

1. Think of a Question - Your question will drive your entire project. Use the list of topics provided by your teacher. Make sure that your question is something that can be measured and answered by following the scientific process. Your question will also be the title of your project.

Project Question

Which solution will keep cut flowers fresh the longest?
? - Normal water, sugar water, salt water, vinegar water, and bleach water.

2. Research Your Topic - spend some time with your group learning more about your topic. Use reliable Internet sources, books from the library, your science book, or other resources. Do not forget to write these sources down to include in the bibliography. Not only do you want to be an expert on your topic, but you want to teach others about your topic.

1. Key Words - locate 3 or more key science words related to your topic. Make sure that the words you choose are directly related to your topic. Provide a definition of each key word IN YOUR OWN WORDS.
2. A paragraph describing the science behind your project - after you have completed your research give us (your audience) some background information on your topic in a complete and well-written paragraph (5-7 sentences). Give us specific, rather than general information. Use the space provided to write a draft. You will edit a final copy to place on your display board.

Key Words

Key word	Definition
solution	A homogeneous mixture of one or more solutes that are dissolved in a solvent.

Cut flowers	Flowers that have been picked from a plant, usually placed in water to keep them fresh.
Preservation	The act of keeping something in its original state for as long as possible, in this case, keeping flowers fresh.
Hydration	The process of providing water to something, which is important for keeping plants and flowers alive and healthy.
Freshness	The quality of being new and not spoiled or decayed.
Wilting	The drooping or bending of a plant or flower due to lack of water or nutrients, indicating that it's not healthy.
Bacteria	Tiny living organisms that can only be seen with a microscope; some bacteria can help break down things, while others can cause food or flowers to spoil.
Xylem	A tube in the plant that carries water from the roots to all parts of the plant. Also called sapwood.



Resource:

Type of Resource: _____

Website: http://floralife.com/wp-content/uploads/2021/09/The-Importance-of-Fresh-Cut-Flowers-

Author: Aril Rancold, Ph.D. chief scientist

Title: The Importance of Hydration of Fresh Cut Flowers

Publishing Company: Floralife

Location of the Publishing Company: 751 Thunderbolt Drive waterloo

Date of Publication: June, 2009

Information found in your own words:

(Must be at least one paragraph summary.)

The water in a cut flower is important because it keeps the flower looking fresh and helps it last longer in a vase. Flowers lose most of their water through the leaves in a process called transpiration. To be healthy, they need to absorb through their stems, to replace the water that was lost. If flowers take in more water than they lose, the flowers stay hydrated. But, if they lose more water, the flower becomes dry and wilts. The xylem in the stem, helps move water up to the flowers. But the xylem can get blocked by air bubbles and dirt making it harder for the plant to get water. Flower stores can

You must have 3 Resources



Source:

Type of Resource: _____

Website: <http://ucanr.edu/datastore/Files/034-76.pdf>

Author: Michael S. Reid and Linda L. Dodge

Title: Flower handlers sanitation is crucial

Publishing Company: Department of Environmental Horticulture, UCD

Location of the Publishing Company: _____

Date of Publication: November, 1997

Information found in your own words:

(It must be at least one paragraph summary.)

Bacteria play a big role in how long cut flowers stay fresh in a vase. When flowers are put in water, bacteria starts to grow quickly, especially if the water has sugar. The flower's stem releases sugars and other nutrients, which is good food for the bacteria. As bacteria grows, they block xylem in the stem that carries water, making it harder for the flower to stay hydrated. This causes flowers to wilt faster. That's why it's important to use clean containers.

Flower handlers add some acid to the water to slow down bacteria growth. Cutting an inch off the stem, helps get rid of bacteria, but if you put it back in plain water, new bacteria will grow and block the xylem. This causes the flower to die.

Resource #3

You must have 3 Resources



Resource:

Type of Resource: _____

Website: <http://ajd.umass.edu/greenhouse-floriculture/fact-sheets/sugar-acidity>

Author: Dr. Susan S. Holt

Title: Sugar and Acidity in Preservative solutions for Field-Grown

Publishing Company: University of Massachusetts Amherst

Location of the Publishing Company: Stockbridge Hall, 80 Compu

Date of Publication: _____

cut
Flowers
Centre
way

Information found in your own words:

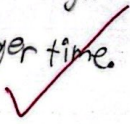
(Must be at least one paragraph summary.)

