CLASSICAL BREEDING IN THE DIATOM SPECIES *Seminavis robusta* FOR BIOTECHNOLOGICAL USE IN THE EUROPEAN AQUACULTURE INDUSTRY

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Abstract: Microalgae are a natural source of high-value fatty acids and could address the reduced availability of fish oil from pelagic fisheries and the increasing needs from the aquaculture sector and the ω-3 market (Chauton et al., 2015). Still, their exploitation on industrial scale is scarce, mainly due to the lack of highly performant strains.

Classical breeding constitutes a source of genetic diversification in microalgae, generating progeny strains with unique genetic heritage and bypassing the controversial issue of genetic modified organisms (GMOs). In the framework of the H2020 NewTechAqua project, our goal is to generate improved microalgae strains via classical breeding for application as aquafeed in European aquaculture. The heterothallic diatom species *Seminavis robusta* is particularly suitable for controlled breeding programs based on pedigree selection (Chepurnov et al., 2012).

Eight wild-type strains of *S. robusta* were purchased from the BCCM/DCG collection (PAE laboratory, UGENT, Belgium) and crossbred according to their sexual compatibility (De Decker et al., 2018). Single cells of 66 F1 progeny strains from eleven breeding pairs successfully developed into monoclonal cultures. All the 74 strains were cultured for twelve days under the same growth conditions in 6-well plates. Sixteen bright field and fluorescence CY5 images per well were taken every three days using the Cytation™ 3 plate reader and imager from BioTek, and processed using Gen5 and ImageJ softwares. Cell density over time was estimated using the percentage of surface showing CY5 fluorescence over the total surface.

Sixteen F1 progeny strains aroused biotechnological interest as they showed faster growth compared to their wild-type parents. Further studies will address fatty acid composition and quantification for all the strains. The most performant F1 strains will undergo crossbreeding experiments in an iterative manner, using a pedigree-based approach. Our findings will ultimately contribute to achieve a more sustainable, resilient and cost-effective European aquaculture.

Key words: Classical breeding, *Seminavis robusta*, aquaculture, w-3 PUFAs, DHA, EPA

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