



SUSTAINABLE COMMERCIAL
USE OF
MICROORGANISMS: MAJOR
WINERIES AROUND THE WORLD
TOPIC: MICROORGANISMS:
FRIEND AND FOE
280 mins

Sustainable commercial use of microorganisms - Major wineries around the world

TIME-280 Minutes

OVERVIEW

Students will explore microorganisms and the commercial industry, along with that, using Google Earth they will observe some of the major wineries around the world.

SUBJECT/TOPIC

Commercial use of microorganisms : major wineries around the world

AGE LEVEL

7th - 8th Grade



- Learning Objectives
- Students will learn
- The role microbes play in the commercial industry.
- The process of wine making.
- Learning that microbes are major contributors in the commercial market.
- Sustainable ways of wine production



Inquiry

- What role do microorganisms play in producing various commercial products and explain how they thus become a vital source for commerce.
- Name some of the major wineries around the world and how is the final product produced?
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Materials Needed

- Access to Google Earth
- Access to a search engine or a related encyclopedia
- Internet access



Lesson Summary

- **Engage:** Discuss the various microorganisms and how they can be both harmful and useful to humans.
- **Explore:** The uses of microbes, how they aid in the commercial world and which are the major microbes frequently used for these purposes.
- **Explain:** The process of wine making and that the microorganisms are used for commercial use or financial profits and gain.
- **Revise:** Discuss and revise upon the subject that microbes are important for the humankind while some can be harmful too.

- **Apply:** Make an impact by observing uses of microorganisms in vital processes of daily life and our level of dependency on them.



Sustainable Development Goals

- The implementation of use of renewable resources like solar energy, wind energy, etc can reduce the energy consumption of the wine making factories wherein they need to store the produce.



Culminating Task/Assessment

- Students will think deeper into how microorganisms affect our lives in different ways, they can make a project on how the participation of microbes in the production of wines is a contributor in a country's economy.



Textbook Chapter

- 8th grade NCERT Science Ls.2 - Microorganisms friend and foe thoroughly throws light on this topic.

Engage (20 minutes)

1. The teacher will show bread slice with fungal growth on it, some spoiled leather articles, fermented dough ,curd, wine, and a piece of spongy cake and ask the students what information they get from this.
2. In groups students will research on these questions
What converts milk into curd? 2. Who discovered vaccine and how it works? 3. How do diseases spread from one person to another?
4. How can we preserve food for a longer period? 5. How nitrogen makes soil fertile? Is this knowledge is helpful in Baking and Brewing industry, Microbiology, Medicines, Leather Industry and Agriculture.
3. Which microorganisms are beneficial in wine production?
4. They will research on the sustainability factor in wine production. Carbon foot print of each winery.
5. Students in groups will research on Sustainable wines winemaking process that protects the environment, supports social responsibility, maintains economic feasibility, and produces high quality wines.
6. Students will also research on different preservation methods.

Explore (40 minutes)

1. Students will further explore groups and species of microorganisms, process of fermentation, physical environmental factors like temperature, pH, anaerobic /aerobic conditions requires for the growth.
2. They will frame multiple hypothesis about the different conditions appropriate for the growth of microorganisms and how to avoid contamination in the wine production.
3. Teacher will talk about various career options which may require the knowledge of this chapter. 2. This knowledge is helpful to become Pathologists, Microbiologists, Researchers, Lab technicians and Engineers in food and medicine industry.

Explain (40 minutes)

1. Students will learn the process of wine making and different raw materials used in different wines. Using Google earth tool they will visit different wineries of the world and explain how each winery is different from each other in production process .
2. Students learn about various methods of food preservation which can help them later in choosing a career.
Students will analyse the commercial use or financial profits and gain related to wineries of the world.
Students will test their framed hypothesis and will find out better solution for the Sustainable commercial production of wine.

Revise (20 minutes)

1. Discuss and revise upon the subject that microbes are important for the humankind while some can be harmful too.
2. Why does food get spoiled if kept for long duration?
3. Why do we catch cold quickly if we get in close-contact with an infected person?
4. What converts milk into curd?
5. What do we see on the moist bread slice kept in open for two to three days?
6. Why do we add baking soda/yeast while preparing cake or biscuits?
7. Why are small children provided with Polio drops after regular intervals?
8. How can we preserve fruits and vegetables for a longer time?
9. Why do we boil milk before using it?
10. Why are we advised to keep the food items covered?
11. Which food items are rich in proteins?

