

## Insect production Pyhäsalmi mine

**The Europe's deepest active base metal mine is now being reused for food production. The underground spaces in the Pyhäsalmi mine create a significant test environment for new food production methods in natural resources field. The mine's reuse is expanding from plant growing to insect production in 1430 m deep underground.**

In the Pyhäsalmi mine's reuse projects, we have recently succeeded in growing plants at 660 m depth. As a new project in the natural resources field, an insect farm where house crickets (*acheta domesticus*) are being grown has been built in the mine during the summer. The facility has been built with the cooperation partners on the mine's main level at 1430 m depth.

Callio Edible Insects From Mine is an insect production project, the purpose of which is to pilot insect production underground. The aim is to develop an ecological and efficient insect farm to a challenging location that uses the geothermal heat and other circular economy principles.

"Insects are a huge potential for global food production. We are testing automated insect breeding technology in this project that enables cricket production in different environments without daily care", says Robert Nemlander from Entocube who came up with the original idea for this project.

"In the first phase of the project, we concentrate on developing new, efficient production technology and remote control and monitoring. A 3D model that enables remote monitoring and control of the insect farm virtually is being created. At the moment, the first insect population is being grown. Later, we will concentrate on innovations in circular economy and closed food production system in underground insect production. In addition, we are investigating the possibilities of networking with the international Mars research, as the conditions in the mine are similar to the pressurized Mars lava tunnels. Studies have shown that insect food production for human populations moving to Mars in the future would be possible.", tells project manager Hannele Blomqvist.

"Pyhäjärvi Callio offers unique possibilities in the field of natural resources because underground, the conditions are stable around the clock and around the year, and the conditions can also be automatically and remotely controlled. Growing crickets is important to us in many ways: we are developing new solutions to the future food productions challenges but also investigating visions of circular economy and networking with the international Mars research", says Callio Program Director Sakari Nokela.

The project has just started, so we are still looking for cooperation partners for insect production with circular economy principles and insect food processing. The plan is to produce delicious cricket product samples for visitors as well as the personnel working in the mine.

The underground insect farm concept being developed can be duplicated in other underground facilities in Finland and abroad. The aim is to pilot and produce new methods and solutions for the edible insect industry and to produce new information and business opportunities.



The project is being carried out between 1 December 2018 and 30 November 2020 in cooperation with the town of Pyhäjärvi, Entocube Oy, Pyhäsalmi Mine Oy, Probot Oy, M-Solutions Oy, Muon Solutions Oy and Callio Mine For Business. The project belongs to North Ostrobothnia rural development projects run by Centre for Economic Development, Transport and the Environment of Finland (European Union funding).

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