Different solutions can have a big impact on how long cut flowers stay fresh. When a flower is cut from its plant, it can no longer do photosynthesis to produce sugars. That's why, adding sugar to the water, helps flower stay alive longer by providing them with food and energy. However, adding sugar can also lead to increased bacteria growth. Adding something, like bleach, to the water, helps stop the growth of bacteria that can kill the flowers. But too much of these acids can cause harm to the flowers as well. These solutions can be used improve the lifespan of cut flowers. By using the right amount, flowers can stay fresh and

Research Description (Final copy to be put on display board)

The water in a cut flower is important because it keeps the flower looking fresh and helps it last longer in a vase. Flowers use most of their water, in a process called transpiration. To be healthy, they need to absorb through their stems, to replace the water that was lost. If flowers take in more water than they lose, the flowers stay hydrated. But, if they lose more water, the flowers become dry and wilt. The xylem in the stem helps move water up to the flowers. But, the xylem can get blocked by the air bubbles and bacteria, making it harder for the plant to get water. Flower shops use special solutions to help flowers get water more easily, which keeps them fresh longer. The bacteria play a big role in how long cut flowers stay fresh in a vase. When flowers are put in water, bacteria start to grow faster, especially if the water has sugar. The flowers stem releases sugars and other nutrients, which is good food for the bacteria. As the bacteria grows, they block the xylem in the stem that carries water, making it harder for the flower to stay hydrated. This causes flowers to wilt faster. That's why it's important to use clean containers and add some acid to the water to slow down bacteria growth. Cutting an inch off the stem helps get rid of bacteria, but if you put it back in plain water, new bacteria will grow and block the xylem. This causes the flower to die faster.

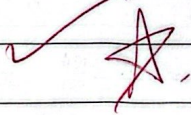
Different solutions can have an impact on how long flowers stay fresh. When a flower is cut from its plant, it can no longer do photosynthesis to produce sugars. That's why, adding sugar to water, helps flowers stay fresh longer by providing them with food and energy. However, adding sugar can also lead to increased bacteria growth. Adding something like bleach, to the water helps stop the bacteria growth that can kill the flowers. But too much of those acids can cause harm to the flowers as well. These solutions can be used to improve the life-span of cut flowers. By using the right amount, flowers can stay fresh and healthy for a longer time.



State Your Hypothesis - In your group decide what you think the outcome of the project will be and make a good guess as to what you think the answer to your question will be. **Also explain WHY you think that will be the outcome.** Remember, it is ok if you don't have the right answer; that is how scientists make discoveries. Make sure that your hypothesis is written in a complete sentence.

Hypothesis

I think, that the cut flowers in sugar water will stay fresh the longest because sugar helps provide food for the flowers, as cut flowers cannot do photosynthesis. Other solution may harm them, or stop them from absorbing water properly.



4. Design Your Experiment - Clearly write out the procedure you are going to follow. Remember that your experiment needs to follow the scientific process and that you need to have one variable that you are going to change.

1. Materials: List all the materials that will be used in the experiment, including the quantity for each material.
2. Variables - List the variables that you are going to keep the same and the one variable that you are going to change. You need to have at least one control (normal) variable and at least two to three other variables.
3. Write your procedure - Think through each step very carefully and list them in numbered order.

MATERIALS: Bulleted list of materials used, including specific sizes, colors, amounts, etc. Be sure to use metric units. (Example: two Celsius thermometers, 5cm of tape)

- Roses (cut flowers)
- Tablespoon
- Cups
- Salt
- Sugar
- Vinegar
- Bleach
- Marker
- Notebook
- Pencil
- Camera (To take photos for proof)
- Water

Constant Variable What stays the same (Example: location, time out in the sun, thermometers)	Test Variable 1-ONE thing that is changed/different (Example: Aluminum can painted black, aluminum can painted white)
- The type of flower (Rose) - Size of flower stem - Amount of water - Amount of solute - Size of cups - Room temperature - Same lighting - Duration of experiment	- Type of solution used (Regular water, sugar, salt, vinegar, bleach)

PROCEDURES: Numbered list. Must begin with a ~~verb~~ Be specific and include quantities/amounts):

Sample #1: Peel Label off and several aluminum cans.

#2: Place the heat lamp 10 cm from the cans.

Gather all materials.

Label each cup with the name of the solution

Fill $\frac{3}{4}$ of the cup with water (7cm)

Add 1 tablespoon of the following solutes to their named cups: Sugar, Salt,

Stir each solution to ensure it has been dissolved.

