SENGAMALA THAYAAR EDUCATIONAL TRUST WOMENS COLLEGE

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MEC III BASIC BIOTECHNOLOGY- 16SMBEBC3

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FERMENTATION CULTURE MEDIUM

INTRODUCTION

- For large scale fermentation, a suitable medium has to be designed to have high product and biomass yield.
- The designed medium should favour for high product concentration, low level of unwanted products ,easy sterilization ;effluent treatment product recovery and purification otherwise the production process would be some that difficult.
- In fermentation industries producing theraputics, defined or semi-defined used ; it would avoid product contamination side-effects while using the product.

COMPONENTS

- A proper medium should be formulated culturing the microbes in the fermenter concentration of difficult constituents medium depends upon the specific need organisms
- All microbes required a Corbon source,a nitrogen source, mineral elements,vitamins and one or a few amino acid for Thier successful growth

- Corbon source: Cane molasses, juice, glucose,sugar beet ,malts,etc.
- Nitrogen source:Ammonium nitrate,pea nut granules,soya,yeast extracts ,etc.
- Mineral elements: Sulphur, phosphorus,zinc, copper, manganese,etc.
- Growth factors:The proteins present in the medium increase the production of pectinase.The pH of the medium should be justed to 6-8.

FORMULATION OF MEDIUM

- Various components in the medium the mineral requirements for biomass growth product formation.
- Antifoams are added control foam formation during fermentation. Designing a medium containing all medium components in suitable proportions is called medium formulation.

- There are three methods for medium formulation.
- In one method,one component is changed while the concentration of all other components remains constant;this procedure is repeated all media components one by one.This is called traditional method.
- In the second method called complete factorial design,all disable combinations are made at a time and a disable combination is chosen to perform fermentation.
- The first two methods are replaced by a third method called fractional factorial design.

- In the fractional factorial design, stimulation changing of the concentration of media components is performed within a specific range according to a statistical technique
- There are two methods for fractional factorial medium designing. Packet – Burman design and Box- Wilson design
- The pakcet- Burman design and Box- Wilson design involve the following steps:

- The minimum essential concentration and highest concentration of each and every component required increasing the products level are determined changing its concentration while all others constant
- The component that gives the highest amount of product is the key component in the medium
- The key component level is changed while keeping all the other component remain the same as in the experiment the gave the highest yield of the products
- The composition that produces the maximum amount of the product is chosen for the fermentation.

PRODUCTION AND FUNCTION OF PROTEASE

- Enzymes may be defined as biocatalysis you synthesized by living cells. They are protein in nature ,colloidal and thermo labile in character and specific in their action

MICROBIAL PRODUCTION OF ENZYMES

- These organisms include bacteria,fungi and actinomycetes and the cultures of plant and animal cells
- The microbes grow easily in the medium containing the cheap raw materials. The microbes grow well even in the fluctuating climatic conditions.
- Microbial production of enzymes involves the following steps:
    1. Selection of process - Organisms
    2. Improvement of organism production of enzymes
    3. Culture of microbes for the production of enzymes
    4. Regulation of enzymes biosynthesis
    5. Extraction of enzymes
    6. Purification of enzymes
    7. Storage of enzymes

PRODUCTION OF PROTEASE

- Protein into simpler compounds.
- Source: Aspergillus, Bacillus licheniformis,etc.
- Uses
- Designing fabrics
- Meat tenderizing
- Bread baking
- Manufacture of liquid glue
- Leather processing
- Recovery of silver from spent film
- Digestive aids
- Manufacture of detergents
- Degumming of silks

APPLICATION OF ENZYME

- Enzymes isolated from microbial cultures and others have been put in several practical uses. In general,uses of enzymes are divided into four categories.They are
- Therapeutic uses
- Analytical uses
- Manipulative uses
- Industrial uses

- Therapeutic uses
- Fungal diastase is given for indigestion and fermatative dyspepsia
- Lipase is given for indigestion of high- fat containing foods.
- Pancreatin is given for digestive disturbances,flatulence and dyspepsia
- Rhodonase is given for cyanide poisoning
- The following are some limitations to use enzymes as potent drugs-
- Since enzymes are large molecules,they cannot be distributed to target cell/ organ easily
- Some enzymes may elicit antigenic property in sensitive paitents.
- Enzymes have short life span in circulatory system of man

.Analytical uses

- Properties of some enzymes are used in testing the presence of certain substances in samples. Estimation of the product concentration is called end point measurement. Measuring the rate of reaction is the kinetics measurement. The following are examples of analytical uses of enzymes.
  - ✓ Biosensor containing glucose oxidase measures glucose level blood within 20 seconds.
  - ✓ Biosensor containing invertase measures sucrose concentration of fermentation broths in 6 minutes

. Manipulative uses

- Many enzymes isolated from microbes are used for manipulation of genetic make up of organisms through recombinant DNA technology.

4. Industrial uses

- Microbial enzymes have wide application in the dairy industry, detergent industry , starch industry, brewing industry, distillery and pharmaceutical industry.

a. Dairy industry

- ✓ Rennin obtained from mucor michei is used in cheese making
- ✓ Lactase is used to add flavour to ripening cheese

- B. Detergent industry
- Detergent made from enzymes remove proteinaceous diets on cloths and textile fibers
- Alpha amylase removes starchy dirts from cloths
- Amylase is used to add starch to cloths before dyein.

- Thank you.