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Research Article

Study on the most effective conditions and environment that exert influences on extending life of yeast cells

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Yeast is a kind of microbes that people always use for daily life benefits. But the most common problems for all the yeast users is the limited storage times and it's very wasteful to throw away the expired yeast and buy the new one continuously. The purpose of this research was to find the conditions that can best prolong yeast life. By setting up the experiments for two sets that are temperatures and light colors and use Saccharomyces cerevisiae in this experiment. In the first experiment, raise the yeast in the three different temperature that are 2 Celsius with 28% humidity, 20 Celsius with 70% humidity and 40 Celsius with 55% humidity. The result shows that 25 Celsius is the temperature with the most yeast left in it and cell's most average density is 118,083,333.33 cell/ml. The results are different in the same 0.05 significance level. And in another experiment, raise the yeast in three different light colors that are red, blue and white. The result shows that red is the color with the most yeast left in it and cell's most average density is 115,333,333.33 cell/ml. The results are different in the same 0.05 significance level.

Keywords: Yeast, Saccharomyces cerevisiae, Light colors, Temperature.

1. Introduction

Yeast is a microbe that has been used by humans from the past to the present. Which is utilized in daily life And many industrial benefits, such as making bread, wine, liquor, beer, alcohol, etc. Today, yeast has also been used to make a variety of dermatology. In which each baker will have yeast left over from use Therefore it is necessary to store the yeast for the next use A popular method of storage today is to store in the purchased container. May keep in the refrigerator Cabinets for storing food or placing in a general kitchen. As a result, the problem of yeast storage in this form is that the yeast will deteriorate quickly. Makes it unable to be used next time Therefore causing waste if having to discard the deteriorated yeast before expiration And must buy again every time you want to use From the environment of the location where yeast is stored, each temperature Humidity and exposure to different The researcher is interested to study the optimum conditions that can maintain the best yeast conditions. The factors in the study of yeast preservation are temperature, humidity, and color. For the benefit of people who want to extend the shelf life of yeast as much as possible and to help reduce the cost for entrepreneurs in many industries that need to use yeast as the main component. Including the invention of packaging for yeast storage. The hypothesis taken for the research are (i) Different temperatures Has different effects on storage and preservation of yeast. (ii) Different colors of light Affecting the storage and preservation of yeast differently.

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2. Yeast

Yeast is a group of molds that are mostly single cells. There are many shapes, such as round shape, resit triangle. Lemon Shape Guava, etc. Most of them are non-sexual reproduction by way of sprouting. It is commonly found in soil nature, in the soil, in different parts of the plant, some yeast is found in insects, and in the stomach of some animals, the source of yeast is commonly sourced with high concentrations of sugar, such as sweet juices, natural yeast, often contaminated into food. Yeast is a very small creature. The eukaryotic micro-organisms are arranged in fungi, both useful and punishable for food. Yeast has been used a long time ago, especially in the production of alcoholic foods from very small properties, can be cultured in a timely manner and a hassle-free approach. As a result, yeast begins to play an important role in aquaculture. It can be used as one of the most important natural foods, such as red mites. Rotifer and Artemia Yeast is a microorganism known since ancient times, although it is said that yeast is the first microorganism that humans use. There are also high minerals such as chrome, zinc, iron, phosphorus and selenium, and yeast brewers are also an important source of protein of 16 grams per 30 grams of yeast volume, up to 50%-55%.

