CAN BLACK SEED WATER KEEP FOOD FRESH LONGER THAN NORMAL WATER AND OTHER SEED WATERS?

NATIONAL SCIENCE FAIR RESEARCH PLAN

LEVEL : PRIMARY LEVEL

CATEGORY :Environmental Science

SUBMITTED BY

MOHAMED USAID V

(GRADE :5)

(Community Building & Academic Excellence)

ABSTRACT

Project Title : CAN BLACK SEED WATER KEEP FOOD FRESH LONGER THAN NORMAL WATER AND OTHER SEED WATERS?

Project ID : NSF-SCH-2025-196
Participant Name : MOHAMED USAID V
School : K H MATRICULATION GIRLS HIGHER SECONDARY SCHOOL.
City & State : MELVISHARAM, TAMILNADU.

This experiment investigates whether black seed water can keep apple slices and cucumber pieces fresh for a longer time compared to plain water and fenugreek seed water. Black seed (Nigella sativa) is known for its antibacterial and preservative properties. In this study, equal-sized food samples were stored in three solutions under identical conditions for 7 days. Observations of colour, smell, texture, and freshness were recorded daily. The results showed that food stored in black seed water remained fresh the longest, followed by fenugreek water, while food in plain water spoiled the fastest. This suggests that black seed water may act as a natural preservative.

Introduction

Food spoilage is a common problem around the world due to microbial growth, oxidation, and moisture loss. Artificial preservatives are widely used to slow spoilage, but they may have negative health effects. Therefore, identifying natural and safe preservatives is important.

Black seed (Nigella sativa), also known as Habbatus Sauda, has been used in traditional medicine for centuries. It is mentioned in Islamic medicine as a seed that contains healing properties. Research shows that black seeds have antibacterial, antifungal, antioxidant, and preservative qualities.

This research focuses on testing whether black seed–infused water can preserve fresh apple slices better than plain water and fenugreek seed water. The study aims to find a natural, safe, and easily available method for food preservation.

Hypothesis

If black seed water has natural preservative properties, then apple slices stored in black seed water will stay fresh for more days and show fewer spoilage signs compared to apple slices stored in plain water or fenugreek seed water.

Methodology

Materials

- Black seeds (Nigella sativa)
- Fenugreek seeds
- Clean drinking water

- Apple slices
- Cucumber pieces
- 3 glass jars with lids
- Labels
- Refrigerator or room-temperature storage area

Procedure

1.Prepare the solutions

- Soak black seeds in water overnight.
- Soak fenugreek seeds in another jar overnight.
- Keep plain water as the control.

2. Prepare the food samples

Cut apple slices and cucumber pieces into equal sizes.

3. Set up the experiment

Place each food sample into:

✓ Black seed water

✓ Fenugreek seed water

✓ Plain water

Label all containers clearly.

4. Store under identical conditions

Keep all jars in the same place.

5. Daily observation

Check colour, smell, texture, softness, and fungal growth.

Record the freshness condition every day for 7 days.

Control and Variables

Independent Variable

Type of preservation solution

✓ Black seed water

✓ Fenugreek seed water

✓ Plain water (control)

Dependent Variable

Freshness of the food measured using:

- ✓ Colour
- ✓ Texture
- ✓ smell
- ✓ presence of fungal/microbial growth

Controlled Variables

- ✓ Type and size of apple slices & cucumber pieces
- ✓ Amount of solution in each container
- ✓ Type of container
- ✓ Temperature (kept in same location)
- ✓ Duration of experiment (7 days)
- ✓ Observation timings

Result based on Tabulation

Table 1: Direct Comparison of Preservation

S.No	Food Sample	Preservation Medium	Days Fresh	Spoilage Signs
1	Apple slices	Normal water	2	Browning, odor change
2	Apple slices	Black seed water	4	Slight softening
3	Apple slices	Fenugreek water	2	Mild odor
4	Cucumber pieces	Normal water	1	Soft, slimy texture
5	Cucumber pieces	Black seed water		Slightly dull color
6	Cucumber pieces	Fenugreek water	3	Minor odor detected

