

INVESTIGATION ABOUT THE INFLUENCES OF CARBON MATERIALS ON THE GROWTH OF SACCHAROMYCES CEREVISIAE UNDER STRESS CONDITIONS

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Abstract

The current research attempt mainly to investigate the influence of carbons on the growth of micro-organs, such as: saccharomyces cerevisiae, bacillus subtilis, etc. It is found that (1) this growth promotion shows more effective under the lighting surroundings, (2) carbons could accelerate the bacterial growing under the salt stress, (3) the growth promotion process would hardly remain effective unless the salt stress agar plates are used.

Key words: graphite, micro-organs, growth promotion;

Introduction

It has been widely recognized that carbon materials have unique biological effects. Carbon has been used for making artificial organs, for example the artificial cardiac valves [3, 5], the treatment of hard and soft tissue injures [6]. Bacterial growth is often increased by the addition of carbon materials, such as Bacillus carboniphilus [1], Gonococcus and Meningococcus [2], and marine bacterial [4]. Also it is applied in the field of sewage disposal [7]. In this experiment, we want to confirm that whether the propagation of carbon comes out on the saccharomyces cerevisiae or not. We put the bacterial under stress environment in which the concentrate of salt is higher than usual.

Experimental and Materials

Carbon: two types of particulate graphite are commercial products from different companies. The size of graphite is different from each other, one of them is bigger (about 70 microns), and the other one is smaller (about 33 microns). They were autoclaved at 120 centigrade for 15 minutes before scattered on the medium.

Bacterial and growth conditions: Saccharomyces cerevisiae was obtained from Sichuan University, and stored in the fridge at 6 centigrade. Before using, the bacterial was inoculated to the fastigiated medium in a tube for 24 hours. Then, put some distilled water into the tube to mix with the bacterial. The suspension obtained dilute decimal to reduce the concentrate of the cells.

Bacterial cells were usually cultivated on YPD medium, which contained glucose (2%, Chengtu, Jin shan), peptone (1%, Beijing, Ao bo xing), yeast extract (0.5%, Beijing, Ao bo xing), sodium chloride (pure chemical, Chengtu, United chemical reagent graduate school), and agar (1.5%, Beijing, Ao bo- xing). The medium was diluted twofold with water and added additional salt in different concentrations, for instance 10g/l, 30g/l, 50g/l, then autoclaved at 120 centigrade for 15 minutes. 200 ml of the prepared suspension was added to the Petri dish and mixed with the liquid medium. When the medium became cold (about 50 centigrade), graphite was scattered to its surface or on the bottom of the dish. Then they were incubated at 28 centigrade for several days.

Results and Discussions

1. High concentrate of Sodium chloride will constrain the growth of the bacterial.

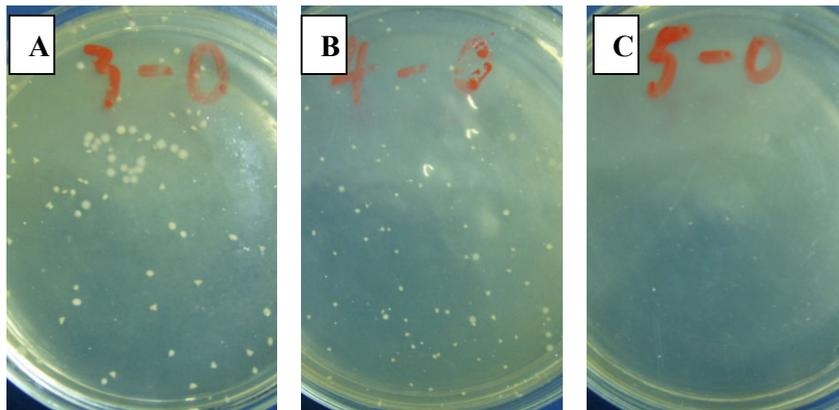


Figure 1. Bacterial grew slowly on the salt medium with the increase of salt concentration.

From A to C, the concentration of the salt was 10 g/l, 30 g/l, 50 g/l respectively.

After incubated 48 hours, the trend was obviously which implied that the concentrate of salt would affect heavily to the growth of the bacterial. The concentrate was higher; the colony was smaller (**Figure 1**). As well-known of us, these factors will affect the growth of bacterial listed as follows: appropriate temperature, carbon source, nitrogen source, salt etc. But the amount of salt should be constrained to a fixed level. If this level is exceeded, the high concentrate salt will stress the growth of the bacterial.