2.1. Saccharomyces cerevisiae

This is a type of yeast derived from the Greek that is Latinized, meaning sugar mold. Saccharo-means sugar and myces means mold. Cerevisiae comes from Latin, meaning beer, used for fermentation. (Fermentation) to get the main product is ethyl alcohol. This type of yeast will change Sugar gives ethyl alcohol and carbon dioxide. Used in the production of alcoholic beverages. There are many types of beer, which are called Brewer's yeast, which are used to produce beer. Ale is also known as Ale yeast. Its characteristics are Produce high alcohol at a temperature of 16 to 24 degrees Celsius after fermentation. The yeast cells float on the surface of the beer. Make it known as Top-fermenting yeast or top yeast or surface yeast, wine, sake, brandy, whiskey, rum Cerevisiae may be used in combination with other microbes such as mold bacteria for fermentation of protein foods such as soy fermented foods. To give the aroma of alcohol, such as fermented soy sauce (fermented soy sauce) used as a leavening agent (leavening agent) to produce bakery products that may be called Saccharomyces cerevisiae says Baker's yeast is used for the production of bread, donuts, yeast. Bread that is fluffed up with yeast is called yeast leavening bread. Yeast used for bakeries. May use the form of fresh yeast Or dry yeast, mixed with wheat flour and sugar. In the first step in bread production, yeast uses sugar as food and then produces carbon dioxide. Make wheat flour, which has gluten proteins that are sticky and flexible, expand into air holes in small spaces. In the texture of the bread Causing the structure of the bread to rise s yeast is used for the production of bread. Yeast donuts, yeast-shaped breads are called yeast leavening bread yeast used for bakeries. May use the form of fresh yeast Or dry yeast, mixed with wheat flour and sugar. In the first step in bread production, yeast uses sugar as food and then produces carbon dioxide. Make wheat flour, which has gluten proteins that are sticky and flexible, expand into air holes in small spaces. In the texture of the bread Causing the structure of the bread to rise.

2.2. Light colors

Light is radiation energy that recognizes and reacts with the process of analyzing the brain's distinguished analysis. The eye can analyze light energy by acknowledging the object, relative to position, direction, distance. The intensity of light and visible wavelengths, colors, is the color-of-light intensity that appears to be colored by visual lye, looking through the eye-based perception process, where the eye has already passed through the nerve, touching vision through the center of the brain switching to the visual center. The data was analyzed to distinguish us from the fact that the light wave measurement scan began in the 19th century in 1928. It was presented in 1931 by analyzing colors from spectrum light relative to light wavelengths. It shows the white light in the midst of a spectacle around horseshoe-shaped horseshoe shape, showing wavelengths of 400-700 mu cie-colored triangles built on the X and Y-Carltonties. 0 mu green about 520 mu and red about 700 mu is the color of the light, mixed and produces different colors, the red light has the highest wavelength, but the minimum wave frequency is refracted to the slightest, and the purple light will have the lowest wavelength, but the maximum frequency of waves and refractable as much as in the last year.

2.3. Temperature

Temperature is a measure of the average kinetic energy of a particle in any substance that corresponds to the heat or cold of that substance. In the past, there were two ways of thinking about temperature: following the principles of thermodynamics. And according to the micro-description in statistical physics That concept of thermodynamics Was developed by Lord Kelvin In relation to the measurement in the macro Therefore, the definition of temperature in the first thermodynamics. Therefore, specifying the various variable values that can be measured from the observation The statistical physics approach provides more in-depth understanding than thermodynamics. By explaining the accumulation of large particles And interpret the parameters in thermodynamics (macroeconomic) as the statistical mean of the parameters of the particles in the micro In the study of statistical physics Can interpret the definition of temperature in thermodynamics as Is a measure of the average energy of each particle in degrees of freedom in a thermodynamic system Which the temperature can be viewed as a statistical property Therefore, the system must consist of a large amount of particles in order to be able to provide meaningful temperature values that can be utilized in solids. This energy is found in the vibrations of matter atoms in a balanced state. In ideal gas This energy is found in the movement of gas molecules. Thermometer is an instrument to measure the amount of heat or cold Temperature measuring instruments are called thermometers.

2.4. Cell counting

Counting slides on a counting chamber. Slides with a counting chamber are Petroff Hausser counting chamber. Bacteria are counted. Hemacytometer uses a large eucaryotic microbe. These slides have a chamber which knows the depth of the chamber and the floor of the chamber is a square which knows the width and length of the square. Therefore, when microbes are dripped into a chamber with a cover glass closed, microbes are counted using a 400X magnification microscope in a small cube. It will be able to calculate the number of cells per ml of the sample. For the pros and cons of the counting chamber, it is the same as stained film.