Graph: 1 Direct Comparison of Preservation

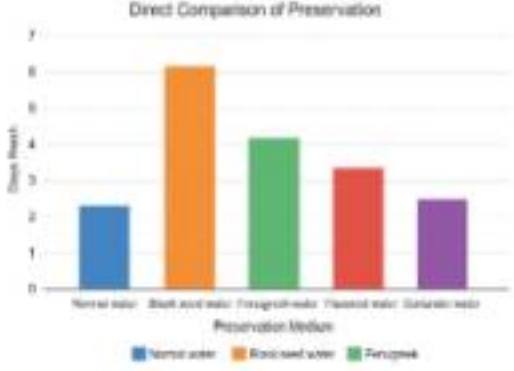


Table 2: Relative Preservation Efficiency

Preservation Medium	Average Shelf Life (Days)	Freshness Score (1–10)	Efficiency (%)
Normal water	1.5	3	30%
Black Seed water	5.5	8	90%
Fenugreek water	3.5	6	60%
Flaxseed water	3	5	50%
Coriander water	2.5	4	40%

Graph : 2 Relative preservation Efficiency

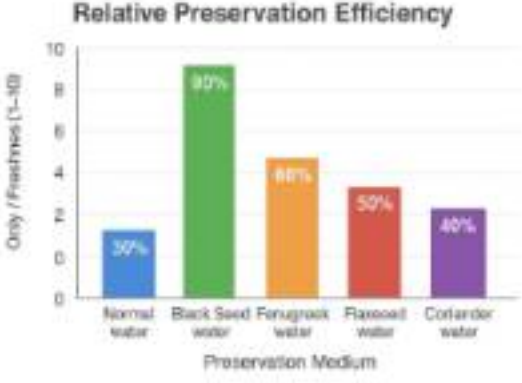
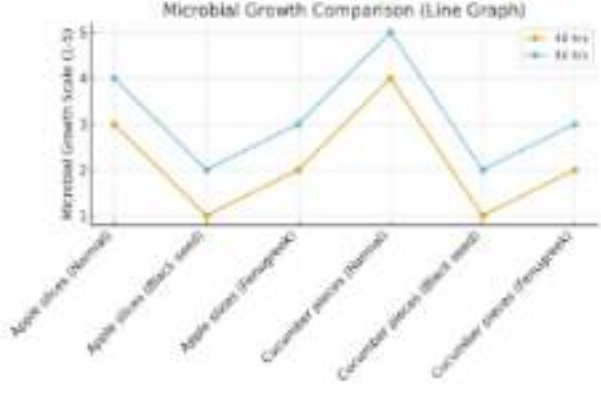


Table 3 – Microbial Growth Observation (Numerical Values)

Food Item	Preservation Medium	Growth after 48 hrs	Growth after 96 hrs
Apple slices	Normal water	3	4
Apple slices	Black seed water	1	2
Apple slices	Fenugreek water	2	3
Cucumber pieces	Normal water	4	5
Cucumber pieces	Black seed water	1	2
Cucumber pieces	Fenugreek water	2	3

Scale used:
1 = very low growth 2 = low 3 = moderate 4 = high 5 = very high

Graph :3 Microbial Growth Observation



Collection of data- Photographs

Figure 1: Materials Used in the Experiment


Glass container
water
Fenugreek seeds
Black seeds
Cucumbers
Apples
Containers

Figure 2: Black Seeds and Fenugreek Seeds Soaked in Water for Preparation of Seed-Infused Solutions

