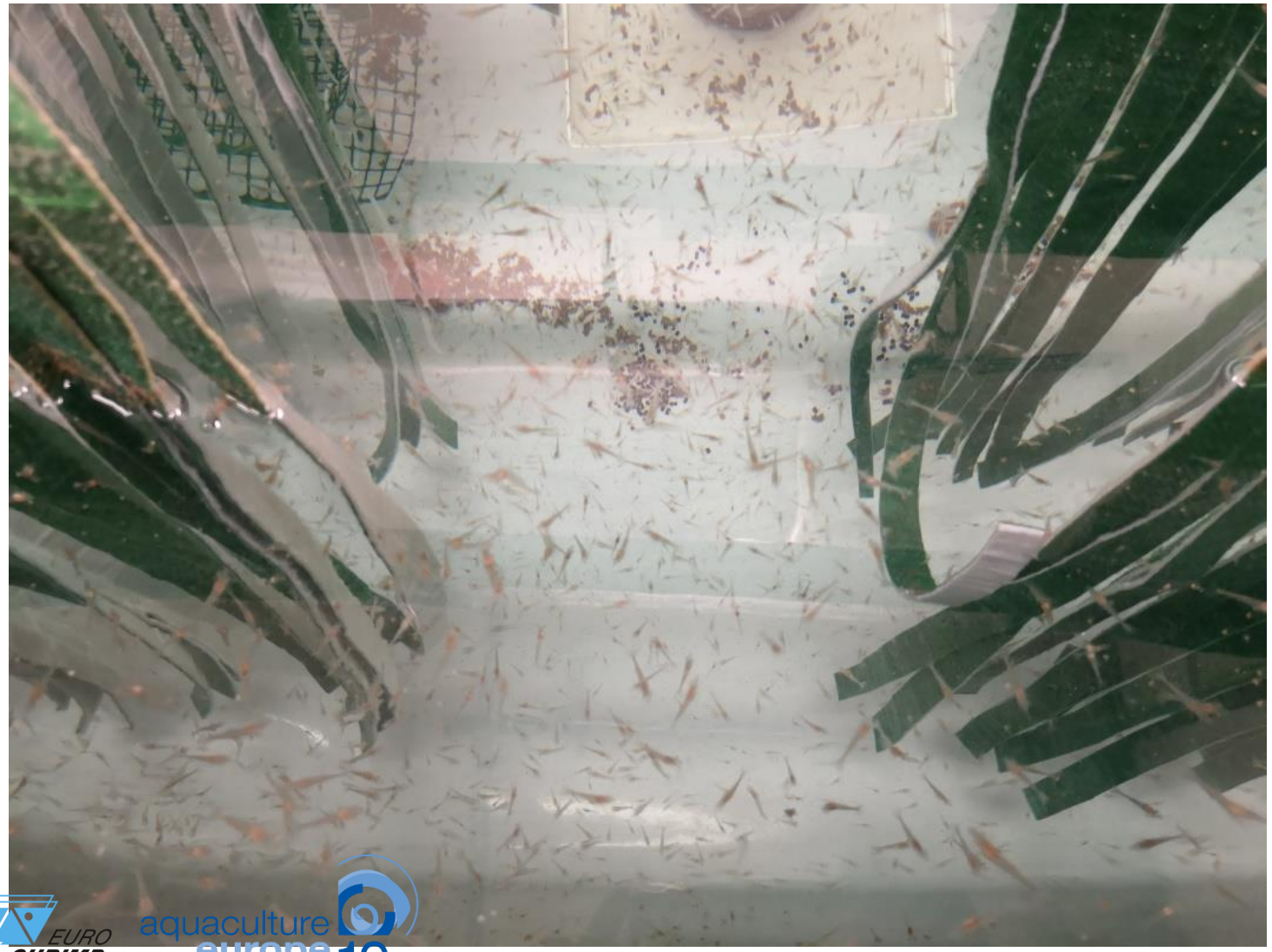
Zinevičius, 2015

Direct use of geothermal water from the large and shallow Upper-Middle Devonian aquifer containing 15-35 g/L salts and 20-30°C temperature.



Rastenienė and Puronas, 2005

Second round



Tasks:

- To run fully loaded system
- Denitrification filter
- To optimize water quality and feeding
- Reduce mortality

Thank You!

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