

Food preservation with Natto bacteria

Research background

About 690,000,000 people were suffering from hunger in 2019(The State of Food Security and Nutrition in the World,2020).

On the other hand, something like a third of all the food that is produced in the world each year becomes waste(United Nations World Food Programme,2018). Food is thrown away not in developed countries. The food waste rate of developing countries is not so different from that of developed countries. A main cause in developing countries is lack of equipment for preservation and transportation.

In this research, we researched a way to preserve food without special equipment in order to lower food waste and contribute to elimination of hunger.

Hypothesis

The hypothesis of this research is that it is possible to preserve food by using harmless microbes. It is expected that they prevent growth of other microbes, harmful microbes.

In particular, this research focused on natto bacteria.

natto bacteria

- Adapt to severe situations
-100~100°C/acidic
 - Eliminate other microbes
produce polyglutamic acid
 - Break down
proteins and carbohydrates
- Suitable for this research



https://images-na.ssl-images-amazon.com/images/I/71TJmTuln5L_AC_SY879_.jpg

fermentation/rotting/food poisoning

Referred definitions by SUNATEC

Fermentation: Harmless food reaction
Possible to eat.

Rotting: Harmful food reaction Impossible to eat
No specific symptoms happen by eating

Food poisoning: Food reaction which becomes problems Caused by specific pathogenic microbes

Experiment2, Success in preventing rotting is in the case food changed differently from rotting.

Experiments

Overview of experiments

Experiment1

Make fermented foods(*miso,natto*)

Containing little water
Blocked from the air

Experiment2

Prevention of **rotting**

Experiment3

Prevention of **food poisoning**

Experiment2

Whether natto bacteria prevent food from rotting

Hypothesis: Natto bacteria eliminate microbes causing rotting of food.

Method: Control experiments(3 samples with natto bacteria and 3 samples with natto) Observe differences in changing process

→ Succeeded in preventing some samples from rotting

A, cases of success

Carrot Potato Lotus root
Burdock Sweet potato

→ High in carbohydrates

B, cases of unsuccess

Eggplant Asparagus Onion
Enoki mushroom Spinach
Daikon radish Sprout

→ High in water

Experiment3

Whether natto bacteria prevent food poisoning

Hypothesis: Natto bacteria eliminate microbes causing food poisoning.

Method: Stick colon bacillus on all samples
Control experiments Use foods(A,cases of success)
Measure with coliform bacteria examination paper

→ No differences



http://suncoli.com/wp/wp-content/themes/suncoil/images/product/img_product01.jpg

Consideration

Consider from the results of experiment2·3

Experiment2: Succeeded in preventing foods which are high in carbohydrates from rotting

→ Natto bacteria broke down more carbohydrates and became more active.

Experiment3: No differences were found. Two factors are considered.
Did two experiments, to find out factors.

Factor.1

Natto bacteria couldn't eliminate colon bacillus.

Control experiment
Use soy(best condition)

→ No differences Unanalyzable

Factor.2

Natto bacteria was detected on the paper.

Use sweet potato
(with natto bacteria)

→ Not detected

Conclusion·Future prospect

Natto bacteria prevented food from rotting. Whether natto bacteria can prevent food poisoning is unknown now. We should unravel this. Though there are some improvement points, possibility of application of natto bacteria and safe food preservation was felt.

More samples are needed to establish the new food preservation way. Our prospects are to analyze them and to contribute to eliminating hunger.

References

The State of Food Security and Nutrition in the World,2020 United Nations World Food Programme,2018
Differences among fermentation and rotting, food poisoning SUNATEC Inquiry about natto *natto koubou sendaiya*
Food composition database Ministry of Education, Culture, Sports, Science and Technology