Fig.1. Petroff - Hausser counting chamber

- Counting bacteria using magnification objective lens 40X.
- If bacteria are counted, the length of 0.05 mm per side should be diluted to 1-10 cells in each small hole and count no less than 10 chambers.
- If it is a yeast or large microbe, use a large chamber with 0.2mm length on each side.
- Counting is to count only the cells that touch or overlap the top or right side of the square.

But will not count any cells that touch or overlap the bottom and to the left of the square.

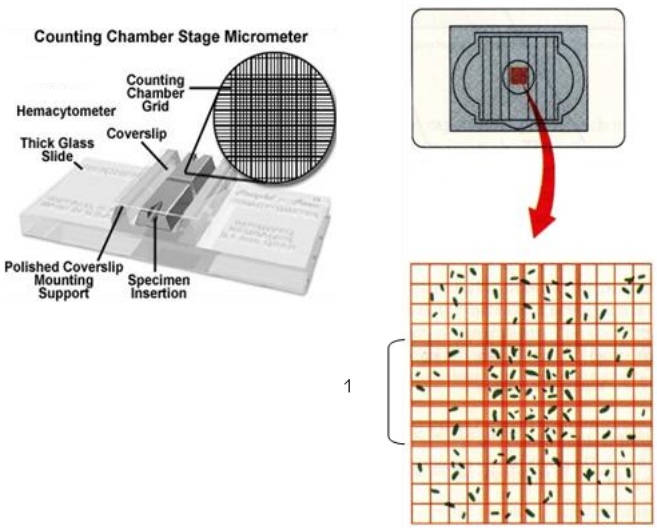

Fig.2. The view from the top of the chamber has a square in the middle of the slide.

2.5. Hygrometer

A hygrometer is a tool used to measure the amount of steam that is in the air. Relative humidity can be measured in the range 0 to 100% RH. However, most measuring tools, the measuring range depends on the type of sensor. Relative humidity is expressed as a ratio of the amount of steam present in the air or the gas reaching the saturation point 100%.

There are two popular instruments for measuring air humidity as follows:

Wet and dry hygrometer is a dark instrument to measure humidity by evaporation of water to absorb heat as well. Where the evaporation is more or less depends on the freshness of the air at the time, it consists of two pairs of thermometers, one for measuring temperature Bulbous The other is used to measure moisture. Finding the relative humidity can be done by reading the attached humidity table with the instrument.

Table 1. Relative humidity as a percentage

Temp (^{0}c)	10-14	15-19	20-24	25-29	30-34
0.5	94	95	96	96	97
1.0	89	90	92	93	93
1.5	83	86	88	89	90
2.0	77	81	83	85	86
2.5	72	76	80	82	83
3.0	67	72	75	78	78
3.5	61	67	72	75	77
4.0	56	63	68	71	74
4.5	51	58	64	68	71
5.0	46	54	60	62	68
6	36	46	63	57	62
7	26	38	46	51	57

Source: (Pin Sak Chum Kasian 2003, 81)

3. Methods of experimentation

Part 1: Study of temperature and humidity affecting yeast stability

Divide the experiment into 3 sets which are

Set 1, experiment at 2 degree celsius, humidity 28%
Set 2, experiment at 25 degree celsius, humidity 70%
Set 3, experiment at 40 degree celsius, humidity 55%

With the process of conducting the experiment as follows

- Weighing yeast using digital scales for 3 experimental sets, 1 gram of each experiment
- Place all 3 sets of yeast in the experiment and leave for 24 hours.
- After 24 hours, dissolve 100 ml of each batch of yeast
- Bring the solution in item 3 to 10 milliliters, add 100 milliliters of water
- Count the yeast by using the hematocrit
- Repeat the experiment 1-4 2 more times
- Find the average yeast count.
- Use the remaining amount of yeast to calculate the density of the yeast.

