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**Production of Antibiotics (Medical biotechnology)/ Commercial production of Penicillins**

**Antibiotics:**

* Antibiotics are substances produced by one micro-organism that inhibits the growth of or kills another micro-organisms
* Antibiotics are mainly produced by Streptomyces, Bacteria and Fungi
* Antibiotics are the most widely used chemotherapeutic agents
* At present more than 5,000 antibiotics are known
* Of these 100 antibiotics are available for medical use like **Penicillins, Erythromycin, Neomycin, Streptomycins, etc.,**

**Penicillins:**

* Penicillins are produced by ***Penicillium sp***. of fungi
* Penicillins are a group of antibacterial antibiotics produced by the fungus ***Penicilium sp.,( Penicilliumnotatum and P.chrysogenum)***
* ***Alexander Fleming in 1926*** identified the penicillin producing bacterium
* And named in 1929 by Alexander
* They are harmful to gram positive bacteria
* They inhibit cell wall synthesis of bacteria
* IT is an effective agent against Staphylococcin, *Streptococci*, *Pneumococci*, *Meningococci* bacteria, etc.,
* Penicillin is an effective medicine for the treatment of syphilis
* Penicillin is an organic acid
* Penicillin is useful in the treatment of bacterial pneumonia

**Commercial production of Penicillin**

* Penicillin is commercially produced in the industry by culturing the fungus***Penicillium chrysogenum* and *Penicilliumnotatum***
* The fungus can be cultured in two methods such as Surface culture method and Submerged culture method

**Surface culture method**

* The fungus is cultured on the surface of a liquid medium without agitation
* After an appropriate incubation period, the penicillin is extracted from the medium which is an old method

**Submerged culture method**

* The fungus is grown in a liquid medium which is vigourously aerated and agitated
* After an appropriate incubation period, the penicillin is separated from the medium
* Today penicillin is produced by the submerged method
* Penicillin is reduced either by batch culture or continuous culture method\
* Penicillin production needs anaseptic condition
* It needs tremendous amount of air
* The production of penicillin involves a chemical pro0cess called antibiotic fermentation
* The industry is called antibiotic fermentationindustry
* In the industry, the fermentation unit consists of the following g main components
* 1. Fermenter (Culture vessel)
* Mixing tank
* Seed tank
* Recovery tank
* Fermenter (Culture vessel) receives the medium from a mixing tank and the fungus *Penicillium chrysogenum* from a seed tank
* The seed tank receives the fungus from a culture tube
* The mixing tank receives the raw materials for the medium
* Theraw materials of the medium include
* Corn steep liquor (a by-product of maize)
* Lactose, Glucose, salts, Phenylacetic acid and calcium carbonate (as buffer)
* The medium and the fungus are well mixed by an agitator provided in the fermenter
* The fermenter has a cooling device by circulating chilled water
* The fermenter is supplied with filtered sterilized air
* The fungus grows as pellets
* In seven days, the fermentation process is completed and penicillin is produced in the medium
* The mass of fungus is separated from the culture medium by centrifugation and filtration
* Penicillin is then extracted from the clear fluid by solvent extraction process using amyl acetate or butyl acetate
* Finally it is purified by precipitation and crystallization

**Industrial production of Penicillin**

Fungus

Solvent extraction

Precipitation

Crystallization

Medium

Filtration

Centgrifugation

Fermenter

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