ACTA SCIENTIFIC MICROBIOLOGY (ISSN: 2581-3226)

Volume 3 Issue 4 April 2020

Research Article

Exposure of Food to External Microbial Air

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Received: February 18, 2020

Published: March 10, 2020

Abstract

Air is an essential source of life in our plant it contains essential elements for our life also it contains pathogens transmitted by fleas or growth of mold which threaten our food if it not storage by proper ways in good place and temperature and this lead to many food borne disease and poisoning which lead to death So, air is double-edged sword it gives us life or take it.

Keywords: Food Microbiology; Air; Food Spoilage; Food Borne Disease; Food Safety; Air Pollution; Antioxidant; Spoilage

Introduction

Air and food are abasement of our life but there is a conflict between each other as food exposure to atmospheric air can make spoilage and deterioration due microbial and fungal growth so must we must put this in our consideration.

Our experiment depends on When expose foods such as apples and bananas to external microbial air what happens?

As astronauts in space do some measures which critical to guarantee survive of their life. food also need to be covered and treated by some antioxidant to guarantee not spoilage and damage life of others by toxic bacteria which grow into it so this experiment proven this theory applicated by cutting the fruits and vegetable and use inhibitor of bacterial growth to stop and prevent microbial spoilage occurrence.

Material and Methods

Experiment: The result of exposure of food to air and effect of chemical inhibitors in stopping the spoilage effect of air

Materials

- Distilled water
- (apples, bananas, celery sticks and carrots,)
- vitamin C tablets.
- plastic bowl, knife, spoons and paper plates.

Methods

1. Add distilled water in 2 deep plastic bowl.
2. Put vitamin C tablet in one until it dissolves and disappear and leave the other as plain water.
3. Label both bowls.
4. Cut fruit into six equal slices.
5. Place 2 wedges into each of the two prepared liquids plastic bowls.
6. Make sure they are immersed completely and leave for only 10 minutes.
7. Transfer each wedge with a spoon and place in separate paper plates.
8. Put the last 2 wedges on a paper plate marked 'untreated'.
9. Repeat experiment with different fruits and vegetables as carrots
10. Leave all 3 plates stand for almost an hour and observe for any browning or any change in physical appearance.

Results and Discussion

Discussion

After experiment we must notice changes occur to fruits and vegetables and notice which plates turn brown first and think about other chemical inhibitors used for food preservation and ad-

ditives affect on quality of food and discuss about the quantity of inhibitor and its effect on retardation and delay of spoilage.

Results

1. We can notice that One which treated with Vitamin C will show less spoiling due to Vitamin C play role as an antioxidant and inhibits the action of oxygen on foods (the browning effect) so vitamin c effective agent in retard food spoilage
2. Nature preservative as Sugar give sweety taste for jam, salts which use as preservative in pickles, Acids as organic acids which are both naturally present in foods during fermentation most commonly used organic acids include citric, malic, benzoic, lactic and propionic acids.
    - Citric acid is found in citrus fruits as lemons act by inhibiting the growth of thermophilic bacteria.
    - Malic acid is widely found in fruit and vegetables. It inhibits the growth of yeasts and some bacteria due to a decrease in pH.
    - Benzoic acid is the oldest and most widely used preservative. It occurs naturally in cranberries, raspberries, plums, prunes, cinnamon and cloves. It is primarily used as an antifungal agent in fruit-based fruit products, bakery products and margarine.
    - Lactic acid is not naturally present in foods, but is formed during fermentation of sugar by lactic acid bacteria. Lactic acid inhibits the growth of spore forming bacteria at pH 5.0 but does not affect the growth of yeast and moulds.
    - Propionic acid occurs in foods by natural processing. It is found in Swiss cheese at concentrations of up to 1%. It is effective against moulds and bacteria. and chemical substance can be used by permissible level to enhance quality, flavor but it must use under control to avoid carcinogenic effect of it as
    - Nitrites - added in meats for redness
    - Sulfites - added to dried and preserved fruits and vegetables for freshness and it forbidden to use in food preparation process
    - MSG –(mono sodium glutamate) added to enhance the flavor of food
    - this acids and salt and chemicals act as preservative and additives used for prevent and stop bacterial growth and increase taste and flavor by using in limits when it increases permissible level it then transferee to chemical hazard and affect public health
3. To estimate the effect of quantity of Vitamin C tablets and its effect on spoilage we can vitamin c divided into halves and quarters and dissolve in the same amount of water as the whole tablet.

