

NEWSLETTER

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LIFEWATEROIL

The **LIFE20 ENV/BG/001042 LIFE WATEROIL** Project is being implemented by LUKOIL Neftohim Burgas JSC, Burgas Municipality, Prof. d-r Asen Zlatarov University and Eurovix SPA, Italy. The Project is co-financed by the European Union under the LIFE program as an initiative improving the quality of the environment.

LUKOIL Neftohim Burgas JSC has completed the construction of a "closed" system for pressure supply of treated wastewater to the Electro Desalination Plant (EDP) unit and/or Section 90 of the Hydrocracker Complex, implementing a number of measures leading to a reduction in the consumption of



fresh water from the Mandra Dam. The use of stripped (treated) water in the EDP has minimised the consumption of fresh water from the dam for the needs of this installation. A closed process effluent pipeline is to be constructed from the desalters to a treatment facility at the Central Refinery.

Eurovix S.P.A. has improved the powder bioactivator formulation with microbial strain able to grow in minimal medium polluted by petroleum hydrocarbons and able to degrade them.

The strain is a non-pathogenic organism, with an aerobic metabolism and is a static, non-sporulating microbe. This strain is widely employed in bioremediation applications due to its ability to catabolize (degrade) a wide range of compounds, such as fossil fuel and pharmaceutical compounds.

Eurovix tested, at lab scale, different growth conditions of the selected strain. The composition of the medium, temperature, medium oxygenation, pH, centrifugation and lyophilisation steps were optimized to achieve an optimal industrial-scale production.

After the production phases which included the cultivation, filtration, centrifugation and the lyophilisation of the microbial cells, the vital cell concentration of the obtained lyophilized powder was $1 \cdot 10^{10}$ CFU/g. Although the viable cell concentration of the final powder was high, a scaled-up production of the



microorganism is necessary to obtain a useful amount of lyophilized powder for the production of bioactivators.

To achieve large-scale production, Eurovix R&D staff is employing new machines purchased with WATEROIL funds for the fermentation and separation of a large amount of fermentation medium.

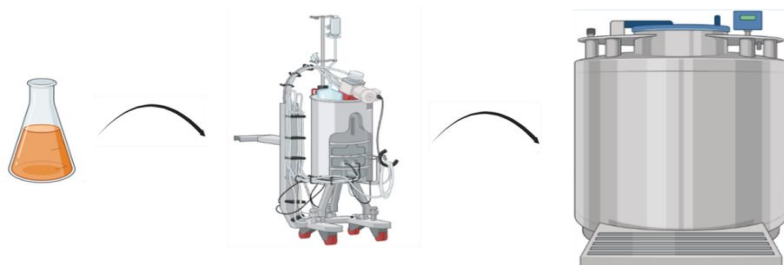


Figure 1. Schematic representation of the process of industrial-scale production of microbial strains

The fermentation bioprocess consists of an initial preculture-cultivation in a flask in 8 litres of nutrient broth (Figure 2a). The preculture is then introduced into a 30-liter bioreactor (Solaris) (Figure 2b). Then the last cultivation step is carried out in a 100-liter bioreactor (Eurovix equipment). The separation of the cells from culture media is carried out by a cross-flow filtration module with a filtering capacity of 20L/hours (Figure 2c). The product obtained undergoes a centrifugation phase (if necessary) and a lyophilisation phase.



Figure 2. Microbial strains industrial production

After the microbial production, the powder strain obtained is mixed with other raw materials and packaged.

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