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BIOFAT: 1 year of cultivation ot a 0.5 ha scale

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Original Citation:

BIOFAT: 1 year of cultivation ot a 0.5 ha scale / Fonseca D. Costa L., S.J., Vieira, V.V., Tredici, M., Biondi, N., Prussi, M., Rodolfi, L., Bassi, N., Mangini, S., Wrubl, F., Leu, S., Boussiba, S., de Pooter, M., Rios, S., Lépine, O., Anton, S., Martinelli, L.. - STAMPA. - (2015), pp. 205-205. (AlgaEurope 2015 Lisbon, 2015 1-3 December 2015).

Availability:

The webpage https://hdl.handle.net/2158/1051765 of the repository was last updated on 2016-09-08T17:12:53Z

Publisher:

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14 November 2026

BIOFAT: 1 YEAR OF CULTIVATION AT A 0.5 HA SCALE

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BIOFAT is an FP7 demonstration project that integrates the entire value chain of the algae process from optimized growth, biosynthesis of starch and oil accumulation to downstream processing in a biorefinery concept. The value chain of biofuel production from microalgae will be tested on a large scale during the project, which is being implemented in two stages: process optimization in two pilot-scale facilities, each one-half hectare in size, in Italy and Portugal; and economic modelling and scale-up to a 10-hectare demo facility.

BCPP and BPPP (BIOFAT Camporosso Pilot Plant and BIOFAT Pataias Pilot Plant, respectively) were designed with technologies that are part of the partners' expertise and portfolio, and that represent well-established platforms for microalgae production: Green Wall Panels (GWPs), Tubular Photobioreactors (TPBRs) and Raceways (RWs). BCPP was based on the conventional RW model with improvements regarding the mixing energy, whereas BPPP is based on a non-conventional raceway design with slopped channels, known as Cascade Raceways – CRWs.

BPPP unit occupies 0.5 ha area and has a total volume of 230 m3. The installed equipment includes all the necessary infrastructures to support a production unit, such as daily control laboratory, inoculum culture chamber, office, workshop, water treatment, nutrients and salt management, and the core production units which include 3 m3 of GWPs, 48 m3 of TPBRs, 1 prototype CRW with 900 L for R&D purposes and 2 CRWs with 90 m3 each.

Nannochloropsis oceanica F&M-M24 was cultivated at BPPP during 1 year in all these 3 different technologies. Each GWP was maintained in batch and then used as inoculum for a TPBR. The TPBR were operated in semi-continuous mode in N-replete culture medium, with daily nutrient control and then used to inoculate the CRWs, which were operated in the same regime. The CRWs were harvested according to the weather conditions and to the concentration system capacity. Except for the GWP, all the systems were fed with recycled culture medium. BPPP was operated for more than 1 year with very satisfactory results on such a scale: the performance obtained indicates that with 17 MJ/m2/day average annual radiation, the pilot productivity is close to 15 g/m2/d.

At BCPP, the installed equipment also included all the necessary infrastructures to support a production unit. In the core system small inoculum volumes are used to inoculate GWP-II cultivation systems. The GWP-II occupies an area of around 500 m2 and 2 lines of cultivation with 8000 L each unit, totaling 16 m3. The growth and starvation stage is then performed in traditional raceway ponds. The outdoor cultivation consists in an assembly of 4 RWs, two with 500 m2 each for growth (RWA), and two with 1250 m2 each for final growth and starvation (RWB). BCPP is

being operated at full scale since early summer 2015, in order to collect enough data for an LCA and economic analysis.

Since June 2014 a specially designed harvesting system from the project partner Evodos was provided, and trials with Nannochloropsis were performed in cooperation between EVODOS, A4F and A&A, both for UF pre-concentration and dynamic settler final harvesting. The extracted oil from the biomass produced during this project will be used for biodiesel production tests.

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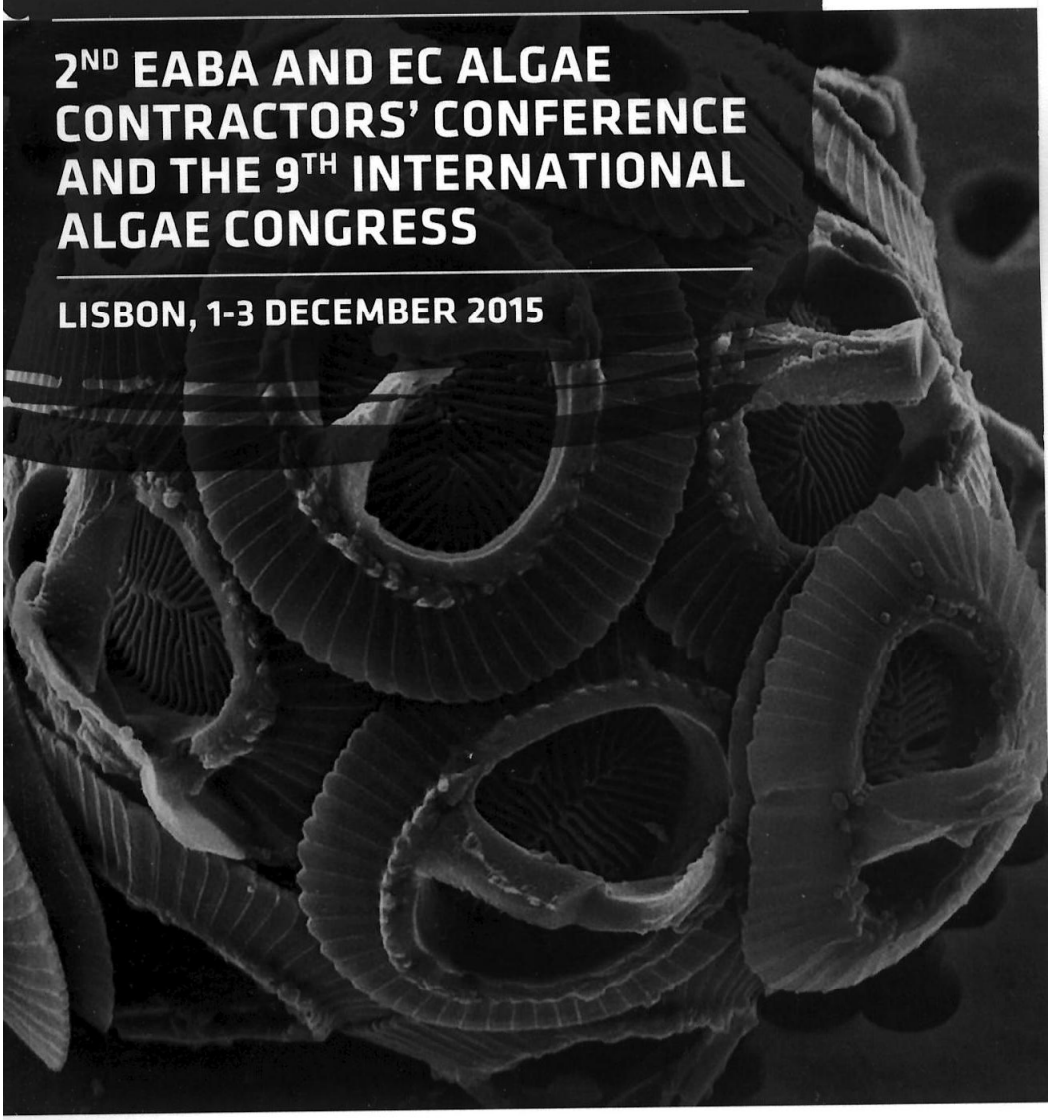

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