

Single Cell Proteins: Instant Source of Energy

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Introduction

Single-cell protein refers to an edible protein isolated from pure microbial cultures and which can be used as a protein supplement for humans as well as animals. Microorganisms like algae, fungi, yeast and bacteria have very high protein content in their biomass. These microbes can be grown using inexpensive substrates like agricultural waste viz. rice straw, wheat straw, wood shavings, sawdust, and corn cobs. The microorganisms utilize the carbon and nitrogen present in these materials and convert them into high-quality proteins.

SCP production centres in India:

- Central Food Technological Research Institute(CFTRI)
- National Botanical Research Institute (NBRI)

Why microorganisms for Single Cell Proteins?

- Grow at a faster rate.
- The quality and quantity of protein is considered better (controversies prevail).
- Wide range of raw materials can be used.
- The production process is easy and simple.
- Microbes can be subjected easily to desired genetic manipulations.

Production of Single-Cell Protein:

Production of pure microbial cultures for desired protein products requires a nitrogen, carbon and phosphorus for optimal growth of the pure culture. Heat sterilization or filtration through microporous membranes can be done to avoid contamination. The interested/ selected

microorganism is inoculated under aseptic conditions. After the multiplication of the biomass, it is recovered from the medium and purified. There are four main steps for the production of SCP:

1. Fermentation
2. Harvesting.
3. Post-harvest treatment.
4. SCP processing for food

Problems during extraction:

- Very low concentrations, usually less than 5%.
- 60-80% dry cell weight; contains nucleic acids, fats, CHO, vitamins and minerals
- Rich in essential amino acids (Lys-Met).

Advantages of Single-Cell Protein

- Microorganisms have a high rate of multiplication, which means a large quantity of biomass can be produced in a comparatively shorter duration.
- Amino acid composition can be varied by genetic modification of microbes.
- A broad variety of raw materials can be used as a substrate.
- Production is not depends upon the climatic conditions.

Disadvantages of Single-Cell Protein

- High level of nucleic acids.
- The biomass may trigger an allergic reaction.
- Presence of secondary toxic metabolites
- The capital production cost is high
- Sophisticated machinery is required.

Applications of Single-Cell Protein

- Provides instant energy.
- It is good for health.
- It is the best protein supplemented food.
- It is the rich source of vitamins, amino acids, minerals, crude fibres, etc.
- Used to lowers blood sugar level in diabetic patients, reduce body weight, cholesterol and stress
- Used in Cosmetic products.

References:

1. Al-Mudhafr A W H and Al-Garawyi A M A. 2019. Microbiological sources and nutritional value of single cell protein (SCP). *International Journal for Research in Applied Sciences and Biotechnology*. 6: 1–3.
2. Ahmadi A R, Ghoorchian H, Hajihosaini R and Khanifar J. 2010. Determination of the amount of protein and amino acids extracted from the microbial protein (SCP) of lignocellulosic wastes. *Pakistan Journal of Biological Sciences*. 13: 355–361.
3. Anupama and Ravindra P. 2000. Value-added food: single cell protein. *Biotechnology Advances*. 18: 459–479.