Get the cut flowers, and place them into each of the cups

Record your observations every day for 7 days. Observe for wilting, petal, and stem condition, and water levels.

Repeat experiment ^{four} ~~two~~ more times for accuracy.

the chart is too big

Label:				
	Trial 1	Trial 2	Trial 3	Average

pts: Your data written in paragraph form. You may discuss patterns and comparisons found in data.

nce 1: One sentence summarizing what you were testing.

nce 2: Briefly explain what the data was for the first trial.

nce 3: Briefly explain what the data was for the second trial.

nce 4: Briefly explain what the data was for the third trial.

nce 5: Briefly explain the average of the data collected. Here is where you would make a ment comparing the data, identifying the most and least quantities observed.

yes, different solutions do affect how long flowers can stay fresh. We saw this in our experiment. over 7 days, the flowers in sugar water stayed the freshest, with almost no petals dropped and very little wilting, getting the highest score (6). The regular water flowers did well too, but started wilting slightly and also dropped a few petals. We gave it a score of 5 which was the second highest. Distilled water scored a score of 3.5 as it had no wilting but many petals dropped and the stem was turning white. Vinegar water had the most petals lost, the stem was very brown and we gave it a score of 2.5. Salt water was the worst as it caused a lot of wilting and had a few petals dropped as well. I got the lowest score of 2. Overall, sugar water kept the flowers the freshest and healthiest the longest.

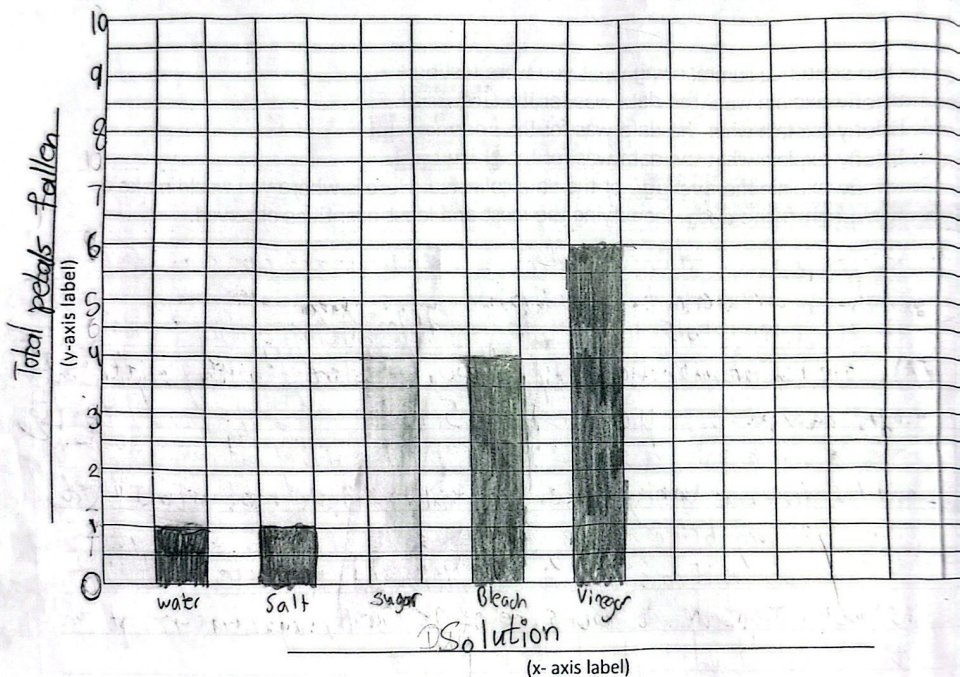
Graph: Record AVERAGE data from chart into a bar graph.

- Bars must be equal widths and with equal spacing
- First bar cannot touch "0" line on the y-axis
- Select appropriate scale for y-axis (by 1's, by 2's, by 5's, or by 10's depending on your

Helpful website to create a graph: <http://nces.ed.gov/nceskids/createagraph/>

Petal Drop Average

(Title of Graph) ↓



find out what happened. Think about the best way to show your data: bar graph, line graph, chart, etc. and then create a table or a graph using your data. Write out the results of each test in the experiment in paragraph form using complete sentences. Make sure that you include the numerical data (measurements) as well as any other important observations that you made.

