MICROBIAL OILS WITH HIGH LEVELS OF OMEGA-3 FATTY ACIDS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Application No. 63/005,054, filed April 3, 2020, which is incorporated by reference herein in its entirety.

BACKGROUND

Oil from microorganisms is produced as a result of two parallel fatty acid synthesis pathways: the classical fatty acid synthesis (FAS) pathway and the polyunsaturated fatty acid (PUFA) synthase pathway. Medium chain fatty acids like myristic (C14:0) and palmitic acid (C16:0) are generally produced from the FAS pathway and long chain polyunsaturated fatty acids (LC-PUFA) like docosahexaenoic acid (DHA, C22:6 n-3) and docosapentaenoic acid (DPA, C22:5 n-6) are generally produced from the PUFA synthase pathway. The resultant fatty acid profile, however, varies greatly across microorganisms, depending on the relative activity of these parallel pathways.

BRIEF SUMMARY

In one aspect of the present disclosure, there is provided a microbial oil comprising at least 85% total fatty acids by weight, wherein the total fatty acids comprise at least 50% docosahexaenoic acid by weight, between 6% to 18% docosapentaenoic acid n-6 by weight, and less than 1% stearic acid by weight.

In another aspect of the present disclosure, there is provided a microbial oil comprising at least 85% total fatty acids by weight, wherein the total fatty acids comprise at least 60% docosahexaenoic acid by weight.

In a further aspect of the present disclosure, there is provided a method of making a biomass comprising culturing an oil-producing *Aurantiochytrium* microorganism in a culture medium comprising a fatty acid synthesis inhibitor, wherein the biomass comprises at least 500 mg/g oil.

Provided herein are microbial oils and methods of making and using microbial oils with high levels of omega-3 fatty acids. Specifically, provided is a microbial oil comprising at least 85% total fatty acids by weight, wherein the total fatty acids comprise at least 50%

DHA by weight. Also provided is a method of making a biomass comprising culturing an oil-producing microorganism (e.g., *Aurantiochytrium*) in a culture medium comprising a fatty acid synthesis inhibitor, wherein the biomass comprises at least 500 mg/g oil.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a graph showing fatty acid profiles of *Aurantiochytrium* sp. (G3) utilizing different initial fatty acid synthesis inhibitor dosing timepoints at 20°C.

Figure 2 is a graph showing fatty acid profiles of *Aurantiochytrium* sp. (G3) in varying concentrations of fatty acid synthesis inhibitor at 20°C.

Figure 3 is a graph showing fatty acid profiles of *Aurantiochytrium* sp. (G3) in various fatty acid synthesis inhibitor dosing strategies at 20°C. Treatments indicating 3x and 6x are multiple additions of fatty acid synthesis inhibitor at equally-spaced time intervals