2. The light illumination will affect the growth of bacterial.

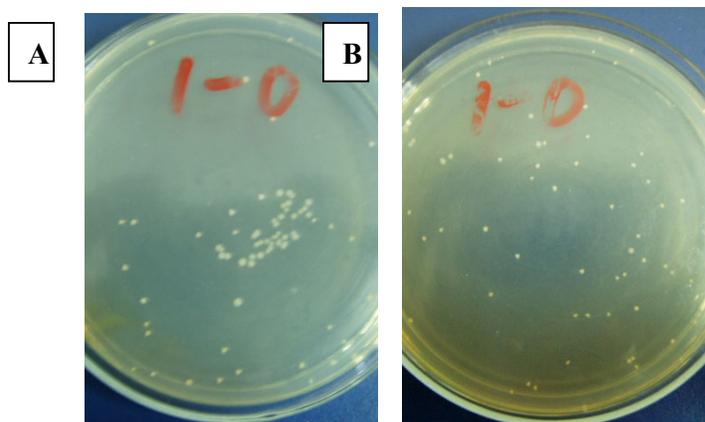


Figure 2. A was under the light illumination, B was not.

Many of the assays did not refer the effect of illumination to microorganism in detail, but this experiment confirmed that the illumination would accelerate the cultivate speed of the bacterial. So did this case which was salt-added. Both of the plates were mostly in the same case: the same cultivate temperate, the same medium, the same bacterial. The medium were diluted twofold and salt adequate. Only one difference between them: A under the illumination of 9 v lamp, without B (**Figure 2**). When the bacterial exposed to the light, they grew fast and the single colony formed quickly. It shows that light is helpful to the propagation of bacterial.

3. Graphite shows promotion effect to the growth of the bacterial.

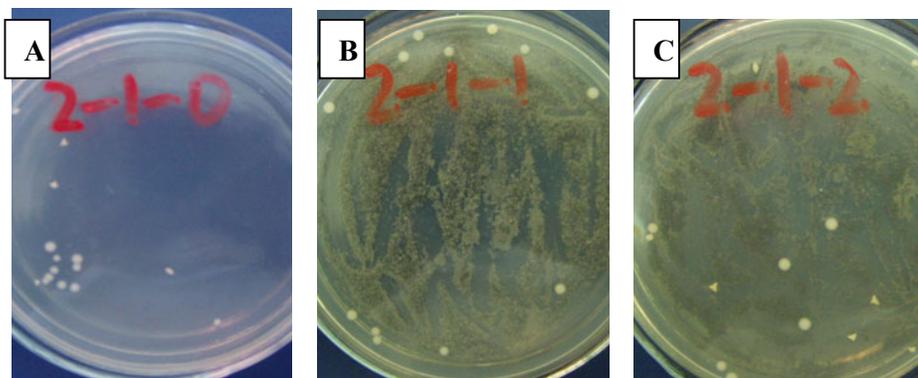


Figure 3. A was graphite absent, whereas big graphite was scattered to B, small graphite to C.

All of the plates were incubated in the illumination (as described before), and their medium were diluted twofold with 30g/l salt added. The temperature of incubation was 28 centigrade. And the bacterial was commixed with the medium. It was isolated between the graphite and the surface of medium, due to the graphite was scattered to the lid of the dish. We found that graphite showed considerable promotion to the colony under such conditions, both the big graphite and the small one (**Figure 3**). It had no any difference between the last two plates, and implied that the diverse size of graphite affected the growth of bacterial in the same way.

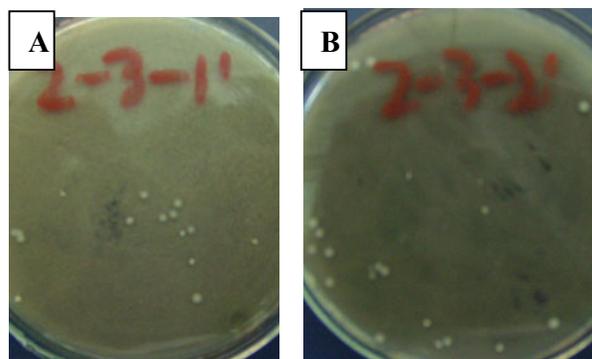


Figure 4. Big graphite was added to A while small one to B.

The graphite was contacted with the surface of the medium. Compared to the forgoing group, the colony on the latter one was smaller (**Figure 4**). And the big graphite reacted on the bacterial in the same ways as smaller graphite. It shows that graphite has no affection to the bacterial when it contacts to the medium.

Conclusions

The results presented in this paper demonstrate the following:

- (i) *Saccharomyces cerevisiae* can not grow very well under the high concentration of salt.
- (ii) The illumination can stimulate *saccharomyces cerevisiae* cultivate fast.
- (iii) Graphite exerts impactful effect to the growth of *Saccharomyces cerevisiae*, and the dissimilar size of graphite improves the colony alike when it is not contacted with the medium.

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