

# Current Research in Microbiology

## Chapter 4

### Solid State Fermentation: A Source of Bioactive Molecule Production

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#### Abstract

Fermentations have been playing a very important role in society since the knowledge helped in production of valuable products. Since inception, fermentation has supported in production of variety of value added products like beverages, solvents, enzymes, vitamins, growth factors etc.

Recently, there has been a drastic diversification of usage of variety of substrate replacing traditional substrates for fermentation. Now a days Solid State Fermentation has gained momentum for production of bioactive molecules due to its benefits over traditional fermentation substrates.

#### 1. Introduction

Bioconversions popularly labelled as fermentations can be defined as breakdown of complex organic substances into simple substances either by micro-organisms directly or by their enzymes to produce economically important products.

Pathway of Production :- The bioconversion of complex substrate to variety of secondary metabolites requires multistep enzymatic reactions. Basically the complete bioconversion can be categorized in two stages:-

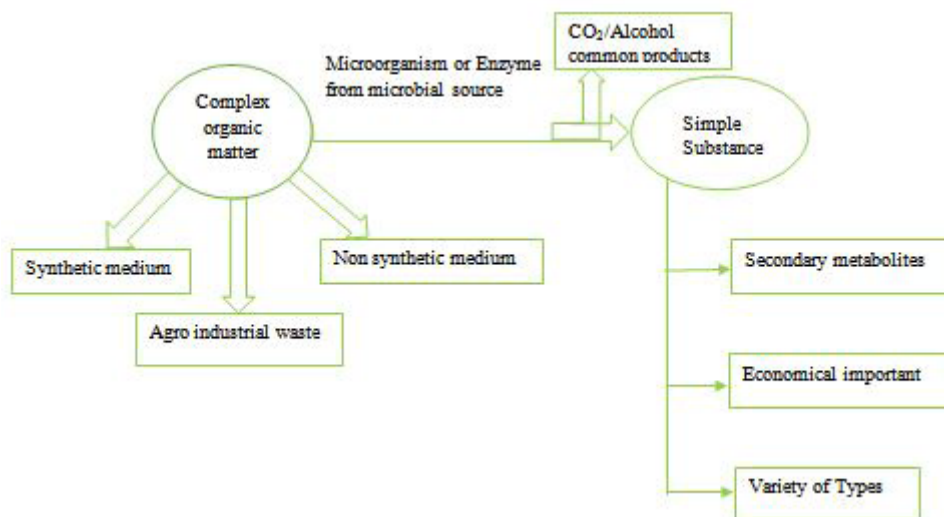
- (a) Production of Primary Metabolites
- (b) Production of Secondary Metabolites

**(a) Production of Primary Metabolites** :- This is a primary or preliminary stage where all catabolic reaction takes place. Complex molecules are broken down into their constituents. The immediate products of primary breakdown are called primary metabolites. Primary metabolites are products which are essential for the microbes for self growth and sustainment as

the microorganisms multiply and increase the total biomass of the fermentative stuff.

**(b) Production of Secondary Metabolites :-** These are the additional compounds produced after the organisms complete log phase and initiates stationary phase. The secondary metabolites are also called as Bioactive compounds due to their beneficial applications in pharmaceuticals, food and health market [1,2,3].

Secondary metabolites have a wide range of applications. The economically important products are antibiotics, peptides, enzyme and growth factors [4,5,6].



**Figure1:** Underlying principle of fermentation

## 2. Fermentation Types:- Submerge Fermentation and Solid State Fermentation

The Submerge Fermentations are well known traditional style of fermentation exemplified by wine production, enzyme production etc. where the substrate is in liquid medium. The most common substrate are molasses, corn steep liquor, broths etc. Since utilization of substrate is fast hence the nutrients are required to be constantly replenished. Generally, bacterial growth is highly favoured in nutrients dissolved in liquid medium.

SSF:- Agriculture and animal productions have been flourishing since decades [7] resulting in generation of wastes which remain underexploited. The valorization of such agro industrial wastes is the upcoming alternative as fermentation substrates in SSF. The commonly used substrates for SSF are categorized in the final **Table1**.

**Table 1**

Products	Products	Substrate used	References
Antibiotics	Iturin	soybean curd residue	Ohno et al., 1995
	Griseofulvin production	Rice bran	Saykhedkar and Singhal, 2004
	Anti bacterial	chicken meat	Maragkoudakis et al., 2009
	Antimicrobial, antihypertensive and antioxidant properties	Cheddar cheeses	Pritchard et al., 2010
Pigments	carotenoid	-	Dharmaraj et al., 2009
Enzyme	Tannases, pectinases, caffeinases, mannanases, phytases, xylanases and proteases,	wheat straw or barley, sugar cane bagasse, coffee pulp, grape wastes, copra pasta	Aguilar et al., 2008
	Amylase	Media	Kokilaand Mrudula, 2010
Antihypertensive agents	Fermented Soybean Seasoning	Peptides	Nakahara et al., 2010
Antitumor agents	Taxol	medium MID	Ruiz-Sanchez et al., 2010

### 3. References

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