

# PRODUCTION OF A MICROBIOLOGICAL MATERIAL ON A BIOCHAR CARRIER FROM LIGNOCELLULOSE-BASED PLANT BIOMASS WITH TWO-STAGE FERMENTATION TECHNOLOGY



*lignocellulose/lignin-degrading fungus • two stage fermentation • straw biochar • soil improver*

## Key facts

- **Category of the technology:** 150 l/batch liquid fermentation, 250 kg/batch solid fermentation, composting
- **Input:** wheat straw, lignocellulose/lignin-degrading fungus, horse manure
- **Output product(s):** microbiological soil improver product on a biochar carrier
- **Available capacity:** 150 l/batch liquid fermentation, 250 kg/batch solid fermentation
- **Focusing geographical areas:** EU27, UK, USA, Australia, Japan



## Summary of the technology

Using an effective lignocellulose/lignin-degrading fungal strain, this technology produces a microbiological product to promote the composting of biomass with a high lignocellulose content, such as horse stable manure. This technology applies an innovative, liquid and solid-phase, two-stage fermentation process. The scale-up of fermentation was successfully implemented: the liquid fermenter operates with a capacity of 150 l/batch, while the solid fermenter has a capacity of 250 kg/batch. The optimal parameters of the fermentation process were also determined. A large amount of fungal mycelium is produced during a relative short (48-72 hours) liquid phase fermentation process. The mycelia is then separated from the liquid fraction and mixed with a solid biochar carrier during the second stage fermentation process. The 150 l/batch liquid phase fermentation produces viable, actively growing fungal mycelium, which is used to inoculate the second stage solid phase fermentation process. Solid fermentation uses biochar produced from lignocellulose-based wheat straw which is suitable for microbiological adaptation as a carrier of the microbiological fungal material. This solid-phase fermentation was carried out under partially sterile conditions. Biochar was produced by pyrolysis of wheat straw. The solid carrier is produced at a material core temperature of 550 °C with a residence time of 60 minutes, which ensures that the produced material contains more than 98% dry matter and is free from microorganisms. The 3R-pyrolysis process is a zero-emission, energetically self-sustaining that provides additional green energy. The biochar product produced from lignocellulose-based wheat straw can be used in agriculture as a microbial carrier and as a yield-enhancing material.

## Competitive position and advantages

- **Zero emission environmental & climate impact performance:** all material streams in all states are recycled, reused and converted into useful and safe products. Autothermal, producing surplus bioenergy.
- **Economical and scalable** the two-stage, liquid and solid phase fermentation process for production of microbial product on biochar carrier.
- The two-stage liquid fermentation system has **high productivity, greater flexibility, easier operation and maintenance.**

### Contact

**Name:** Edward Someus

**Company:** 3R-BioPhosphate Ltd.

**Web:** [www.BioPhosphate.net](http://www.BioPhosphate.net)

**e-mail:** [biochar@3Ragrocarbon.com](mailto:biochar@3Ragrocarbon.com)