Part 2 Study of color light affecting yeast preservation

Divide the experiment into 3 sets which are

Set 1, experiment using a 3 watt red light bulb 660-665 nm wavelength
Set 2, experiment using 3 watt blue light bulb, 455-470 nm wavelength
Set 3, experiment by using 3 watt white light bulbs

All three experiments were carried out at a temperature of 25 degrees Celsius with humidity, with the following experimental procedures.

- Made from 3 boxes of 5 inches wide, 5 inches long and 5 inches high cardboard boxes.
- Attach the light bulbs in separate boxes, each color is red, blue and white.
- Scale the yeast using digital scales for 3 sets of experiments. Each set of 1 gram of experiment
- Put the yeast into 3 sets of tile cups, place in 1 paper box per box, cover the lid and put all 3 boxes in a dark room.
- Turn on the lights in all 3 boxes, leave for 24 hours.
- After 24 hours, dissolve the yeast 100 ml.
- Take 10 ml of yeast solution in item 8, add 100 ml of water.
- Count the yeast by using the hematocrit
- Repeat the experiment 1-9 2 more times
- Find the average amount of yeast that can be counted.
- Take the remaining yeast amount to calculate the density of the yeast.

4. Data Analysis

In this data analysis The data was analyzed by computer. Statistical Package for the Social Scienes /

Personal Computer plus (SPSS / PC +) and EXCEL Program which has the following operations.

- Determine the average (x) and standard deviation (SD.) Amount of remaining yeast from the experiment on raising yeast at different temperatures and colors.
- Test statistical significance based on assumptions 1 and 2 using one-way ANOVA.

5. Results and Discussion

From the experiment on raising yeast at 3 different temperatures, namely 2 degrees Celsius, 25 degrees Celsius, 40 degrees Celsius, and the experiment of raising yeast in 3 different colors namely red, blue, white light. Has the effect of extending the yeast life, allowing the yeast to be preserved and maintained the best The optimum temperature is 25 degrees Celsius, as the density of the yeast obtained from culturing at 2 and 40 degrees Celsius causes the yeast to die. It may be because the temperature is too high and too low, not suitable for maintaining yeast. And the most suitable light is red light Because it may be because red is the color that has the wavelength range suitable for the yeast preservation of the most and from the analysis of variance, density and yeast density of cultures at 3 different temperatures, 2 degrees Celsius, 25 degrees Celsius and 40 degrees Celsius, it has a different effect Significantly at the level of 0.05 which is in line with the hypothesis 1 and the analysis of variance.

Table 2. Density of yeast from culturing at various temperatures and humidity

No	The density of yeast that can be counted at various temperatures. (cell/ml)		
	2ºC	25ºC	40ºC
1	98,000,000	126,000,000	63,250,000
2	101,250,000	106,000,000	64,250,000
3	81,750,000	122,250,000	67,000,000
Avg	93,666,666.6	118,083,333.3	64,833,333.3
SD	10,447,288.3	10,631,125.69	1,941,863.37

The density of yeast from culturing at 3 different colors of light, red, blue and white, was found to be significantly different at the level of 0.05, which is in line with the hypothesis 2.

Table 2. Density of yeast from culturing at various temperatures and humidity

No	The density of yeast that can be counted at various temperatures. (cell/ml)		
	White	Blue	Red
1	74,750,000	89,250,000	16,750,000
2	84,750,000	103,000,000	125,000,000
3	89,000,000	103,750,000	104,250,000
Avg	82,833,333.3	98,666,666.6	115,333,333.3
SD	7,315,793.4	8,163,689.9	10,447,288.3

6. Conclusion

Experiment on raising yeast at 3 different temperatures, namely 2 degrees Celsius, 25 degrees Celsius and 40 degrees Celsius. Each temperature has 3 experiments. It is found that the temperature that the most yeast left is 25 degrees Celsius. Average 118,083,333.33 cell / ml. Experiment on raising yeast in 3 different color light, red, blue, and white. Each color has 3 experiments. It is found that the color that the most yeast left is red light. The density of yeast is Average 115,333,333.33 cell / ml.

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