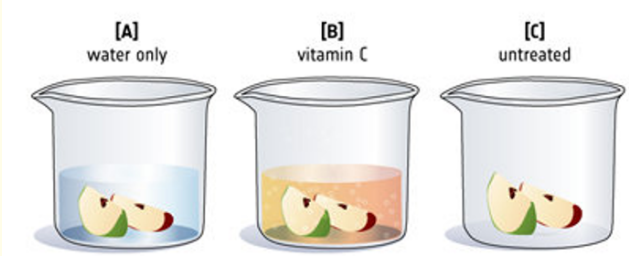

Figure 1

Conclusion

Many factors has role in food spoilage some of them related to external air and other related to food

Extrinsic factors

Extrinsic factors are factors in the environment surrounding food, which effect on both the microorganisms and the food itself during processing and storage. Extrinsic factors include (temperature, humidity and oxygen) [1,2].

Temperature of air

Different microorganisms grow and multiplicate over a wide zone of temperatures, each microorganism has a favorite temperature to grow and multiply. so, determine temperature of food is Avery essential factor in avoiding bacterial growth, because if we know the temperature growth ranges for each dangerous microorganism it helps us to choose the proper temperature for food storage and delivery and preparation to make them less able to grow and multiplicate.

Humidity in air

The humidity of air is an important main factor for the growth of microorganisms at the food surfaces. Dry storage of food help in reduce spoilage as moisture is one of requirements in life of bacteria.

Oxygen in air

Many bacteria want oxygen in order to develop and multiplicate: These are called Aerobic microorganisms. As *Escherichia coli*, a fecal bacterium which need oxygen to survive and grows readily on many foods. We can eradicate this by keeping food in low oxygen environment to ensure that all Aerobic bacteria can growth or multiply.

On the other hand, there are some bacteria not need oxygen to survive, called Anaerobic microorganisms. An *Clostridium botulinum*, the bacterium causing botulism, which can survive in very low oxygen environments such as tinned foods and can forming bacteria can protect themselves from external environment and when the suitable condition return it germinate and return to normal bacterial cell able to become harmful

Intrinsic factors

Intrinsic factors find as part of the food product itself.as high protein level food more common rapidly spoilages as meat and milk and milk products if not storage in suitable conditions this enhance growth and multiply of certain microorganisms. The common intrinsic factors affect the growth and multiplication of microorganisms in foods. (pH and water activity).

pH of environment

pH is a measure of How acidic or alkaline an environment is, it ranges from 0 (highly acidic) to 14(high alkaline) on a scale that has 'Neutral' (neither acid nor alkaline) at pH7. Most microorganisms grow best at close to the neutral pH value (pH 6.6 to 7.5) Only a few microorganisms grow in very acid conditions below a pH of 4.0. Bacteria grow at a fairly specific pH for each species. fungi grow over a wider range of pH values. For example, meats naturally have a pH of about 5.6 or above. At this pH meat is susceptible to spoilage by bacteria, molds and yeasts. on the other hand, the pH of meat can be lowered by pickling, which makes it less favorable as an environment for microorganisms to grow in.

Moisture content (water activity, a_w)

Microorganisms need a wet environment to grow in. The water requirements of microorganisms are described as water activity (represented by the symbol a_w), a measure of how much water is present.

The water activity of pure water is $a_w = 1.00$. Most foodborne pathogenic bacteria require a_w to be greater than 0.9 for growth and multiplication water activity can be controlled by more than methods we can remove all water activity by lyophilization or freeze drying (by using spray dryers or heating drums) also can decrease water activity by addition of solutes as salts and sugar.

For example, *Staphylococcus aureus* may grow with a_w as low as 0.86. But even *Staphylococcus aureus* cannot grow and multiply in drier food like bread, which has $a_w = 0.7$.

Microbial spoilage

Microbial spoilage is caused by microorganisms like fungi (molds, yeasts) and bacteria. But there is different between bacterial and fungal growth how can differentiate between both of them They spoil food by growing in it and producing substances that change the color, texture and odor of the food. Eventually the food will be unfitting for human consumption.

Fungal contamination

Fungal spoilage by yeast and mould not harm as bacterial spoilage as in fungal spoilage we can see change of food appearance as grow of furry layer and the odour is bad Many examples indicate fungal spoilage as souring of milk and rotting of food.

Bacterial contamination

It Is often more dangerous due to the food does not always look bad, even if it is severely infected. When microorganisms get access to food, they utilize the nutrients found in it and their numbers rapidly increase. They change the food's flavor and synthesize new compounds that can be harmful to humans.

In generally Food spoilage directly change the colour, taste, odour and consistency and texture of food, and it may become dangerous to eat. The presence of a bad odour coming from food is a mark that it may be unsafe. We must put in our consideration that not all unsafe food smells bad.

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