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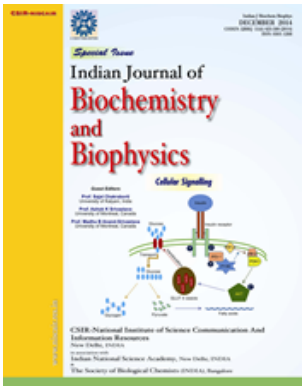

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Production of medium chain fatty acid rich single cell oil using whole de-oiled mustard meal from soil fungus

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Screening of fungal strain was done from soil collected from the rice bran oil industry to search for important fatty acids with health beneficial effects. This study investigates the exceptional production of microbial oil medium-chain fatty acids like caproic acid (6:0), caprylic acid (8:0), capric acid (10:0), by the cultivated fungal culture in a media containing whole mustard meal as a supplement. This paper presents the result on the production of oil with such type of fatty acid composition which makes the oil more stable during cooking and gives fewer calories after consumption which is beneficial for health.

Keywords: Behenic acid, Long chain fatty acids, Low-calorie oil, Meal supplementation, Oleaginous fungi

Fatty acids, the major component of triacylglycerides (TAGs) are the major contributors to dietary fat in human. Fatty acids have a specific metabolic role as a source of energy, functional role as the component of cell membrane phospholipids and signaling role as they constitute many molecules involved in cell signaling processes[1]. Thus fatty acids have a wide range of general and specific biological activities that influence health, well being and disease risk[2]. One of the alternative sources of TAGs is microbial oils or single cell oils (SCOs) because many of which have a similar fatty acid profile as vegetable oil[3]. SCOs are produced by oleaginous microorganisms with the ability to accumulate lipids more than 20% (*w/w*) of their total dry biomass weight[4]. Accumulation of lipids in cells of oleaginous microorganisms including bacteria, yeast, mold, and microalgae during the secondary metabolic growth under conditions where carbon is in excess and another essential nutrient such as nitrogen is limiting[5]. Lipids of oleaginous fungi have attracted great worldwide attention as they can accumulate lipids as high as 80% of their cell biomass[6]. They possess some biotechnological advantages for SCO production such as short life, pelleted growth for easier downstream, easy to scale up, and their ability to use a wide range of carbon sources such as lignocellulosic carbon, agro-industrial residues[7]. Increasing attention has been paid to develop new oil resources by using microbes over the conventional plant and animal resources. There are several filamentous fungi that can produce some value-added fatty acids such as long-chain fatty acids that are comparable to conventional plant oils[8] and some fungi are also capable of accumulating polyunsaturated fatty acids (PUFAs) such as Docosahexaenoic acid (DHA), Alpha-linoleic acid (ALA), Gamma-linoleic acid (GLA), Eicosapentaenoic acid (EPA) and Arachidonic acid (ARA)[9]. Long-chain PUFAs have been reported to exhibit a multifunctional role in preventing or curing a variety of diseases in the human body[10]. Along with their role as energy supplying fuel, short-chain saturated fatty acids (SCFA), from C1 to C5 and medium-chain saturated fatty acids (MCFAs), from C6-C12, are important food constituents and also play an important role in controlling cell metabolism and intracellular signalling[11]. MCFAs have gained attention as an important diet because they exhibit unique structural and physiological characteristics. They are relatively soluble in water, absorbed and transported directly *via* the portal system, have more rapid β-oxidation, augmenting diet-induced thermogenesis and have little affinity to store as body fat. During the last few years, MCFAs have gained attention as part of a healthy diet for the patients suffering from lipid mal-absorption, mal-digestion, obesity, and carnitine deficiency disease. TAGs

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