

## Microalgae biomass

Origin:	Wastewater treatment plant using <i>Chlamydomonas acidophila</i> reactor
Recycling pathways:	<ul style="list-style-type: none"> <li>• Plant biostimulant</li> <li>• Organic soil improver</li> <li>• Organo-mineral fertiliser</li> </ul>



## COMPOUND MATERIAL DESCRIPTION

### ORIGIN & AVAILABILITY

Microalgae biomass is produced at wastewater treatment plant using a reactor growing *Chlamydomonas acidophila*.

Microalgae biomass potential ranges from 1.3 to 2.6 tons/y/plant, based on wwtp capacity of 100 PE - 200 PE.

This biomass is locally distributed at remote, rural and island locations, potentially in UK, FR. A first practical implementation in Scotland (Bo'ness wwtp, 2019) show a successful manufacturing of biomass.

A low seasonal variability in quantity and quality can be expected, due to the low light intensity supplied and required by *C. acidophila*.

### QUALITY CONSIDERATIONS

It is essential to check content of main components and safety criteria. An average P-content in the dry microalgae biomass reached values of around 1.4% (41-82 kg P<sub>2</sub>O<sub>5</sub>/y/plant) and N by 7%. Further main components are plant hormones, vitamins, fatty ac-

ids and antioxidants. The non-harmfulness of potential residual elements of the wastewater where *C. acidophila* grew are to be assessed.

### INTEREST & VALUE

Microalgae biomass supports plant growing, fosters soil life and contribute to mineralization of nutrients.

Using microalgae as biofertiliser has the reported potential for enhanced soil fertility, plant growth, nutrients dynamic, fruit quality and nutritional characteristics and grain yield. Also, *C. acidophila* accumulates carotenoids, valuable antioxidants able to improve the plant growth.

Algal biofertiliser soil amendments increase the organic carbon of soil, enhancing soil microbial activity and improving the mineralisation of nutrients for plant availability.

### TIPS/BE AWARE

Handling and transport of microalgae biomass is strongly influenced by its solid content (4-6%).

## RECYCLING PATHWAYS

As this compound material can be recycled as a fertiliser, the formulations proposed refer to a possible Product Function Category (PFC) according to the wording set up in the EU Fertilising Products Regulation ((EU) 2019/1009). The microalgae could fall under the compound Material Categories "Plants, plant parts or plant extracts" (CMC 2) provided processing requirements are met, and potentially under "Micro-organisms" (CMC 7) in case the *Chlamydomonas* would get added to the list. In any case, existing national legislations (and possibly Regulation (EU) 2019/515 on mutual recognition) apply.

### PLANT BIOSTIMULANT – PFC 6 (A)

After partial drying and formulation, the microalgae-biomass can be used as microbial plant stimulant.

Producer of eco-friendly compounds for gardening and horticulture are here targeted.

The logistical aspects to collect efficiently decentralised microalgae biomass that match with a minimum required quantity could be a limiting factor. Decisive is also the drying step: a decentral solution (waste heat, solar facility) would be to find.

The expanding market for gardening and horticulture is a factor in support of this pathway.

### ORGANIC SOIL IMPROVER – PFC 3 (A)

Having less than 20% dry matter, the biomass belongs to the liquid soil improver, unless a drying occurs. It can be applied without further processing using common soil application machinery to land.

The targeted users are the local farmers, but also technical services of the municipalities or private enterprises for soil works.

Limiting factors can be on one hand the small amount produced, and on the other hand the need

to harmonise the optimal application time with the production cycle of the biomass. To face this, a storage might be required. Not complying with the EU Fertilising Products Regulation but potentially with the national ones, the microalgae biomass could be mixed with other organic material (manure, sewage sludge, co-digestion substrate) and thus stored with them.

Factors in support of this pathway include the direct use of a biomass with an interesting P-content, the potential advantages of microalgae as plant biostimulant (through enzyme and hormones), the soil improvement by the addition of organic carbon and the strengthening of synergies between local players.

### ORGANO-MINERAL FERTILISER – PFC 1 (B)

Co-formulated with inorganics fertilisers, the microalgae biomass could be incorporated after drying in an organo-mineral fertiliser. The specific properties of microalgae as biostimulator for healthy plant growth would be herewith combined with the mineral fertiliser in one product.

Target groups, limiting and supporting factors are the same as for the use as plant biostimulant.

## STAKEHOLDERS MAPPING

This figure shows the main stakeholders that may be involved in the recycling pathways of microalgae biomass.

