

BioEnergy

News

ALGEACELL[®] – harnessing the power of algae

The pioneering product for the optimization of stressed biogas processes

For a number of years now, Schaumann BioEnergy has tapped into the positive properties of brown algae for process optimization in AD plants. A redeveloped pulping technique now allows raw algae to be processed in an even more gentle and efficient way, yielding not only alginates in their optimal form but also further active ingredients (e.g. phytohormones and laminarin).

The new product ALGEACELL[®] by Schaumann BioEnergy harnesses the brown algae's advanced effects (see figure 1). ALGEACELL[®]'s properties have been verified and substantiated by a series of lab and field trials.

Effects of alginates

Processing raw brown algae releases alginates (polysaccharides) capable of forming

three-dimensional structures in liquids. In digesters, these structural enhancers improve the homogenous distribution of solids in addition to offering a highly efficient system for ion enclosure and exchange ("eggbox-model", see figure 3). This capacity enhances stable digester operation especially when faced with changing feedstocks, accumulating acids or inhibitory salts.

Fig. 1: Gentle pulping of brown algae

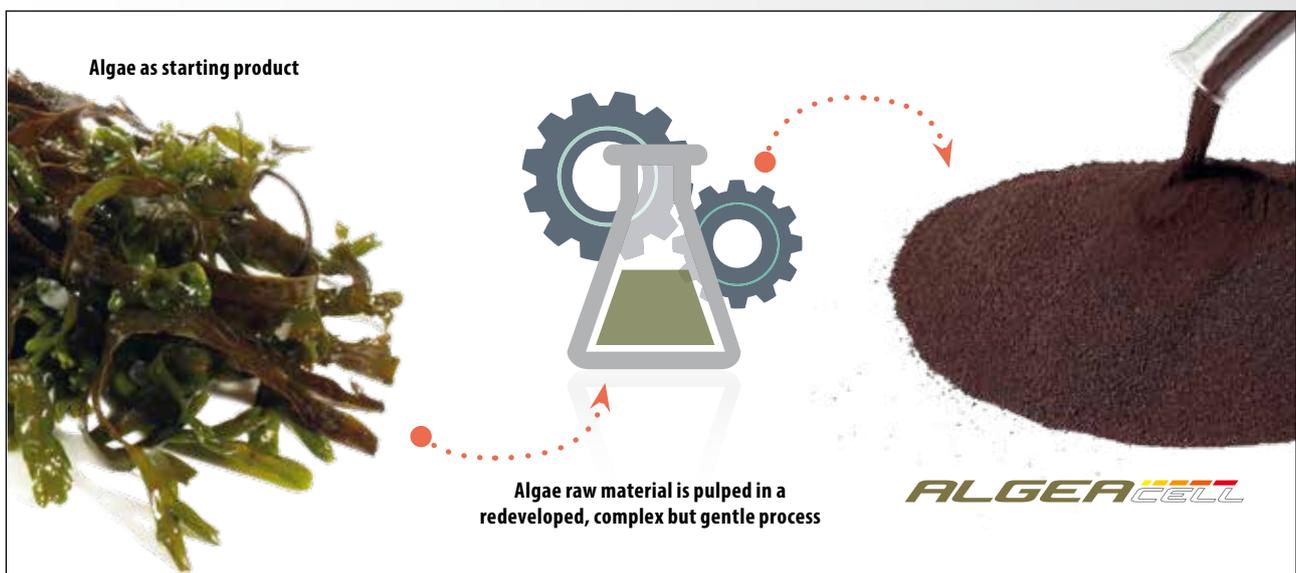


Fig. 2: Additional biogas yield by application of ALGEACELL® in nitrogen-rich digesters (ISF Schaumann Research 2018)

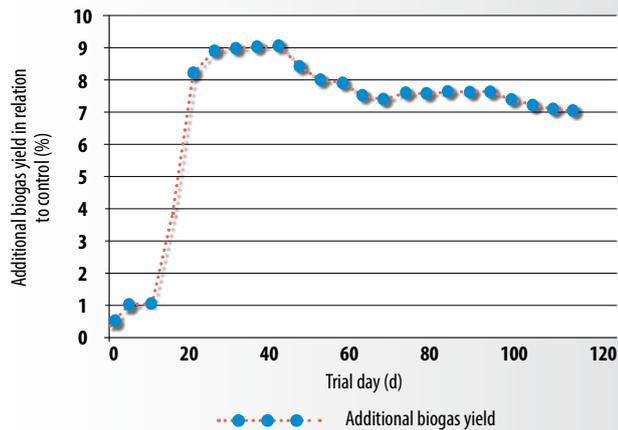
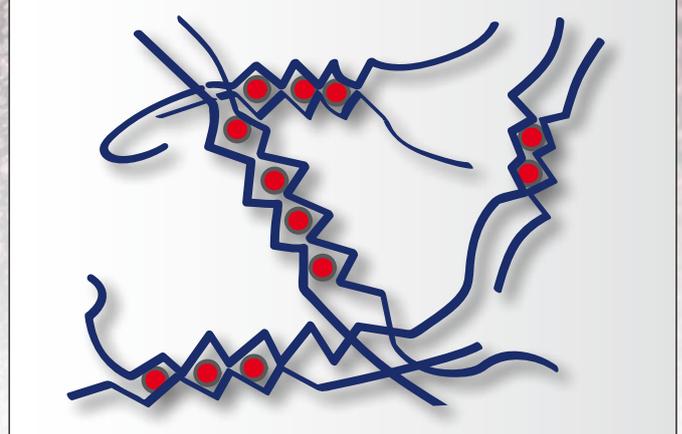


Fig. 3: Schematic representation of ion enclosure in ALGEACELL®-alginates (eggbox-model)



Phytohormones and laminarin

In the digester, inhibitors will negatively affect the microbial degradation cascade and restrict the metabolism of the microorganisms involved. The consequences are reduced turnover rates and disruptions where growth and reproduction of microorganisms are concerned.

Reduced turnover will cause incomplete degradation and a decrease in biogas production. Restricted microbial growth will amplify this effect further and decimate the microbial populations most affected by the inhibition leading to reduced overall resilience in the face of process disruptions.

Released and preserved by the redeveloped pulping process, algal phytohormones and beta-glucans (e.g. laminarin) are able to counteract these effects by triggering metabolic impulses in the microorganisms which significantly enhance energetic turnover and

cell division rates. The impaired degradation and biogas generation process can go back to its former optimal level.

Particularly sites being operated on high proportions of farmyard manure in their diet and incomplete degradation due to elevated nitrogen concentrations or short retention times realize an increase in biogas production through the application of ALGEACELL®.

Figure 2 illustrates the positive effect of ALGEACELL® on the biogas process. It shows the percentage additional biogas yield in lab reactors running at elevated ammonium concentrations (4.0g/l) over a period of 110 days. The additional biogas yield stabilizes at a level of ca. 7 %.

Conclusion

In times of steadily increasing substrate costs, ALGEACELL® offers the opportunity of harvesting more energy from the feed-

stocks available while increasing the proportion of cost-efficient farmyard manure at the same time. Particularly with increased amounts of nitrogen-rich feedstocks, ALGEACELL® creates maximum degradation efficiency on top of facilitating microbial adaption to high ammonia loads. By its homogenizing effect on the digestate, ALGEACELL® keeps the formation of floating layers at bay and reduces tendencies for process disruptions.

Dr. Harald Lindorfer

02_E_181214