**Yeast as a producer of lipid**

Microorganisms are considered as abundant sources of oil and fats because their membranes and membranous structures always contain intracellular lipids. Those microorganisms that can produce high lipid content or more than 200 g /kg of their biomass are identified as “oleaginous,

Oleaginous microorganisms are considered as promising feedstock because of their similar fatty acid composition to that of vegetable oils. Also, microbes have a short life cycle as compared to plants so the time to harvest is shorter, less labor is required, microbial oil production is less affected by venue, season and climate, and scale-up is easier, as well as they grow well on a variety of substrates some of which are cheap carbon sources and other carbohydrate-rich agricultural or food processing wastes Therefore, microbial oil has a tremendous potential to become one of the major oil feeds stocks for biodiesel production.

Yeasts are unicellular organisms which reproduce asexually by budding. They are used industrially to ferment carbohydrates to such products as alcohol and citric acid. Oleaginous yeasts can accumulate TAGs rich in PUFAs including oleic and linoleic acid. The lipid bodies accumulate during stationary phase and they can constitute up to 70% of the total lipid content of the cell under nutrient limitation conditions .The efficiency of oil biosynthesis by yeast and its composition depend on the genetic properties of the yeast strains, cultivation conditions and the composition of culture medium.

Under favorable conditions, some oleaginous yeast can accumulate large quantities of lipids by utilizing lignocellulosic biomass and other cheap materials including wastewater from soybean and olive oil manufacturing plants, waste whey from cheese, and glycerol the by- product from biodiesel plants.

A number of methods, such as hot acid hydrolysis, microwave irradiation, sonication, high-pressure homogenization, bead beating, and swelling by osmotic pressure have been used for cell disruption. Moreover, lipid is most efficiently recovered from freeze-dried or freeze-thawed yeast cells and this procedure is commonly employed. Mechanical disintegration of the cell and drying yeast at moderate temperatures also proved to enhance lipid extraction.

Autolysis, is another method which can be induced by exposing yeasts to elevated temperatures (40-60 °C), organic solvents and detergents.

Several oil extraction methods have been developed. Wet rendering, mechanical pressing and solvent extraction are the basic methods for oil extraction. Mechanical (hydraulic and screw) the enzyme-assisted cold pressing employed later.

In mechanical pressing, oils contained material is boiled in the wet rendering method for partial separation then the oil is skimmed off. The third and the most conventionally used method is the solvent extraction.

Solvent extraction methods

1. Conventional organic solvent extractions methods Lipid extraction could be carried out using different methods. The yeast cells are firstly separated by centrifugation then dried at 60°C to constant weight. The dried cells are then milled and extracted. It was demonstrated that the bound lipids require an acidified extractant to affect their release.some other method includes ,Lipid extraction by Bligh and Dyer method, Modified Bligh and Dyer method: Successive liquid/liquid extraction, Soxhlet method.
2. Developed lipid extraction methods
3. 1. Pressurized liquid extraction (PLE )method
4. Accelerated solvent extraction (ASE)
5. . Enzyme-assisted extraction
6. Supercritical CO2 Extraction ( SCCE)
7. Yeast Oil content ( %dry wt.) Candida curvata 58 Cryptococcus albidus 65 Lipomyces starkeyi 64 Rhodotorula glutinis 72