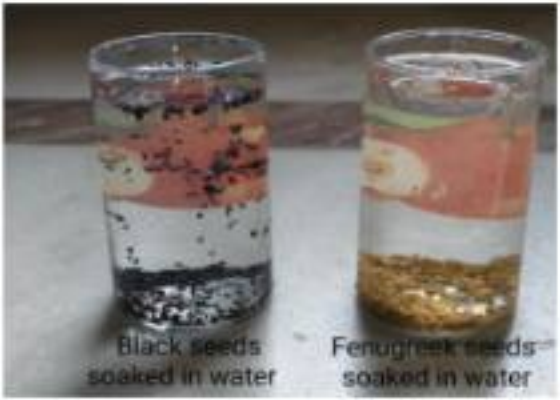


Figure 3: Seed-Infused Water Prepared After Overnight Soaking

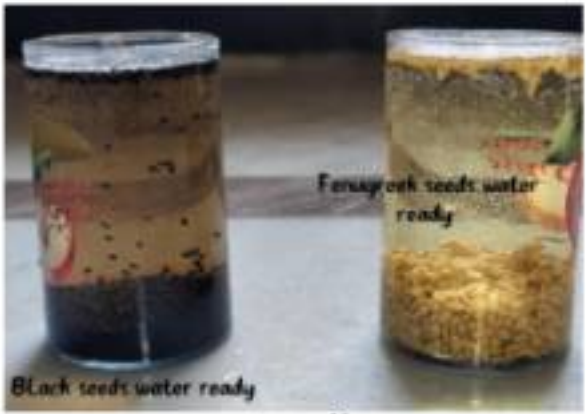


Figure 4: Fresh Apple and Cucumber Slices Prepared for Testing

Figure 5: Samples Immersed in Different Preservation Waters

Sample -1 Apple slices

Sample -2 Cucumber slices

Figure 6: All Samples Stored Under Same Refrigeration Conditions

Figure 7: Observation on Day 1 – All Samples Fresh and Clear

Figure 4: Observation on Day 3 – Slight Changes Visible In Some Sample

Figure 5: Observation on Day 5 – Clear Difference In Preservation

Figure 10: Final Comparison of Samples After Seven Days

RESULTS

The experiment was carried out with six sets of samples — apple and cucumber slices soaked separately in normal water, black seed water, and fenugreek water. Observations were made at regular intervals for 24 hours at room temperature. During the first few hours, all slices appeared fresh and unchanged. However, after 4 hours, the apple and cucumber slices soaked in normal water began to lose freshness, showing slight dullness and color change. In contrast, the slices treated with black seed water remained bright and firm, showing almost no signs of browning or odor. The slices treated with fenugreek water showed a mild change in color but were still better than those in plain water.

After 8 hours, the differences became clearer. The apple slices in normal water turned brown and soft, while the cucumber slices became watery and pale. The black seed-treated apples and cucumbers, however, maintained their natural color and crisp texture with no unpleasant smell. Fenugreek-treated slices showed partial softening but still retained acceptable freshness. After 24 hours, the normal water samples were completely spoiled, emitting a strong odor and showing decay. The fenugreek water samples were moderately affected but still usable. The black seed water samples looked the freshest, with apples showing only light browning and cucumbers maintaining their green color and firmness.

Overall, among all six sets, black seed water was found to be the most effective natural preservative, keeping both apple and cucumber slices fresher for a longer duration. Fenugreek water showed moderate preservation ability, while normal water had the least effect. This confirms that natural extracts like black seed and fenugreek help slow down oxidation and spoilage compared to plain water.

DISCUSSION

- The experiment clearly shows that black seed water preserves fruits and vegetables most effectively, followed by fenugreek water, while normal water had minimal preservation effect.
- Black seed water slowed down oxidation and microbial growth due to its strong antioxidant and antibacterial compounds (thymoquinone).
- Fenugreek water also delayed spoilage slightly because it contains natural phenolic compounds with mild antimicrobial activity.

- Normal water allowed faster enzymatic browning in apples and microbial decay in cucumbers.

CONCLUSION

- The study concludes that black seed water is the most effective natural preservative for fruits and vegetables among the three tested liquids.
- Apple and cucumber slices treated with black seed water stayed fresh, firm, and odor-free for over 24 hours, while those in fenugreek water showed moderate preservation and those in normal water spoiled quickly.

- Hence, black seed water > fenugreek water > normal water in preservation performance.

These results support the hypothesis that black seed water contains stronger antioxidant and antimicrobial properties that help slow spoilage naturally

APPLICATION

- ***Domestic use*:** Can be used at home to keep cut fruits and vegetables fresh longer.
- ***Food industries*:** Offers a chemical-free, eco-friendly preservation method.

- *Educational projects*: Demonstrates the power of natural Islamic remedies in science.

- ***Health and hygiene***: Encourages consumption of Tayyib (pure) food without artificial chemicals.

- ***Future research***: Can explore combinations of black seed and fenugreek extracts for longer preservation effects.

References

1. *Ali, B., et al. (2008).* "Nigella sativa: A miracle herb and its bioactive compounds." *Journal of Herbal Medicine.*
2. WHO Food Safety and Preservation Guidelines.
3. *Modern Food Microbiology* – James M. Jay, Springer, 2015.
4. Online Islamic Medicine Archives – OMEIAT Database, 2025.

Acknowledgement

I would like to express my sincere gratitude to everyone who has played a role in the completion of this project. Their support and guidance have been invaluable, contributing significantly to the success of this endeavor.

Firstly, I extent my heartfelt thanks to my school, K.H. Mat. Girls Hr. Sec. School, Melvisharam. For providing me with the opportunity and resources to pursue this project. The encouragement from my teachers and the school administration has been instrumental in shaping this research.

I am deeply thankful to all the science teachers for their contribution, guidance and support. Their expertise and insights have greatly enriched the content and quality of this project.

I would also like to acknowledge the assistance and cooperation of my peers and fellow students who provided valuable feedback and encouragement throughout the research process.

Lastly, I want to express my appreciation to my family and friends for their unwavering support, understanding and motivation. Their encouragement has been the driving force behind the completion of this project.