Lesson Plan -Fruit Cup DNA Extraction From Kiwi

Introduction

DNA is present in the cells of all living organisms. This procedure uses household equipment and store supplies to extract DNA from kiwi in sufficient quantity to be seen and spooled.

Materials

- 5 oz plastic cups
- 1 set of measuring spoons
- 1 plastic knife for cutting kiwi
- 1 plastic spoon for mixing and mashing kiwi
- #2 cone coffee filter
- 30 ml distilled water
- 1 clear-colored shampoo, such as Suave Daily Clarifying Shampoo
- 1/2 of a kiwi
- table salt, either iodized or non-iodized
- 1 plastic transfer pipette or medicine dropper
- 1 sealed test tube containing 95% ethanol (grain alcohol)

Lab Instructions

The process of extracting DNA from a cell is the first step for many laboratory procedures in biotechnology. The scientist must be able to separate DNA from the unwanted substances of the cell gently enough so that the DNA does not denature (break up).

You will prepare a solution of kiwi treated with salt, distilled water and shampoo. The salt allows the DNA to precipitate out of a cold alcohol solution. The detergent breaks down the cell membrane by dissolving the lipids (fatty molecules) and proteins of the cell and disrupting the bonds that hold the cell membrane together. The detergent then forms complexes with these lipids and proteins, causing them to precipitate out of solution.

1. In one of the 5 oz cups, make a solution consisting of 1 teaspoon of shampoo and two pinches of table salt. Add distilled water to make a final volume of 30 ml or approximately 1/3 the volume of the cup. Dissolve the salt and shampoo by stirring slowly to avoid foaming.

1. Using the plastic knife, peel and cut 1/2 of a kiwi into small pieces and add it to the solution from step 1. Mash the kiwi against the side of the cup with the back of the spoon for 10 minutes. (The detergent dissolves the lipids that hold the cell membranes together, which releases the DNA into the solution. The detergent causes lipids and proteins to precipitate out of the solution, leaving the DNA. The salt enables the DNA strands to come together.)
2. While one member of your group mashes the kiwi, another member will place a #2 cone coffee filter inside the second 5 oz plastic cup. Fold the coffee filter's edge around the cup so that the filter does not touch the bottom of the cup.
3. Filter the mixture by pouring it into the filter and letting the solution drain for several minutes until there is approximately 5 ml (covers the bottom of the cup) of filtrate to test.
4. Obtain a test tube of cold alcohol. For best results, the alcohol should be as cold as possible.
5. Fill the plastic pipette with kiwi solution and add it to the alcohol. (DNA is not soluble in alcohol. When alcohol is added to the mixture, the components of the mixture, except for DNA, stay in solution while the DNA precipitates out into the alcohol layer.)

6. Let the solution sit for 2 to 3 minutes without disturbing it. It is important not to shake the test tube. You can watch the white DNA precipitate out into the alcohol layer. When good results are obtained, there will be enough DNA to spool on to a glass rod, or using a Pasteur pipette that has been heated at the tip to form a hook, you can retrieve some of the DNA. DNA has the appearance of white, stringy mucus.

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