Draw Conclusions - After you have determined the results it is time to decide the answer to your original question. Write your answer in a complete sentence using the question to begin your answer. You also need to tell whether your hypothesis was correct or incorrect. If it was incorrect explain why you think so. End this paragraph by saying how you could change or improve your experiment in the future.

Conclusions

Answer to your original question: In conclusion, my hypothesis was proven correct as sugar water kept the flowers freshest. We found out that sugar water helped the flowers stay fresh the longest because it provided food and energy to the flowers, preventing them from wilting quickly. Regular water was the second best, as it kept the flowers healthy but didn't provide extra nutrients. Bleach water came in third, as it slowed down bacteria growth but also caused petals to wrinkle. Vinegar water was fourth because it caused a lot of browning and, salt water was the worst, as it caused the flowers to dry out and wilt very quickly.

with

you're your hypothesis correct or incorrect? If incorrect, why?

My hypothesis was correct because sugar water kept the flowers
fresh the longest, as it provided the flower with nutrients
to stay healthy.

were to complete this experiment again, what changes would you make? How
you improve this experiment?

If I were to do this experiment again, I would try using different amounts of each solute to see if that would make a change. We could also try using other solutions, like baking soda or lemon juice, to see how they would affect the flowers. We could have done this experiment for a longer period to see how the solutions work over time. By trying these new things we could make our experiments better and learn more about keeping flowers fresh.

Display board - Now that you have completed your experiment you will begin setting up your display board to communicate the results of your experiment to others. Remember, the board is graded on the information not how colorful or pretty it looks. Your display board must have ALL of the following components located in the same places. Other board guidelines:

ont should be easy to read and at least a size of 16pt or greater.

include faces of students

10. Abstract – The abstract is a short version of your science fair final report. It should be no more than 250 words. Most of the information you will put in your abstract is already written, you will just need to copy it over. You must have the following five components in your abstract:

- Introduction
- Project Question
- Procedures
- Results
- Conclusions

The only new thing you will need to write is the **Introduction**. This is where you describe the purpose for doing this experiment or project. Tell why people should care about the work you did. How does your experiment give us new science information? Can this information be used to improve our lives? If so, how? This is where you want to interest the reader in your project and motivate them to read the rest of it.

Abstract Introduction

Have you ever wondered how to keep flowers fresh for longer? When flowers are cut, they start to lose water and nutrients, which makes them wilt and die. For my project, I tested five different solutions: regular water, salt water, sugar water, bleach and vinegar water to see which one keeps cut flowers fresh the longest. I wanted to find out which solution works best to help flowers stay healthy.

Project Question: Which solutions keep cut flowers fresh longest?

Procedure:

1. Gather all materials
2. Label each cup with the name of the solution
3. Fill $\frac{3}{4}$ of the cup with water (1cm)
4. Add 1 tablespoon of the following solutions to their named cups: sugar, salt, vinegar, and bleach.

5. Stir each solution to ensure it has been dissolved

6. Get the cut flowers, and place them into each cup

7. Record your observations every day for 7 days. Observe for wilting, petal and stem condition, petals dropped and water level

8. Repeat this experiment four more times for accuracy.

Results: Yes, different solutions do affect how long flowers can stay fresh. We saw this in our experiment. Over 7 days, the flowers in sugar water stayed the freshest, with almost no petals dropped and

very little wilting, getting the highest general score (6). The regular water flowers did well too, but started wilting slightly and also dropped a few petals. We give it a score of 5, which was the

second highest. Bleach water scored a score of 3.5 as it had no wilting but many petals dropped, and the stem was turning white. Vinegar water had the most petals lost, the stem was very brown and

we gave it a score of 2.5. Salt water was the worst, as it caused a lot of wilting, and had a few petals dropped as well. I got the lowest score of 2. Overall, sugar water kept the flowers freshest and healthiest.

In conclusion, my hypothesis was proven correct as sugar water kept the flowers the freshest. We found out that sugar water helped the flowers stay fresh the longest because it provided food and energy to the flowers, preventing them from wilting quickly. Regular water was the second best, as it kept the flowers healthy but didn't provide extra nutrients. Bleach water came
Finally, you will type up the abstract, edit and revise it, and then print it. Make sure that your abstract is written in Times New Roman or Arial font at size 12pt.

in third, as it slowed down bacteria growth but also caused petals to become wrinkly. Vinegar water was the fourth because it caused a lot of browning, and salt water was the worst, as it caused the flowers to dry out and wilt very quickly.