Next, repeat the process with a second source of information.

Explore (30 minutes)

1. What if wineries sell environmentally friendly wine at a higher price, which could consist of an economic incentive for producers towards the adoption of production practices associated to the use of less pesticide?

Explain (30 minutes)

1. Students will further make a flow chart to verify their hypothesis
2. How is natural wine produced? What's better for storage of wine glass or cans?
3. How much amount of water is required for 1 litre of wine production?
4. Amount of greenhouse gas emission during wine making process?
5. What is the impact of pesticides in growing of grapes and further on taste and production of wine?

Life Skills • How to establish relationship with daily life by knowing this concept?

1. To differentiate whether Micro-organisms are friend or foe .
2. To be able to preserve food by different methods.
3. To get skilled in making different food items by knowing about fermentation. •(Team-Spirit • Public Speaking • Analytical and Research Skill • Creative story writing • Story-telling)

Revise (20 minutes)

1. Students will compile answers of these questions in groups.
2. How is natural wine produced?
3. What's better for storage of wine glass or cans?
4. How much amount of water is required for 1 litre of wine production?
5. What is the environmental impact on use of excessive pesticides on farms?
6. Amount of greenhouse gas emission during wine making process?
7. What is the impact of pesticides in growing of grapes and further on taste and production of wine?

(Option to repeat this process with additional sources of information, each time resulting in an updated hypothesis.)

Apply (80 minutes)

1. Make an impact by observing uses of microorganisms in vital processes of daily life and our level of dependency on them.
 2. Students will be able to guide their farmer parents or other villagers about the importance of growing leguminous plants in their fields to increase the fertility of soil.
- Design a campaign where different wine producers from around the world about what initiatives they had put in place to ensure their wineries are run sustainably.

Evaluate: Exemplar Response and/or Rubric

Group Presentation Rubric

The teacher will use this rubric to evaluate each group's presentation. Students can look at this rubric so they may understand what they are being graded on. The Group Presentation Rubric will be combine with the Teammate Participation Rubric to determine your final grade for the project.

Trait	Criteria				Points
	1	2	3	4	
Content Did the presentation have valuable material?	Presentation contained little to no valuable material on sustainable commercial use of microorganisms	Presentation had moments where valuable material on sustainable commercial use of microorganisms was present but as a whole content was lacking.	Presentation had a good amount of material on sustainable commercial use of microorganisms and benefited the class.	Presentation had an exceptional material on wineries of the world and sustainable commercial use of microorganisms amount of valuable material and was extremely beneficial to the class.	—

Collaboration Did everyone contribute to the presentation? Did everyone seem well versed in the material?	The teammates never worked from others' ideas. It seems as though only a few people worked on the presentation.	The teammates sometimes worked from others' ideas. However it seems as though certain people did not do as much work as others.	The teammates worked from others' ideas most of the time. And it seems like every did some work, but some people are carrying the presentation.	The teammates always worked from others' ideas. It was evident that all of the group members contributed equally to the presentation.	_____
Organization Was the presentation well organized and easy to follow?	The presentation lacked organization and had little evidence of preparation.	There were minimal signs of organization or preparation.	The presentation had organizing ideas but could have been much stronger with better preparation.	The presentation was well organized, well prepared and easy to follow.	_____
Presentation Did the presenters speak clearly? Did the engage the audience? Was it obvious the material had been rehearsed?	Presenters were unconfident and demonstrated little evidence of planning prior to presentation.	Presenters were not consistent with the level of confidence/ preparedness they showed the classroom but had some strong moments.	Presenters were occasionally confident with their presentation however the presentation was not as engaging as it could have been for the class.	Presenters were all very confident in delivery and they did an excellent job of engaging the class. Preparation is very evident.	_____

Additional Resources

<https://www.youtube.com/watch?v=8KLufAFC9w> b) <https://www.youtube.com/watch?v=XuZQUEFD52I> c)
<https://www.youtube.com/watch?v=fRWpRl-wLwM> d) <https://www.youtube.com/watch?v=1EkehFkhWf4> e)
<https://www.youtube.com/watch?v=7D0eIsuZC3w>

Options for Differentiation

Students can design a plan on wineries including economics, environmental impacts of everything done on the farm and all aspects of human resources, including employees and the surrounding community

Credits

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