Research Paper Physics

Effects of Static Magnetic Field on The Colony of Micro-Orgenism

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ABSTRACT

The present study" Effects Of Static Magnetic Field On The Colony Of Micro-Orgenism" is an effort to understand the behavioural changes of physical system(yeast -Sacchromyce cerevisiae) under influence of different values of static magnetic-field strength. This experimental study is the study of interaction of biological system with static magnetic field that gives opportunity to analyze the behaviours of micro-organism with the variation physical parameters (static magnetic field). The results of this interaction of biological system with static magnetic field are very fruitful for rule out the nature of growth and decay of colonies of micro-organism as well as variation of shape and size of micro-organism under the laws physics and biology. This reasurch work is very significant for further development of biophysics and computational science for artificial modification of the growth of cells and size of cells by application of external static magnetic field. These result applications are use to design the bio-sensor for finding the magnetic field of any location with the calibration of size and shape of yeast and computer simulator for the growth of yeast. This research is also very important for Food industry and Pharmaceutical industry.

KEYWORDS micro-organism, static-magnetic field, yeast.

INTRODUCTION

- In this present Study yeast (micro-organism- *Sacchromyce cerevisiae*.) is taken as physical system for experimental observation of behavirial change of yeast under the influence of static magnetic field. Yeast is unicellular microorganism, have no original system that have not ability to control the effects of the variation of physical parameters. Therefore yeast easily changes the behaviour (shape, size and growth rate) due to change of environmental parameters such as temperature, pressure, magnetic field etc. In this experimental study all parameters of environment are taken as a controlled variable accept magnetic field strength is taken variable, for the environment of yeast (physical system) where placed. This study gives the scientific way to artificial modification of the growth of cells and size of cells by application of external static magnetic field.

Description of Physical system:- Yeast (*Sacchromyce cerevisiae*)cells exhibit great diversity with respect to cell size, shape and colour. Even individual cells from a particular yeast strain of a single species can display morphological and colour heterogeneity. This is mainly due to alterations of physical and chemical conditions in the environment. Among different yeast species, cell size may vary widely. In the following we will concentrate on *Sacchromyce cerevisiae*. More detailed information and references on yeast cytology can be found in *Sacchromyce cerevisiae* cells are generally ellipsoidal in shape ranging from 5 to 10 μ m at the large diameter and 1 to 7 μ m at the small diameter. Mean cell volumes are 29 or 55 μ m 3 for a haploid or a diploid cell, respectively; cell size increases with age. [Walker, 1998]..*Sacchromyces cerevise* is a one species of yeast, This is unicellar fungi micro-organism closely related to the molds. They are ellipsoidal, spherical or cylindrical cells and are several times larger than the average bacterial cells. Because of their large size, numerous structure and inclusion are readily visible with light microscope with certain special stain, such as the fulgent stain, the nucleus is also visible. These are spherical or ovoid ascomycete fungi. They are widely distributed in nature and found in soil, dust, on fruits and leaves of many plants and saccharine foods. These cells exist in two morphological types. The most common one is the yeast phase in which the cells are normal, ellipsoidal or ovoid shaped. The other is a filamentous phase in which the cells are so much elongated that they appear filamentous. The filament formation depends upon temperature, certain nutrients, presence of carcinogens and irradiations.

PREPARATION OF NUTRIENT MEDIUM:-

SUBOURAUD'S AGAR :-The subourad's agar (nutrient medium) is prepared in following steps:

- To prepare 100 ml of nutrient broth, warm 50 ml distilled water is taken in round bottom flask.
- Dissolve 1 gm Peptone, 4 gm glucose, 0.5 gm NaCl in it by continuous shaking.
- Add remaining 50 ml distilled water and pout into tubes or conical flask.
- Check the pH of the medium it should be 4.5-5.5
- Plug with cotton and autoclave at 121° C and 15 psi for 20 minute.
- To make solid add 2.5 gm Agar to the broth and boil till all the agar dissolve.

SUBOURAUD'S BROTH (LIQUID NUTRIENT MEDIUM)

- To prepare 100 ml of nutrient broth, warm 50 ml distilled water is taken in round bottom flask.
- Dissolve 1 gm Peptone, 4 gm glucose, 0.5 gm NaCl in it by continuous shaking.
- Add remaining 50 ml distilled water and pout into tubes or conical flask.

- Check the pH of the medium it should be 4.5-5.5
- Plug with cotton and autoclave at 121° C and 15 psi for 20 minute.

PREPARATION OF BIOLOGICAL SYSTEM(*Saccharomyces cerevisiae*):

First solid Agar medium is prepared. This medium is sterilized with the help of Autoclave machine. Then Saccharomyces cerevisiae granules 1gm, manufactured by Ranbaxy is dissolved in 10 ml luke warm sterile distilled water. It is called suspension. This is made in test tube. This test tube is fitted by sterilized cotton plug to avoid contamination. Then the culture is prepared in the petridish containing subouraud's Agar broth. For this platinum wire loop is used. First the loop is heated in the flame and then the hot tip is first touched to the surface of the medium to attain the temperature of medium. After this suspension is taken in the loop and it is strike on the solid Subouraud's Agar medium. This is repeated for two to five times. This is done in between the two flames separated by 6 cm, called as work area, so as to avoid contamination. This was kept for 12 Hrs.After this 100 ml liquid Subouraud's medium is prepared in conical flask. The culture is transferred in this nutrient medium by platinum loop by above method, called as inoculam. The process introducing microbes in the nutrient medium is called inoculation.Six plastic cylindrical container of volume 5ml are taken and these are sterilized in boiled water and alcohol for 5 days. Then 5 ml of inoculam is transferred in each container by micropipette. This process is called as isolation.

