

Strawberry DNA

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This lab requires a little bit of prep work for the fellow or teacher. It is not difficult or time consuming, but it must be done. The cell lysing solution made of detergent salt and water must be prepped and the alcohol must be placed in a freezer

1. In the glass Pyrex bottle, make your DNA extraction liquid: mix a ratio of 2 teaspoons of detergent, 1 teaspoon of salt and 1/2 cup of water.
2. Place alcohol into the freezer the night before. Keep it on ice or in the freezer/fridge when not in use.

Tell students to be very careful and purposeful with this lab as shaking or stirring the last few steps will not allow the DNA to come out of solution and the experiment will be ruined.

TN Science Standards:

7.LS3.1 Hypothesize that the impact of structural changes to genes (i.e., mutations) located on chromosomes may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

8.LS4.5 Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.

How to Extract DNA from a Strawberry

Major concepts

Cells are the basic unit of life and make up all plants, animals and bacteria. Deoxyribonucleic acid, or DNA, is the molecule that controls everything that happens in the cell. DNA contains instructions that direct the activities of cells and, ultimately, the body. This activity will demonstrate how DNA can be isolated from a strawberry using common household materials.

Objectives

To learn an easy way to extract DNA from a strawberry using household products To see a large sample of DNA

Background

This DNA extraction activity results in a large quantity of DNA that can be seen with the naked eye. It is an easy activity and, if you follow the instructions, there is almost no way to make a mistake that would affect the results. It is much more effective than extracting DNA from any other source because strawberries are soft and easy to smash. In addition, ripe strawberries produce enzymes (pectinases and cellulases), which are chemicals that help in breaking down the cell walls.

Strawberries have enormous genomes. Humans have two copies of each chromosome (diploid genome). A chromosome is an organized package of DNA found in the nucleus of the cell. Strawberries have up to eight copies of each chromosome (octoploid genome).

Materials (per group)

1 re-sealable plastic bag
Strawberries (fresh or frozen)
2 teaspoons lysing solution
1 plastic cups (One cup will be used for the filtering apparatus below) Filtering apparatus: coffee filter and plastic cup
Ice cold 90 percent rubbing alcohol
1 wooden popsicle stick or plastic coffee stirrer

Procedures

1. Pull off any green leaves on the strawberry that have not been removed yet.
2. Put the strawberry into the plastic bag, seal it and gently smash it for about two minutes. Completely crush the strawberry. This starts to break open the cells and release the DNA.
3. Add 2 teaspoons of the DNA extraction liquid into the bag with the strawberry. This will further break open the cells.
4. Reseal the bag and gently smash for another minute (Avoid making too many soap bubbles).
5. Place the coffee filter inside the other plastic cup.
6. Open the bag and pour the strawberry liquid into the filter. You can twist the filter just above the liquid and gently squeeze the remaining liquid into the cup. You may also choose to put the liquid in a small glass test tube to better see the DNA extraction, just be extra careful not to shake or move the tube too much.
7. Next, using the pipet, pour down the side of the cup an equal amount of cold rubbing alcohol as there is strawberry liquid. Do not mix or stir, be very careful to be very still. You have just isolated the DNA from the rest of the material contained in the cells of the strawberry.
8. Within a few seconds, watch for the development of a white cloudy substance (DNA) in the top layer above the strawberry extract layer.
9. Tilt the cup and pick up the DNA using a plastic coffee stirrer or wooden stick *after* waiting a few minutes to make sure all of the DNA has floated to the top. Be careful to be very gentle or this will be messed up.
10. Put the DNA on a microscope slide or dark paper if available. Examine it and make notes.
11. Thoroughly **clean and dry** the cups and tubes. The bag may be disposed of in the trash, but plastic cups and glass tubes are expected to be returned.