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STUDENT WORKSHEET

Subject: Conventional Biotechnology
Topic: Kimchi Fermentatio
Class : 9/Phase D

Name group :
Class :

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A. Learning Objectives

1. To understand the concept of conventional biotechnology through the fermentation process.
2. To develop critical and creative thinking skills through scientific investigation.
3. To design and conduct an independent STEM-based experiment.

B. Problem Orientation

Kimchi is a traditional Korean food made through a fermentation process by lactic acid bacteria. The fermentation process is influenced by several factors such as the amount of salt, temperature, and fermentation time.

C. Research Problem

ANSWER GROUP 1 :

How does the amount of salt affect the fermentation of kimchi?

ANSWER GROUP 2 :

How does fermentation time affect the taste of kimchi?

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C. Hypothesis

If

.....

Then

.....

ANSWER GROUP 1 :

If the amount of salt is increased, then the fermentation process will be slower and the kimchi will be less sour.

ANSWER GROUP 2 :

If fermentation time is longer, then the kimchi will become more sour.

D. Procedure (Work Steps)

Write your Procedure (Work Steps) based on your prior knowledge in the next page here

NEXT

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3. Experimental Procedure

Write the steps of the experiment that your group will carry out.

No	Steps
1	.....
2	.....
3	.....
4	.....
5	.....
6	.....
7	.....
8	.....
9	.....
10	.....
11	.....

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KUNCI JAWABAN langkah kerja group 1

SALT VARIABLE (Kimchi Group)
Focus: Different salt amounts (1, 2, 3 spoons)

Steps:

1. Prepare chopped napa cabbage and divide it into 3 small cups (with lids).
2. Add seasoning to each cup:
   - Soy sauce (a little)
   - Chili powder
   - Garlic powder
   - Shrimp paste (terasi)
   - Ginger powder
3. Add different amounts of salt:
   - Cup A → 1 spoon of salt
   - Cup B → 2 spoons of salt
   - Cup C → 3 spoons of salt
4. Mix each cup well until all ingredients are evenly distributed.
5. Close the cups tightly.
6. Store all cups at the same place and temperature.
7. Observe changes (smell, texture, taste) after a short time (simulation observation).
8. Record the differences in the LKPD.

KUNCI JAWABAN langkah kerja group 1

VARIASI GARAM (Kimchi Group)
Fokus: Perbedaan jumlah garam

Langkah-langkah:

1. Siapkan sawi putih yang sudah dipotong lalu bagi ke dalam 3 cup kecil (bertutup).
2. Tambahkan bumbu ke setiap cup:
   - Kecap asin secukupnya
   - Cabe bubuk
   - Bawang putih bubuk
   - Terasi
   - Jahe bubuk
3. Tambahkan garam dengan jumlah berbeda:
   - Cup A → 1 sendok garam
   - Cup B → 2 sendok garam
   - Cup C → 3 sendok garam
4. Aduk semua bahan hingga merata.
5. Tutup rapat setiap cup.
6. Simpan di tempat yang sama (suhu sama).
7. Amati perubahan (aroma, tekstur, rasa).
8. Catat hasil pengamatan pada LKPD.

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KUNCI JAWABAN langkah kerja group 2

TIME VARIABLE (K-pop Group)
Focus: Different fermentation time

Steps:

1. Prepare chopped napa cabbage and put it into 2 big cups (with lids).
2. Add the same seasoning to both cups:
   - Soy sauce
   - Chili powder
   - Garlic powder
   - Shrimp paste
   - Ginger powder
   - Salt (same amount for both cups, e.g., 2 spoons)
3. Mix all ingredients evenly.
4. Close both cups tightly.
5. Create time variation:
   - Cup A → observe after short time (e.g., 10–15 minutes / simulation "Day 1")
   - Cup B → observe after longer time (e.g., 20–30 minutes / simulation "Day 2–3")
6. Open each cup at different times and observe:
   - Smell
   - Texture
   - Taste
7. Record the results in the LKPD.

KUNCI JAWABAN langkah kerja group 2

VARIASI WAKTU (K-pop Group)
Fokus: Perbedaan waktu fermentasi

Langkah-langkah:

1. Siapkan sawi putih yang sudah dipotong, masukkan ke dalam 2 cup besar (bertutup).
2. Tambahkan bumbu yang sama pada kedua cup:
   - Kecap asin
   - Cabe bubuk
   - Bawang putih bubuk
   - Terasi
   - Jahe bubuk
   - Garam (jumlah sama, misalnya 2 sendok)
3. Aduk hingga semua bahan tercampur rata.
4. Tutup kedua cup dengan rapat.
5. Buat variasi waktu:
   - Cup A → diamati lebih cepat (misalnya 10–15 menit / simulasi hari 1)
   - Cup B → diamati lebih lama (misalnya 20–30 menit / simulasi hari 2–3)
6. Buka cup sesuai waktu yang ditentukan, lalu amati:
   - Aroma
   - Tekstur
   - Rasa
7. Catat hasil pengamatan pada LKPD.

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E. Possible Analysis (Expected Result)

Write the conclusion of your experiment.

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1. Possible Analysis (Expected Result) GRUP 1

- Low salt → faster fermentation → more sour taste
- High salt → slower fermentation → less sour
- Salt controls bacterial activity

2. Possible Analysis (Expected Result)

- Short time → fresh taste → less sour
- Long time → stronger fermentation → more sour
- Time increases acid production by bacteria

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