EXPERIMENTAL METHOD:-

External magnetic fields of strength 0.2, 0.4, 0.6, 0.8 and 1.0 Tesla are applied to five containers as shown in fig -1.1 For this purpose disc shape magnet pair of 3cm in diameter and 2mm thickness is used. One magnet is kept at bottom and other is kept on top of the container of same strength with opposite poles facing with each other as shown in fig. 3.5. One control container (without external magnetic field) prepared. All the containers are kept in laminar air flow (model no. EHT 81A, manufactured by Expo Hi Tech.) at 30°C and 28.4 (Lux intensity measured by Luxmeter model no. Lx-101 made by Lutron company) for 48 hours.

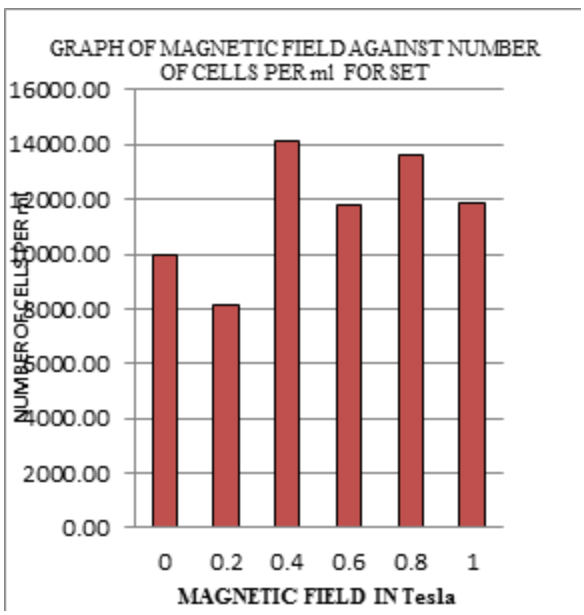
After 48 hours number of cells are counted by haemocytometer (model: Neu-Bar Bright line, manufactured by HBG Germany).The cell size is measured by ocular micrometer. The results are studied comparing with control container results. All the apparatus used were sterilized by autoclave machine (model: 743/S.T.J.E.186, manufactured by Medica Instruments Mfg. Ltd., Mumbai).

Experimental observation:-

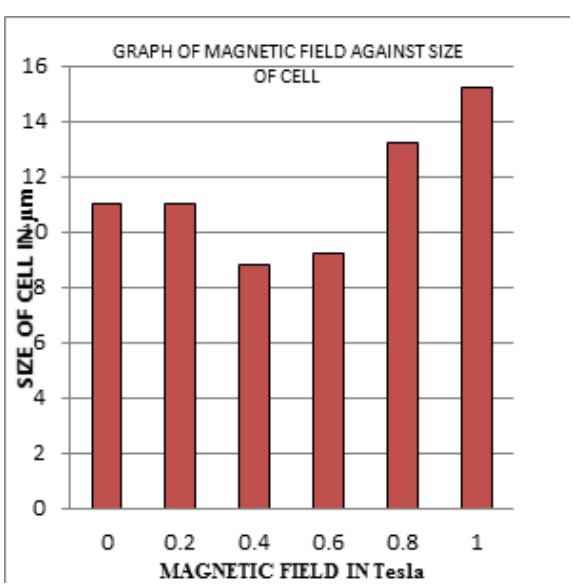
The 24 hour old yeast culture is striked on solid Agar medium in 6- plate in different plates as shown fig-1.5 .These plates are exposed to different static homogenous magnetic field (0.2, 0.4, 0.6, 0.8 and 1.0 T) produced by disc shape magnet pair of 3cm in diameter and 2mm thickness, along with control to 48 Hour after 48 hour. This magnetic field effect on the identical colony of yeast is observed that given in Bar-chat-1 and the size of yeast are shown in observation Table-1and bar-chat-2A and observation Table-1.

Magnetic Field in Tesla	SET 01 No. of cells per ml	SET 02 No. of cells per ml	size of cell in µm
0	7379.38	9975.00	11
0.2	5032.50	8125.00	11
0.4	14912.50	13587.50	8
0.6	10070.63	11762.50	9.2
0.8	13442.50	14118.75	13.2
1.0	13108.75	11868.75	15.2

BAR-CHSAT NO-. 1



BARCHAT NO. 2



Conclusion: - This study given important experimental way to design the size of colony and micro-organisms density liquid medium with the help of the variation the strength of static magnetic field , we got very significant result for 24 Hour old yeast (*Sacchromyces cerevisiae*) is striked on solid Ag oar plate and these plates are exposed to different static uniform magnetic field as shown in fig no -1.5.These results (Bar-chat-1&2) are giving the scientific way to design the size of colony as well as size of yeast with the application of static magnetic. It observed from bar-chat-1 the size of colony yeast is large at the static magnetic field strength 0.4T to 0.8T

comparative to the magnetic field strength 0.2 T to 1.0 T. In bar-chat-2 the growth of size of yeast cells are observed that the size cells are small at magnetic field strength for the 0.2 T, 0.6 T and 1.0 T comparative to 0.4 T and 0.8 T magnetic fields and reduction in growth for the 0.2 T, 0.6 T and 1.0 T magnetic field.

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